MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS
FISHERIES DIVISION
JOB PROGRESS REPORT

STATE: Montana PROJECT NO. F-78-R-5
PROJECT TITLE: Statewide Fisheries Investigations
JOB TITLE: Northcentral Montana Coldwater Lake Ecosystems



1998 ANNUAL REPORT

## ABSTRACT

A total of nine waters in the Choteau area, two in the Great Falls area and 16 in the Lewistown area were inventoried during the report period. Poor survival of the Arlee and DeSmet strains of rainbow trout and fair survival of wild rainbow trout were observed in gill net catches in Smith River Reservoir. In Newlan Creek Reservoir, survival of Yellowstone cutthroat was rated as good and was higher than catches in 1998, while Eagle Lake rainbow trout survival was rated as good and the catch of wild rainbow trout was rated as poor. In Ackley Lake, survival of 1996 Eagle Lake plants was rated as fair, survival of 1997 Eagle Lake plants and Arlee plants from 1996 and 1997 were rated as poor, and survival of 1998 Eagle Lake plants was good. Ackley Lake rainbow trout gill net catch overall was good. Bair Reservoir rainbow continue to exhibit slow growth and gill net catch was the same as found in 1997. In Martinsdale Reservoir, gill net catch of all fish species was similar to 1997, with the exception of white suckers which were captured at the highest rate since 1987. All Yellowstone cutthroat trout captured were from 6 inch plants, not 3 inch plants. In Yellow Water Reservoir, white sucker numbers increased dramatically from 1997 and rainbow catch decreased from 1997. Two illegal introductions were found which included pumpkinseed Yellow Water Reservoir and yellow perch in Upper Carter Pond. The 1996 drawdown of Big Casino Reservoir appears to have only temporarily reduced the white sucker population. Walleye continue to be stocked into Big Casino Reservoir. Thallium levels were sampled in trout at the Boy Scout Pond near Kendall Mine.

## OBJECTIVES

1. To identify and monitor the characteristics and trends of fish populations, angler harvest and preferences, and habitat conditions in Northcentral Montana coldwater lake/reservoir/pond ecosystems.

2. Use survey and inventory information to identify management problems and opportunities, then develop and implement management actions to maintain fish populations at levels consistent with habitat conditions or other limiting factors.

3. Review projects proposed by state, federal and local agencies and private parties which have the potential to affect fisheries resources and aquatic habitats. Provide technical advice or decisions to reduce or mitigate resource damage.

4. Provide landowners and other private parties with technical advice and information to sustain and enhance fisheries resources and aquatic habitat.

5. Enhance public understanding and awareness of fishery and aquatic habitat resources and issues in Northcentral Montana through oral and written communication.

6. Maintain and enhance public access to fishery resources in Northcentral Montana.

## PROCEDURES

Fish populations were sampled using standard 125 x 6 ft experimental multifilament nylon gill nets with 25 ft sections of 0.75, 1.0, 1.25, 1.5 and 2.0 inch square mesh; 3 x 4 ft frame trap nets (0.25 inch square mesh); and 4 x 6 ft frame trap nets (1.00 inch square mesh). Gill nets were fished either sinking or floating. Fish were measured to the nearest tenth of an inch and weighed to the nearest hundredth of a pound. Rainbow trout strains were marked with fin clips or tetracycline. Gill net survival ratings were grouped under the following categories: good > 8.0 fish per net, fair = 4.0 - 7.9 fish per net and poor = 0.0 - 3.9 fish per net. Year classes of trout were based on size structure. Zooplankton were sampled with a 30 centimeter diameter with 150 micron mesh. The Wisconsin net was towed vertically at three stations in each lake. The samples from the deepest two stations were combined and three 1 ml subsamples were used to identify and enumerate the zooplankton.

## RESULTS

### *Choteau Management Area*

Trout populations in five coldwater lakes and reservoirs were inventoried with overnight gill nets in late September and early October. These waters included Bean Lake, Eureka Reservoir, Nilan Reservoir, Piskun Reservoir and Willow Creek Reservoir. Inventory results are summarized in Table 1. A number of smaller water bodies were sampled with trap nets, gill nets or with hook and line. Yellowstone cutthroat trout populations appear healthy in Sock Lake. Grayling stocked in Lake Levale have had good survival and may have naturally reproduced as small fish were observed. Approximately 750 white suckers were trapped and removed from Swazee Lake (on the Sun River Game Range) to improve water clarity and trout growth. Approximately 400 grayling were transferred from the Sunny Slope Canal to Tunnel Lake. All raw data is on file in the Choteau Field Office.

*Great Falls Management Area*

Smith River Reservoir - Fall gill netting work in 1998 found poor survival among the Arlee and DeSmet strains of rainbow trout while wild rainbow trout produced fair catches (Table 2). The Arlee and DeSmet strains of rainbow trout captured represented two years of plants, 1998 and 1997. The mean length of the DeSmet strain from 1997 plants was 0.7 inches longer than the Arlee while the weights were identical (Table 2). Conversely, for the 1998 plants, the Arlee strain was 2.5 inches longer and 0.35 pounds heavier (Table 2). We could not determine the origin of 1 rainbow trout captured. The 1997 DeSmet plant exhibited lower condition factors than the other rainbow trout.

We examined 18 of the 21 rainbow trout stomachs; Six were empty, 1 contained vegetation, and 11 contained one or more of the following: zooplankton, ants, coleoptera,and diptera.

We also captured several other species of interest during the annual gill netting at Smith River Reservoir. They included mountain whitefish, longnose sucker, white sucker, and ling, which averaged 5.0, 18.5, 29.5, and 2.5 per net, respectively.

Newlan Creek Reservoir - During netting activities in 1998, we averaged 10 Yellowstone cutthroat trout in each net set (Table 2), which would be rated as good survival. This is higher than catches in 1997 (Tews et al. 1998). The Yellowstone cutthroat trout captured were from the 1998 and 1997 plants. The 1997 plants averaged only 11.5 inches in length and 0.45 pounds, while the 1998 plant averaged 9.3 inches in length and 0.24 pounds. The rainbow trout catch included three years (1996-1998) of the Eagle Lake strain plants as well as wild fish. All Eagle Lake rainbow trout combined produced a catch of 27.3 fish per net which indicates good survival. The catch of wild rainbow trout was poor. We could not determine the origin of 7 rainbow trout captured. As in previous years, the rainbow trout caught had a relatively short mean length. We also captured ling, which averaged 0.67 fish per net and longnose suckers, which averaged 31.7 fish per net.

*Lewistown Management Area*

Ackley Lake - Rainbow trout gill net catch increased from 17.5 per net in 1997 to 34.8 per net in 1998 (Table 3, Figure 1). This was the highest rainbow catch since 1990 (Tews et al. 1998). Six large (greater than 17 inches) unmarked rainbow trout were captured. In recent years only one large unmarked trout has been captured (Tews et al. 1998, Tews et al. 1997). Based on the marking scheme used in Ackley Lake, these rainbow trout are assumed to be Arlee. However, they may be wild fish, which entered Ackley Lake via the diversion canal. White sucker numbers decreased from 1997, while longnose suckers increased (Table 3, Tews et al. 1998). Mountain whitefish and brown trout were also captured. Copepods and *Daphnia* (Appendix 1) dominate the zooplankton community.

Table 1. Overnight gill netting results in coldwater lakes and reservoirs in the Choteau area of Region 4, 1998.

| Water (date) | Surface acres | No. of nets1/ | Mean hours fished/net | Species2/ | No. of fish | Length range(mean) | Weight range(mean) |
|---|---|---|---|---|---|---|---|
| Bean Lake | 200 | 1 S | 20.0 | Rb | 21 | 7.3-11.4( 8.5) | 0.16-0.66( 0.27) |
| (9/30/98) | | | | | 6 | 15.0-15.9(15.5) | 1.50-1.70( 1.63) |
| Eureka Res. | 50 | 2 F | 18.0 | Rb | 42 | 6.6-12.5( 9.5) | 0.12-0.69( 0.36) |
| (10/1/98) | | | | | 21 | 13.8-18.6(15.6) | 1.02-2.08( 1.41) |
| | | | | LL | 5 | 17.1-23.2(19.5) | 1.66-4.74( 2.89) |
| | | | | WSu | 82 | 6.7-11.4( 8.3) | 0.12-0.61( 0.24) |
| | | | | | 1 | (13.9) | ( 1.22) |
| | | | | | 1 | (18.8) | ( 2.96) |
| Nilan Res. | 400 | 2 F | 19.0 | Rb | 21 | 7.4-12.4( 9.9) | 0.16-0.73( 0.42) |
| (9/30/98) | | | | | 12 | 14.2-16.3(15.3) | 1.06-1.56( 1.32) |
| | | | | WSu | 1 | ( 8.9) | ( 0.30) |
| Pishkun Res. | 1300 | 3 F | 18.3 | Rb | 1 | (22.9) | ( 4.91) |
| (9/18/98) | | 3 S | | KOK | 1 | ( 7.7) | ( 0.14) |
| | | | | | 3 | 15.2-16.2(15.5) | 1.24-1.40( 1.31) |
| | | | | NP | 3 | 14.2-14.9(14.6) | 0.62-0.74( 0.68) |
| | | | | | 3 | 16.6-18.6(17.3) | 1.04-1.33( 1.15) |
| | | | | | 5 | 20.3-25.3(22.2) | 1.89-4.05( 2.64) |
| | | | | YP | 56 | 5.0- 8.9( 6.7) | 0.06-0.36( 0.17) |
| | | | | | 29 | 9.0-11.0( 9.9) | 0.36-0.79( 0.53) |
| | | | | WSu | 1 | ( 8.4) | ( 0.23) |
| Willow Ck Res. | 1350 | 2 F | 19.3 | Rb | 4 | 7.1- 8.8( 8.0) | 0.11-0.25( 0.18) |
| (9/29/98) | | 1 S | | | 7 | 14.0-17.4(15.4) | 1.16-1.92( 1.50) |
| | | | | WSu | 10 | 6.5-12.8(10.1) | 0.12-0.85( 0.51) |
| | | | | | 37 | 13.2-17.5(15.2) | 0.89-2.27( 1.61) |

1/ Standard 125 foot experimental nylon gill nets: F = floating; S = sinking.
2/ Species abbreviations: Rb = rainbow trout; LL = brown trout; KOK = kokanee salmon; YP = yellow perch; NP = northern pike; WSu = white sucker.

Table 2. Overnight gill netting results in coldwater reservoirs near White Sulphur Springs in the Great Falls Management area of Region Four during 1998.

| Water name (Date surveyed) | Surface Acres | No. of nets[1] | Mean hours fished per net | Species, strain[2] & year planted | No. of fish | Length (in) Mean S.D. | Length (in) Range | Weight (pounds) Mean S.D. | Weight (pounds) Range | Condition Factor Mean | Condition Factor Range |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Smith River Res (09/14/98) | 327 | 1F,1S | 28.0 | Rb-A-1998 | 2 | 12.3± 0.2 | 12.2-12.5 | 0.69± 0.01 | 0.69-0.70 | 36.9 | 35.3-38.5 |
| | | | | Rb-A-1997 | 3 | 14.4± 2.0 | 12.1-15.6 | 1.06± 0.29 | 0.72-1.23 | 35.4 | 32.4-40.6 |
| | | | | Rb-D-1998 | 4 | 9.8± 0.4 | 9.3-10.3 | 0.34± 0.04 | 0.28-0.37 | 35.7 | 33.9-37.3 |
| | | | | Rb-D-1997 | 3 | 15.1± 1.4 | 13.6-16.2 | 1.06± 0.32 | 0.70-1.31 | 29.7 | 27.8-30.8 |
| | | | | Rb-Wild | 8 | 13.2± 2.3 | 9.1-15.9 | 0.84± 0.34 | 0.25-1.28 | 34.4 | 29.8-38.7 |
| | | | | Rb-Unknown | 1 | 15.9 | - | 1.15 | - | 28.6 | - |
| | | | | MW | 10 | 12.7± 2.4 | 9.1-15.2 | 0.91± 0.45 | 0.26-1.37 | 39.4 | 33.8-46.1 |
| | | | | LnSu | 37 | 13.5± 4.5 | 6.0-18.6 | 1.7±0 .80 | 0.08-2.40 | 36.3 | 30.4-42.3 |
| | | | | Wsu | 59 | 12.7± 4.3 | 5.6-18.5 | 1.12± 0.75 | 0.07-2.40 | 41.4 | 34.1-51.0 |
| | | | | Ling | 5 | 10.6± 1.8 | 8.4-12.2 | 0.24± 0.10 | 0.13-0.36 | 18.9 | 16.9-21.9 |
| Newlan Creek Res (09/14/98) | 280 | 2F,1S | 20.3 | YCt-1998 | 23 | 9.3± 0.8 | 6.8-10.5 | 0.24± 0.05 | 0.11-0.34 | 30.0 | 26.8-35.0 |
| | | | | YCt-1997 | 7 | 11.5± 0.7 | 10.7-12.5 | 0.45± 0.08 | 0.34-0.58 | 29.7 | 24.9-32.0 |
| | | | | Rb-I-1998 | 60 | 7.1± 0.4 | 6.0-7.8 | 0.12± 0.02 | 0.08-0.17 | 33.2 | 25.4-60.2 |
| | | | | Rb-I-1997 | 18 | 10.9± 0.9 | 8.9-11.8 | 0.43± 0.08 | 0.25-0.54 | 32.5 | 28.7-38.0 |
| | | | | Rb-I-1996 | 4 | 12.8± 0.2 | 12.6-13.0 | 0.60± 0.01 | 0.59-0.61 | 28.8 | 27.8-29.5 |
| | | | | Rb-Wild | 4 | 11.2± 1.6 | 8.9-12.3 | 0.48± 0.15 | 0.27-0.62 | 33.2 | 29.3-38.3 |
| | | | | Rb-Unknown | 7 | 9.3± 2.2 | 6.6-11.9 | 0.33± 0.19 | 0.10-0.53 | 31.2 | 27.9-34.4 |
| | | | | LnSu | 95 | 12.7± 1.9 | 6.0-16.0 | 0.69± 0.22 | 0.15-1.30 | 33.4 | 26.0-69.4 |
| | | | | Ling | 2 | 13.1± 4.5 | 9.9-16.2 | 0.52± 0.46 | 0.19-0.84 | 19.7 | 19.6-19.8 |

1-Standard experimental gill nets (nylon and monofilament); F=Floating; S=Sinking
2-Species abbreviations: Rb=Rainbow trout; YCt=Yellowstone cutthroat trout; EB=Brook trout; MW=Mountain Whitefish; WSu=White sucker; LnSu=Longnose sucker; Strain abbreviations: A=Arlee; D=DeSmet; I=Eagle Lake

Table 3. Overnight gill netting results in large lakes and reservoirs in Lewistown area of northcentral Montana during 1998.

| Water name (Date surveyed) | Surface acres | # of nets 1/ | Mean hours fished/net | Species strain & year planted 2/ | Total # of fish | Length (in) Range (Mean) | Weight (lbs.) Range (Mean) | Relative Weight Range (Mean) 4/ |
|---|---|---|---|---|---|---|---|---|
| Ackley Lake | 240 | 2 F, 2 S | 25.9 | RB-I-98 | 55 | 5.6-9.7 (8.2) | 0.08-0.37 (0.20) | 49.0-129.7 |
| (9/24/98) | | | | RB-A-98 | 42 | 6.2-10.1 (8.8) | 0.08-0.56 (0.29) | 53.9-150.9 (91.4) |
| | | | | RB-I-97 | 14 | 13.8-15.7 (15.0) | 1.15-1.46 (1.31) | 82.2-101.5 (91.0) |
| | | | | RB-A-97 | 1 | 14.6 | 1.25 | 93.2 |
| | | | | RB-I-96+ | 21 | 15.6-20.2 (18.1) | 1.35-2.82 (2.24) | 73.39-106.9 (87.24) |
| | | | | RB-A-96 | 6 | 17.5-19.0 (18.4) | 2.07-2.52 (2.34) | 82.0-97.6 (88.2) |
| | | | | MWF | 4 | 15.7-18.7 (16.6) | 1.83-2.94 (2.15) | 121.6-128.7 (125.6) |
| | | | | LL | 2 | 14.9-18.5 (16.7) | 1.39-2.87 (2.13) | 108.7-118.3 (113.5) |
| | | | | WSU 3/ | 92 | 6.5-18.7 (12.6) | 0.11-2.89 (1.17) | 80.7-117.5 (98.1) |
| | | | | LNSU 3/ | 99 | 6.9-19.2 (16.3) | 0.09-2.91 (1.81) | |
| Bair Reservoir | 272 | 1 F. 1 S | 17.7 | RB-I-98 | 26 | 6.8-9.1 (7.8) | 0.10-0.22 (0.15) | 58.4-105.0 (72.8) |
| (9/17/98) | | | | RB-I-97+ | 38 | 10.5-13.3 (11.7) | 0.36-0.70 (0.51) | 62.2-80.7 (72.9) |
| | | | | YCT-97 | 7 | 10.5-11.5 (10.9) | 0.36-0.45 (0.39) | 71.8-83.0 (79.9) |
| | | | | EB | 2 | 10.7-10.9 (10.8) | 0.40-0.42 (0.41) | 85.8-86.4 (86.1) |
| | | | | WSU | 101 | 6.8-14.0 (11.0) | 0.12-1.19 (0.52) | 65.9-106.1 (79.4) |
| Martinsdale Reservoir | 1000 | 2 F, 2 S | 24.4 | RB-A-98 | 40 | 5.5-11.6 (9.1) | 0.17-0.50 (0.33) | 37.1-109.7 (93.6) |
| (9/17/98) | | | | RB-A-97+ | 19 | 14.4-17.6 (16.0) | 1.25-1.90 (1.66) | 79.8-114.0 (94.1) |
| | | | | YCT | 5 | 9.6-15.7 (12.2) | 0.32-1.25 (0.71) | 83.2-97.2 (89.5) |
| | | | | LL | 1 | 19.4 | 2.53 | 90.6 |
| | | | | WSU 3/ | 263 | 6.1-18.2 (13.4) | 0.08-2.47 (1.14) | 65.3-124.2 (93.0) |
| | | | | LNSU 3/ | 17 | 6.7-18.7 (13.9) | 0.13-2.61 (1.18) | |

1/ Standard experimental gill nets (nylon and monofilament) F = Floating; S = Sinking
2/ Species abbreviations: RB = Rainbow trout; YCT = Yellowstone cutthroat trout; EB = Brook trout; MWF = Mountain whitefish; WSU = White sucker; LNSU = Longnose sucker; FHCH = Flathead chub; PUMP = Pumpkinseed; Strain abbreviations: A = Arlee; D = DeSmet; I = Eagle Lake. 3/ A random subset were weighed and measured. 4/ Wr equations from Anderson and Neuman, 1996 and Bister and Willis, MFWP communications.

Table 3 Continued. Overnight gill netting results in large lakes and reservoirs in Lewistown area of northcentral Montana during 1998.

| Water name (Date surveyed) | Surface acres | # of nets 1/ | Mean hours fished/net | Species strain & year planted 2/ | Total # of fish | Length (in) Range (Mean) | Weight (lbs.) Range (Mean) | Relative Weight Range (Mean) 4/ |
|---|---|---|---|---|---|---|---|---|
| Yellow Water Res. (9/4/98) | 193 | 1 F, 1 S | 15.9 | RB-A/T-98 | 4 | 6.4-11.5 (9.0) | 0.11-0.46 (0.31) | 70.0-130.2 (106.0) |
| | | | | RB-I-98 | 1 | 7.0 | 0.10 | 80.5 |
| | | | | RB-A-97 | 3 | 16.0-16.9 (16.4) | 1.85-1.97 (1.93) | 94.9-105.7 (101.8) |
| | | | | RB-I-97 | 2 | 14.9-17.0 (16.0) | 1.53-1.96 (1.75) | 92.7-119.7 (106.2) |
| | | | | RB-A-96 | 1 | 22.1 | 4.02 | 86.8 |
| | | | | RB-I-96 | 1 | 22.3 | 3.68 | 77.3 |
| | | | | YCT-97 | 2 | 15.7-16.5 (16.1) | 1.50-1.96 (1.73) | 99.9-112.0 (105.9) |
| | | | | FHCH | 1 | 6.2 | 0.08 | |
| | | | | PUMP | 2 | 4.7-5.0 (4.9) | 0.07-0.09 (0.08) | 90.9-95.6 (93.3) |
| | | | | WSU | 163 | 10.5-16.7 (13.5) | 0.45-1.66 (1.04) | 76.6-111.4 (93.3) |

1/ Standard experimental gill nets (nylon and monofilament) F = Floating; S = Sinking
2/ Species abbreviations: RB = Rainbow trout; YCT = Yellowstone cutthroat trout; EB = Brook trout; MWF = Mountain whitefish; WSU = White sucker; LNSU = Longnose sucker; FHCH = Flathead chub; PUMP = Pumpkinseed; Strain abbreviations: A = Arlee; D = DeSmet; I = Eagle Lake. 3/ A random subset were weighed and measured; 4/ Wr equations from Anderson and Neuman, 1996 and Bister and Willis, MFWP communications.

Bair Reservoir - Gill net catch of white suckers continued to decline from 1996 (Figure 2, Tews et al. 1998). Average size of Age 1 rainbow trout declined slightly. Yellowstone cutthroat trout stocked in 1997 were captured at a rate of 3.5 per net (Table 3). Condition of all salmonids was poor. *Daphnia* and copepods (Appendix 1) dominate the zooplankton community.

Martinsdale Reservoir - Gill net catch was similar to 1997, except for white sucker abundance, which was the highest sampled since 1987 (Figure 3, Tews et al. 1998). All Yellowstone cutthroat captured had a double tetracycline mark, which indicated they were from six-inch plants. Gill netting has not captured any Yellowstone cutthroat from three-inch plants stocked in 1994 or 1996. Copepods and *Daphnia* (Appendix 1) dominate the zooplankton community.

Yellow Water Reservoir - Gill net catch of rainbow trout decreased from 16.5 per net 1997 to 6 per net in 1998 (Figure 4). Maximum size of gill netted rainbow trout was larger in 1998 than in 1997. White sucker numbers increased dramatically again from 49 per net in 1997 to 81.5 per net in 1998 (Table 3, Tews et al. 1998). Growth of individual plants was not evaluated in 1998 due to small sample size. Two of the 10,000 six-inch Yellowstone cutthroat trout stocked in 1997 were gill netted. Growth and condition of these two fish were good. Two pumpkinseed were captured in fall gill netting in 1998. Pumpkinseed have not been legally introduced into Yellow Water Reservoir. Copepods and *Daphnia* (Appendix 1) dominate the zooplankton community.

Small Lewistown Area Reservoirs

Twelve small trout ponds in the Lewistown Area were gill netted during 1998. Buffalo Wallow and Peterson Pond appear to have partially winterkilled during the winter of 1996/1997. No rainbow trout from plants prior to 1997 were captured during gill netting in Peterson Pond (Table 4) and anglers have not been catching older fish. Peterson Pond oxygen levels did not get low enough to kill the illegally stocked lake chub. Three fish captured in Buffalo Wallow showed extraordinary growth (7-8 inches and 2 lbs in one year) if they were stocked in 1997, and therefore are more likely to be survivors of the 1997 winter. The zooplankton community in Buffalo Wallow Reservoir is diverse but dominated by *Ceriodaphnia* and copepods (Appendix 1).

Trout captured in Upper and Lower Carter Ponds were in excellent condition (Table 4). In addition to rainbow trout, one largemouth bass was netted in Lower Carter Pond. In Upper Carter Pond, the illegal introduction of yellow perch was discovered when two yellow perch were caught in the gill net. The zooplankton community of Upper Carter Pond is diverse but dominated by rotifers (Appendix 1).

The Boy Scout Pond near Kendall Mine was surveyed for the first time in 1998 in conjunction with sampling for thallium contamination. Only one year class of very poor condition trout was found. Thallium sampling results indicate that levels are not high enough to be acutely toxic to fish or humans, but using EPA criteria, there may be some risk to human health (D. Skaar, personal communications). The zooplankton community is dominated by *Daphnia* (Appendix 1).

Hanson Creek Reservoir rainbow trout were in good condition (Table 4) and northern redbelly dace were plentiful (Table 5). The zooplankton community is diverse but dominated by copepods (Appendix 1).

Urs Pond, near Coffee Creek, was gill netted and seined in 1998. This pond is very turbid and vegetation is plentiful. The trout were in excellent condition, but small, and were actually caught more readily in the beach seine than by gill nets (Tables 4 and 5). Fathead minnows and brassy minnows were abundant in Urs Pond. The zooplankton community is diverse but dominated by copepods (Appendix 1).

Barta Pond is fairly shallow and clear, and contains rainbow and brook trout in very good condition (Table 4). A few minnows were caught in the gill net at Barta Pond. The zooplankton community of Barta Pond is diverse but dominated by *Bosmina* (Appendix 1).

Three Denton area ponds were netted for the first time in 17 years in 1998. The smallest pond, Senef Pond, had the largest and best condition trout (Table 4). However, due to shallow depth and vegetative growth, oxygen may be deficient at times. The zooplankton community in Senef Pond is diverse and dominated by *Ceriodaphnia* spp. Kingsbury Pond had several age classes of trout, which were in reasonable condition, and no suckers were present (Table 4). The zooplankton community of Kingsbury Pond is dominated by copepods. Holgate Pond had the

smallest and poorest condition trout, and several small trout were dead or dying around the edges when the pond was netted in July (Table 4). This pond may have winterkilled in winter 1997/1998 (except for the white suckers). The zooplankton community of Holgate Pond is dominated by *Daphnia* and copepods.

Big Casino Reservoir - The reservoir draining done in 1996 appears to have had only a temporary impact on the white sucker population. White suckers increased from the 55 per net in fall 1997 (Tews et al. 1998) to 79.5 per net in fall 1998 (Table 4). Average size of suckers increased from 10.2 to 10.7 inches. White sucker numbers were even higher in May 1998 (Table 4). Nearly 6000 rainbow trout were stocked in 1998 at 6 - 10 inches. Rainbow gill net catch was rated as good and average total length in September was 9.4 inches, but condition was poor (Table 4). As a predator control measure for white suckers, 2000 1.4 inch walleye were stocked in 1998. The walleye seem to be growing well, but none were captured in the fall gill netting and there is evidence that some walleyes are leaving the reservoir through the dam outlet. The zooplankton community is diverse but dominated by copepods (Appendix 1).

A study of the zooplankton communities of thirteen central Montana lakes was conducted in 1998. The zooplankton communities were compared to the density and size of suckers (white and longnose combined) when present and to the size of trout (all species combined). It has been shown in previous studies (Schneidervin and Hubert 1987, Tabor et al. 1996) that suckers are highly efficient predators of zooplankton, particularly *Daphnia* spp. and that rainbow trout growth is dependent on *Daphnia* spp. abundance. In central Montana reservoirs (except Big Casino Creek Reservoir) high densities of suckers and low densities of zooplankton appear to be related, but within the range of variation of zooplankton densities in lakes without suckers (Figure 5). In addition, there seem to be more diverse zooplankton communities in lakes without suckers (Appendix 1). However, trout total length does not seem to be related to zooplankton density (Figure 6), and there is a slight negative relationship between trout total length and *Daphnia* density (Figure 7). Relative weight maybe a better indicator of trout health than total length in these ponds since Wr will reduce confounding by year class strength. With the exception of Big Casino Creek Reservoir, fat trout were found with the largest numbers of zooplankton (Figure 8). Since Big Casino rainbow trout are planted on a monthly basis as catchables, their size is likely influenced by factors outside the pond environment. However, healthy trout were also found in ponds with low zooplankton densities.

Table 4. Overnight gill netting results in small reservoirs in Lewistown area of northcentral Montana during 1998.

| Water name (Date surveyed) | # of nets 1/ | Mean Hours Fished/net | Species strain & year planted 2/ | Total # of fish | Length (in) Range (Mean) | Weight (lbs) Range (Mean) | Relative Weight Range (Mean) 3/ |
|---|---|---|---|---|---|---|---|
| Barta Pond (7/8/98) | 1 F | 22.3 | RB-A-97 | 8 | 10.6-12.5 (11.9) | 0.59-0.81 (0.70) | 85.3-116.5 (96.0) |
| | | | RB-A-96+ | 4 | 16.6-18.9 (17.3) | 1.89-2.88 (2.30) | 94.3-108.8 (102.3) |
| | | | EB | 2 | 11.6-11.8 (11.7) | 0.73-0.78 (0.76) | 117.1-131.8(124.5) |
| | | | Minnow | 4 | 6.1-6.4 (6.3) | 0.10-0.12 (0.11) | |
| Big Casino Creek Reservoir (5/6/98) | 1 S 1 F | 24.4 | RB-97 | 86 | 6.8-12.6 (9.5) | 0.07-0.68 (0.27) | 51.3-91.4 (71.0) |
| | | | WSU | 344 | 6.2-16.7 (11.5) | 0.06-2.02 (0.71) | 16.0-28.8 (93.8) |
| | | | WE | 11 | 6.7-8.5 (7.5) | 0.07-0.18 (0.11) | 57.9-106.0 (75.6) |
| Big Casino Creek Reservoir (9/2/98) | 1 S 1 F | 19.9 | RB-97/98 | 46 | 7.5-10.6 (9.4) | 0.11-0.45 (0.25) | 56.0-87.4 (67.4) |
| | | | WSU | 159 | 6.1-15.5 (10.7) | 0.08-1.38 (0.53) | 61.8-106.2 (83.8) |
| Boy Scout Pond (6/2/98) | 1 S | 18.5 | RB-I-97 | 32 | 7.5-12.1 (9.8) | 0.14-0.52 (0.29) | 52.3-87.4 (70.1) |
| Buffalo Wallow Reservoir (7/16/98) | 1 S 1 F | 26.0 | RB-I-98 | 17 | 5.5-7.5 (6.4) | 0.06-0.16 (0.10) | 61.3-124.3 (85.0) |
| | | | RB-I/T-97+ | 26 | 12.7-17.9 (15.3) | 1.10-2.73 (1.66) | 91.9-124.5 (107.2) |
| Carter Pond - Lower (7/23/98) | 1 S 1 F | 19.7 | RB-A-98 | 121 | 5.5-8.4 (7.1) | 0.08-0.29 (0.17) | 72.1-156.8 (109.5) |
| | | | RB-A-97 | 27 | 11.2-14.8 (13.1) | 0.60-1.74 (1.09) | 96.1-139.2 (108.9) |
| | | | RB-A-96 | 18 | 15.1-21.1 (16.4) | 1.64-5.8 (2.37) | 103.8-143.8 (121.3) |
| | | | LMB | 1 | 5.8 | 0.10 | 113.2 |
| Carter Pond - Upper (7/23/98) | 1 S | 21.7 | RB-A-98 | 73 | 5.7-8.3 (6.7) | 0.07-0.31 (0.14) | 67.1-142.2 (104.2) |
| | | | RB-A-97 | 27 | 9.4-14.7 (12.5) | 0.31-1.62 (0.94) | 86.2-135.1 (108.5) |
| | | | RB-A-96 | 3 | 15.1-16.7 (15.8) | 1.59-2.07 (1.85) | 103.3-115.0 (108.5) |
| | | | YP | 2 | 8.0-8.7 (8.4) | 0.26-0.35 (0.31) | 100.9-103.6 (102.3) |
| Hanson Creek Reservoir (5/13/98) | 1 S | 22.7 | RB | 37 | 9.5-18.3 (10.8) | 0.29-2.98 (0.54) | 74.0-113.1 (87.8) |
| Holgate Pond (7/29/98) | 1 S | 21.1 | RB-A | 35 | 4.6-10.1 (7.7) | 0.04-0.32 (0.16) | 62.6-94.3 (75.2) |
| | | | WSU | 10 | 10.1-18.6 (13.3) | 0.47-2.28 (1.14) | 80.8-101.5 (93.4) |
| Kingsbury Pond (7/28/98) | 1 S | 24.5 | RB-A-98 | 31 | 5.6-7.6 (6.6) | 0.07-0.17 (0.11) | 64.4-100.8 (85.9) |
| | | | RB-A-97 | 21 | 9.9-13.2 (11.7) | 0.39-0.87 (0.62) | 72.6-98.2 (88.3) |
| | | | RB-A-96 | 5 | 14.4-15.4 (14.9) | 0.75-1.74 (1.23) | 54.8-110.6 (86.0) |
| Peterson Pond (Missile) (5/13/98) | 1 S | 23.0 | RB-I-97 | 24 | 9.7-13.4 (11.5) | 0.32-0.93 (0.60) | 75.8-105.6 (89.1) |
| Senef Pond (7/29/98) | 1 S | 22.3 | RB-A | 19 | 7.1-19.5 (12.7) | 0.14-2.64 (0.93) | 83.8-110.3 (95.3) |
| Urs Pond (6/11/98) | 1 S 1 F | 22.9 | RB-A | 5 | 5.2-17.5 (9.8) | 0.06-3.28 (1.09) | 78.5-142.3 (113.8) |

1/ Standard experimental gill nets (nylon and monofilament) F = Floating; S = Sinking. 2/ Species abbreviations: RB = Rainbow trout; YCT = Yellowstone cutthroat trout; WE = Walleye; EB = Brook trout; LMB = Largemouth bass; YP = Yellow perch; WSU = White sucker; LNSU = Longnose sucker; Strain abbreviations: A = Arlee; T = Erwin; I = Eagle Lake. 3/ Wr equations from Anderson and Neuman, 1996 and Bister and Willis, MFWP communications.

Table 5. Beach seine catch in small reservoirs in the Lewistown area, 1998.

| Water Name | Date | Water Temp | # of Hauls | Species Count 1/ (Average Length in inches) | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | NRBDC | WE | RB | FHMN | WSU | BRMN |
| Big Casino Reservoir | 8/10/98 | 87 | 3 | | 5 (5.2) | 8 (9.1) | 2 (1.7) | 6 (6.4) | |
| Hanson Creek Reservoir | 8/10/98 | 80 | 3 | 209 (2.4) | | 1 (14.0) | | | |
| Urs Pond | 8/12/98 | 75 | 3 | | | 20 (6.6) | 1521 (2.1) | | 76 (3.2) |

1/ Species abbreviations: NRBDC = Northern redbelly dace; WE = Walleye; RB = Rainbow trout; FHMN = Fathead minnow; WSU = White sucker; BRMN = Brassy minnow.

Environmental and biological variables are so unique to each reservoir it is difficult to determine what role suckers or zooplankton play in rainbow trout growth. This data does not indicate that suckers are directly influencing trout size by competing for zooplankton in these lakes. Suckers and trout may be competing for other food items such as benthic invertebrates or small fish, or other factors such as nutrient load, lake volume, temperature, angler pressure or habitat may be limiting trout size. Sampling date is also a factor. Two reservoirs, Hanson Creek Reservoir and Big Casino Creek Reservoir, were sampled three times, once each in May, June and July. The May sample from Hanson Creek Reservoir is similar to the June and July samples, but the May sample from Big Casino Creek Reservoir is very different from the June and July samples, and is also very different than any other sample collected. In the future, we suggest limiting sampling to June and July to minimize time bias.

## DISCUSSION

In the Choteau area netting surveys should continue on the larger trout lakes and reservoirs to monitor survival and growth. Lake Levale should be further evaluated for natural reproduction of grayling, and future stocking rates based on these findings. Water clarity in Swazee Lake improved immediately following white sucker removal. It is recommended to remove additional suckers in Swazee Lake and monitor any changes in trout growth. The DeSmet and Arlee plants should be continued in Smith River Reservoir. The Eagle Lake rainbow plants in Newlan Creek Reservoir should be continued for another year. We should consider introducing a non-reproducing predator to reduce sucker numbers in Newlan Creek Reservoir. Fall plants of three-inch Yellowstone cutthroat trout apparently did not survive in Martinsdale Reservoir. These fish will no longer be stocked. The three-inch plants should be replaced with annual six-inch plants. The extremely slow growth of Eagle Lake rainbow trout in Yellow Water Reservoir is a concern and may be the result of escalating sucker numbers affecting the food supply for trout. The illegal introduction of pumpkinseed into Yellow Water may also impact the trout fishery. If growth declines for older fish in Yellow Water, other management options such as rehabilitation

and predator control should be considered. Based on results in Bear Paw Lake (Kent Gilge, MFWP, personal communications) smallmouth bass may be a good option for Yellow Water Reservoir. Poor growth and recovery of stocked salmonids in Bair Reservoir continues to be a concern and options should be explored to improve the situation. A screen needs to be evaluated for the outlet at Big Casino Reservoir to contain the stocked walleye. The illegal introduction of yellow perch into Upper Carter Pond will probably negatively impact on the trout fishery and needs to be monitored.

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Carol Endicott coordinated Lewistown area fieldwork in May. Kelly Smith, Jimmy Forrest, Tom Flowers, Rick Bryant, Paul Hamlin and Michael Barrick provided assistance with this project. Hatchery personnel are also acknowledged for coordinating various rainbow strains and the respective marking schemes.

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Principal Fish Species Involved: Rainbow trout, Yellowstone cutthroat trout, brown trout, brook trout, kokanee salmon, grayling, white sucker, longnose sucker, mountain whitefish, flathead chub, pumpkinseed, carp, walleye, spottail shiner, largemouth bass, yellow perch, northern redbelly dace, fathead minnow, brassy minnow.

Code Numbers of Waters Referred to in Report:

| | |
|---|---|
| 14-7320 | Eureka Reservoir |
| 16-4300 | Ackley Lake |
| 16-4260 | Upper Carter Pond |
| 16-4261 | Lower Carter Pond |
| 16-4400 | Barta Pond |
| 16-4497 | Boy Scout Pond |
| 16-4628 | Big Casino Reservoir |
| 16-5535 | Hanson Creek Reservoir |
| 16-5960 | Holgate Pond |
| 16-6260 | Kingsbury Pond |
| 16-7642 | Peterson Pond |
| 16-8208 | Senef Pond |
| 16-8660 | Urs Pond |
| 178720 | Bean Lake |
| 17-9330 | Newlan Creek Reservoir |
| 17-9616 | Smith River Reservoir |
| 18-7340 | Buffalo Wallow Reservoir |
| 18-7750 | Bair Reservoir |
| 18-8380 | Martinsdale Reservoir |
| 18-9500 | Yellow Water Lake |
| 20-7650 | Lake Levale |
| 20-7900 | Nilan Reservoir |
| 20-7950 | Piskun Reservoir |
| 20-8150 | Sock Lake |
| 20-8300 | Swazee Lake |
| 20-8400 | Tunnel Lake |
| 20-8500 | Willow Creek Reservoir |

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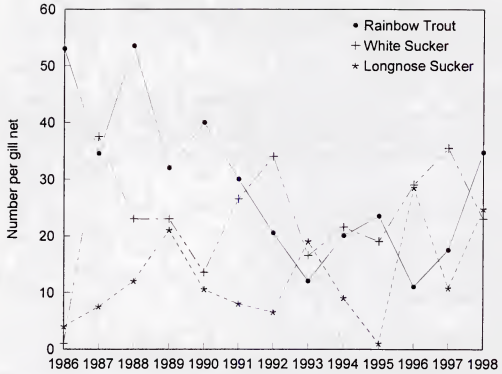


Figure 1. Fall catch per net of common species from floating and sinking nets in Ackley Lake.

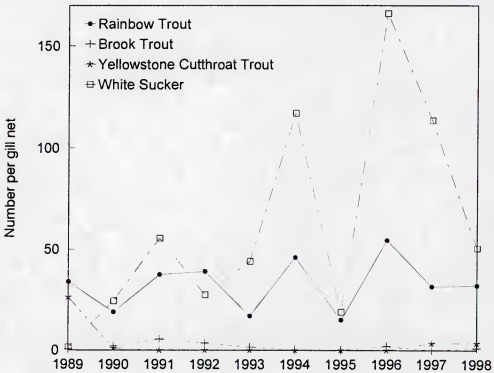


Figure 2. Bair Reservoir gill net catch per net of common species since draining in 1988. Floating and sinking gill nets were used except in 1996 when only sinking gill nets were used.

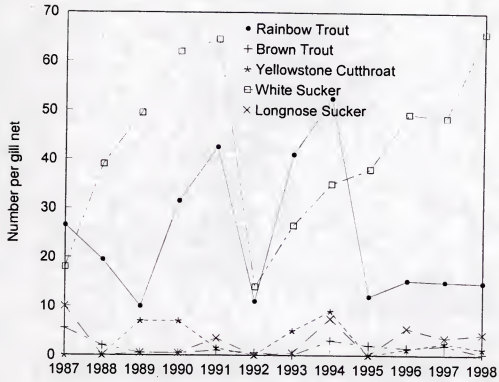


Figure 3. Martinsdale Reservoir fall gill net catch per net of common species.

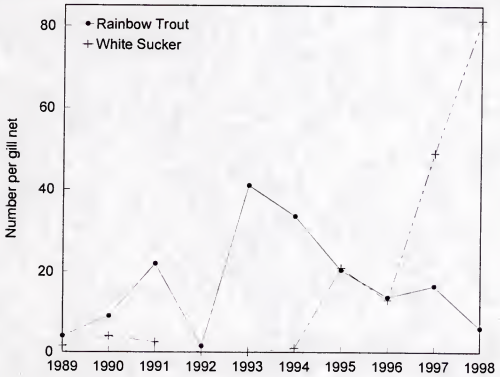


Figure 4. Yellow Water Reservoir gill net catch per net of common species since 1988 drawdown.

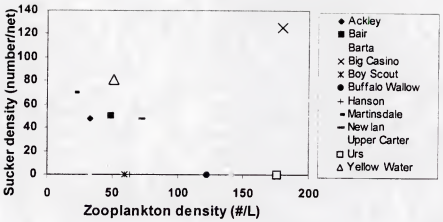


Figure 5. Density of white and longnose suckers from 1998 gill netting and total number of zooplankton per liter in summer tows, 1998.

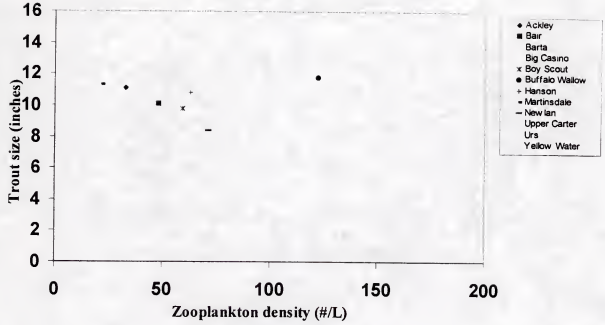


Figure 6. Average total length of trout from 1998 gill netting and total number of zooplankton per liter in summer tows, 1998.

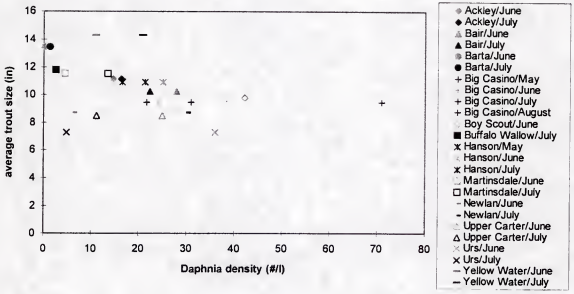


Figure 7. Average total length of trout from 1998 gill netting and Daphnia density from summer 1998 tows.

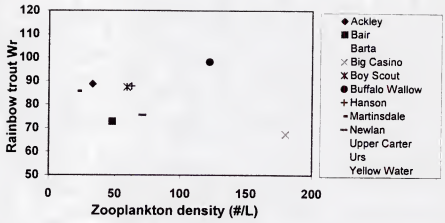


Figure 8. Relative Weight of rainbow trout compared with zooplankton density.

Appendix Table 1. Zooplankton composition of northcentral Montana lakes in 1998.

| Lake (Dates sampled) | Number of Per liter | Type of organism | Percent | Size (Range) Mm |
|---|---|---|---|---|
| Ackley Lake | 32.94 | *Daphnia* | 46.6 | 1.37 (0.83-2.24) |
| 6/9/98, 7/6/98 | | *Ceriodaphnia* | 0.4 | 1.46 (0.60-2.30) |
| | | Calanoid copepods | 21.1 | 1.13 (0.43-2.29) |
| | | Cyclopoid copepods | 27.7 | 0.81 (0.35-1.23) |
| | | Nauplii | 4.2 | - |
| Bair Reservoir | 48.10 | *Daphnia* | 52.1 | 1.04 (0.56-1.71) |
| (6/24/98, 7/13/98) | | *Bosmina* | 0.4 | 0.28 (0.26-0.35) |
| | | Cyclopoid copepods | 47.1 | 0.74 (0.42-1.17) |
| | | Nauplii | 0.4 | - |
| Barta Pond | 33.10 | Chironomidae | 0.6 | 4.00 |
| 6/22/98, 7/7/98 | | *Daphnia* | 2.6 | 1.10 (0.75-1.65) |
| | | *Ceriodaphnia* | 0.8 | 1.76 |
| | | *Bosmina* | 67.8 | 0.28 (0.21-0.43) |
| | | Cyclopoid copepods | 26.8 | 0.87 (0.38-1.65) |
| | | Calanoid copepods | 0.8 | 1.50 |
| | | Nauplii | 0.6 | |
| Big Casino Creek | 32.94 | *Daphnia* | 21.2 | 0.63 (0.35-1.17) |
| Reservoir | | *Ceriodaphnia* | 2.4 | 1.04 (0.50-1.25) |
| (5/5/98, 6/3/98, | | *Bosmina* | 8.7 | 0.35 (0.24-0.56) |
| 7/2/98) | | Cyclopoid copepods | 62.5 | 0.76 (0.42-1.44) |
| | | Calanoid copepods | 0.7 | 0.90 (0.75-1.07) |
| | | Nauplii | 4.5 | - |
| Boy Scout Pond | 59.37 | *Daphnia* | 71.1 | 0.72 (0.45-0.91) |
| (6/2/98) | | *Bosmina* | 4.5 | 0.33 (0.22-0.54) |
| | | Cyclopoid copepods | 16.6 | 0.82 (0.61-1.12) |
| | | Nauplii | 7.8 | - |
| Buffalo Wallow | 122.27 | Chironomidae | 0.2 | 3.10 (2.16-4.03) |
| Reservoir | | Ephemeroptera | 0.2 | 2.05 (1.22-2.88) |
| (7/15/98) | | *Daphnia* | 2.1 | 1.06 (0.48-2.22) |
| | | *Ceriodaphnia* | 61.8 | 0.50 (0.29-1.15) |
| | | *Bosmina* | 0.7 | 0.28 (0.24-0.37) |
| | | Cyclopoid copepods | 3.8 | 0.71 (0.37-1.58) |
| | | Calanoid copepods | 29.5 | 0.85 (0.32-1.41) |
| | | Nauplii | 1.7 | - |
| Carter Pond | 128.95 | Rotifera | 57.0 | 0.28 |
| Upper | | Chironomidae | 0.3 | 2.23 (1.31-3.84) |
| (6/9/98, 7/23/98) | | *Daphnia* | 8.5 | 0.84 (0.35-1.90) |
| | | *Ceriodaphnia* | 9.3 | 0.54 (0.32-0.54) |
| | | Cyclopoid copepods | 13.4 | 0.66 (0.32-1.14) |
| | | Calanoid copepods | 11.2 | 1.01 (0.43-1.74) |
| | | Nauplii | 0.3 | - |
| East Fork | 119.28 | Annelida | 0.1 | 3.9 |
| Reservoir | | *Daphnia* | 26.6 | 0.82 (0.45-1.62) |
| 6/9/98, 7/1/98 | | *Bosmina* | 30.8 | 0.32 (0.19-0.45) |
| | | Cyclopoid copepods | 42.5 | 0.64 (0.40-1.12) |

Appendix Table 1. Zooplankton composition of northcentral Montana lakes in 1998 (Continued).

| Lake (Dates sampled) | Number Per liter | Type of organism | Percent | Size (Range) Mm |
|---|---|---|---|---|
| Hanson Creek Reservoir 5/5/98, 6/3/98, 7/1/98 | 62.9 | Chironomidae | 0.2 | 3.68 |
| | | *Daphnia* | 32.5 | 1.20 (0.42-1.87) |
| | | *Bosmina* | 0.2 | 0.29 |
| | | Calanoid copepods | 3.7 | 1.03 (0.86-1.14) |
| | | Cyclopoid copepods | 63.1 | 0.83 (0.38-1.52) |
| | | Nauplii | 0.3 | |
| Holgate Pond 7/29/98 | 100.75 | *Daphnia* | 46.8 | 0.72 (0.46-1.02) |
| | | *Bosmina* | 0.6 | 0.27 (0.24-0.28) |
| | | Cyclopoid copepods | 37.2 | 0.68 (0.46-1.04) |
| | | Calanoid copepods | 11.2 | 0.78 (0.42-1.49) |
| | | Nauplii | 4.2 | - |
| Kingsbury Pond 7/27/98 | 168.81 | *Daphnia* | 1.6 | 0.68 (0.40-0.99) |
| | | *Bosmina* | 1.5 | 0.26 (0.21-0.43) |
| | | Cyclopoid copepods | 76.5 | 0.80 (0.46-1.47) |
| | | Nauplii | 20.4 | - |
| Martinsdale Reservoir 6/24/98, 7/13/98 | 21.9 | *Daphnia* | 41.2 | 1.32 (0.66-2.11) |
| | | *Bosmina* | 0.7 | 0.32 (0.22-0.44) |
| | | Calanoid copepods | 10.3 | 0.89 (0.32-1.79) |
| | | Cyclopoid copepods | 44.5 | 0.70 (0.32-1.12) |
| | | Nauplii | 3.3 | - |
| Newlan Creek Reservoir 6/24/98, 7/13/98 | 71.2 | *Daphnia* | 24.4 | 0.82 (0.26-1.57) |
| | | *Bosmina* | 14.3 | 0.35 (0.24-0.50) |
| | | Cyclopoid copepods | 60.6 | 0.64 (0.34-1.09) |
| | | Calanoid copepods | 0.2 | 0.94 (0.59-1.30) |
| | | Nauplii | 0.5 | - |
| Senef Pond 7/28/98 | 404.84 | Chironomidae | 0.1 | 4.34 |
| | | Ephemeroptera | 0.1 | 3.57 |
| | | Rotifera | 0.6 | 0.15 (0.13-0.16) |
| | | *Ceriodaphnia* | 75.6 | 0.60 (0.32-0.77) |
| | | *Bosmina* | 1.9 | 0.37 (0.26-0.43) |
| | | Cyclopoid copepods | 13.8 | 0.66 (0.38-1.2) |
| | | Calanoid copepods | 6.4 | 1.05 (0.54 –1.31) |
| | | Nauplii | 1.5 | - |
| Urs Pond (6/10/98, 7/8/98) | 176.4 | Diptera | 0.1 | 3.50 |
| | | Rotifera | 0.2 | 0.17 (0.16-0.18) |
| | | *Daphnia* | 11.4 | 0.72 (0.37-1.23) |
| | | *Bosmina* | 0.1 | 0.27 |
| | | Cyclopoid copepods | 82.5 | 0.65 (0.38-1.23) |
| | | Calanoid copepods | 0.4 | 1.09 (0.66-1.70) |
| | | Nauplii | 5.3 | |
| Yellow Water Reservoir 6/25/98, 7/10/98 | 50.7 | *Daphnia* | 31.2 | 1.05 (0.45-2.10) |
| | | *Bosmina* | 0.2 | 0.21 |
| | | Cyclopoid copepods | 18.0 | 0.77 (0.42-1.22) |
| | | Calanoid copepods | 43.1 | 1.00 (0.35-2.30) |
| | | Nauplii | 7.5 | |