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MONTANA DEPARTMENT OF FISH AND GAME
FISHERIES DIVISION

JOB PROGRESS REPORT

State of Montana
Project No. F-11-R-26 Name Northeast Montana Fisheries Study
Job No. I-a Title Inventory and Survey of Waters of
the Project Area
Period Covered April 1, 1978 through March 31, 1979

ABSTRACT

Beach seining was conducted at Nelson Reservoir to evaluate production of young-of-the-year and forage fishes. The catch for young-of-the-year walleye in 1978 was excellent and rated as the best on record. Good to excellent catches of yellow perch were also made. Larval netting was conducted to evaluate walleye and yellow perch reproduction, but very few walleye were taken and this sampling technique may have very limited application. Fresno Reservoir was sampled by beach seining. Reproduction of yellow perch and northern pike was excellent, but walleye appeared in only moderate numbers. Smallmouth bass introduced into Fresno Reservoir in 1976 were not taken by seining. Early spring trapping at Medicine Lake produced a fair catch of northern pike but no walleye. Beach seining at Medicine Lake again indicated no successful reproduction by northern pike; however, several young-of-the-year yellow perch were taken indicating this species may be increasing. Sampling with three 125-foot experimental gill nets set overnight at Box Elder Reservoir caught 1,120 yellow perch, 328 white suckers, and 4 rainbow trout and arrangements for rehabilitation were initiated. Gartside Reservoir, historically, has been plagued with an abundance of non-game species. The reservoir was drained and rehabed in 1977 and restocked with rainbow trout in 1978. Two 125-foot experimental gill nets fished overnight in the fall of 1978 caught 109 rainbows in good condition and no non-game fish. Larval fish sampling conducted on the Milk and Missouri Rivers revealed paddlefish reproduction in the lower Milk River. Sauger/walleye were taken in fair numbers in the Milk River. Benthos information is presented for 10 streams in the Circle West project area. Sampling results are presented for Coal Creek, Flat and Pedersen Lakes, and Killenbeck, VR 9, Whitetail, Latka, PR 161, Kuester, Berreth, Lee, Lorentzen, Marsh-Thompson, Christensen, Wards, Taylor, Langen, Dix, Waro, Mattingley, and Portra Reservoirs.

RECOMMENDATIONS

Recommendations for each phase of this job are made as the findings for individual waters are discussed.

OBJECTIVES

The purpose of this project is to determine the physical, chemical, and biological characteristics of the waters of immediate or potential importance to the recreational fishery of the project area, and to recommend measures for improving the fishery.

Job objectives were:

- (1) Determine year-class strength of walleye, yellow perch and forage fishes in Nelson Reservoir to determine the effect of water level fluctuations.
- (2) Determine abundance of adult and young-of-the-year walleye, northern pike, and forage fishes in Fresno Reservoir to evaluate severe draw-down; and determine success of recent smallmouth bass introductions.
- (3) Determine reproductive success of Medicine Lake sport fishes to evaluate effects of alkaline water, and attempt to artificially fertilize walleye and northern pike eggs to determine viability of sex products.
- (4) Determine sites and conditions utilized for spawning by walleye and sauger in the Missouri River from Fort Peck Reservoir to the Milk River.
- (5) Survey numerous small and intermediate size reservoirs (2-100 surface acres) to evaluate existing fish populations to determine need and suitability for stocking.
- (6) Determine fish populations in streams to ascertain game fish populations, success of introductions of brook trout and smallmouth bass, and importance as spawning and nursery areas to other species.

These objectives were attained, but some stream sampling to evaluate brook trout and smallmouth bass (Item 6 above) was not conducted.

FINDINGS

Nelson Reservoir

This reservoir covers approximately 4,000 surface acres. It is utilized for off-stream storage from the Milk River. A ditch which diverts water from the Milk River is the primary source of water. Water levels in the reservoir fluctuate several feet annually depending on Milk River flows and demands for irrigation water.

Nelson Reservoir contains an excellent self-sustaining fishery for walleye and yellow perch. Although the average size of walleye taken is approximately one pound, several trophy-sized walleye in the 10- to 14-pound class are taken each year. Yellow perch approaching one pound are common in the fishery. Northern pike have appeared in moderate numbers in recent years, entering via

the Milk River. Northern pike reproduction is almost nil in the reservoir and they are expected to decline.

In 1978, beach seining was conducted with a 100-foot x 9-foot x $\frac{1}{4}$ -inch square mesh seine. Two duplicate samples were attempted from two sites.

The catch for young-of-the-year walleye (Table 1) was excellent in 1978 and was rated as the best on record. Good to excellent catches of yellow perch young were also taken. In general the numbers of other species were low. Species diversity was low and several species normally taken by this type of sampling were not represented in 1978.

Larval sampling was initiated at Nelson Reservoir in 1978 in an effort to obtain better information on reproductive success of various species. Most seining data has been difficult to evaluate due to the high degree of catch variation encountered.

Table 1. A summary of shoreline seining results at Nelson Reservoir, 1978.

Species	Station I		Station II	
	Sample Trial & Date		Sample Trial & Date	
	1 (7-24)	2 (7-27) ^{1/}	1 (7-20)	2 (7-27)
Yellow perch (y-of-y)	5,827	---	741	1,460
Yellow perch (yrlg.)	1	---	---	---
Carp (y-of-y)	135	---	---	---
Crappie, sp.	---	---	---	1
Walleye (y-of-y)	194	222 ^{2/}	234	47
Buffalo, sp. (y-of-y)	---	---	---	1
Emerald shiner	80	---	21	180
White sucker (y-of-y)	917	---	53	360
Longnose sucker (y-of-y)	---	---	1	---

^{1/} Sample incomplete due to wind.

^{2/} Represents catch from approximately one-half of sample area.

Larval fish sampling methods consisted of towing paired $\frac{1}{2}$ -meter nets of #00 mesh near the water surface for 10 minutes. Water volumes sampled were determined by flow meters and/or current meters for particular stations. Repeat samples at a particular station were made by duplicating sampling time and boat speed, or by duplicating shoreline distance.

Sampling for larval fish was initiated on May 3 when surface water temperatures ranged from 50°F. to 53°F. No fish were taken until May 17 (Table 2). Ten stations were utilized for sampling, primarily to include a variety of areas. However, high winds on occasion did not permit sampling certain

Table 2. A summary of larval fish collected per 1000 m³ at Nelson Reservoir, 1978.

Station	Date	Temp. (°F.)	Species					
			YP ^{1/}	WE	Carp	GE	Cyp.	Cat.
Partridge N. Shore #1	5-03	50						
	5-10	53						
	5-17		782					
	5-26		243		193	4	136	41
Mid N. Shore #2	5-03							
	5-10							
Upper N. Shore #3	5-03	54						
	5-10	58	564					
	5-17	61	2,745					
	5-26		128		29		132	25
Mid-Reservoir	5-03							
Upper N. Shore #4	5-10		84					
Emil Bay N. Shore	5-10		16					
Emil Bay S. Shore	5-10		42					
State Park	5-17		572					
	5-26		95		918		4	16
Upper S. Shore	5-17		2,543	4				
	5-26		1,671	12	90		12	45
Islands	5-17	56	25					
	5-26		78	12	103		29	41

^{1/} Abbreviations: YP = Yellow Perch; WE = Walleye; Carp; GE = Goldeye;
Cyp. = Cyprinidae sp (other than carp); Cat. = Catostomidae sp.

stations as desired. Two stations, Partridge N. Shore #1 and St. Park, were utilized for larval sampling because they have been utilized to sample young-of-the-year by beach seining.

Yellow perch larvae were the predominant fish taken, appearing in more samples and in high numbers. Larval walleye were taken in small numbers and only appeared in three samples. Beach seining revealed an abundance of young-of-the-year walleye, but no larval walleye were taken at areas coinciding with seining sites.

Discussion and Recommendations: Reservoir levels were extremely low in the summer of 1977 and remained low in the spring of 1978. Only once (1961) during the past 28 years have reservoir levels approached the low levels of 1977. Spawning substrate for walleye appeared to be very restricted in 1978 due to low reservoir levels; however, excellent walleye reproduction occurred. Water levels raised relatively fast in the spring of 1978, but walleye spawning was believed to have been completed before gravel and rubble shorelines were flooded. Larval netting did not appear to be a useful technique for evaluating walleye reproduction. Larval walleye only appeared in late samples and continued sampling may have produced greater catches. However, when larval netting was concluded on May 26, Daphnia sp. were so abundant they rapidly filled the nets and made sampling difficult.

Beach seining should be continued to monitor walleye and yellow perch reproduction and assess forage fish abundance. Additional larval fish sampling should be attempted to better evaluate the technique as a useful tool on this body of water.

Fresno Reservoir

Fresno Reservoir is a highly fluctuating irrigation reservoir of 5,757 surface acres (spillway elevation) located on the Milk River approximately 12 miles northwest of Havre.

Beach seining was conducted at 12 stations in August, 1978 to evaluate reproductive success (Table 3). These sampling stations have been utilized since 1968 except in years when extreme draw-down occurred. In 1976, however, no sampling was conducted since favorable water levels occurred and no major changes from 1975 were anticipated.

The seine utilized was 100-foot x 9-foot with $\frac{1}{4}$ -inch square mesh. The catch for young-of-the-year yellow perch was the highest ever recorded. This catch may have been higher, since one seining station which usually produces a high catch was not utilized as in the past due to the presence of fishermen. The catch of young northern pike was excellent, and the catch of young walleye was rated as fair. Only three young crappie, sp. were taken and it appears that this species will remain low in abundance. Local fishermen report that during the years of initial filling, Fresno Reservoir was renown for excellent crappie fishing. Emerald shiners were taken in low numbers; however, young-of-the-year were observed in high numbers along the shoreline at many locations.

Table 3. A summary of forage fish and young-of-the-year game and sport fish taken with a 100-foot x 9-foot x 1/4-inch square mesh beach seine in Fresno Reservoir, 1965-1978.

Date (No. of Seine Hauls in Parenthesis)	Species and Number								
	Yellow Perch	Crappie sp.	Walleye	No. Pike	Emerald Shiner	White Sucker	Silvery Minnow	Lake Chub	Unident. Minnows
July 1965 (7)	--	2	--	8	--	--	--	--	--
August 1966 (6)	--	14	--	2	--	--	--	--	11
August 1967 (10)	--	19	24	5	15	--	--	--	276
August 1968 (12)	2,909	552	16	6	147	--	--	--	161
August 1969 (12)	1,140	67	4	6	385	2	--	--	380
August 1970 (12)	10,151	883	27	45	521	1	15	107	--
1971 ^{1/}									
August 1972 (12)	1,005	379	102	22	205	--	72	--	--
1973 ^{2/}									
August 1974 (12)	1,583	1,355	13	59	29	--	25	--	--
August 1975 (11)	4,154	59	10	32	155	--	--	--	--
1976 ^{3/}									
1977 ^{2/}									
August 1978 (12)	10,684	3	22	42	12	--	--	--	--

^{1/} Seining incomplete due to low reservoir levels as reported in F-11-R-19, Job I-a.

^{2/} No seining conducted due to low reservoir levels.

^{3/} No seining conducted due to favorable conditions and lack of change anticipated.

Other fishes taken during seining were 1 yearling northern pike, 30 yearling yellow perch, and 7 adult yellow perch.

Discussion and Recommendations: Fresno Reservoir experienced rapid filling in 1978 due to high spring run-off. Reservoir levels were generally above normal throughout the summer due to rainfall which reduced the demand for irrigation water. The overall reproductive success of key species was gratifying in view of extremely low reservoir levels in 1977 which rated among the lowest on record since fish population sampling has been initiated.

In the summer of 1976, 10,000 (2-inch) smallmouth bass were introduced into Fresno Reservoir. To date, no record has been received indicating survival of these bass.

Gill netting to sample adult fishes has not been conducted on a regular basis. However, evaluation of the yellow perch population should be made by this method. Occasional catches of perch have been reported by sport fishermen. Young-of-the-year abundance dating back to 1968 indicates a fishable population should have established.

Medicine Lake

Medicine Lake, located on the Medicine Lake National Wildlife Refuge, contains approximately 8,700 surface acres. The lake supports a dense population of carp, suckers, and fathead minnows. Northern pike, walleye, and yellow perch have been introduced to establish a sport fishery; however, populations have not developed due to a lack of natural reproduction by these species. Limited northern pike reproduction has been found, but not sufficient to maintain populations created by stocking.

Early spring trapping was conducted immediately following ice-out with 4-foot x 6-foot frame traps of 1-inch square mesh. This trapping was conducted jointly with Medicine Lake Refuge personnel. Traps were fished primarily in Medicine Lake proper at the rock crossing (Sayer Bay) and head of Tax Bay since these areas produced the best walleye catch in the past. The overall sampling effort with traps was low. Trapping produced fair to good catches of northern pike, however, no walleye were taken.

Beach seining was also conducted at six sites in late August to determine reproductive success for selected species. Approximately 1,500 feet of shoreline was sampled with a 100-foot x 9-foot seine with $\frac{1}{4}$ -inch square mesh. The catch consisted of 2 northern pike (young-of-the-year), 5 yellow perch (young-of-the-year), 871 fathead minnows, 3 lake chubs, 34 white suckers (young-of-the-year and yearling), and 8 carp (adult and yearling).

Discussion and Recommendations: Walleye fingerlings were introduced into Medicine Lake in 1973. Some adult walleye were taken by trapping in 1976 and 1977; however, none were taken in 1978. Mats of dead fish, mostly carp, were found on the shoreline in the spring of 1978 as a result of winterkill. It is believed that most of this winterkill occurred on satellite waters upstream from Medicine Lake and dead fish were washed into the lake during spring run-off. No dead walleye and only a couple of dead northern pike were observed.

Trap net catches of northern pike were fair in 1978; however, northern pike taken were generally smaller in size than those taken in recent years. Two adult yellow perch were taken by trapping and the presence of five young-of-the-year taken by seining indicates this species may be capable of increasing significantly. Although two northern pike (young-of-the-year) were taken by seining, it is doubtful that these were the result of natural reproduction since a portion of 230,000 fingerlings stocked in 1978 were released near the area where seining capture was made.

In 1978, stocking was also conducted on other refuge waters as follows: Gaffney Lake, 60,000 fingerling northern pike, 8,600 largemouth bass and 8,600 smallmouth bass; No. 12 Lake, 60,000 fingerling northern pike.

Future trapping and seining should be conducted and extended to other waters such as Gaffney and No. 12 lakes to determine survival, reproduction, and expansion of fish populations.

Box Elder Reservoir

This 90-surface acre reservoir has been stocked and managed for rainbow trout fishing during the past 15 years. In the past three years fishermen have reported catches of yellow perch on occasion. In early April, 1978 prior to total ice-out, three 125-foot experimental gill nets were set overnight to determine yellow perch abundance and stocking needs.

The catch consisted of 1,120 yellow perch, 328 white suckers, and 4 rainbow trout. Yellow perch taken were in the 5- to 8-inch size range and averaged 6.7 inches in total length. Most of the suckers exceeded one pound in weight. Rainbow trout taken varied from 10.6 to 14.3 inches and were in poor condition, lacking the robust appearance associated with rapid growth rates produced in this reservoir in the past.

Discussion and Recommendations: Chemical rehabilitation is recommended to remove suckers and perch. Rehab arrangements were begun in 1978; however, due to excessive toxicant costs this was not judged to be practical. The city of Plentywood was contacted to provide a partial draw-down to facilitate rehab success and reduce costs. Due to a pending law suit regarding water rights, the city refused to release water. Box Elder Reservoir has been vulnerable to occasional winterkill. Therefore, efforts are also underway with the city of Plentywood to obtain a fall draw-down in an effort to induce winterkill. Some fishermen are requesting a change to warm-water species such as northern pike or walleye. However, continued rainbow trout management is recommended since it will provide better catches for more fishermen. The size of this reservoir would not sustain suitable fishing for northern pike or walleye with existing fishing pressure.

Gartside Reservoir

This 35-surface acre reservoir near Sidney was constructed in the mid-1950's for fishing. Fishing is maintained by annual stocking of 7- to 9-inch

rainbow trout due to heavy fishing pressure. An abundance of rough fish which compete for food make fingerling trout stocking impractical due to poor growth. Rotenone application has been conducted twice to eradicate rough fish, but treatment was not successful due to springs within the reservoir and dense growths of aquatic vegetation.

In the fall of 1977 arrangements were made to drain the reservoir since rough fish had increased and no growth of catchable-sized trout was occurring. In fact, these stocked trout appeared to lose weight. Rotenone application was made to the small remaining pool and two small reservoirs in the immediate drainage. Restocking with 7,000 5-inch rainbows and 5,000 8-inch rainbows was conducted in June, 1978. An additional 3,008 9-inch rainbows were stocked in late September, 1978.

In early October, 1978 two 125-foot experimental gill nets were set overnight to determine the growth rate of stocked trout and presence of rough fish. The catch consisted of 109 rainbow trout and no rough fish were taken. It was not possible to identify all fish from a particular plant. Catchable-sized (9-inch) trout stocked in late September just prior to netting were difficult to separate from fish assumed to be of 5-inch origin stocked in June.

The overall size of fish taken ranged from 7.0 to 12.1 inches in total length. The largest group of fish were presumedly from the 8-inch June stocking and were generally 10 to 12 inches in length and weighed approximately 0.50 pound. Five-inch fish stocked in June were generally in the 8- to 10-inch size and weighed approximately 0.25 pound.

Discussion and Recommendations: Growth rates experienced in the first year of restocking were suitable. Elimination of rough fish should contribute to additional growth of existing trout. This should reduce or eliminate the need for stocking expensive catchable-sized trout. Rough fish inhabit slough-type pools below the dam and late winter draw-down will be utilized in an effort to prevent spillway overflow which might allow access of rough fish during spring run-off.

Flat Lake

Flat Lake is a 10-surface acre reservoir that was constructed in 1973 by impounding a small bay of Fort Peck Reservoir. Following construction, rotenone was utilized in 1973 to eradicate the existing fish population in order to develop trout management. Post treatment netting revealed that rehab was successful; however, by 1977 many catches of yellow perch were reported by fishermen.

In the spring of 1978, immediately following ice-out, two 4-foot x 6-foot frame traps with $\frac{1}{2}$ -inch square mesh were fished a total of 16 trap-days to sample the fish population and remove unwanted species. The catch consisted of 10,670 yellow perch, 28 rainbow trout, 8 black crappie, 1 burbot, 14 white suckers, and 1 carp.

Discussion and Recommendations: Rainbow trout taken appeared to be slow-growing and in generally poor condition. Therefore, fingerling-sized (2 to 4 inches) trout normally stocked annually were not utilized and catchable-sized trout were stocked. Yellow perch taken were mostly in the 4- to 6-inch size range. Perch removal was approximately 1,000 fish per acre; however, trout stocked following perch removal showed no obvious increased growth rate. The first 10 trap-days produced 93 percent of the perch catch. Seining conducted later in the season revealed an abundance of young-of-the-year perch. Similar trapping is recommended in 1979 to better evaluate yellow perch removal.

Killenbeck Reservoir

Due to potential winterkill problems in this reservoir and the presence of dead crappie during ice-out, sampling was conducted to determine the fish population and restocking needs. One 125-foot experimental gill net set for 2½ hours during mid-day caught 21 northern pike. In August seining revealed fair to good numbers of young-of-the-year crappie and northern pike.

Discussion and Recommendations: Key species in the reservoir were found in suitable numbers and no special management is recommended. Most northern pike taken were in the 1- to 2-pound class and it appears that forage abundance for northerns may be lacking. Seining in 1972 and 1973 revealed an abundance of fathead minnows and brook sticklebacks, but none were found in 1978.

VR 9 Reservoir

This reservoir is located near Glasgow Air Force Base and has been managed for rainbow trout fishing. Stocking of fingerling (2- to 4-inch) trout at approximately 500 per surface is conducted annually. Due to heavy fishing pressure, a small number of 7- to 9-inch trout are also stocked in the spring.

Due to reports of yellow perch catches, a 4-foot x 6-foot trap with ½-inch square mesh was fished for three days immediately after ice-out. The catch consisted of 67 yellow perch and 12 rainbow trout. All but three of the perch taken were sexually mature adults and had an average total length of 8.9 inches (range 7.5 to 12.4 inches) and an average weight of 0.43 pounds (0.24 to 1.23 pounds). The sex ratio consisted of 55 percent females and 45 males. Rainbow trout taken ranged in general from 10 to 14 inches total length.

Discussion and Recommendations: This reservoir has provided good to excellent trout fishing; however, yellow perch will undoubtedly increase rapidly and create poor trout growth. Perch are new to the reservoir and impacts on trout growth cannot be determined without additional sampling. If the size of perch present can be maintained, the reservoir will provide an attractive fishery. Reductions in trout stocking appear warranted. The loss of trout fishing in VR 9 can be partially offset by intensified trout stocking in the Glasgow Air Force Base Pond immediately upstream.

Whitetail Reservoir

This reservoir has been managed for rainbow trout since 1962. However, due to chronic low winter dissolved oxygen problems and occasional summer-kill, northern pike and yellow perch stocking was initiated in 1975.

In August, 1978 sampling was conducted with a 100-foot x 9-foot beach seine with $\frac{1}{4}$ -inch square mesh to evaluate reproductive success of those introductions. Two shoreline sites were sampled. Three young-of-the-year northern pike were taken ranging from 9.0 to 9.4 inches, and thousands of young-of-the-year yellow perch escaped through the seine mesh and could not be counted.

Discussion and Recommendations: Successful reproduction of these species should maintain a good fishery and no supplemental stocking is required.

Pedersen Lake

This natural lake contains approximately 100 surface acres and is located in the "prairie pothole" area in the extreme northeast part of the Region. Most lakes of this type in the general vicinity are not suitable for fish. Water quality analysis and winter dissolved oxygen tests indicated this lake would support fish.

In 1975 northern pike were introduced, followed by yellow perch in 1976. Limited beach seining and gill netting were conducted in August, 1978 to determine survival and reproduction of stocked fish. One young-of-the-year northern pike and 23 young-of-the-year yellow perch were taken by seining 225 feet of shoreline. Gill netting revealed a moderate population of fishable-sized northern pike up to 5.0 pounds.

Discussion and Recommendations: Although numbers of young fish taken was low, the overall results were encouraging. Establishment of this fish population is still in the development stages and sufficient improvement to provide a good sport fishery is anticipated.

Milk-Missouri Rivers

Larval fish sampling was conducted in the Milk and Missouri Rivers to determine reproduction (Table 4). Sampling was conducted with #00 mesh nets suspended from bridges or paired nets towed by boat. Sampling time varied from 10 to 15 minutes.

The outstanding feature of this sampling was the catch of larval paddlefish at the mouth of the Milk River. One objective of this work was to compare larval fish abundance in the Milk and Missouri Rivers. The Missouri River, just above the mouth of the Milk River, was sampled on three occasions. However, no larval fish were taken in the Missouri River samples. Surface water temperatures in the Missouri River recorded on sampling days varied from 50°F. to 53°F., whereas, temperatures in the Milk River on corresponding dates varied from 64°F. to 76°F.

Table 4. A summary of larval fish taken per 1000 m³ in the Milk River, 1978. Stations are listed in sequence from lower to upper reaches of the drainage.

Station	Date	Temp. (°F.)	Species							
			<u>Perca flavescens</u>	<u>Stizostedion sp.</u>	<u>Polyodon spathula</u>	<u>Hiodon allosoides</u>	<u>Etheostoma exile</u>	<u>Pimephales promelas</u>	<u>Catostomidae sp.</u>	<u>Cyprinidae sp.</u>
Mouth #1	5-08	56								
	5-23	64			3				47	16
	5-23	64			11				38	6
	6-05	68				3				236
	6-29	76				30		6	157	522
	6-29	76							98	279
Mouth #2	6-05	68				6				209
G. Narrows #1	6-05	68				6				253
G. Narrows #2	6-05	68				19				632
Pel. Rapids #1	6-05	68								134
Pel. Rapids #2	5-11	54								
	5-11	54								
	5-16	60		9					55	
	5-16	60		12					74	
Laumeyer	5-11	54								
	5-11	54								
Nashua Br.	5-17	60		9					53	
	5-17	60		13			4		84	
	5-17	60								
Hwy. 24 Glasgow	5-17	60							89	8
	5-17	60							157	
	5-17	60					7		50	
Hwy. 246 Glasgow	5-17	60	5	5					71	
Hwy. 2 Hinsdale	5-19	58		17						

Discussion and Recommendations: Additional sampling is recommended to determine abundance and distribution of larval fishes in the Milk with particular emphasis on paddlefish and sauger/walleye. Run-off was well above normal in 1978 which may have created suitable paddlefish spawning conditions that otherwise occur on rare occasions. Sampling methodologies should be evaluated since considerable variation was found between samples at a given station.

Miscellaneous Investigations

Coal Creek: Seining was conducted at four sites north of Peerless in 1978 to determine survival of 6,000 2-inch smallmouth bass introduced in 1977. The catch consisted of 3 northern pike young-of-the-year, moderate numbers of white suckers, and an abundance of unidentified minnows. High water in 1978 apparently contributed to northern pike migration and spawning which is not believed to occur annually in the upper stream reaches sampled. Smallmouth bass may have been a victim of winterkill; however, sampling efforts were minimal and not conclusive.

Latka Reservoir: One 125-foot experimental gill net was set overnight in October, 1978 to evaluate survival of largemouth bass and yellow perch introductions. No fish were collected by this net, apparently due to winterkill.

PR 161 Reservoir: This 75-surface acre reservoir located south of Malta has provided good fishing for northern pike in recent years. In April, 1978 sampling was conducted with two 125-foot experimental gill nets fished during mid-day. No fish were taken, apparently due to winterkill in 1977-78.

Kuester Reservoir: This reservoir contains 80 surface acres and was built in 1959. Annual trout stocking was initiated in 1960 and outstanding fishing existed for several years. However, due to unknown and unauthorized introductions, green sunfish became established and soon over-populated the reservoir resulting in poor growth of trout. Partial draw-down was attempted to facilitate rotenone application. However, the drain mechanism was not functional and stocking of northern pike began in 1969. Initially northerns grew rapidly and produced excellent fishing. Within a few years northern pike reduced the green sunfish population and yellow perch introductions began in 1975 to maintain a forage supply. One haul with a 100-foot seine in 1978 produced a catch of 27 yellow perch and one northern pike. It appears yellow perch will become established and additional stocking is not recommended.

Berreth Reservoir: Spring sampling was conducted with two 4-foot x 6-foot frame traps following complaints indicating an abundance of small, slow-growing northern pike. Sixteen northern pike were handled ranging in size from 12.9 to 15.2 inches; however, catch rates were low. The owner later reported observing hundreds of small northerns being washed over the spillway during early spring run-off. In April, 700 7-inch yellow perch were stocked to develop a forage supply. Over-population of northern pike occurs as a result of natural reproduction. Some spring trapping may be useful to remove small northerns and assist establishment of yellow perch.

Lee Reservoir: This fluctuating irrigation reservoir contains black bullheads and white suckers. Northern pike were stocked in 1968 and 1972 to develop a self-sustaining fishery. One frame trap was utilized in the spring of 1978 to determine northern pike survival and abundance. Beaver damage to the trap permitted fish to escape easily, but one adult northern and three bullheads were captured.

Lorentzen Reservoir: Seining was conducted in this small reservoir south of Saco to determine survival of black crappie stocked in 1975. No fish were taken, apparently due to winterkill, and no further stocking is recommended.

Marsh-Thompson Reservoir: Initial fish stocking in this reservoir consisted of yellow perch and black crappie in 1967, and largemouth bass in 1968. A reasonably good balance evolved and all species have provided good fishing and satisfactory growth. Following reports of dead fish in the spring of 1978, apparently due to winterkill, one 4-foot x 6-foot frame trap with $\frac{1}{2}$ -inch square mesh was fished overnight and limited shoreline seining was conducted. Moderate numbers of yellow perch were taken, but no bass or crappie. No dead perch were observed on the shoreline; however, crappies 8 to 10 inches in length and one bass estimated at 4 pounds were observed. A small number of 2-inch black crappie were restocked in the fall of 1978 and largemouth bass stocking will be scheduled for 1979.

Christensen (Tom) Reservoir: Management with rainbow trout was conducted for several years, but discontinued due to chronic winterkill. In 1977, 1,500 1-inch black bullheads were stocked to develop fishing in an area of limited opportunities. One 125-foot experimental gill net set overnight in 1978 caught no fish and 700 additional 1-inch bullheads were stocked. If these fish do not survive, no further stocking is justified.

Wards Reservoir (VR 82): Largemouth bass and rainbow trout stocking in this fertile, shallow 15-surface acre reservoir was discontinued due to winterkill. Small numbers of northern pike have since been stocked, black bullheads were introduced in 1974. Gill netting in 1976 revealed moderate numbers of northern and bullheads (average length 13.1 inches and average weight 1.63 pounds). Following reports of dead fish in the spring of 1978, two 125-foot experimental gill nets were set overnight to determine the status of the fish population. The catch consisted of only one 9-inch bullhead and 2,500 1-inch bullheads were stocked. Additional northern pike stocking is not recommended.

Taylor (Leo) Reservoir: This shallow, turbid reservoir has contained an abundance of largemouth bass and bluegill for many years. Seining conducted in 1978 indicated all fish had been eliminated by winterkill. No further management or restocking is recommended.

Langen Reservoir (VR 61): This reservoir has supported a self-sustaining largemouth bass population for over 20 years. Beach seining conducted in 1978 caught only two 5- to 7-9 inch bass. Numerous carcasses were observed on the shoreline, apparently due to winterkill. This reservoir is located in a remote area and receives little fishing use. Natural reproduction is expected to restore the fishery.

Dix Reservoir (VR 147): Attempts to develop largemouth bass fishing have been underway in recent years. Beach seining and dead fish observed in 1978 indicated a winterkill of 90-95 percent had occurred. Largemouth bass were restocked and channel catfish were introduced in 1978 to develop a fishery.

Waro Reservoir: Largemouth bass and crappie sp. were stocked in 1969, and black bullheads in 1975. Limited gill netting in 1978 indicated none of these species have survived. This reservoir appears to be suitable for fish and additional efforts to develop fishing are recommended.

Mattingley Reservoir: Rainbow trout and largemouth bass were introduced in 1975. Fishermen have reported catches of 2- to 4-pound rainbows, but no bass. Approximately 200 feet of shoreline was seined in 1978 with a 100-foot x 9-foot seine of $\frac{1}{4}$ -inch square mesh. The catch consisted of 10,000+ fatheads, and one 10- to 12-inch bass escaped over the seine. Sampling was limited due to an abundance of aquatic vegetation. This reservoir appears to be of sufficient quality and additional stocking is recommended.

Portra Reservoir: Northern pike fingerlings (3,000 2-inch) were introduced in 1977. Excellent catches by fishermen were reported in 1978. Beach seining conducted in 1978 to evaluate forage revealed an abundant population of fathead minnows.

Circle West Tributary Study: Benthos sampling was conducted in the spring of 1977 on 10 streams in the vicinity of the Circle West development site as one segment of "base line" studies. The proposed Circle West project consists of manufacture of ammonia, methanol-methyl fuel, and synthetic diesel fuel oil. Projected water requirements for plant operation are 67,000 acre-feet annually.

Sampling in pools was conducted with a 6-inch x 6-inch Ekman dredge and a "Waters Round" sampler was used for obtaining riffle samples. Sample dates ranged from March 15 to April 1, and temperatures varied from 32° to 42°F. A summary of benthos organisms taken is presented in Table 5.

POND SURVEYS

A total of 35 reservoirs were surveyed to determine their suitability for fish. Eighteen of these checked support fish or have been stocked in the past. The remaining seventeen reservoirs surveyed involved requests for initial stocking; however, only four of seventeen were judged to be suitable for fish. Winter dissolved oxygen tests were conducted on 23 reservoirs to evaluate winterkill problems. Dissolved oxygen concentrations were extremely low in the winter of 1978-79 and extensive winterkill is anticipated.

Data collected on all waters was transferred to the Region file for permanent reference. An abbreviated list of background data is maintained on waters of questionable value for long term management. When it becomes apparent that a given water has sufficient value, a permanent file is developed. It is recommended that survey work and data recording procedures on waters of this type be continued.

Table 5. Number of macroinvertebrates collected in 5-square foot bottom samples for streams in the Circle West study area, 1977.

Streams Sampled			DIPTERA							COLEOPTERA					ANNELIDA					
			Chironomidae	Ceratopogonidae	Tipulidae	Tabanidae	Culicidae ^{1.}	Psychodidae	Simuliidae	Other	Elmidae	Dytiscidae	NEUROPTERA ^{2.}	EPHEMEROPTERA	TRICHOPTERA	ODONATA	HEMIPTERA	Oligochaeta	Hirudinea	AMPHIPODA
Big Dry Cr.		Pool	5										1	1			2			
		Riffle	24						1											
Little Dry Cr.		Pool	51	4						1			1	1	1		1			
		Riffle	54		1	1				16		3	36	670		2	28		5	
Timber Cr.	Sta. #1	Pool	11		1										1					
		Riffle	11		1	1											1		1	
	Sta. #2	Pool	6				216			10	1		82	6	6	10	43	1	1	
		Riffle	1														1			
Nelson Cr.	Sta. #1	Pool				7										1				
	Sta. #2	Pool				2									3					
	Sta. #3	Pool	1																	
	Sta. #4	Pool	613			5									7	95				
	Sta. #5	Pool																		
Stoney Butte Cr.		Pool	209			5	2			2					1		1			
Horse Cr.		Pool	148	7		20				1			1		11	2	16		3	
		Riffle	1										1				1			
McGuire Cr.		Pool	1										1				4			
Prairie Elk Cr.	Sta. #1	Pool	109			1	1	1		3			88	7	4		6		22	
		Riffle	20			1				1			1							
	Sta. #2	Pool	1											4					2	
		Riffle	1							1				1						
Sand Cr.	Sta. #1	Pool															1			
		Riffle																		
	Sta. #2	Pool													2					
		Riffle																		
Redwater River	Sta. #1	Pool + Riffle ^{3.}	242		1	2			16			4	1	21			17		1	2
		Pool	5							1			9	2	1		11		2	
	Sta. #2	Riffle	47					16						68			5			
		Pool										1								
	Sta. #3	Riffle	14																	

1. Consisted entirely of Chaoborinae.

2. Consist entirely of Sialidae.

3. Pool + Riffle samples combined representing a 10-square foot sample.

Waters Referred to:

15-6480-05	Nelson Reservoir	16-6775-08	Marsh-Thompson Reservoir
15-5240-05	Fresno Reservoir	16-4675-30	Christensen Reservoir
16-6975-08	Medicine Lake	15-8240-07	Wards Reservoir (VR 82)
16-4495-05	Box Elder Reservoir	16-8476-08	Taylor Reservoir
21-3250-07	Gartside Reservoir	15-6025-08	Langen Reservoir
16-5110-07	Flat Lake	15-9610-08	Dix Reservoir (VR 147)
16-6200-08	Killenbeck Reservoir	16-7962-30	Waro Reservoir
15-6920-20	VR 9 Reservoir	16-6841-07	Mattingley Reservoir
16-8860-08	Whitetail Reservoir	16-7690-08	Portra Reservoir
16-7540-08	Pedersen Lake	16-0245-10	Big Dry Creek
15-2680-02	Milk River Sec. 1	16-1990-02	Little Dry Creek
16-2440-01	Missouri River Sec. 2	16-3790-02	Timber Creek
16-0850-02	Coal Creek	16-2650-02	Nelson Creek
16-6520-08	Latka Reservoir	16-3715-01	Stoney Butte Creek
15-8760-20	PR 161 Reservoir	16-1765-02	Horse Creek
16-6420-07	Kuester Reservoir	16-2270-02	McGuire Creek
16-4435-08	Berreth Reservoir	16-2880-02	Prairie Elk Creek
16-6530-30	Lee Reservoir	16-3230-02	Sand Creek
15-6615-30	Lorentzen Reservoir	16-2940-02	Redwater River

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