Banks Lake Fishery Evaluation Project

Annual Report
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Banks Lake Fishery Evaluation Project Annual Report: Fiscal Year 2001
(September 1, 2001 to August 31, 2002)

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Abstract.—The Washington Department of Fish and Wildlife implemented the Banks Lake Fishery Evaluation Project (BLFEP) in September 2001 with funds from the Bonneville Power Administration. The first year of the BLFEP was used to gather historic information, establish methods and protocols, collect limnology data, and conduct the first seasonal fish surveys. Water quality parameters were collected monthly from February to May and bi-monthly from June to August. Banks Lake water temperatures began to increase in April and stratification was apparent by June at all 3 limnology collection sites. By late August, the thermocline had dropped to nearly 20 m deep, with 19-20 °C temperatures throughout the epilimnion. Dissolved oxygen levels were generally above 10 mg/L until mid summer when dissolved oxygen dropped near or below 5 mg/L below 20-m deep. Secchi depths ranged from 3-10 m and varied by location and date. Nearshore and offshore fish surveys were conducted in May and July using boat electrofishing, fyke net, gill net, and hydroacoustic surveys. Smallmouth bass *Micropterous dolomieui* (24 %) and lake whitefish *Coregonus clupeaformis* (20 %) dominated the nearshore species composition in May; however, by July yellow perch *Perca flavescens* (26 %) were the second most common species to smallmouth bass (30 %). Lake whitefish dominated the offshore catch during May (72 %) and July (90 %). The May hydroacoustic survey revealed highest densities of fish in the upper 1/3 of the water column in the mid- to northern sections of the reservoir near Steamboat Rock. In the future, data from seasonal surveys will be used to identify potential factors that may limit the production and harvest of kokanee, rainbow trout, and various spiny-rayed fishes in Banks Lake. The limiting factors that will be examined consist of: abiotic factors including water temperature, dissolved oxygen levels, habitat, exploitation and entrainment; and biotic factors including food limitation and predation. The BLFEP will also evaluate the success of several rearing and stocking strategies for hatchery kokanee in Banks Lake.

Acknowledgements

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1.1 Introduction

The Bureau of Reclamation created Banks Lake in 1951 to function as an equalizing reservoir for the Columbia Basin Irrigation Project. It occupies the Upper Grand Coulee, formerly a channel of the Columbia River, located in the high scrub desert of Grant County, Washington. The Grand Coulee was formed during the Pleistocene Epoch when an ice sheet temporarily diverted the Columbia River from its present course southward. Water erosion cut the gorge out of basalt rock creating canyon walls rising up to 600 feet. Later, the ice sheet melted and retreated, allowing the Columbia River to flow along its original course leaving the riverbed behind.

Banks Lake is contained within two earth-fill dams, the North Dam and Dry Falls Dam, or the South Dam. The North Dam, near Electric City, WA is 44 m high and 442 m long. Dry Falls Dam, close to Coulee City, is 37 m high and 2987 m long and supports a two-lane highway. Banks Lake is 43 km long, contains 1.6 billion m^3 of water and covers 10,881 ha of surface area (USBOR 1964). At an elevation of 479 m (1,570 ft) (full pool), the average depth is 14 m with a maximum depth of 26 m. Water is pumped up 85 m from a pumping plant at the left forebay of Grand Coulee Dam (Franklin Delano Roosevelt Lake -FDR) to a feeder canal 2.6 km in length, which delivers water to Banks Lake at the North Dam (USBOR 1964).

Additionally, Banks Lake is used as a pumped storage / power generating reservoir. The project includes six pump-generating units (P/G) in order to provide additional power during peak power periods, daily during the morning and evening and seasonally from October to March. The first two units were installed and operational by fall, 1974 (Stober et al. 1974). By early 1984, the other four units were fully operational (B. Mattson, personal communication).

Dry Falls Dam also houses a power plant. Water for irrigation is withdrawn from the south end of Banks Lake through a turbine at Dry Falls Dam with a maximum rate of 8,000-cfs. Another 1,600-cfs is diverted to the spillway during the peak of the irrigation season (J. Moody, personal communication). The water is routed through the Main Canal 13.5 km to Billy Clapp Lake and then distributed to the Columbia Basin Irrigation Project. Return flows from these lands are accumulated in the Potholes Reservoir for irrigation in the southern area of the project (USBOR 1964). The project irrigates approximately 271,140 ha, which is a little over one-half of the authorized lands in the Columbia Basin Project (USFWS 2002). Approximately 3.0 billion m^3 of Banks Lake water is supplied to the Irrigation Project each year (J. O'Callaghan, personal communication). The storage capacity of Banks Lake is a little over 1.6 billion m^3, therefore, the reservoir water volume is completely flushed out about two and one-half times during the irrigation season (USFWS 2002).

Currently, water levels fluctuate minimally (1-2 ft) during the irrigation season, from late March until late October. Historically, a maximum drawdown of five to fifteen feet occurred in May, before the spring runoff increased pumping from Lake Roosevelt, achieving full elevation (1570 feet) during August. Irrigation demand, rainfall, runoff, and power demand contributed to an alteration of this elevation cycle (Stober et al. 1974).

1.2 Historical Fishery

Prior to the inundation of Banks Lake in 1951, Devil's Lake was the largest of several small lakes in the coulee, including Steamboat and Lewis Lakes. There are no records of the fish assimilation in the small lakes, but local fisherman indicated that prior to flooding the coulee sizeable populations of largemouth bass (*Micropterus salmoides*) and pumpkinseed sunfish (*Lepomis gibbosus*) existed (Stober et al. 1975). This is reflected in the Washington Department of Game (currently Washington Department of Fish and Wildlife -WDFW) catch records from 1952-1954 and Steamboat Rock Resort creel counts from 1953-1954, which indicate that bass and pumpkinseed dominated the creel, amounting to 64 % and 32 % of the catch, respectively. Also identified in the 1952-54 catch, in order of decreasing abundance, were yellow perch (*Perca flavescens*), brook trout (*Salvelinus fontinalis*), rainbow trout (*Oncorhynchus mykiss*), kokanee (*O. nerka*), burbot (*Lota lota*), bull trout (*Salvelinus confluentis*), and black crappie (*Pomoxis nigromaculatus*). All three years yielded a combined CPUE of 3.6 fish/angler/trip (Nelson 1954).

A creel survey conducted by WDFW personnel from 1960-1964 yielded an additional two species not present in the 1952-54 catch, lake whitefish (*Coregonus clupeaformis*) and pike (*Esox lucius*). The fishery had shifted from being dominated by bass and pumpkinseed in the 1950's to being represented mainly by yellow perch (59 %), rainbow trout (24 %), and kokanee (14 %) in the early 1960's. Other fish included in the catch were black crappie, bass, burbot, and pumpkinseed. The average CPUE declined from 3.6 fish/angler/trip in the early 1950's to 2.2 fish/angler/trip (0.7 fish/hr) during the early 1960's (Spence 1965).

Yellow perch and kokanee were once again dominant in a creel survey conducted by Duff (1973) during the years 1971-1972, representing 56 % and 30 % of the catch, respectively. Also present in the sport fishery were the following species: rainbow trout (5 %), black crappie (4 %), largemouth bass (2 %), pumpkinseed (2 %), and lake whitefish, walleye (*Stizostedion vitreum*), and burbot (1 %) (Duff 1973). Duff also recorded the presence of bluegill (*Lepomis macrochirus*) within the fishery. Reported angler usage at Banks Lake was 92,236 fisherman days with a catch of 90 tons of fish, divided almost evenly between salmonid and spiny ray fish. The average CPUE of 3.8 fish/angler/trip (0.9 fish/hr) was reminiscent of the catch seen in the early 1950's. Since 1965, the fishing intensity had risen 300 % and the economic value of the fishery was estimated at $1.6 million (Duff 1973).

Sampling efforts between the years 1973-1976 by Stober et al. (1976) yielded the following species not contained within the sport fishery or previously encountered: longnose sucker (*Catostomus catostomus*), carp (*Cyprinus carpio*), prickly sculpin (*Cottus asper*), mountain whitefish (*Prosopium williamsoni*), chinook salmon (*Oncorhynchus tshawytscha*), peamouth (*Mylocheilus caurinus*), brown bullhead (*Ameiurus nebulosus*), brown trout (*Salmo trutta*), northern pikeminnow (*Ptychocheilus oregonensis*), and largescale sucker (*Catostomus macrocheilus*) (Stober et al. 1975). Bluegill were the only fish not taken that was reported by Duff (1973). Ninety percent of gill net and beach seine catches were comprised of yellow perch, lake whitefish, and kokanee.

A creel census conducted in 1975 found the sport fishery to consist predominately of kokanee (43.2 %) and yellow perch (34.4 %), with the average CPUE decreasing to 0.5 fish/hr. (Stober et al. 1975). In 1977, a limited creel survey revealed that the relative abundance of kokanee had declined to 17.8 %. However, in 1978, following the implementation of a barrier net designed to retain adult fish in the reservoir, the abundance of kokanee in the creel increased to 83.7 %. A simultaneous reduction in other sportfish occurred and the CPUE was 0.3 fish/hr (Stober et al. 1979).

Routine creel surveys performed by WDFW personnel during the years 1974-1982 (WDFW, Region 2, unpublished data) included the following species not observed in the creel prior: smallmouth bass, carp and catfish. Yellow perch and kokanee dominated the creel from 1974 to 1980 [Kokanee are referred to as kokanee and coho in the creel records. Coho were stocked in 1971 and could not have been present in the creel so they were assumed to be kokanee]. The same trend noted by Stober et al. (1979) toward a reduction of average CPUE was observed in 1977. By 1981 kokanee had disappeared from the creel, and yellow perch CPUE had decreased.

1.3 Species Composition

The following is a summary of fishes known to occur in Banks Lake at various times. Included are comments about the source of the population as well as a brief history. In addition, stocking records from 1953-1998 are located in Appendix A.

Kokanee.—Kokanee have been planted sporadically in the reservoir since 1956; however, they are indigenous to the Columbia River Basin and source populations could have arisen from Lake Roosevelt via inflow from the feeder canal. It was first reported that kokanee were entrained from Lake Roosevelt through the generators of Grand Coulee Dam in 1949 (Gangmark and Fulton 1949, cited in Stober et al. 1975).

Kokanee populations reported in the 1972 creel survey by Duff appeared to be self-sustaining as indicated by the large numbers of 2-, 3-, and 4- year old fish that could not have been from the last plant in 1966. It is possible that these fish could have been entrained from Lake Roosevelt; however, Duff (1973) and Stober et al. (1974) observed kokanee spawning along the shoreline.

Extreme drawdown of the reservoir during 1973 and 1974 reduced the reproductive success of kokanee. This was represented by a decline in the number of kokanee shoreline spawners observed, a decrease in abundance in gill net catch, and a reduction of the catch in the creel (Stober et al. 1977).

By the mid-1980's the kokanee fishery had declined, and has yet to recover, despite intensive stocking efforts in recent years. Significant numbers of kokanee fry are entrained downstream from the irrigation canals after being stocked. This is apparent by the kokanee catch in un-stocked Billy Clapp Reservoir, downstream from Banks Lake (USFWS 2002).

Rainbow Trout.—Rainbow trout have been planted annually since 1956 with few exceptions. However, rainbow trout are native to the Columbia River Basin and the population is probably supplemented by entrainment from Lake Roosevelt.

Rainbow trout were a dominant part of the fishery in the 1960's (Spence 1965). Although targeted by anglers, rainbow trout did not constitute a substantial part of the salmonid fishery in 1975-1976, which was dominated by kokanee (Stober et al. 1976) and coho salmon (WDFW, Region 2, unpublished data). In order to minimize the apparent decline, the size at release was increased, which would help negate predation (USFWS 2002). Entrainment through the irrigation canals might also have impacted the rainbow trout fishery negatively. Stober et al. (1976) discovered that rainbow trout releases made closest to the canals in either end indicated higher loss to entrainment particularly during the summer in the irrigation canal and in winter at the feeder canal. Also compromising the fishery during the 1970's was the effect reservoir drawdown in the spring had on spawning success of rainbow trout, a spring spawner.

Brook Trout.—Other than the appearance of Brook trout in the 1952-1954 creel survey, only one other record exists. Thompson (1952) identified brook trout spawning in Northrup Canyon Creek, a tributary to Banks Lake. Apparently they never became established and a year later, Thompson recommended closing the creek to fishing in order to protect rainbow trout spawning in the creek (Thompson 1953).

Bull Trout.—The only account of Bull trout (*Salvelinus confluentis*) was a few individuals reported in the 1952-54 creel census conducted by Nelson (1954). It is likely that they were entrained from Lake Roosevelt and never became established in Banks Lake, or that they were a misidentified brook trout.

Brown Trout.—Brown trout may have been introduced from Lake Roosevelt or by sport fisherman. Stober and colleagues recorded the two occurrences of brown trout in the fishery during the early 1970's (Stober et al. 1975).

Cutthroat Trout.—Cutthroat trout (*Oncorhynchus clarki*) were planted once by Washington Department of Fish and Game (WDFW) in 1959. They have never been reported in the creel or in reservoir surveys.

Coho Salmon.—WDFW planted coho salmon (*Oncorhynchus kisutch*) in 1971 only, but they failed to become established

Chinook Salmon.—Chinook salmon were planted by WDFW in 1974, 1975, and 1976. The 1975-76 creel survey conducted by Stober and workers yielded a catch consisting of 20 % of the 1974 plant indicating a high rate of return (Stober et al. 1975). Chinook were part of the creel during 1978, but were not observed after 1979.

It is also possible that this species was entrained into Banks Lake from Lake Roosevelt. Stober et al. (1975) noted that large Chinook salmon, five to eleven pounds, had been captured by anglers that were too large to be from the 1974 plant and were likely from a 1971-72 plant into Lake Roosevelt (Stober et al. 1975).

Lake Whitefish.—Lake whitefish were present in a creel survey of Banks Lake in 1965 conducted by Merrill Spence (Duff 1973). Lake whitefish dominated the fishery in 1975 by number and biomass. They were probably introduced from Lake Roosevelt through the feeder canal. Spawning, incubation, and emergence were mostly unaffected by water level fluctuations since these events occurred when the reservoir was held nearly constant at full pool (Stober et al.1976).

Burbot.—Burbot were stocked by WDFW in 1988 in an attempt to restore the fishery expended as a result of over harvest in the 1960's (WDFW, Region 2, unpublished data). A burbot population exists in Lake Roosevelt and the population may have originated as a result of entrainment through the feeder canal.

Northern Pike.—One northern pike was present in the creel survey conducted by Spence (1965). Duff (1973) confirmed the introduction of pike in the reservoir. It is probable that the northern pike occurrence was the result of an angler introduction or entrainment from Lake Roosevelt.

Largemouth bass.—Largemouth bass were present in the small lakes of Grand Coulee prior to inundation. They dominated, along with pumpkinseed, in the 1952-54 creel survey. During the Stober surveys in the mid 1970's largemouth bass still represented an important part of the fishery with approximately the same catch, but lower catch per unit effort as in the early fifties. Largemouth bass numbers seemed to be declining in recent years but the absence of accurate data makes this difficult to determine (USFWS 2002).

Smallmouth Bass.—Smallmouth bass (*M. dolomieui*) were planted in 1981 by WDFW (WDFW, Region 2, unpublished data). They were present in a 1981 creel survey and in bass tournaments during the years 1984-1987 in low numbers; however, their numbers have since increased.

Walleye.—Walleye established a small reproducing population in Banks Lake in the 1960's as reported by Spence (1965). They were probably introduced from Lake Roosevelt as a result of hydro operations as they were known to occur in Lake Roosevelt. WDFW began supplementing the walleye population in 1992, and continued during the years 1995 through 1998.

Yellow Perch.—Yellow perch occurrence in Banks Lake is likely a result of entrainment from Lake Roosevelt. Although the abundance of yellow perch was low in Banks Lake during the 1952-54 creel census, (Nelson 1954) its adaptability combined with high reproductive potential led to its becoming the most successfully abundant species by number during the 1970's (Stober et al. 1975).

Black Crappie.—Black crappie were thought to be introduced via Lake Roosevelt or through angler introduction (Stober et al. 1975).

Pumpkinseed.—Pumpkinseed were present in the small lakes of Grand Coulee prior to inundation. They were dominant in the 1952-54 sport catch, but in the early 1970's few were taken.

Bluegill.—Duff (1973) reported bluegill in the fishery in the early 1970's, which were probably introduced via an illegal plant by anglers. However, Stober (1974) did not find any bluegill present during the reservoir wide survey of 1973-74.

Brown Bullhead.—Brown bullhead may have been entrained from Lake Roosevelt; however, Stober et al. (1975) reasoned that the brown bullhead occurrence in Banks Lake was likely a result of an introduction from an angler since it was not known to occur in Lake Roosevelt during the early 1970's.

Carp.—Carp are believed to occur in Banks Lake as a result of an introduction from Lake Roosevelt through the irrigation pumps. They were present in creel surveys during the latter 1970's and early 1980's.

Channel Catfish.—Channel catfish (*Ictalurus punctatus*) may have been inadvertently introduced into Banks Lake via escapement from a net pen experiment conducted by WDFW in 1988.

Native Non-Game Species.—The mountain whitefish, peamouth, longnose, largescale and bridgelip (*Catostomus columbianus*) suckers, northern pikeminnow, and prickly sculpin are indigenous to the Columbia River system and probably were introduced into Banks Lake as a result of irrigation water input from Lake Roosevelt

(Stober et al. 1975). Few of these species were captured by Stober and workers except for the prickly sculpin. They were the most abundant non-game species in 1975.

Additional Species.—Additional species documented in Banks Lake include yellow bullhead (*Ameiurus natalis*), and white catfish (*Ictalurus catus*) (USFWS 2002).

1.4 Entrainment

Stober and workers examined entrainment at the north end of the reservoir via input from irrigation water from Lake Roosevelt, the immigration and/or emigration of fish during pump/generation operation, and entrainment through the irrigation canals at the south end of the reservoir during the years 1974 through 1976.

Feeder canal—Fish were pumped into Banks Lake from Lake Roosevelt at the feeder canals at a lower rate and different species composition than they were pumped out through the irrigation canals. Prickly sculpin, kokanee and largescale sucker were the primary species entrained from Lake Roosevelt in 1975-76, and were entrained at a rate of 0.66 fish/hour (Stober et al. 1976).

Pump / Generation.—Limited investigations revealed that the pump-generation flow (P/G 7 & 8) resulted in relatively minor fish loss. The mean entrainment rate in 1975 was 4.1 fish/hr consisting mostly of small rainbow trout stocked in the fall of 1974. In 1976, the entrainment rate had declined to 1.6 fish/hr. Other species observed included whitefish, chinook, and yellow perch (Stober et al. 1976). Ice and snow cover could have affected these results, as it might have inhibited fish movement leading to an underestimation of total entrainment. The lack of surveys in November and December, a period of greater fish movement, may also have underestimated total entrainment.

Irrigation canal.—Entrainment through the irrigation outlet canal totaled 436,216 fish (110,338 kg biomass) in 1975-76. Yellow perch, kokanee, and lake whitefish were the primary species entrained out of nineteen total species. Northern pikeminnow, brown trout, and bridgelip sucker were the only species that did not occur in the irrigation canal catch (Stober et al. 1977). The timing of entrainment was associated with sexual maturity and pre-spawning activity (Stober et al. 1976).

Stober et al. (1979) conducted more extensive sampling of entrainment through the irrigation canals in 1977 and 1978. They found that the relative abundance of entrained kokanee had decreased to 17.8 % in 1977, compared to 67.4 % in 1975 and 59.6 % in 1976. The catch per haul was reportedly affected by schooling behavior, maturation, and temperature avoidance. They also conducted a mark-recapture study and found that kokanee moved as far as 30 km. A few kokanee were fitted with sonic tags to determine the behavior of fish encountering a barrier net placed in front of the irrigation canal. The barrier net was effective at excluding some of the kokanee from the intake at the irrigation canal (Stober et al. 1979).

1.5 Historical Limnology

Stober and colleagues were contracted in 1973 by the Bureau of Reclamation to assess how the effect pumped storage and irrigation withdrawal impacted the ecology of Banks Lake. The following consists of findings from their limnological studies during the years 1973 through 1976. In summary, they characterized Banks Lake as being divided into two pools, the north pool and the south pool. The north pool, which extends from the North Dam to the Steamboat Rock area, is characterized by a reduction in temperature, transparency, retention time, and zooplankton abundance and by an increase in both nutrients and phytoplankton standing stock when compared to the south pool (Stober et al. 1976).

Temperature.—Temperature observations indicated that Banks Lake is a complex river-run reservoir during the irrigation season and reverted to thermal characteristics of a typical northern latitude lake thereafter. In late spring, as air temperature increased, a thermal stratification was evident at all stations; however, once pumping through the feeder canal began, stratification at the north end disappeared due to turbulent mixing. The cool, dense water pumped in caused an underflow as it met with warmer water in the southern end, causing stratification until September when ambient temperature and pumping rates decreased. The reservoir had turned over by mid-September in 1973 and 1974 (Stober et al.1975).

Transparency.—The south end of the reservoir exhibited the greatest transparency primarily due to the lack of littoral zones in that area. Maximum transparency occurred during winter, while the minimum occurred during spring phytoplankton blooms. Generally, transparency increased from north to south and was influenced by suspended sediment due to phytoplankton standing crop, wave action, and pump induced turbidity (Stober et al. 1976).

PH.—No trends were detected for pH throughout the reservoir and values ranged from 5.7 to 9.0 (Stober et al. 1976).

Dissolved Oxygen.—Dissolved oxygen saturation levels were consistently high. A minimum of 42 % oxygen saturation was observed and only 14 out of 236 observations were less than 70 %. The northern sections of the reservoir exhibited less of a dissolved oxygen stratification due to turbulent mixing compared to the southern end of the reservoir (Stober et al. 1976).

Ionic Composition.—The ionic composition of Banks Lake was dominated by calcium, magnesium, carbonate, and bicarbonate, similar to, but slightly less than Lake Roosevelt. An increase in sodium and potassium was demonstrated from north to south. Sulphate concentrations were higher in the northern end of the reservoir (Stober et al. 1976). A small decline in water hardness was observed during the summer. Water hardness for the system was described as soft to moderately hard (Stober et al. 1976). Conductivity was highest during May, after pumping began from Lake Roosevelt, and lowest in December. Conductivity levels were reportedly low, but normal for the Columbia Basin (Stober et al. 1976).

Silica.—Silica increased with pumping in the spring and declined through the production season when diatoms were actively assimilating this nutrient (Stober et al. 1977).

Phosphate & Nitrogen.—Orthophosphate levels increased correspondingly to pumped water from Lake Roosevelt (Stober et al 1976). Supplies of phosphorus and nitrogen increased slightly between 1974 and 1975 and increased significantly in 1976 (Stober et al. 1977).

Nitrogen was a limiting factor for the reservoir. Nitrate concentrations were typically low with lowest values occurring in the summer during phytoplankton production. Nitrate concentrations exhibited a dependency upon, and increased with, water pumped from Lake Roosevelt. Small amounts of nutrients might be contributed from runoff and ground water sources. During years of high drawdown, nutrients are added to the system due to the breakdown and development of terrestrial and littoral vegetation by recycling nutrients in the sediment and the water column. Seasonal runoff and ground water might also contribute small amounts of nitrogen. Most of the nitrogen was depleted by the time it reached the southern end of the reservoir contributing as a limiting factor for phytoplankton blooms in the south end (Stober et al. 1976).

Chlorophyll a.—Pumped input from FDR was observed to dramatically increase chlorophyll α levels at the north end of the reservoir in early June. Chlorophyll levels began to taper off during the summer months, followed by a fall bloom. This trend may have occurred due to the cessation of pumped input and irrigation withdrawal, resulting in the retention of nutrients and or phytoplankton in the north end. In the southern end of the reservoir chlorophyll α concentrations were repeatedly low (Stober et al. 1974).

Primary Productivity.—Major phytoplankton blooms occurred in the northern portion of the reservoir whereas only minor blooms occurred in the southern end due to nutrient limiting factors. Plant production was also increased in the north end by turbulent mixing. Plant production that occurred flowed into the south pool, where it was retained for a longer period of time.

Drawdown during the growing season may have reduced the surface area available for periphyton as well as the volume of the reservoir available for periphyton production, while terrestrial plant production in the littoral zone and aquatic macrophyte production may have been enhanced (Stober et al. 1975).

Zooplankton.—Zooplankton in the north pool was flushed toward the south end reducing retention and development time, although some zooplanktors were flushed into the north end from Lake Roosevelt. Longer retention times, warmer temperatures, and an inflow of phytoplankton promoted greater stability and abundance of zooplankton in the south pool (Stober et al. 1976).

Benthos.—Water level fluctuations have reportedly affected the benthic community by altering the species composition, reducing the total population and relocating the area of maximum abundance (Stober et al. 1976).

Section 2.0 Banks Lake Limnology and Fisheries Surveys, February 2001 to August 2002.

2.1 Introduction

The Washington Department of Fish and Wildlife implemented the Banks Lake Fishery Evaluation Project (BLFEP) in September 2001 with funds from the Bonneville Power Administration. The first year of the BLFEP was used to gather historic information, establish methods and protocols, collect limnological data, and conduct the first seasonal fish surveys.

This annual report will summarize the tasks completed during fiscal year 2001, which started on 1 September, 2001 and ended August 31, 2002. Due to time constraints, this report will not include completed analysis for each task or discussion of results and potential management implications. Technical reports that correspond to calendar years will be published with WDFW, and if appropriate, may replace this report at a later date. The purpose of this report is to show we completed our contract obligations by conducting the tasks outlined in our Statement of Work (Appendix B).

2.2 Methods

2.2.1 Limnology

To understand the primary and secondary productivity of Banks Lake, we collected baseline data on water quality, phytoplankton and zooplankton at three fixed sites, once each month from February to May and twice monthly from June to August. Each fixed site represented different basin morphologies of the reservoir and was located in the north basin (LIM1 – N47°56.106' - W119°04.072'), mid reservoir west of Steamboat Rock (LIM3 – N47°53.059' – W119°08.308'), and the south end near Million-Dollar Mile (LIM5 – N47°43.791' – W119°15.715') (Figure 1). Water quality parameters included temperature, dissolved oxygen, conductivity, turbidity and pH, and were collected from the surface to the bottom at 3-m increments with a Hydrolab Inc. water quality instrument. Water samples (three replicates) were collected at 5 m with a Van Dorn bottle and analyzed for chlorophyll *a* (concentration), phytoplankton (identification, enumeration, density, biovolume), and nitrogen and phosphorous (concentration; mg/L). Water samples were placed on ice with no exposure to light and taken to the limnology laboratory within 24 hours of collection.

Zooplankton was collected with a 50 or 30 cm diameter, 153-micron mesh Wisconsin style net. Three replicate tows were taken from each site from the bottom to the surface. Zooplankton was "fixed" for 20 seconds in 95 % ethanol and then preserved in 70 % ethanol. Laboratory analysis involved zooplankton identification, density and length measurements.

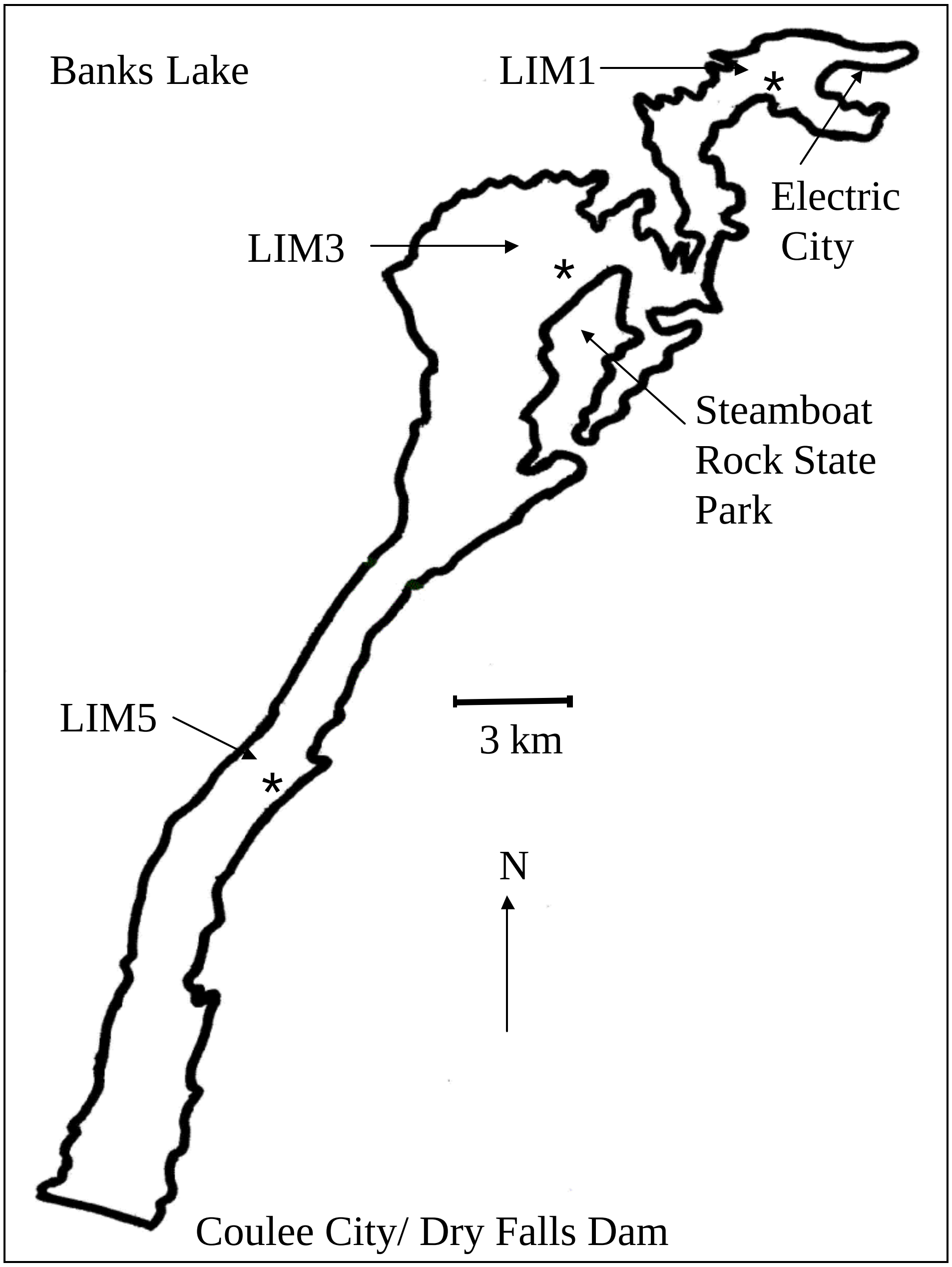

Figure 1. Map of Banks Lake showing the 3 limnology-sampling sites ( ) for fiscal year 2001.

2.2.2 Fish Surveys

We collected baseline fisheries data for littoral and limnetic fish species during the spring from May 27 to June 5, and during the summer from July 22 to August 5, 2002. Shocked and netted fish were measured (TL-mm) and weighed (g), except for age 0 fish that were captured in high numbers during the summer sample. Sub samples of these fish were measured and weighed from each site and the remaining fish were counted and a total weight was recorded for the batch. Scale samples were taken from live fish and scales and otoliths from dead fish. Diet samples were collected using gastric lavage from live fish collected via electrofishing. Additional diet samples were taken from gill netted fish to supplement species and size classes that were not adequately sampled with electrofishing gear. Stomachs and stomach contents were preserved in 95% ethanol. Bass and walleye were tagged prior to release. A dorsal muscle tissue sample was taken from a subset of fish for a future food web study of isotope ratios.

Littoral zone.—To determine littoral sample sites, the reservoir was stratified into three regions determined by basin morphology (Figure 2). Arcview software was used to divide the shoreline, including islands, into 462 sites that were 400 m long each. Sample sites were then randomly selected using Statview. Our minimum goal was to sample 15 % of the shoreline sites; however, efforts were made in May and July to sample more sites to allow for a statistical power analysis to determine the appropriate sampling intensity for future studies.

We used the standard protocol from the WDFW Warm Water Fish Survey Manual (Bonar et al. 2000) to determine fish species composition, CPUE, and collection of biological data for determining growth, age, condition factor and relative weight. Specific capture methods included boat electrofishing, gill netting, and fyke netting in a 3:2:2 ratio. Gill nets were 1.8 m deep 61 m long and consisted of 7 mesh sizes in equal length panels; stretch mesh measurements were 25, 38, 51, 64, 76, 102, and 152). Each electrofishing boat set gill nets and fyke nets just prior to dusk, and retrieved the nets the following morning. Electrofishing boats traveled parallel to the shoreline at night and sampled for 600 consecutive seconds. To initiate fish galvanotaxis, we produced 2 amps by setting the voltage to low power, the frequency to 30 Hz DC and the range to 42 % of duty cycle. Shocked fish were collected with dip nets and placed into a live well.

Hydroacoustic surveys.—We used an HTI model 241 echosounder with two 200 kHz transducers; a 15° split-beam transducer in vertical orientation and a 6° x 10° elliptical split-beam transducer in horizontal orientation. The transducers were clamped to a pole and mounted to the starboard side of 6.7 m vessel 1 m below the surface. Data were logged directly into a computer and unprocessed echoes were backed up using digital audiotapes. A pulse repetition rate of 8 pings per second was fast multiplexed between the transducers at a pulse width of 1.25 ms and a 10 kHz pulse width chirp. The horizontal transducer was offset by 7° and sampled fish targets from 1.5- to 8 m below the surface. Data within 16 m of the horizontal transducer was excluded from analysis due to the narrow beam width and potential boat avoidance by fish in the near field (Mous and Kemper 1996; Yule 2000). The vertical transducer data were analyzed from 8 m below the transducer (9 m subsurface) to within 1 m of the bottom of the reservoir. Additionally, we had to correct our fish counts within each 2 m strata for the probability

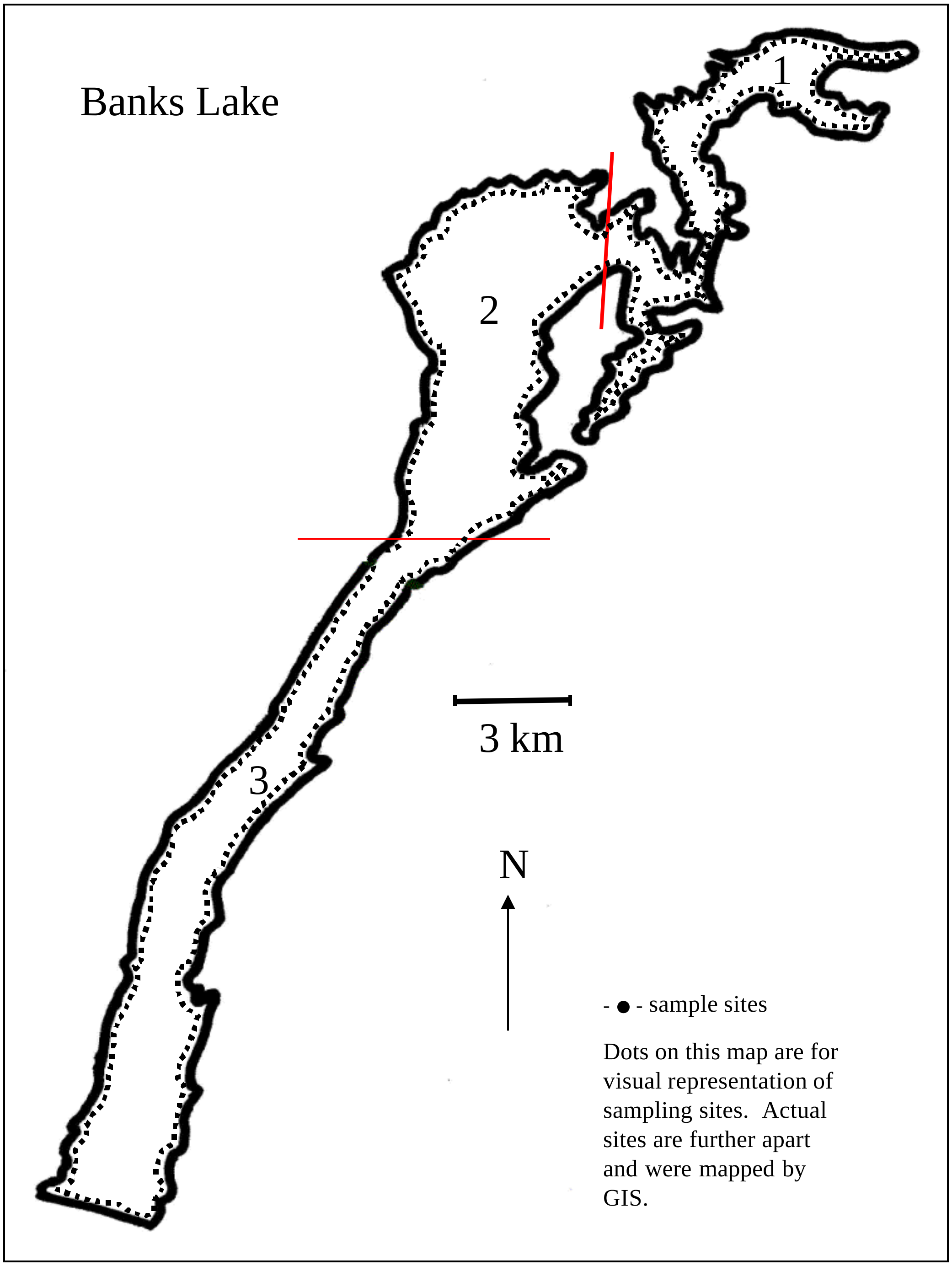

Figure 2. Map of Banks Lake showing 3 stratified regions for nearshore fish surveys. Nearshore sampling sites began every 400 m and included islands not shown on this map.

of detection of fish targets based on the diameter of the sound impulse cone and the fish velocity (boat speed).

Eighteen transects were conducted in an elongated zigzag pattern across the limnetic zone of Banks Lake on 27 May and 29 July 2002 (Figure 3). The survey began one hour after sunset and each transect covered 1.4 to 3.7 km at a speed of approximately 8 km/hour, for a total survey distance of 51.4 km. A global positioning system (GPS) logged the latitude and longitude into the data files and transect distances were calculated using MapSource software (Garmin 2000).

A series of acoustic echoes were considered a fish if tracked for at least 3 consecutive pings, within 0.3 m/ping, a maximum velocity of 5 ms/ping, and a target strength between –55 and –28.8 dB. Target strengths were converted to fish lengths using a formula generated by Love (1971, 1977).

Density (fish/m^3) was calculated for each transect and transect densities were averaged together for a reservoir wide estimate of fish density. Mean fish density was then multiplied by reservoir volume to estimate abundance. Two standard errors were used to estimate the 95 % confidence interval of the acoustic abundance estimate. For each transect, individual tracked fish were verified as real within the post processing software Echoscape 2.10 (HTI 2001). Raw fish counts were adjusted to the effective beam width within each 2 m depth strata by the equation:

$$F_1 = F_0 * [1-(EBW/NBW)]$$

where F_1 was the adjusted fish count, F_0 was the original fish count EBW was the effective beam width for that stratum and NBW was the nominal beam width for the transducer. Density was calculated by dividing the adjusted fish count by the total swept volume for each transect. Swept volume was calculated as the sum of the volumes for every 2 m depth strata for each transect, adjusted for bottom encroachment and multiplied by transect length. The volume of each strata was calculated by the equation:

$$Vs_1 = V_1 – V_2$$

where V_1 was the volume from the transducer to the bottom of the stratum and V_2 was the volume from the transducer to the top of the stratum and:

$$V = [½* b * h * (l*e)]$$

where e was the percent bottom encroachment (proportion of the transect where bottom depths were equal to or greater than the max depth of the stratum), l was the distance (m) of the transect, h was the distance (m) from the transducer to the end of the stratum, and b was the beam diameter calculated by:

$$b = 2 R \tan(NBW/2)$$

where R is the range (m) to the end of the stratum.

Species specific abundance estimates were calculated by multiplying the species composition of various size classes by the acoustic abundance estimates for the

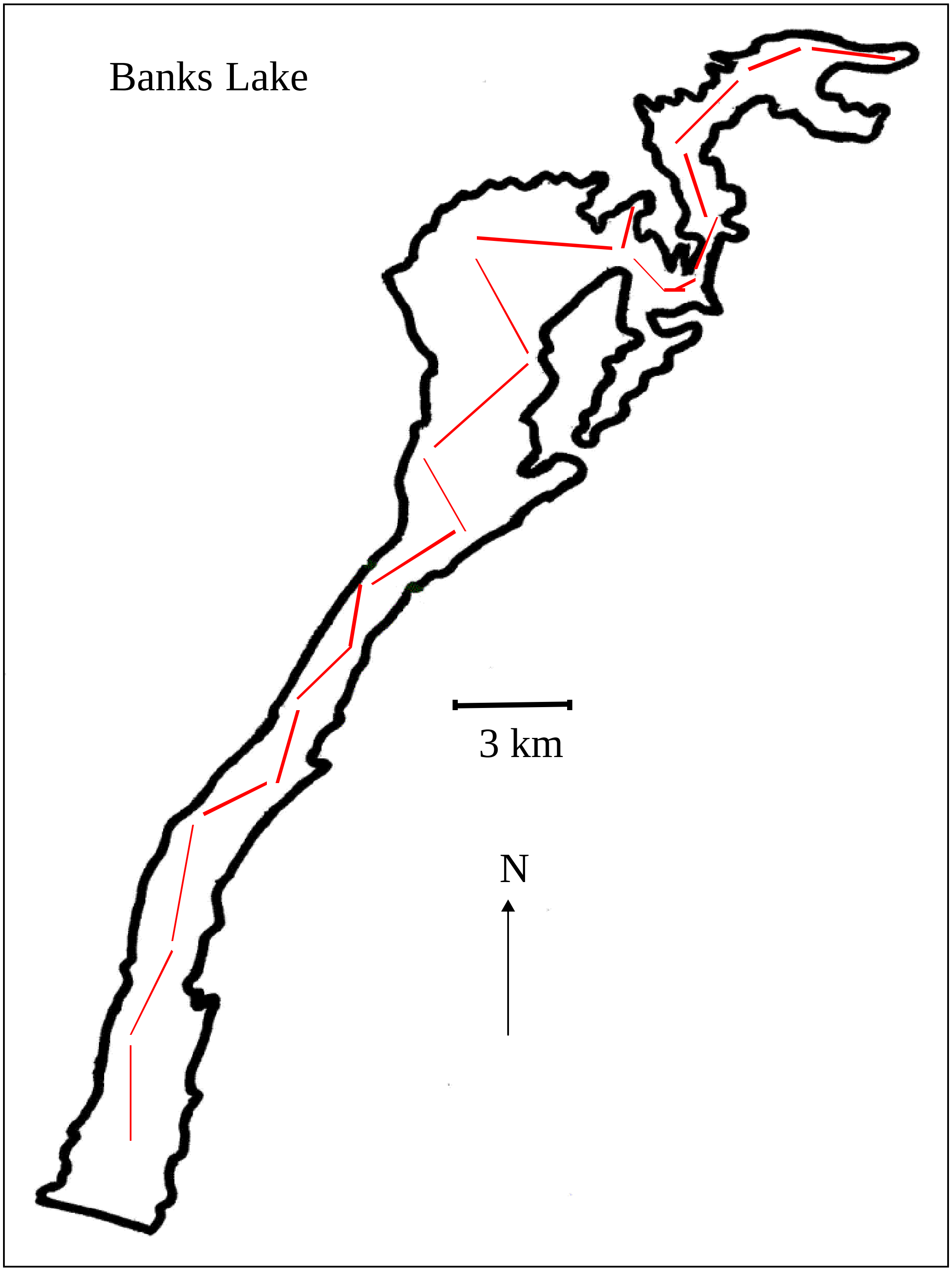

Figure 3. Map of Banks Lake, WA showing locations of hydroacoustic transects where data was collected in May and July of 2002. The southern most transect was not surveyed due to insufficient nighttime hours.

corresponding sizes. We applied the length frequency from the vertical transducer to the horizontal data because fish target echoes in horizontal aspect do not relate to fish length as they do in vertical aspect (Kubecka 1994; Yule 2000). The assumption that fish species composition and size distribution was the same from 1.5- to 8 m (horizontal acoustics) and from 8- to 25 m was validated with netting data.

Limnetic gill net surveys.—Limnetic gill net surveys were used to provide species verification, depth distributions, and length frequencies of acoustic targets larger than 200 mm. The night of the acoustic survey, and for 3 nights following the survey, 7-14 vertical gill nets and one floating and one sinking horizontal gill net were randomly placed in the limnetic zone of Banks Lake. The 14 vertical nets consisted of replicate samples of seven nets that were 2.6 m wide and 26.2 m deep, and consisted of one mesh size throughout (25, 38, 51, 64, 76, 89, or 102 mm stretch). Horizontal nets were 2.6 m deep and 46 m long with seven panels (same mesh array as the verticals) that were 6.5 m long. We covered 20 % (51 of 252) of the potential limnetic sampling sites that were deep enough (at least 12 m) to sample. Maptech software was used to spatially segregate (~500 m diameter) the limnetic sampling sites by placing a point near the center of each quadrant of each section in their respective township and range. Additional points were added along the north, south, east, and west borders of each section, as well as the center point (Figure 4). This method provided uniform coverage, representative offshore sites throughout the reservoir, and a GPS point to navigate to for net deployment.

2.1.3 Fish Tagging and Marking

Future modeling studies will require an estimate of the abundance of piscivores to expand individual predator consumption to the entire population in order to determine the impact of predation on the hatchery and wild salmonids. We conducted a pilot study to evaluate marking strategies, recapture probabilities, and exploitation of marked fish. We used the Big Wally's Walleye Tournament (18-19 May 2002) and the Washington State BASS Federation's Bass Jamboree (25-27 May 2002) to maximize the number of fish for marking. Two, 2-person crews attempted to tag all fish that were returned to the tournament holding tanks. Each fish was measured in mm (TL) and an individually numbered 3 cm FLOY© T-bar anchor tag was inserted adjacent to the posterior end of the first dorsal fin. Due to the size of the tags, we only tagged bass that were larger than 200 mm. The recapture event took place during the reservoir-wide fish survey in May and June.

Hatchery kokanee were marked to evaluate the success of different stocking and rearing strategies, and to distinguish hatchery kokanee from wild kokanee. A net pen was obtained by WDFW Fish Management staff and was constructed and deployed on Banks Lake near Electric City to rear kokanee fingerlings through the fall and winter, until their release in May 2002. The Spokane Tribal Hatchery marked net pen kokanee with an adipose and left pelvic fin clip. Nearly 700,000 kokanee fry were released directly into Banks Lake during June 2002, and were marked with a single oxy-tetracycline (OTC) mark by the Ford Hatchery and Spokane Tribal Hatchery. The otoliths or vertebrae from all kokanee captured in the creel and fish sampling will be examined for the OTC mark.

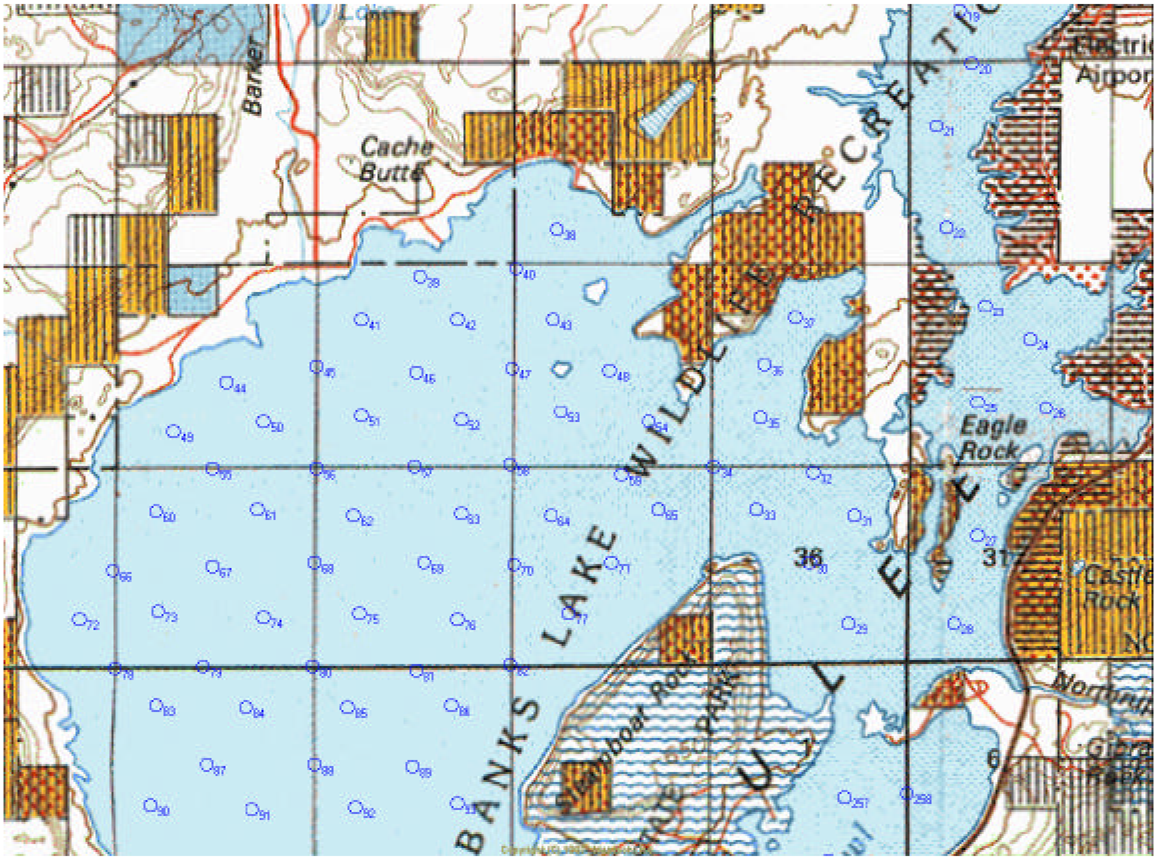

Figure 4. Partial map of Banks Lake showing the layout of limnetic sampling sites. Approximately 20% of the sites were randomly selected and surveyed with vertical and horizontal gill nets.

2.3 Results

2.3.1 Limnology

Water Quality.—Banks Lake water temperatures began to increase in April, stratification was apparent by June at all 3 limnology collection sites (Figures 5,6,7). By late August the thermocline had dropped to nearly 20 m deep, with 19-20 °C temperatures throughout the epilimnion and very little thermal refuge for kokanee (Figures 5,6,7). Dissolved oxygen levels were generally above 10 mg/L until mid summer when dissolved oxygen dropped near or below 5 mg/L below 20 m deep; a critical level for fish survival and growth. Secchi depths ranged from 3-10 m and varied by location and date (Figure 8). All water quality parameters results can be seen in Appendix C.

Primary and Secondary Productivity.—Three replicate samples were collected at three limnology sites on 21 February, 19 March, 23 April, 22 May, 12 June, 25 June, 9 July, 23 July, 5 August, and 22 August. Results can be seen in Appendix D; however, phytoplankton and paraphyton biovolume data were not available from the contracted limnology laboratory at the time of this report.

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2.3.2 Fish Surveys

Littoral zone surveys.—In May, 51 sites were electrofished for a combined total of 30,033 seconds (8.34 hrs), 22 sites were gill netted and 22 sites were sampled with fyke nets. In all, 95 of 462 sites were surveyed for 21% shoreline coverage. A total of 1,184 fish were collected during the littoral surveys (Table 1). Electrofishing, gill nets, and fyke nets captured 691, 450, and 43 fish, respectively. Catch rates were highest for electrofishing (82.8 fish/hour), intermediate for gill nets (20.5 fish/night), and lowest in fyke nets (1.9 fish/net night) (Table 2).

In July, 45 sites were electrofished for a combined total of 24,632 seconds (6.84 hrs), 24 sites were gill netted and 16 sites were sampled with fyke nets. In all, 85 of 462 sites were surveyed for 18% shoreline coverage. A total of 1,310 fish were collected during the littoral surveys (Table 3). Electrofishing, gill nets, and fyke nets accounted for 775, 425, and 105 fish, respectively. Catch rates were highest for electrofishing (113.27 fish/hour), intermediate for gill nets (17.71 fish/night), and lowest in fyke nets (6.56 fish/net night) (Table 2).

Hydroacoustic surveys.—In May, 847 fish targets were detected on the vertically oriented transducer with an average density of 4.0 fish / 10,000 m^3 (2.4; 95 % CI) The horizontally oriented transducer detected 3810 fish for an average density of 13.4 fish / 10,000 m^3 (4.3; 95 % CI). Highest densities occurred in the upper 10-15 m of the water column and in the middle sections of the reservoir from the Northrup Creek area to the southern end of Steamboat Basin (Figures 3 and 9). Reservoir-wide abundance of all fish targets between 30 and 700 mm was 2.5 million (0.9 million; 95 % CI). When divided by the surface area of the reservoir this translated to 231 fish / ha. There was an even distribution of fish targets larger (51 %) and smaller (49 %) than 200 mm.

In July, similarly high densities of fish targets were observed during the survey. Results for the July survey were not available at the time of this report, but 18 transects

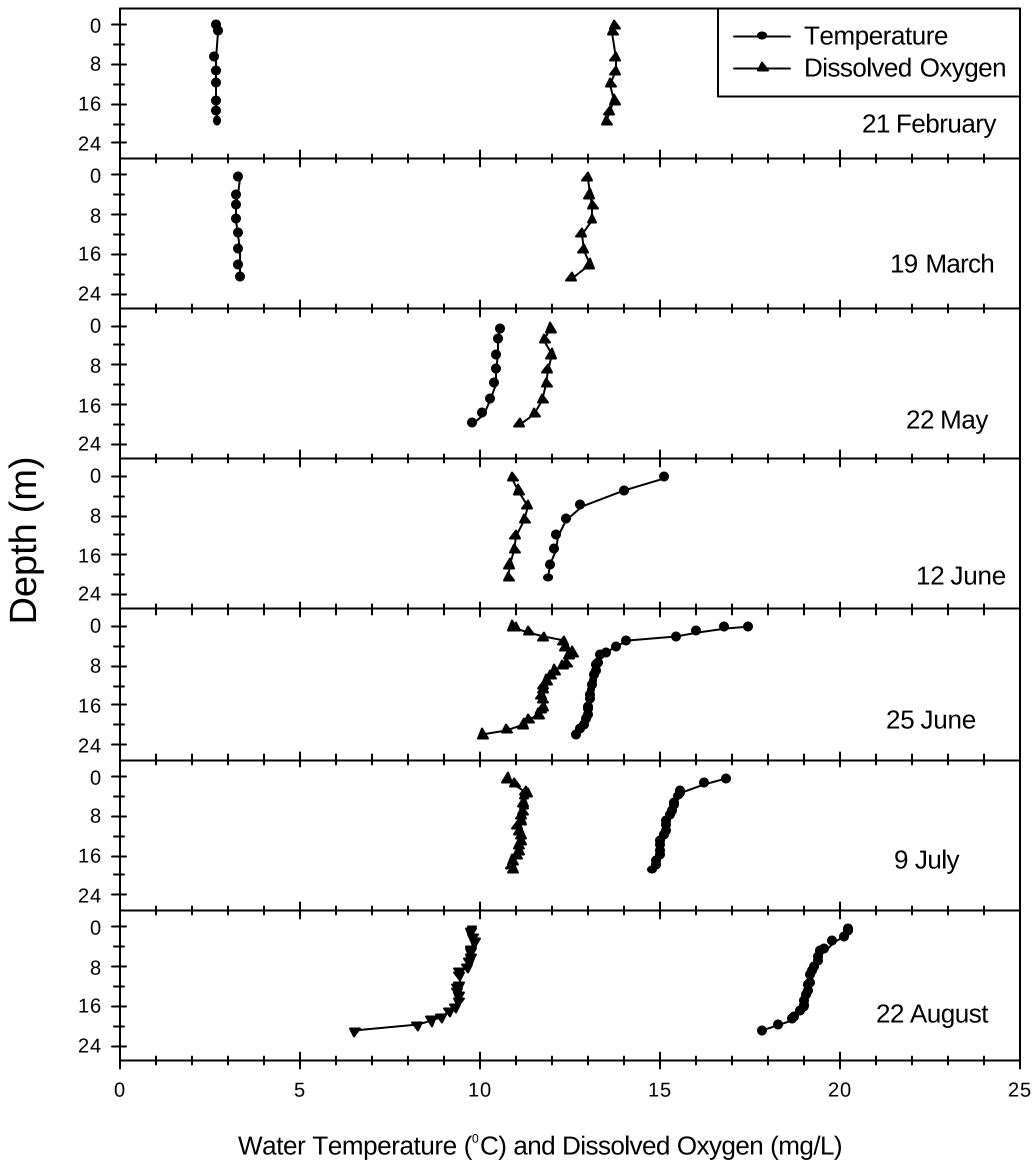

Figure 5. Temperature and dissolved oxygen profiles for limnology site 1 (LIM1) on Banks Lake from February to August, 2002. No data was available for April at this site.

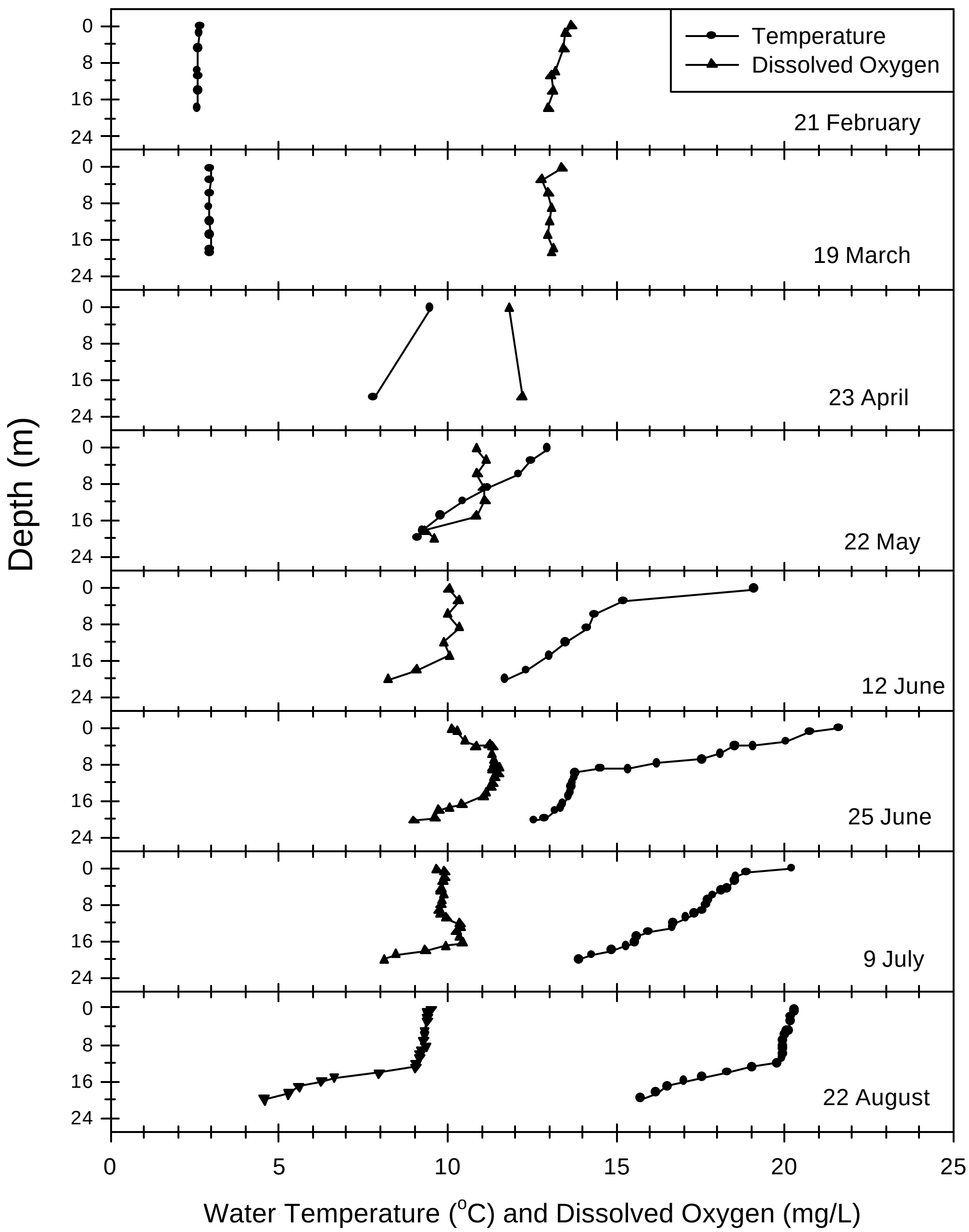

Figure 6. Temperature and dissolved oxygen profiles for limnology site 3 (LIM3) on Banks Lake from February to August, 2002.

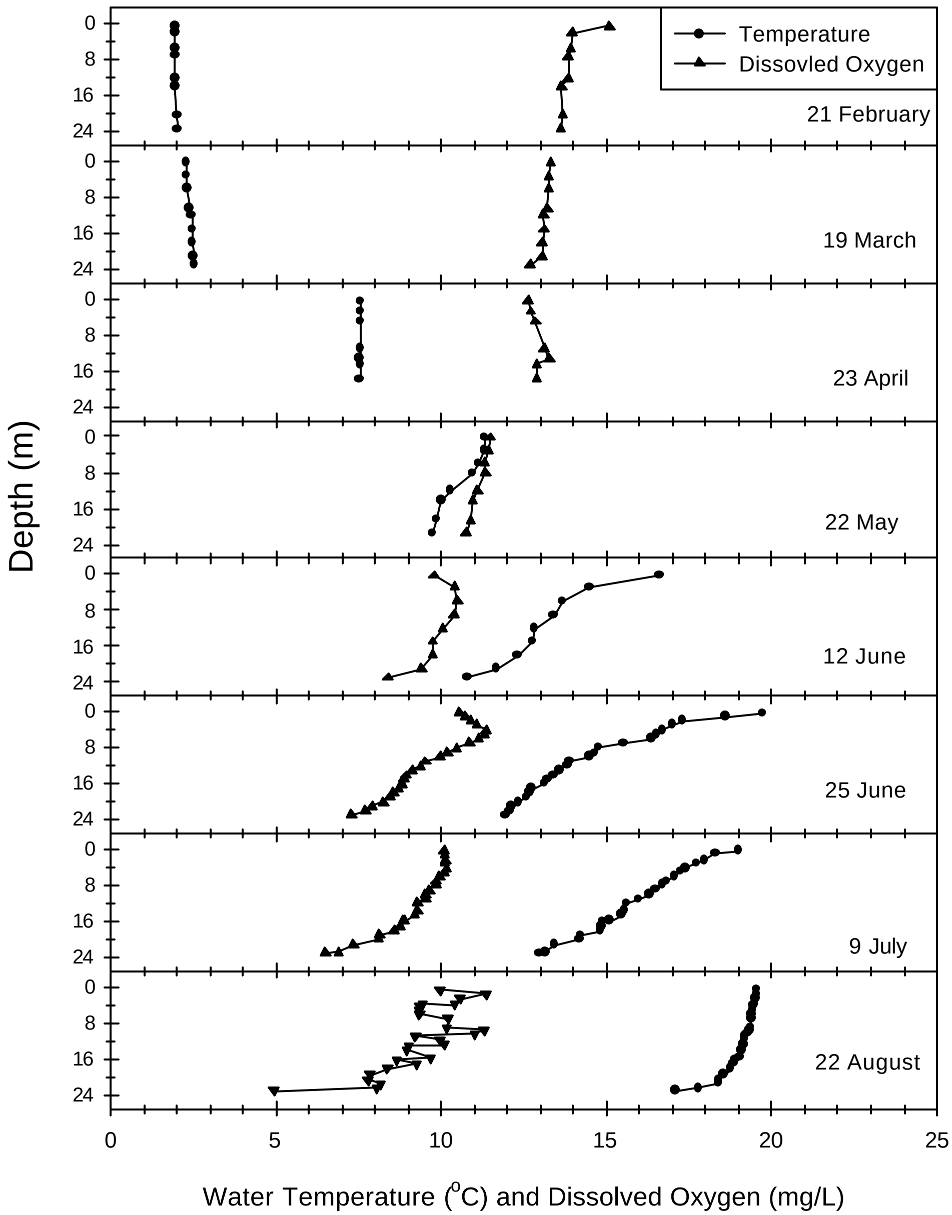

Figure 7. Temperature and dissolved oxygen profiles for limnology site 5 (LIM5) on Banks Lake from February to August, 2002.

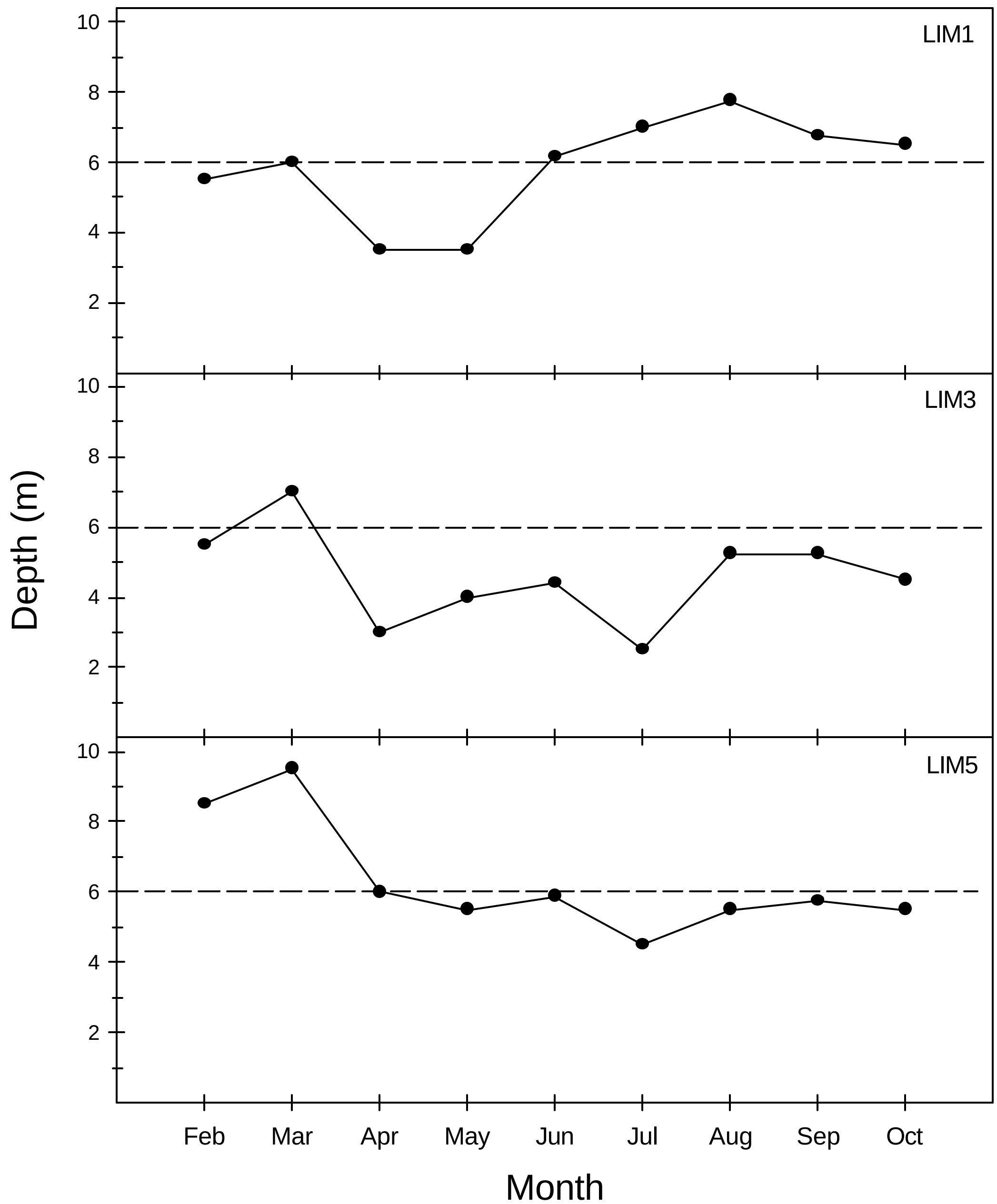

Figure 8. Monthly secchi disk depths (m) at each water quality site on Banks Lake from February to October, 2002. LIM1 was in the northern basin, LIM3 was in the basin west of Steamboat Rock, and LIM5 was in the southern arm near the Million Dollar Mile. Measurements were recorded twice per month from June to October and the averages were reported.

Table 1. Number of fish collected, species composition (%n) and the minimum and maximum lengths of fish captured in littoral gill nets, fyke nets and boat electrofishing surveys from 27 May to 5 June, 2002 on Banks Lake, WA.

			Length (mm)	
Species	Number	% n	Minimum	Maximum
Black Crappie	2	0.2	75	84
Bluegill	0	0.0	-	-
Bullhead spp.	61	5.2	30	359
Burbot	5	0.4	577	678
Carp	154	13.0	282	710
Cottid spp.	217	18.3	44	195
Kokanee	0	0.0	-	-
Largemouth Bass	9	0.8	203	534
Longnose Sucker	11	0.9	383	515
Peamouth	3	0.3	306	364
Pumpkinseed	2	0.2	85	132
Rainbow Trout	54	4.6	88	452
Smallmouth Bass	294	24.8	62	594
Tench	0	0.0	-	-
Walleye	76	6.4	86	775
Whitefish spp.	239	20.2	192	572
Yellow Perch	57	4.8	64	325
Unknown	0	0.0	-	-
Total	1184			

Table 2. Catch-per-unit of effort by species for all littoral gear types for May and July, 2002 on Banks Lake, WA.

	Electrofishing Fish/hour		Fyke Nets Fish/net night		Littoral Gill Nets Fish/net night	
Species	May	July	May	July	May	July
Black Crappie	0.00	0.44	0.09	2.25	0.00	0.08
Bluegill	0.00	0.15	0.00	0.81	0.00	0.17
Bullhead spp.	3.00	4.53	1.23	0.25	0.41	0.54
Burbot	0.00	0.00	0.00	0.00	0.23	0.17
Carp	11.51	8.77	0.09	0.06	2.55	3.54
Cottid spp.	25.77	10.38	0.09	0.00	0.00	0.00
Kokanee	0.00	0.00	0.00	0.00	0.00	0.13
Largemouth Bass	0.96	1.46	0.00	0.00	0.05	0.08
Longnose Sucker	0.24	0.00	0.14	0.00	0.27	0.13
Whitefish spp.	0.00	0.00	0.00	0.00	10.86	3.58
Peamouth	0.00	0.00	0.00	0.00	0.14	0.00
Pumpkinseed	0.00	0.29	0.09	0.25	0.00	0.00
Rainbow Trout	3.96	0.00	0.05	0.00	0.91	1.96
Smallmouth Bass	30.33	43.12	0.00	0.13	1.86	3.88
Tench	0.00	0.00	0.00	0.13	0.00	0.00
Unknown	0.00	1.32	0.00	0.06	0.00	0.00
Walleye	1.32	2.19	0.05	0.00	2.91	2.38
Yellow Perch	5.75	40.63	0.14	2.63	0.27	1.08
Total	82.83	113.27	1.95	6.56	20.45	17.71

Table 3. Number of fish collected, species composition (%n) and the minimum and maximum lengths of fish captured in littoral gill nets, fyke nets and boat electrofishing surveys from 22 July to 5 August, 2002 on Banks Lake, WA.

			Length (mm)	
Species	Number	% n	Minimum	Maximum
Black Crappie	41	3.1	36	358
Bluegill	18	1.4	56	75
Bullhead spp.	48	3.7	45	388
Burbot	4	0.3	434	579
Carp	146	11.2	74	745
Cottid spp.	71	5.4	39	140
Kokanee	3	0.2	115	265
Largemouth Bass	12	0.9	32	392
Longnose Sucker	3	0.2	415	478
Peamouth Chub	0	0.0	-	-
Pumpkinseed	6	0.5	70	136
Rainbow Trout	47	3.6	230	465
Smallmouth Bass	390	29.8	37	470
Tench	2	0.2	332	343
Walleye	72	5.5	110	634
Whitefish spp.	91	7.0	193	552
Yellow Perch	346	26.4	12	297
Unknown	10	0.8	46	65
Total	1310			

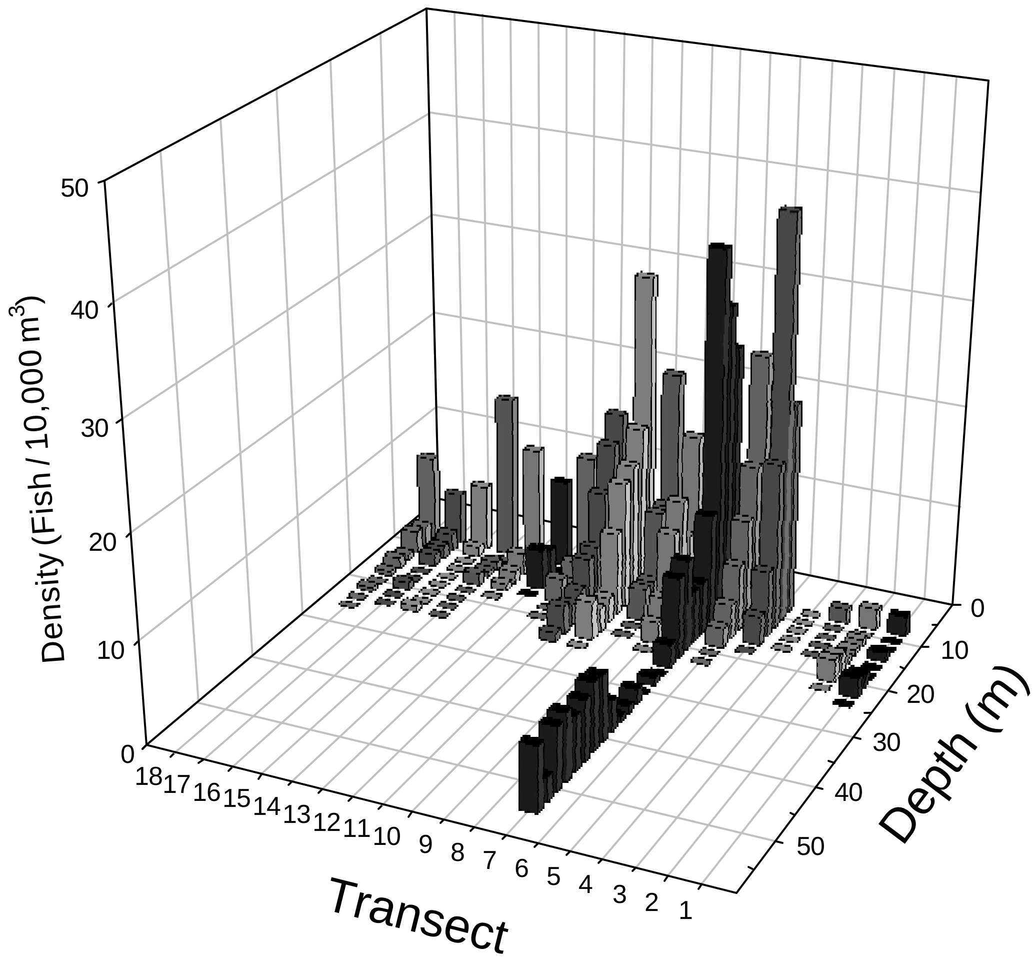

Figure 9. Density by depth of fish determined by hydroacoustics for Banks Lake, May 2002. Transect 1 began at the North Dam and transect 18 ended near Goose Island at the south end of the reservoir. Transect 7 extended into Devils Lake North of Steamboat Rock and was the only transect where depths exceeded 26 m.

were surveyed on 29 July. A complete analysis of the 2 surveys will be completed in future technical reports.

Limnetic gill net surveys.—In May, 48 limnetic sites were sampled with a combination of vertical and horizontal gill nets. Our goal of 51 net sets was not accomplished due to inclement weather and associated safety hazards. Limnetic nets caught 157 fish during three nights. Vertical gill nets accounted for 38 % of the total catch, primarily catching whitefish (93 %). The floating horizontal net only caught whitefish (58 %) and rainbow trout (42 %), and the sinking horizontal caught several species including whitefish (60 %), smallmouth bass (24 %) and carp (9 %). No kokanee stocked in 2002 were captured, and only one adult kokanee was caught during the May survey (Table 4). Catch rates were the highest in the sinking gill net (26.3 fish/net night) and lowest in the vertical gill nets (1.40 fish/net night) (Table 5).

In July, 63 limnetic sites were sampled with a combination of vertical and horizontal gill nets. Limnetic nets caught 351 fish; however 219 fish (206 whitefish) came from ten net nights of vertical effort in Devils Lake with 46 m deep vertical nets (Table 6). Eighteen kokanee were captured in July; however, they only represented 5% of the total catch and have not yet been examined for OTC marks (Table 6). Catch rates were similar in vertical and sinking horizontal gill nets (5.8 fish/net night) and lowest in the floating horizontal net (0.50 fish/net night) (Table 5).

Aging structures, tissue samples, and stomach contents were taken from various fish during the two sample periods as shown in Tables 7 and 8. All stomach contents have been analyzed in the laboratory for the proportional contribution of various prey taxon. The WDFW fish scale and otolith laboratory in Olympia was not able to analyze growth structures in time for this report. Future technical reports will include complete analysis of age, growth, relative weight, diet, isotope food web structure, and fish bioenergetics.

2.3.3. Fish Tagging and Marking

During the Big Wally's Walleye Tournament, we tagged 526 walleye between 386 mm and 765 mm. An additional 67 walleye were caught, but died while being transported to the weigh station or in the live well on the barge. We tagged a total of 1,279 smallmouth bass and 201 largemouth bass during the Washington State BASS Federation's Bass Jamboree. Tagged smallmouth bass and largemouth bass ranged from 242-654 mm and 295-498 mm, respectively. During the spring reservoir-wide fish survey, we tagged an additional 129 smallmouth bass, 6 largemouth bass, and 9 walleye (Table 9).

Approximately 31,000 kokanee were transferred into the Electric City net pens on November 13, 2001. Mean size at stocking was 106 mm ± 17 SD. The mean size of the net pen kokanee on May 19, 2002 was 166 mm ± 16 SD, resulting in a mean growth rate of approximately 60 mm in five months. We also conducted quality control in May to evaluate in mark (fin clip) presence and quality on the net pen kokanee. The beginning of pelvic fin regeneration was evident; however, the clips were still evident. A total of 80 fish were examined and 70 % had the correct marks (including partially regenerated fins) and 30% had one or both of the required clips absent. Of the 30 % of the fish with incorrect clips, 21.3 % had a pelvic clip only, 7.5 % had an adipose clip only, and 1.3 % had no fin clips.

Table 4. Number of fish collected, species composition (%n) and the minimum and maximum lengths of fish captured in limnetic gill nets in May, 2002 on Banks Lake, WA.

			Length (mm)	
Species	Number	% n	Minimum	Maximum
Black Crappie	0	0	-	-
Bluegill	0	0	-	-
Bullhead spp.	0	0	-	-
Burbot	1	0.6	565	-
Carp	7	4.5	486	563
Cottid spp.	1	0.6	62	-
Kokanee	1	0.6	193	-
Largemouth Bass	0	0	-	-
Longnose Sucker	0	0	-	-
Peamouth	0	0	-	-
Pumpkinseed	0	0	-	-
Rainbow Trout	12	7.6	220	387
Smallmouth Bass	19	12.1	74	315
Tench	0	0	-	-
Walleye	3	1.9	228	542
Whitefish spp.	113	72.0	282	741
Yellow Perch	0	0	-	-
Unknown	0	0	-	-
Total	157			

Table 5. Catch-per-unit of effort by species for all limnetic gill nets for May and July, 2002 on Banks Lake, WA.

	Floating Horizontal Fish/net night		Sinking Horizontal Fish/net night		Vertical Fish/net night	
Species	May	July	May	July	May	July
Black Crappie	0	0	0	0	0	0
Bullhead spp.	0	0	0	0	0	0
Burbot	0	0	0.33	0	0	0
Carp	0	0	2.33	0	0	0
Cottid spp.	0	0	0.33	0	0	0
Kokanee	0	0.25	0.33	0.4	0	0.28
Largemouth Bass	0	0	0	0	0	0
Longnose Sucker	0	0	0	0	0	0
Peamouth Chub	0	0	0	0	0	0
Pumpkinseed	0	0	0	0	0	0
Rainbow Trout	2.67	0	0.33	0	0.07	0.22
Smallmouth Bass	0	0	6.33	0	0	0.02
Walleye	0	0	0.67	0	0.02	0.07
Whitefish spp.	3.67	0.25	15.67	5.4	1.31	5.42
Yellow Perch	0	0	0	0	0	0
Total	6.33	0.5	26.33	5.8	1.4	5.83

Table 6. Number of fish collected, species composition (%n) and the minimum and maximum lengths of fish captured in limnetic gill nets in July, 2002 on Banks Lake, WA.

			Length (mm)	
Species	Number	% n	Minimum	Maximum
Black Crappie	0	0.0	-	-
Bluegill	0	0.0	-	-
Bullhead spp.	0	0.0	-	-
Burbot	0	0.0	-	-
Carp	0	0.0	-	-
Cottid spp.	0	0.0	-	-
Kokanee	18	5.1	109	478
Largemouth Bass	0	0.0	-	-
Longnose Sucker	0	0.0	-	-
Peamouth Chub	0	0.0	-	-
Pumpkinseed	0	0.0	-	-
Rainbow Trout	12	3.4	275	417
Smallmouth Bass	1	0.3	206	-
Tench	0	0.0	-	-
Walleye	4	1.1	395	525
Whitefish spp.	316	90.0	137	540
Yellow Perch	0	0.0	-	-
Unknown	0	0.0	-	-
Total	351			

Table 7. Number of stomach samples analyzed by species for the spring (May 27-June 5) and summer (July 22-August 5) 2002 surveys at Banks Lake, WA. Seventy-eight smallmouth bass were not analyzed due to adequate sample size during the spring sample.

Species	Spring	Summer
Black Crappie	0	2
Burbot	5	3
Kokanee	1	13
Largemouth Bass	8	5
Pumpkinseed	0	1
Rainbow Trout	29	30
Smallmouth Bass	246	100
Walleye	26	32
Whitefish	36	41
Yellow Perch	27	21
Total	378	248

Table 8. Number of scale and Otolith samples collected by species for the Spring (May 27-June 5) and Summer (July 22-August 5) surveys 2002 at Banks Lake, WA. Isotope sampling did not begin until Summer 2002. Dashes indicate that data was not desired and zeros indicate that data was desired but not obtained.

	Spring			Summer		
Species	Scale	Otolith	Isotope	Scale	Otolith	Isotope
Black Crappie	2	0	-	5	2	15
Bluegill	0	0	-	1	0	13
Bridgelip Sucker	0	0	-	0	0	0
Bullhead spp.	-	-	-	-	-	27
Burbot	-	6	-	-	4	3
Carp	-	1	-	-	1	21
Cottid spp.	-	-	-	-	-	15
Kokanee	-	0	-	-	3	14
Largemouth Bass	8	2	-	7	2	7
Longnose Sucker	4	0	-	1	0	2
Pumpkinseed	0	0	-	3	0	6
Rainbow Trout	17	0	-	36	24	17
Smallmouth Bass	230	30	-	206	78	54
Tench	-	-	-	-	-	2
Walleye	74	61	-	71	61	56
Whitefish	125	100	-	83	44	32
Yellow perch	15	4	-	49	7	46
Total	475	204	-	462	226	330

Table 9. The total number of bass (SMB and LMB) and walleye (WAL) marked (Mark) and recaptured (Recap) by various methods through 5 June 2002 on Banks Lake. The tagging and recapture event codes are as follows: BWWT - Big Wally's Walleye Tournament, WSBFBJ - Washington State BASS Federation's Bass Jamboree, WDFW reservoir-wide survey conducted in early May and late June.

Tagging Event	SMB Mark	LMB Mark	WAL Mark	SMB Recap	LMB Recap	WAL Recap
BWWT	---	---	526	0	0	0
WSBFBJ	1,279	201	1	2	8	0
WDFW	129	6	9	3	0	0
TOTALS	1,408	207	536	5	8	0

*Note: Three walleye tags were returned by anglers during the recapture period.

2.4 Discussion

This report represents the final deliverable for BPA contract number 00005860 for Fiscal Year 2001. Other reports relevant to the completion of our tasks include the annual report for the Ford Hatchery Project (BPA contract 00005850), which contains the results of the Banks Lake creel survey from 1 September, 2001 to 31 August, 2002 (Lewis et al. 2002). Also, the 2000 WDFW warmwater survey report has been completed and a draft has been submitted to WDFW Fish Program-Fish Management Division staff for review and comment. A final report will be published in 2003 as a WDFW technical report.

The Statement of Work for this contract included 8 tasks labeled 1.1-1.8 (Appendix B). We have addressed tasks 1.2, 1.4 in this report, which constituted the majority of data collection efforts for the contract. Tasks 1.1, 1.3, and 1.8 were also completed but did not have a tangible deliverable associated with them; however, activities associated with these tasks were reported during quarterly reports provided to BPA contract officers during the contracting period. Task 1.7 was the analysis of the creel survey conducted for the Ford Hatchery renovation project and was addressed in the annual report for that contract. The planning and design of Task 1.5 was completed during this contract period, but implementation was delayed until September of 2002 and will be reported in our fiscal year 2002 report. Likewise, the feasibility of Task 1.6 was explored through several meetings, phone conversations, and site visits, but it was not implemented. It was determined that a cooperative netting study with the U.S. Bureau of Reclamation would be necessary to adequately address our questions regarding entrainment through the Dry Falls hydroelectric facility.

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Appendix A

A1. Stocking records for Banks Lake, WA from 1953 to 1998. Data was obtained from the WDFW Region 2 files and cross referenced with the Olympia data base and hatchery records. Abbreviations are as follows; rainbow trout (RBT), kokanee (KOK), steelhead (STHD), triploid rainbow trout (3n RBT), Kamloops rainbow trout (KAM), cutthroat trout (CT), coho salmon (COHO), Chinook (CHK), burbot (BUR), walleye (WAL), channel catfish (CH CAT), and smallmouth bass (SMB).

Year	RBT	KOK	STHD	3n RBT	KAM	CT	COHO	CHK	BUR	WAL	CH CAT	SMB
1953	4,000											
1957												
1958												
1959	202,298											
1959		949,560										
1959						40,000						
1960												
1961	92,480											
1961					7,875							
1962	60,710											
1962		1,000,000										
1963	167,060											
1963		506,000										
1964	105,430											
1964		954,000										
1965	25,000											
1965	85,000											
1965	24,000											
1965	26,300											
1965		1,000,000										
1966	107,020											
1966					17,550							
1966		1,000,000										
1967					5,400							
1967	6,500											
1967	104,900											
1968	20,000											
1968	21,150											
1968	88,875											
1969					12,300							
1969	124,835											
1970	20,265											
1970	61,833											
1970	20,230											
1970	81,475											
1971							101,750					
1971		150,000										
1971	20,000											
1971	20,116											

1971	72,750							
1971	72,035							
1972	3,300							
1972	11,280							
1972	131,912							
1972	20,025							
1973	130,985							
1973	16,965							
1974	47,565							
1974	87,984							
1975	42,341							
1975	87,984							
1976				45,840				
1976	112,549							
1977	57,673							
1977		12,400						
1978		434,511						
1978		1,497,356						
1978		75,753						
1980		1,221,039						
1980	18,299							
1981	43,680							
1981	100,540							
1981								593
1982	150,205							
1983	84,870							
1984		1,294,125						
1984	215,527							
1985	278,060							
1986	200,018							
1987			195,000					
1987	169,994							
1988	186,148							
1988					192			
1988							14,041	
1989		655,100						
1989	111,206							
1990	84,883							
1990		986,656						
1991	131,993							
1992	85,288							
1992	60,000							
1992		260,000						
1992		288,000						
1992			90,000					
1992						365,000		
1992						863		
1993	100,021							
1993	59,995							
1993		395,604						

1993		301,130	
1994	50,517		
1994	165,252		
1994		928,000	
1994		300,459	
1995	86,953		
1995		300,000	
1995		816,960	
1995			7,000
1996	149,600		
1996	95,399		
1996			84,000
1996			10,473
1997	126,378		
1997	165,830		
1997		114,094	
1997		630,860	
1997		537,081	
1997			4,927
1998	51,944		
1998	500		
1998	266,134		
1998		60,000	
1998		77,488	
1998		575,511	
1998		832,590	
1998		132,848	
1998			151,453

Appendix B. Statement of Work for Fiscal Year 2001.

2001-2002 Banks Lake Fishery Evaluation
Statement of Work

Inland Fish Investigations
Washington Department of Fish and Wildlife
600 Capitol Way North
Olympia, WA 98501-1091

Project Summary

A. Administrative Summary:

Project Leader:	Casey Baldwin
Telephone:	(509) 921-2303
Address:	10905 E. Montgomery, Suite 3, Spokane, WA 99206
Project Headquarters:	1550 Alder St. NW, Ephrata, WA
Project Period:	September 2001-September 2002
Administrative Contact:	Dianna Neiswanger (contracts office)

B. Relationship to the Columbia River Fish and Wildlife Program:

The Banks Lake project directly addresses the overall goal for the Sub-basin, "to manage the myriad of native and non-native habitats and associated species to provide fish and wildlife harvest opportunities in the Lake Roosevelt Subbasin, which include the many area lakes and their subbasins used to achieve on and off-site mitigation for the loss of anadromous fish.". Banks Lake is a ten thousand hectare impoundment with a diverse fish community, ample access for recreation, and close proximity to several state highways. It is an excellent location to provide resident fishing opportunities as offsite mitigation for the loss of anadromous fishes above Chief Joseph and Grand Coulee Dam. Limiting factors for stocked salmonids and naturally recruiting panfish need to be examined if Banks Lake is to maximize its contribution to fish and wildlife harvest opportunities in the Lake Roosevelt Subbasin (NWPPC Fish and Wildlife Program section 10.1 and 10.2A.1). The value of fisheries such as Banks Lake is to replace lost fishing opportunity for the public and act as a buffer to increasing and continued angling pressure on unlisted native stocks. Burbot in Banks Lake also deserve our conservation efforts. Burbot represent a crossover species (similar to white sturgeon, redband rainbow trout, and westslope cutthroat trout) because they have sport fishing and inherent value as a native species to the Columbia Basin.

Appendix B. Continued.

C. Coordination and Connection to Other Projects:
This project would monitor and evaluate the hatchery stocking of kokanee from Ford Hatchery and the Spokane Tribal Hatchery (project # 199104600). The Ford Hatchery has also submitted a new project for renovations and increased production, most of which would go into Banks Lake. The evaluation outlined in the Ford Hatchery proposal includes a creel survey, however, several other important questions regarding the fishery cannot be answered with a creel survey. The Banks Lake project will determine if the fishery is underutilized and what the appropriate level of salmonid supplementation is for Banks Lake. We will determine the limiting factors for both stocked salmonids and recruiting panfish and provide the necessary information for sound management decisions to maximize the fishery in Banks Lake. Even without additional input from the Ford or Spokane Tribal Hatcheries this project is consistent with the Northwest Power Planning Councils program section 10. Additionally, we will evaluate the impact of additional 5-10 feet of draw down requested by NMFS in the 2000 Biological Opinion. The proposed research would also be directly related to the Lake Roosevelt Fisheries Evaluation Program (199404300) since Banks Lake receives water (and fish) from Lake Roosevelt. It would provide information regarding the loss of fish from Lake Roosevelt including those released by the Sherman Creek Hatchery (199104700) and Lake Roosevelt Rainbow Trout (199500900) and Kokanee (200001800) net pen programs. This project will also be closely tied with the Moses Lake project (199502800) and the WDFW warmwater research program and will involve extensive sharing of equipment, data, and expertise. A preliminary fish survey by WDFW warm water teams, and an offshore hydroacoustic and gill net survey were conducted in September 2000 and the information will serve as a starting point for this project.

D. Abstract

Banks Lake once supported a popular and successful fishery for kokanee and various warmwater panfish that has declined in recent years. The limiting factors for these and other species need to be determined if Banks Lake is to maximize its contribution as a fishery providing harvest as mitigation for the loss of anadromous salmon above Chief Joseph and Grand Coulee Dams. The limiting factors to be examined include water quality, habitat, food limitation, predation, and entrainment. We need to link environmental conditions to habitat use to understand the physical and chemical limitations of the system. We will estimate zooplankton biomass and production to establish the potential of the forage base and carrying capacity for various planktivorous fishes. Predator prey interactions between piscivore and prey-fish will be quantified through diet analysis and bioenergetics modeling. The emigration and immigration of sportfish through the irrigation and hydroelectric facilities will be monitored to understand which species and size classes are likely gained and lost during hydro operations. Finally, substrate type, habitat complexity, littoral productivity, and spawning success will be determined before and after the summer draw down period to assess impacts of the proposed change in hydro operations outlined in the 2000 NMFS Biological Opinion. Finally, we will provide management recommendations to WDFW and BPA regarding harvest, slot limit, stocking numbers and timing. The goal these

Appendix B. Continued.

actions will be to maintain a quality fishery for large predatory species (walleye, bass, and burbot) while simultaneously increasing panfish and salmonid harvest opportunities.

E. PERFORMANCE WORK STATEMENT

INTRODUCTION

The purpose of this Statement of Work is to outline the tasks and budget for the first year of a 5-year project. Section 1 outlines the objectives, tasks and methods for year 1 of the study, which consists of the planning and development phase. Section 2 outlines the objectives, tasks, and methods for the 5-year study, as it was proposed to the NWPPC and reviewed by the ISRP. Although Section 2 is not a refined research plan, it should provide better direction regarding the tasks outlined in Section 1.

Section 1. Planning and Development

Objective 1: Understand the physical and biological history and current status of Banks Lake. Refine research plan to effectively address limiting factors of the fishery.

Task 1.1 Various "start up" tasks including: Hire, train, and orientation of personnel. Make initial purchases of equipment and supplies.

Task 1.2 Summarize and report pertinent historical data from biological and physical surveys of Banks Lake. These include stocking history, USBR studies, fishing derby reports, Washington Department of Game records, etc. Combine historical information with recent studies including the analysis of data from nearshore and offshore survey of Banks Lake in September 2000.

Task 1.3 Coordinate with provincial and subbasin colleagues and other interested parties including USBR, Lake Roosevelt Fisheries Evaluation Project, Lake Roosevelt Hatchery Coordination Team, Restore the Moses Lake Fishery Project, and Banks Lake Enhancement Project.

Task 1.4 Collect baseline data on water quality, zooplankton, and fisheries to establish physical and biological characteristics of Banks Lake to refine study design, methods and hypothesis for outyear studies.

Methods 1.4.1 Collect temperature, dissolved Oxygen, conductivity, pH, and secchi depths at 3 offshore sites once each month during ice-free periods (Section I, Figure 1). Data will be collected from the surface to the bottom at 1 meter increments with a Hydrolab Inc. water quality probe borrowed from WDFW Lake Roosevelt or Moses Lake Project.

Methods 1.4.2 Collect baseline values for primary productivity from 3 sites once each month from March to September excluding April (Section I, Figure 1). WDFW personnel will collect the samples and a limnology laboratory will be subcontracted to analyze them for chlorophyll *a* (concentration), phytoplankton (identification, enumeration, density, biovolume), periphyton chlorophyll *a* (concentration), and periphyton (identification, enumeration, density and biovolume) and zooplankton (identification, density, length measurements). Chlorophyll a and phytoplankton will be collected with an integrated core sampler from the euphotic zone. The euphotic zone will be defined as 3 times the mean secchi depth (Horne and Goldman 1994). Periphyton will be collected at the surface over a two week period on Dura Sampler periphyton collectors. Primary production samples will be placed on ice with no exposure to light and taken to the limnology laboratory within 24 hours of collection.

Methods 1.4.3 To collect zooplankton we will use a 15 cm diameter, 153 micron mesh Wisconsin style net. Three replicate tows will be taken from each site at two discrete depths. The two discrete depth ranges will correspond to the euphotic zone and the aphotic zone. Zooplankton will receive a 20 second "fix" in 95 % ethanol and then be preserved in 70 % ethanol.

Methods 1.4.4 Collect baseline fisheries data for nearshore and offshore fish species in May and July, 2002.

Nearshore surveys.—We will use standard protocol from the Warm water Fish Survey Manual (Bonar et al. 2000) to determine fish species composition, CPUE, and collect biological data for determining growth, age, condition factor and relative weight. Specific capture methods will include boat electrofishing, gill nets, fyke nets, and beach seines. The reservoir will be stratified into 3 regions determined by basin morphology, and we will sample on 4 consecutive nights during each sample month (Section I, Figure 2). We will boat electroshock 12 sites within each region (36 total) randomly selected from the 440 total available sites outlined by WDFW in their September 2000 survey. Additionally, 6 gill net and 6 fyke net (18 total for each gear type) sites will be surveyed within each region during May and July.

Hydroacoustic surveys.—To determine offshore fish abundance and distribution we will use an HTI model 241 echosounder with a 15E split-beam transducer, pole-mounted 1 m below the surface with a down-looking orientation. Multiplexing will be used to detect near surface fish targets with a 6E by 10E elliptical transducer pointed in a side looking orientation. Data will be logged directly into a computer for later analysis and simultaneously backed up on digital audiotapes. A pulse repetition rate of 5-10 pings/second will be used and echoes within 7.5E off-axis (3E side looking), which meet the single echo criteria of the software and are tracked for 3 continuous pings with target strength between –55 and –28.8 dB (30-700 mm; Love 1971, 1977) will be included as fish targets. Banks Lake will be surveyed on a single night each month and 13 transects will be conducted in an elongated zigzag pattern across the offshore region from North Dam to Dry Falls Dam (Section I, Figure 3). Densities will be extrapolated to abundances based on reservoir volume.

Offshore gill netting and trawling surveys.—To verify targets we will use an array of vertical and horizontal gill nets with mesh sizes from 25-104-mm (stretch mesh) in 13-mm increments. Horizontal nets (8' x 150') will include floaters, suspended, and bottom nets, while vertical nets (8' wide) will sample the entire water column. Suspended nets will be set at depths where acoustic targets are seen on the echograms to maximize catch rates. For 3 nights following a hydroacoustic survey we will set 7 vertical nets and 3

Appendix B. Continued.

horizontal nets. A 9'x9' Kuichak trawl towed at various depths and baited minnow traps will be used to capture small fish not susceptible to the gill nets.

Task 1.5 Determine GPS locations of each littoral zone sampling site and classify substrate type, aquatic habitat complexity and terrestrial habitat characteristics for each sampling reach. Re-classify each reach after 5-10 foot summer draw down. We will begin with the sections sampled during fish surveys and complete as many other randomly selected sites as possible within a 1-week period before and after the draw down.

Task 1.6 Test the feasibility of operating, and success of a smolt trap in the Dry Falls irrigation canal to monitor entrainment of juvenile fish from Banks Lake.

Methods 1.6.1 Work with WDFW anadromous division to obtain (borrow), deploy and test a screw trap in the irrigation canal below Dry Falls Dam. Calibration tests will be conducted with batches of hatchery fish released at incremental distances from the trap. The trap will then be operated during hatchery releases in Banks Lake to monitor entrainment of hatchery released salmonids, along with naturally recruiting warmwater fish.

Task 1.7 Analyze and report the creel survey funded under the Ford Hatchery renevation project (number 21021) consistent with the statement of work for that project.

Task 1.8 Write and finalize the study design for year 2; including statement of work, historical data summary, initial baseline surveys, and annual report. Refine, add or modify hypothesis based on new data or assimilation of historical information. Provide detailed methods for each task in Section 1, or other associated tasks if they differ from those outlined in Section 1, based on historical literature search and/or initial data collection. Draft to be submitted to BPA contract officer by the end of FY01 contract deadline.

Section 2.
Proposal for 5-year study (FY2001-2005) (as submitted to NWPPC, September, 2000.)

Overall Objective: Maximize the nearshore and offshore fishery of Banks Lake for various sport fishes including kokanee, rainbow trout, yellow perch, walleye, small- and largemouth bass, crappie, perch and burbot. Further refinement of this objective to species specific abundance goals, harvest, and angler effort will require some level of data collection to understand the biological interactions and carrying capacity of the system. This overall objective will be achieved through a series of studies that seeks to determine the limiting factors for various fish species (or groups of species). Provide management recommendations to WDFW and BPA regarding harvest, slot limit, stocking numbers and timing to meet the potential of the Banks Lake fishery. Provide annual progress reports covering activities and information collected during each fiscal year. At

the end of year 3, prepare a summary report that incorporates multi-year data trends and bioenergetics modeling results in manuscript format for submission to a scientific journal.
Objective 1. Determine what factors limit the recruitment of hatchery-stocked kokanee, rainbow trout, and panfish (yellow perch, crappie and bluegill) to the Banks Lake Fishery.
Hypothesis 1.1: Recruitment of stocked kokanee and rainbow trout in Banks Lake is low and few fish are available for harvest.
Hypothesis 1.2: Natural recruitment of kokanee in Banks Lake is low and few fish are available for harvest. We are assuming that rainbow trout cannot reproduce in Banks Lake due to lack of suitable tributaries, and therefore will not pursue their potential success.
Task 1-a. Compare kokanee and rainbow trout harvest to reservoir-wide abundance to determine if the population is underutilized or overexploited.
Methods 1-a: Harvest estimates will be obtained from the Ford Hatchery Improvement Project creel study (Project 21021; attached). Kokanee abundance will be estimated by extrapolating mobile hydroacoustic density to reservoir volume. Survey design will be consistent with standardized methods, modified to the specific conditions and data requirements of Banks Lake (Brandt 1996; Ransom et al. 1999). Initially, surveys consisting of 20 offshore acoustic transects will be conducted once each season (spring, summer and autumn) and species composition surveys will include gill nets, purse seines, and midwater trawling until the most efficient protocol for a defendable estimate is established. With 100 % marked fish from the hatchery and adequate species composition data the acoustic abundance estimates will also provide abundance of naturally recruiting kokanee. Rainbow trout abundance may be difficult to obtain with hydroacoustics depending on distribution, behavior, and sampling conditions. Alternative methods, such as test fisheries or limited but intensive creel surveys may be necessary to evaluate the success of the rainbow trout supplementation. For panfish we will develop an index that relates catch rate from the littoral zone sampling methods to harvest in the creel. Statewide warm water sampling methods will be used so that Banks Lake can be evaluated relevant to local and regional standards (Bonar et al. 2000).
Hypothesis 1.3: Temperature and dissolved oxygen conditions do not limit kokanee, rainbow trout, and panfish distribution and growth in Banks Lake.
Task1-b. Determine if physical and chemical conditions are suitable for kokanee, rainbow trout and panfish in Banks Lake.

Methods1-b: Measure water quality parameters from the surface to the bottom of the reservoir at 5 offshore sites and 5 nearshore sites on a bi-weekly basis. Compare results to literature values for dissolved oxygen and temperature preferences and physiological tolerances. Relate fish distribution to water quality parameters to determine behavioral reactions to unfavorable conditions. Kokanee distribution will be determined with offshore sampling techniques outlined in "Mehods 1-a". Growth (length- and weight-at-age) will be determined by scale, otolith, and/or length frequency analysis. The relative weight and length-at-age of spawners (kokanee) will be used to compare growth to other systems in the region and throughout western North America (Murphy et al. 1991; Hyatt and Hubert 2000).

Appendix B. Continued.

Hypothesis 1.4: Zooplankton biomass and production are adequate to support consumption by stocked salmonids and naturally recruiting panfish.

Task 1-c. Determine if zooplankton production is adequate to support hatchery supplementation at current and projected levels. Predict the additional number of kokanee, rainbow trout and panfish that can be supported by Banks Lake zooplankton population.

Methods 1-c: Measure zooplankton species composition, density and biomass at 5 sites along the reservoir, using standard methods of collection. Determine if zooplankton production is limited by bottom-up (primary production) or top-down (planktivory) influences based on size structure and species composition (Brooks and Dodson 1965). Estimate the consumption demand of stocked kokanee with a bioenergetics model (Hanson et al. 1997) and compare to available zooplankton biomass. Kokanee diet, growth and thermal experience will be determined from samples obtained in "Task 1-a". Once the biomass of edible size and species of zooplankton is established, we will use the bioenergetics model to predict the additional number of ages 1-4 kokanee that can be supported.

Hypothesis 1.5: Piscivore consumption does not limit the recruitment of hatchery-stocked kokanee rainbow trout and panfish in Banks Lake.

Task 1-d. Determine if predation by walleye, bass, and other piscivores (pikeminnow, burbot and rainbow trout) limits recruitment of hatchery-stocked kokanee, rainbow trout and panfish.

Methods d: Determine the proportion of kokanee in piscivore's diet once each season and for several weeks following hatchery releases and use a bioenergetics model to quantify the consumption of kokanee prey. Nearshore electro shocking and gill net sites will be established and surveyed during each season to determine species composition, diet, growth, and thermal experience of nearshore fish for bioenergetics modeling efforts. Standard methods used by WDFW warm water research crews will be applied to the nearshore sampling regime (Fletcher et al. 1993). Piscivores captured during offshore sampling (Task 1-a) will be analyzed for diet content. The blotted-dry wet weight proportion of each diet taxon will be determined and averaged within each species and season. The model will extrapolate between sampling dates except when fine scale diet information is available such as during stocking events. Following each major stocking event we will capture piscivores by boat electro shocking and gill netting to determine the proportion of kokanee (and other diet taxon). Piscivore diets will be monitored for 4 consecutive days following the release and at 1-week intervals for 4 weeks. This information will be incorporated into the annual bioenergetics modeling of the seasonal diet of piscivores to estimate a total impact to stocked kokanee. Abundance estimates for piscivores (age-2 and older) will be necessary to quantify predator consumption estimates. A Petersen mark-recapture estimate will be used to estimate the population size for walleye and small- and largemouth bass (Otis et al. 1978). Fishing tournaments and seasonal nearshore sampling surveys will be used as mark and recapture events. If sample sizes of recaptures are not adequate during these events for within year closed estimates then an open population model (Schnabel estimate) will be adopted which can incorporate unknown mortality and recruitment into the population.

Appendix B. Continued.

Hypothesis 1-6: Substantial numbers of stocked kokanee, rainbow trout, and other sport fishes are not present in the North Dam Canal or behind the barrier net adjacent to Dry Falls hydroelectric facility.

Task 1-e. Determine species composition and size structure of fish populations in the North Dam Canal and behind the barrier net.

Methods e: Use gill nets, fyke nets, and electrofishing boats to determine species, size, and potential fish lost through the pumping and hydroelectric facilities each season. Sample each location for 4 consecutive days and nights, before and after pumping procedures. Based on results, explore feasibility of sampling within each of these projects to quantify the abundance of fish that are lost.

Hypothesis 1-7: Panfish abundance is not limited by spawning and summer survival of YOY.

Hypothesis 1-8: Panfish abundance is not limited by over winter survival of age-0 fish.

Task 1-f: Conduct electrofishing, fyke net, beach seine, and gill net surveys consistent with the WDFW warm water sampling protocol (Fletcher et al. 1993) to determine species composition, catch rate, relative weight, condition, age structure, growth, diet, and other biological characteristics of the littoral zone fish community. Compare fall and spring catch rates of age-0 panfish to determine the timing of the recruitment bottleneck, if one occurs. Examine the condition of age-0 panfish from the fall sample and compare to literature values of critical mass needed for over winter survival. Model consumption estimates for piscivorous walleye, bass, and others to estimate impact of predators on over winter survival.

Objective 2. Evaluate the impact of summer draw down to littoral habitat structure, invertebrate productivity, and warm water fish spawning success.

Hypothesis 2-1: A summer draw down of 5-10 feet will not reduce the habitat type or complexity of the littoral zone.

Hypothesis 2-2: A summer draw down of 5-10 feet will not reduce the primary and secondary productivity of the littoral zone.

Hypothesis 2-3: A summer draw down of 5-10 feet will not reduce the spawning success of warm water sport fishes in Banks Lake.

Task 2-a: Subcontract a graduate student from a University to set up and conduct an experiment to measure "before and after" effects of the summer draw down on littoral habitat type and complexity, primary and secondary productivity, and spawning success of warm water sport fishes.

Objective 3. Provide management recommendations for catch rates, bag and slot limits, hydro operations and stocking rates, timing, and species. The goal these actions will be to maintain a quality fishery for large predatory species (walleye, bass, and burbot) while simultaneously increasing panfish and salmonid harvest opportunities.

Task 3-1: Assimilate data and publish in report and manuscript format. Present information to managers, scientists, and public interest groups to foster an understanding by all entities the strengths and limitations of Banks Lake for particular species or fish assemblages.

Appendix B. Continued.

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F. Budget:

Budget Summary **FY 2001**

	Item	**Cost $**
1	Personnel	68,518
2	Fringe Benefits	19,433
3	Goods and Services	23,142
4	Travel	4,500
5	Contracts	4,725
6	Capital Equipment	36,292
7	Direct Cost	156,610
8	Indirect Cost	30,344
9	**Project Total**	**186,954**

Appendix B. Continued.

BUDGET DETAILS

Washington Department of Fish and Wildlife
Banks Lake Fisheries Evaluation
Project No. 21008
BPA Contract No.
Effective Dates: September 25, 2001 through September 25, 2002
Date Prepared: 7/12/01

CATEGORY			BUDGET
Salaries	**Months**	**Rate**	
Research Scientist 1 (Inland Fish Research Unit Leader)	0.25	4673	$ 1,168
Research Scientist 1 (Casey Baldwin)	6	4150	$ 24,900
Fisheries Biologist 2 (Unfilled)	9	3250	$ 29,250
Scientific Technician 1 (Unfilled)	6	2200	$ 13,200
Total Salaries			**$ 68,518**
Fringe Benefits (No. of individuals)			
12.85% of Salaries (SS/medicare/retirement/personnel services)		0.1285	$ 8,808
Medical Benefits ($436/mo), Labor and Industry ($64/ mo)	21.25	500	$ 10,625
Total Fringe Benefits			**$ 19,433**
Goods and Services			
Boat gas & oil (45 days * $45/day)			$ 2,025
Truck gas & oil [10,000 mi / (10mi/gal)]*$1.75/gal			$ 1,750
Horizontal & Vertical Gill Nets (10 offshore, 8 nearshore) * $300 ea			$ 5,400
Office & Lab Supplies (paper, computer disks, shipping charges, gloves, lab tools)			$ 1,000
Field Supplies Misc. (zooplankton net, Secchi disk, spring scales, ethanol, batteries, gloves)			$ 1,100
Communications			
office phones ($80/month)*12 months			$ 960
long distance charges ($40/ month * 12 months)			$ 480
cell phone & service ($150 phone) + (12 months service* $50/month)			$ 750
internet (12 months * $22/ month)			$ 264
Personnel services			$ 400
Desktop computer lease (see memo) $45/month * 12 months			$ 540
Software			$ 750
Laser printer			$ 900
Boat & motor maintenance/repairs/modifications			$ 1,500
Repair, refurbish, transport, and deploy smolt trap			$ 2,000
Office lease, utilities & services (1/8 of Spokane office lease)			$ 2,000
Boat trailer + tax			$ 1,323
Total Goods and Services			**$ 23,142**
Travel/Training	days	per day	

Appendix C. Continued.

Research (3 people * 15 days)	45	50	$ 2,250
Meetings, conferences, training (3 people * 5 days)	15	150	$ 2,250

Appendix B. Continued

Total for Travel/Training			**$ 4,500**
Capital Equipment			
18 ' work boat + tax (see attached quote)			$ 5,160
50 hp tiller drive four stroke outboard engine + tax (see attached quote)			$ 6,514
¾ ton pickup truck + tax (see attached contract price)			$ 24,618
Total for Capital Equipment			**$ 36,292**
Subcontractor			
University limnology lab	# samples	$/sample	
Chlorophyll a (3 sites, 5 occasions) (concentration)	15	20	$ 300
Phytoplankton (3 sites, 5 occasions) (identification, enumeration, density, and biovolume)	15	40	$ 600
Zooplankton (3 sites, 2 depths, 9 occasions) (identification, enumeration, density, and length measurements)	54	50	$ 2,700
Periphyton chlorophyll a (3 sites, 5 occasions) (concentration)	15	20	$ 300
Periphyton enumeration (3 sites, 5 occasions) (identification, enumeration, density, and biovolume)	15	55	$ 825
Total for subcontractor			**$ 4,725**
Contract Subtotal			**$156,610**
Indirect Overhead (25.22% excluding capital equipment items)		0.2522	**$ 30,344**
TOTAL 2001 BUDGET			**$186,954**

G. Work Schedule:

Task	Staff Days	Duration (months)	Products
1.1	30	6	project initialization
1.2	70	6	introduction chapter to annual report
1.3	20	12	coordination with cooperators
1.4	100	6	baseline physical and biological data
1.5	20	1	sample sites classified for habitat
1.6	55	4	testing for entrainment monitoring
1.7	60	12	harvest, effort, exploitation, economic value
1.8	70	12	refined research plan for out years
	425		

* note: 425 staff days is based on 21.25 FTE months multiplied by the average days per month (20) excluding holidays and annual leave.

Appendix B. Continued.

H. Facilities and Equipment:

Much of the sampling equipment necessary for this project have already been purchased by other projects working in the subbasin or within WDFW. The boat, hydroacoustic equipment and personnel necessary to sample offshore fish are currently working on the Lake Roosevelt Monitoring Project (199404300) and will split time and effort between these two waters. Likewise, the electro shocking boat used on the Restore Moses Lake Recreational Fishery Project (199502800) (or one of several other shocking boats in WDFW Region 2) will be used to sample nearshore fish. Also, water quality monitoring, and precision GPS equipment are available from these two projects and will not have to be purchased specifically for Banks Lake. These equipment sharing opportunities represent a means of working in a cooperative and efficient manor within the province and sub-basin, minimizing capitol equipment expenditures for a new project. However, to minimize scheduling conflicts an 18' boat and 50 hp motor will need to be purchased to collect water quality, zooplankton, and conduct portions of the gill net surveys. The WDFW Region 2 office in Ephrata has office and storage space within a reasonable working distance (27 miles) of Banks Lake at no cost. However, Region 1 does not have state funded office or storage facilities so a portion of the Spokane research office/storage lease fee is included in the budget.

Appendix B. Continued.

I. Maps with sections, transects, sampling sites etc. :

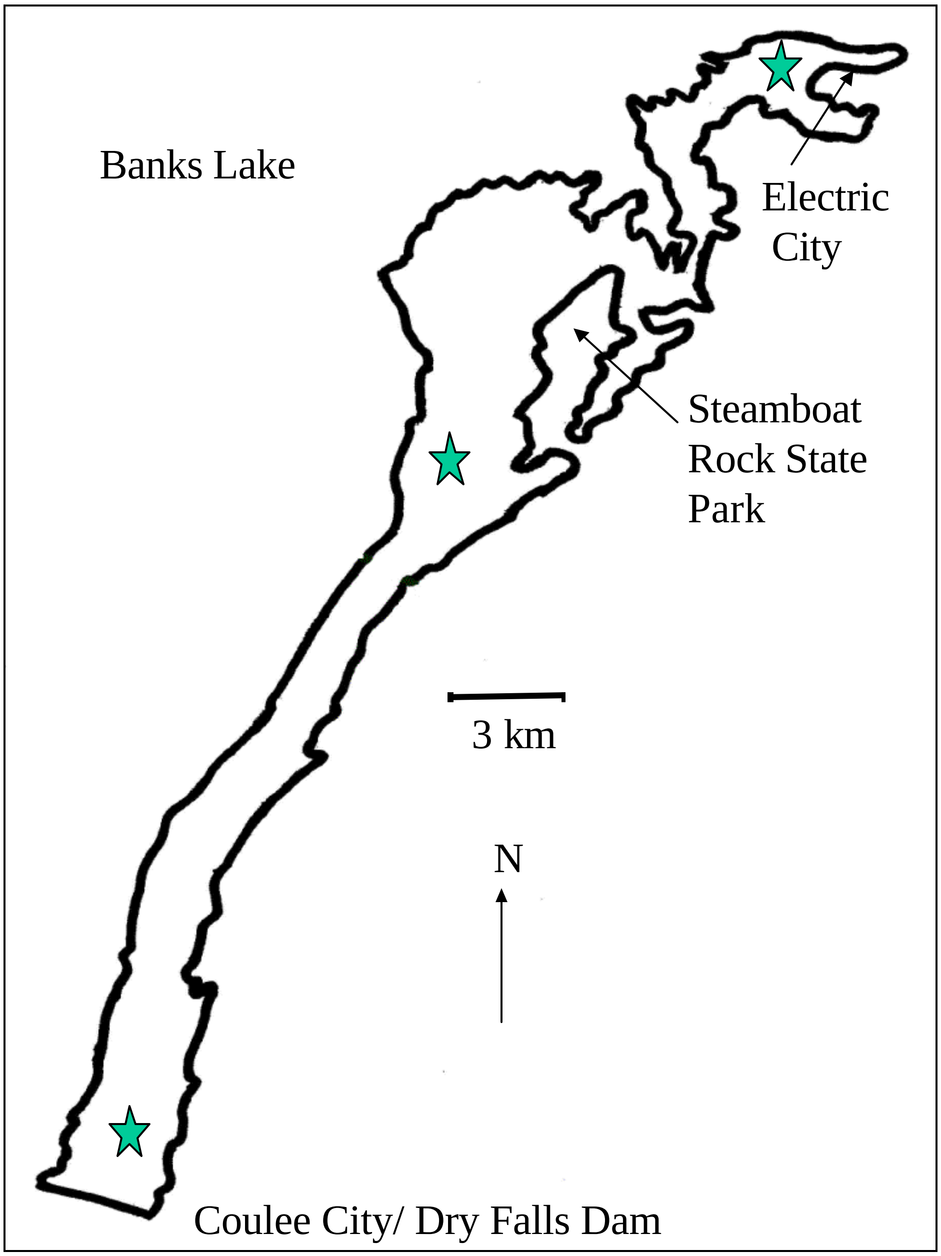

Figure 1. Map of Banks Lake showing limnology-sampling sites (☆) for fiscal year 2001.

Appendix B. Continued.

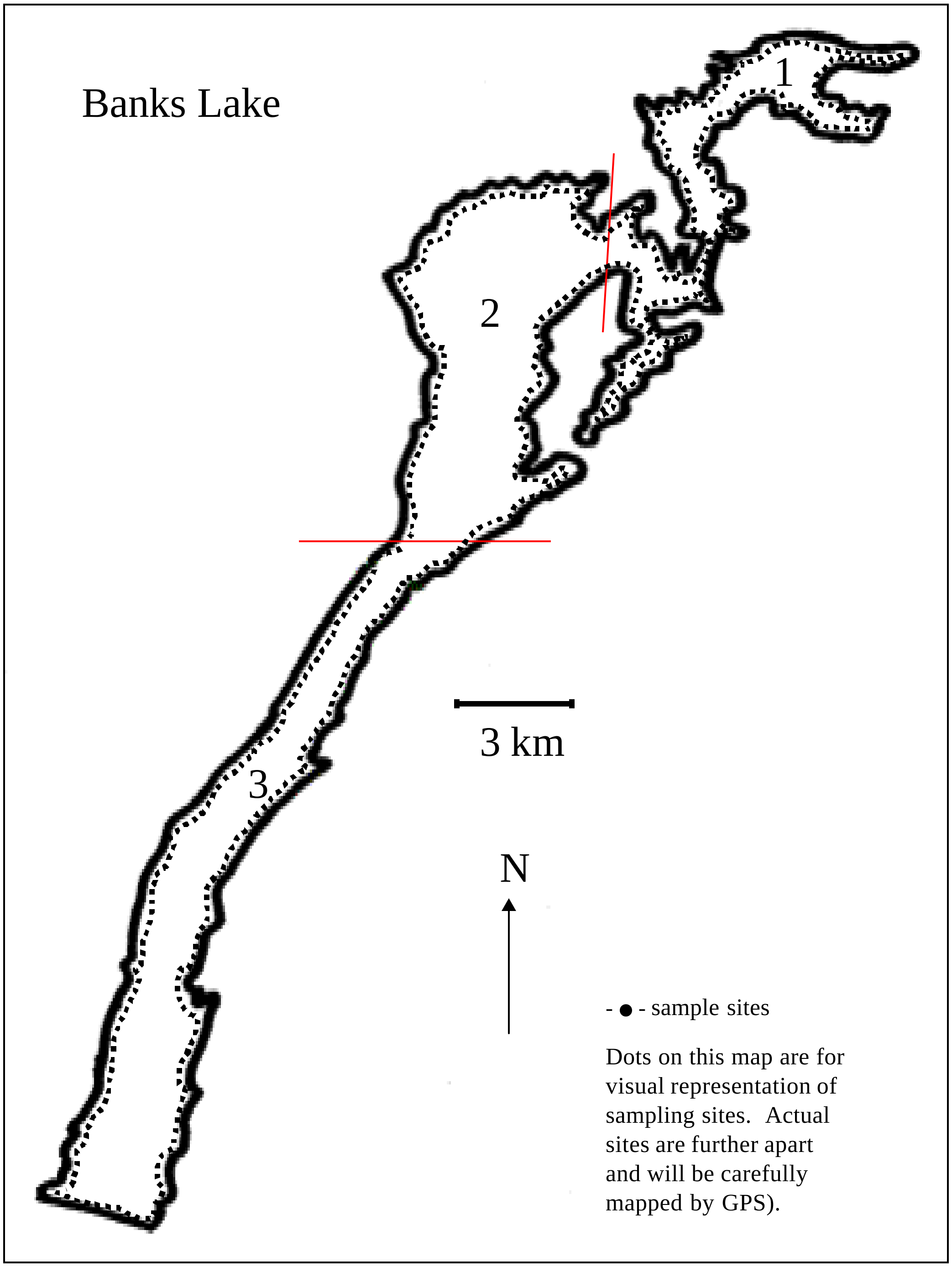

Figure 2. Map of Banks Lake showing 3 stratified regions for nearshore fish sampling. Sampling sites were selected by WDFW (September 2000 warm water fisheries survey) every 400 meters of shoreline. A subset of sites will be randomly selected within each region from a potential 199 sites in region 1, 106 sites in region 2, and 135 sites in region 3.

Appendix B. Continued.

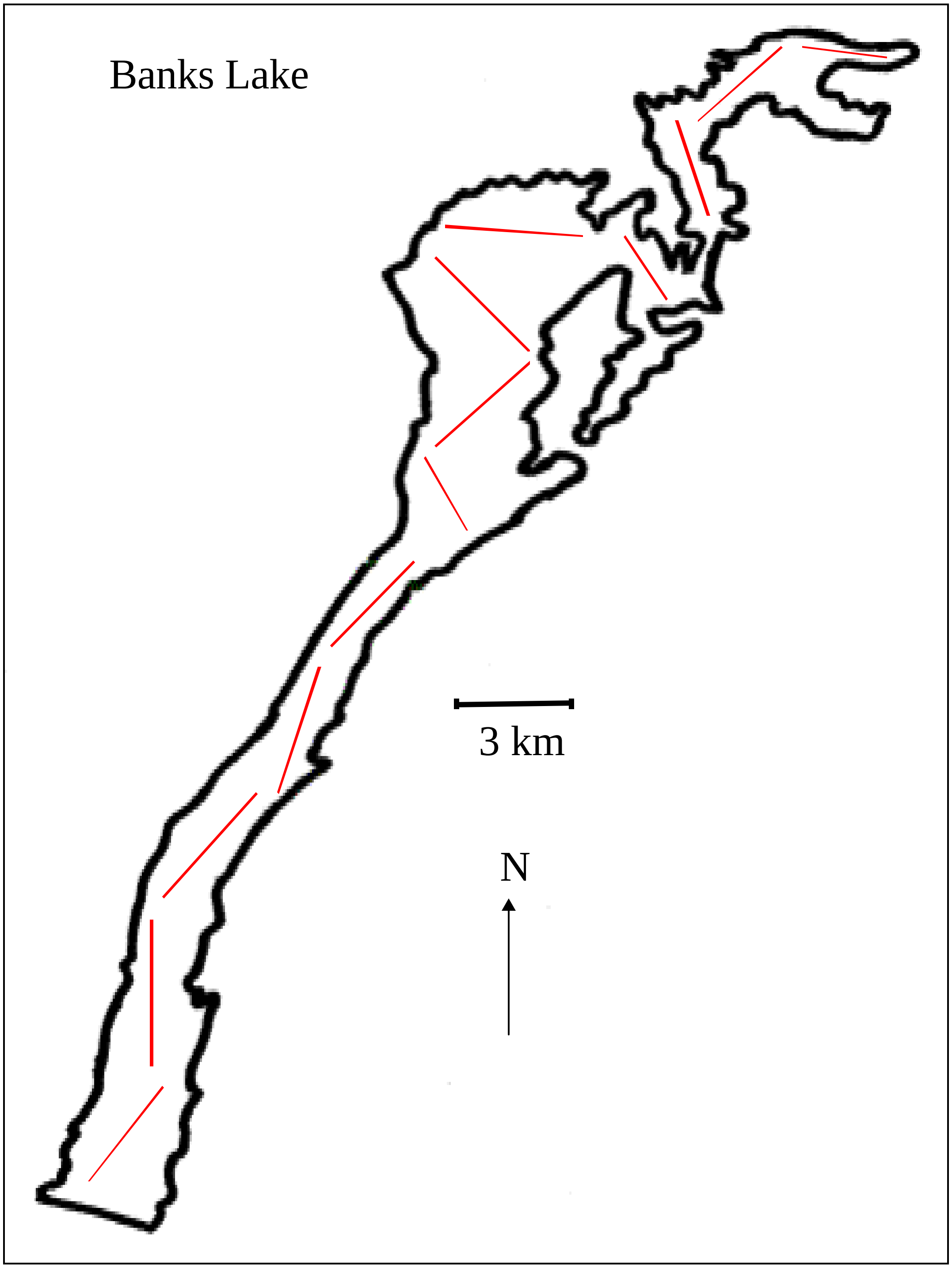

Figure 3. Map of Banks Lake showing the approximate location for 13 hydroacoustic transects.

Appendix C

Table C1. Water Quality parameters from Banks Lake between February and August 2002. Abbreviations are as follows: Dissolved Oxygen (DO), Saturation (Sat), and Specific Conductivity (SpCond).

				(øC)	% (Sat)	(mg/l)	(g/l)	(NTU)	(m)		(mS/cm)	Secchi
Date	Year	Site	Time	Temp	DO	DO	TDS	Turb	Depth	pH	SpCond	Depth (m)
2/21/2002	2002	LIM1	12:58	2.71	100.60	13.73	0.0827	1000.0	0.1	8.11	0.1290	5.5
2/21/2002	2002	LIM1	12:58	2.72	100.70	13.74	0.0825	1000.0	0.1	8.11	0.1289	
2/21/2002	2002	LIM1	12:58	2.71	100.70	13.77	0.0825	1000.0	0.1	8.11	0.1289	
2/21/2002	2002	LIM1	12:59	2.75	100.50	13.69	0.0824	1000.0	1.5	8.13	0.1288	
2/21/2002	2002	LIM1	13:01	2.68	100.90	13.78	0.0825	1000.0	6.6	8.06	0.1285	
2/21/2002	2002	LIM1	13:02	2.69	100.90	13.77	0.0822	1000.0	9.4	8.05	0.1290	
2/21/2002	2002	LIM1	13:02	2.70	99.90	13.63	0.0825	1000.0	11.9	8.05	0.1289	
2/21/2002	2002	LIM1	13:03	2.69	100.70	13.75	0.0825	1000.0	15.4	8.02	0.1284	
2/21/2002	2002	LIM1	13:05	2.70	99.60	13.59	0.0825	1000.0	17.5	8.11	0.1284	
2/21/2002	2002	LIM1	13:06	2.74	99.10	13.52	0.0825	1000.0	19.7	8.02	0.1290	
2/21/2002	2002	LIM3	15:36	2.65	100.00	13.67	0.0830	1000.0	0.1	8.06	0.1297	5.5
2/21/2002	2002	LIM3	15:36	2.65	99.50	13.60	0.0831	1000.0	0.1	8.07	0.1298	
2/21/2002	2002	LIM3	15:36	2.64	98.70	13.50	0.0832	1000.0	1.6	8.06	0.1300	
2/21/2002	2002	LIM3	15:37	2.60	98.20	13.45	0.0830	1000.0	5.0	8.05	0.1297	
2/21/2002	2002	LIM3	15:38	2.59	96.40	13.20	0.0830	1000.0	9.8	8.02	0.1298	
2/21/2002	2002	LIM3	15:39	2.60	95.40	13.06	0.0828	1000.0	11.0	8.04	0.1297	
2/21/2002	2002	LIM3	15:40	2.60	95.90	13.12	0.0829	1000.0	14.2	8.03	0.1296	
2/21/2002	2002	LIM3	15:41	2.59	94.90	12.99	0.0829	1000.0	17.8	8.03	0.1295	
2/21/2002	2002	LIM5	16:55	1.98	129.10	17.36	0.0840	1000.0	0.2	8.11	0.1312	8.5
2/21/2002	2002	LIM5	16:56	1.97	108.40	15.09	0.0840	1000.0	0.6	8.10	0.1312	
2/21/2002	2002	LIM5	16:57	1.96	100.20	13.96	0.0839	1000.0	2.1	8.09	0.1311	
2/21/2002	2002	LIM5	16:57	1.95	100.00	13.93	0.0839	1000.0	5.6	8.09	0.1311	
2/21/2002	2002	LIM5	16:58	1.95	99.30	13.83	0.0838	1000.0	7.2	8.07	0.1310	
2/21/2002	2002	LIM5	16:58	1.95	99.20	13.83	0.0837	1000.0	12.2	8.04	0.1308	
2/21/2002	2002	LIM5	16:59	1.95	97.90	13.64	0.0837	1000.0	13.9	8.08	0.1308	
2/21/2002	2002	LIM5	17:00	2.02	98.30	13.67	0.0838	1000.0	20.3	8.03	0.1309	
2/21/2002	2002	LIM5	17:00	2.03	98.00	13.62	0.0837	1000.0	23.4	8.00	0.1309	
2/21/2002	2002	LIM5	17:01	2.04	97.70	13.57	0.0835	1000.0	23.3	8.03	0.1307	
3/19/2002	2002	LIM1	14:31	3.31	97.30	13.10	0.0844	1000.0	0.6	8.19	0.1319	6.0
3/19/2002	2002	LIM1	14:32	3.33	96.90	13.00	0.0843	1000.0	0.5	8.19	0.1317	
3/19/2002	2002	LIM1	14:33	3.29	97.20	13.06	0.0847	1000.0	4.0	8.19	0.1323	
3/19/2002	2002	LIM1	14:34	3.27	97.70	13.13	0.0846	1000.0	6.1	8.19	0.1321	
3/19/2002	2002	LIM1	14:34	3.26	97.60	13.12	0.0845	1000.0	9.0	8.19	0.1321	
3/19/2002	2002	LIM1	14:36	3.30	95.40	12.82	0.0845	1000.0	11.9	8.17	0.1320	
3/19/2002	2002	LIM1	14:38	3.33	96.10	12.89	0.0845	1000.0	15.1	8.15	0.1317	
3/19/2002	2002	LIM1	14:39	3.34	97.20	13.04	0.0845	1000.0	18.2	8.15	0.1321	
3/19/2002	2002	LIM1	14:40	3.38	93.70	12.56	0.0846	1000.0	20.9	8.11	0.1322	
3/19/2002	2002	LIM3	13:16	2.28	101.90	14.07	0.0000	1000.0	0.0	7.98	0.0000	7.0

Table C1. Continued

Date	Site	Time	(øC) Temp	% (Sat) DO	(mg/l) DO	(g/l) TDS	(NTU) Turb	(m) Depth	pH	(mS/cm) SpCond	Secchi Depth (m)
3/19/2002	LIM3	13:17	2.95	98.80	13.39	0.0846	1000.0	0.5	8.12	0.1319	
3/19/2002	LIM3	19:19	2.95	94.20	12.77	0.0845	1000.0	3.0	8.12	0.1321	
3/19/2002	LIM3	13:20	2.94	95.80	12.99	0.0845	1000.0	5.9	8.12	0.1321	
3/19/2002	LIM3	13:21	2.93	96.50	13.09	0.0846	1000.0	9.0	8.12	0.1322	
3/19/2002	LIM3	13:22	2.94	96.00	13.02	0.0846	1000.0	12.0	8.11	0.1322	
3/19/2002	LIM3	13:24	2.96	95.50	12.96	0.0846	1000.0	15.0	8.10	0.1322	
3/19/2002	LIM3	13:25	2.96	96.90	13.13	0.0847	1000.0	18.1	8.08	0.1323	
3/19/2002	LIM3	13:25	2.96	96.60	13.09	0.0847	1000.0	19.0	8.08	0.1323	
3/19/2002	LIM5	11:43	2.31	98.30	13.56	0.0846	1000.0	0.0	7.96	0.1322	9.5
3/19/2002	LIM5	11:45	2.30	96.40	13.31	0.0846	1000.0	0.4	8.00	0.1322	
3/19/2002	LIM5	11:47	2.30	96.10	13.26	0.0846	1000.0	3.3	8.04	0.1322	
3/19/2002	LIM5	11:49	2.32	96.20	13.27	0.0845	1000.0	6.0	8.05	0.1321	
3/19/2002	LIM5	11:51	2.39	95.70	13.21	0.0845	1000.0	10.5	8.03	0.1320	
3/19/2002	LIM5	11:53	2.46	95.30	13.09	0.0845	1000.0	12.0	8.05	0.1320	
3/19/2002	LIM5	11:55	2.47	95.50	13.11	0.0845	1000.0	15.2	8.05	0.1320	
3/19/2002	LIM5	11:57	2.47	95.00	13.05	0.0845	1000.0	18.1	8.05	0.1320	
3/19/2002	LIM5	11:59	2.52	95.10	13.05	0.0844	1000.0	21.1	8.04	0.1319	
3/19/2002	LIM5	12:00	2.53	92.60	12.69	0.0844	1000.0	23.0	8.03	0.1321	
4/23/2002	LIM1	14:20	6.62	101.50	12.51	0.0915	1000.0	0.4	8.40	0.1430	3.5
4/23/2002	LIM1	14:24	6.59	106.40	13.10	0.0912	1000.0	0.4	8.28	0.1425	
4/23/2002	LIM3	15:30	9.49	103.00	11.83	0.0885	1000.0	0.4	8.29	0.1383	3.0
4/23/2002	LIM3	15:43	7.80	102.00	12.21	0.0889	1000.0	19.7	8.27	0.1390	
4/23/2002	LIM5	17:14	7.58	107.40	12.92	0.0856	1000.0	0.5	8.27	0.1337	6.0
4/23/2002	LIM5	17:15	7.56	105.10	12.66	0.0856	1000.0	0.5	8.20	0.1338	
4/23/2002	LIM5	17:16	7.55	104.90	12.63	0.0857	1000.0	0.5	8.20	0.1338	
4/23/2002	LIM5	17:17	7.56	105.50	12.71	0.0857	1000.0	2.9	8.21	0.1340	
4/23/2002	LIM5	17:18	7.55	106.80	12.86	0.0860	1000.0	5.1	8.24	0.1344	
4/23/2002	LIM5	17:20	7.55	106.90	13.12	0.0863	1000.0	11.0	8.22	0.1348	
4/23/2002	LIM5	17:20	7.54	110.20	13.28	0.0863	1000.0	13.3	8.22	0.1348	
4/23/2002	LIM5	17:21	7.55	106.90	12.88	0.0864	1000.0	14.5	8.22	0.1350	
4/23/2002	LIM5	17:22	7.54	106.90	12.88	0.0865	1000.0	17.8	8.20	0.1351	
5/22/2002	LIM1	18:56	12.37	105.40	11.22	0.0000	39.7	0.1	8.05	0.0000	3.5
5/22/2002	LIM1	18:58	10.58	107.80	11.97	0.0796	3.2	0.7	8.32	0.1243	
5/22/2002	LIM1	19:00	10.52	106.10	11.79	0.0796	4.8	2.9	8.30	0.1243	
5/22/2002	LIM1	19:00	10.50	107.80	11.98	0.0798	4.8	5.9	8.29	0.1246	
5/22/2002	LIM1	19:01	10.46	106.80	11.89	0.0796	4.9	8.9	8.26	0.1244	
5/22/2002	LIM1	19:03	10.43	106.50	11.86	0.0797	5.1	11.8	8.25	0.1245	
5/22/2002	LIM1	19:04	10.31	105.10	11.74	0.0798	6.1	15.0	8.18	0.1247	
5/22/2002	LIM1	19:04	10.11	102.60	11.51	0.0799	6.3	17.9	8.08	0.1251	
5/22/2002	LIM1	19:06	9.81	98.30	11.11	0.0803	6.2	19.9	7.94	0.1255	
5/22/2002	LIM3	17:10	12.96	103.30	10.86	0.0876	7.3	0.4	8.59	0.1365	4.0

Table C1. Continued

Date	Site	Time	(øC) Temp	% (Sat) DO	(mg/l) DO	(g/l) TDS	(NTU) Turb	(m) Depth	pH	(mS/cm) SpCond	Secchi Depth (m)
5/22/2002	LIM3	17:10	12.97	104.00	10.93	0.0876	6.7	0.4	8.58	0.1369	
5/22/2002	LIM3	17:11	12.47	104.90	11.15	0.0866	7.4	3.1	8.55	0.1351	
5/22/2002	LIM3	17:13	12.12	101.50	10.88	0.0863	7.9	5.9	8.47	0.1348	
5/22/2002	LIM3	17:14	11.21	101.10	11.07	0.0876	8.0	9.0	8.36	0.1335	
5/22/2002	LIM3	17:14	10.45	99.80	11.11	0.0840	8.6	11.9	8.13	0.1313	
5/22/2002	LIM3	17:15	9.79	95.80	10.83	0.0866	8.2	15.0	8.03	0.1352	
5/22/2002	LIM3	17:16	9.26	81.70	9.33	0.0887	9.8	18.3	7.79	0.1386	
5/22/2002	LIM3	17:17	9.12	83.60	9.60	0.0886	10.2	19.9	7.78	0.1385	
5/22/2002	LIM5	16:06	13.61	101.60	10.53	0.0000	0.0	-0.1	8.07	0.0000	5.5
5/22/2002	LIM5	16:09	11.32	105.20	11.48	0.0897	9.9	0.3	8.50	0.1402	
5/22/2002	LIM5	16:11	11.30	104.80	11.44	0.0897	5.9	3.1	8.50	0.1401	
5/22/2002	LIM5	16:12	11.14	103.30	11.32	0.0898	5.7	5.9	8.45	0.1403	
5/22/2002	LIM5	16:18	10.97	103.10	11.34	0.0897	5.6	8.1	8.46	0.1402	
5/22/2002	LIM5	16:19	10.29	99.10	11.10	0.0895	5.6	12.0	8.28	0.1399	
5/22/2002	LIM5	16:20	10.01	97.50	10.97	0.0897	5.8	14.2	8.21	0.1402	
5/22/2002	LIM5	16:22	9.87	96.40	10.88	0.0896	5.9	18.5	8.20	0.1400	
5/22/2002	LIM5	16:22	9.74	94.90	10.75	0.0897	6.7	21.5	8.10	0.1402	
6/12/2002	LIM1	14:23	15.25	109.10	10.91	0.0790	5.1	0.3	8.23	0.1235	3.8
6/12/2002	LIM1	14:24	15.13	108.80	10.91	0.0790	3.0	0.3	8.23	0.1235	
6/12/2002	LIM1	14:24	14.03	107.90	11.08	0.0791	4.0	3.0	8.32	0.1235	
6/12/2002	LIM1	14:26	12.83	107.50	11.34	0.0786	4.1	6.0	8.17	0.1229	
6/12/2002	LIM1	14:27	12.41	105.60	11.24	0.0775	3.6	9.0	8.04	0.1210	
6/12/2002	LIM1	14:28	12.16	102.90	11.00	0.0784	3.7	12.2	7.89	0.1225	
6/12/2002	LIM1	14:29	12.10	102.20	10.96	0.0784	3.8	15.0	7.82	0.1225	
6/12/2002	LIM1	14:30	11.97	100.80	10.84	0.0780	4.1	18.0	7.80	0.1220	
6/12/2002	LIM1	14:31	11.91	100.40	10.81	0.0776	4.7	20.8	7.73	0.1213	
6/12/2002	LIM3	16:26	19.09	108.80	10.04	0.0874	7.3	0.4	8.29	0.1367	4.3
6/12/2002	LIM3	16:27	15.22	103.10	10.32	0.0860	7.5	3.0	8.35	0.1344	
6/12/2002	LIM3	16:28	14.35	98.10	10.00	0.0862	8.0	6.0	8.32	0.1347	
6/12/2002	LIM3	16:29	14.14	100.80	10.33	0.0859	8.2	9.0	8.25	0.1343	
6/12/2002	LIM3	16:30	13.52	95.20	9.89	0.0822	7.9	12.0	8.02	0.1284	
6/12/2002	LIM3	16:31	13.02	95.90	10.07	0.0815	8.0	15.0	7.89	0.1274	
6/12/2002	LIM3	16:32	12.34	85.00	9.07	0.0845	9.0	18.1	7.66	0.1317	
6/12/2002	LIM3	16:33	11.72	76.20	8.24	0.0872	10.4	20.1	7.47	0.1363	
6/12/2002	LIM5	17:53	16.60	100.80	9.78	0.0907	3.5	0.4	8.34	0.1417	6.75
6/12/2002	LIM5	17:54	14.48	102.30	10.40	0.0900	3.9	3.0	8.35	0.1406	
6/12/2002	LIM5	17:55	13.67	101.30	10.49	0.0899	3.8	6.0	8.33	0.1405	
6/12/2002	LIM5	17:56	13.41	99.80	10.39	0.0897	3.8	9.1	8.23	0.1402	
6/12/2002	LIM5	17:57	12.82	95.40	10.06	0.0897	4.1	12.1	8.06	0.1401	
6/12/2002	LIM5	17:58	12.76	92.20	9.74	0.0892	5.0	15.0	7.91	0.1392	
6/12/2002	LIM5	17:58	12.32	91.30	9.73	0.0899	4.0	18.0	7.80	0.1404	

Table C1. Continued

Date	Site	Time	(øC) Temp	% (Sat) DO	(mg/l) DO	(g/l) TDS	(NTU) Turb	(m) Depth	pH	(mS/cm) SpCond	Secchi Depth (m)
6/12/2002	LIM5	17:59	11.67	86.90	9.41	0.0902	3.9	21.0	7.72	0.1409	
6/12/2002	LIM5	18:00	10.79	75.90	8.39	0.0910	4.5	23.0	7.53	0.1421	
6/25/2002	LIM1	13:06	17.49	114.3	10.91	0.0732	6.9	0.1	8.24	0.1144	8.5
6/25/2002	LIM1	13:10	16.81	113.7	11	0.0732	13.2	0.3	8.23	0.1144	
6/25/2002	LIM1	13:11	16.05	115.5	11.36	0.0731	4.0	1.2	8.24	0.1138	
6/25/2002	LIM1	13:12	15.47	118.3	11.78	0.0724	6.1	2.2	8.2	0.1132	
6/25/2002	LIM1	13:12	14.09	120.2	12.33	0.0724	6.0	3	8.11	0.1129	
6/25/2002	LIM1	13:13	13.8	120	12.39	0.0723	6.2	4.2	8.07	0.1129	
6/25/2002	LIM1	13:13	13.53	121.3	12.59	0.0722	6.2	5.4	8.03	0.1127	
6/25/2002	LIM1	13:14	13.39	119.6	12.46	0.0722	6.3	6	7.95	0.1127	
6/25/2002	LIM1	13:14	13.29	118.8	12.4	0.0722	6.6	7.5	7.89	0.1129	
6/25/2002	LIM1	13:15	13.27	117.9	12.31	0.0722	6.5	8	7.87	0.1129	
6/25/2002	LIM1	13:15	13.25	115.7	12.07	0.0722	6.7	9	7.84	0.1127	
6/25/2002	LIM1	13:16	13.21	114.7	11.97	0.0722	6.9	10.1	7.83	0.1129	
6/25/2002	LIM1	13:16	13.17	113.6	11.86	0.0722	6.8	11.1	7.79	0.1127	
6/25/2002	LIM1	13:17	13.13	112.4	11.78	0.0721	6.8	12	7.81	0.1126	
6/25/2002	LIM1	13:17	13.12	112.2	11.76	0.0722	7.1	13	7.76	0.1129	
6/25/2002	LIM1	13:18	13.1	111.7	11.71	0.0723	7.0	14	7.76	0.113	
6/25/2002	LIM1	13:18	13.09	111.9	11.74	0.0723	7.0	15	7.77	0.1129	
6/25/2002	LIM1	13:19	13.04	112.1	11.77	0.0723	7.3	16.5	7.7	0.1128	
6/25/2002	LIM1	13:19	13.04	111.6	11.71	0.0723	7.3	17	7.75	0.1129	
6/25/2002	LIM1	13:19	13.04	110.8	11.63	0.0723	7.7	18	7.74	0.113	
6/25/2002	LIM1	13:20	12.98	108.1	11.36	0.0725	7.7	18.9	7.69	0.1133	
6/25/2002	LIM1	13:20	12.92	106.6	11.22	0.0726	9.2	20	7.64	0.1135	
6/25/2002	LIM1	13:21	12.8	101.9	10.75	0.0729	16.8	21	7.56	0.1139	
6/25/2002	LIM1	13:21	12.72	95.5	10.08	0.0733	61.2	22	7.49	0.1145	
6/25/2002	LIM3	14:16	21.6	115.3	10.13	0.0857	3.6	0.3	8.83	0.1339	4.5
6/25/2002	LIM3	14:17	20.75	115.1	10.28	0.0857	3.4	1	8.86	0.1334	
6/25/2002	LIM3	14:18	20.05	117.5	10.5	0.0848	10.1	3.1	8.94	0.1325	
6/25/2002	LIM3	14:18	19.07	118.9	10.83	0.0848	4.2	4.1	8.98	0.1327	
6/25/2002	LIM3	14:19	18.53	120.4	11.24	0.085	5.4	4	8.95	0.1329	
6/25/2002	LIM3	14:19	18.52	121.4	11.34	0.085	4.5	4.1	8.96	0.1329	
6/25/2002	LIM3	14:20	18.11	119.9	11.3	0.0849	4.6	5.8	8.92	0.1319	
6/25/2002	LIM3	14:20	17.55	119.4	11.38	0.0843	4.2	7	8.7	0.1232	
6/25/2002	LIM3	14:20	16.22	116	11.36	0.0746	3.6	7.9	8.38	0.1158	
6/25/2002	LIM3	14:21	15.36	113.6	11.34	0.073	3.4	9.1	8.16	0.1141	
6/25/2002	LIM3	14:21	14.55	113.4	11.52	0.0732	3.6	9	8.12	0.1144	
6/25/2002	LIM3	14:21	14.53	113.1	11.49	0.0733	3.7	9	8.11	0.1145	

Table C1. Continued

Date	Site	Time	(øC) Temp	% (Sat) DO	(mg/l) DO	(g/l) TDS	(NTU) Turb	(m) Depth	pH	(mS/cm) SpCond	Secchi Depth (m)
6/25/2002	LIM3	14:20	14.55	112.4	11.41	0.0733	3.5	9	8.1	0.1145	
6/25/2002	LIM3	14:22	14.52	111.8	11.35	0.0732	3.4	9	8.09	0.1144	
6/25/2002	LIM3	14:22	13.79	111.4	11.5	0.0725	4.1	10	7.97	0.1132	
6/25/2002	LIM3	14:23	13.75	110.2	11.39	0.0727	4.2	11.1	7.93	0.1136	
6/25/2002	LIM3	14:23	13.71	109.6	11.34	0.0728	4.2	12.1	7.88	0.1138	
6/25/2002	LIM3	14:24	13.69	109.1	11.28	0.0728	4.4	13	7.86	0.1138	
6/25/2002	LIM3	14:25	13.64	107.7	11.15	0.0728	4.3	14.2	7.85	0.1138	
6/25/2002	LIM3	14:26	13.58	106.7	11.07	0.0742	4.4	15	7.8	0.1189	
6/25/2002	LIM3	14:26	13.41	100.1	10.42	0.0767	4.0	16.8	7.66	0.1199	
6/25/2002	LIM3	14:27	13.35	96.6	10.07	0.077	4.2	17.5	7.64	0.1203	
6/25/2002	LIM3	14:27	13.2	93.1	9.74	0.0782	4.3	18.2	7.63	0.1217	
6/25/2002	LIM3	14:28	12.89	91.4	9.62	0.0797	4.9	19.8	7.45	0.1276	
6/25/2002	LIM3	14:28	12.56	84.8	8.99	0.0819	4.6	20.3	7.45	0.1279	
6/25/2002	LIM5	15:29	19.72	115.8	10.55	0.0885	6.5	0.3	8.77	0.1383	5.0
6/25/2002	LIM5	15:30	18.6	115.3	10.74	0.0883	3.1	1.1	8.8	0.1372	
6/25/2002	LIM5	15:31	17.32	113.9	10.9	0.0877	3.2	2	8.82	0.1371	
6/25/2002	LIM5	15:31	17.01	115.1	11.09	0.0874	3.4	2.9	8.82	0.1366	
6/25/2002	LIM5	15:32	16.7	117.2	11.36	0.0866	3.9	4.1	8.86	0.1351	
6/25/2002	LIM5	15:32	16.51	116.3	11.32	0.0864	3.8	5.1	8.84	0.135	
6/25/2002	LIM5	15:33	16.37	114.1	11.14	0.086	4.0	6	8.77	0.1344	
6/25/2002	LIM5	15:34	15.51	109.2	10.86	0.0862	3.9	7	8.54	0.1347	
6/25/2002	LIM5	15:34	14.75	103.5	10.46	0.0861	3.5	8	8.26	0.1347	
6/25/2002	LIM5	15:34	14.65	101	10.19	0.086	3.5	9.2	8.19	0.1344	
6/25/2002	LIM5	15:36	14.48	98.2	9.97	0.0858	3.7	10	8.1	0.1344	
6/25/2002	LIM5	15:36	13.88	92.5	9.52	0.0864	3.3	11.1	7.89	0.135	
6/25/2002	LIM5	15:36	13.82	91	9.38	0.0861	3.2	12	7.85	0.1342	
6/25/2002	LIM5	15:37	13.58	88	9.12	0.0866	3.5	13	7.73	0.1354	
6/25/2002	LIM5	15:37	13.4	85.8	8.94	0.0877	3.5	14.2	7.73	0.137	
6/25/2002	LIM5	15:38	13.21	84.9	8.88	0.0879	3.2	15	7.68	0.1373	
6/25/2002	LIM5	15:38	13.14	84.2	8.82	0.0879	3.7	16	7.67	0.1373	
6/25/2002	LIM5	15:39	12.75	82.3	8.7	0.0886	3.1	17	7.64	0.1384	
6/25/2002	LIM5	15:40	12.68	80.9	8.56	0.0886	3.2	18	7.61	0.1385	
6/25/2002	LIM5	15:40	12.58	79.7	8.45	0.0888	3.0	19	7.59	0.1387	
6/25/2002	LIM5	15:40	12.36	77.4	8.25	0.0891	2.8	20.1	7.54	0.1392	
6/25/2002	LIM5	15:41	12.13	73.8	7.9	0.0894	3.2	20.9	7.52	0.1396	
6/25/2002	LIM5	15:42	12.07	71.8	7.71	0.0894	3.2	22	7.47	0.1397	
6/25/2002	LIM5	15:42	11.95	67.8	7.29	0.0899	3.9	23	7.44	0.1403	

Table C1. Continued

Date	Site	Time	(øC) Temp	% (Sat) DO	(mg/l) DO	(g/l) TDS	(NTU) Turb	(m) Depth	pH	(mS/cm) SpCond	Secchi Depth (m)
7/9/2002	LIM1	12:39	16.84	111.7	10.78	0.0745	12.6	0.4	8.42	0.1164	7.0
7/9/2002	LIM1	12:39	16.23	112	10.96	0.0738	7.3	1.4	8.38	0.1153	
7/9/2002	LIM1	12:40	15.59	113.5	11.27	0.0739	3.6	3	8.32	0.1154	
7/9/2002	LIM1	12:40	15.59	114.1	11.33	0.0739	3.3	3.4	8.3	0.1151	
7/9/2002	LIM1	12:41	15.54	113	11.23	0.074	3.5	4	8.32	0.1157	
7/9/2002	LIM1	12:42	15.44	112.7	11.21	0.0741	3.6	5.3	8.27	0.1158	
7/9/2002	LIM1	12:42	15.41	112.7	11.23	0.0741	3.4	6	8.23	0.1155	
7/9/2002	LIM1	12:43	15.36	112.1	11.19	0.0741	3.4	7	8.22	0.1158	
7/9/2002	LIM1	12:43	15.31	111.8	11.17	0.0739	3.8	7.9	8.16	0.1155	
7/9/2002	LIM1	12:44	15.22	111.5	11.16	0.0741	3.7	9	8.1	0.1158	
7/9/2002	LIM1	12:44	15.21	110.2	11.04	0.0738	3.6	10	8.1	0.1155	
7/9/2002	LIM1	12:45	15.21	111	11.11	0.0741	3.6	11	8.05	0.1158	
7/9/2002	LIM1	12:46	15.13	111.4	11.16	0.0737	3.4	12	7.99	0.1152	
7/9/2002	LIM1	12:46	15.05	111.2	11.17	0.0737	3.5	13.1	7.95	0.1152	
7/9/2002	LIM1	12:47	15.02	110.3	11.08	0.0737	3.4	14	7.97	0.1151	
7/9/2002	LIM1	12:47	15.02	110.6	11.11	0.0738	3.5	15.1	7.95	0.1154	
7/9/2002	LIM1	12:48	15.01	109.6	11.02	0.0738	3.3	16	7.93	0.1154	
7/9/2002	LIM1	12:49	14.94	108.4	10.92	0.0741	3.9	17	7.91	0.1158	
7/9/2002	LIM1	12:50	14.93	108.1	10.89	0.0741	3.7	18	7.91	0.1158	
7/9/2002	LIM1	12:50	14.83	108.3	10.93	0.0737	4.4	19	7.84	0.115	
7/9/2002	LIM3	13:50	20.21	107.1	9.68	0.083	14.2	0.3	8.73	0.1296	2.5
7/9/2002	LIM3	13:51	18.88	106.9	9.91	0.0826	17.0	1	8.78	0.129	
7/9/2002	LIM3	13:51	18.57	106.1	9.9	0.0823	16.8	2	8.75	0.1286	
7/9/2002	LIM3	13:52	18.52	105.6	9.86	0.0823	17.3	2.9	8.75	0.1286	
7/9/2002	LIM3	13:53	18.3	104.7	9.81	0.0821	16.2	4.7	8.63	0.1282	
7/9/2002	LIM3	13:53	18.12	103.9	9.79	0.0819	15.7	5	8.63	0.128	
7/9/2002	LIM3	13:55	17.87	104.6	9.89	0.0815	15.0	6	8.58	0.1271	
7/9/2002	LIM3	13:55	17.74	103.5	9.84	0.0815	15.2	7.2	8.53	0.1274	
7/9/2002	LIM3	13:56	17.67	103.1	9.8	0.0816	15.6	8.2	8.52	0.1276	
7/9/2002	LIM3	13:57	17.55	102.3	9.75	0.0816	15.8	9.4	8.46	0.127	
7/9/2002	LIM3	13:57	17.33	102.3	9.79	0.0814	15.7	10.1	8.37	0.1268	
7/9/2002	LIM3	13:57	17.07	103.7	9.97	0.0796	15.4	10.9	8.31	0.1242	
7/9/2002	LIM3	13:58	16.7	106.9	10.37	0.0776	15.9	12.2	8.26	0.1212	
7/9/2002	LIM3	13:59	16.69	107.1	10.39	0.0776	16.7	13	8.26	0.1204	
7/9/2002	LIM3	13:59	15.97	104.3	10.27	0.0766	16.5	14	8.06	0.1197	
7/9/2002	LIM3	14:00	15.63	104.2	10.34	0.0761	17.3	15	8	0.1188	

Table C1. Continued

Date	Site	Time	(øC) Temp	% (Sat) DO	(mg/l) DO	(g/l) TDS	(NTU) Turb	(m) Depth	pH	(mS/cm) SpCond	Secchi Depth (m)
7/9/2002	LIM3	14:01	15.57	105	10.43	0.0761	17.1	16.3	7.97	0.119	
7/9/2002	LIM3	14:01	15.32	99.7	9.95	0.0765	17.6	17.1	7.87	0.1194	
7/9/2002	LIM3	14:02	14.87	92.6	9.34	0.0773	20.5	18	7.73	0.1207	
7/9/2002	LIM3	14:03	14.27	82.7	8.45	0.0784	25.4	19	7.57	0.1223	
7/9/2002	LIM3	14:03	13.92	78.9	8.12	0.0792	28.1	20	7.5	0.1238	
7/9/2002	LIM5	15:02	18.99	109	10.08	0.084	0.0	0.3	8.74	0.1313	4.5
7/9/2002	LIM5	15:03	18.3	107.7	10.1	0.0837	0.0	1	8.76	0.1307	
7/9/2002	LIM5	15:03	17.98	107.3	10.13	0.0838	6.7	2.4	8.78	0.1309	
7/9/2002	LIM5	15:04	17.72	106.5	10.11	0.0839	5.9	3.1	8.75	0.1311	
7/9/2002	LIM5	15:04	17.39	106.4	10.16	0.0841	5.5	4.2	8.73	0.1316	
7/9/2002	LIM5	15:05	17.25	105.2	10.08	0.084	5.8	5	8.71	0.1314	
7/9/2002	LIM5	15:05	17.07	103.4	9.95	0.084	5.9	6	8.64	0.1313	
7/9/2002	LIM5	15:06	16.84	101.9	9.85	0.0839	5.9	7.2	8.5	0.131	
7/9/2002	LIM5	15:06	16.72	101.6	9.85	0.0838	5.7	7.9	8.48	0.1307	
7/9/2002	LIM5	15:07	16.49	99.1	9.65	0.0839	6.1	9	8.42	0.1311	
7/9/2002	LIM5	15:07	16.3	97.3	9.52	0.0839	6.1	10	8.35	0.1311	
7/9/2002	LIM5	15:08	15.98	96.9	9.53	0.0843	6.3	11.1	8.29	0.1318	
7/9/2002	LIM5	15:08	15.61	93.6	9.29	0.0847	5.9	12	8.18	0.1324	
7/9/2002	LIM5	15:09	15.54	93.4	9.28	0.0849	6.4	13.5	8.14	0.1326	
7/9/2002	LIM5	15:09	15.47	92.3	9.19	0.085	6.6	14.5	8.08	0.1326	
7/9/2002	LIM5	15:10	15.11	89	8.88	0.0852	7.1	15.8	7.96	0.1332	
7/9/2002	LIM5	15:11	14.89	87.9	8.85	0.0855	6.7	16	7.95	0.1336	
7/9/2002	LIM5	15:12	14.87	86.9	8.76	0.0856	7.4	17	7.97	0.1333	
7/9/2002	LIM5	15:13	14.82	84.9	8.57	0.0856	7.1	18	7.94	0.1337	
7/9/2002	LIM5	15:13	14.23	79.6	8.14	0.0861	6.9	19	7.79	0.1345	
7/9/2002	LIM5	15:14	14.18	79.4	8.12	0.0862	6.9	20	7.74	0.1347	
7/9/2002	LIM5	15:14	13.43	71.1	7.35	0.0871	6.5	21.2	7.62	0.1362	
7/9/2002	LIM5	15:15	13.15	65.9	6.9	0.0875	6.3	22.8	7.56	0.137	
7/9/2002	LIM5	15:15	12.99	61.9	6.5	0.0878	7.1	23	7.5	0.1372	
7/23/2002	LIM1	14:41	21.51	111.5	9.81	0.0767	969.1	0.1	8.58	0.1199	5.5
7/23/2002	LIM1	14:42	19.96	115.7	10.5	0.0765	1000	1	8.61	0.1196	
7/23/2002	LIM1	14:43	17.21	120.4	11.55	0.0758	1000	3	8.5	0.1184	
7/23/2002	LIM1	14:44	16.81	117.2	11.34	0.0757	1000	6.6	8.35	0.1183	
7/23/2002	LIM1	14:45	16.6	110.5	10.74	0.0759	1000	9	8.25	0.1185	
7/23/2002	LIM1	14:47	16.53	109.4	10.64	0.0759	1000	12.3	8.21	0.1185	
7/23/2002	LIM1	14:48	16.44	109.5	10.68	0.0759	1000	16	8.14	0.1181	
7/23/2002	LIM1	14:50	16.37	107.3	10.48	0.0757	1000	18.1	8.11	0.1182	

Table C1. Continued

Date	Site	Time	(øC) Temp	% (Sat) DO	(mg/l) DO	(g/l) TDS	(NTU) Turb	(m) Depth	pH	(mS/cm) SpCond	Secchi Depth (m)
7/23/2002	LIM1	14:52	14.76	74.2	7.5	0.076	1000	21.1	7.63	0.1188	
7/23/2002	LIM3	12:59	23.14	113.4	9.67	0.0828	3.3	0.5	8.91	0.1295	4.5
7/23/2002	LIM3	13:00	23.26	112.2	9.55	0.083	1.3	0.5	8.91	0.1296	
7/23/2002	LIM3	13:01	21	115.5	10.27	0.0813	4.1	3.1	8.98	0.127	
7/23/2002	LIM3	13:03	18.84	117.1	10.87	0.0762	3.5	5.9	8.61	0.1193	
7/23/2002	LIM3	13:04	16.69	103.5	10.03	0.0755	3.8	9	8.01	0.118	
7/23/2002	LIM3	13:06	16.09	99.2	9.74	0.0756	3.9	12	7.91	0.1182	
7/23/2002	LIM3	13:07	15.62	86.4	8.57	0.0778	3.8	15	7.72	0.1216	
7/23/2002	LIM3	13:08	14.7	63.8	6.46	0.0804	5.7	17.9	7.48	0.1256	
7/23/2002	LIM3	13:08	14.47	58.5	5.95	0.0809	5.3	17.9	7.53	0.1257	
7/23/2002	LIM5	11:42	22.43	108.4	9.36	0.084	4.8	0.6	8.93	0.1312	4.0
7/23/2002	LIM5	11:42	22.43	108.3	9.37	0.084	4.5	1	8.94	0.1313	
7/23/2002	LIM5	11:43	21.21	105.5	9.34	0.0835	4.7	3	8.82	0.1305	
7/23/2002	LIM5	11:44	19.14	103.2	9.46	0.084	5.2	7.6	8.42	0.1316	
7/23/2002	LIM5	11:45	18.87	99.5	9.23	0.0839	5	9.3	8.43	0.1311	
7/23/2002	LIM5	11:47	18	93.8	8.86	0.0842	5	12	8.2	0.1316	
7/23/2002	LIM5	11:48	17.11	87.9	8.42	0.0842	4.7	15.7	7.91	0.1316	
7/23/2002	LIM5	11:50	15.75	75.8	7.5	0.0848	5.9	18	7.7	0.1325	
7/23/2002	LIM5	11:52	15.07	69.2	6.94	0.0857	5.3	21.5	7.59	0.1356	
7/23/2002	LIM5	11:53	13.73	53.2	5.5	0.0883	4.7	23	7.46	0.138	
8/5/2002	LIM1	16:37	19.41	111.2	10.2	0.0769	6.8	0.3	8.52	0.1202	7
8/5/2002	LIM1	16:37	18.53	112	10.45	0.0766	7.2	1.1	8.56	0.1197	
8/5/2002	LIM1	16:37	18.21	112.9	10.61	0.0766	7.5	2.2	8.58	0.1195	
8/5/2002	LIM1	16:38	18.12	112.7	10.62	0.0766	7.7	3	8.57	0.1197	
8/5/2002	LIM1	16:38	18.07	111.5	10.51	0.0767	7.8	4.4	8.53	0.1196	
8/5/2002	LIM1	16:38	18.05	110.9	10.46	0.0765	7.9	5.7	8.51	0.1196	
8/5/2002	LIM1	16:38	18.05	109.9	10.37	0.0765	7.8	6	8.5	0.1196	
8/5/2002	LIM1	16:39	18.03	109.4	10.32	0.0764	8.2	7.1	8.48	0.1194	
8/5/2002	LIM1	16:39	18.02	108.5	10.24	0.0765	8.1	8	8.44	0.1196	
8/5/2002	LIM1	16:40	18.01	108.4	10.23	0.0765	8.2	9.5	8.42	0.1197	
8/5/2002	LIM1	16:40	18	108.3	10.22	0.0765	8.5	10	8.42	0.1196	
8/5/2002	LIM1	16:40	17.99	108.1	10.21	0.0766	8.7	11.3	8.36	0.1197	
8/5/2002	LIM1	16:41	17.99	108.7	10.26	0.0766	8.7	13.2	8.32	0.1197	
8/5/2002	LIM1	16:41	17.98	108.2	10.22	0.0767	9	12.9	8.36	0.1197	
8/5/2002	LIM1	16:41	17.98	108.8	10.27	0.0766	9.3	14.2	8.35	0.1197	
8/5/2002	LIM1	16:42	17.9	107.1	10.13	0.0768	9.5	15.2	8.29	0.1199	
8/5/2002	LIM1	16:42	17.84	106.4	10.08	0.0768	9.7	16.1	8.27	0.1199	

Table C1. Continued

Date	Site	Time	(øC) Temp	% (Sat) DO	(mg/l) DO	(g/l) TDS	(NTU) Turb	(m) Depth	pH	(mS/cm) SpCond	Secchi Depth (m)
8/5/2002	LIM1	16:42	17.78	106.4	10.09	0.0767	9.7	17.3	8.27	0.1199	
8/5/2002	LIM1	16:43	17.75	105.4	10	0.0767	10.2	18.2	8.18	0.1204	
8/5/2002	LIM1	16:43	17.48	101.7	9.71	0.0771	12	19.3	8.1	0.1207	
8/5/2002	LIM1	16:44	17.25	96.2	9.22	0.0775	11.9	20	7.97	0.121	
8/5/2002	LIM1	16:44	17	86.8	8.36	0.0778	14	21.1	7.86	0.1215	
8/5/2002	LIM3	14:54	20.69	105.9	9.47	0.0811	2.6	0.5	8.85	0.1267	5
8/5/2002	LIM3	14:55	20.66	116.3	10.41	0.081	3.1	1	8.88	0.1265	
8/5/2002	LIM3	14:55	20.23	107.9	9.74	0.0808	3.7	2.2	8.91	0.1263	
8/5/2002	LIM3	14:56	20.21	106.7	9.63	0.0808	3.8	3	8.9	0.1263	
8/5/2002	LIM3	14:57	20.2	106.3	9.6	0.0809	4	3.5	8.9	0.1261	
8/5/2002	LIM3	14:57	20.08	106	9.59	0.0808	4.2	4	8.89	0.1262	
8/5/2002	LIM3	14:57	19.98	105.4	9.56	0.0808	4.2	5	8.87	0.1263	
8/5/2002	LIM3	14:58	19.94	104.9	9.52	0.0808	4.3	6	8.84	0.1263	
8/5/2002	LIM3	14:58	19.91	104.3	9.48	0.0808	4.5	6.9	8.82	0.1263	
8/5/2002	LIM3	14:59	19.87	103.8	9.43	0.0809	4.9	8	8.77	0.1262	
8/5/2002	LIM3	14:59	19.81	102.8	9.35	0.0808	5.1	9.1	8.7	0.1262	
8/5/2002	LIM3	14:59	19.79	102.2	9.3	0.0809	5.7	10.4	8.67	0.1264	
8/5/2002	LIM3	15:00	19.39	102.5	9.41	0.0801	6.4	11	8.6	0.1252	
8/5/2002	LIM3	15:00	19.26	103.8	9.55	0.0794	5	11.9	8.53	0.124	
8/5/2002	LIM3	15:01	19.01	103.4	9.56	0.0791	5.5	12.9	8.45	0.1236	
8/5/2002	LIM3	15:01	17.35	91.8	8.73	0.0789	7.3	14	7.98	0.1233	
8/5/2002	LIM3	15:02	16.66	83.7	8.12	0.0791	7.1	15.7	7.8	0.1239	
8/5/2002	LIM3	15:02	16.2	74.3	7.28	0.0795	8.3	17	7.68	0.124	
8/5/2002	LIM3	15:03	15.22	55.2	5.52	0.0808	10.1	18.2	7.55	0.1263	
8/5/2002	LIM3	15:03	14.73	52.1	5.27	0.0815	12	19.2	7.46	0.1274	
8/5/2002	LIM5	12:58	19.46	103.9	9.52	0.0826	77.7	0.5	8.7	0.1291	5
8/5/2002	LIM5	12:58	19.31	103.3	9.5	0.0825	85.1	1	8.71	0.1289	
8/5/2002	LIM5	12:59	19.15	102.2	9.42	0.0825	81	2	8.71	0.129	
8/5/2002	LIM5	12:59	19.05	101.2	9.35	0.0826	82.3	3	8.64	0.1291	
8/5/2002	LIM5	13:00	19.04	100.2	9.26	0.0826	82.6	4.2	8.62	0.1291	
8/5/2002	LIM5	13:00	19.03	100.1	9.25	0.0826	82.9	5	8.55	0.1291	
8/5/2002	LIM5	13:00	19.03	99.9	9.23	0.0826	84.4	6	8.52	0.1291	
8/5/2002	LIM5	13:01	19.01	99.7	9.22	0.0827	86.8	7.1	8.53	0.1291	
8/5/2002	LIM5	13:01	18.89	98.6	9.14	0.0827	88	8	8.5	0.1291	
8/5/2002	LIM5	13:01	18.88	98.4	9.13	0.0827	90.7	9	8.42	0.1291	
8/5/2002	LIM5	13:02	18.85	95.8	8.89	0.0826	93.1	10	8.4	0.1291	
8/5/2002	LIM5	13:03	18.79	95.2	8.84	0.0826	94.7	11	8.32	0.1291	

Table C1. Continued

Date	Site	Time	(øC) Temp	% (Sat) DO	(mg/l) DO	(g/l) TDS	(NTU) Turb	(m) Depth	pH	(mS/cm) SpCond	Secchi Depth (m)
8/5/2002	LIM5	13:03	18.58	94.1	8.72	0.0827	96.4	12.7	8.18	0.1292	
8/5/2002	LIM5	13:03	18.29	93.2	8.75	0.083	98.5	13	8.14	0.1296	
8/5/2002	LIM5	13:04	18.23	92.3	8.67	0.0828	100.3	14	8.11	0.1293	
8/5/2002	LIM5	13:04	18.24	91.8	8.62	0.0827	101.5	15	8.07	0.1292	
8/5/2002	LIM5	13:04	18.11	88.2	8.31	0.0826	103.7	16.1	7.99	0.129	
8/5/2002	LIM5	13:05	17.59	84.6	8.06	0.0825	106.7	17.1	7.85	0.129	
8/5/2002	LIM5	13:05	17.37	80.3	7.68	0.0825	108.7	18.1	7.78	0.1289	
8/5/2002	LIM5	13:06	17.31	79.4	7.6	0.0827	109	19.3	7.76	0.1289	
8/5/2002	LIM5	13:06	17.22	79.1	7.59	0.0824	110.4	20	7.71	0.1287	
8/5/2002	LIM5	13:06	16.84	75.3	7.21	0.083	111.8	21.5	7.6	0.1300	
8/5/2002	LIM5	13:07	16.26	68.4	6.69	0.0838	111.8	22	7.58	0.1309	
8/5/2002	LIM5	13:07	15.86	61.6	6.08	0.0844	116	23	7.54	0.1318	
8/22/2002	LIM1	12:48	20.25	108.5	9.79	0.0782	435.7	0.4	8.64	0.1220	8.5
8/22/2002	LIM1	12:48	20.26	108.2	9.76	0.0781	4.7	1.0	8.66	0.1221	
8/22/2002	LIM1	12:49	20.11	108.5	9.81	0.0779	3.8	2.0	8.66	0.1216	
8/22/2002	LIM1	12:49	19.81	108.2	9.85	0.0778	3.9	3.0	8.61	0.1214	
8/22/2002	LIM1	12:49	19.60	107.2	9.76	0.0777	3.9	4.6	8.54	0.1214	
8/22/2002	LIM1	12:50	19.45	106.4	9.75	0.0777	4.1	5.0	8.47	0.1215	
8/22/2002	LIM1	12:50	19.43	106.3	9.75	0.0776	4.1	6.2	8.46	0.1212	
8/22/2002	LIM1	12:51	19.39	106.0	9.72	0.0776	4.1	7.1	8.47	0.1213	
8/22/2002	LIM1	12:51	19.30	105.0	9.65	0.0776	4.2	8.0	8.38	0.1213	
8/22/2002	LIM1	12:52	19.23	102.4	9.43	0.0777	4.3	9.0	8.36	0.1214	
8/22/2002	LIM1	12:52	19.20	102.4	9.43	0.0777	4.2	9.8	8.33	0.1214	
8/22/2002	LIM1	12:52	19.17	102.4	9.44	0.0777	4.5	11.6	8.27	0.1214	
8/22/2002	LIM1	12:52	19.16	101.9	9.39	0.0776	4.9	12.0	8.28	0.1213	
8/22/2002	LIM1	12:53	19.14	101.8	9.39	0.0777	4.7	13.0	8.26	0.1215	
8/22/2002	LIM1	12:53	19.08	101.8	9.40	0.0776	4.5	14.0	8.23	0.1213	
8/22/2002	LIM1	12:53	19.03	101.7	9.40	0.0776	4.6	15.0	8.22	0.1213	
8/22/2002	LIM1	12:54	19.03	101.1	9.34	0.0776	4.7	16.1	8.18	0.1213	
8/22/2002	LIM1	12:54	18.89	98.9	9.17	0.0778	5.2	17.0	8.14	0.1214	
8/22/2002	LIM1	12:54	18.74	96.6	8.95	0.0778	5.4	18.2	8.08	0.1216	
8/22/2002	LIM1	12:55	18.68	92.9	8.65	0.078	5.2	18.8	8.05	0.1219	
8/22/2002	LIM1	12:55	18.31	88.2	8.27	0.0787	5.9	19.9	7.87	0.1230	
8/22/2002	LIM1	12:55	17.84	69.1	6.54	0.081	9.8	21.1	7.66	0.1266	
8/22/2002	LIM3	13:46	20.30	105.5	9.51	0.0812	4.7	0.3	8.69	0.1266	5.5
8/22/2002	LIM3	13:46	20.30	104.2	9.39	0.0811	4.1	1.0	8.69	0.1267	
8/22/2002	LIM3	13:47	20.20	104.0	9.39	0.0811	4.1	1.9	8.71	0.1267	

Table C1. Continued

Date	Site	Time	(øC) Temp	% (Sat) DO	(mg/l) DO	(g/l) TDS	(NTU) Turb	(m) Depth	pH	(mS/cm) SpCond	Secchi Depth (m)
8/22/2002	LIM3	13:47	20.17	103.7	9.38	0.081	4.1	3.0	8.70	0.1265	
8/22/2002	LIM3	13:48	20.12	103.1	9.32	0.0811	4.0	5.0	8.71	0.1266	
8/22/2002	LIM3	13:48	20.07	102.9	9.31	0.0809	4.0	5.0	8.69	0.1262	
8/22/2002	LIM3	13:48	20.01	102.8	9.31	0.0808	4.0	6.0	8.67	0.1263	
8/22/2002	LIM3	13:48	19.96	102.2	9.27	0.0808	3.9	7.0	8.65	0.1263	
8/22/2002	LIM3	13:49	19.95	103.2	9.36	0.0807	4.1	8.4	8.58	0.1263	
8/22/2002	LIM3	13:49	19.95	101.4	9.20	0.0808	4.0	9.0	8.60	0.1263	
8/22/2002	LIM3	13:49	19.94	101.3	9.19	0.0808	4.1	10.0	8.55	0.1263	
8/22/2002	LIM3	13:50	19.93	100.8	9.15	0.0808	4.0	10.9	8.55	0.1263	
8/22/2002	LIM3	13:50	19.77	99.6	9.07	0.0808	4.4	12.0	8.48	0.1262	
8/22/2002	LIM3	13:50	19.04	97.9	9.05	0.078	5.5	12.9	8.25	0.1220	
8/22/2002	LIM3	13:51	18.32	84.8	7.95	0.0797	5.4	14.0	7.96	0.1245	
8/22/2002	LIM3	13:52	17.55	69.6	6.63	0.0811	6.0	15.1	7.81	0.1268	
8/22/2002	LIM3	13:52	17.02	64.9	6.25	0.0814	6.2	15.9	7.72	0.1272	
8/22/2002	LIM3	13:53	16.52	57.4	5.59	0.0816	6.7	17.0	7.58	0.1278	
8/22/2002	LIM3	13:53	16.20	53.9	5.28	0.082	8.0	18.5	7.57	0.1281	
8/22/2002	LIM3	13:53	15.75	46.0	4.55	0.0829	11.5	19.8	7.45	0.1312	
8/22/2002	LIM5	14:52	19.55	109.0	9.97	0.0829	10.2	0.5	8.65	0.1294	6
8/22/2002	LIM5	14:53	19.54	124.1	11.36	0.0827	10.2	1.6	8.66	0.1292	
8/22/2002	LIM5	14:53	19.51	115.5	10.57	0.0828	10.2	2.6	8.65	0.1293	
8/22/2002	LIM5	14:54	19.48	113.6	10.41	0.083	10.3	4.0	8.65	0.1297	
8/22/2002	LIM5	14:55	19.48	103.1	9.44	0.0828	10.6	3.6	8.66	0.1295	
8/22/2002	LIM5	14:55	19.42	102.0	9.36	0.0827	10.5	4.1	8.65	0.1292	
8/22/2002	LIM5	14:56	19.42	101.8	9.33	0.0827	11.4	5.1	8.63	0.1292	
8/22/2002	LIM5	14:56	19.39	101.8	9.34	0.0828	11.0	6.0	8.61	0.1294	
8/22/2002	LIM5	14:57	19.38	111.2	10.20	0.0826	11.3	7.0	8.56	0.1291	
8/22/2002	LIM5	14:57	19.37	101.4	10.18	0.0825	11.7	8.9	8.48	0.1291	
8/22/2002	LIM5	14:57	19.34	123.0	11.30	0.0822	12.0	9.6	8.50	0.1285	
8/22/2002	LIM5	14:58	19.28	119.8	11.02	0.0821	11.7	10.4	8.46	0.1282	
8/22/2002	LIM5	14:58	19.19	100.1	9.22	0.0822	12.4	10.9	8.35	0.1287	
8/22/2002	LIM5	14:58	19.19	108.2	9.97	0.0823	12.8	11.6	8.46	0.1286	
8/22/2002	LIM5	14:59	19.17	98.8	10.08	0.0824	12.5	12.8	8.39	0.1286	
8/22/2002	LIM5	14:59	19.16	98.0	9.03	0.0824	14.1	13.0	8.37	0.1286	
8/22/2002	LIM5	14:59	19.08	96.9	8.95	0.0821	12.6	14.0	8.31	0.1283	
8/22/2002	LIM5	15:00	19.02	111.7	9.68	0.0821	13.4	15.7	8.24	0.1281	
8/22/2002	LIM5	15:00	18.91	93.4	8.65	0.082	14.8	16.0	8.23	0.1279	

Table C1. Continued

Date	Site	Time	(øC) Temp	% (Sat) DO	(mg/l) DO	(g/l) TDS	(NTU) Turb	(m) Depth	pH	(mS/cm) SpCond	Secchi Depth (m)
8/22/2002	LIM5	15:01	18.85	99.7	9.25	0.0821	15.5	16.9	8.19	0.1283	
8/22/2002	LIM5	15:01	18.76	90.1	8.37	0.082	15.8	18.1	8.11	0.1281	
8/22/2002	LIM5	15:02	18.56	84.1	7.85	0.0822	16.1	19.5	7.97	0.1285	
8/22/2002	LIM5	15:02	18.41	83.2	7.79	0.0825	16.0	20.7	7.88	0.1295	
8/22/2002	LIM5	15:03	18.40	87.2	8.16	0.0825	17.4	21.4	7.94	0.1288	
8/22/2002	LIM5	15:03	17.79	84.9	8.05	0.0837	17.8	22.4	7.70	0.1327	
8/22/2002	LIM5	15:04	17.09	51.4	4.94	0.0857	20.4	23.0	7.63	0.1340	

Appendix D.

Table D1. Chlorophyll, Phosphate, and Nitrate concentrations in Banks Lake From April to August, 2002.

	Chlorophyll (ug/l)						**PO4 mg/l**						**NO3 mg/l**					
Site #1	Rep	**1**	**2**	**3**	**Avg**	**SE**	Rep	**1**	**2**	**3**	**Avg**	**SE**	Rep	**1**	**2**	**3**	**Avg**	**SE**
23-Apr		5.10			5.10	0.00		0.15			0.20	0.000		0.7			0.70	0.00
22-May		3.26	2.88	3.69	3.28	0.23		0.10	0.11	0.10	0.10	0.003		3.4	2.4	4.2	3.33	0.52
12-Jun		2.48	3.15	3.32	2.98	0.26		0.15	0.13	0.22	0.17	0.027		1.3	2.2	1.5	1.67	0.27
25-Jun		2.10	2.08	1.67	1.95	0.14		0.13	1.15	0.12	0.47	0.342		1.9	1.4	1.7	1.67	0.15
09-Jul		1.97	1.82	1.85	1.88	0.05		0.25	0.07	0.02	0.11	0.070		3.4	2.0	2.7	2.70	0.40
23-Jul		2.81	2.83	3.27	2.97	0.15		0.12	0.09	0.09	0.10	0.010		4.3	4.8	4.4	4.50	0.15
05-Aug		1.20	1.35	1.29	1.28	0.04		0.01	0.02	0.02	0.02	0.003		1.5	3.4	1.9	2.27	0.58
22-Aug		0.86	0.82	0.83	0.84	0.01		0.22	0.18	0.14	0.18	0.023		1.9	2.4	2.7	2.33	0.23

	Chlorophyll (ug/l)						**PO4 mg/l**						**NO3 mg/l**					
Site #3	Rep	**1**	**2**	**3**	**Avg**	**SE**	Rep	**1**	**2**	**3**	**Avg**	**SE**	Rep	**1**	**2**	**3**	**Avg**	**SE**
23-Apr		3.69			3.69	0.00		0.17			0.17	0.00		2.9			2.90	0.00
22-May		4.18	4.15	3.51	3.95	0.22		0.18	0.07	0.13	0.13	0.03		1.4	2	1.7	1.70	0.17
12-Jun		1.30	1.74	1.92	1.65	0.18		0.09	0.11	0.07	0.09	0.01		1.3	2.1	1.8	1.73	0.23
25-Jun		2.95	3.06	3.76	3.26	0.25		0.46	0.52	0.60	0.53	0.04		2.8	3.5	4.1	3.47	0.38
09-Jul		2.04	2.48	2.75	2.42	0.21		0.02	0.04	0.04	0.03	0.01		1.2	0.6	0.9	0.90	0.17
23-Jul		3.33	3.24	2.91	3.16	0.13		3.33	3.24	2.91	3.16	0.13		4.3	4.7	4.3	4.43	0.13
05-Aug		1.07	1.08	1.12	1.09	0.02		0.00	0.00	0.00	0.00	0.00		1.5	2	1.9	1.80	0.15
22-Aug		0.75	1.01	1.06	0.94	0.10		0.17	0.09	0.12	0.13	0.02		2.3	1.4	1.7	1.80	0.26

	Chlorophyll (ug/l)						**PO4 mg/l**						**NO3 mg/l**					
Site #5	Rep	**1**	**2**	**3**	**Avg**	**SE**	Rep	**1**	**2**	**3**	**Avg**	**SE**	Rep	**1**	**2**	**3**	**Avg**	**SE**
23-Apr		1.45			1.45	0.00		0.50			0.50	0.000		1.3			1.30	0.00
22-May		3.51	3.53	3.47	3.50	0.02		0.03	0.05	0.03	0.04	0.007		1.6	2.2	1.7	1.83	0.19
12-Jun		1.54	1.53	1.42	1.50	0.04		0.09	0.11	0.07	0.09	0.012		2.8	1.8	1.6	2.07	0.37
25-Jun		4.34	3.47	3.02	3.61	0.39		0.09	0.20	0.03	0.11	0.050		1.2	1.5	1.7	1.47	0.15
09-Jul		2.82	3.24	2.90	2.99	0.13		0.03	0.03	0.00	0.02	0.010		0.5	0.9	1.4	0.93	0.26
23-Jul		2.27	2.63	2.32	2.41	0.11		0.06	0.10	0.03	0.06	0.020		4.5	5.4	6	5.30	0.44
05-Aug		1.26	1.38	1.22	1.29	0.05		0.01	0.03	0.02	0.02	0.006		2.5	2	2.7	2.40	0.21
22-Aug		1.11	1.00	0.91	1.01	0.06		0.05	0.07	0.03	0.05	0.012		2.2	1.5	1.5	1.73	0.23

Table D2. Zooplankton species, density, biomass, and length measurements in Banks Lake from February to August, 2002.

Date	02/21/2002					
Site #1		**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
	D. schodleri number/liter	6.622	3.985	6.329	5.645	0.834
	D. schodleri mass/liter (ug)	52.755	29.346	44.360	42.154	6.847
	D. schodleri avg. lngth (mm)	1.151	1.116	1.095	1.121	0.016
	D. galeata number/liter	0.000	0.000	0.000	0.000	0.000
	D. galeata mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	D. galeata avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	D. retrocurva number/liter	0.000	0.000	0.000	0.000	0.000
	D. retrocurva mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	D. retrocurva avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Bosmina longirostris number/liter	2.402	2.695	3.574	2.891	0.352
	Bosmina longirostris mass/liter (ug)	3.000	3.892	4.766	3.886	0.510
	Bosmina longirostris avg. lngth (mm)	0.360	0.384	0.375	0.373	0.007
	Leptodiaptomus ashlandi #/l	3.750	4.395	4.981	4.375	0.355
	Leptodiaptomus ashlandi ug/l	23.155	25.720	26.157	25.011	0.937
	Leptodiapt ashlandi avg *(*mm)	0.872	0.865	0.822	0.853	0.016
	Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000
	Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
	Epischura nevadensis avg *(*mm)	0.000	0.000	0.000	0.000	0.000
	Diacyclops thomasi #/l	5.215	6.622	4.805	5.547	0.550
	Diacyclops thomasi ug/l	28.033	28.728	19.038	25.266	3.121
	Diacyclops thomasi avg *(*mm)	0.901	0.836	0.797	0.845	0.030
	Mesocyclops edax #/l	0.059	0.000	0.000	0.020	0.020
	Mesocyclops edax ug/l	0.545	0.000	0.000	0.182	0.182
	Mesocyclops edax avg *(*mm)	1.150	0.000	0.000	0.383	0.383
	Leptodora kindtii number/liter	0.000	0.000	0.000	0.000	0.000
	Leptodora kindtii mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	Leptodora kindtii avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000
	Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000

Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Total Inds./liter	18.048	17.696	19.689	18.478	0.614
Total mass (ug)/liter	107.488	87.686	94.321	96.498	5.819

Site #3	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
D. schodleri number/liter	2.856	2.111	3.228	2.732	0.329
D. schodleri mass/liter (ug)	23.206	14.591	29.073	22.290	4.205
D. schodleri avg. lngth (mm)	1.128	1.072	1.180	1.127	0.031
D. galeata number/liter	0.000	0.000	0.000	0.000	0.000
D. galeata mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
D. galeata avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
D. retrocurva number/liter	0.000	0.000	0.000	0.000	0.000
D. retrocurva mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
D. retrocurva avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Bosmina longirostris number/liter	0.310	0.062	0.186	0.186	0.072
Bosmina longirostris mass/liter (ug)	0.326	0.094	0.253	0.224	0.068
Bosmina longirostris avg. lngth (mm)	0.350	0.400	0.375	0.375	0.014
Leptodiaptomus ashlandi #/l	3.849	3.415	4.532	3.932	0.325
Leptodiaptomus ashlandi ug/l	22.723	18.554	28.750	23.342	2.960
Leptodiapt ashlandi avg *(*mm)	0.853	0.816	0.869	0.846	0.016
Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis avg *(*mm)	0.000	0.000	0.000	0.000	0.000
Diacyclops thomasi #/l	5.029	3.725	4.036	4.263	0.393
Diacyclops thomasi ug/l	21.687	18.179	19.132	19.666	1.047
Diacyclops thomasi avg *(*mm)	0.822	0.867	0.864	0.851	0.015
Mesocyclops edax #/l	0.000	0.000	0.000	0.000	0.000
Mesocyclops edax ug/l	0.000	0.000	0.000	0.000	0.000
Mesocyclops edax avg *(*mm)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii number/liter	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000

Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Total Inds./liter	12.045	9.313	11.982	11.113	0.900
Total mass (ug)/liter	67.941	51.418	77.207	65.522	7.542

Site #5	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
D. schodleri number/liter	1.783	1.144	3.140	2.022	0.588
D. schodleri mass/liter (ug)	11.858	6.652	20.178	12.896	3.939
D. schodleri avg. lngth (mm)	1.052	0.998	1.040	1.030	0.016
D. galeata number/liter	0.053	0.000	0.106	0.053	0.031
D. galeata mass/liter (ug)	0.689	0.000	0.332	0.340	0.199
D. galeata avg. lngth (mm)	1.500	0.000	0.863	0.788	0.435
D. retrocurva number/liter	0.000	0.000	0.000	0.000	0.000
D. retrocurva mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
D. retrocurva avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Bosmina longirostris number/liter	0.053	0.000	0.213	0.089	0.064
Bosmina longirostris mass/liter (ug)	0.149	0.000	0.159	0.103	0.051
Bosmina longirostris avg. lngth (mm)	0.475	0.000	0.300	0.258	0.139
Leptodiaptomus ashlandi #/l	3.778	3.246	5.375	4.133	0.640
Leptodiaptomus ashlandi ug/l	26.277	20.612	19.770	22.220	2.043
Leptodiapt ashlandi avg *(*mm)	0.915	0.891	0.698	0.835	0.069
Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis avg *(*mm)	0.000	0.000	0.000	0.000	0.000
Diacyclops thomasi #/l	3.725	3.246	4.204	3.725	0.277
Diacyclops thomasi ug/l	17.914	15.098	8.776	13.930	2.702
Diacyclops thomasi avg *(*mm)	0.868	0.855	0.614	0.779	0.083
Mesocyclops edax #/l	0.000	0.000	0.000	0.000	0.000
Mesocyclops edax ug/l	0.000	0.000	0.000	0.000	0.000
Mesocyclops edax avg *(*mm)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii number/liter	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000

	Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Total Inds./liter	9.393	7.637	13.038	10.022	1.591
	Total mass (ug)/liter	56.888	42.363	49.214	49.488	4.195

Date	03/19/2002					
Site #1	**Species**	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
	D. schodleri number/liter	3.709	5.505	5.273	4.829	0.564
	D. schodleri mass/liter (ug)	23.182	40.601	37.695	33.826	5.388
	D. schodleri avg. lngth (mm)	1.054	1.108	1.107	1.090	0.018
	D. galeata number/liter	0.000	0.000	0.000	0.000	0.000
	D. galeata mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	D. galeata avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	D. retrocurva number/liter	0.000	0.000	0.000	0.000	0.000
	D. retrocurva mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	D. retrocurva avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Bosmina longirostris number/liter	1.912	2.028	2.318	2.086	0.121
	Bosmina longirostris mass/liter (ug)	3.269	4.083	4.579	3.977	0.382
	Bosmina longirostris avg. lngth (mm)	0.405	0.423	0.418	0.415	0.005
	Leptodiaptomus ashlandi #/l	4.114	5.099	4.752	4.655	0.288
	Leptodiaptomus ashlandi ug/l	29.021	33.875	27.473	30.123	1.928
	Leptodiapt ashlandi avg *(*mm)	0.934	0.908	0.865	0.902	0.020
	Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000
	Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
	Epischura nevadensis avg *(*mm)	0.000	0.000	0.000	0.000	0.000
	Diacyclops thomasi #/l	7.591	8.228	8.286	8.035	0.223
	Diacyclops thomasi ug/l	39.056	36.914	46.723	40.898	2.978
	Diacyclops thomasi avg *(*mm)	0.879	0.831	0.922	0.877	0.026
	Mesocyclops edax #/l	0.000	0.000	0.000	0.000	0.000
	Mesocyclops edax ug/l	0.000	0.000	0.000	0.000	0.000
	Mesocyclops edax avg *(*mm)	0.000	0.000	0.000	0.000	0.000
	Leptodora kindtii number/liter	0.000	0.000	0.000	0.000	0.000

Leptodora kindtii mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Total Inds./liter	17.326	20.861	20.629	19.605	1.142
Total mass (ug)/liter	94.528	115.473	116.470	108.824	7.153

Site #3	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
D. schodleri number/liter	1.825	1.891	2.151	1.956	0.100
D. schodleri mass/liter (ug)	12.811	14.794	16.338	14.648	1.021
D. schodleri avg. lngth (mm)	1.089	1.122	1.130	1.114	0.013
D. galeata number/liter	0.000	0.000	0.000	0.000	0.000
D. galeata mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
D. galeata avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
D. retrocurva number/liter	0.000	0.000	0.000	0.000	0.000
D. retrocurva mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
D. retrocurva avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Bosmina longirostris number/liter	0.196	0.522	0.261	0.326	0.100
Bosmina longirostris mass/liter (ug)	0.361	0.905	0.302	0.523	0.192
Bosmina longirostris avg. lngth (mm)	0.417	0.406	0.363	0.395	0.017
Leptodiaptomus ashlandi #/l	7.432	7.432	7.236	7.366	0.065
Leptodiaptomus ashlandi ug/l	38.368	41.118	39.265	39.584	0.810
Leptodiapt ashlandi avg *(*mm)	0.816	0.832	0.820	0.823	0.005
Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis avg *(*mm)	0.000	0.000	0.000	0.000	0.000
Diacyclops thomasi #/l	6.910	5.737	5.411	6.019	0.455
Diacyclops thomasi ug/l	24.945	23.392	18.207	22.181	2.037
Diacyclops thomasi avg *(*mm)	0.770	0.794	0.742	0.769	0.015
Mesocyclops edax #/l	0.000	0.000	0.000	0.000	0.000
Mesocyclops edax ug/l	0.000	0.000	0.000	0.000	0.000
Mesocyclops edax avg *(*mm)	0.000	0.000	0.000	0.000	0.000

	Pull 1	Pull 2	Pull 3	Average	Std Error
Leptodora kindtii number/liter	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Total Inds./liter	16.363	15.580	15.059	15.667	0.379
Total mass (ug)/liter	76.486	80.209	74.112	76.936	1.774

Site #5	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
D. schodleri number/liter	1.721	1.512	1.617	1.617	0.060
D. schodleri mass/liter (ug)	11.839	11.913	14.000	12.584	0.708
D. schodleri avg. lngth (mm)	1.083	1.136	1.185	1.135	0.029
D. galeata number/liter	0.000	0.000	0.052	0.017	0.017
D. galeata mass/liter (ug)	0.000	0.000	0.728	0.243	0.243
D. galeata avg. lngth (mm)	0.000	0.000	1.550	0.517	0.517
D. retrocurva number/liter	0.000	0.000	0.000	0.000	0.000
D. retrocurva mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
D. retrocurva avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Bosmina longirostris number/liter	0.052	0.000	0.052	0.035	0.017
Bosmina longirostris mass/liter (ug)	0.052	0.000	0.114	0.055	0.033
Bosmina longirostris avg. lngth (mm)	0.350	0.000	0.450	0.267	0.136
Leptodiaptomus ashlandi #/l	6.154	5.424	6.363	5.980	0.285
Leptodiaptomus ashlandi ug/l	34.268	36.374	39.865	36.836	1.632
Leptodiapt ashlandi avg (mm)	0.826	0.910	0.869	0.868	0.024
Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis avg (mm)	0.000	0.000	0.000	0.000	0.000
Diacyclops thomasi #/l	5.163	5.945	7.040	6.050	0.544
Diacyclops thomasi ug/l	25.237	31.547	31.498	29.427	2.095
Diacyclops thomasi avg (mm)	0.860	0.896	0.831	0.862	0.019
Mesocyclops edax #/l	0.000	0.000	0.000	0.000	0.000

Mesocyclops edax ug/l	0.000	0.000	0.000	0.000	0.000
Mesocyclops edax avg (mm)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii number/liter	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Total Inds./liter	13.090	12.881	15.124	13.699	0.715
Total mass (ug)/liter	71.396	79.834	86.205	79.145	4.289

Date	04/23/2002					
Site #1	**Species**	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
	D. schodleri number/liter	0.179	0.105	0.030	0.105	0.043
	D. schodleri mass/liter (ug)	0.798	0.516	0.510	0.608	0.095
	D. schodleri avg. lngth (mm)	0.917	0.929	1.250	1.032	0.109
	D. galeata number/liter	0.000	0.000	0.000	0.000	0.000
	D. galeata mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	D. galeata avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	D. retrocurva number/liter	0.000	0.000	0.000	0.000	0.000
	D. retrocurva mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	D. retrocurva avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Bosmina longirostris number/liter	0.449	0.284	0.090	0.274	0.104
	Bosmina longirostris mass/liter (ug)	0.487	0.524	0.158	0.389	0.116
	Bosmina longirostris avg. lngth (mm)	0.335	0.411	0.392	0.379	0.023
	Leptodiaptomus ashlandi #/l	2.691	0.598	0.673	1.321	0.686
	Leptodiaptomus ashlandi ug/l	14.930	3.873	4.100	7.634	3.648
	Leptodiapt ashlandi avg (mm)	0.835	0.889	0.865	0.863	0.016
	Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000
	Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
	Epischura nevadensis avg (mm)	0.000	0.000	0.000	0.000	0.000

Diacyclops thomasi #/l	1.286	1.121	0.912	1.106	0.108
Diacyclops thomasi ug/l	3.866	5.612	2.835	4.104	0.811
Diacyclops thomasi avg *(*mm)	0.681	0.865	0.700	0.749	0.058
Mesocyclops edax #/l	0.000	0.000	0.000	0.000	0.000
Mesocyclops edax ug/l	0.000	0.000	0.000	0.000	0.000
Mesocyclops edax avg *(*mm)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii number/liter	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis number/liter	0.000	0.179	0.000	0.060	0.073
Alona quadrangularis mass/liter (ug)	0.000	0.129	0.000	0.043	0.053
Alona quadrangularis avg. lngth (mm)	0.000	0.300	0.000	0.100	0.122
Total Inds./liter	4.785	2.108	1.705	2.866	0.966
Total mass (ug)/liter	20.209	10.526	7.603	12.779	3.809

Site #3	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
D. schodleri number/liter	4.535	2.907	6.156	4.532	0.938
D. schodleri mass/liter (ug)	30.565	19.510	38.959	29.678	5.632
D. schodleri avg. lngth (mm)	1.061	1.060	1.043	1.055	0.006
D. galeata number/liter	0.000	0.000	0.000	0.000	0.000
D. galeata mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
D. galeata avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
D. retrocurva number/liter	0.000	0.000	0.000	0.000	0.000
D. retrocurva mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
D. retrocurva avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Bosmina longirostris number/liter	2.897	0.598	2.565	2.020	0.717
Bosmina longirostris mass/liter (ug)	5.149	1.367	6.231	4.249	1.474
Bosmina longirostris avg. lngth (mm)	0.404	0.443	0.450	0.432	0.014
Leptodiaptomus ashlandi #/l	10.582	6.583	12.482	9.882	1.738
Leptodiaptomus ashlandi ug/l	70.081	48.195	89.785	69.354	12.012
Leptodiapt ashlandi avg *(*mm)	0.898	0.954	0.938	0.930	0.017
Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000

Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis avg *(*mm)	0.000	0.000	0.000	0.000	0.000
Diacyclops thomasi #/l	19.399	12.910	19.664	17.324	2.209
Diacyclops thomasi ug/l	89.279	60.291	103.050	84.207	12.601
Diacyclops thomasi avg *(*mm)	0.838	0.846	0.893	0.859	0.017
Mesocyclops edax #/l	0.000	0.000	0.000	0.000	0.000
Mesocyclops edax ug/l	0.000	0.000	0.000	0.000	0.000
Mesocyclops edax avg *(*mm)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii number/liter	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis number/liter	0.252	0.000	0.171	0.141	0.074
Alona quadrangularis mass/liter (ug)	0.169	0.000	0.258	0.142	0.076
Alona quadrangularis avg. lngth (mm)	0.300	0.000	0.400	0.233	0.120
Total Inds./liter	37.665	22.998	41.037	33.900	5.537
Total mass (ug)/liter	195.243	129.364	238.284	187.630	31.672

Site #5	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
D. schodleri number/liter	3.591	3.933	5.301	4.275	0.522
D. schodleri mass/liter (ug)	22.736	21.554	30.893	25.061	2.936
D. schodleri avg. lngth (mm)	1.029	0.972	1.013	1.004	0.017
D. galeata number/liter	0.000	0.000	0.000	0.000	0.000
D. galeata mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
D. galeata avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
D. retrocurva number/liter	0.000	0.000	0.000	0.000	0.000
D. retrocurva mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
D. retrocurva avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Bosmina longirostris number/liter	0.171	0.000	0.513	0.228	0.151
Bosmina longirostris mass/liter (ug)	0.258	0.000	0.622	0.293	0.180
Bosmina longirostris avg. lngth (mm)	0.400	0.000	0.367	0.256	0.128
Leptodiaptomus ashlandi #/l	28.042	25.990	34.882	29.638	2.688
Leptodiaptomus ashlandi ug/l	181.337	164.652	231.902	192.630	20.218
Leptodiapt ashlandi avg *(*mm)	0.887	0.890	0.903	0.893	0.005

		Pull 1	Pull 2	Pull 3	Average	Std Error
	Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000
	Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
	Epischura nevadensis avg *(*mm)	0.000	0.000	0.000	0.000	0.000
	Diacyclops thomasi #/l	15.389	13.166	16.244	14.933	0.917
	Diacyclops thomasi ug/l	67.137	50.738	69.390	62.421	5.878
	Diacyclops thomasi avg *(*mm)	0.809	0.774	0.809	0.797	0.012
	Mesocyclops edax #/l	0.000	0.000	0.000	0.000	0.000
	Mesocyclops edax ug/l	0.000	0.000	0.000	0.000	0.000
	Mesocyclops edax avg *(*mm)	0.000	0.000	0.000	0.000	0.000
	Leptodora kindtii number/liter	0.000	0.000	0.000	0.000	0.000
	Leptodora kindtii mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	Leptodora kindtii avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000
	Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Total Inds./liter	47.193	43.089	56.939	49.074	4.107
	Total mass (ug)/liter	271.468	236.944	332.807	280.407	28.032

Date	05/22/2002					
Site #1	**Species**	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
	D. schodleri number/liter	0.080	0.483	0.322	0.295	0.117
	D. schodleri mass/liter (ug)	0.147	10.086	6.025	5.419	2.885
	D. schodleri avg. lngth (mm)	0.700	1.558	1.425	1.228	0.267
	D. galeata number/liter	0.000		0.161	0.054	0.066
	D. galeata mass/liter (ug)	0.000		1.107	0.369	0.452
	D. galeata avg. lngth (mm)	0.000		1.125	0.375	0.459
	D. retrocurva number/liter	0.000	0.000	0.000	0.000	0.000
	D. retrocurva mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	D. retrocurva avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Bosmina longirostris number/liter	0.483	0.322	0.161	0.322	0.093
	Bosmina longirostris mass/liter (ug)	0.875	0.444	0.554	0.624	0.129
	Bosmina longirostris avg. lngth (mm)	0.400	0.363	0.500	0.421	0.041

	Leptodiaptomus ashlandi #/l	3.461	4.024	4.185	3.890	0.220
	Leptodiaptomus ashlandi ug/l	25.510	32.780	33.400	30.563	2.533
	Leptodiapt ashlandi avg *(*mm)	0.926	0.961	0.950	0.946	0.010
	Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000
	Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
	Epischura nevadensis avg *(*mm)	0.000	0.000	0.000	0.000	0.000
	Diacyclops thomasi #/l	7.646	6.841	7.404	7.297	0.238
	Diacyclops thomasi ug/l	30.759	27.413	29.918	29.363	1.005
	Diacyclops thomasi avg *(*mm)	0.785	0.781	0.788	0.785	0.002
	Mesocyclops edax #/l	0.000	0.000	0.000	0.000	0.000
	Mesocyclops edax ug/l	0.000	0.000	0.000	0.000	0.000
	Mesocyclops edax avg *(*mm)	0.000	0.000	0.000	0.000	0.000
	Leptodora kindtii number/liter	0.000	0.000	0.000	0.000	0.000
	Leptodora kindtii mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	Leptodora kindtii avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000
	Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis number/liter	0.161	0.000	0.483	0.215	0.142
	Alona quadrangularis mass/liter (ug)	0.012	0.000	0.035	0.016	0.010
	Alona quadrangularis avg. lngth (mm)	0.150	0.000	0.146	0.099	0.049
	Total Inds./liter	11.831	11.831	12.609	12.090	0.259
	Total mass (ug)/liter	57.303	71.830	70.302	66.478	4.609
Site #3		**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
	D. schodleri number/liter	7.773	5.300	11.572	8.215	1.824
	D. schodleri mass/liter (ug)	75.346	47.384	105.737	76.156	16.850
	D. schodleri avg. lngth (mm)	1.220	1.174	1.187	1.194	0.014
	D. galeata number/liter	4.770	1.590	3.975	3.445	0.955
	D. galeata mass/liter (ug)	15.176	6.101	13.837	11.705	2.828
	D. galeata avg. lngth (mm)	0.859	0.903	0.876	0.879	0.013
	D. retrocurva number/liter	0.000	0.000	0.000	0.000	0.000
	D. retrocurva mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	D. retrocurva avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Bosmina longirostris number/liter	11.130	8.480	5.742	8.451	1.556

Bosmina longirostris mass/liter (ug)	15.800	11.647	8.107	11.851	2.223
Bosmina longirostris avg. lngth (mm)	0.361	0.367	0.371	0.366	0.003
Leptodiaptomus ashlandi #/l	14.840	7.508	6.890	9.746	2.553
Leptodiaptomus ashlandi ug/l	114.302	52.454	52.779	73.178	20.562
Leptodiapt ashlandi avg *(*mm)	0.976	0.907	0.960	0.948	0.021
Epischura nevadensis #/l	0.353	0.088	1.325	0.589	0.376
Epischura nevadensis ug/l	11.882	2.039	39.093	17.671	11.081
Epischura nevadensis avg *(*mm)	1.875	1.600	1.743	1.739	0.079
Diacyclops thomasi #/l	12.720	6.625	8.745	9.363	1.786
Diacyclops thomasi ug/l	58.101	27.609	40.566	42.092	8.835
Diacyclops thomasi avg *(*mm)	0.833	0.796	0.829	0.819	0.012
Mesocyclops edax #/l	0.000	0.000	0.000	0.000	0.000
Mesocyclops edax ug/l	0.000	0.000	0.000	0.000	0.000
Mesocyclops edax avg *(*mm)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii number/liter	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Total Inds./liter	51.586	29.592	38.248	39.809	6.397
Total mass (ug)/liter	290.607	147.233	260.119	232.653	43.607

Site #5	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
D. schodleri number/liter	3.042	3.477	4.781	3.767	0.522
D. schodleri mass/liter (ug)	29.211	23.639	37.242	30.031	3.948
D. schodleri avg. lngth (mm)	1.200	1.075	1.130	1.135	0.036
D. galeata number/liter	0.362	0.290	0.000	0.217	0.111
D. galeata mass/liter (ug)	1.230	0.750	0.000	0.660	0.358
D. galeata avg. lngth (mm)	0.870	0.800	0.000	0.557	0.279
D. retrocurva number/liter	0.000	0.000	0.000	0.000	0.000
D. retrocurva mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
D. retrocurva avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000

Bosmina longirostris number/liter	0.869	1.159	1.304	1.111	0.128
Bosmina longirostris mass/liter (ug)	1.543	2.390	1.336	1.757	0.322
Bosmina longirostris avg. lngth (mm)	0.404	0.413	0.350	0.389	0.020
Leptodiaptomus ashlandi #/l	11.010	14.197	11.010	12.072	1.062
Leptodiaptomus ashlandi ug/l	71.652	95.643	59.162	75.485	10.704
Leptodiapt ashlandi avg (mm)	0.886	0.891	0.806	0.861	0.028
Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis avg (mm)	0.000	0.000	0.000	0.000	0.000
Diacyclops thomasi #/l	13.400	18.253	15.935	15.863	1.401
Diacyclops thomasi ug/l	45.076	62.362	43.223	50.221	6.094
Diacyclops thomasi avg (mm)	0.737	0.747	0.675	0.720	0.023
Mesocyclops edax #/l	0.290	1.304	1.014	0.869	0.302
Mesocyclops edax ug/l	2.658	7.615	5.893	5.389	1.453
Mesocyclops edax avg (mm)	1.138	0.950	0.943	1.010	0.064
Leptodora kindtii number/liter	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Total Inds./liter	28.973	38.679	34.044	33.899	2.803
Total mass (ug)/liter	151.370	192.399	146.856	163.542	14.487

Date	06/12/2002					
Site #1	**Species**	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
	D. schodleri number/liter	1.858	1.334	1.430	1.541	0.161
	D. schodleri mass/liter (ug)	14.366	6.509	8.009	9.628	2.408
	D. schodleri avg. lngth (mm)	1.108	0.897	0.997	1.001	0.061
	D. galeata number/liter	1.430	2.097	2.764	2.097	0.385
	D. galeata mass/liter (ug)	8.151	9.426	15.608	11.062	2.303
	D. galeata avg. lngth (mm)	1.023	0.893	1.012	0.976	0.042
	D. retrocurva number/liter	0.048	0.238	0.191	0.159	0.057
	D. retrocurva mass/liter (ug)	0.072	0.558	1.311	0.647	0.361
	D. retrocurva avg. lngth (mm)	0.650	0.745	1.125	0.840	0.145
	Bosmina longirostris number/liter	1.858	1.382	2.859	2.033	0.435
	Bosmina longirostris mass/liter (ug)	2.603	1.836	4.982	3.141	0.947
	Bosmina longirostris avg. lngth (mm)	0.374	0.354	0.400	0.376	0.013
	Leptodiaptomus ashlandi #/l	1.620	1.001	1.334	1.318	0.179
	Leptodiaptomus ashlandi ug/l	11.384	5.800	12.231	9.805	2.017
	Leptodiapt ashlandi avg *(*mm)	0.900	0.796	1.021	0.906	0.065
	Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000
	Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
	Epischura nevadensis avg *(*mm)	0.000	0.000	0.000	0.000	0.000
	Diacyclops thomasi #/l	7.291	5.623	11.246	8.053	1.667
	Diacyclops thomasi ug/l	40.625	16.871	72.379	43.292	16.079
	Diacyclops thomasi avg *(*mm)	0.909	0.699	0.960	0.856	0.080
	Mesocyclops edax #/l	0.191	0.095	0.000	0.095	0.055
	Mesocyclops edax ug/l	1.723	0.325	0.000	0.683	0.529
	Mesocyclops edax avg *(*mm)	1.125	0.775	0.000	0.633	0.332
	Leptodora kindtii number/liter	0.000	0.000	0.000	0.000	0.000
	Leptodora kindtii mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	Leptodora kindtii avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Diaphanosoma brachyurum number/liter	0.000	0.143	0.000	0.048	0.048
	Diaphanosoma brachyurum mass/liter (ug)	0.000	0.151	0.000	0.050	0.050
	Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.542	0.000	0.181	0.181
	Alona quadrangularis number/liter	0.000	0.000	0.095	0.032	0.032
	Alona quadrangularis mass/liter (ug)	0.000	0.000	0.144	0.048	0.048
	Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.400	0.133	0.133

Total Inds./liter	14.296	11.913	19.919	15.376	2.373
Total mass (ug)/liter	78.925	41.476	114.664	78.355	21.129

Site #3

	Pull 1	Pull 2	Pull 3	Average	Std Error
D. schodleri number/liter	5.830	3.798	3.180	4.269	0.800
D. schodleri mass/liter (ug)	66.329	44.175	32.471	47.658	9.928
D. schodleri avg. lngth (mm)	1.259	1.294	1.207	1.253	0.025
D. galeata number/liter	3.357	4.682	3.268	3.769	0.457
D. galeata mass/liter (ug)	27.825	40.074	27.421	31.773	4.152
D. galeata avg. lngth (mm)	1.221	1.202	1.208	1.210	0.006
D. retrocurva number/liter	0.177	0.618	0.265	0.353	0.135
D. retrocurva mass/liter (ug)	1.025	3.834	0.901	1.920	0.958
D. retrocurva avg. lngth (mm)	1.100	1.057	0.883	1.013	0.066
Bosmina longirostris number/liter	0.000	0.177	0.265	0.147	0.078
Bosmina longirostris mass/liter (ug)	0.000	0.356	0.173	0.176	0.103
Bosmina longirostris avg. lngth (mm)	0.000	0.425	0.300	0.242	0.126
Leptodiaptomus ashlandi #/l	7.243	7.155	5.830	6.743	0.457
Leptodiaptomus ashlandi ug/l	35.959	36.737	29.025	33.907	2.451
Leptodiapt ashlandi avg *(*mm)	0.768	0.794	0.774	0.779	0.008
Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis avg *(*mm)	0.000	0.000	0.000	0.000	0.000
Diacyclops thomasi #/l	9.717	8.303	6.095	8.038	1.054
Diacyclops thomasi ug/l	53.126	38.416	21.084	37.542	9.260
Diacyclops thomasi avg *(*mm)	0.886	0.825	0.744	0.818	0.041
Mesocyclops edax #/l	0.000	0.000	0.442	0.147	0.147
Mesocyclops edax ug/l	0.000	0.000	3.135	1.045	1.045
Mesocyclops edax avg *(*mm)	0.000	0.000	1.020	0.340	0.340
Leptodora kindtii number/liter	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis number/liter	0.088	0.088	0.000	0.059	0.029
Alona quadrangularis mass/liter (ug)	0.088	0.031	0.000	0.040	0.026

Alona quadrangularis avg. lngth (mm)	0.350	0.250	0.000	0.200	0.104
Total Inds./liter	26.412	24.822	19.345	23.526	2.140
Total mass (ug)/liter	184.352	163.624	114.209	154.062	20.805

Site #5

	Pull 1	**Pull 2**	**Pull 3**	**Average**	**Std Error**
D. schodleri number/liter	13.414	14.755	16.364	14.844	0.853
D. schodleri mass/liter (ug)	133.919	110.657	117.294	120.623	6.919
D. schodleri avg. lngth (mm)	1.229	1.106	1.094	1.143	0.043
D. galeata number/liter	1.610	0.402	1.878	1.297	0.454
D. galeata mass/liter (ug)	6.619	1.948	8.124	5.564	1.859
D. galeata avg. lngth (mm)	0.950	1.000	0.954	0.968	0.016
D. retrocurva number/liter	0.000	0.000	0.134	0.045	0.045
D. retrocurva mass/liter (ug)	0.000	0.000	0.344	0.115	0.115
D. retrocurva avg. lngth (mm)	0.000	0.000	0.800	0.267	0.267
Bosmina longirostris number/liter	1.475	2.280	2.146	1.967	0.249
Bosmina longirostris mass/liter (ug)	1.743	3.534	1.968	2.415	0.563
Bosmina longirostris avg. lngth (mm)	0.359	0.391	0.331	0.361	0.017
Leptodiaptomus ashlandi #/l	10.463	11.804	15.023	12.430	1.353
Leptodiaptomus ashlandi ug/l	47.034	54.561	62.986	54.861	4.607
Leptodiapt ashlandi avg (mm)	0.742	0.763	0.728	0.744	0.010
Epischura nevadensis #/l	0.000	0.000	0.134	0.045	0.045
Epischura nevadensis ug/l	0.000	0.000	7.211	2.404	2.404
Epischura nevadensis avg (mm)	0.000	0.000	2.300	0.767	0.767
Diacyclops thomasi #/l	9.255	12.877	10.731	10.954	1.051
Diacyclops thomasi ug/l	25.190	43.129	33.414	33.911	5.184
Diacyclops thomasi avg (mm)	0.681	0.748	0.729	0.719	0.020
Mesocyclops edax #/l	0.402	0.000	0.268	0.224	0.118
Mesocyclops edax ug/l	3.021	0.000	1.530	1.517	0.872
Mesocyclops edax avg (mm)	1.050	0.000	0.950	0.667	0.335
Leptodora kindtii number/liter	0.000	0.000	0.134	0.045	0.045
Leptodora kindtii mass/liter (ug)	0.000	0.000	10.594	3.531	3.531
Leptodora kindtii avg. lngth (mm)	0.000	0.000	3.050	1.017	1.017
Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000

	Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Total Inds./liter	36.619	42.118	46.813	41.850	2.946
	Total mass (ug)/liter	217.528	213.829	243.467	224.941	9.324

Date	06/25/2002					
Site #1	**Species**	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
	D. schodleri number/liter	0.612	0.612	0.285	0.503	0.109
	D. schodleri mass/liter (ug)	5.278	4.042	2.307	3.876	0.862
	D. schodleri avg. lngth (mm)	1.100	1.083	1.100	1.094	0.006
	D. galeata number/liter	4.894	3.671	4.445	4.337	0.357
	D. galeata mass/liter (ug)	17.464	15.909	17.909	17.094	0.606
	D. galeata avg. lngth (mm)	0.877	0.951	0.914	0.914	0.021
	D. retrocurva number/liter	0.367	0.122	0.163	0.218	0.076
	D. retrocurva mass/liter (ug)	0.911	0.609	0.604	0.708	0.101
	D. retrocurva avg. lngth (mm)	0.783	0.983	0.900	0.889	0.058
	Bosmina longirostris number/liter	1.713	0.530	0.734	0.992	0.365
	Bosmina longirostris mass/liter (ug)	0.793	0.722	0.973	0.829	0.075
	Bosmina longirostris avg. lngth (mm)	0.227	0.365	0.367	0.320	0.046
	Leptodiaptomus ashlandi #/l	1.550	1.591	1.387	1.509	0.062
	Leptodiaptomus ashlandi ug/l	4.572	8.499	7.802	6.958	1.210
	Leptodiapt ashlandi avg *(*mm)	0.625	0.814	0.838	0.759	0.067
	Epischura nevadensis #/l	0.000	0.122	0.204	0.109	0.059
	Epischura nevadensis ug/l	0.000	2.441	3.441	1.961	1.022
	Epischura nevadensis avg *(*mm)	0.000	1.500	1.320	0.940	0.473
	Diacyclops thomasi #/l	3.263	4.813	3.467	3.847	0.486
	Diacyclops thomasi ug/l	4.844	26.033	16.345	15.741	6.124
	Diacyclops thomasi avg *(*mm)	0.517	0.893	0.853	0.754	0.119
	Mesocyclops edax #/l	0.775	0.000	0.000	0.258	0.258
	Mesocyclops edax ug/l	2.111	0.000	0.000	0.704	0.704
	Mesocyclops edax avg *(*mm)	0.692	0.000	0.000	0.231	0.231
	Leptodora kindtii number/liter	0.041	0.000	0.000	0.014	0.014
	Leptodora kindtii mass/liter (ug)	0.668	0.000	0.000	0.223	0.223
	Leptodora kindtii avg. lngth (mm)	1.650	0.000	0.000	0.550	0.550

		Pull 1	Pull 2	Pull 3	Average	Std Error
	Diaphanosoma brachyurum number/liter	0.082	0.000	0.000	0.027	0.027
	Diaphanosoma brachyurum mass/liter (ug)	0.053	0.000	0.000	0.018	0.018
	Diaphanosoma brachyurum avg. lngth (mm)	0.450	0.000	0.000	0.150	0.150
	Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Total Inds./liter	13.296	11.460	10.686	11.814	0.774
	Total mass (ug)/liter	36.695	58.256	49.379	48.110	6.256

Site #3		**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
	D. schodleri number/liter	1.358	0.679	0.770	0.936	0.213
	D. schodleri mass/liter (ug)	13.224	7.594	9.614	10.144	1.647
	D. schodleri avg. lngth (mm)	1.118	1.250	1.282	1.217	0.050
	D. galeata number/liter	0.905	1.449	1.494	1.283	0.189
	D. galeata mass/liter (ug)	7.267	11.424	9.465	9.385	1.201
	D. galeata avg. lngth (mm)	1.138	1.136	1.068	1.114	0.023
	D. retrocurva number/liter	0.045	0.000	0.045	0.030	0.015
	D. retrocurva mass/liter (ug)	0.146	0.000	0.136	0.094	0.047
	D. retrocurva avg. lngth (mm)	0.875	0.000	0.850	0.575	0.288
	Bosmina longirostris number/liter	0.453	0.181	0.181	0.272	0.091
	Bosmina longirostris mass/liter (ug)	0.208	0.146	0.267	0.207	0.035
	Bosmina longirostris avg. lngth (mm)	0.233	0.325	0.375	0.311	0.042
	Leptodiaptomus ashlandi #/l	1.358	1.947	1.947	1.750	0.196
	Leptodiaptomus ashlandi ug/l	4.409	9.224	11.356	8.330	2.055
	Leptodiapt ashlandi avg (mm)	0.659	0.772	0.838	0.757	0.052
	Epischura nevadensis #/l	0.000	0.045	0.091	0.045	0.026
	Epischura nevadensis ug/l	0.000	0.484	1.963	0.816	0.590
	Epischura nevadensis avg (mm)	0.000	1.150	1.525	0.892	0.459
	Diacyclops thomasi #/l	3.712	3.395	3.169	3.425	0.158
	Diacyclops thomasi ug/l	8.269	16.718	14.555	13.181	2.534
	Diacyclops thomasi avg (mm)	0.596	0.870	0.846	0.771	0.088
	Mesocyclops edax #/l	0.000	0.091	0.136	0.075	0.040
	Mesocyclops edax ug/l	0.000	1.339	1.739	1.026	0.526
	Mesocyclops edax avg (mm)	0.000	1.375	1.300	0.892	0.446
	Leptodora kindtii number/liter	0.045	0.000	0.000	0.015	0.015
	Leptodora kindtii mass/liter (ug)	3.427	0.000	0.000	1.142	1.142

Leptodora kindtii avg. lngth (mm)	3.000	0.000	0.000	1.000	1.000
Diaphanosoma brachyurum number/liter	0.091	0.136	0.000	0.075	0.040
Diaphanosoma brachyurum mass/liter (ug)	0.113	0.690	0.000	0.267	0.214
Diaphanosoma brachyurum avg. lngth (mm)	0.600	1.017	0.000	0.539	0.295
Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Total Inds./liter	7.968	7.922	7.832	7.907	0.040
Total mass (ug)/liter	37.064	47.619	49.094	44.593	3.788

Site #5	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
D. schodleri number/liter	9.133	5.747	4.252	6.377	1.444
D. schodleri mass/liter (ug)	90.504	62.189	53.161	68.618	11.249
D. schodleri avg. lngth (mm)	1.239	1.252	1.340	1.277	0.032
D. galeata number/liter	0.551	0.472	0.472	0.499	0.026
D. galeata mass/liter (ug)	2.730	3.842	2.706	3.093	0.375
D. galeata avg. lngth (mm)	1.000	1.200	1.083	1.094	0.058
D. retrocurva number/liter	0.000	0.000	0.000	0.000	0.000
D. retrocurva mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
D. retrocurva avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Bosmina longirostris number/liter	0.236	0.157	0.236	0.210	0.026
Bosmina longirostris mass/liter (ug)	0.175	0.127	0.410	0.237	0.087
Bosmina longirostris avg. lngth (mm)	0.317	0.325	0.417	0.353	0.032
Leptodiaptomus ashlandi #/l	1.968	2.441	2.441	2.283	0.157
Leptodiaptomus ashlandi ug/l	11.426	15.301	15.321	14.016	1.295
Leptodiapt ashlandi avg *(*mm)	0.844	0.869	0.866	0.860	0.008
Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis avg *(*mm)	0.000	0.000	0.000	0.000	0.000
Diacyclops thomasi #/l	7.794	8.660	7.952	8.136	0.266
Diacyclops thomasi ug/l	35.503	35.789	27.485	32.926	2.722
Diacyclops thomasi avg *(*mm)	0.839	0.806	0.764	0.803	0.022
Mesocyclops edax #/l	0.315	0.000	0.000	0.105	0.105
Mesocyclops edax ug/l	3.181	0.000	0.000	1.060	1.060
Mesocyclops edax avg *(*mm)	1.175	0.000	0.000	0.392	0.392

Leptodora kindtii number/liter		0.315	0.157	0.157	0.064
Leptodora kindtii mass/liter (ug)		65.497	18.038	27.845	19.375
Leptodora kindtii avg. lngth (mm)		4.250	3.375	2.542	0.357
Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Total Inds./liter	20.313	17.636	15.510	17.820	1.389
Total mass (ug)/liter	209.016	135.286	117.121	153.808	28.098

Date	07/09/2002					
Site #1	**Species**	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
	D. schodleri number/liter	0.402	0.282	0.443	0.376	0.048
	D. schodleri mass/liter (ug)	3.127	1.760	113.886	39.591	37.150
	D. schodleri avg. lngth (mm)	1.065	1.050	1.772	1.296	0.238
	D. galeata number/liter	1.489	1.288	1.489	1.422	0.067
	D. galeata mass/liter (ug)	8.476	6.770	6.157	7.135	0.694
	D. galeata avg. lngth (mm)	1.036	1.011	0.930	0.992	0.032
	D. retrocurva number/liter	0.040	0.040	0.000	0.027	0.013
	D. retrocurva mass/liter (ug)	0.292	0.121	0.000	0.138	0.085
	D. retrocurva avg. lngth (mm)	1.200	0.850	0.000	0.683	0.356
	Bosmina longirostris number/liter	0.080	0.161	0.201	0.148	0.035
	Bosmina longirostris mass/liter (ug)	0.162	0.229	0.327	0.239	0.048
	Bosmina longirostris avg. lngth (mm)	0.425	0.388	0.383	0.398	0.013
	Leptodiaptomus ashlandi #/l	0.483	0.161	0.241	0.295	0.097
	Leptodiaptomus ashlandi ug/l	3.577	1.255	2.015	2.282	0.683
	Leptodiapt ashlandi avg *(*mm)	0.921	1.000	1.017	0.979	0.030
	Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000
	Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
	Epischura nevadensis avg *(*mm)	0.000	0.000	0.000	0.000	0.000
	Diacyclops thomasi #/l	4.950	3.742	3.762	4.151	0.399
	Diacyclops thomasi ug/l	17.958	13.137	12.678	14.591	1.689
	Diacyclops thomasi avg *(*mm)	0.771	0.759	0.720	0.750	0.016

	Pull 1	Pull 2	Pull 3	Average	Std Error
Mesocyclops edax #/l	0.040	0.080	0.000	0.040	0.023
Mesocyclops edax ug/l	0.623	0.646	0.000	0.423	0.212
Mesocyclops edax avg *(*mm)	1.400	1.075	0.000	0.825	0.423
Leptodora kindtii number/liter	0.000	0.040	0.000	0.013	0.013
Leptodora kindtii mass/liter (ug)	0.000	3.452	0.000	1.151	1.151
Leptodora kindtii avg. lngth (mm)	0.000	3.150	0.000	1.050	1.050
Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Total Inds./liter	7.485	5.795	6.137	6.472	0.516
Total mass (ug)/liter	34.215	27.369	135.063	65.549	34.813

Site #3	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
D. schodleri number/liter	0.690	0.604	0.560	0.618	0.038
D. schodleri mass/liter (ug)	13.545	14.045	13.958	13.849	0.154
D. schodleri avg. lngth (mm)	1.466	1.532	1.635	1.544	0.049
D. galeata number/liter	0.259	0.216	0.172	0.216	0.025
D. galeata mass/liter (ug)	6.360	3.998	4.082	4.813	0.774
D. galeata avg. lngth (mm)	1.750	1.580	1.800	1.710	0.067
D. retrocurva number/liter	0.086	0.000	0.000	0.029	0.029
D. retrocurva mass/liter (ug)	0.223	0.000	0.000	0.074	0.074
D. retrocurva avg. lngth (mm)	0.800	0.000	0.000	0.267	0.267
Bosmina longirostris number/liter	0.000	0.000	0.000	0.000	0.000
Bosmina longirostris mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Bosmina longirostris avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Leptodiaptomus ashlandi #/l	3.449	4.053	3.923	3.808	0.183
Leptodiaptomus ashlandi ug/l	23.742	28.690	29.579	27.337	1.816
Leptodiapt ashlandi avg *(*mm)	0.928	0.940	0.960	0.943	0.009
Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis avg *(*mm)	0.000	0.000	0.000	0.000	0.000
Diacyclops thomasi #/l	2.932	2.630	2.242	2.601	0.200
Diacyclops thomasi ug/l	14.607	17.112	12.232	14.650	1.409

	Pull 1	Pull 2	Pull 3	Average	Std Error
Diacyclops thomasi avg (mm)	0.886	0.980	0.914	0.927	0.028
Mesocyclops edax #/l	0.043	0.000	0.086	0.043	0.025
Mesocyclops edax ug/l	0.668	0.000	1.165	0.611	0.338
Mesocyclops edax avg (mm)	1.400	0.000	1.325	0.908	0.455
Leptodora kindtii number/liter	0.000	0.043	0.043	0.029	0.014
Leptodora kindtii mass/liter (ug)	0.000	3.699	4.007	2.568	1.287
Leptodora kindtii avg. lngth (mm)	0.000	3.150	3.250	2.133	1.067
Diaphanosoma brachyurum number/liter	0.043	0.043	0.000	0.029	0.014
Diaphanosoma brachyurum mass/liter (ug)	0.347	0.196	0.000	0.181	0.100
Diaphanosoma brachyurum avg. lngth (mm)	1.250	1.000	0.000	0.750	0.382
Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Total Inds./liter	7.502	7.588	7.028	7.373	0.174
Total mass (ug)/liter	59.492	67.739	65.023	64.085	2.426

Site #5

	Pull 1	**Pull 2**	**Pull 3**	**Average**	**Std Error**
D. schodleri number/liter	0.942	2.535	3.042	2.173	0.633
D. schodleri mass/liter (ug)	11.357	33.124	57.087	33.856	13.206
D. schodleri avg. lngth (mm)	1.285	1.341	1.552	1.393	0.081
D. galeata number/liter	0.036	0.072	0.000	0.036	0.021
D. galeata mass/liter (ug)	0.390	0.217	0.000	0.202	0.113
D. galeata avg. lngth (mm)	1.400	0.850	0.000	0.750	0.407
D. retrocurva number/liter	0.000	0.000	0.000	0.000	0.000
D. retrocurva mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
D. retrocurva avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Bosmina longirostris number/liter	0.036	0.000	0.000	0.012	0.012
Bosmina longirostris mass/liter (ug)	0.055	0.000	0.000	0.018	0.018
Bosmina longirostris avg. lngth (mm)	0.400	0.000	0.000	0.133	0.133
Leptodiaptomus ashlandi #/l	1.666	3.332	2.752	2.583	0.488
Leptodiaptomus ashlandi ug/l	9.800	18.859	14.133	14.264	2.616
Leptodiapt ashlandi avg (mm)	0.849	0.837	0.787	0.824	0.019
Epischura nevadensis #/l	0.000		0.000	0.000	0.000
Epischura nevadensis ug/l	0.000		0.000	0.000	0.000
Epischura nevadensis avg (mm)	0.000		0.000	0.000	0.000

Diacyclops thomasi #/l	6.772	11.300	12.314	10.129	1.703
Diacyclops thomasi ug/l	32.316	46.232	55.645	44.731	6.776
Diacyclops thomasi avg *(*mm)	0.861	0.816	0.824	0.834	0.014
Mesocyclops edax #/l	0.000	0.000	0.145	0.048	0.048
Mesocyclops edax ug/l	0.000	0.000	1.672	0.557	0.557
Mesocyclops edax avg *(*mm)	0.000	0.000	1.250	0.417	0.417
Leptodora kindtii number/liter	0.036	0.000	0.000	0.012	0.012
Leptodora kindtii mass/liter (ug)	7.309	0.000	0.000	2.436	2.436
Leptodora kindtii avg. lngth (mm)	4.400	0.000	0.000	1.467	1.467
Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Total Inds./liter	9.489	17.239	18.253	14.994	2.768
Total mass (ug)/liter	61.227	98.433	128.537	96.065	19.467

Date	07/23/2002					
Site #1		**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
	D. schodleri number/liter	0.107	0.568	0.107	0.260	0.154
	D. schodleri mass/liter (ug)	0.564	1.633	0.679	0.959	0.339
	D. schodleri avg. lngth (mm)	1.000	0.788	1.083	0.957	0.088
	D. galeata number/liter	1.385	0.923	1.385	1.231	0.154
	D. galeata mass/liter (ug)	7.376	3.937	6.725	6.013	1.055
	D. galeata avg. lngth (mm)	0.987	0.915	0.999	0.967	0.026
	D. retrocurva number/liter	0.036	0.462	0.036	0.178	0.142
	D. retrocurva mass/liter (ug)	0.257	2.065	0.106	0.810	0.629
	D. retrocurva avg. lngth (mm)	1.200	0.973	0.850	1.008	0.103
	Bosmina longirostris number/liter	0.142	0.036	0.036	0.071	0.036
	Bosmina longirostris mass/liter (ug)	0.179	0.022	0.022	0.074	0.052
	Bosmina longirostris avg. lngth (mm)	0.363	0.300	0.300	0.321	0.021
	Leptodiaptomus ashlandi #/l	1.278	1.101	1.420	1.266	0.092
	Leptodiaptomus ashlandi ug/l	8.239	5.255	11.097	8.197	1.686
	Leptodiapt ashlandi avg *(*mm)	0.892	0.793	0.979	0.888	0.054

		Pull 1	Pull 2	Pull 3	Average	Std Error
	Epischura nevadensis #/l	0.036	0.000	0.000	0.012	0.012
	Epischura nevadensis ug/l	0.819	0.000	0.000	0.273	0.273
	Epischura nevadensis avg *(*mm)	1.600	0.000	0.000	0.533	0.533
	Diacyclops thomasi #/l	7.598	7.208	9.977	8.261	0.865
	Diacyclops thomasi ug/l	15.454	16.431	22.804	18.229	2.304
	Diacyclops thomasi avg *(*mm)	0.595	0.628	0.632	0.618	0.012
	Mesocyclops edax #/l	0.000	0.000	0.213	0.071	0.071
	Mesocyclops edax ug/l	0.000	0.000	1.956	0.652	0.652
	Mesocyclops edax avg *(*mm)	0.000	0.000	1.108	0.369	0.369
	Leptodora kindtii number/liter	0.036	0.036	0.000	0.024	0.012
	Leptodora kindtii mass/liter (ug)	10.457	2.151	0.000	4.203	3.188
	Leptodora kindtii avg. lngth (mm)	5.100	2.750	0.000	2.617	1.474
	Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000
	Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Total Inds./liter	10.616	10.332	13.173	11.374	0.903
	Total mass (ug)/liter	43.346	31.495	43.389	39.410	3.957
Site #3		**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
	D. schodleri number/liter	0.388	0.560	0.776	0.575	0.112
	D. schodleri mass/liter (ug)	2.533	3.738	8.124	4.798	1.699
	D. schodleri avg. lngth (mm)	1.061	0.981	1.217	1.086	0.069
	D. galeata number/liter	0.194	0.237	0.690	0.374	0.159
	D. galeata mass/liter (ug)	0.853	1.499	5.799	2.717	1.552
	D. galeata avg. lngth (mm)	0.964	1.048	1.100	1.037	0.040
	D. retrocurva number/liter	0.000	0.022	0.172	0.065	0.054
	D. retrocurva mass/liter (ug)	0.000	0.039	0.882	0.307	0.288
	D. retrocurva avg. lngth (mm)	0.000	0.700	1.000	0.567	0.296
	Bosmina longirostris number/liter	0.022	0.022	0.000	0.014	0.007
	Bosmina longirostris mass/liter (ug)	0.066	0.013	0.000	0.026	0.020
	Bosmina longirostris avg. lngth (mm)	0.500	0.300	0.000	0.267	0.145
	Leptodiaptomus ashlandi #/l	1.962	2.220	2.759	2.314	0.235
	Leptodiaptomus ashlandi ug/l	9.025	10.186	14.081	11.097	1.529

		Pull 1	Pull 2	Pull 3	Average	Std Error
	Leptodiapt ashlandi avg *(*mm)	0.775	0.756	0.788	0.773	0.009
	Epischura nevadensis #/l	0.022	0.000	0.086	0.036	0.026
	Epischura nevadensis ug/l	0.092	0.000	4.404	1.499	1.453
	Epischura nevadensis avg *(*mm)	0.775	0.000	2.250	1.008	0.660
	Diacyclops thomasi #/l	2.652	3.514	4.743	3.636	0.607
	Diacyclops thomasi ug/l	9.304	8.689	18.824	12.273	3.281
	Diacyclops thomasi avg *(*mm)	0.732	0.622	0.778	0.711	0.046
	Mesocyclops edax #/l	0.043	0.000	0.172	0.072	0.052
	Mesocyclops edax ug/l	2.938	0.000	1.640	1.526	0.850
	Mesocyclops edax avg *(*mm)	2.875	0.000	1.125	1.333	0.836
	Leptodora kindtii number/liter	0.043	0.043	0.000	0.029	0.014
	Leptodora kindtii mass/liter (ug)	2.938	3.096	0.000	2.011	1.007
	Leptodora kindtii avg. lngth (mm)	2.875	2.938	0.000	1.938	0.969
	Diaphanosoma brachyurum number/liter	0.129	0.151	0.086	0.122	0.019
	Diaphanosoma brachyurum mass/liter (ug)	0.486	0.524	0.259	0.423	0.083
	Diaphanosoma brachyurum avg. lngth (mm)	0.817	0.868	0.850	0.845	0.015
	Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Total Inds./liter	#REF!	6.403	9.485	#REF!	#REF!
	Total mass (ug)/liter	#REF!	24.898	54.013	#REF!	#REF!
Site #5		**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
	D. schodleri number/liter	1.132	0.604	1.509	1.081	0.263
	D. schodleri mass/liter (ug)	24.740	7.581	31.824	21.382	7.197
	D. schodleri avg. lngth (mm)	1.448	1.231	1.565	1.415	0.098
	D. galeata number/liter	0.038	0.151	0.000	0.063	0.045
	D. galeata mass/liter (ug)	0.274	1.060	0.000	0.445	0.318
	D. galeata avg. lngth (mm)	1.200	1.175	0.000	0.792	0.396
	D. retrocurva number/liter	0.000	0.000	0.000	0.000	0.000
	D. retrocurva mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	D. retrocurva avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Bosmina longirostris number/liter	0.000	0.000	0.000	0.000	0.000
	Bosmina longirostris mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	Bosmina longirostris avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000

Leptodiaptomus ashlandi #/l	1.773	3.923	2.565	2.754	0.628
Leptodiaptomus ashlandi ug/l	13.757	27.920	14.949	18.875	4.535
Leptodiapt ashlandi avg *(*mm)	0.972	0.927	0.849	0.916	0.036
Epischura nevadensis #/l	0.905	0.075	0.000	0.327	0.290
Epischura nevadensis ug/l	3.273	2.599	0.000	1.957	0.998
Epischura nevadensis avg *(*mm)	0.677	1.900	0.000	0.859	0.556
Diacyclops thomasi #/l	7.243	8.828	7.168	7.746	0.541
Diacyclops thomasi ug/l	30.253	36.114	31.789	32.719	1.755
Diacyclops thomasi avg *(*mm)	0.806	0.802	0.836	0.815	0.011
Mesocyclops edax #/l	0.000	0.302	7.168	2.490	2.341
Mesocyclops edax ug/l	0.000	3.888	31.789	11.893	10.012
Mesocyclops edax avg *(*mm)	0.000	1.288	0.836	0.708	0.377
Leptodora kindtii number/liter	0.000	0.075	0.000	0.025	0.025
Leptodora kindtii mass/liter (ug)	0.000	20.058	0.000	6.686	6.686
Leptodora kindtii avg. lngth (mm)	0.000	4.900	0.000	1.633	1.633
Diaphanosoma brachyurum number/liter	0.113	0.000	0.000	0.038	0.038
Diaphanosoma brachyurum mass/liter (ug)	0.127	0.000	0.000	0.042	0.042
Diaphanosoma brachyurum avg. lngth (mm)	0.567	0.000	0.000	0.189	0.189
Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Total Inds./liter	11.204	13.958	18.410	14.524	2.099
Total mass (ug)/liter	72.423	99.220	110.353	93.999	11.256

Date	08/05/2002					
Site #1	**Species**	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
	D. schodleri number/liter	0.945	0.709	0.236	0.630	0.208
	D. schodleri mass/liter (ug)	8.898	6.685	1.330	5.638	2.247
	D. schodleri avg. lngth (mm)	1.091	1.049	1.050	1.063	0.014
	D. galeata number/liter	0.354	0.354	0.945	0.551	0.197
	D. galeata mass/liter (ug)	6.943	4.772	10.065	7.260	1.536
	D. galeata avg. lngth (mm)	1.539	1.286	1.275	1.367	0.086
	D. retrocurva number/liter	0.000	0.157	0.157	0.105	0.052
	D. retrocurva mass/liter (ug)	0.000	1.512	2.209	1.240	0.652
	D. retrocurva avg. lngth (mm)	0.000	1.269	1.450	0.906	0.456

Bosmina longirostris number/liter	0.354	0.118	0.394	0.289	0.086
Bosmina longirostris mass/liter (ug)	0.406	0.159	0.281	0.282	0.071
Bosmina longirostris avg. lngth (mm)	0.353	0.375	0.310	0.346	0.019
Leptodiaptomus ashlandi #/l	1.811	1.614	1.653	1.693	0.060
Leptodiaptomus ashlandi ug/l	6.059	6.072	10.618	7.583	1.517
Leptodiapt ashlandi avg *(*mm)	0.682	0.712	0.890	0.762	0.065
Epischura nevadensis #/l	0.000	0.000	0.157	0.052	0.052
Epischura nevadensis ug/l	0.000	0.000	2.852	0.951	0.951
Epischura nevadensis avg *(*mm)	0.000	0.000	1.400	0.467	0.467
Diacyclops thomasi #/l	7.558	6.732	9.763	8.017	0.905
Diacyclops thomasi ug/l	14.722	11.153	31.972	19.282	6.428
Diacyclops thomasi avg *(*mm)	0.594	0.566	0.736	0.632	0.053
Mesocyclops edax #/l	0.000	0.079	0.315	0.131	0.095
Mesocyclops edax ug/l	0.000	0.103	3.370	1.158	1.107
Mesocyclops edax avg *(*mm)	0.000	0.538	1.200	0.579	0.347
Leptodora kindtii number/liter	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum number/liter	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Total Inds./liter	11.022	9.763	13.621	11.469	1.136
Total mass (ug)/liter	37.029	30.456	62.696	43.393	9.836

Site #3	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
D. schodleri number/liter	0.815	0.996	1.086	0.966	0.080
D. schodleri mass/liter (ug)	16.890	8.240	19.023	14.718	3.297
D. schodleri avg. lngth (mm)	1.449	1.136	1.325	1.303	0.091
D. galeata number/liter	0.272	0.815	0.272	0.453	0.181
D. galeata mass/liter (ug)	1.578	4.023	0.634	2.078	1.010
D. galeata avg. lngth (mm)	0.938	0.978	0.767	0.894	0.065
D. retrocurva number/liter	0.091	0.181	0.091	0.121	0.030
D. retrocurva mass/liter (ug)	0.737	0.797	0.272	0.602	0.166

		Pull 1	Pull 2	Pull 3	Average	Std Error
	D. retrocurva avg. lngth (mm)	1.213	0.975	0.850	1.013	0.106
	Bosmina longirostris number/liter	0.000	0.000	0.091	0.030	0.030
	Bosmina longirostris mass/liter (ug)	0.000	0.000	0.090	0.030	0.030
	Bosmina longirostris avg. lngth (mm)	0.000	0.000	0.350	0.117	0.117
	Leptodiaptomus ashlandi #/l	3.984	3.712	2.264	3.320	0.534
	Leptodiaptomus ashlandi ug/l	14.564	21.905	12.486	16.318	2.857
	Leptodiapt ashlandi avg *(*mm)	0.693	0.849	0.820	0.787	0.048
	Epischura nevadensis #/l	0.000	0.000	0.091	0.030	0.030
	Epischura nevadensis ug/l	0.000	0.000	4.160	1.387	1.387
	Epischura nevadensis avg *(*mm)	0.000	0.000	2.150	0.717	0.717
	Diacyclops thomasi #/l	5.568	6.972	6.610	6.383	0.421
	Diacyclops thomasi ug/l	13.826	21.403	19.668	18.299	2.292
	Diacyclops thomasi avg *(*mm)	0.646	0.719	0.708	0.691	0.023
	Mesocyclops edax #/l	0.000	1.268	1.811	1.026	0.536
	Mesocyclops edax ug/l	0.000	12.082	13.515	8.532	4.286
	Mesocyclops edax avg *(*mm)	0.000	1.136	1.020	0.719	0.361
	Leptodora kindtii number/liter	0.045	0.000	0.091	0.045	0.026
	Leptodora kindtii mass/liter (ug)	4.207	0.000	16.720	6.976	5.021
	Leptodora kindtii avg. lngth (mm)	3.250	0.000	4.250	2.500	1.283
	Diaphanosoma brachyurum number/liter	0.860	0.272	0.996	0.709	0.222
	Diaphanosoma brachyurum mass/liter (ug)	1.783	0.998	3.945	2.242	0.881
	Diaphanosoma brachyurum avg. lngth (mm)	0.691	0.917	0.905	0.837	0.073
	Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
	Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
	Total Inds./liter	11.635	14.215	13.400	13.083	0.762
	Total mass (ug)/liter	53.586	69.448	90.513	71.183	10.695
Site #5		**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
	D. schodleri number/liter	1.181	0.551	0.787	0.840	0.184
	D. schodleri mass/liter (ug)	22.151	4.588	5.372	10.704	5.728
	D. schodleri avg. lngth (mm)	1.448	1.068	1.003	1.173	0.139
	D. galeata number/liter	0.079	0.039	0.157	0.092	0.035
	D. galeata mass/liter (ug)	0.806	1.683	3.293	1.927	0.728
	D. galeata avg. lngth (mm)	1.350	2.400	1.600	1.783	0.317

D. retrocurva number/liter	0.000	0.000	0.000	0.000	0.000
D. retrocurva mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
D. retrocurva avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Bosmina longirostris number/liter	0.039	0.000	0.079	0.039	0.023
Bosmina longirostris mass/liter (ug)	0.024	0.000	0.172	0.065	0.054
Bosmina longirostris avg. lngth (mm)	0.300	0.000	0.450	0.250	0.132
Leptodiaptomus ashlandi #/l	4.370	2.165	2.441	2.992	0.693
Leptodiaptomus ashlandi ug/l	18.616	9.877	10.446	12.980	2.823
Leptodiapt ashlandi avg *(*mm)	0.741	0.768	0.751	0.753	0.008
Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis avg *(*mm)	0.000	0.000	0.000	0.000	0.000
Diacyclops thomasi #/l	7.637	8.503	10.314	8.818	0.789
Diacyclops thomasi ug/l	24.836	23.211	23.106	23.718	0.560
Diacyclops thomasi avg *(*mm)	0.732	0.671	0.632	0.678	0.029
Mesocyclops edax #/l	0.000	0.000	0.000	0.000	0.000
Mesocyclops edax ug/l	0.000	0.000	0.000	0.000	0.000
Mesocyclops edax avg *(*mm)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii number/liter	0.079	0.000	0.000	0.026	0.026
Leptodora kindtii mass/liter (ug)	8.257	0.000	0.000	2.752	2.752
Leptodora kindtii avg. lngth (mm)	3.375	0.000	0.000	1.125	1.125
Diaphanosoma brachyurum number/liter	0.394	0.236	0.394	0.341	0.052
Diaphanosoma brachyurum mass/liter (ug)	0.778	0.827	0.611	0.739	0.065
Diaphanosoma brachyurum avg. lngth (mm)	0.675	0.842	0.645	0.721	0.061
Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Total Inds./liter	13.778	11.495	14.172	13.148	0.834
Total mass (ug)/liter	75.467	40.187	43.000	52.885	11.320

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Site #1	**Species**	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
	D. schodleri number/liter	1.137	1.516	0.800	1.151	0.207
	D. schodleri mass/liter (ug)	14.139	21.330	10.662	15.377	3.141
	D. schodleri avg. lngth (mm)	1.246	1.281	1.195	1.241	0.025

D. galeata number/liter	1.516	0.674	0.337	0.842	0.351
D. galeata mass/liter (ug)	20.472	9.533	5.634	11.880	4.441
D. galeata avg. lngth (mm)	1.365	1.419	1.463	1.416	0.028
D. retrocurva number/liter	0.211	1.937	1.432	1.193	0.513
D. retrocurva mass/liter (ug)	1.483	13.760	10.173	8.472	3.645
D. retrocurva avg. lngth (mm)	1.160	1.078	1.060	1.100	0.031
Bosmina longirostris number/liter	0.000	0.000	0.000	0.000	0.000
Bosmina longirostris mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Bosmina longirostris avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Leptodiaptomus ashlandi #/l	2.358	2.611	1.432	2.134	0.358
Leptodiaptomus ashlandi ug/l	11.859	4.689	4.470	7.006	2.427
Leptodiapt ashlandi avg *(*mm)	0.772	0.487	0.622	0.627	0.082
Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis avg *(*mm)	0.000	0.000	0.000	0.000	0.000
Diacyclops thomasi #/l	3.032	4.717	5.769	4.506	0.797
Diacyclops thomasi ug/l	10.966	8.092	6.679	8.579	1.261
Diacyclops thomasi avg *(*mm)	0.786	0.563	0.492	0.614	0.089
Mesocyclops edax #/l	0.042	0.000	0.084	0.042	0.024
Mesocyclops edax ug/l	0.392	0.000	0.237	0.210	0.114
Mesocyclops edax avg *(*mm)	1.150	0.000	0.700	0.617	0.335
Leptodora kindtii number/liter	0.000	0.084	0.000	0.028	0.028
Leptodora kindtii mass/liter (ug)	0.000	10.535	0.000	3.512	3.512
Leptodora kindtii avg. lngth (mm)	0.000	3.650	0.000	1.217	1.217
Diaphanosoma brachyurum number/liter	0.084	0.000	0.000	0.028	0.028
Diaphanosoma brachyurum mass/liter (ug)	0.231	0.000	0.000	0.077	0.077
Diaphanosoma brachyurum avg. lngth (mm)	0.800	0.000	0.000	0.267	0.267
Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Total Inds./liter	8.380	11.539	9.854	9.924	0.912
Total mass (ug)/liter	59.541	67.940	37.855	55.112	8.963

Site #3	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**
D. schodleri number/liter	3.984	3.169	1.086	2.746	0.863
D. schodleri mass/liter (ug)	82.546	24.844	11.971	39.787	21.700

D. schodleri avg. lngth (mm)	1.489	1.038	1.171	1.232	0.134
D. galeata number/liter	0.543	0.407	0.317	0.423	0.066
D. galeata mass/liter (ug)	7.889	5.238	4.671	5.933	0.992
D. galeata avg. lngth (mm)	1.333	1.367	1.379	1.360	0.014
D. retrocurva number/liter	1.992	2.037	1.403	1.811	0.204
D. retrocurva mass/liter (ug)	23.080	19.614	11.548	18.081	3.416
D. retrocurva avg. lngth (mm)	1.305	1.180	1.163	1.216	0.045
Bosmina longirostris number/liter	0.000	0.000	0.136	0.045	0.045
Bosmina longirostris mass/liter (ug)	0.000	0.000	0.118	0.039	0.039
Bosmina longirostris avg. lngth (mm)	0.000	0.000	0.333	0.111	0.111
Leptodiaptomus ashlandi #/l	4.527	4.029	2.535	3.697	0.598
Leptodiaptomus ashlandi ug/l	13.535	16.582	8.898	13.005	2.234
Leptodiapt ashlandi avg *(*mm)	0.626	0.722	0.678	0.675	0.028
Epischura nevadensis #/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis ug/l	0.000	0.000	0.000	0.000	0.000
Epischura nevadensis avg *(*mm)	0.000	0.000	0.000	0.000	0.000
Diacyclops thomasi #/l	10.684	7.922	2.218	6.941	2.493
Diacyclops thomasi ug/l	25.447	15.376	3.146	14.656	6.448
Diacyclops thomasi avg *(*mm)	0.614	0.581	0.497	0.564	0.035
Mesocyclops edax #/l	1.268	0.724	1.222	1.071	0.174
Mesocyclops edax ug/l	8.514	3.826	4.649	5.663	1.445
Mesocyclops edax avg *(*mm)	1.007	0.897	0.757	0.887	0.072
Leptodora kindtii number/liter	0.181	0.000	0.045	0.075	0.054
Leptodora kindtii mass/liter (ug)	0.178	0.000	3.728	1.302	1.214
Leptodora kindtii avg. lngth (mm)	0.550	0.000	3.100	1.217	0.955
Diaphanosoma brachyurum number/liter	1.086	1.675	1.041	1.268	0.204
Diaphanosoma brachyurum mass/liter (ug)	3.613	5.949	4.009	4.524	0.722
Diaphanosoma brachyurum avg. lngth (mm)	0.850	0.818	0.854	0.841	0.012
Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Total Inds./liter	24.265	19.964	10.005	18.078	4.223
Total mass (ug)/liter	164.802	91.429	52.736	102.989	32.863

Site #5	**Pull 1**	**Pull 2**	**Pull 3**	**Average**	**Std Error**

D. schodleri number/liter	0.572	2.974	2.211	1.919	0.709
D. schodleri mass/liter (ug)	11.805	50.210	37.009	33.008	11.266
D. schodleri avg. lngth (mm)	1.603	1.378	1.421	1.467	0.069
D. galeata number/liter	0.496	0.076	0.152	0.241	0.129
D. galeata mass/liter (ug)	1.308	0.614	0.843	0.921	0.204
D. galeata avg. lngth (mm)	0.769	1.250	1.075	1.031	0.140
D. retrocurva number/liter	0.114	0.457	0.686	0.419	0.166
D. retrocurva mass/liter (ug)	0.765	1.644	5.877	2.762	1.578
D. retrocurva avg. lngth (mm)	1.017	0.892	1.078	0.995	0.055
Bosmina longirostris number/liter	0.000	0.076	0.076	0.051	0.025
Bosmina longirostris mass/liter (ug)	0.000	0.026	0.167	0.064	0.052
Bosmina longirostris avg. lngth (mm)	0.000	0.250	0.450	0.233	0.130
Leptodiaptomus ashlandi #/l	1.449	2.897	2.897	2.414	0.483
Leptodiaptomus ashlandi ug/l	6.701	14.407	18.450	13.186	3.446
Leptodiapt ashlandi avg *(*mm)	0.751	0.799	0.900	0.817	0.044
Epischura nevadensis #/l	0.000	0.000	0.076	0.025	0.025
Epischura nevadensis ug/l	0.000	0.000	3.316	1.105	1.105
Epischura nevadensis avg *(*mm)	0.000	0.000	2.100	0.700	0.700
Diacyclops thomasi #/l	3.698	7.320	5.490	5.502	1.045
Diacyclops thomasi ug/l	13.773	9.003	22.015	14.931	3.801
Diacyclops thomasi avg *(*mm)	0.745	0.498	0.815	0.686	0.096
Mesocyclops edax #/l	0.000	1.601	0.686	0.762	0.464
Mesocyclops edax ug/l	0.000	6.374	7.585	4.653	2.353
Mesocyclops edax avg *(*mm)	0.000	0.786	1.206	0.664	0.353
Leptodora kindtii number/liter	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Leptodora kindtii avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Diaphanosoma brachyurum number/liter	0.076	1.067	0.839	0.661	0.300
Diaphanosoma brachyurum mass/liter (ug)	0.370	3.683	4.166	2.740	1.193
Diaphanosoma brachyurum avg. lngth (mm)	1.025	0.836	0.991	0.951	0.058
Alona quadrangularis number/liter	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis mass/liter (ug)	0.000	0.000	0.000	0.000	0.000
Alona quadrangularis avg. lngth (mm)	0.000	0.000	0.000	0.000	0.000
Total Inds./liter	6.405	16.469	13.114	11.996	2.959
Total mass (ug)/liter	34.722	85.961	99.428	73.370	19.711