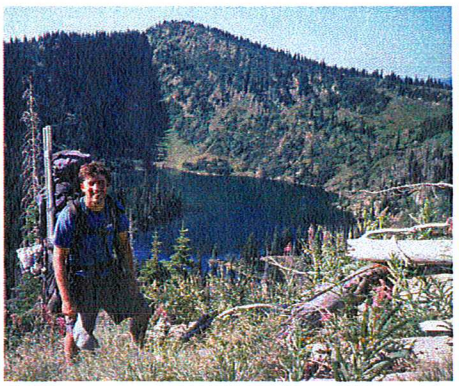
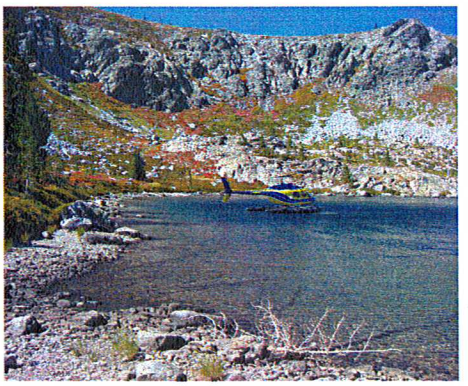
# MOUNTAIN LAKE SURVEYS AND MANAGEMENT PLAN


## Middle Clark Fork Region of the Bitterroot Mountains

**W. Ladd Knotek & John C. Thabes**
**Montana Fish, Wildlife & Parks**
**May 2008**

Montana Fish, Wildlife & Parks

SPORT FISH RESTORATION

# Executive Summary

The middle Clark Fork region of west-central Montana contains ~ 78 alpine and sub-alpine "mountain" lakes (> 1 acre) in the Bitterroot Mountains along the Montana-Idaho border. These lakes lie exclusively on the Lolo National Forest in Mineral County at 4,950–6,850 ft elevation (msl). Although presumed historically fishless, about 40 (51%) of these waters now support trout fisheries, some of which are maintained through stocking. The remaining lakes (~38) are still considered fishless waters.

*Lake Surveys*

In 2004-2006, Montana Fish, Wildlife and Parks (MFWP) fisheries personnel and volunteers surveyed all fish-bearing mountain lakes in the middle Clark Fork region (project area) to describe physical and biological characteristics. These surveys consisted of fish population assessments, amphibian searches, zooplankton sampling, bathymetric mapping, water chemistry measurements, and a description of recreation sites and trail networks. Most fishless lakes were not visited in our study, but basic historical information was available from MFWP surveys conducted in 1970-1975.

Lake surveys revealed a diverse range of lake environments, species assemblages, and trout fisheries in the project area. Lake environments ranged from high, very oligotrophic alpine waters positioned in rocky glacial cirques to sub-alpine, mesotrophic lakes bounded within forested glacial troughs. Physical measurements collected at most lakes (secchi depth, PH, conductivity, TDS and surface water temperature) reflected this diversity. Lake size and depth were also extremely variable, although all of the deepest and largest water bodies supported introduced trout populations.

Fisheries consisted of various combinations of self-sustaining brook trout (*Salvelinus fontinalis*), cutthroat trout (*Oncorhynchus clarki subspp.*) and rainbow trout (*Oncorhynchus mykiss*) populations (all non-indigenous), and a number of westslope cutthroat trout (*Oncorhynchus clarki lewisi)* populations that are maintained or supplemented with periodic stocking. Sculpin (*Cottus spp.*) and longnose sucker (Catostomus catostomus) were present in two lakes. In total, 21 (53%) of fish-bearing lakes supported self-sustaining populations, while 19 (47%) fisheries were maintained or supplemented with stocking. Self-sustaining brook trout populations were the primary fishery component in nearly half (18) of the fish-bearing lakes in the project area. These prolific populations exhibited consistent reproductive success and poor growth rates. As a result, nearly all brook trout fisheries were characterized by high fish density, low average body condition (Wr) and a truncated (stunted) size structure. Population characteristics were much more variable among *Oncorhynchus* populations.

Species of fish and level of natural reproduction were important factors affecting trout abundance, body condition and size structure at mountain lake fisheries. Non-indigenous trout populations were all self-sustaining (stocked historically), typically with high rates of natural reproduction, low body condition, and truncated size structure. Currently stocked westslope cutthroat trout populations (with limited natural reproduction and managed densities) exhibited significantly greater mean lengths, maximum lengths, and body condition relative to self-

sustaining populations. Although some lakes with wild brook trout or rainbow trout are stocked to provide fishery diversity, lakes supporting only stocked westslope cutthroat trout represent the best opportunities to actively manage species composition, fish density and fishery quality.

At the time of reporting, processing of *Oncorhynchus* genetic samples, age/growth information and zooplankton samples had not been completed. Because of limited time and resources, these samples were archived and will be analyzed when applicable for management decisions.

Fishless lakes (38) comprised 48% of the water bodies > 1 acre in the middle Clark Fork region. Numerous other waters, wetlands and seasonal ponds (< 1 acre) were also noted. Fishless lakes were broadly distributed across the project area and represented a diverse range of physical aquatic environments. Although fishless lakes were generally smaller, higher and shallower than fish-bearing water bodies, at least 14 (37%) fishless lakes were > 12 ft deep and considered capable of supporting (over-wintering) trout populations.

Several amphibian and reptile species were documented in mountain lake environments within the project area. The two most common amphibian species were the Columbia spotted frog *(Rana luteiventris)* and long-toed salamander *(Ambystoma macrodactylum krausei).* Columbia spotted frogs were common or abundant along the perimeter of most lakes (78%) and fish populations appeared to have little impact on the density or distribution of this species. Although not quantified, Columbia spotted frog adult, juvenile, larval densities appeared most closely related to the amount of emergent aquatic vegetation along the lakeshore and the timing of our lake surveys. In contrast, the density and likely the distribution of long-toed salamanders did appear to be inhibited by the presence of fish in mountain lakes. Although more than 40 fish-bearing alpine lakes were surveyed, long-toed salamanders were documented at only three. Visits to a limited number of fishless lakes and ponds in the project area revealed dense congregations of long-toed salamander larvae. Western and common garter snakes were the only reptiles observed during lake surveys. These species were common along lakeshores, apparently because amphibians and fish are important dietary components.

Access was an important factor contributing to the range of recreational opportunities at mountain lakes. Most fish-bearing waters (25) were on or adjacent to the United States Forest Service (USFS) trail system and are located within 3.5 miles of established trailheads. Exceptions were generally in the Great Burn Complex (12 lakes in upper Fish Creek) and require further travel (5-10 miles) on the USFS trail system. Nearly all trail routes to mountain lakes were designated for non-motorized travel, although three lakes (Diamond Lake, Moore Lake, Silver Lake) could be reached by active USFS roads. The presence of fish in lakes had an obvious impact on developed access. More than 90% (37 of 40) fish-bearing lakes were accessible by established trails or roads, while less than 10% of fishless lakes were accessible by known trails or established routes. Human disturbance and evidence of long-term use was visible at most fish-bearing lakes (38 of 40). This included established campsites, fire pits, trails around the lake perimeter, and human refuse that were concentrated in the vicinity of at lake inlets and outlets.

Although angling pressure at middle Clark Fork mountain lakes was low relative to valley floor lakes and rivers in western Montana, levels of recreational use appeared similar to other high elevation waters in western Montana. Estimated angler use ranged from no reported use to 251 angler-days per year (mean 1995-2005) at fish-bearing lakes. Differences in use appeared to be closely tied to access (travel distance from roads) and fishery quality (high catch rates of large

fish); lakes lying closer to roads with better fishing received more use than lakes that were more difficult to reach or supported poor fisheries.

*Considerations, Guidelines and Tools for Management of Mountain Lakes*

Management strategies and objectives were developed for each lake and each sub-basin (management unit) based on collective lake survey results, pertinent biological and social considerations, tools available and current MFWP management philosophies. Key biological and social considerations in mountain lake management include: (A) providing a diversity of recreational opportunities and fishery qualities, (B) preserving the integrity of natural aquatic systems, (C) minimizing impacts to native fish populations, (D) land management designation and regulations, and (E) levels/patterns of recreational use. MFWP's lake management guidelines and priorities for the area essentially reflect these considerations.

MFWP management philosophies for mountain lakes in the middle Clark Fork region stress: (1) providing diverse opportunities for anglers and recreationists, (2) maintaining fishless waters to sustain ecological integrity and natural processes, (3) promoting native fish where possible, (4) stocking fish only where required to meet fisheries objectives, (5) managing individual lakes in the context of the overall watershed and management unit, and (6) practicing adaptive lake management as new information and tools become available.

Although mountain lakes are relatively simple biological environments, the list of effective methods to pursue management objectives or illicit meaningful change is limited. There are four basic options available for management of mountain lake fisheries: (1) change species of fish, (2) modify the density (or presence/absence) of fish, (3) impose harvest restrictions or other regulations and (4) modify intensity or patterns of angling pressure and use through land management designation or access. Current tools to effect these changes include changes in the stocking program, suppression or eradication of wild trout populations, and changes in angling restrictions or management of recreational use. Larger scale land management and access designations, administered by the USFS, are important facets that have direct and indirect implications for lake management.

Improving fishery quality/diversity and preserving natural ecological integrity were the major biological objectives identified for mountain lakes management in the middle Clark Fork region. Although seemingly conflicting, both objectives are achievable at a regional scale and, in some situations, concurrently at the same lake. The impacts of introducing fish into historically fishless lakes has raised concern for a range of indigenous species and communities. With limited information, MFWP has addressed these concerns by stocking responsibly (i.e., species, location, density) and incorporating a physically diverse and geographically dispersed range of fishless waters into lake management plans. Maintaining ecological integrity also includes conserving native fish species in stream networks associated with lakes. Wild, non-indigenous trout populations in lakes serve as a continual headwater source of emigrants which may hybridize and compete with native fish populations, particularly bull trout and westslope cutthroat trout. This threat and the prospect of improved fishery quality (e.g., brook trout fisheries) forms the foundation for recommended management priorities involving suppression

of brook trout populations and genetic swamping of non-indigenous *Oncorhynchus* populations at some mountain lakes.

*Management of Lakes and Lake Fisheries in the Middle Clark Fork Project Area*

Mountain lakes in the middle Clark Fork project area were divided into eight management units based on their geographic and hydrologic location. Management units included: Upper St. Regis, Middle St. Regis, Lower St. Regis, Dry-Cedar Creeks, Trout Creek, North Fork Fish Creek, West Fork Fish Creek and South Fork Fish Creek. The descriptions and management approaches for these units combine information from fishless lakes with historical data, recent survey information, and management strategies for individual fish-bearing lakes and associated stream networks. This framework is intended to provide a broader, balanced approach that incorporates unique water bodies within the context of interconnected watersheds, proximal ecosystems, and diversified angling opportunities.

All mountain lakes (>1 acre) in the project area and within each management unit were also categorized based on lake management objectives. Management categories included: (1) High density/harvest-oriented fisheries, (2) Quality fisheries, (3) Self-sustaining fisheries, (4) Diversified fisheries, and (5) Fishless lakes.

Proposed management alternatives focus on refined stocking practices, suppression or removal of brook trout from numerous waters and conversion of non-native populations to native westslope cutthroat trout fisheries. These management priorities are recommended to improve the quality of lake fisheries, reduce risks of hybridization and competition with native aquatic populations in outlet stream networks, and to promote overall ecological diversity. Priority candidates for brook trout removal include Moore Lake and Upper Trio Lake. These two populations offer opportunities for fishery improvement and are the only headwater sources of brook trout in Little Joe Creek and Fish Creek, two of most important spawning and rearing areas for bull trout in the region. Numerous other brook trout populations in Lower St. Regis Lake, Clear Lake, Silver Lake, Diamond Lake, Lost Lake, Bonanza Lakes, and Oregon Lakes also offer opportunities for native fish conservation and fishery enhancement. Removal of brook trout and exclusion of fish is proposed at Rudie Lake. Trail Lake and Crystal Lake offer higher quality brook trout fisheries that are not recommended for suppression.

Priorities for conversion of mixed *Oncorhynchus* populations to westslope cutthroat trout include Heart Lake (Big Cr.), French Lake, Lower Trio Lake, North and South Cedar Log Lakes, and Surveyor Lake. This would most likely be achieved through experimental 'genetic swamping' or fish removal, followed by re-stocking.

Lakes included in the MFWP fish planting program are stocked exclusively with age-0 westslope cutthroat trout (M012 hatchery strain) as it is currently considered the only appropriate species for stocking in middle Clark Fork mountain lakes. Alternative species will be evaluated in the future as new hatchery strains (particularly sterile stocks) are developed.

# Acknowledgments

Thanks to all the MFWP fisheries technicians, interns, and volunteers that assisted with mountain lakes sampling, including John Syslo, Nick Stipech, Mike Jones, Raven Rashap, Mack Long, Connie Long, Pat Saffel, Scott Spaulding, Dustin Allen, Aaron Dupuis, Darci Macur, Katie Knotek, Aubree Benson, Marte Thabes, Leo Rosenthal, Bill Pfeiffer and Leo Thrush.

Mack and Connie Long, Centennial Trail Outfitters and Hole in the Wall Ranch provided stock and wranglers for extended sampling trips and were very helpful.

We thank Brian Riggers, Greg Munther, David Schmetterling, Pat Saffel, Bryce Maxell, and Bruce Rieman for reviewing various sections and drafts of the report. Pat Saffel also provided crucial statistical support.

The staff at the MFWP Washoe Park Trout Hatchery in Anaconda produce and transport the westslope cutthroat trout for the mountain lake stocking program. These individuals include: Mark Sweeney, Paul Suek and Angela Souther.

This study and report were funded with Montana hunter and angler license dollars and Federal Wallop-Breaux/Sport Fish Restoration Act funds.

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## APPENDICES

# Introduction

The middle Clark Fork region of west-central Montana, considered the project area for this document, contains more than 78 alpine and sub-alpine "mountain" lakes (> 1 acre and > 4,950 ft elevation) that lie in the Bitterroot Mountains along the Montana-Idaho border (Figure 1). The project area lies exclusively on the Ninemile and Superior Ranger Districts of the Lolo National Forest, encompassing lakes in the St. Regis River, Dry Creek, Trout Creek, Cedar Creek and Fish Creek drainages. A distinct portion of the upper Fish Creek watershed makes up the Montana portion of the Great Burn Complex, a large roadless tract that has been proposed for Wilderness designation.

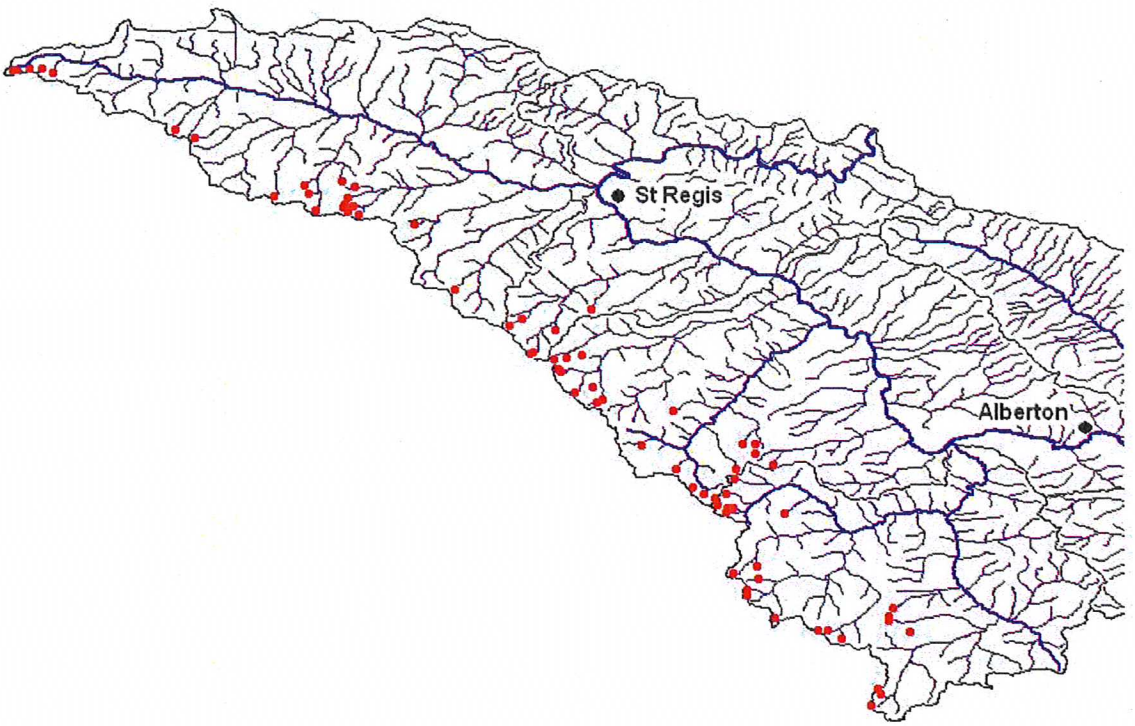



**Figure 1**. Distribution of mountain lakes in the middle Clark Fork region of west-central Montana.

Mountain lakes in the middle Clark Fork region are physically diverse and provide a range of recreational opportunities. About half of the lakes support trout fisheries, including self-sustaining populations and those that are maintained through stocking. Westslope cutthroat trout (*Oncorhynchus clarki lewisi*) and brook trout (*Salvelinus fontinalis*) are the most common fish species, although remnant populations of Yellowstone cutthroat trout (*O. clarki bouvieri*) and rainbow trout (*O. mykiss*) are present in some waters. Fishless lakes are distributed across the project area and contribute to overall diversity, along with variable access, elevation and topography among sub-basins. Because lakes and associated stream networks support numerous indigenous trout, amphibian and other native populations, maintaining fishless lakes and stocking conservatively with appropriate species (where fish plants occur), are major

considerations for lake management. Removal or suppression of wild, non-indigenous trout (i.e., brook trout and rainbow trout) that provide poor quality fisheries and compete or hybridize with native stocks is also an emphasis.

Like most high elevation environments in the northern Rocky Mountains, middle Clark Fork mountain lakes generally lie in remote, relatively pristine settings that support high ecological and recreational value. As human population growth, residential/urban development, and natural resource demands rapidly expanded in western Montana over the past several decades, aquatic resource managers have focused on protection and enhancement of productive middle and low elevation resources (e.g., valley and foothill rivers, streams, wetlands) that face imminent threats of degradation and support the majority of recreational use. During this period, mountain lakes were managed less intensively.

However, in the interim, research and evaluation efforts revealed many biological and social issues that expanded the range of considerations involved with mountain lake management programs (Bahls 1992; Dunham et al. 2004). These considerations reflect the complexity of contemporary resource management and the desired balance between ecological and recreational values. Advocates for the unique attributes of fishless lakes, the basin-wide impacts of non-native fish introductions, the importance of diverse recreational opportunities, etc. have expanded the importance of mountain lakes beyond their traditional value as remote trout fisheries. Observed or expected increases in recreational use associated with rapid human population growth has also necessitated the need for more comprehensive natural resource planning.

Management responsibility for middle Clark Fork mountain lakes is essentially shared by Montana Fish, Wildlife and Parks (MFWP), charged with fish, wildlife and aquatic resource management in the state, and the United States Forest Service (USFS), the federal agency which manages all lands in the project area. Recent activities at mountain lakes have included periodic stocking by MFWP, with adjustments in stocking frequency, number, or species based on infrequent monitoring and anecdotal reports from anglers regarding the status of lake fisheries. The USFS has integrated mountain lakes into larger scale plans for protection of the headwater tributary basins where mountain lakes occur, and has provided and maintained access to most lakes that is consistent with the land management designation for the area. To date, there has been no coordinated effort to identify resource conditions and values or to develop objectives, priorities or long range plans for mountain lake resources.

## Goals and Objectives

In this document, we summarize historic and recent survey data for middle Clark Fork mountain lakes and develop management strategies for specific lakes and sub-basins. This framework incorporates survey information, relevant biological and social considerations, the desire for diversified recreational opportunities, and an emphasis on native fish and intact ecological systems.

Specific goals and objective of the report include:

1) **Summarize current information on mountain lakes in the middle Clark Fork portion of the Bitterroot Mountains**.

   *Objective A*. Compile and incorporate historical information for all lakes, including stocking histories and previous surveys

   *Objective B*. Summarize and report data collected in recent surveys of all fish-bearing lakes

   Objective C. Provide current information for each fish-bearing lake in a useful format for public use

2) **Present and discuss relevant considerations and guidelines for mountain lake management.**

   *Objective A*. Discuss significant social and biological issues that are considered pertinent for mountain lake management

   *Objective B*. Present MFWP lake management philosophies and general fishery management objectives

   Objective C. Describe current tools available to resource managers

3) **Provide a management framework that outlines rationale and specific recommendations for individual lakes and sub-basins**.

   *Objective A*. Designate and describe mountain lake management units in the middle Clark Fork region

   *Objective B*. Describe proposed management strategies for each lake including fishless lakes, self-sustaining fisheries, and stocked fisheries

   *Objective C*. Provide stocking schedules for mountain lakes in the MFWP fish planting program

   *Objective D*. Outline and prioritize management recommendations for lakes supporting non-native fish populations

# Mountain Lake Surveys

## Introduction

All known fish-bearing mountain lakes in the project area were visited by MFWP field crews in 2004-2006. The objective of the surveys was to describe physical and biological lake attributes, as well as evaluate accessibility and relative levels of recreational use. Surveys included fish population assessments, amphibian searches, zooplankton sampling, bathymetric mapping, water chemistry measurements, and a description of recreation sites and trail networks.

Most of the fishless lakes in the project area were not visited during our survey period. Basic information for many fishless lakes was collected in 1970-1975 and we assumed that lakes were still fishless if they had not been stocked by MFWP. Descriptive information (e.g., elevation, surface area, specific location, etc) for some fishless lakes was approximated from USGS topographic maps and existing GIS data.

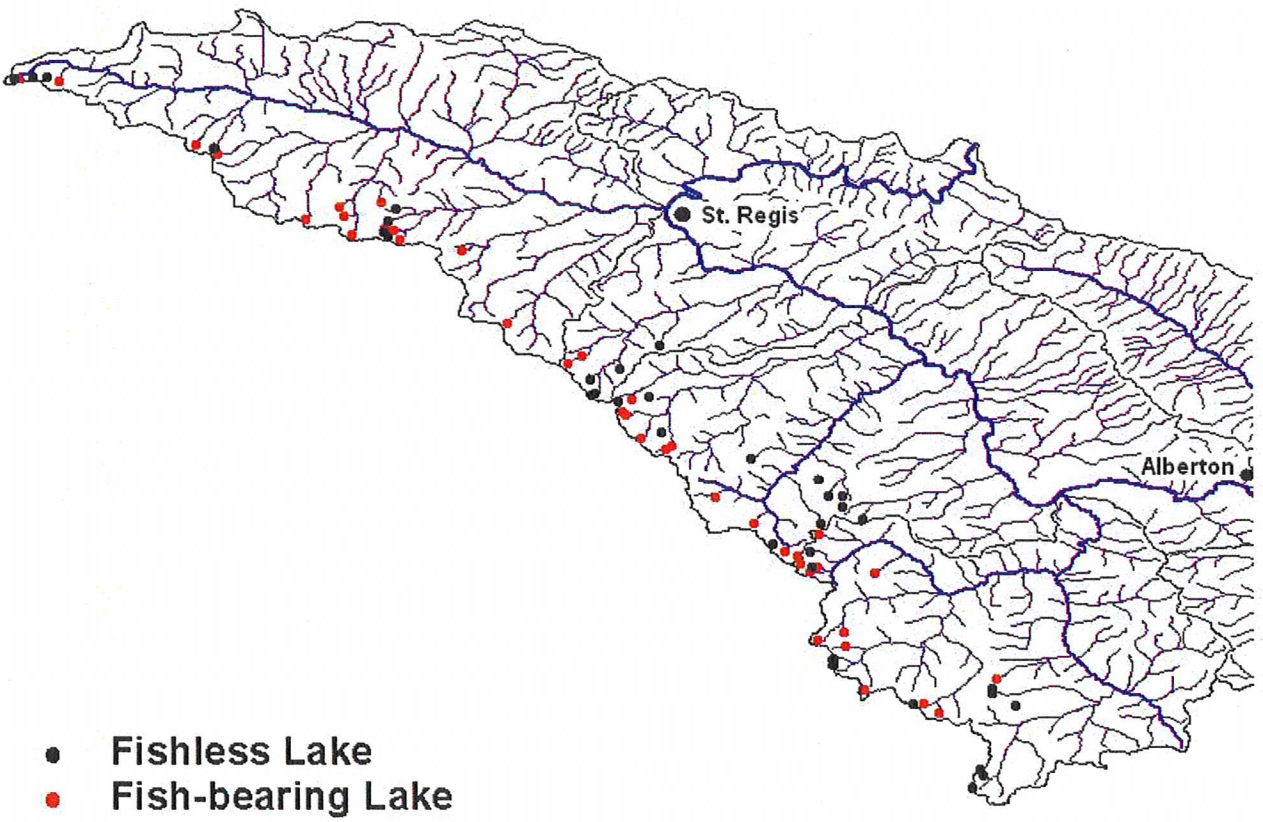



**Figure 2**. Geographic distribution of fish-bearing and fishless lakes in the middle Clark Fork project area.

## Methods

Fish-bearing mountain lakes in the middle Clark Fork project area were surveyed between June 30 and September 21 in 2004-2006 by MFWP biologists, technicians and volunteers. Lakes were accessed primarily on foot, although livestock and aircraft were used to reach remote water bodies. We used established protocols to collect a standardized series of biological and physical data at each lake (described below). Deviations from these methods are noted where applicable or no data are reported.

### *Lake Physical Measurements*

Basic water chemistry measurements were collected at shoreline and mid-lake locations using a hand-held electronic meter. Measurements included surface water temperature, pH, conductivity (uS/cm), and total dissolved solids (TDS; ppm). Water transparency was also measured from an inflatable boat with a Secchi disk between 10:00 and 17:00 while wearing polarized sunglasses. The disk was lowered until it was no longer visible, then raised until visible. The distance halfway between the points of disappearance and reappearance is the Secchi depth. The Secchi depth reported was the mean of two replicates by independent observers. In some cases, the maximum observable Secchi depth was estimated because it exceeded the maximum water depth of the lake.

Lake bathymetric maps were created using field location and depth measurements at a series of points that characterized each lake. Although the total number of points varied based on lake size and depth variability, the protocol always included locations along the entire lake perimeter and at least five transects across the water body. At each transect point, latitude and longitude measurements were collected from an inflatable boat using a hand held GPS unit. Water depth was measured concurrently with a hand held electronic depth-finder. The total number of points collected per lake generally ranged from 150-300.

Field data were transferred to spreadsheet files in the office and sent to MFWP's Information Services Unit. Once formatted, point data were processed by TIN (triangulated integrated network) mapping software to produce bathymetric maps with 2-20 ft contours. The program also calculated surface area, lake volume, etc. Features of interest such as inlet streams, outlet streams, and campsite/fire ring locations were later plotted on each map (see maps in Appendix C).

### *Fish Sampling*

Fish sampling was conducted using overnight sets of sinking, experimental, monofilament gill nets. We used standardized net dimensions and mesh size (125'x 4'; 5 panels; 0.75", 1.00 ", 1.25",1.5", and 2.0" bar) specified for alpine lake sampling in Montana (Stiff 2000). Nets were set for a single sampling period (minimum 10 hrs) usually beginning between 18:00 and 20:00. Nets were typically anchored to a log or rock on the shoreline (small mesh end) near a point or prominent feature with gradual depth contour. We used an inflatable boat or float tube to stretch and set the remainder of the net (maximum depth rarely exceeded 30 ft). Small lakes (< 20 acres) were sampled for one night with one net. On larger lakes (>20 acres) and in instances

where fish abundance was obviously low based on visual observations (during bathymetric mapping and lakeshore surveys), we set two nets concurrently at widely-spaced locations to help ensure an adequate, representative sample. For analysis, all gill net catch results were standardized by species as number of fish/net/hr.

Fish caught in gill nets were sacrificed and processed on shore. We weighed (g) and measured (TL, mm) each individual, assessed sex and maturity, and noted a qualitative description of major taxa in stomach contents (anecdotal). Scales and otoliths were removed from 20 fish, stored in envelopes and archived for subsequent age and growth analyses (not performed in this study). In most instances where *Oncorhynchus* spp. were present, we preserved 25 fin clips (caudal or anal fin) in individual vials filled with 95% ethanol. These samples were stored to allow future determination of the relative genetic contribution of westslope cutthroat trout, rainbow trout, and Yellowstone cutthroat trout in lake populations. In some instances, additional fish were collected to complete genetic or age/growth (otoliths and scale) samples. We typically angled from shore to supplement gill net catch, but did not include these samples in gill net catch summaries.

*Relative Weight as an Index of Fish Condition*

Indices of well-being or condition are used to describe length-weight relationships ("plumpness") in fish. Relative weight (Wr) is a common index where average fish of all species have a value of 100, regardless of the units of measure (Anderson and Neumann 1996). Relative weight for an individual fish is derived through the following equation:

$$Wr = W / Ws \times 100$$

Where W is the weight of an individual and Ws is a length-specific standard weight. Standard weight equations are of the form:

$$\log_{10} Ws = a' + b' (\log_{10} L)$$

where a' and b' account for the genetically determined shape characteristics of a species and L is the total length. Species-specific a' and b' values yield a Wr of 100 for fish that are well fed and have an average condition or "plumpness" that reflect "ecological and physiological optimality". Ws was calculated for brook trout, cutthroat trout and rainbow trout using the following equations (Anderson and Neumann 1996):

| | |
|---|---|
| Rainbow Trout | $\log Ws = -4.898 + 2.990 \log L$ |
| Cutthroat Trout | $\log Ws = -5.192 + 3.086 \log L$ |
| Brook Trout | $\log Ws = -5.085 + 3.043 \log L$ |

Relative weight was calculated for individual trout based on total length and weight measurements. Means and ranges were then computed to represent the condition or well-being of each lake population. Trout with high condition generally exhibit faster growth rates and may achieve larger sizes. High average condition for a population was considered an indication that fish densities were appropriate for the inherent carrying capacity of a lake and that natural reproduction and or stocking levels were not excessive.

*Estimates of Trout Natural Reproduction and Spawning Habitat*

Level of trout natural reproduction was qualitatively classified as *low, moderate* or *high* for each fish-bearing lake based on observations of trout juvenile recruitment, population size structure, and gill net catch rates (Table 1). Because age-0 and age-1 trout year classes were typically too small to be caught in gill nets, relative juvenile abundance had to be estimated visually as shoreline surveys were completed. Juveniles were typically observed in lake inlets or outlets and near cover along lake margins. Juvenile abundance was described as low (none observed), moderate (a few juveniles seen sporadically along shoreline) or abundant (juveniles seen at numerous locations) based on these observations. Characteristics of population size structure and gillnet catch rate corresponding to various levels of estimated natural reproduction are also displayed in Table 1.

In estimating natural reproduction, the 2000 year class was excluded for stocked cutthroat trout populations because including stocked fish would significantly bias these estimates. This was the only recent stocking event in these lakes and this year class was generally dominant and easy to identify within a size class histogram generated from gill net catch.

**Table 1**. Population characteristics collectively considered in estimating level of trout natural reproduction in middle Clark Fork mountain lakes.

| | **Population Characteristics[1]** | | |
|---|---|---|---|
| **Estimated Natural Reproduction** | **Juvenile Trout Abundance** | **Population Size Structure[2]** | **Gill Net Catch Rate (#/net/hr)[2]** |
| **Low** | Low | Most size classes missing | < 0.3 |
| **Moderate** | Moderate | Multiple size classes present, but gaps evident | 0.3-0.8 |
| **High** | Abundant | All size classes present | >0.8 |

1 Attributes of trout juvenile abundance, size structure and gill net catch rate were considered collectively when assigning levels of estimated natural reproduction.

[2] Stocked cutthroat trout (2000) were excluded when assessing population size structure and gill net catch rate.

Availability of trout spawning habitat in lake inlets, outlets and springs was also noted. Suitable spawning habitat included accessible lotic (flowing water) areas with adequate discharge at the time of survey, estimated water velocities of 1-4 ft/sec, suitable spawning gravels (0.25-1.0 inch dominant size classes), and slopes < 3% (see Bjornn and Reiser 1991). These anecdotal data primarily apply to *Oncorhynchus* spp. because they require more stringent habitat conditions (relative to brook trout) to successfully spawn based on relative reproductive success in mountain lakes in Montana and Idaho. Brook trout regularly use these same inlet and outlet habitats for spawning, but can also successfully reproduce along shoreline areas or seeps that are not suitable for *Oncorhynchus* spp.

*Amphibian Surveys*

Amphibian surveys were conducted around the entire lake perimeter using the methods of Maxell et al. (2002). This essentially involved sweeping shoreline emergent vegetation with a short-handled dip net (<0.25" mesh) and visually searching for adult and larval amphibians along the lake margins. All amphibians were identified to species and life stage. Total observed abundance of each species and life stage was noted for each lake.

*Zooplankton Sampling*

Zooplankton samples were collected from an inflatable boat using a Wisconsin style plankton net with 4.75 inch mouth and 80 micron Nitex netting. Two replicate 50 ft vertical tows were completed. When lakes were <50 ft deep, tows were completed at the deepest point in the lake from 1 ft above the bottom to the surface. For each tow, zooplankton were concentrated in a collection jar at the end of the net using a squirt bottle and deposited in a bottle of ~ 70% ethanol for storage. Total volume of water sampled was calculated by multiplying the area of the net opening (17.7 $in^2$) by the depth of the tow. Time and resource constraints did not allow processing of zooplankton samples for this report, but all samples were archived.

*Description of Recreational Use*

Relative recreational use at each lake was estimated and described based on qualitative observations. Indicators including trail presence/absence and condition, number and condition of campsites/fire rings, amount of refuse, ease of access, etc., along with fishing pressure estimates from the MFWP mail surveys were used collectively to describe overall recreational use. Locations of trailheads, distances to lakes from access points, trail numbers, etc. were obtained from field observations, USGS topographic maps and current USFS maps.

*Statistical Analyses*

Basic descriptive statistics such as means, ranges, tests for normality, etc. were calculated for most quantitative data collected during lake surveys. A series of statistical comparisons were also performed to test for significant (alpha=0.05) differences between lake types and fishery characteristics. In all comparisons, either a two-tailed t-test (two categories) or simple analysis of variance (ANOVA) procedure (multiple categories) with unequal sample sizes was used to detect differences among categories. If significant differences were found in ANOVA procedures, a post-hoc HSD test was performed to determine which categories were different (unequal sample sizes).

**Results and Discussion**

A total of 78 mountain lakes (> 1 acre) were identified in the middle Clark Fork project area. All 40 fish-bearing lakes were surveyed in 2004-2006 and existing data was collated for the 38 fishless waters. Tabular summaries of existing data for all lakes, including physical attributes, fish population and amphibian information, etc., are found in Appendix A (Tables 1-5). These data are also included in the individual lake summaries in Appendix C (fish-bearing lakes only).

*Lake Physical Attributes*

Mountain lakes in the project area were widely distributed geographically and in elevation along the northeast front of the Bitterroot Mountains near the Montana-Idaho border on the Lolo National Forest (see Figure 1 and Appendix A). The majority of lakes (>95%) were situated in high, glacial cirque basins near the headwaters of Clark Fork River tributary watersheds. The remainder were found in glacial troughs or other landforms at similar elevations. Mountain lakes occurred in alpine and sub-alpine environments at elevations ranging from 4,983 ft to 6,850 ft (msl). Qualitative physical descriptions of fish-bearing lakes are included with individual lake summaries in Appendix C.

Lake morphology, water chemistry and other physical characteristics were variable (Appendix A, Tables 1-3). Water bodies ranged in size from 1 to 62 surface acres (0.4-25 ha), maximum depth ranged from < 5 to 181 ft (~1-55 m), and lake volume ranged from 5 to 3,555 acre-ft. Water chemistry measurements (fish-bearing lakes only) included pH (range 8.0-9.5), conductivity (range 47-119 uS/cm), and total dissolved solids (range 17-91 ppm). Secchi depth measurements of lake transparency were recorded from 12-58 ft (3.7-17.7 m). In some lakes, Secchi depth exceeded the maximum water depth. Surface water temperatures were not reported because we only visited lakes once and these measurements are not meaningful (highly variable daily and seasonally).

*Lake Fisheries and Trout Population Characteristics*

Lake fisheries were comprised of westslope cutthroat trout, brook trout, rainbow trout, and Yellowstone cutthroat trout in various combinations. Sculpins and longnose suckers were also observed in Cliff Lake and Heart Lake, respectively. We considered approximately half (21) of the 40 fish-bearing lakes to be completely self-sustaining based on length distributions, fish densities and the availability of suitable spawning habitat (Table 2 below; Appendix A, Tables 4 and 5). Of these 21 wild populations, 15 were predominantly brook trout and six were cutthroat trout (Yellowstone or westslope). Most of these populations have not been stocked in the past 30 years and exhibited consistent, abundant natural reproduction, low average body condition, and a 'stunted' (truncated) size structure.

The remaining 19 fish-bearing water bodies (49%) are included in the MFWP stocking program (2007). These include westslope cutthroat trout fisheries that are sustained through stocking (11) and mixed populations (8) where westslope cutthroat trout are planted to supplement wild rainbow trout or brook trout populations (Table 2 below). Most stocked westslope cutthroat populations exhibited some level of natural reproduction based on length distributions and overall fish densities. However, periodic supplementation is continued when natural recruitment is considered inadequate or too inconsistent to meet management objectives. The exceptions are the eight mixed populations, where westslope cutthroat trout are stocked to diversify stunted brook trout or rainbow trout populations (truncated size structure) and to begin "swamping" non-native *Oncorhynchus* fisheries with native cutthroat trout that are compatible with wild stream populations in the watershed. It should be noted that the number of stocked fisheries used in comparisons below is based on pre-2007 management, not the refined 2007 stocking schedule in Appendix B.

**Table 2**. Categories of middle Clark Fork mountain lake fisheries.

| | |
|---|---|
| Wild Brook Trout Fisheries | 15 |
| Wild Cutthroat Trout Fisheries* | 6 |
| **Total Self-Sustaining Fisheries** | **21** |
| Stocked W. Cutthroat Trout Fisheries | 11 |
| Wild Brook Trout Supplemented with Westslope Cutthroat Trout | 3 |
| Wild Rainbow Trout Supplemented with Westslope Cutthroat Trout | 5 |
| **Total Stocked Fisheries (2007)** | **19** |
| **Total Fish-bearing Lakes** | **40** |

* Includes westslope cutthroat trout and Yellowstone cutthroat trout

Fish species were widely distributed and all were present across the range of lake environments within the project area. There was no segregation of fish species based on location or lake morphology as no significant differences were detected among brook trout, cutthroat trout and rainbow trout when lake elevations ($P=0.90$), maximum depths ($P=0.56$) and surface areas ($P=0.80$) were compared using ANOVA. Measurements for water chemistry and transparency were also similar among lakes supporting the various fish species ($p>0.50$ for all comparisons). This is not to imply that lake physical characteristics do not influence fish population attributes and other biological variables. Variation among lakes was apparent, but differences were subtle. We likely did not have the capacity to detect physical patterns or differences among water bodies because we measured a limited number of variables and had modest sample sizes. In previous studies, trout growth in mountain lakes was positively correlated with concentrations of dissolved solids, summer water temperatures, and prey density, and was negatively related to lake elevation, lake depth and stocking density (Bailey and Hubert 2003; Donald et al. 1980; Donald and Anderson 1982; Stiff 1998).

Accurate estimates of fish population abundance are difficult to obtain for lentic waters, particularly when lakes are numerous and remote. In our lake surveys, we used experimental gill net catch-per-unit-effort as an index of trout abundance. Gill net catch rates ranged from 0.1 – 5.1 (mean 1.1) trout/net/hr. Local weather conditions, lake morphology and limited effort likely affected catch rates, but relative abundance estimates based on gill net catch were generally consistent with anecdotal angler reports and our visual observations of fish density (with high water clarity in mountain lakes, fish are very visible from boats and shoreline).

Since about half of the fisheries we sampled were supplemented with stocking, this could be a complicating factor in assessing overall fishery characteristics and differences. However, it was relatively easy to identify and weigh the contribution of stocking in relative fish densities because only westslope cutthroat trout were stocked in a limited number of lakes (22) prior to 2007. Where supplementation did occur, it was completed only in 2000, at the same rate (50/acre) and with same size fish (2 inch). This year class was very evident in most of the stocked lakes surveyed in 2004-2006. Even when stocked westslope cutthroat trout were

included with wild fish in comparisons of overall catch rates and other variables (below), supplementation status did not obscure the general population characteristics and trends. However, when applicable for recently stocked lakes, we attempted to reduce the bias of stocking in analyses by excluding this year class.

Species of fish and level of natural reproduction appeared to be the most important factors affecting trout abundance and size characteristics in mountain lakes. In general, brook trout populations were prolific and very abundant, while cutthroat trout and rainbow trout reproduction and population abundance were variable. This was evident in some of our comparisons of gill net catch rates among different types of fisheries (Table 3). In these comparisons, westslope cutthroat trout, Yellowstone cutthroat trout and rainbow trout were combined (collectively "*Oncorhynchus*") as sample sizes of the latter two species were inadequate for meaningful statistical comparisons. Although mean catch rates (#/net/hr) for *all* brook trout and *Oncorhynchus* populations were very similar, this assessment is misleading because it includes both self-sustaining and stocked *Oncorhynchus* populations. When gill net catch rates were compared for stocked cutthroat trout populations (limited natural reproduction) versus wild brook trout populations (P=0.32) or all self-sustaining populations (P=0.06, pooled species), mean catch rates were lower for stocked cutthroat trout fisheries. Though not statistically significant, these results illustrate the intuitive patterns among fisheries. Brook trout appeared to be consistently abundant among populations (regardless of quality of inlet and outlet spawning habitat), while *Oncorhynchus* abundance was variable and highly dependant on lake spawning conditions. Densities could be controlled and limited in stocked populations because natural recruitment was generally low and stocking was conservative.

**Table 3**. Comparisons of gill net catch rates among mountain lake fishery categories in the middle Clark Fork project area.

| COMPARISON | | | | | | |
|---|---|---|---|---|---|---|
| **Population Type** | **Mean Gill Net Catch Rate (SD)** | | **Population Type** | **Mean Gill Net Catch Rate (SD)** | **df** | **P[1]** |
| All *Oncorhynchus* | 1.07 (0.68) | vs | Wild Brook Trout | 1.13 (1.09) | 37 | 0.84 |
| Stocked WCT | 0.77 (0.49) | vs | Wild Brook Trout | 1.13 (1.09) | 28 | 0.32 |
| Stocked WCT | 0.77 (0.49) | vs | All Self-sustaining | 1.34 (1.02) | 37 | 0.06 |

[1] Significance of comparisons using two-tailed t-tests with unequal sample sizes.

Differences were also observed among species when population size structure and body condition were compared. The mean and maximum lengths of all brook trout populations were significantly smaller than in the pooled cutthroat trout and rainbow trout populations (Table 4). Mean body condition was also lower for brook trout populations, although this difference was not statistically significant (P=0.43). Differences between brook trout and *Oncorhynchus* would undoubtedly be even greater if only stocked cutthroat trout populations were considered (see Table 4), since the *Oncorhynchus* sample included the 10 self-sustaining populations that are also abundant and generally stunted. Statistically significant disparities among species were not surprising given the prevalence of abundant, stunted brook trout populations in the project area.

**Table 4**. Comparison of size structure and body condition between brook trout and *Oncorhynchus* spp. populations in middle Clark Fork mountain lakes.

| | Brook Trout | | | *Oncorhynchus spp.* | | | |
|---|---|---|---|---|---|---|---|
| | **Mean (SD)** | **Range** | **n** | **Mean (SD)** | **Range** | **n** | **P[1]** |
| **Max Length (mm)** | 280 (70) | 210-495 | 18 | 355 (59) | 233-500 | 22 | < 0.001* |
| **Mean Length (mm)** | 220 (36) | 184-346 | 18 | 286 (50) | 195-415 | 22 | < 0.001* |
| **Mean Wr** | 91.8 (13.2) | 82-141 | 18 | 95.0 (12.0) | 80-110 | 22 | 0.43 |

[1] Significance of comparisons using two-tailed t-tests with unequal sample sizes.
* Indicates a statistically significant difference.

When average size structure and body condition were compared for all self-sustaining populations (species pooled) versus stocked cutthroat trout populations (Table 5), the mean length, maximum length and mean Wr were all significantly higher for stocked populations. Again, this likely reflects the differences in reproductive rate and abundance for wild populations (uncontrolled, high natural reproduction) and stocked fisheries (low natural reproduction and controlled densities).

**Table 5**. Comparison of size structure and body condition between socked and self-sustaining (wild) trout populations (all species pooled) in middle Clark Fork mountain lakes.

| | Stocked Populations | | | Wild Populations | | | |
|---|---|---|---|---|---|---|---|
| | **Mean (SD)** | **Range** | **n** | **Mean (SD)** | **Range** | **n** | **P[1]** |
| **Max Length (mm)** | 368 (60) | 233-500 | 16 | 290 (66) | 206-495 | 24 | 0.0005* |
| **Mean Length (mm)** | 296 (53) | 195-415 | 16 | 230 (38) | 184-346 | 24 | 0.0005* |
| **Mean Wr** | 99 (12) | 83-128 | 16 | 90 (12) | 76-141 | 24 | 0.035* |

[1] Significance of comparisons using two-tailed t-tests with unequal sample sizes.
* Indicates a statistically significant difference.

Level of natural reproduction was inconsistent between water bodies and among years, and was dependant on many physical and behavioral variables. Based on population structure, overall abundance, and observations of juvenile recruitment, level of natural reproduction was qualitatively classified as *low, moderate* or *high* for each fish-bearing lake that we visited. Not surprisingly, estimated levels of natural reproduction were typically described as *high* or *moderate* for brook trout (all wild) and other self-sustaining *Oncorhyncus* populations. These observations were consistent with the comparisons of population size structure and body condition between stocked and non-stocked fisheries discussed above. When mean length,

maximum lengths and mean Wr were evaluated for all populations relative to estimated level of natural reproduction, all three parameters were significantly different ($p<0.0003$; ANOVA with unequal sample sizes) based on level of natural reproduction. As anticipated, follow-up tests suggested that the mean length, maximum length and body condition of trout populations were inversely related to the level of natural reproduction (Figure 3). However, it should be recognized that this group of comparisons is biased by the fact that population size structure was one of the variables considered when determining qualitative natural reproduction assignments (i.e., high, moderate or low).

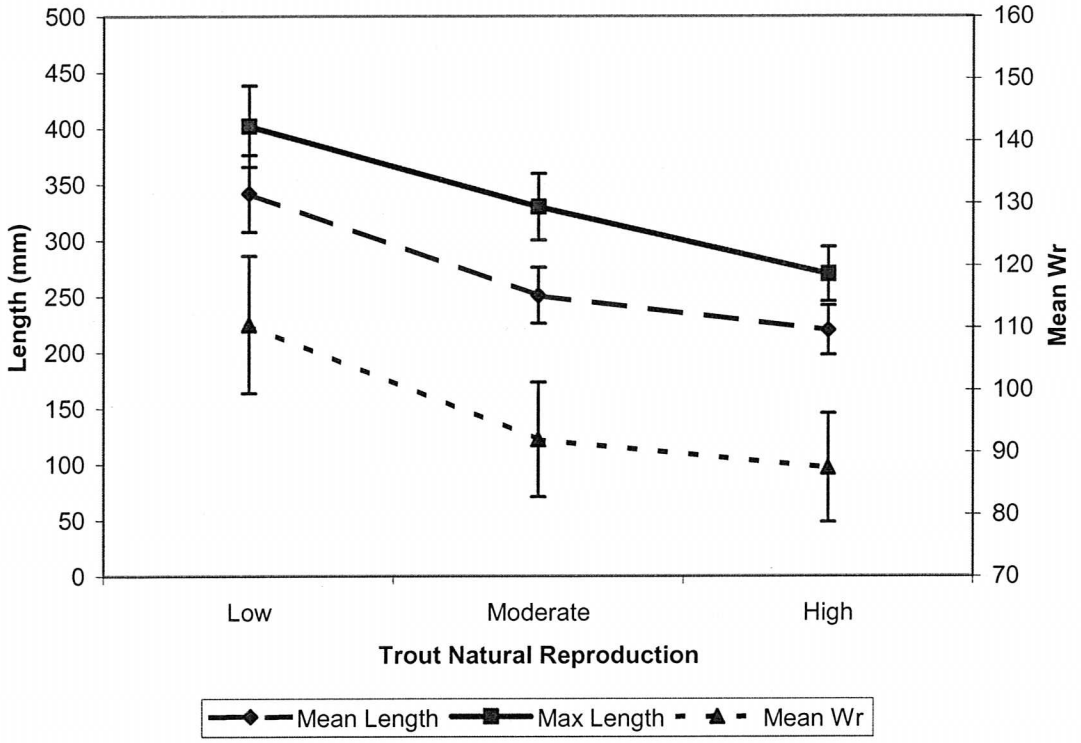



**Figure 3**. Relationship of estimated natural reproduction with mean length, maximum length and mean relative weight for trout populations in the middle Clark Fork project area. Values displayed represent mean +/- 1 SD.

These data and comparisons are relevant for management of middle Clark Fork mountain lake fisheries because they highlight the limitations and opportunities for various types of fisheries, and form the basis for the long-term management objectives. In terms of angling quality and diversity, wild brook trout fisheries currently offer limited opportunity with few options for long-term improvement. Although angler catch rates are often high, we consider truncated size structure and low body condition to be unsatisfactory for most anglers. Headwater brook trout populations also pose a significant threat to native fish populations in associated stream networks through hybridization and competition. Mountain lake *Oncorhynchus* fisheries are much more variable. Some consist of abundant, stunted populations similar to brook trout fisheries and others contribute to hybridization of native westslope cutthroat trout stocks. However, managing species composition, population abundance and size structure is generally more realistic compared with brook trout fisheries, particularly in lakes where cutthroat trout natural

reproduction is limited. In these waters, population characteristics and species composition can be managed through stocking.

*Trout Diet Information*

Trout diet information was qualitatively described at each lake based on field observation of stomach contents (no microscopic analysis). These should be considered anecdotal observations as no quantitative assessment or formal taxonomic classifications were completed. Zooplankton and/or insects were the most common summer foods as they were the dominant diet items for > 95% of lake populations. Preliminary laboratory analyses of several zooplankton samples indicated that larger copepods and cladocerans (e.g., *Daphnia* spp.) were the primary components. Most insects in trout diets were aquatic life stages of dragonflies and damselflies (Odonata), mayflies (Ephemeroptera), and midges, mosquitos, etc. (Diptera). Terrestrial insects were also common, including bees and ants (Hymenoptera) and beetles (Coleoptera). At several lakes, particularly more productive waters with higher fish condition, leeches (Hirudinea) and "scuds" (*Gamarus* spp. – freshwater shrimp) were a significant component of stomach contents. Snails (Gastropoda) were additional, infrequent diet items at < 10% of lakes.

*Trout Genetic Composition and Age/Growth Information*

At the time of report preparation, genetic data for fish species identification and age/growth information were not available. Although fin clips, scales, otoliths and length measurements were collected from individual fish as part of lake survey procedures, limited time and resources did not allow us to promptly analyze these data. Basic fish recruitment and growth data were inferred from population length frequency distributions, relative abundance, and other data.

**Table 6.** Species composition of Oncorynchus fisheries based on fish morphological characteristics.

| | |
|---|---|
| **Westslope Cutthroat Trout Only *Oncorhynchus* Observed** | **18 lakes** |
| (Eighteen different lakes) | |
| **Westslope and/or Yellowstone Cutthroat Trout Observed** | **2 lakes** |
| North Cedar Log Lake | |
| South Cedar Log Lake | |
| **Westslope Cutthroat Trout and/or Rainbow Trout Observed** | **5 lakes** |
| French Lake | |
| Gold Lake | |
| Heart Lake (Big Creek) | |
| Surveyor Lake | |
| Trio Lake - Lower | |
| **Total Lakes with Wild and Stocked *Oncorhynchus* Populations** | **25** |

Fish species identification was based on (morphological) diagnostic characteristics (Table 6 ). This has proven to be an effective method of identifying populations with a predominant Yellowstone cutthroat trout or rainbow trout component, but is not reliable for identifying populations with a low non-native *Oncorhynchus* genetic contribution (i.e., late generation hybrid swarms that are primarily westslope cutthroat trout). More thorough analysis of age, growth and genetic information will be conducted for individual lakes as it is relevant for management decisions.

*Amphibian and Reptile Observations*

Shoreline amphibian surveys were conducted on all fish-bearing lakes and a limited number of fishless lakes in the project area. Although several amphibians and reptiles have been documented in the region, Columbia spotted frogs (*Rana luteiventris*) and long-toed salamanders (*Ambystoma macrodactylum krausei*) are the two most common species in alpine and sub-alpine lake environments (Werner et al. 2004). Columbia spotted frogs were common or abundant along the perimeter of most lakes (Appendix A, Table 4). Adults, juveniles, and larvae (tadpoles) were observed at 31 of 40 fish-bearing lakes. Frog egg masses were also noted at some water bodies.

Presence of fish appeared to have little impact on the density or distribution of Columbia spotted frog adults in middle Clark Fork lakes. We observed no significant correlation of fish density, fish species or fish presence/absence with the presence or density of this frog species along lake perimeters ($P>0.5$ in all comparisons). These observations are consistent with recent alpine lake studies in the Flathead River drainage of northwest Montana (Maxell 2002; Grisak 2006) and in northern Idaho (Meyer and Schill 2007; E. Shriever, IDF&G, personal communication). Although not quantified, Columbia spotted frog adult, juvenile, larval densities appeared most closely related to the amount of emergent aquatic vegetation along the lakeshore and the timing of our lake surveys. Adult frogs were typically observed anytime during summer, but tadpoles and juveniles were not common until latter portions of sampling periods.

In contrast, the density and likely the distribution of long-toed salamanders did appear to be inhibited by the presence of fish in alpine lakes in our project area. Although more than 40 fish-bearing alpine lakes were surveyed, long-toed salamanders were documented at only three. In these cases, only 1-2 larval individuals were observed. Visits to a limited number of fishless lakes and ponds in the project area revealed that dense congregations of long-toed salamander larvae were common (e.g., Windfall Lake and Mud Lake). Although anecdotal, these observations do suggest that introduced fish have a negative impact on the distribution and abundance of long-toed salamanders, and are consistent with other studies in the northern Rockies (Pilliod and Peterson 2000; Maxell 2002; E. Shriever, IDF&G, personal communication).

Western and common garter snakes were also observed along the shorelines of several lakes. These reptiles are common at mountain lakes as amphibians and fish are important dietary components. An expanded discussion of other amphibian and reptile species that may utilize lentic environments in the project area is presented in the 'Biological and Social Considerations in Lake Management' section of this report. This and other sections re-iterate the need for an expanded evaluation of amphibian and reptile populations, particularly at fishless lakes.

*Fishless Lakes*

Most (36) of the 38 fishless lakes in the project area have been managed as fishless waters for >25 years, but stocking was recently discontinued at two additional lakes (Windfall Lake and North Cache Lake). Fish populations at Windfall Lake and North Cache Lake do not appear to be self-sustaining and any remaining fish will likely not reproduce. Four fishless lakes (> 1 acre) were visited and surveyed in 2005-2006, but the majority of information summarized in Appendix A, Table 1 was collected during initial MFWP lake surveys in 1970-1975 (MFWP file data). Fishless lakes not visited in 2005-2006 should be sampled as soon as possible to confirm that fish have not been introduced, verify physical attributes, and describe other biological parameters (e.g., presence/absence of amphibian species).

**Table 7.** Comparison of elevation and morphology between fishless and fish-bearing mountain lakes in the middle Clark Fork project area.

| | Fishless Lakes | | | Fish-Bearing Lakes | | | |
|---|---|---|---|---|---|---|---|
| | **Mean (SD)** | **Range** | **n** | **Mean (SD)** | **Range** | **n** | **P[1]** |
| **Elevation (ft-msl)** | 6,187 (348) | 5,650-6,850 | 38 | 5,883 (369) | 4,983-6,607 | 40 | 0.0004* |
| **Max Depth (ft)** | 14 (13.5) | <5-74 | 27 | 57 (46.1) | 7-181 | 40 | <0.0001* |
| **Surface Acreage** | 2.9 (1.7) | 1-7 | 38 | 14.5 (12.5) | 1-62 | 40 | <0.0001* |

[1] Significance of comparison between fishless and fish-bearing lakes using two-tailed t-tests.
* Indicates a statistically significant difference

Fishless lakes were distributed across lake management units (see later section of this report) and elevations in the middle Clark Fork region. The majority of these waters were small (< 4 acres) and shallow (< 5 ft) and did not support fish because they were considered unsuitable for continued fish stocking by previous fish managers. However, at least 14 waters (37%) are greater than 12 feet deep and are likely capable of over-wintering fish. Although physical characteristics of fishless lakes were variable and many are considered capable of supporting fisheries, fishless lakes were generally smaller, shallower and higher in elevation than fish-bearing waters ($p < 0.001$ on all comparisons, two-tailed t-tests, see Table 7 above).

*Recreational Aspects*

Alpine and sub-alpine lakes in the project area provide a range of recreational opportunities through diversity in fisheries, access, terrain, lake morphology, scenery, etc. Although the focus of this report was fisheries and angling was the most frequent activity observed during surveys at fish-bearing lakes, recreationists also traveled to mountain lakes for solitude, swimming, unique scenery, and many other reasons (based on informal field interviews and observations).

The presence of fish in lakes had an obvious impact on developed and maintained access. More than 90% (37 of 40) of fish-bearing lakes were accessible by established trails or roads, while

less than 10% of fishless lakes were accessible by known trails or maintained routes (based on limited field surveys, maps and anecdotal information). Most fish-bearing waters (25) lie on or adjacent to the USFS trail system and are located within 3.5 miles of established trailheads. Exceptions are generally in the Great Burn Complex (12 lakes in upper Fish Creek) and require further travel (5-10 miles) on the USFS trail system. Nearly all trail routes to mountain lakes are designated for non-motorized travel, although three lakes (Diamond Lake, Moore Lake, Silver Lake) can be reached by USFS roads. Existing travel routes and logistics are specified for each fish-bearing water body in Appendix C.

Human disturbance and evidence of long-term use was visible at most fish-bearing lakes (38 of 40). This included established campsites, fire pits, trails around the lake perimeter, and human refuse. Recreationist activity was generally most evident near lake inlets and outlets. The locations of primary campsites and fire pits are shown on bathymetric maps in Appendix C.

Although angling pressure at middle Clark Fork mountain lakes was low relative to valley floor lakes and rivers in western Montana (MFWP State-Wide Mail Surveys), levels of recreational use appeared similar to other alpine and sub-alpine waters in western Montana. Estimated angler use ranged from no reported use to 251 angler-days per year (mean 1995-2005) at fish-bearing lakes. Mail surveys of angling use and satisfaction are conducted state-wide every 2 years by MFWP and are most useful for tracking major fisheries with thousands of angler days estimated based on a large number of respondents. In the case of mountain lakes and other lower use waters, estimates are usually inconsistent, with high error rates. However, mail surveys are helpful for identifying long-term trends in fishing pressure and major differences among lakes. In our study area, differences in angler use suggested by mail surveys were largely consistent with field observations and intuitive assumptions. Differences in use appeared to be closely tied to access (travel distance from roads) and fishery quality (high catch rates of large fish); lakes lying closer to roads with better fishing received more use than lakes that were more difficult to reach or supported poor fisheries.

# Management of Mountain Lake Resources

MFWP is charged with managing fisheries and aquatic resources within the state, including alpine and sub-alpine (mountain) lakes. In the past, mountain lakes management has been perceived by some to mean indiscriminate trout stocking. Although this perception may have been historically accurate in western Montana, there is no doubt that the range of considerations involved with mountain lake management programs has increased in recent decades. These considerations reflect the complexity of contemporary resource management and the balance between biological and social values.

Several fundamental philosophies form the current basis of MFWP's management strategies for mountain lakes in the middle Clark Fork region, including providing diversity of opportunity, conserving biological integrity, and protecting native species, within the context of responsible natural resource use in interconnected sub-basins. Within this framework, strategies include maintaining fishless lakes and a range of fishery management objectives for fish-bearing lakes.

Although mountain lakes are relatively simple environments (biologically), the list of effective methods to illicit meaningful change is limited. There are four basic options available for management of mountain lake fisheries: (1) change species of fish, (2) modify the density (or presence/absence) of fish, (3) impose harvest restrictions or other regulations and (4) modify intensity or patterns of angling pressure and use through land management designation or access. Current tools to effect these changes include changes in the stocking program, suppression or eradication of wild trout populations, and changes in angling restrictions or management of recreational use. Larger scale land management and access designations, administered by the USFS, are important facets that have direct and indirect implications for lake management.

Management objectives and recommended prescriptions for individual lakes were developed within the eight middle Clark Fork management units delineated by local geography and hydrologic connectivity (see Lake Management Unit descriptions later in this report). The following sections describe the considerations, tools, and guidelines that form the basis for these strategies.

## Biological and Social Considerations for Mountain Lake Management

### Diversity of Opportunity and Fishery Quality

For the purposes of this document, fishery *quality* reflects a combination of fish size structure, abundance, and average body condition (Wr as an index of "plumpness"). The highest quality mountain lake fishery would be one that supports an extremely abundant population of large, plump trout. Unfortunately, many of these population characteristics are biological trade-offs that are balanced at the lake and management unit scales to help provide diverse opportunities. Diverse fisheries support a range of species with varied fish size structure, body condition, and angler catch rates. Later in this section, fishery objectives such as "quality" fisheries, "harvest-oriented" fisheries, etc. are defined that indicate this desire for angling diversity. In a broader perspective, these aspects are combined with interspersed fishless waters, considerations for

native fish, variable access and scenery, and different levels of solitude to provide overall recreational and ecological diversity.

Photos by Gary Michael and John Thabes


***Trout populations in alpine and sub-alpine lakes exhibited considerable variability in average body condition: westslope cutthroat trout (left) with low condition (Wr=89) and brook trout (right) with high condition (Wr=141)***

Alpine and sub-alpine lakes are relatively simple, oligotrophic and meso-oligotrophic environments that presumably provide a finite carrying capacity for top aquatic predators such as trout (Bailey and Hubert 2003). Therefore, basic lake productivity and fish population densities generally dictate fish growth rates, size structure, and body condition within a water body. Trout population density appears most influenced by the level of reproductive success or stocking, species of fish, and, in some cases, level of harvest (Donald et al 1980; Donald and Anderson 1982; Bailey and Hubert 2003). Once fish are introduced, the greatest challenge for fisheries managers is maintaining appropriate and consistent fish densities.

Since the character of mountain lake fisheries is highly dependant on trout density, prolific populations that reproduce consistently are essentially "unmanaged" unless aggressive actions are implemented (rare). Self-sustaining brook trout populations are the most common example of this situation in the project area. Of the 18 fisheries predominantly comprised of brook trout in our surveys, 15 contained abundant, stunted populations with low body condition (mean Wr 82-94) and a maximum length of 8.1-12.7 inches (206-322 mm). Several self-sustaining rainbow trout and cutthroat trout populations also exhibited these characteristics. In all of these instances, we consider fishery quality and diversity of opportunity to be low. Comparison with limited MFWP lake surveys conducted in 1970-1975 also highlighted the stability of these populations. Reduced density, larger size structure, etc. can be achieved with intensive management, but these are typically temporary changes. Repeated trials (particularly with brook trout) have demonstrated that prolific wild populations quickly revert to their original status (if there was a noticeable change) once management actions or controls are lifted (Meyer et al. 2006 (streams); MFWP-Region 1, unpublished data (lakes)). Because mountain lakes are numerous and generally remote, consistent perpetual treatments are typically not feasible. Therefore, the only realistic opportunity for fishery improvement in most wild, stunted populations is complete

elimination of the trout population, followed by re-stocking with a compatible species (westslope cutthroat trout in this case) which may have limited natural reproductive potential.

In many lakes, fish species and availability of spawning habitat are the underlying factors that facilitate self-sustaining populations and population abundance. Trout species vary in spawning habitat requirements and their ability to reproduce in mountain lakes. Rainbow trout and cutthroat trout have slightly different spawning habitat requirements and preferences among species, but are normally limited to lower gradient lake inlets and outlets. Brook trout are able to successfully and consistently spawn in most situations, including lakeshores and small springs (don't require a stream). In our project area, brook trout populations produced consistent year classes and maintained abundant populations virtually everywhere they have been introduced (MFWP stocking records). There were also numerous wild cutthroat trout and rainbow trout populations, but year-class strength (based on length distributions) and overall population abundance varied among lakes. This is attributed primarily to differences in spawning habitat quality and annual hydrologic conditions. The extreme cases where habitat conditions prevent consistent natural reproduction and persistence of self-sustaining populations in the long term represent the greatest management opportunity, as population density (and presumably body condition and size structure) can be roughly controlled through stocking density and frequency. The preponderance of stunted brook trout fisheries do not offer these opportunities for improved fishery diversification and quality because densities cannot be limited or controlled.

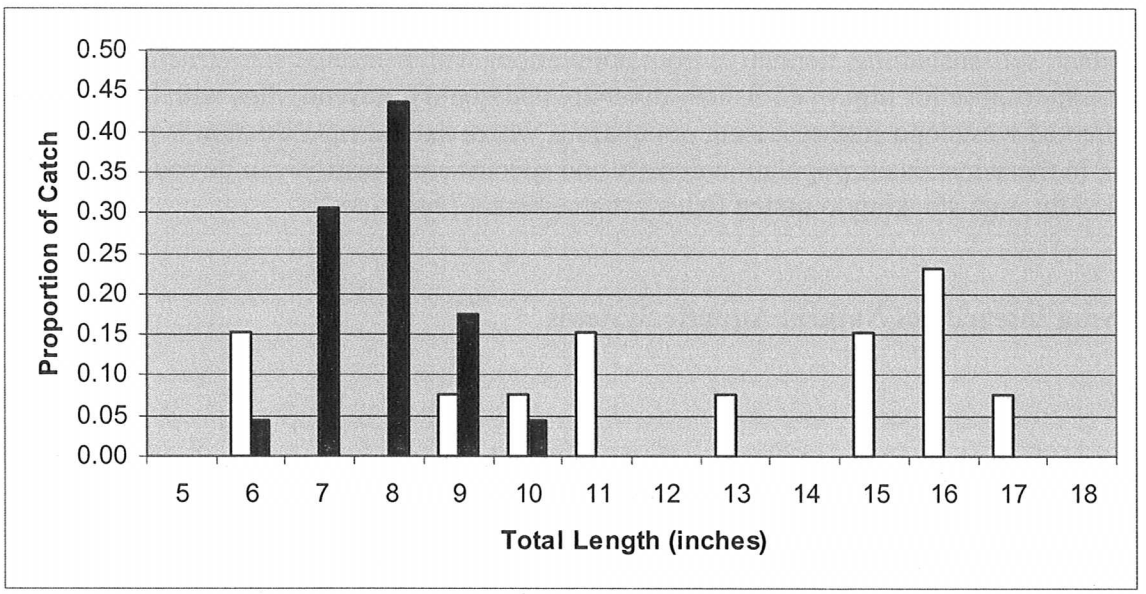



**Figure 4**. Example size distributions for a self-sustaining, "stunted" brook trout population (dark bars) with low average body condition (mean Wr = 82) and a "quality" westslope cutthroat trout population (white bars) with good average body condition (mean Wr = 97) from mountain lake experimental gillnet surveys in the middle Clark Fork project area.

Angler harvest rates and specialized fishing regulations (discussed below) are other management considerations that can help shape trout population characteristics. However, levels of angler use and angler compliance must be significant factors to be effective for population management.

Since most mountain lakes in the project area do not presently receive high angler pressure and consistent compliance is unknown, the impact of imposing harvest restrictions and potential size-selective harvest would likely be ineffectual. The exceptions are stocked fisheries that are directly or easily accessible by road. Readily accessible mountain lakes (e.g., Missoula Lake) are among the most heavily used in the project area and require more frequent, higher density stocking to maintain viable westslope cutthroat trout fisheries. This is not the case with easily accessible brook trout fisheries, which maintain high densities of small fish (e.g., Moore and Silver Lakes). It is not clear if this simply reflects the minimal influence of harvest versus the incredibly high reproductive rate of brook trout or a preference of harvest-oriented anglers for cutthroat trout over brook trout.

In summary, fishery quality and diversity are considered important elements of mountain lake management within the overall range of recreational opportunities and conservation responsibilities. Fish species and population density are two important factors that directly influence fishery characteristics and the options available for management, given the other biological, social and logistical constraints. Although a reasonable number of mountain lake brook trout fisheries can be maintained to enhance diversity and provide high catch rate fisheries, they collectively provide limited opportunity for diversification or improved quality, and represent a significant risk to the integrity of native fish populations (see below). Brook trout eradication is the only viable long-term alternative for change in most of these cases. This description also applies to many self-sustaining cutthroat trout and rainbow trout populations, but other management options are available for some lakes. In the middle Clark Fork region, trout species diversity is high in mountain lake fisheries, but there is a disproportionately high number of abundant, self-sustaining, nonnative trout populations with truncated size structure. The greatest opportunity for improved fishery diversity and quality currently lies with hatchery-supplemented westslope cutthroat trout populations where natural reproduction is present, but limited. In these instances, population density and species composition can be roughly controlled through stocking to match fishery management objectives.

## Preserving Integrity of Natural Aquatic Systems

*History*

Most mountain lakes in the middle Clark Fork region did not historically support fish. As fish stocking became common practice and recreationists' desire for new fishing opportunities increased in the 1930's-1950's, non-indigenous trout were introduced into most of the larger, deep waters in the region that were perceived as capable of supporting (over-wintering) fisheries. The fish stocking program continued to expand in the 1960's-1970's as aircraft for stocking became available, new fish species were raised in hatcheries, and public demand for fisheries continued to grow.

By the 1990s, concern over the ecological impacts of widespread fish introductions in mountain lakes was increasing (particularly in designated wilderness and proposed wilderness areas). Primary issues included: (1) the sensitivity of these relatively fragile ecosystems and their native fauna to fish introductions (Dunham et al. 2004, Pister 2000), (2) the use of aircraft and other mechanized tools to stock in wilderness and back-country areas (see Stocking section), (3) human social impacts (and related resource impacts) of crowding, displacement and focused recreational use driven by created lake fisheries (see sections below) and (4) the stocking of non-

indigenous trout species that compete and hybridize with native fish populations downstream (see section below).

Research on the impacts of fish stocking to natural alpine lake systems has focused on many different trophic levels (Knapp et al. 2001; Schindler et al. 2001; Parker et al. 2001), but effects on native amphibian populations have been the most recognized and contentious. In particular, studies documenting the decline of yellow-legged frogs (*Rana muscosa*) and Pacific treefrogs (*Hyla regilla*) in response to non-native trout introductions in Sierra-Nevada mountain lakes initially heightened awareness of the issue (Matthews and Knapp 1999; Knapp and Matthews 2000; Pope and Matthews 2001; Matthews et al. 2001). In the northern Rocky Mountain region, similar relationships have been reported between introduced fish and long-toed salamanders (*Ambystoma macrodactylum)* in alpine and sub-alpine lakes (Maxell 2002; Funk and Dunlap 1999).

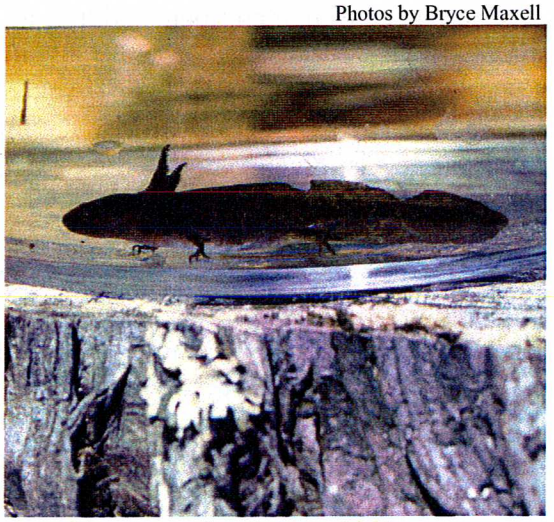
*Amphibian Species in the Middle Clark Fork Region*

The northern Bitterroot Mountains (middle Clark Fork region) are inhabited by a number of native amphibian species that depend on lotic and lentic environments at various life stages. Descriptions from Werner et al. (2004) are paraphrased throughout this section. The most common are two frog species, Columbia spotted frog (*Rana luteiventris*) and Rocky Mountain tailed frog (*Ascaphus montanus*). In the northern Rocky Mountains, Columbia spotted frogs are common in high elevation wetlands, ponds and lakes with emergent aquatic vegetation. Various lentic waters are used during all life stages and the importance of larger ponds and lakes is often stressed as adult over-wintering habitat. Shallow ponds and wetlands used for breeding are often near these deeper waters used for over-wintering. Columbia spotted frog adults and larvae were common or abundant at most lakes we surveyed in the middle Clark Fork region. Rocky Mountain tailed frogs are also common at high elevations in the northern Rocky Mountains. This species is most closely tied to cold mountain streams. Both adults and larvae are well adapted to headwater stream environments, where water temperatures often do not exceed $13^0$ C. This species was not observed at any mountain lakes we surveyed, but is very common in outlet streams and cold tributaries throughout the project area. Tailed frog adults have also been observed in lakes and wetlands in late fall and early spring, indicating that they may use these areas as over-wintering habitats (Maxell et al 2003). The Pacific treefrog (*Pseudacris regilla*) is also likely present in the middle Clark Fork region. This species uses ponds, lakes and temporary wetlands for breeding and larval development, but is typically found at lower elevations in this region. Habitation of high elevation alpine lakes is likely uncommon.

Several salamander species have also been documented in the northern Bitterroot Mountain range, but only the long-toed salamander (*Ambystoma macrodactylum krausei*) is common. This species has a widespread distribution in the northern Rocky Mountains of Montana. The northern long-toed salamander subspecies frequents ponds, lakes, and marshes, particularly for breeding and larval development. At higher elevations, larvae likely must overwinter in lentic waters at least once, and possibly twice, prior to metamorphosis (Maxell et. al 2003). Long-toed salamander larvae were observed in low densities at several fish-bearing lakes in the project area and were very abundant in some fishless lakes.

Photos by Bryce Maxell

***Columbia spotted frog larvae***



***Long-toed salamander larva***

Other salamander species in the middle Clark Fork region include the Idaho giant salamander (*Dicamptodon aterrimus*) and Coeur d'Alene salamander (*Plethodon idahoensis*). Both of these species are uncommon, with very limited confirmed sightings in the project area (Werner et al. 2004). Coeur d'Alene salamanders live in damp environments such as springs, seeps, waterfall spray zones, and damp stream banks near talus or fractured rock. They typically over-winter in underground cavities or rock crevices and breeding presumably occurs in similar environments. Idaho giant salamanders were first documented in Montana in 2005 by U.S. Forest Service fisheries personnel working in lower Big Creek - middle St. Regis Lake Management Unit (Jennifer Mickelson, USFS, personal communication). Since that time, researchers with the Montana Natural Heritage Program and University of Montana have observed this species at multiple sites in the upper and middle portions of the St. Regis watershed along the Montana-Idaho border (Bryce Maxell, Montana Natural Heritage Program, personal communication). This species also prefers headwater stream environments. Neither species was observed during MFWP lake surveys nor has ever been documented in lakes or ponds in the northern Rocky Mountains of Montana.

Boreal toads (*Bufo boreas boreas*), the western toad subspecies found in Montana, were apparently historically common in the northern Bitterroot Mountains. They are now a Species of Concern in Montana because breeding has only been documented in 2%-5% of lentic sites surveyed in recent years and they have apparently been extirpated from a high percentage of historic breeding sites. While they still appear to be widespread with healthy populations in some local watersheds, breeding populations are observed in a much lower percentage of watersheds and sites relative to the 1950s, and most breeding populations do not appear to be as robust (Maxell et al 2003). Adults are primarily terrestrial, but have been shown to use streams and other watercourses during long range movements (Adams et al. 2005). Boreal toads are able to breed in any standing water, including ditches, gravel pits, wetlands, temporary ponds, larger lakes and backwaters of streams. Although this species was commonly observed during stream surveys in the middle Clark Fork region, none were documented during alpine lake surveys.

Several reptile species also inhabit west-central Montana, but most are not obligate inhabitants of high elevation aquatic environments. The only reptile species we encountered during lake surveys were common (*Thamnophis sirtalis*) and terrestrial (*Thamnophis elegans* ) gartersnakes,

which was often observed sunning or feeding on Columbia spotted frogs along lake shorelines. These species are common at lakes, ponds, and wetlands and along stream corridors in alpine and sub-alpine environments in the region where they forage on amphibians, fish, small mammals, birds and a variety of invertebrates.

Recent research projects have also documented unique insect and invertebrate species in headwater streams within the middle Clark Fork project area (Stagliano et al. 2007). At least four insect Species of Concern were recently reported or re-documented (after presumed extirpation) in the Northern Rocky Mountain Refugium (NRMR), which includes the Montana-Idaho border area on the Clearwater and Lolo National Forests. Specifically, the trans-border area of the Bitterroot Mountains from Lookout Pass (head of St. Regis River watershed) to Lost Trail Pass (upper Bitterroot River) represents an island of mountainous forest that was spared from the most recent glaciation and filling of Lake Missoula to the north and lava flows from the south. The highest diversity of unique invertebrate species was found in the steep gradient, headwater streams in this region. It is not know if these and other rare or undescribed species occur in associated mountain lakes.

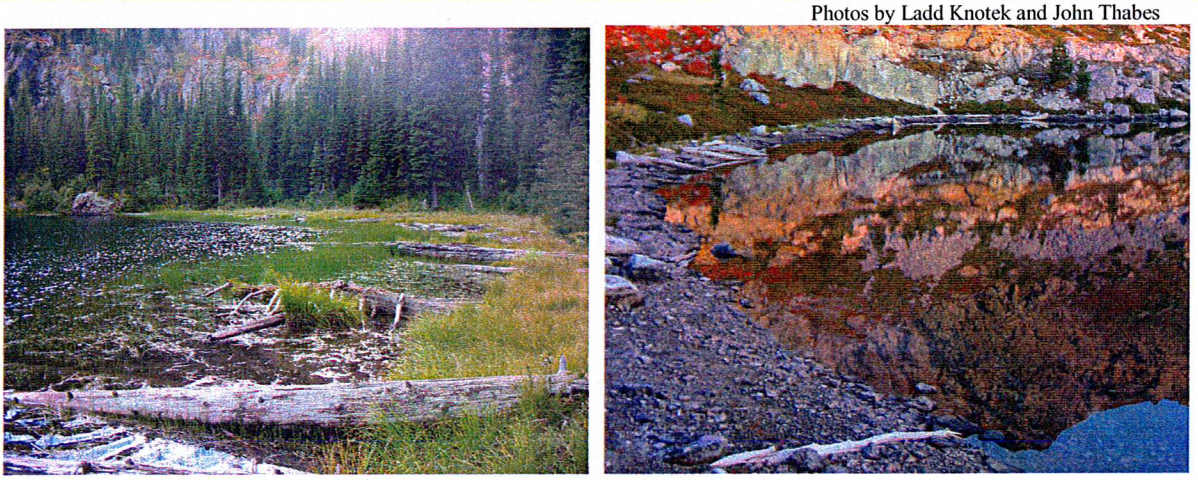
*Impacts of Introduced Fish on Native Amphibians in Mountain Lakes*

Columbia spotted frogs and long-toed salamanders are the two primary species of concern with regard to impacts of introduced mountain lake fish populations on native amphibians in the project area. Although MFWP did not conduct rigorous investigations, fish populations appeared to have little impact on the density or distribution of Columbia spotted frog adults in middle Clark Fork lakes. Columbia spotted frogs were common or abundant at most lakes we surveyed (31 of 40 or 77%). We observed no significant correlation of fish density, fish species or fish presence/absence with the presence or density of this frog species along lake perimeters ($P>0.5$ in all comparisons). These observations are consistent with recent alpine lake studies in the Flathead River drainage of northwest Montana (Maxell 2002; Grisak 2006 ) and in northern Idaho, where Columbia spotted frogs were observed at 83% of fish-bearing lakes and 87% of fishless lakes (Meyer and Schill 2007; E. Shriever, IDF&G, personal communication). Although not quantified, Columbia spotted frog adult, juvenile, and larval densities were most closely related to the amount of emergent aquatic vegetation along the lakeshore and the timing of our lake surveys. Adult frogs were typically observed anytime during summer, but tadpoles and juveniles were not common until latter portions of sampling periods. Others (e.g., Pilliod and Peterson 2001) have reported that Columbia spotted frog abundance is lower at sites with fish relative to fishless waters, but acknowledged that habitat variables may play a primary role in this relationship (fish-bearing waters tend to be deeper, with less suitable shoreline habitat). This and other studies suggest a more complex, basin-scale interaction where Columbia spotted frogs may experience higher over-winter survival in deeper lakes and seasonally migrate to these waters that are now largely inhabited by predaceous fish.

In contrast, the density and likely the distribution of long-toed salamanders did appear to be inhibited by the presence of fish in alpine lakes in our project area. Although more than 40 fish-bearing alpine lakes were surveyed for amphibians in the middle Clark Fork, long-toed salamanders were documented at only three (Hazel, Moore, and Vann Lakes). In these cases, only 1-2 larval individuals were observed. Infrequent visits to a limited number of fishless lakes and ponds in the project area revealed that dense congregations of long-toed salamander larvae were common (e.g., Mud and Windfall Lakes). Although anecdotal, these observations do

suggest that introduced fish have a negative impact on the distribution and abundance of long-toed salamander, and are consistent with other studies in the northern Rockies (Pilliod and Peterson 2000; Maxell 2002). These results were also consistent with mountain lake surveys in northern Idaho (since 2003) where long-toed salamanders were observed at 72% of fishless lakes and only 18% of fish-bearing waters ( E. Shriever, IDF&G, personal communication).

Photos by Ladd Knotek and John Thabes



***Typical lakeshore habitats where Columbia spotted frog larvae and adults were common (left) and rare (right)***

Herpetologists have speculated that depredation impacts to long-toed salamanders are exacerbated by the extended aquatic larval period at high elevations. In cold mountain lake environments, it is not uncommon for larvae to over-winter in lakes for multiple years prior to metamorphosis (Pilliod and Peterson 2001). Therefore, the period when they are vulnerable to fish predation may be extended relative to other amphibian species (e.g., Columbia spotted frogs) that also use lakes as larval nursery habitats.

Direct and indirect impacts of fish introductions on other (vertebrate) species are not clear. For instance, reptiles such as common and terrestrial gartersnakes are common along lakeshores and may experience increased competition as amphibians are frequent diet items. This is especially true for the common gartersnake, which is an amphibian specialist. Beneficial aspects of alpine lake fish populations are also possible, but rarely acknowledged. New food resources for piscivorous mammals and birds may support larger populations, with expansion into new habitats.

Ultimately, responsible management of alpine lake resources demands a balance of trout fisheries, diverse recreational opportunities, and conservation of natural ecological integrity. This includes consideration of a range of native species and trophic interactions. With limited information, resource managers attempt to achieve this balance by stocking fish responsibly (i.e., species, location, density) and by incorporating a physically diverse and geographically dispersed range of fishless waters into alpine lake management plans.

**Impacts To Native Fish Populations**

Continued expansion of non-indigenous fish and other organisms into additional lakes and stream networks is one of the major threats facing native aquatic populations and existing fisheries. Expansion may occur as established populations progressively colonize new, accessible waters or by intentional and unintentional introductions by humans. Identifying migration barriers is an important component in developing management and conservation actions. Regulations and public education efforts discouraging transfer of fish and species among waters (i.e., bucket biology) are also critical.

Introduction of non-native fish and other aquatic species have contributed to the significant decline in distribution and abundance of native coldwater fish in Montana (Shepard et al. 2005; MBTSG 1996). Although many species have been impacted, native salmonids such as westslope cutthroat trout and bull trout are often the primary concern in the Clark Fork Basin when non-native species introductions or management changes are considered.

In the case of mountain lake fisheries, fish introductions and continued stocking raise two primary levels of concern. The first involves overall impacts of fish introductions to multiple trophic levels in historically fishless water bodies. In essence, predatory trout can disrupt the natural ecological integrity of fragile alpine and sub-alpine aquatic systems (discussed above). The second major biological consideration is the compatibility of stocked species with existing stream fish populations in the drainage. Stocking in headwater lakes typically equates to new fish introductions in the entire watershed via eventual emigration and colonization. Most trout species have a strong instinctive desire to move downstream from lake outlets to lower stream reaches. This pattern has been demonstrated in multiple drainages in our middle Clark Fork project area through genetic testing (MFWP, unpublished data) and in numerous other watersheds in Montana (R. Leary, MFWP, personal communication). Introduced trout constitute a risk of hybridization with similar native species, a threat of increased competition with numerous aquatic and terrestrial species, and may alter the natural genetic variability or the unique, drainage-specific makeup of native trout populations (particularly westslope cutthroat trout).

In the middle Clark Fork region, headwater lakes have been stocked with numerous species, but primarily with brook trout, rainbow trout, Yellowstone cutthroat trout and westslope cutthroat trout. Many native vertebrate species inhabit these tributary drainages, but westslope cutthroat trout, bull trout, sculpin and tailed frogs are the most common. Brook trout are a concern for many of these native populations for several reasons. First, they are prolific and able to reproduce in and colonize a wide range of habitats. Second, brook trout hybridize with bull trout (both genus *Salvelinus*). Early generation hybrids ($F_1$) of these species have much reduced reproductive viability. Finally, brook trout directly compete with many aquatic species (particularly westslope cutthroat trout) for space and food resources. In fact, relative abundance and population distribution data indicate that brook trout often out-compete westslope cutthroat trout in streams where physical habitat or water quality has been degraded (Knotek et al. 2005).

Introduced *Oncorhynchus* species and subspecies (genus containing cutthroat trout and rainbow trout) primary affect the genetic composition of native westslope cutthroat trout stream populations. Yellowstone cutthroat trout, rainbow trout and westslope cutthroat trout readily hybridize and produce completely viable offspring. As non-native emigrants from lakes are

incorporated into native westslope cutthroat trout populations, the genetic make-up and integrity of these populations is believed to change. This change is clearly recognized through genetic testing of stream populations decades after non-native trout were introduced into headwater lakes. The result of this "introgression" is believed to be significant (possibly detrimental) changes in unique, localized adaptations that characterize stream-dwelling westslope cutthroat trout populations. The same concerns may apply even when "genetically pure" westslope

Photos by David Schmetterling, Bill Thomas and Ladd Knotek

***Common native fish and amphibian species that inhabit headwater stream systems associated with mountain lakes: sculpin (top left), westslope cutthroat trout (top right), tailed frog larva (bottom left) and bull trout (bottom right)***

cutthroat trout are stocked in headwater lakes. Because the stocked strain does not have the same unique genetic make-up of the native population, biologists fear that interbreeding may affect the natural integrity of the native population. MFWP has responded to this concern by developing the M012 strain of westslope cutthroat trout, which is now used for all mountain lake stocking in the project area (see Stocking section). This strain was derived from a number of genetically non-introgressed populations in western Montana that presumably contributed a diversity of localized genetic characteristics to the stock. Therefore, this "generalist" hatchery strain with high genetic variability is considered compatible with native westslope cutthroat trout populations in the region.

Currently, MFWP is pursuing additional measures to ensure genetic compatibility. Sterile (triploid) trout are being produced for use in lakes and private ponds where introgression of wild populations is a concern. Drainage-specific hatchery stocks for westslope cutthroat trout re-introduction efforts in the Flathead Drainage of northwest Montana (Brian Marotz, MFWP, personal communication) are also being considered. This project would use "nearest neighbor" sources or fish from the same drainage to re-stock headwater lakes after chemical rehabilitation.

**Land Management Designation and Practices**

Since all of the mountain lakes in the middle Clark Fork project area lie within the Lolo National Forest, lake management objectives should be consistent and compatible with Forest Service land use and land management designations. However, some of the most contentious disputes among natural resource management agencies involve stocking of mountain lakes and introduced fisheries in Wilderness and primitive areas (Fraley 1996). Mountain lake fisheries and Wilderness designation are often at odds because wilderness values stress natural biological integrity, non-mechanized activities and resources that are minimally influenced by man, while state fisheries managers often desire to continue stocking and management activities using standard methods (that pre-date Wilderness designation) to provide optimal fisheries for recreation. Although management objectives and mandates may conflict, State and Federal managers have worked to develop a reasonable balance between fishery management and wilderness integrity through the AFWA/USFS/BLM Agreement (2006). This agreement specifies polices and guidelines for fish and wildlife management in designated and proposed Wilderness areas. Mountain lake fisheries and aquatic resource management in Wilderness areas on National Forest System lands are important components of the agreement.

The middle Clark Fork region does not contain designated Wilderness, but does include a large portion of the *proposed* Great Burn Wilderness Complex (primarily upper Fish Creek). In conducting recent lake surveys and in formulating lake management strategies, MFWP followed the standards outlined in the AFWA/USFS/BLM Agreement. For instance, the Minimum Requirements Decision Process (MRDP) was used to develop the least intrusive methods for conducting lake surveys and stocking in sensitive areas. This involved close coordination with the Ninemile Ranger District (Lolo National Forest).

There are many other important land management considerations that extend to all USFS lands. These include the location and configuration of trailheads and access points, the location and condition of trail routes, allowable methods of transportation, camping and recreation restrictions, location and methods for timber management, fire management policies and practices, mining and water rights administration, etc. These aspects have direct and indirect impacts on the quality of lake fisheries and on the recreational experience of visitors. The complex interaction of land management and fisheries management makes coordination among State and Federal resource managers essential.

**Levels of Recreational Use and the Impact of Lake Fisheries**

Overall, current angler and recreational use of alpine and sub-alpine lakes in the middle Clark Fork region is low. Estimated angler use, based on MFWP's state-wide mail surveys, ranged from no reported use to 251 angler days per year (mean 1995-2005) at fish-bearing lakes.

Although anglers are presumed to comprise the majority of recreationists at mountain lakes, interests also range from day hiking and camping to desire for solitude or experiences in primitive settings based on our interactions with visitors during lake surveys.

Despite light overall use, recreational pressure at mountain lakes is not uniform. There is no doubt that the historic distribution of fish introductions and continued management of lake fisheries affect the distribution and level of recreational use. This is evident in aspects ranging from the location of trail systems, campgrounds and roads to estimates of angling use and evidence of anthropogenic disturbance along lakeshores. Lake surveys (2004-2006) and anecdotal information suggest that road-accessible lakes support the heaviest use and human disturbance, fish-bearing lakes experience more use and disturbance than fishless waters, fish-bearing lakes are more likely to have established campsites and fire rings than fishless lakes, and fish-bearing lakes are more likely to be accessible by maintained trail systems or roads. These and other intuitive observations simply reinforce the influence of lake management on the distribution and level of recreational use, and emphasize the importance of land management practices in determining how and how much these lake resources are utilized.

Administration of commercial outfitting (by the USFS) is also a key element in managing recreational use and maintaining the quality of lake fisheries. Although demand for quality and trophy trout fisheries is high, opportunities at mountain lakes are somewhat limited. These resources could easily be compromised or dominated by commercial interests if the location, timing and constraints on outfitter permits are not carefully considered.

Human population growth and tourism are increasing rapidly in western Montana. Expanded recreational use and demands for more diversified opportunities will continue to accompany this growth. At the same time, protection of ecological diversity and integrity in alpine and sub-alpine areas becomes more critical as valley and foothill parcels are sub-divided and developed. These are current natural resource management challenges that will only intensify. The goal of this document is to provide basic information and a framework for mountain lake management that balances current and expected recreational demands with conservation responsibilities.

## MFWP Mountain Lake Management Guidelines

Based on current biological and social considerations, management tools, constraints, and other aspects described in this report, the following approaches were emphasized in developing management strategies for mountain lakes in the middle Clark Fork region:

*1. Provide diverse opportunities for anglers and recreationists*

Lake management strategies include fisheries with a range of trout species, size categories, fish densities and accessibility. Diversity is provided through varied stocking strategies and natural variation in self-sustaining, wild trout populations. These fisheries are broadly distributed geographically within the project area and occur at altitudes from 4,980 – 6,850 ft (msl).

*2. Maintain fishless waters to sustain ecological integrity and natural processes*

Approximately 47% of alpine lakes in the middle Clark Fork watershed (> 1 acre) are presumed fishless. These include at least 14 lakes that are capable of supporting fisheries (> 15 ft deep), but stocking has been deferred. Two previously stocked lakes were converted to fishless management because of their remote, pristine condition (North Cache Lake) or high observed densities of amphibians and limited fishery value (Windfall lake). Additional lakes were identified as candidates for brook trout removal and some may be appropriately managed as fishless waters (e.g., Rudie Lake) if trout eradication was successful. There are also numerous existing fishless waters that are less than one surface acre.

*3. Promote native fish where possible*

The lake stocking program has been converted to exclusive use of genetically compatible (M012 strain) westslope cutthroat trout in middle Clark Fork alpine and sub-alpine lakes. These fish presumably possess local adaptations that promote excellent growth and survival in high lake environments as they were derived from wild populations in western Montana. This strain will also reduce potential genetic risks to native cutthroat populations that inhabit drainages downstream of the lakes. Lakes that support self-sustaining, non-native trout are now being considered for conversion to native fisheries on a case-by-case basis. This may be accomplished through removal of introduced populations or genetic "swamping" with hatchery raised (M012) westslope cutthroat trout.

*4. Stock fish only where required to meet fisheries management objectives*

Prior to thorough lake surveys (2004-2006), lake stocking was generally liberal and based on anecdotal information. The lake stocking program has been refined in this document. Prescribed planting rates, frequencies and locations are based on current information and specific management objectives for each lake. Through this process, eight lakes have been removed from the planting program (self-sustaining cutthroat populations or conversion to fishless) and four lakes have been added to the program (all to provide diversity with native fish on top of existing self-sustaining, non-native populations).

*5. Manage individual lakes in the context of the overall watershed and management unit*

Individual alpine lakes are often part of larger chain or cluster of lakes and are typically connected with other water bodies within a watershed via tributary stream networks. This context should be considered in the design of current management strategies and in future decisions. One important application of this initiative is the management of non-native lake fisheries in drainages where native fish conservation is the emphasis. Headwater (lake) sources of non-native fish that compete and hybridize with native populations are considered a significant threat to conservation efforts. These considerations were incorporated into middle Clark Fork Lake Management Units described in the section below.

*6. Practice adaptive lake management as new information and tools become available*

Alpine lake management strategies were based on limited historical information and current "snap-shot" surveys of these water bodies and fisheries. These strategies will inevitably need to be adjusted as we learn more and as conditions change. Examples of conditions likely to change include significant increases in recreational use and further unauthorized introductions of non-

native fish. Additional tools to manage non-native fish will likely emerge as this state-wide problem continues to escalate.

## Fisheries Management Tools

In previous sections, many of the social and biological considerations and underlying philosophies for mountain lake management were discussed. In subsequent sections, these ideas are applied in the project area through development of management objectives for individual lakes and management units. This section briefly describes the methods currently available to facilitate change and achieve management objectives.

There are essentially four options available to allow flexibility and produce changes in mountain lake fisheries: (1) change species of fish, (2) modify the density (or presence/absence) of fish, (3) impose harvest restrictions or other regulations and (4) modify intensity or patterns of angling pressure and use through land management designation or access. Current tools to effect these changes include changes in the stocking program, suppression or eradication of wild trout populations, and changes in angling restrictions or management of recreational use.

### Fish Stocking in Mountain Lakes

Stocking is a frequently used tool to diversify, maintain and improve mountain lake fisheries. Over the past century, stocking practices and techniques have evolved in response to advances in technology, recognition of natural resource impacts, increased public demand for fisheries, and new information gained through trial and error.

*History*

Early observations and accounts from the late 1800's and early 1900's indicate that most alpine and sub-alpine lakes in the middle Clark Fork region and other portions of western Montana were historically fishless (MFWP, unpublished file data). MFWP stocking records report that initial fish plants in middle Clark Fork mountain lakes began in the early 1930s. Combinations of brook trout, rainbow trout and various strains of cutthroat trout were planted in many of the current fish-bearing lakes from 1931-1949 (MFWP, unpublished data). Attempts to establish brown trout and coho salmon in a few lakes were also documented. Recorded stocking histories for each lake are described (through 2000) in individual lake summaries (Appendix C). It is evident that many undocumented lake plants also occurred in the mid-1900s. Many self-sustaining trout populations (particularly brook trout) currently exist in lakes where there is no record of this species being stocked. This is not surprising as public groups and individuals were apparently provided with fish and encouraged by state and federal agencies to "seed" new waters during this time period.

As the long-term performance of introduced fish species was evaluated and concern mounted over the loss of unique native fish stocks in the late 1900s, MFWP stocking policies for alpine lakes changed. Fishery limitations of prolific species like brook trout that typically overpopulate available resources were acknowledged and impacts of displacement and hybridization on native

fish populations in streams were recognized. This led to a more conservative and thoughtful approach in selection of species for stocking.

In 1984, MFWP began collecting wild westslope cutthroat trout for development of the M012 hatchery stock. This strain was derived from non-introgressed stream populations in the lower Clark Fork and Flathead systems for use in the Clark Fork and Flathead Basins in western Montana. The objective was to create a genetically diverse stock that incorporated the variation among numerous local populations. The M012 stock was designed to be genetically compatible with existing native populations and perform well over a range of environmental conditions. Since nearly every stream in the Middle Clark Fork system supports native westslope cutthroat trout, use of the M012 strain for alpine lake stocking was a logical application.

As stocking of non-native or non-compatible fish stocks in alpine lakes was increasingly scrutinized, the impacts of fish stocking (as a general practice) on sensitive, high elevation aquatic communities was also emphasized and questioned, particularly in designated Wilderness areas (Carter 1997; Knapp et al. 2001(a)). The 'unnatural' presence of fish in pristine, historically fishless waters and documented effects of fish on several species (e.g., amphibians, zooplankton) that inhabit and thrive in fishless waters suggested the need to better balance benefits of alpine trout fisheries with the overall ecological diversity provided, in part, by fishless waters (Knapp et al. 2001(b); Pilliod and Peterson 2001).

By 2000, M012 strain westslope cutthroat trout were the only fish stocked in middle Clark Fork alpine lakes and the value of fishless lakes was considered in development of the stocking program. These practices were continued as lake surveys were completed and this management plan was developed.

*Stocking Rates*

Middle Clark Fork alpine lakes are stocked with ~ 50 mm (TL) M012 strain westslope cutthroat trout in accordance with the MFWP stocking program. Base stocking rates are 50 fish per surface acre every seven years. These rates were based on (1) prescribed stocking rates in other regions and states, (2) evaluation of past stocking on middle Clark Fork mountain lakes, and (3) a conservative philosophy that over-stocking lakes will decrease the diversity and quality of fisheries.

For many lakes, stocking rates were adjusted from the base rate to meet management objectives and accommodate perceived rates of natural reproduction. Natural reproduction was estimated during lake surveys from fish population size structure, fish density, juvenile relative abundance and availability of spawning habitat. For instance, stocking rates were reduced to 35-40 per acre every seven years for some *quality* fisheries that had moderate natural reproduction. *Harvest-oriented* fisheries are typically stocked more frequently (every 2-4 yrs) at a higher rate (> 50/acre).

*Stocking Methods*

Alpine lake stocking is now completed almost exclusively by helicopter. This method is efficient, cost-effective and causes minimal disturbance to lakes and recreationists. The entire

middle Clark Fork region currently requires about 1 day for stocking every seven years (in early July). MFWP currently uses a helicopter with a series of individual, external holding tanks, aeration system, and an automated release from within the aircraft. Typically the pilot slowly circles over water body and releases the allotted fish from 50 ft or less above the water surface. Two lakes (Surveyor Lake and Missoula Lake) that are easily accessible by road and are stocked more frequently are the exception to this method within the project area. Fish are transported by truck and planted by hand at these waters.

*Future Alternatives*

Westslope cutthroat trout (M012) are currently the only strain of fish planted in middle Clark Fork alpine lakes because no other hatchery stocks are considered compatible with native stream populations (primarily bull trout and westslope cutthroat trout in lake-associated stream networks). As sterile (triploid) stocks are developed and tested, alternative species may be considered. Stocking of completely non-reproductive individuals would further reduce the risk of introgression with native populations and the possibility of significant long-term expansion.

Another technique that has been used to help alleviate the threat of genetic introgression is "swamping", where high numbers of genetically compatible westslope cutthroat trout are stocked frequently in lakes containing rainbow trout or Yellowstone cutthroat trout populations. The rationale is that the nonnative *Oncorhynchus* component of a wild population will be replaced by genetically compatible individuals by overwhelming them numerically via stocking. The effectiveness of this method may be maximized when coordinated with removal methods that first suppress the population being "swamped". This technique was originally applied (and continues) in the South Fork Flathead River drainage of northwest Montana, where mixed results have been reported (Leary et al. 2006). Field trials and monitoring will continue in the process of evaluating this tool.

*2007 Stocking Program for Middle Clark Fork Mountain Lakes*

Appendix B summarizes the stocking program for middle Clark Fork alpine lakes in 2007. A total of 19 lakes were stocked in 2007 based on fishery management objectives including six quality fisheries, six quality-diversified fisheries, four harvest-oriented fisheries, and three trophy fisheries. See Fishery Management Strategies section for a description of these objectives. Four lakes were added to the stocking program in 2007 to diversify existing fisheries. Eight lakes were removed from the program in 2007 because they already supported self-sustaining westslope cutthroat trout fisheries or were left fishless. This program will undoubtedly evolve as new information is gathered and as management priorities change.

**Eradication or Suppression of Wild Trout Populations**

A range of methods have been used to reduce or remove introduced fish populations from mountain lakes. There are essentially three (often concurrent) circumstances where eradication or suppression of non-indigenous trout is considered prudent at mountain lakes: (1) when the existing trout populations are self-sustaining, stunted and offer low fishery value or limited angling opportunity (e.g., brook trout), (2) when lake populations are a significant risk to native

populations in associated stream networks, or (3) when management strategies designate the conversion of a lake to "fishless" in order to restore natural ecological integrity. The desire to improve and diversify existing lake fisheries is a primary objective in the middle Clark Fork region because of the prevalence of stunted, nonnative trout fisheries. Brook trout, and to a lesser extent Yellowstone cutthroat trout and rainbow trout, populations offer limited fishery value and threaten the persistence of native trout stocks residing downstream of headwater lakes. Strategic eradication of some populations, followed by subsequent controlled stocking with westslope cutthroat trout or fishless lake management, could improve fishery diversity and quality, reduce risks to native populations and enhance overall ecological integrity. However, attempts at eradication or suppression of non-indigenous trout are not recommended in many situations. For instance, larger lakes and those with high groundwater influence (inflow from spring) are not conducive to effective chemical treatment or suppression. Other lakes may be unsuitable because of direct connectivity with downstream fish populations and likely re-colonization after treatment (i.e., no barrier at lake outlet).

As declines in the distribution and abundance of native salmonid stocks have been recognized throughout their ranges, the importance of reducing impacts of predation, competition and hybridization by introduced salmonids has been emphasized. Reduction or removal of non-native trout populations in mountain lakes is a priority for fishery improvement and native species conservation in many Montana watersheds because these populations typically lie at the headwaters of important stream ecosystems and thus impact the entire watershed. Mountain lakes are generally small, relatively manageable environments where it is feasible to replace non-native fisheries with more compatible species or restore them to historic, natural conditions.

In most cases where introduced, self-sustaining trout populations in mountain lakes are compromising conservation values or fishery management objectives, complete population eradication is the most effective option. Partial eradication or consistent manual removal are generally ineffective long-term solutions to a population level problem. Unless self-sustaining populations (e.g., brook trout) are completely eradicated or reduction measures continue indefinitely, wild populations quickly revert to their original status (Meyer et al. 2006 (streams); MFWP-Region 1, unpublished data (lakes)). In some instances, manual removal or size-selective harvest regulations may be implemented to improve average size and body condition, but significant long-term changes are difficult to sustain using these approaches when prolific species have access to adequate spawning habitat.

Population suppression (partial removal) can be an important tool when complete eradication is not feasible. One example is the utility of reducing trout population size (e.g., Yellowstone cutthroat or rainbow trout populations) prior to genetic "swamping" with compatible westslope cutthroat trout. When population eradication is not feasible or practical, using these two techniques together is likely the most effective method for converting the genetic composition of a nonnative *Oncorhynchus* lake population to westslope cutthroat trout.

Techniques for reducing or removing trout populations from mountain lakes include chemical, biological and manual methods. All of these management tools have advantages, limitations and drawbacks that must be considered on a case-by-case basis as described in the following section.

*Chemical Methods*

Treatment of water bodies with fish toxicants (piscicides) or "chemical rehabilitation" has been a common practice for removing unwanted fish species from lakes and streams for more than 70 years in North America (Finlayson 2001). In Montana, this technique has been used most extensively in the northwest portion of the state. Since 1948, more than 130 lakes have been successfully treated by MFWP in just the Flathead and Kootenai drainages. There are currently an additional 21 mountain lakes proposed for treatment in the South Fork Flathead River drainage over the next 10 years as part of the largest westslope cutthroat trout genetic conservation project ever implemented in Montana.

In the chemical rehabilitation process, lakes are treated with organic compounds that interfere with cellular energy production in gill-breathing organisms. Toxicant application is designed to be lethal for all fish, but result in only limited mortality for other gill-breathing species such as certain life stages of some amphibians and insects. Rotenone, derived from select plants in the pea family, is the most common fish toxicant used in Montana and the United States. This compound breaks down naturally in aquatic environments at a rate that is closely tied to water temperature, exposure to sunlight and other factors. The typical half-life of rotenone is two weeks, but breakdown is much slower in fall and winter coldwater conditions when high elevation lake projects are usually implemented. Application rates vary slightly with target species, but salmonid removal generally requires low concentrations. Rotenone is registered and approved for aquatic use by the Environmental Protection Agency (EPA) as exhaustive testing has demonstrated that it is does not constitute a health hazard or have a long term effect on humans or the environment (Finlayson 2000). Once treatment is completed, water bodies are typically re-stocked soon after the toxicant has degraded or the following spring. Repeated trials have demonstrated that water bodies retain natural ecological function and biological diversity after treatment (Finlayson 2001).

Chemical rehabilitation is the preferred method for fish eradication because the probability of complete removal is high, and occurs over a relatively short period of time with no apparent long-term, deleterious environmental or biological impacts (Finlayson 2000). In most cases where eradication of existing fish populations is desired, fish toxicants are considered the only viable option with a high probability of success (Finlayson 2001).

The largest drawbacks of chemical rehabilitation projects are the cost, the small margin for error in implementation, and high public scrutiny. Although normally cost-effective in terms of long-term fishery benefits, chemical rehabilitation projects require significant financial and time commitments. The cost of fish toxicants is directly proportional to the volume of the water body treated, as well as the prescribed concentration of the chemical and the number of treatments desired. Logistical factors such as access, land management designation (e.g., wilderness or not), and the degree of public involvement are also important. Preparation for chemical rehabilitation projects often requires years of field data collection, preparation of environmental documents, public scoping, and fundraising. Once the project is finally implemented, survival of just a few unwanted fish (e.g., in unrecognized springs or fresh water sources) or new unauthorized introductions can undermine the entire project.

Photo by Gary Michael

**Airplane dropping liquid rotenone during a chemical rehabilitation project**

Some past and proposed chemical rehabilitation projects have been extremely controversial, primary due to misinformation and unsubstantiated environmental health concerns. Public scrutiny is intense for projects proposed on heavily populated water bodies and many of these projects have not been completed. This is typically not an issue for mountain lakes, although objections are common for other reasons. Protests are particularly common for chemical rehabilitation projects proposed in designated Wilderness. Opposition typically revolves around the introduction of "unnatural" chemicals into pristine environments, the use of equipment and means of application, and the management objectives of the project. Many Wilderness advocates feel that introduction of any compounds that are not naturally occurring (even if temporary), the short-term use of mechanized methods, and the continued management of fisheries in historically fishless lakes are inappropriate, despite the usual long term biological justifications and benefits. In many cases, opposition to chemical lake rehabilitation cannot be overcome or the technique may be cost-prohibitive or not logistically feasible.

*Biological Methods*

Biological methods to eradicate or control trout populations in mountain lakes could include a range of organisms or biological agents, but usually involve introduction of predatory fish species. Several species could be used to effectively control or eliminate introduced trout in mountain lakes and field trials are underway in neighboring states such as Idaho (K. Meyer, IDF&G, personal communication). This approach can also be controversial and warrants caution for a number of reasons. New species introductions (justifiably) raise serious concerns as nonnative fish and invertebrate stocking is the source of many of the management and native fish conservation challenges currently facing MFWP. Current self-sustaining, nonnative fish

populations stem from a combination of authorized agency and private introductions that occurred in the early and mid 1900's and more recent unauthorized plants, typically completed by well-intentioned anglers. Regardless of the source or timing, nonnative fish introductions are recognized as one of the primary threats to Montana's fisheries and aquatic ecosystems because of unanticipated competition, predation and genetic issues. Therefore, extreme caution and scrutiny must be applied when importation of new non-indigenous species is proposed to ensure that they don't become liabilities and future targets of eradication projects. Introduction of some species may also be perceived to conflict with prior management decisions and policies which have prevented earlier importation. For instance, MFWP has been hesitant to allow legal stocking of warmwater species such as northern pike (*Esox lucius*) and walleye (*Stizostedion vitreum*) in the upper Columbia River system because they are not indigenous there, natural reproduction and expansion is likely, and impacts to native populations and sport fisheries may be significant. Tiger muskellunge (see below) is a similar species (sterile hybrid) that could be used responsibly for nonnative fish eradication without the inherent risks of new viable predator populations. However, public perception of MFWP's consistency in policies and management decisions is an important consideration.

Several characteristics are desirable in selecting potential species for control or eradication of mountain lake trout populations. In the case of predatory fish, it is essential that the species is an aggressive, nearly obligate piscivore that quickly reaches a size where target species can be consumed. Some species (e.g., tiger muskellunge and bull trout described below) also have the desirable tendency to cannibalize once prey resources dissipate. Introduced predators must also be unable to effectively reproduce (i.e., sterile) or must be genetically compatible with existing native populations. If possible for lake introductions, predator species should prefer lentic habitats over lotic habitats to minimize emigration from lakes and subsequent residence in stream systems. Finally, some introduced predator populations may provide a limited fishery in addition to eliminating unwanted trout species. Although these objectives may be in conflict in most cases, satisfying anglers may be an acceptable mitigation measure for temporary loss of a fishery when a source of introduced predators is readily available.

Bull trout (*Salvelinus confluentus*) are Federally listed as threatened under the Endangered Species Act of 1973 and are considered a Species of Special Concern in Montana. This native trout species is a piscivorous apex predator that could effectively control or eliminate unwanted nonnative populations residing in mountain lakes. Bull trout seem to be an obvious choice as a biological control method as they are a native trout that still inhabits many of the tributary drainages within the project area. Superficially, it appears that selective introduction of this species could concurrently reduce unwanted species in lakes and help recover a threatened native fish. This may be the case in some situations if introductions are carried out thoughtfully and responsibly. However, potential effects to the genetic integrity of remaining wild bull trout populations in downstream stream networks is a significant concern if introduced fish regularly emigrated and reproduced. This primary concern could be overcome with sterilization if a certified process and bull trout source were developed.

Although most rainbow trout (*Oncorhynchus mykiss*) are omnivorous or primarily insectivorous, certain strains have exhibited piscivorous tendencies when forage fish are abundant. *Kamloops* rainbow trout (presumably originating in Kamloops Lake, British Columbia, Canada) have been stocked in several northwest Montana waters and utilized Kokanee salmon (*Oncorhynchus nerka*) and other fish species as a primary prey base. This strain may be a viable biological control alternative in some instances where stunted salmonids are abundant. Since rainbow trout

are not genetically compatible with native, stream-dwelling westlope cutthroat trout stocks in the middle Clark Fork drainage, a source of certified sterile individuals would be required. Currently, triploid (>99% sterility) Kamloops rainbow trout are available in the MFWP hatchery system.

***Bull trout (top), Kamloops rainbow trout (middle), and tiger muskellunge (bottom) are predatory fish that could reduce or eliminate unwanted nonnative trout populations in mountain lakes without long-term persistence or impacts to native aquatic communities***

The tiger muskellunge is a sterile hybrid of the northern pike and muskellunge (*Esox lucius x Esox masquinongy*), neither of which is native to the upper Columbia River system (includes Clark Fork). Tiger "muskies" are fast-growing, coolwater fish that are primarily piscivorous predators capable of consuming a large biomass of prey fish (see Scott and Crossman 1973). Idaho Fish and Game (IDF&G) has recently begun experimental tiger musky introductions in 14 mountain lakes to evaluate their effectiveness in controlling or eliminating wild brook trout populations (K. Meyer, IDF&G, personal communication). Initial results indicate that these

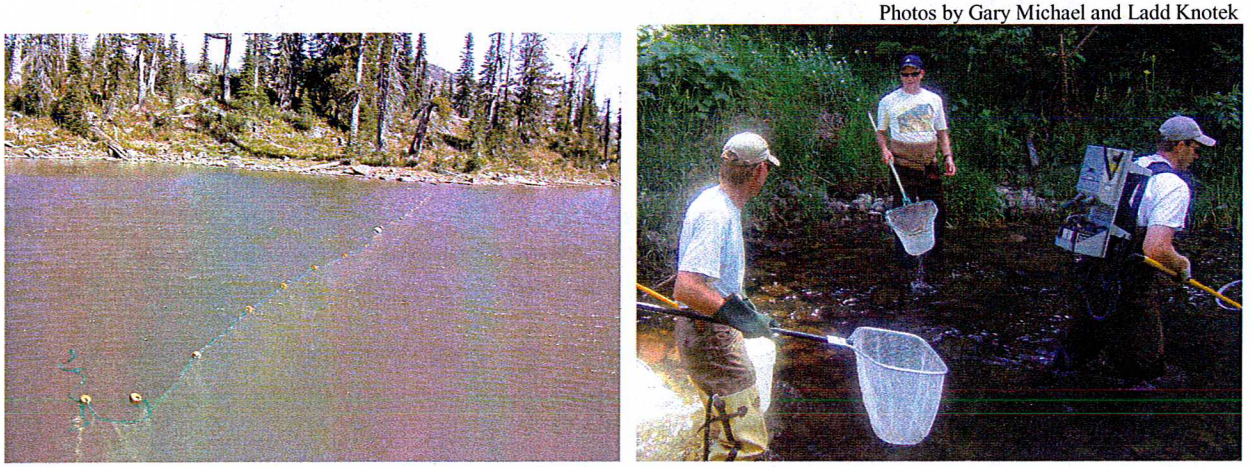
predators may be useful biological controls in simple lake systems. In western Montana, the recent spread and predation impacts of existing (illegally introduced), northern pike populations have highlighted both the biological control potential and risks involved with introducing *Esox* spp. Nonetheless, sterile tiger muskies are a viable and likely efficient option for control or eradication of stunted trout populations in mountain lakes that have minimal risk of unintended impacts.

*Manual Methods*

Manual methods of fish eradication include gill-netting, electrofishing, fish trapping, angling, dewatering, and manipulation of spawning habitat or access to it. These methods are generally not effective for eliminating trout populations from mountain lakes or associated inlet/outlet streams, and are generally labor and time intensive. Most lake systems are too large and complex for manual methods alone to be practical for complete trout eradication. Therefore, they are not considered viable long-term management solutions in most cases. However, there are sensible applications for these techniques in select situations.

Manual removal methods have been used by the California Department of Fish and Game (CDFG) to eradicate trout populations from some small, simple mountain lakes in the Sierra-Nevada Mountains (Roger Bloom, CDFG, personal communication). Gill-netting, electrofishing and traps were employed because other tools were not acceptable in the Wilderness area where these lakes occur. Fish removal was effective in lakes with minimal shoreline complexity and intermittent inlets and outlets. To complete these projects, a field crew was essentially stationed at each lake during summer months over multiple seasons. Consistent, intensive gill-netting throughout the lake was paired with selective electrofishing and trapping at strategic trout refuge and rearing locations such as springs, inlets and outlets. In these specific instances, trout populations can be eradicated over time with considerable financial and time investment.

Photos by Gary Michael and Ladd Knotek



***Common manual fish removal methods include gill-netting (left) and backpack electrofishing (right)***

Manual methods of fish removal or suppression can also be important fishery management tools, particularly when combined with other techniques. For instance, reducing wild, nonnative trout populations to minimal abundance prior to intensive stocking may dramatically increase the effectiveness of genetic "swamping". These techniques may be the only viable options to reduce risk of genetic introgression of native stream populations in designated and proposed wilderness areas where chemical or biological options are not acceptable. Manual methods can also be effective at changing population size structure or reducing abundance if there is an opportunity to employ them consistently. For example, physically modifying the entrance to lake inlets or outlets used for spawning by self-sustaining populations may reduce recruitment over the long term and improve size structure in over-populated, stunted populations.

In addition to chemical, biological and manual alternatives for fish removal, many other methods ranging from super-nutrification to explosives have been proposed and explored. Most of these techniques are not currently considered viable options because of long-term environmental consequences and significant impacts to non-target organisms.

**Angling Restrictions**

Angling restrictions, usually imposed through state fishing regulations, are a common method for limiting or encouraging harvest in lake fisheries. Managing harvest rates can be extremely important in small, relatively unproductive waters where varied population densities, size structures, and species are desired. Regulations are also commonly implemented to diversify social experiences and to limit crowding. These would include limitations such as no-wake restrictions, non-motorized access, variable season structures, etc.

The greatest challenges in implementing effective angling restrictions at mountain lakes are enforcement and incorporating the site-specificity of individual waters. Because mountain lakes are numerous and typically remote, it is logistically difficult to maintain a consistent enforcement presence. Essentially, anglers are on an honor system for compliance. Harvest restrictions are particularly important for "quality" fisheries which depend on lower fish densities and longer-lived fish. Consistent over-harvest by just a few individuals can quickly compromise quality on smaller waters. Management objectives focusing on diversity in lake fisheries and recreational opportunity also conflict with recreationists' desire for simplification of regulations. With growing public demand and many specialized interest groups, the range of unique, high quality opportunities becomes more difficult to sustain. Maintaining these opportunities may require specialized regulations that become extremely complex when lakes or units are managed individually.

To date, MFWP has not implemented specialized angling restrictions on mountain lakes in the Middle Clark Fork region. These lakes currently fall under the standard harvest restrictions and other regulations for lakes and reservoirs in the Western Fishing District (MFWP 2008). Current regulations allow fishing year-round, with no special gear restrictions. Daily limits are restrictive for westslope cutthroat trout (3 fish) and more liberal for rainbow trout (5 fish) and brook trout (20 fish). This framework has likely been adequate to maintain a diversity of quality angling and recreational opportunities because of the inherent and managed variability in terrain, lake access, stocking rates, trout reproductive rates, etc., as well as the high number of widely distributed waters that currently receive limited use. As the human population and tourism

industry in western Montana continue to flourish, we anticipate that mountain lake management will become more complex and regulations will become more specialized and restrictive.

**Managing Recreational Use and Angling Pressure**

Social and biological aspects of lake management are closely tied and inherently inter-dependent. Desire for quality fishing and solitude are two common, but often contradictory, reasons why recreationists choose to put forth great effort to reach alpine lakes. Some of the effects introduced fisheries have on lake environments and human use patterns are obvious. Our lake surveys indicated that > 90% of fish-bearing lakes had developed trail access systems and camp locations, while < 10% of fishless lakes had these features. Introduced fish not only directly affect the ecology of a lake, but also apparently influence the level of human use and disturbance.

Because all mountain lakes in the middle Clark Fork region lie within the Lolo National Forest, sound lake management is dependent on an effective working relationship between MFWP and USFS staff. These agencies share the responsibility for managing aquatic resources, recreational use and levels of angling pressure. The USFS does this directly by designating and restricting access points, developing and maintaining trail systems, designating legal modes of transportation, managing outfitter use permits, etc. MFWP indirectly facilitates or deters use through the distribution of introduced trout fisheries, frequency and level of stocking, and by setting and enforcing angling restrictions.

As the popularity and demand for mountain lake resources rises, the need for coordination and consistent management direction among agencies will become increasingly important. Fishery management objectives presented in this plan are compatible with *current* USFS regulations, access points, and travel routes. However, effective and adaptive resource management requires that fishery management objectives be proactively incorporated with USFS plans for Forest management. In summary, communication among natural resource agencies has become one of the most important mountain lake management tools.

## Definitions of Mountain Lake Fishery Management Objectives

Specific lake management objectives were developed for individual lakes within the context of and sub-basin scale lake management units (see next section). Fish-bearing and fishless water bodies (> 1 acre) in the project area were partitioned into six categories:

High Density / Harvest-Oriented Fishery: Alpine or sub-alpine lake supporting westslope cutthroat trout, where individuals > 300 mm are common and angler catch rates exceed 1.5 fish per hour. Typically lakes that are easily accessible (often by road) and more heavily stocked (> 50 fish/surface acre every 2-4 yrs).

Quality Fishery: Alpine or sub-alpine lake supporting westslope cutthroat trout with a mean relative weight (Wr) > 100, where individuals > 360 mm are common and angler catch rates exceed 1 fish per hour. Typically productive lakes accessible by established trails with low/moderate natural reproduction that are stocked at the standard 50 fish/surface acre as needed to supplement natural reproduction.

Self-sustaining Fishery: Alpine or sub-alpine lake supporting a wild trout population (native or non-native species) that persists solely through natural reproduction (no hatchery supplementation after initial stocking). Fish density, condition, size, and catch rates vary with local conditions.

Diversified Fishery: Alpine or sub-alpine lake supporting a self-sustaining population of non-native trout (rainbow or brook trout) where cutthroat trout are also stocked to provide diversity in angler catch. Fish density, condition, size, and catch rates vary with local conditions.

Fishless Lake: Alpine or sub-alpine lake believed to be naturally devoid of fish (historically) that is not stocked and does not currently support a self-sustaining fish population. Typically more "pristine" lakes with minimal human use and disturbance, where natural processes and ecological integrity are the emphasis.

# Mountain Lake Management Units

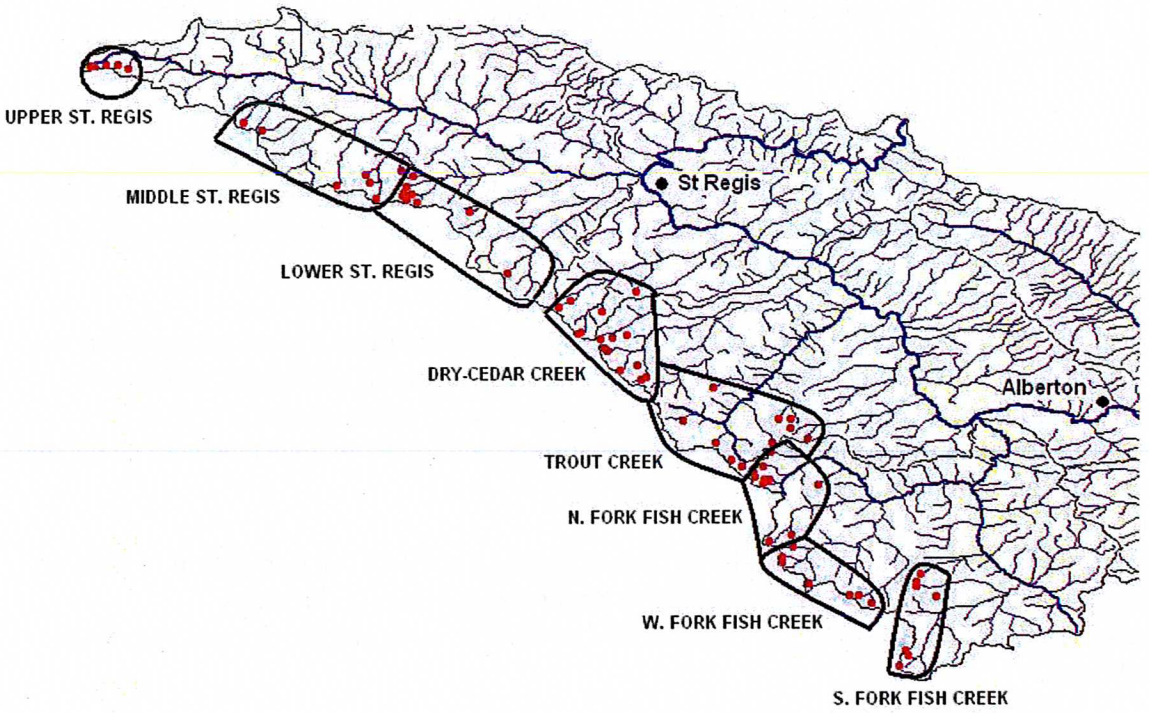



**Figure 5**. Lake management units in the middle Clark Fork region of west-central Montana.

Mountain lakes in the middle Clark Fork project area were divided into eight management units based on their geographic and hydrologic location. The descriptions and management approaches for these units (summarized below) combine information from fishless lakes (Appendix A, Table 1) with historical data, recent survey information, and management strategies for individual fish-bearing lakes (Appendix A, Tables 2-5; Appendices B & C) and associated stream networks. This framework is intended to provide a broader, sub-basin scale approach that incorporates unique water bodies within the context of interconnected watersheds, proximal ecosystems, and diversified angling opportunities.

A sub-basin scale approach is preferable for a number of reasons. Fish stocking, non-native fish introductions, and other management actions affect waters and species outside the vicinity of an individual lake. Similarly, many terrestrial, insect and amphibian species utilize a network of water bodies or require different aquatic environments at various life stages. Management actions also impact the distribution and intensity of human recreational use. Alpine lakes are a focal point for back-country recreation and the status of lake fisheries directly influences how these resources are utilized.

Resource managers strive to sustain diversity within and among lake management units that balances a range of angling opportunities and recreational experiences with conservation of natural aquatic systems. Responsible resource management also necessitates a conservative approach with respect to maintaining a diversity of lake environments (including fishless lakes). This is currently the best method of incorporating the many unique biological communities (e.g.,

benthic, zooplankton, etc.) and processes that are certainly affected by fish stocking and fishery management, but are not specifically described or considered in management decisions.

## I. Upper St. Regis Management Unit

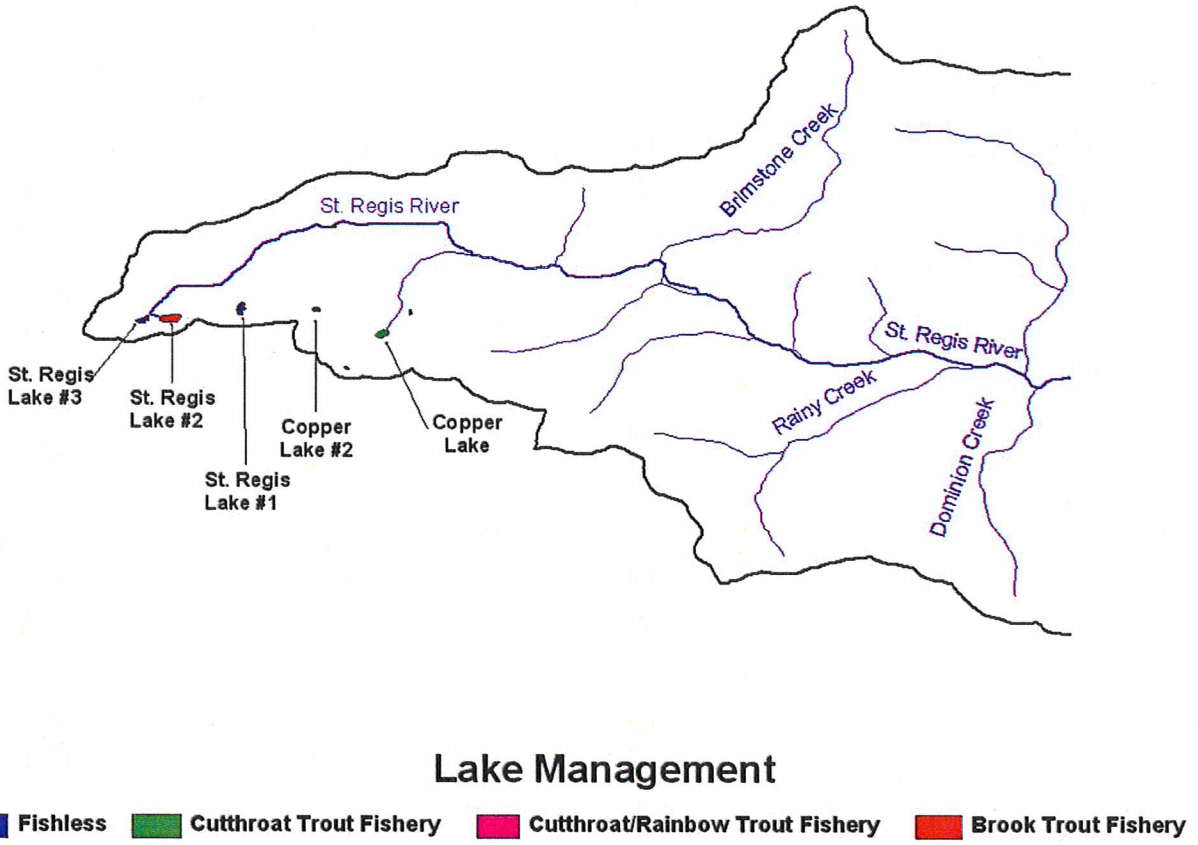



**Figure 6**. Map of mountain lake and fishery status in the Upper St. Regis Management Unit.

### Description

The Upper St. Regis Management Unit includes five lakes > 1 acre in the headwaters of the St. Regis River Drainage, including Copper Gulch (Figure 6). This area contains two marginal fisheries and several fishless lakes. Lower St. Regis Lake (#2) supports a self-sustaining brook trout population that is now supplemented with stocked westslope cutthroat trout. Copper (Silvex) Lake is also stocked to provide a westslope cutthroat trout fishery. Both of these trout populations are 'stunted' (max length 8.3-9.2 inches), with low body condition (mean Wr 86-89). Fishless lakes include St. Regis Lakes #1 and #2, and Copper Lake #2. An additional small fishless lake (< 1 acre), Copper Creek Lake # 1, lies above Copper Lake.

Lakes in this unit are generally small, shallow, unproductive water bodies that are relatively accessible from established road systems (see individual lake descriptions in Appendix C). Shoreline surveys on Copper Lake and St. Regis Lake #2 did not indicate that amphibians and reptiles are particularly abundant in this area. Low numbers of Columbia spotted frogs and

terrestrial garter snakes were observed during lake surveys. However, shoreline surveys were not completed on the three fishless lakes and smaller (un-named) ponds. Idaho giant salamanders may also be present in this management unit (Bryce Maxell, Montana Natural Heritage Program, personal communication), but are typically found in small stream environments. Stream and river reaches immediately downstream of the unit support primarily westslope cutthroat trout, brook trout, and sculpin. Further downstream in the St. Regis River watershed, westslope cutthroat trout x rainbow trout hybrids, bull trout, brown trout, mountain whitefish and longnose suckers become more abundant.

Recreational use appeared frequent at Copper and Lower St. Regis (#2) Lakes. Established trails provided easy access to both lakes. Human refuse, dilapidated infrastructure, and multiple campsites were also evident. There was much less evidence of human use at upper St. Regis Lake (#3), despite easy trail access from lower St. Regis Lake. Other fishless lakes within the unit are less accessible and likely receive very infrequent recreational use.

**Lake Management**

Lakes in the Upper St. Regis unit are generally fishless or provide marginal fisheries. Future lake management will likely be similar to existing practices (Table 8). The performance of westslope cutthroat trout stocked in Lower St. Regis Lake and Copper Lake will be evaluated. High use and accessibility may warrant more frequent stocking of Copper Lake to provide a more harvest-oriented fishery. If monitoring indicates that the quality of these fisheries may be improved through adjustments in frequency or quantity of stocking, changes will be considered.

**Table 8**. Recommended management strategies for Upper St. Regis Management Unit lakes.

| Water Body | Current Fishery | Recommended Future Actions |
|---|---|---|
| Copper Lake | Stocked WCT* | Evaluate performance and survival of stocked WCT – consider managing as a *harvest-oriented fishery* (currently managed as a *quality* WCT fishery) |
| Copper Lake #2 | Fishless | None; Identify any unauthorized fish introductions |
| St. Regis Lake #1 | Fishless | None; Identify any unauthorized fish introductions |
| St. Regis Lake #2 | Wild EBT | Consider tools to improve fishery or eliminate brook trout; Currently managed as a *diversified fishery* (EBT &WCT) |
| St. Regis Lake #3 | Fishless | None; Identify any unauthorized fish introductions |

* Species abbreviations: WCT = westslope cutthroat trout, EBT = brook trout, RBT = rainbow trout

It is unlikely that additional lakes or different fish species will be stocked in this management unit. Currently fishless lakes are likely incapable of supporting sustainable fisheries because of physical constraints (primarily depth). These water bodies also provide habitat for a number of native aquatic and terrestrial species that may be impacted by fish introductions. In particular, more comprehensive amphibian surveys at fishless lakes within the unit are needed.

Conservation of downstream aquatic communities also requires that the compatibility of stocked fish species be considered. Fish stocked in headwater lakes frequently exit the lake and inhabit outlet streams where native fish and amphibian species persist. In this management unit, some

reaches of the upper St. Regis River drainage support native westslope cutthroat trout that appear to be non-introgressed (not hybridized with introduced rainbow trout or Yellowstone cutthroat trout) based on recent genetic testing (MFWP, unpublished data). As a result, MFWP plants only the M012 westslope cutthroat trout strain and no longer considers the stocking of (reproductively viable) non-native *Oncorhynchus* species to be appropriate in these situations.

Future funding and advances in fisheries management tools may also provide the opportunity to improve the fishery in Lower St. Regis Lake. This could involve enhanced size structure or a change in species composition. Brook trout provide angling diversity and can support high catch rates, but are generally considered undesirable in mountain lakes because they rarely provide a quality fishery and present a risk to native trout populations. Brook trout are capable of reproducing in marginal habitats. Once introduced, they typically over-populate a lake and "stunt" as seen in nearly every middle Clark Fork lake where they exist. In addition, just as introduced Yellowstone cutthroat trout and rainbow trout present a hybridization risk to native westslope cutthroat trout populations, non-native brook trout present a threat to native bull trout. Brook trout also directly compete with and displace westslope cutthroat trout and other native fish species (Peterson and Fausch 2003; Peterson et al. 2004; Shepard 2004). Although brook trout will likely always be widely distributed in the middle Clark Fork region, MFWP will strive to balance species diversity with fishery quality and risk to native stream populations.

## II. Middle St. Regis Management Unit

### Description

The Middle St. Regis Management Unit includes nine named lakes (> 1 acre) and several un-named ponds or wetlands (<1 acre) along the Montana-Idaho boarder in the headwaters of three tributaries of the St. Regis River: Silver Creek, Big Creek and Deer Creek (Figure 7). These water bodies exhibit a range of morphological and ecological conditions, fish species, and accessibility (see individual lake reports in Appendix C). Lake environments range from deep, relatively sterile (oligotrophic) glacial cirque lakes (e.g., Crystal Lake) to small, shallow, more productive mesotrophic waters (e.g., Rudie Lake & Gold Lake). Fishless waters include Big Sunday Creek Lake and the Deer Creek Lakes.

Lake fisheries include brook trout, westslope cutthroat trout and rainbow trout in various combinations (see Figure 7). In general, westslope cutthroat and rainbow trout populations have moderate or high body condition (mean Wr 87-95) and can provide quality fisheries. Brook trout populations are generally stunted (max length 9.1-12.7 inches), with low or moderate body condition (mean Wr 87-89). Stream and river reaches immediately downstream of the unit support primarily westslope cutthroat trout, brook trout, and sculpin. Further downstream in the St. Regis River watershed, westslope cutthroat trout x rainbow trout hybrids, bull trout, brown trout, mountain whitefish and longnose suckers become more abundant.

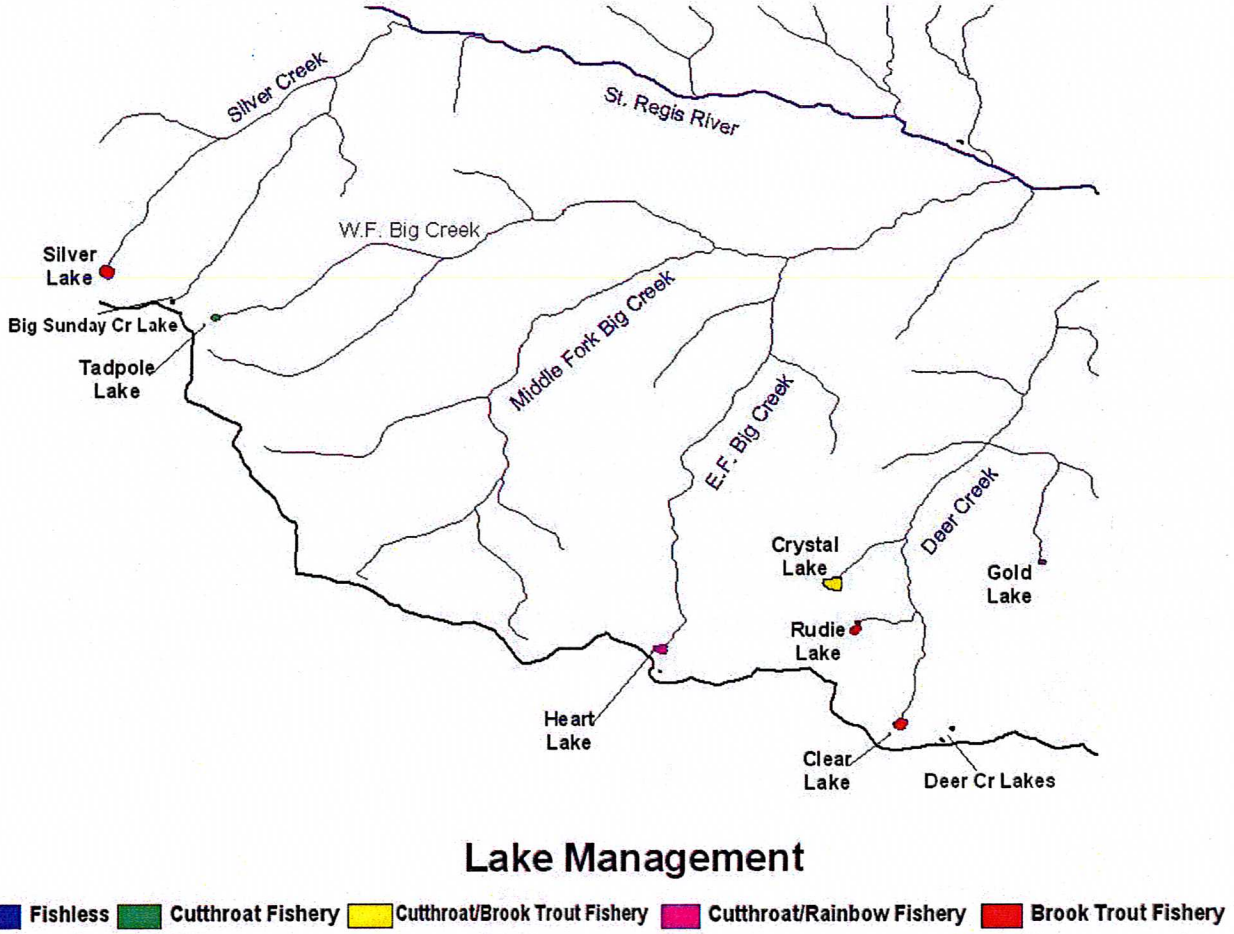



**Figure 7**. Map of mountain lakes and fishery status in the Middle St. Regis Management Unit.

Shoreline amphibian surveys were completed only on the seven fish-bearing lakes in 2004-2006. Columbia spotted frogs were common or abundant along the perimeter of most lakes and densities appeared correlated with the amount of emergent aquatic vegetation. Long-toed salamanders were only observed at Heart Lake. Idaho giant salamanders have also been found in this management unit (Bryce Maxell, Montana Natural Heritage Program, pers. comm.), but are typically found in headwater stream environments (not lakes). Amphibian surveys at fishless lakes within the unit are needed.

Recreational use and accessibility are variable within the unit. Most lakes are accessible via non-motorized travel (1-3 miles) on the USFS trail system. Silver Lake can be reached by road and appears to support frequent use, while Gold Lake and the various fishless waters are relatively remote with no developed travel routes.

### Lake Management

The Middle St. Regis Management Unit provides a diversity of fish-bearing lakes. All of these waters, except Tadpole Lake, appear to support self-sustaining trout populations. Tadpole,

Crystal and Heart Lakes are currently in the MFWP stocking program. Infrequent stocking is considered necessary to maintain the Tadpole Lake westslope cutthroat trout fishery, but cutthroat trout are stocked to diversify wild brook trout (Crystal Lake) and rainbow trout (Heart Lake) fisheries in other cases. Gold Lake was recently removed from the stocking program as size structure and juvenile abundance indicated that the westslope cutthroat trout population was reproducing consistently. Clear, Rudie and Silver lakes support abundant, self-sustaining brook trout populations. Management strategies are summarized in Table 9.

**Table 9**. Recommended management strategies for Middle St. Regis Management Unit lakes.

| Water Body | Current Fishery | Recommended Future Actions |
|---|---|---|
| Big Sunday Cr. Lake | Fishless | None; Identify any unauthorized fish introductions |
| Clear Lake | Wild EBT* | Consider tools to improve fishery or eliminate brook trout. |
| Crystal Lake | Wild EBT with stocked WCT | Evaluate performance and survival of stocked cutthroat trout and consider tools to eliminate brook trout or increase size structure - currently managed as a *diversified, quality* trout fishery. Investigate stability and management of dam at outlet. |
| Deer Cr Lake #2 | Fishless | None; Identify any unauthorized fish introductions |
| Gold Lake | Wild WCT | Confirm that cutthroat trout population is self-sustaining |
| Heart Lake | Wild RBT with stocked WCT | Evaluate performance and survival of stocked cutthroat trout and consider "genetic swamping" to reduce rainbow trout component - currently managed as a *diversified, quality* trout fishery |
| Rudie Lake | Wild EBT | Consider tools to eliminate brook trout and convert to fishless lake |
| Silver Lake | Wild EBT | Consider tools to improve fishery or eliminate brook trout. |
| Tadpole Lake | Stocked WCT | Evaluate performance and survival of stocked cutthroat trout – manage as a *quality* cutthroat trout fishery |

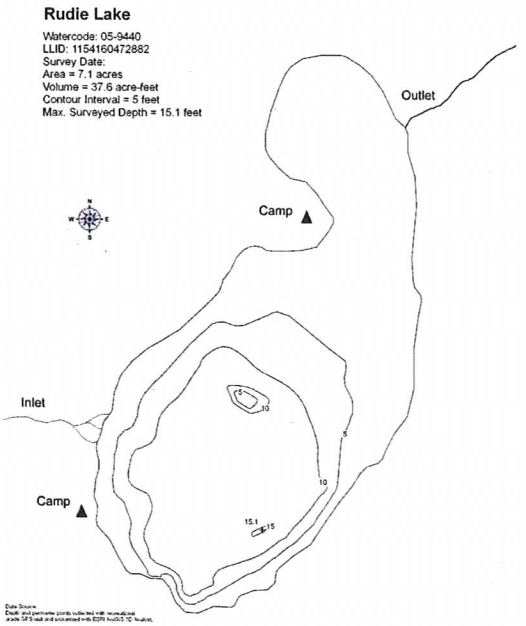
* Species abbreviations: WCT = westslope cutthroat trout, EBT = brook trout, RBT = rainbow trout

The performance of westslope cutthroat trout stocked in Tadpole, Crystal and Heart Lakes will be evaluated over time. MFWP will also seek to confirm that the Gold Lake fishery is self-sustaining. If monitoring indicates that the quality of these fisheries may be improved through adjustments in frequency or quantity of stocking, changes will be considered. The greatest potential improvements in fishery quality would likely be through manipulation of existing wild brook trout populations. However, an increased size structure and higher quality fishery for stunted populations (e.g., Clear Lake and Silver Lake) would likely require consistent size-selective harvest or predation, reduced natural reproduction rates, or complete brook trout removal and restocking. Tools to affect these changes will be evaluated (see Management Tools section). MFWP is also experimenting with low density, infrequent stocking (e.g., Crystal Lake) which supplement existing wild populations to provide diversity of species and potentially the opportunity for larger fish. Lake surveys offered some evidence of resource partitioning among sympatric trout species and suggested that westslope cutthroat trout may grow faster than brook trout, even when introduced into an existing over-populated, stunted brook trout fishery. Crystal lake also experiences major annual fluctuations in pool elevation due to management or improper function of an outlet dam and sluiceway. The stability and operation of this infrastructure needs to be evaluated.

***Crystal (left) and Heart (right) Lakes support wild brook trout and rainbow trout populations (respectively) that are supplemented with stocked cutthroat trout to improve fishery diversity***

There are currently two small fishless lakes (~ 1 acre) in this management unit. Stocking smaller, fishless water bodies (< 1 acre) is not prudent and MFWP recommends that removal of fish from at least one lake would promote overall ecological diversity. Rudie Lake (see photo and map below) is considered a good candidate for complete removal of fish and conversion to historic ecological processes for a number of reasons: (1) It has supported only a marginal brook trout fishery for more than 5 decades, (2) Shallow, littoral areas comprise a high proportion of the lake, (3) Emergent vegetation is abundant on shorelines and in associated wetlands, and (4) The lake has adequate size and depth to provide a winter environment that is not completely frozen and anoxic.

Conservation of downstream aquatic communities also requires that the compatibility of formerly introduced and currently stocked fish species be considered. In this lake management unit, emigration of brook trout and rainbow trout is the biggest concern for downstream populations. Although westslope cutthroat trout in the Big Creek drainage have already been hybridized with rainbow trout, populations in Silver Creek and Deer Creek still appear to be genetically non-introgressed (MFWP, unpublished data). The westslope cutthroat trout M012 strain is currently the only species stocked in these drainages and attempts will be made to reduce the rainbow trout component in Heart Lake. Brook trout emigration from lakes poses a continual threat of hybridization with bull trout and increased competition with westslope cutthroat trout and other aquatic species. Therefore, reducing or removing brook trout populations is considered an important conservation measure for native stream communities.




Rudie Lake photo and bathymetry

## III. Lower St. Regis Management Unit

### Description

The Lower St. Regis Management Unit includes nine lakes > 1 acre along the Montana-Idaho boarder in the headwaters of Ward, Twomile, and Little Joe Creeks (Figure 8). Although lake size and bathymetry varies, the majority of these waters lie within rocky, glacial cirque basins near the state-line divide. Lenore Lake, which is better described as a productive, mid-elevation "pond", is a notable exception.

Only five of the nine lakes in this management unit support fish populations, and all but one (Moore Lake) contain westslope cutthroat trout. Cutthroat trout body condition in Hazel Lake, Hub Lake, Square Lake and Lenore Lake is moderate to high (mean Wr 94-108) and several of these waters provide quality fisheries. Hazel Lake, Square Lake and Lenore Lake are currently in the MFWP fish stocking program. Moore Lake lies in the headwaters of Little Joe Creek and supports a self-sustaining, stunted (max length 10.5 inches) brook trout population. This is problematic for native fish management in Little Joe Creek as this stream is a regional stronghold for wild bull trout and westslope cutthroat trout. Ward and Twomile Creeks also contain abundant westslope cutthroat trout populations and sculpin. The lower main stem St. Regis River and Clark Fork River confluence lie just downstream of the tributary mouths. These rivers support a more diverse community of native and introduced fish species.

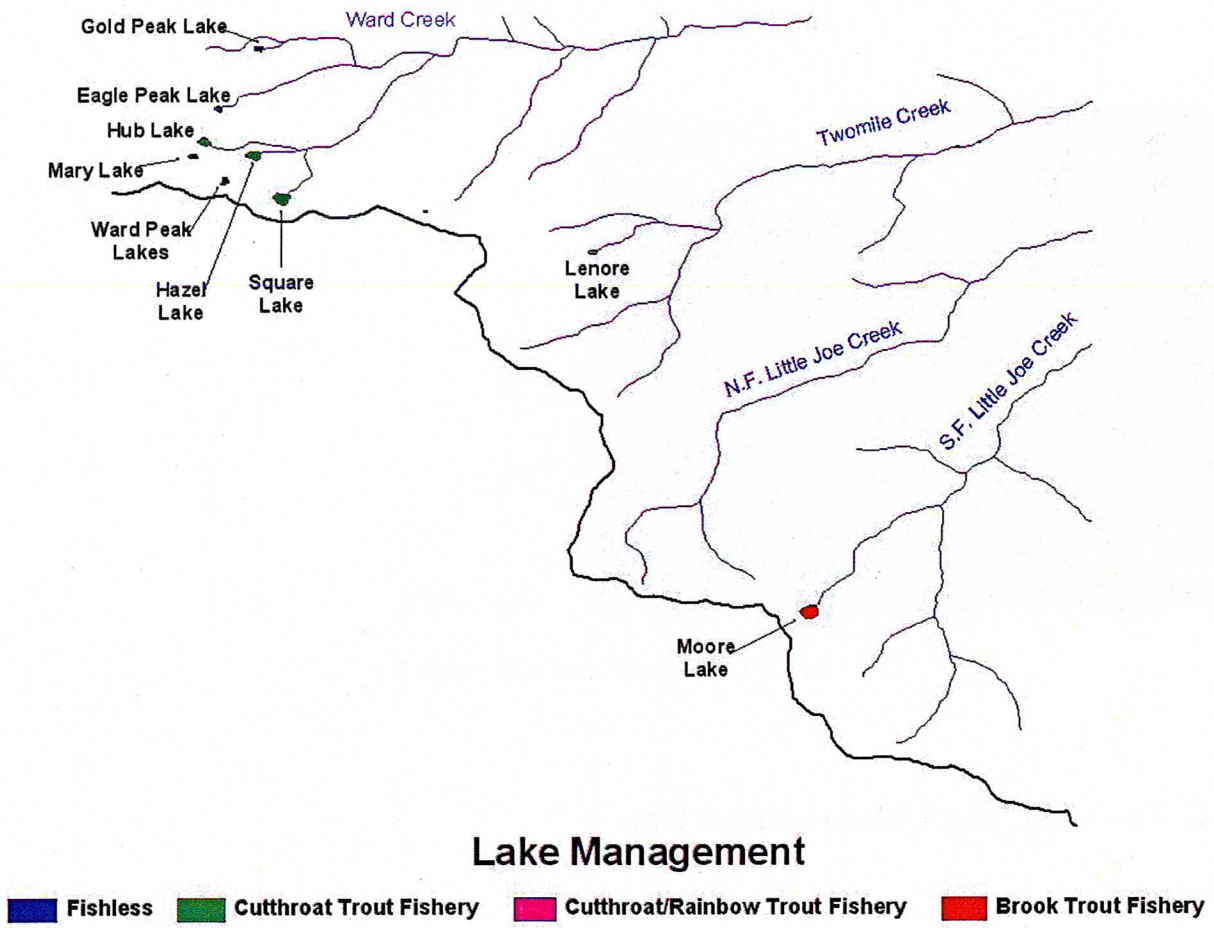



**Figure 8**. Map of mountain lakes and fishery status in the Lower St. Regis Management Unit.

Shoreline amphibian surveys were completed on the five fish-bearing lakes in 2004-2006. Columbia spotted frog adults and tadpoles were common or abundant along the perimeter of most lakes and densities appeared correlated with the amount of emergent aquatic vegetation. Low densities of larval long-toed salamanders were also observed at Hazel and Moore Lakes. Idaho giant salamanders have been documented near this management unit in the St. Regis watershed (Bryce Maxell, Montana Natural Heritage Program, pers. comm.), but are typically found in headwater stream environments (not lakes).

Recreational use and accessibility are variable within the unit. Most lakes are accessible via non-motorized travel (0.5-3 miles) on the USFS trail system from designated trailheads. Moore Lake can be reached by road and appears to support frequent use. Lenore Lake and most of the fishless waters are relatively remote with no developed travel routes.

## Lake Management

The lower St. Regis unit includes several excellent westslope cutthroat trout fisheries and one marginal brook trout fishery (Table 10). Cutthroat trout populations (Hazel, Square and Lenore Lakes) are generally sustained through periodic stocking. However, Hub Lake was recently

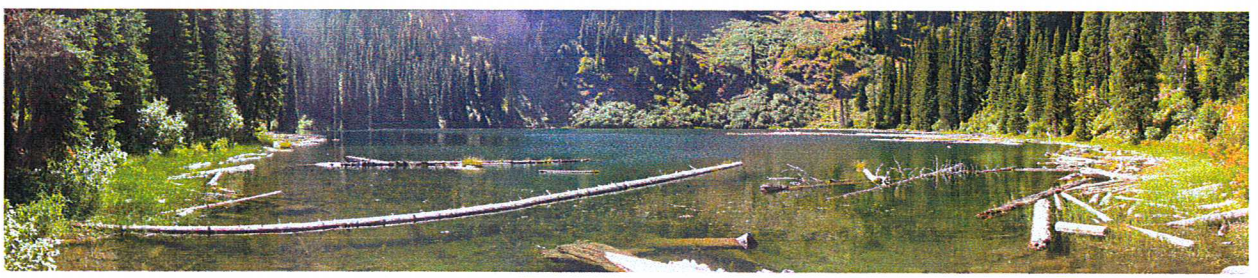
removed from the stocking program as size structure, fish density and juvenile abundance indicated that the westslope cutthroat trout population was reproducing consistently. The performance of stocked westslope cutthroat trout will be evaluated over time. MFWP will also seek to confirm that the Hub Lake fishery is self-sustaining. If monitoring indicates that the quality of these fisheries may be improved through adjustments in frequency or quantity of stocking, changes will be considered.

**Table 10**. Recommended management strategies for Lower St. Regis Management Unit lakes.

| Water Body | Current Fishery | Recommended Future Actions |
|---|---|---|
| Eagle Peak L. | Fishless | None; Identify any unauthorized fish introductions |
| Gold Peak L. | Fishless | None; Identify any unauthorized fish introductions |
| Hazel Lake | Stocked WCT | Evaluate performance and size structure of cutthroat trout population – manage as a *quality* cutthroat trout fishery |
| Hub Lake | Wild WCT | Confirm that cutthroat trout population is self-sustaining |
| Lenore Lake | Stocked WCT | Evaluate performance and survival of stocked cutthroat trout - manage as a *quality* cutthroat trout fishery |
| Mary Lake | Fishless | None; Identify any unauthorized fish introductions |
| Moore Lake | Wild EBT | Consider tools to eliminate brook trout; convert to cutthroat fishery |
| Square lake | Stocked WCT | Evaluate performance and survival of stocked cutthroat trout - manage as a *quality* cutthroat trout fishery |
| Ward Peak L. | Fishless | None; Identify any unauthorized fish introductions |

* Species abbreviations: WCT = westslope cutthroat trout, EBT = brook trout

Removal or suppression of brook trout in Moore Lake is a recommended management priority within the middle Clark Fork region (see photo below). Brook trout emigration poses a continual threat of hybridization with bull trout and increased competition with westslope cutthroat trout and other aquatic species in Little Joe Creek. Both forks of this stream provide spawning and rearing habitat for migratory westslope cutthroat trout and one of the few remaining fluvial bull trout populations in the middle Clark Fork region. Little Joe Creek also supports stream-resident bull trout, westslope cutthroat trout and sculpin. It is not known if the existing brook trout population in Little Joe Creek originated in Moore Lake, but continued emigration from the lake threatens to exacerbate hybridization and competition risks for native stream populations.



***Moore Lake***

Conservation of aquatic communities in Twomile and Ward Creeks also requires that the compatibility of lake fish species be considered. These stream communities are also predominantly comprised of native fish. Although westslope cutthroat trout in the Twomile Creek drainage have already been hybridized with rainbow trout, populations in Ward Creek still appear to be genetically non-introgressed (MFWP, unpublished data). Therefore, westslope cutthroat trout (M012) are the only strain of *Oncorhynchus* spp. currently considered appropriate for stocking in headwater lakes.

The Lower St. Regis Unit contains three fishless lakes > 1 acre and others that are smaller. No change in future management is proposed for these waters. Gold Peak and Mary Lakes are very shallow and would not likely allow over-winter fish survival. Eagle Peak Lake is believed to be capable of supporting fish (>30 ft deep), but is very small (~ 3 acres) and remote. Management of these lakes as fishless waters is also considered significant in providing overall ecological diversity within the management unit. Amphibian surveys and updated lake information for fishless lakes within the unit are needed.

## IV. Dry-Cedar Creeks Management Unit

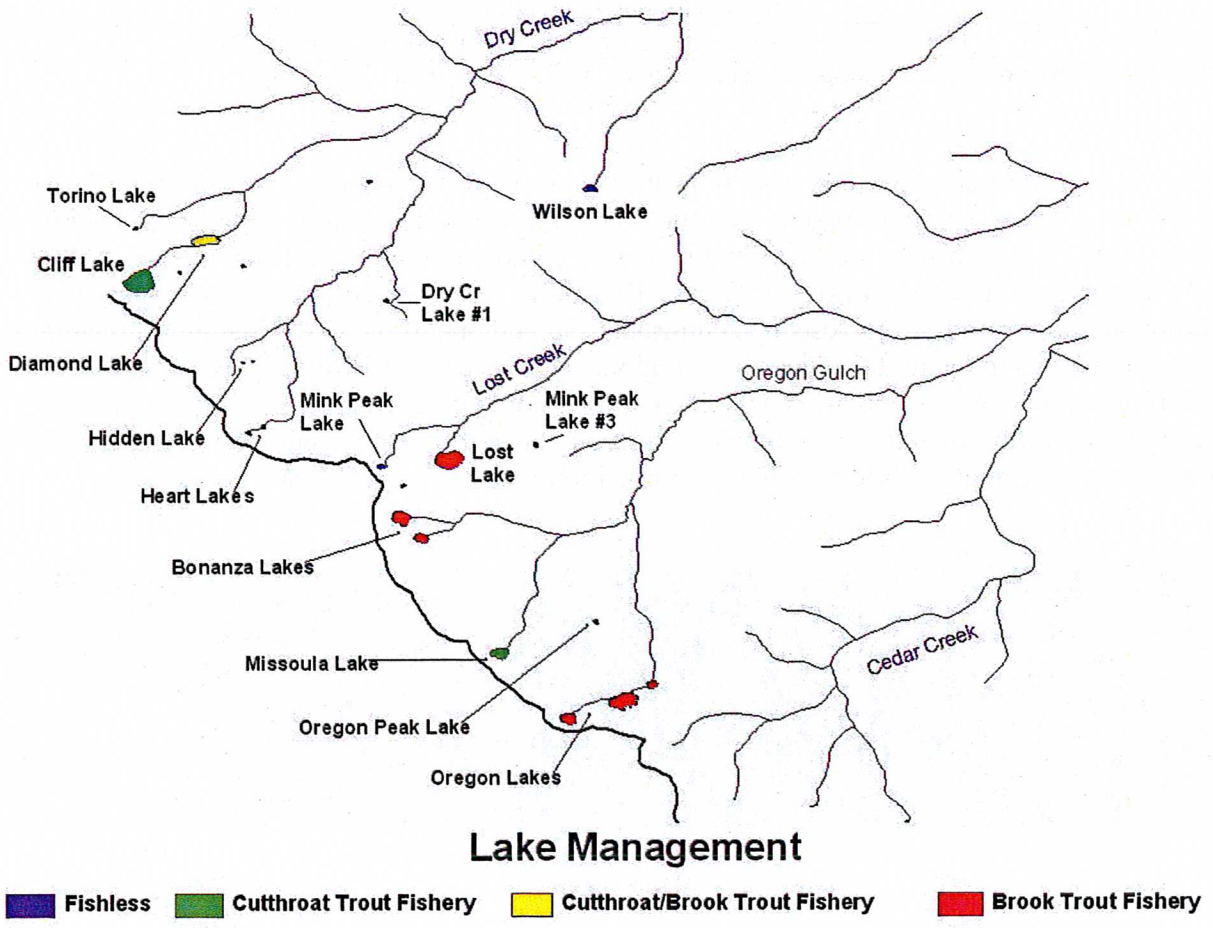
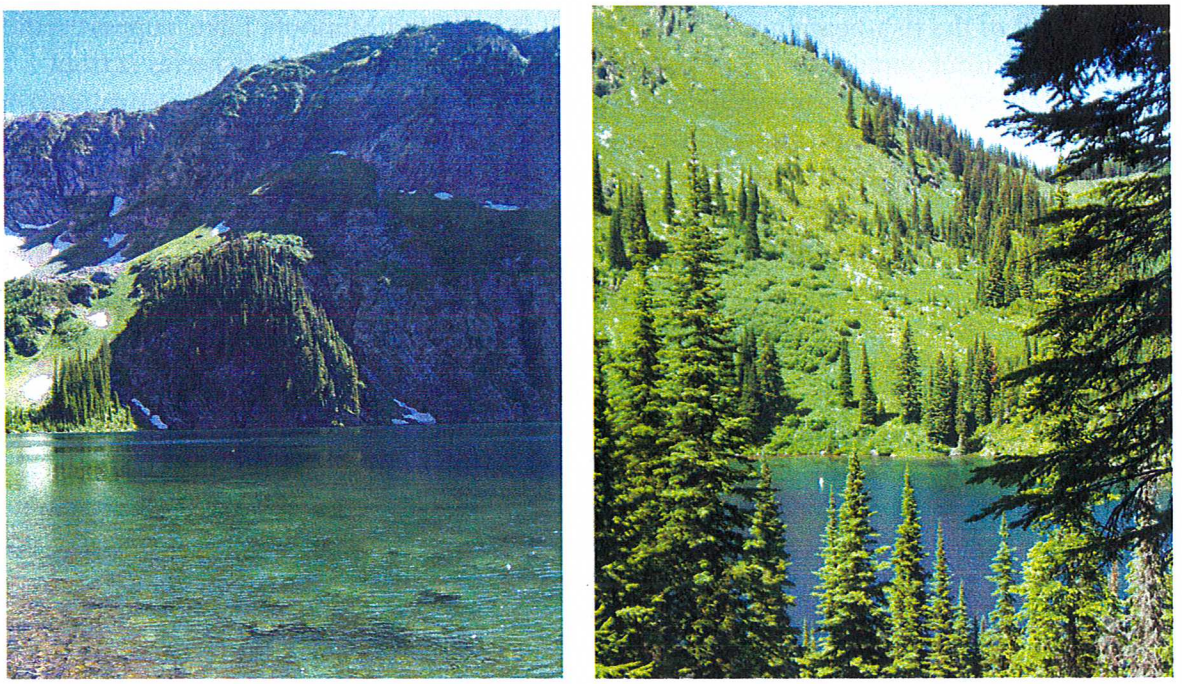



**Figure 9**. Map of mountain lakes and fishery status in the Dry-Cedar Creeks Management Unit.

**Description**

This lake management unit contains a complex of 17 fish-bearing and fishless lakes (> 1 acre) in the headwaters of two major coldwater tributaries of the Clark Fork River (Cedar Creek and Dry Creek). This unit has the highest density of alpine and sub-alpine lakes in the middle Clark Fork project area. Although most of these waters lie in high glacial cirques along the Montana-Idaho border, lake size, bathymetry, productivity, and accessibility varies. Larger (5-34 acres), deeper (21-180 ft max depth), relatively accessible lakes are primarily fish-bearing, while fishless waters are generally smaller (1-3 acres), shallower (<5 ft – 18 ft max depth) and more remote (see Appendices A and C).

There are nine fish-bearing lakes in this management unit, including two westslope cutthroat trout populations that are supplemented with stocking, six self-sustaining brook trout populations, and one water body (Diamond Lake) that supports both species. Cliff Lake and Missoula Lake are popular, easily accessible westslope cutthroat trout fisheries. Missoula Lake lies directly adjacent to a heavily used, USFS campground that is accessible by road. Therefore, it is stocked frequently (2 year cycle), with higher numbers of trout (~ 90/acre) relative to other lakes in this region. Cliff Lake is stocked less frequently (7 year cycle) with lower densities of trout (40/acre) because it requires a short hike to access and supports some natural reproduction. Both lakes contain high densities of trout with moderate to high body condition (mean Wr 101-128). Brook trout populations are typical for lakes in the project area: high density, stunted (max length 8.1-10.5 inches), with low body condition (mean Wr 82-93). Diamond Lake is unique in that it supports stunted, self-sustaining brook trout, and also stunted westslope cutthroat trout (mean Wr 78, max lengths 13 inches) that are likely emigrants from Cliff Lake (lies just upstream).



***Cliff Lake (left) and Missoula Lake (right) are popular, harvest-oriented, westslope cutthroat trout fisheries***

Dry Creek and Cedar Creek are inhabited by native fish populations and are considered important watersheds for westslope cutthroat trout and bull trout conservation. In perennial reaches, Dry Creek supports westslope cutthroat trout, brook trout and sculpins. Westslope cutthroat trout are slightly hybridized (~2%) with rainbow trout throughout the drainage (MFWP, unpublished data). Brook trout populations are likely continuously supplemented by emigrants from Diamond Lake. Cedar Creek is unique in that it supports a predominantly native fish community. This stream supports one of the four remaining viable, fluvial bull trout populations in the middle Clark fork region. Westslope cutthroat trout are also abundant and exhibit slight hybridization (~ 1%) with rainbow trout in the main stem (MFWP, unpublished data). Despite numerous headwater lake populations in the Oregon Gulch drainage, brook trout were not detected in recent stream sampling throughout the watershed. However, it is likely that brook trout are present near lake outlets and immediately downstream.

Amphibian population information is incomplete for this lake management unit. Juvenile and/or adult Columbia spotted frogs were observed in six of the nine fish-bearing lakes surveyed in 2004-2006. However, long-toed salamanders were not observed at any lakes. None of the fishless waters were investigated.

Fish-bearing lakes in this management unit are all readily accessible. Most can be reached via non-motorized travel (< 2.5 miles) from established trailheads on the USFS trail network (see descriptions in Appendix C). Diamond Lake lies at the end of an open USFS road. Fishless lakes are much more remote and are generally not on the established trail system.

**Lake Management**

The Dry-Cedar Creeks Management Unit provides a diversity of alpine and sub-alpine lakes (Table 11). All of the fish-bearing waters, except Cliff Lake and Missoula Lake, support self-sustaining brook trout populations. Management emphasis for brook trout fisheries is trout removal, both to improve fishery quality and to reduce the risk of impacts to downstream native fish communities. Brook trout emigration poses a continual threat of hybridization with bull trout and increased competition with westslope cutthroat trout and other native aquatic species. Cliff and Missoula Lakes are currently in the MFWP stocking program. Infrequent stocking is considered necessary to maintain these popular, harvest-oriented westslope cutthroat trout fisheries.

The performance of westslope cutthroat trout stocked in Missoula and Cliff Lakes will be evaluated over time. If monitoring indicates that the quality of these fisheries may be improved through adjustments in frequency or quantity of stocking, changes will be considered. The greatest potential improvements in fishery quality would likely be through manipulation of existing wild brook trout populations. However, an increased size structure and higher quality fishery for stunted populations (e.g., Oregon Lakes, Bonanza Lakes, Lost Lake) would likely require consistent size-selective harvest or predation, reduced natural reproduction rates, or complete brook trout removal and restocking. Tools to affect these changes will be evaluated (see Management Tools section). Because of current and potential impacts to native bull trout and westslope cutthroat trout populations in Dry Creek and Cedar Creek, removal of brook trout from headwater lakes and replacement with westslope cutthroat trout or other compatible species is considered a conservation priority.

The Dry-Cedar Creeks Management Unit contains eight fishless lakes > 1 acre and several others that are smaller. No change in future management is proposed for these waters. Torino Lake, Mink Peak Lake, Dry Creek #1 and others are very shallow and would not likely allow over-winter fish survival. Several other waters, including Hidden Lake, Oregon Peak Lake and Wilson Lake, are likely capable of supporting fish populations (> 12 ft max depth). However, these small, remote lakes would offer minimal angling opportunity and continued management of these lakes as fishless waters is considered significant in providing overall ecological diversity within the management unit. Amphibian surveys and updated lake information for fishless lakes within the unit are needed.

**Table 11**. Recommended management strategies for Dry-Cedar Creeks Management Unit lakes.

| Water Body | Current Fishery | Recommended Future Actions |
|---|---|---|
| Bonanza Lake - Upper | Wild EBT | Consider tools to improve fishery or eliminate brook trout. |
| Bonanza Lake - Lower | Wild EBT | Consider tools to improve fishery or eliminate brook trout. |
| Cliff Lake | Stocked WCT | Evaluate performance and size structure of cutthroat trout population – manage as *harvest-oriented* fishery |
| Diamond Lake | Wild EBT & WCT | Consider tools to eliminate brook trout or convert to a cutthroat trout fishery |
| Dry Cr Lake #1 | Fishless | None; Identify any unauthorized fish introductions |
| Heart Lakes - upper & lower | Fishless | None; Identify any unauthorized fish introductions |
| Hidden L. – upper & lower | Fishless | None; Identify any unauthorized fish introductions |
| Lost Lake | Wild EBT | Consider tools to improve fishery or eliminate brook trout. |
| Mink Peak Lake | Fishless | None; Identify any unauthorized fish introductions |
| Mink Peak Lake #3 | Fishless | None; Identify any unauthorized fish introductions |
| Missoula Lake | Stocked WCT | Evaluate performance and size structure of cutthroat trout population – manage as *harvest-oriented* fishery |
| Oregon Lake - Upper | Wild EBT | Consider tools to improve fishery or eliminate brook trout. |
| Oregon Lake - Middle | Wild EBT | Consider tools to improve fishery or eliminate brook trout. |
| Oregon Lake - Lower | Wild EBT | Consider tools to improve fishery or eliminate brook trout. |
| Oregon Peak Lake | Fishless | None; Identify any unauthorized fish introductions |
| Torino Lake | Fishless | None; Identify any unauthorized fish introductions |
| Wilson Lake | Fishless | None; Identify any unauthorized fish introductions |

* Species abbreviations: WCT = westslope cutthroat trout, EBT = brook trout

# V. Trout Creek Management Unit

## Description

The Trout Creek Management Unit contains 12 fishless and fish-bearing lakes (> 1 acre) in the headwaters of Trout Creek and Quartz Creek (Figure 10). Fish-bearing waters lie at the head of Trout Creek along the Montana-Idaho border, while most fishless lakes are scattered in upper Cement Creek, Deep Creek and Windfall Creek (tributaries of Trout Creek), and in upper Quartz Creek. Larger (> 11 acres), deeper (> 20 ft max depth), relatively accessible lakes are primarily fish-bearing, while fishless waters are generally smaller (< 5 acres), shallower (< 16 ft max depth) and more remote.

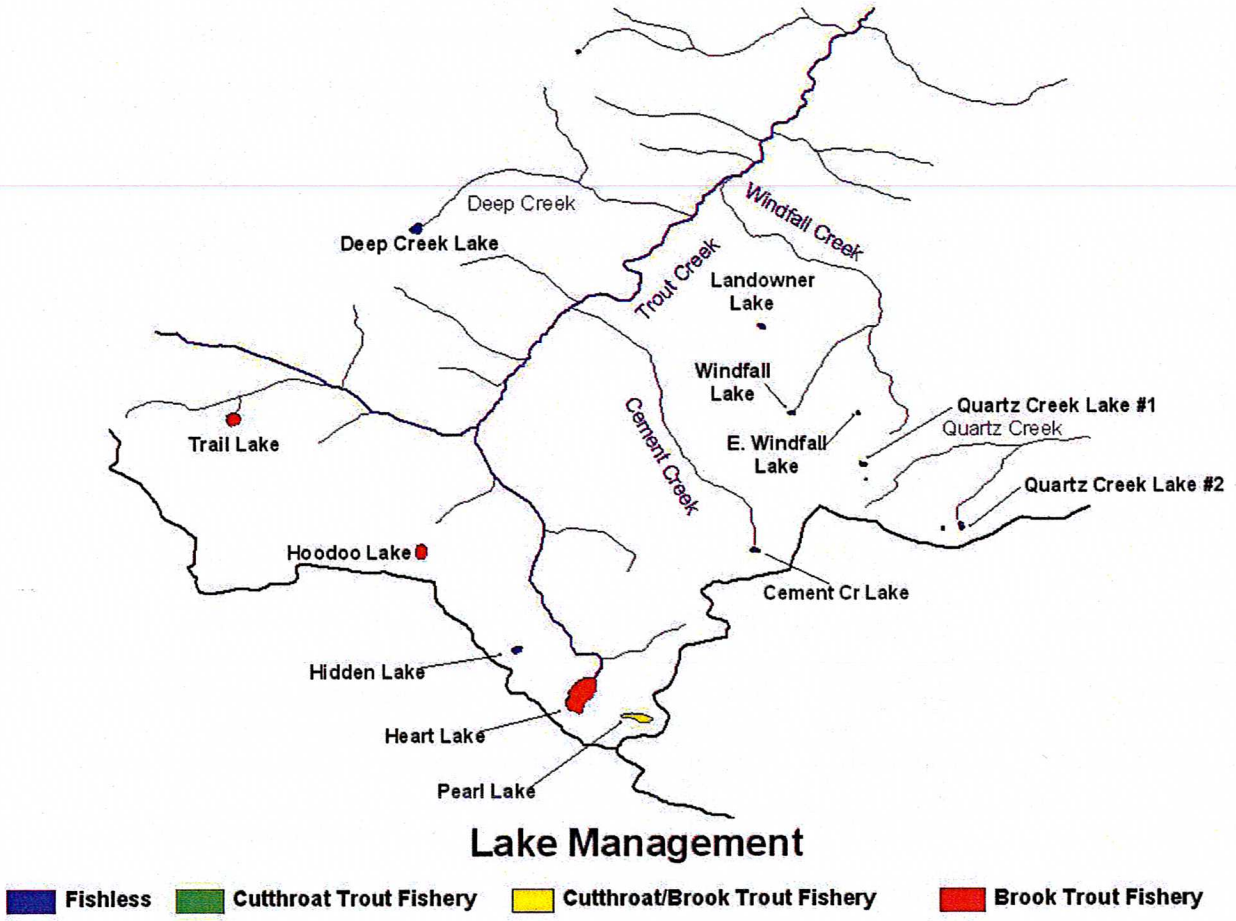



**Figure 10**. Map of mountain lakes and fishery status in the Trout Creek Management Unit.

There are four fish-bearing lakes in this management unit. All support self-sustaining brook trout populations, but one (Pearl Lake) is now supplemented with westslope cutthroat trout to provide fishery diversity. Trout populations in Heart Lake and Hoodoo Lake are typical of brook trout fisheries in the project area: high density, stunted (max length 10-11 inches), with low body condition (mean Wr 87-89). However, Heart Lake is somewhat unique in that it also supports an abundant longnose sucker population in addition to trout. Trail Lake and Pearl Lake

are also distinctive among brook trout fisheries because of unusually large size structure (max length 13-14 inches) and high body condition (mean Wr 101-141) relative to other populations in the project area. Neither lake had obvious physical or ecological characteristics that explained this deviation. However, brook trout population density appeared to be very low in Pearl Lake, which indicates poor reproductive success (unknown), unusually high harvest rates (unlikely) or recent introduction of brook trout (unknown). Pearl Lake is currently the only lake in the management unit that is included in the MFWP fish stocking program.

***Trail Lake (left) and Pearl Lake (right) currently support quality brook trout fisheries***

Trout Creek and Quartz Creek are moderately important for conservation of native fish populations. Quartz Creek is a smaller watershed that has been heavily impacted by historic mining activities. However, the stream does support westslope cutthroat trout in middle and upper reaches that appear to be non-introgressed (MFWP, unpublished data). This populations is isolated from the Clark Fork River by a series of natural and anthropogenic upstream migration barriers near the mouth. Trout Creek is a larger, more complex tributary system with variable species composition and abundance among stream reaches. Although brook trout are common in upper reaches and other non-native fish (e.g., rainbow trout and brown trout) are dominant near the mouth, Trout Creek still supports a remnant bull trout population and localized westslope cutthroat populations that may still be non-introgressed (MFWP, unpublished data). Headwater lakes likely act a continual source of brook trout immigrants and lower reaches are directly connected (year-round) with the Clark Fork River, which supports a mixed community of introduced salmonids, hybrids, and native aquatic populations.

Amphibian surveys were completed at all four fish-bearing lakes in the management unit. Columbia spotted from adults and larvae were common or abundant in all lakes, particularly in areas where emergent aquatic vegetation was present. No long-toed salamanders were documented at any of the lakes. None of the fishless waters were investigated.

Fish-bearing lakes in this management unit are all readily accessible via non-motorized travel (< 2.5 miles) from established trailheads on the USFS trail network (see descriptions in Appendix C). Fishless lakes are much more remote and are generally not on the established trail system.

## Lake Management

The Trout Creek Management Unit provides a diversity of alpine and sub-alpine lakes (Table 12). All of the fish-bearing waters support self-sustaining brook trout populations. Normally, this would suggest few management options. However, Trail Lake supports the finest brook trout fishery in the middle Clark Fork region. Selective harvest and controlled natural reproductive success may further enhance this fishery as fish densities are currently very high (truncates potential growth and body condition). Pearl Lake currently supports lower densities of large brook trout, but could likely support quality brook trout and westslope cutthroat fisheries if fish density can be controlled. The performance of brook trout and stocked westslope cutthroat trout in Pearl lake will be evaluated over time. If monitoring indicates that the quality of this fishery may be improved through adjustments in frequency or quantity of stocking, changes will be considered. Fisheries in Heart and Hoodoo lakes could also be improved through manipulation of existing wild brook trout populations. However, an increased size structure and higher quality fishery for stunted populations would likely require consistent size-selective harvest or predation, reduced natural reproduction rates, or complete brook trout removal and restocking. Tools to affect these changes will be evaluated (see Management Tools section). Downstream benefits of brook trout removal are likely negligible as stream-resident populations are well established in upper Trout Creek.

**Table 12**. Recommended management strategies for Trout Creek Management Unit lakes.

| Water Body | Current Fishery | Recommended Future Actions |
|---|---|---|
| Cement Cr. L. | Fishless | None; Identify any unauthorized fish introductions |
| Deep Cr. Lake | Fishless | None; Identify any unauthorized fish introductions |
| E. Windfall L. | Fishless | None; Identify any unauthorized fish introductions |
| Heart Lake | Wild EBT | Consider tools to improve fishery or eliminate brook trout. |
| Hidden Lake | Fishless | None; Identify any unauthorized fish introductions |
| Hoodoo Lake | Wild EBT | Consider tools to improve fishery or eliminate brook trout. |
| Landowner L. | Fishless | None; Identify any unauthorized fish introductions |
| Pearl Lake | Wild EBT & stocked WCT | Evaluate performance and size structure of cutthroat trout population - currently managed as *diversified quality* fishery |
| Quartz Creek Lake #1 | Fishless | None; Identify any unauthorized fish introductions |
| Quartz Creek Lake #2 | Fishless | None; Identify any unauthorized fish introductions |
| Trail Lake | Wild EBT | Manage as a quality brook trout fishery |
| Windfall Lake | Fishless | None; Identify any unauthorized fish introductions |

* Species abbreviations: WCT = westslope cutthroat trout, EBT = brook trout

The Trout Creek Management Unit also contains eight fishless lakes > 1 acre and several others that are smaller. No change in future management is proposed for these waters. Cement Creek Lake, Landowner Lake, Windfall Lake and others are very shallow (< 10 ft max depth) and would not likely allow over-winter fish survival. Other waters, including Deep Creek Lake, East Windfall Lake, Hidden Lake, and the Quartz Creek lakes are likely capable of supporting fish populations (> 12 ft max depth). However, these small, remote lakes would offer minimal angling opportunity and continued management of these lakes as fishless waters is considered

significant in providing overall ecological diversity within the management unit. Amphibian surveys and updated lake information for fishless lakes within the unit are needed.

## VI. North Fork Fish Creek Management Unit

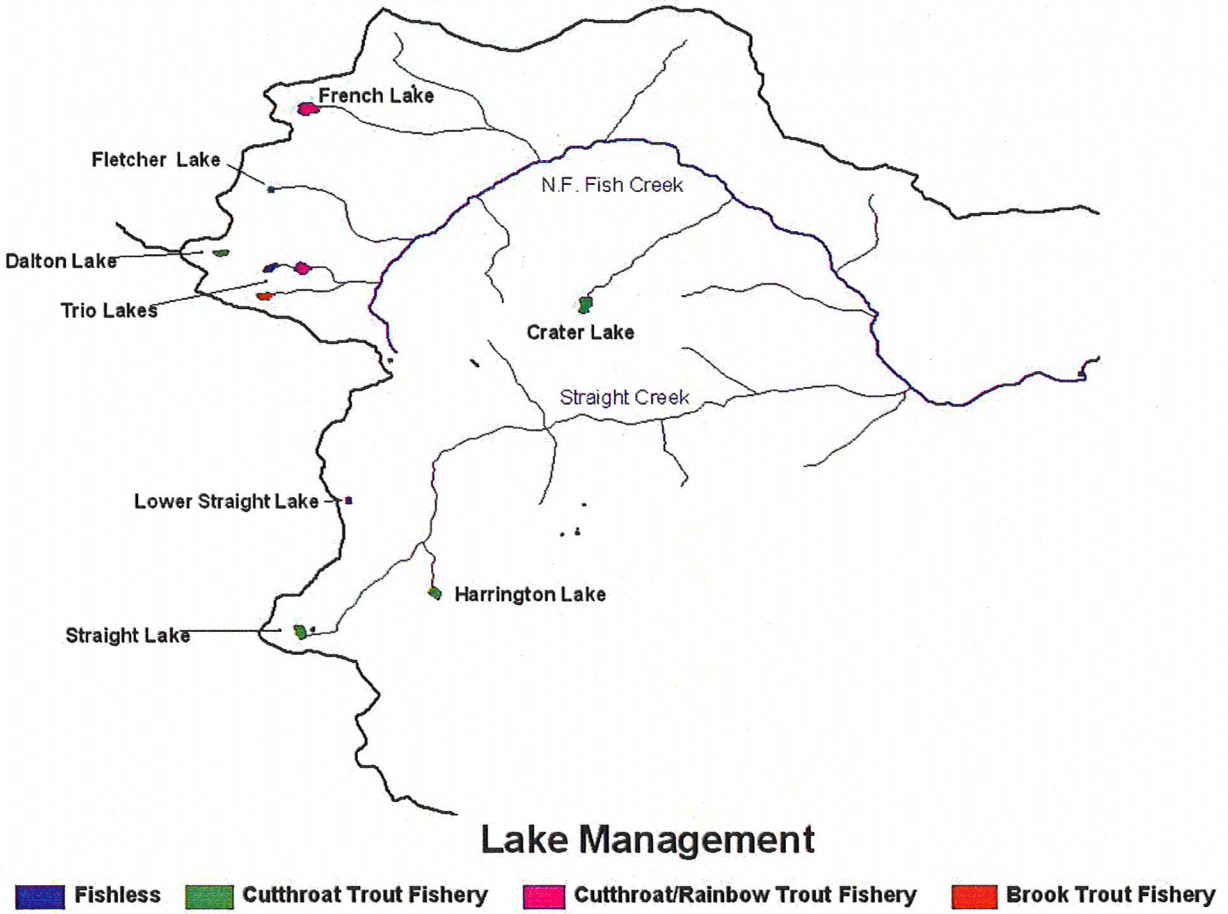



**Figure 11**. Map of mountain lakes and fishery status in the North Fork Fish Creek Management Unit.

### Description

The North Fork Fish Creek Management Unit contains 10 remote, back-country lakes (> 1 acre) that lie in the headwaters of Straight Creek and other smaller tributaries to the North Fork of Fish Creek (Figure 11). These water bodies exhibit a range of morphological and ecological conditions, but most are small (< 18 acres), moderately productive waters that lie in glacial cirque basin or glacial trough landforms near the tree line.

Seven of the lakes are fish-bearing, with variable species composition and levels of natural reproduction. Several fisheries are sustained through periodic westslope cutthroat trout stocking

(Crater Lake, Dalton Lake, and Harrington Lake). Straight Lake is considered a self-sustaining westslope cutthroat trout fishery. Fish body condition in the various westslope cutthroat trout fisheries ranges from moderate to high (mean Wr 86-110), depending on lake productivity (positively correlated) and fish density (negatively correlated).

French Lake and the Trio Lakes support a combination of species. French Lake and Lower Trio Lake are inhabited by self-sustaining rainbow trout populations, with westslope cutthroat trout supplementation. Upper Trio Lake supports the only brook trout population in this management unit. Fish body condition is generally low in these wild fish populations as high fish densities exhaust food resources and lead to truncated growth (stunting). The North Fork of Fish Creek is a regional stronghold for native salmonids. Fluvial bull trout and non-introgressed westslope cutthroat trout are common throughout the stream. Introduced fish species in headwater lakes constitute a threat to the long-term viability of these populations. Further downstream, the West Fork and main stem of Fish Creek support a mixed community of introduced salmonids, hybrids, and native aquatic populations, but native salmonids are the dominant species.

The three fishless lakes (> 1 acre) in this unit range from small productive 'ponds' (e.g., Fletcher Lake; 1.7 acres, < 5 ft deep) to larger, relatively deep waters (e.g., Middle Trio Lake; 7 acres, > 24 ft deep). Characteristics of smaller (< 1 acre), un-named water bodies scattered throughout the unit have not been quantified, but many have been anecdotally described as wetlands or ephemeral ponds.

Amphibian surveys were completed on all lakes > 1 acre except Fletcher Lake and Lower Straight Lake. Columbia spotted frog adults were common on most lake perimeters and densities appeared most closely correlated with the availability of emergent aquatic vegetation along the shore. No other amphibians were observed.

Because the entire management unit lies in the proposed Great Burn Wilderness Area, lake access is difficult. Lakes can be reached via 5-10 miles of non-motorized travel on established USFS trails, typically from the Clearwater Crossing trailhead (see Appendix C). Alternative routes include access from Idaho by crossing the state-line divide or by traveling the state-line trail system from Trout Creek or Schley Mountain (Cache Creek) trailheads.

**Lake Management**

The North Fork Fish Creek Management Unit provides a diversity of fish-bearing and fishless lakes (Table 13). Several of the fish-bearing lakes support stocked westslope cutthroat trout that are managed as quality fisheries (Crater, Harrington, and Dalton Lakes). Straight Lake was recently removed from the stocking program as size structure and fish density indicated that the westslope cutthroat trout population was reproducing consistently. The performance of stocked westslope cutthroat trout will be evaluated over time and MFWP will also seek to confirm that the Straight Lake fishery is self-sustaining. If monitoring indicates that the quality of these fisheries may be improved through adjustments in frequency or quantity of stocking, changes will be considered.

French and Lower Trio Lakes are supplemented with westslope cutthroat trout to diversify wild rainbow trout fisheries and to help reduce the rainbow trout genetic component (downstream hybridization risk). Management priorities include removal or suppression of non-native

rainbow trout populations, as well as elimination of introduced brook trout in Upper Trio Lake (see below). Emigrants from these populations pose a substantial hybridization and competition risk to native fish populations in the North Fork of Fish Creek.

**Table 13**. Recommended management strategies for North Fork Fish Creek Management Unit lakes.

| Water Body | Current Fishery | Recommended Future Actions |
|---|---|---|
| Crater Lake | Stocked WCT* | Evaluate performance and size structure of cutthroat trout population – manage as *quality* cutthroat trout fishery |
| Dalton Lake | Stocked WCT | Evaluate performance and size structure of cutthroat trout population – manage as a *quality* cutthroat trout fishery |
| Fletcher Lake | Fishless | None; Identify any unauthorized fish introductions |
| French Lake | Wild RBT with stocked WCT | Evaluate performance and survival of stocked cutthroat trout and consider "genetic swamping" to reduce rainbow trout component – currently managed as a *diversified, quality* trout fishery |
| Harrington L. | Stocked WCT | Evaluate performance and size structure of cutthroat trout population - manage as a *quality* cutthroat trout fishery |
| Straight Lake | Wild WCT | Confirm that cutthroat trout population is self-sustaining |
| Straight Lake - Lower | Fishless | None; Identify any unauthorized fish introductions |
| Trio L.-Upper | Wild EBT | Consider tools to eliminate brook trout; convert to WCT fishery |
| Trio L.-Middle | Fishless | None; Identify any unauthorized fish introductions |
| Trio L.-Lower | Wild RBT with stocked WCT | Evaluate performance and survival of stocked cutthroat trout and consider "genetic swamping" to reduce rainbow trout component - currently managed as a *diversified, quality* trout fishery |

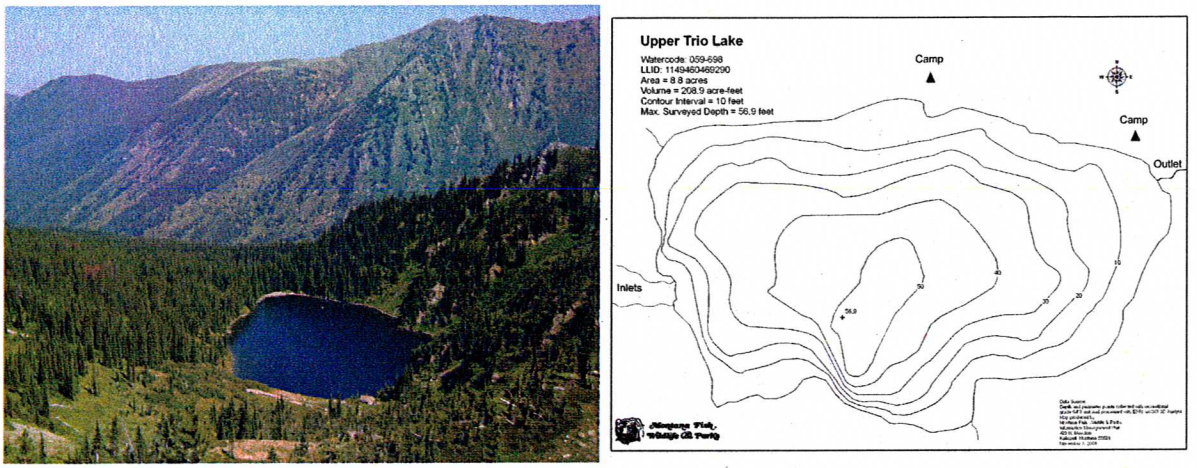
* Species abbreviations: WCT = westslope cutthroat trout, EBT = brook trout, RBT = rainbow trout

Removal or suppression of non-indigenous trout species in North Fork Fish Creek headwater lakes is a recommended management priority within the middle Clark Fork region. The North Fork represents a large, interconnected stronghold for westslope cutthroat trout and a major spawning and rearing habitat for bull trout.

Self-sustaining trout populations in Lower Trio and French Lakes contribute rainbow trout and rainbow trout x cutthroat trout hybrid individuals to outlet streams and threaten the integrity of non-introgressed westslope cutthroat trout populations immediately downstream (MFWP, unpublished data). Genetic samples from French Creek (below French Lake) were the most heavily hybridized *Oncorhynchus* samples in the entire unit. Alternatives for removing or reducing rainbow trout in Lower Trio and French Lakes will be evaluated (see Management Tools section). Typically, alternatives include removal through chemical rehabilitation or genetic "swamping" of rainbow trout through frequent, high density stocking of westslope cutthroat trout.

Similarly, brook trout emigration from Upper Trio Lake poses a continual threat of hybridization with bull trout and increased competition with westslope cutthroat trout and other aquatic species in the North Fork of Fish Creek. Currently, brook trout have only been detected in lower portions of the North Fork. The headwater source population in Upper Trio Lake should be

eliminated to reduce risk of expansion in the stream. Management tools to eliminate brook trout are limited, but all reasonable alternatives will be evaluated.




***Upper Trio Lake photo and bathymetry***

No changes in the management of fishless lakes in this management unit are anticipated. Middle Trio Lake is likely the only fishless water body that could support fish. No stocking is recommended at this lake, as it contributes to overall ecological diversity in the management unit. Upper and Lower Trio Lake could be managed as fishless waters if non-native fish species were eradicated. However, establishment of westslope cutthroat fisheries is recommended since Middle Trio Lake lies in close proximity and already provides a similar aquatic environment.

## VII. West Fork Fish Creek Management Unit

### Description

This management unit contains eight remote, back-country lakes (> 1 acre) that lie in the headwaters of Cedar Log Creek and other smaller tributaries to the West Fork of Fish Creek (Figure 12). These water bodies exhibit a range of morphological and ecological conditions, but most are relatively unproductive waters that lie in glacial cirque basin or glacial trough landforms near the tree line. Several of the lakes in this management unit are particularly large (26-41 acres) and deep (55-148 ft max depth) for water bodies in the middle Clark Fork region (e.g., Upper and Lower Siamese Lakes, South Cedar Log Lake).

Five of the lakes in this management unit are fish-bearing, with varying levels of natural reproduction and combinations of westslope cutthroat trout and Yellowstone cutthroat trout. Two fisheries are supplemented or sustained through periodic westslope cutthroat trout plants (Lower Siamese and Vann Lakes). Self-sustaining trout populations were found in the Cedar Log Lakes and Upper Siamese Lake, which support Yellowstone and westslope cutthroat trout, respectively. Fish body condition in the various cutthroat trout fisheries was generally low or moderate (mean Wr 76-93), as these water bodies are generally oligotrophic and many have high rates of natural reproduction (see Appendix A).

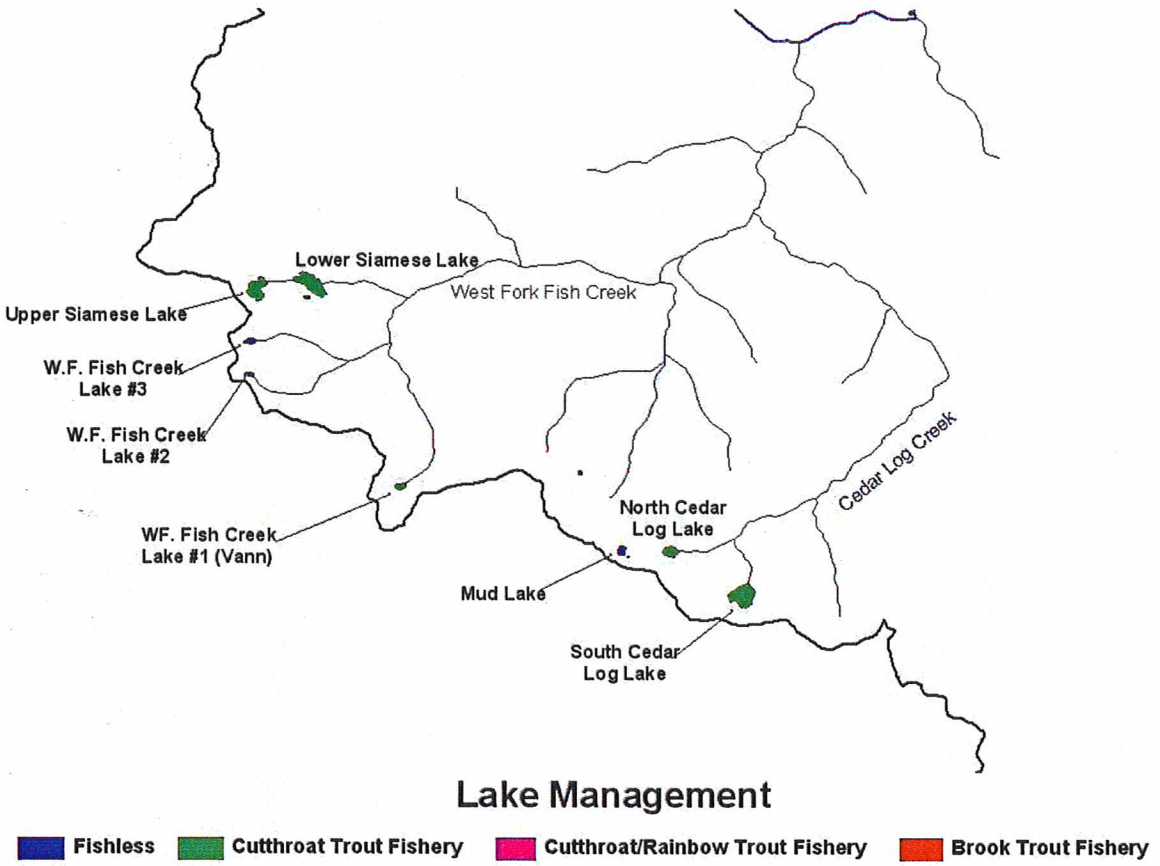



**Figure 12**. Map of mountain lakes and fishery status in the West Fork Fish Creek Management Unit.

The West Fork of Fish Creek is a regional stronghold for native salmonids. Fluvial bull trout and westslope cutthroat trout are abundant throughout the stream. Introduced fish species (Yellowstone cutthroat trout in this case) in headwater lakes constitute a threat to the long-term viability of these populations. Further downstream, the West Fork and main stem of Fish Creek support a mixed community of introduced salmonids, hybrids, and native aquatic populations, but native salmonids are the dominant fish species.

The three fishless lakes (> 1 acre) in this unit range from productive, wetland ponds (e.g., Mud Lake; ~ 5 acres, < 5 ft deep) to relatively sterile (oligotrophic), deeper waters (e.g., West Fork Fish Creek Lake #3; ~6 acres, > 15 ft deep). Characteristics of smaller (< 1 acre), un-named water bodies scattered throughout the unit have not been quantified, but many have been anecdotally described as wetlands or ephemeral ponds.

Amphibian surveys were completed on all lakes > 1 acre except West Fork Fish Creek Lakes #2 and #3. Columbia spotted frog adults and tadpoles were common or abundant at all lakes and densities appeared most closely correlated with the availability of emergent aquatic vegetation

along the shore. Juvenile long-toed salamanders were also observed at West Fork Fish Creek Lake #1 (Vann Lake) and Mud Lake.

Because the entire management unit lies in the proposed Great Burn Wilderness Area, lake access is difficult. Lakes can be reached via 5-10 miles of non-motorized travel on established USFS trails, typically from the Clearwater Crossing trailhead. Alternative routes include access from Idaho by crossing the state-line divide or by traveling the state-line trail system from Trout Creek or Schley Mountain (Cache Creek) trailheads (see Appendix C).

**Lake Management**

The West Fork Fish Creek Management Unit provides a combination of stocked and self-sustaining cutthroat trout fisheries, as well as several fishless lakes (Table 14). Lakes in the MFWP stocking program include Vann Lake and Lower Siamese Lake. These lakes are managed as quality and harvest-oriented westslope cutthroat trout fisheries. Other waters support self-sustaining trout populations with low fish body condition (mean Wr 76-83) and marginal growth (Upper Siamese Lake and Cedar Log Lakes). Upper Siamese Lake was recently removed from the stocking program as trout size structure, fish density and juvenile abundance indicated that the westslope cutthroat trout population was reproducing consistently. The performance of stocked westslope cutthroat trout will be evaluated over time and MFWP will also seek to confirm that the Upper Siamese Lake fishery is self-sustaining. If monitoring indicates that the quality of these fisheries may be improved through adjustments in frequency or quantity of stocking, changes will be considered.

**Table 14**. Recommended management strategies for West Fork Fish Creek Management Unit lakes.

| Water Body | Current Fishery | Recommended Future Actions |
|---|---|---|
| Cedar Log Lake -North | Wild YCT * | Evaluate opportunities to convert to westslope cutthroat trout fishery; consider "genetic swamping" to reduce YCT component |
| Cedar Log Lake - South | Wild YCT | Evaluate opportunities to convert to westslope cutthroat trout fishery; consider "genetic swamping" to reduce YCT component |
| Mud Lake | Fishless | None; Identify any unauthorized fish introductions |
| Siamese Lake - Upper | Wild WCT | Confirm that cutthroat trout population is self-sustaining |
| Siamese Lake - Lower | Stocked WCT | Evaluate performance and size structure of cutthroat trout population – manage as *harvest-oriented* cutthroat trout fishery |
| W. F. Fish Cr L. # 1 (Vann) | Stocked WCT | Evaluate performance and size structure of cutthroat trout population – manage as *quality* cutthroat trout fishery |
| W. Fork Fish Cr Lake #2 | Fishless | None; Identify any unauthorized fish introductions |
| W. Fork Fish Cr Lake #3 | Fishless | None; Identify any unauthorized fish introductions |

* Species abbreviations: WCT = westslope cutthroat trout, YCT = Yellowstone cutthroat trout

North and South Cedar Log Lakes contained wild trout populations with obvious Yellowstone cutthroat trout morphological characteristics (no genetic testing completed). Emigrants from

these populations pose a substantial hybridization risk to native westslope cutthroat trout populations in the West Fork of Fish Creek. Recent genetic testing in the West Fork (1993 and 2004; MFWP, unpublished data) has confirmed low level hybridization of native (westslope) stream populations. Management priorities include suppression of non-native Yellowstone cutthroat trout populations in these waters to reduce future risk. Given the logistical constraints and large size of South Cedar Log Lake, genetic 'swamping' with genetically compatible westslope cutthroat trout will likely be one tool used to help effect this change.

No changes in the management of fishless lakes in this management unit are anticipated. Middle West Fork Fish Creek Lake #3 is likely the only fishless water body that would allow consistent over-winter fish survival. No stocking is recommended at this lake, as it contributes to overall ecological diversity in the management unit.

## VIII. South Fork Fish Creek Management Unit

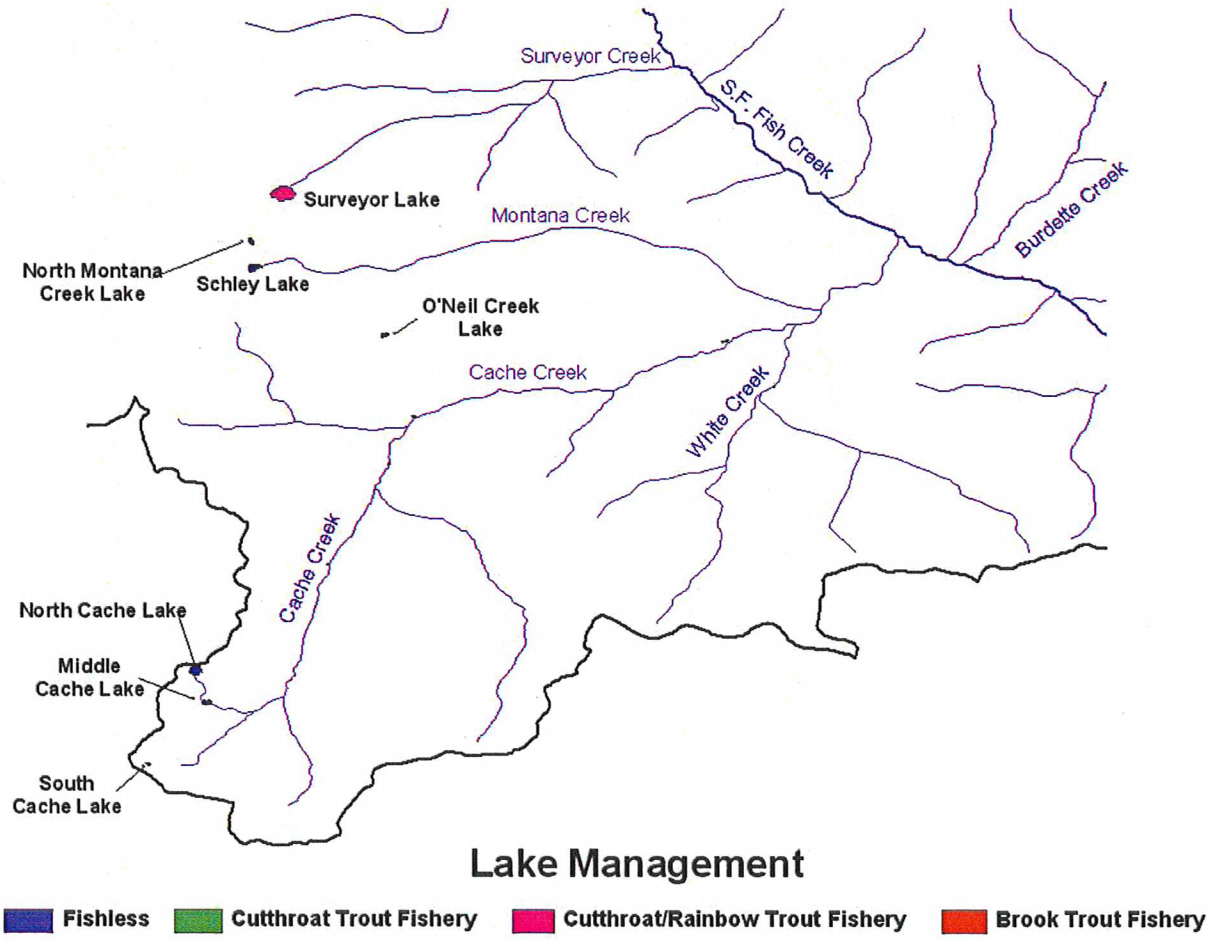



**Figure 13**. Map of mountain lakes and fishery status in the South Fork Fish Creek Management Unit.

## Description

The South Fork Fish Creek Management Unit is comprised of six fishless lakes and one lake fishery in the headwaters of Cache, Montana, and Surveyor Creeks (tributaries of South Fork Fish Creek). Like most middle Clark Fork region alpine lakes, these oligotrophic waters lie in glacial cirque basins located near or above the tree line (5,800-6,850 ft msl). The preponderance of fishless lakes, clustered in upper Montana Creek and upper Cache Creek, makes this management unit unique (Figure 13). Most are small (< 6.5 acres), secluded waters that have not recently been surveyed or have never been surveyed (e.g., North Montana Creek Lake, Schley lake, O'Neil Creek Lake). Tabular information for these lakes in Appendix A is anecdotal or was inferred from maps.

The lone fishery, Surveyor Lake, is comprised of self-sustaining rainbow trout that are supplemented with stocked westslope cutthroat trout to provide diversity. Fish densities are high in Surveyor Lake and trout body condition (mean Wr) is low to moderate (79-91). This water is managed as a high density, harvest-oriented fishery that receives considerable angler use.

The Surveyor Creek and greater Cache Creek drainages support important native populations that have been compromised by past brook trout and rainbow trout introductions in Fish Creek and Surveyor Lake. Surveyor Creek supports predominantly westslope cutthroat trout, with low densities of brook trout and rainbow trout x westslope cutthroat trout hybrids (MFWP, unpublished data). Cache Creek has a similar species composition, with a remnant bull trout population in the main stem and non-introgressed westslope cutthroat trout in some tributaries. Further downstream, the South Fork and main stem of Fish Creek support a mixed community of introduced salmonids, hybrids, and native aquatic populations, but native salmonids are the dominant fish species.

Because shoreline surveys have not been conducted at most the lakes, the status of amphibian populations is unknown. Adult Columbia spotted frogs were observed at Surveyor Lake, but no amphibians were detected at North Cache Lake.

Access to lakes in this unit is variable. Surveyor Lake lies just 0.5 miles by trail from an open USFS road. Not surprisingly, Surveyor Lake is a popular fishery and supports frequent recreational use. Schley Lake and North Montana Creek Lake also lie close to the road network, but there are no developed trails to the lakes. Other fishless lakes lie in Cache Creek roadless areas (proposed Great Burn Wilderness) and are not accessible via the U.S. Forest Service trail network. None of the fishless waters surveyed had evidence of recent recreational use (see Appendix C).

## Lake Management

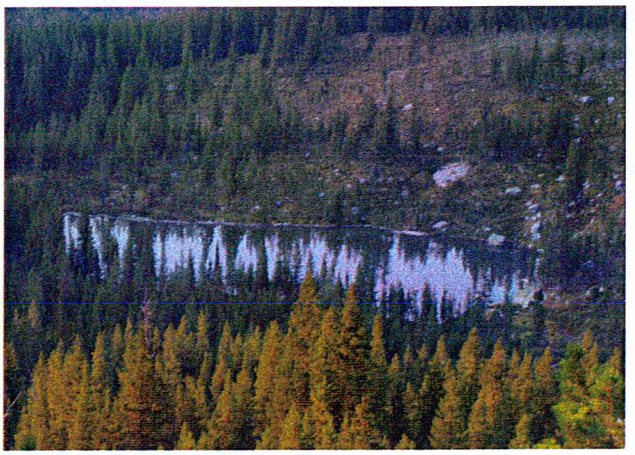
Surveyor Lake supports the only trout fishery in the South Fork Fish Creek Management Unit (Table 15). Easy access and high fish densities make this lake a popular destination for anglers. Similar to other headwater lakes that support wild rainbow trout, conversion to westslope cutthroat trout that are genetically compatible with downstream populations is the preferred management direction. This would likely involve "swamping" the existing population with higher densities of M012 strain westslope cutthroat trout.

**Table 15**. Recommended management strategies for South Fork Fish Creek Management Unit lakes.

| Water Body | Current Fishery | Recommended Future Actions |
|---|---|---|
| Cache Lake - North | Fishless | None; Confirm extirpation of WCT & Identify any unauthorized fish introductions |
| Cache Lake - Middle | Fishless | None; Identify any unauthorized fish introductions |
| Cache lake - South | Fishless | None; Identify any unauthorized fish introductions |
| N. Montana Creek Lake | Fishless | Complete lake survey; Identify any unauthorized fish introductions |
| O'Neil Creek Lake | Fishless | Complete lake survey; Identify any unauthorized fish introductions |
| Schley Lake | Fishless | Complete lake survey and determine suitability for trout introduction; Identify any unauthorized fish introductions |
| Surveyor Lake | Wild RBT and stocked WCT | Evaluate performance and survival of stocked cutthroat trout and consider "genetic swamping" to reduce rainbow trout component – currently managed as a *diversified, harvest-oriented* trout fishery |

* Species abbreviations: WCT = westslope cutthroat trout, RBT = rainbow trout

No change in management is anticipated for fishless waters in upper Cache Creek: North Cache Lake, Middle Cache Lake, and South Cache Lake. These are all relatively pristine, high elevation (6,000-6,850 ft msl) waters that lie in the proposed Great Burn Wilderness area. Only North Cache Lake is considered to be capable of supporting fish, but no stocking is recommended as this lake is very remote and represents a unique alpine environment that has no obvious evidence of human disturbance. MFWP surveys in 2006 indicated that the lake contained extremely low densities of large westslope cutthroat trout that are likely remnants from past stocking. Discontinued stocking is expected to eliminate this trout population as spawning habitat is limited. Currently, there are no plans to develop other fisheries in this management unit without completing thorough field surveys at North Montana Creek Lake, O'Neil Creek Lake, and Schley Lake. Schley Lake is a possible candidate for fish introduction, but stocking would only be considered if other nearby fishless waters provided comparable habitat.

***North Cache Lake (left) and South Cache Lake (right) – fishless waters in the South Fork Fish Creek Management Unit***

As mentioned above, lake assessments (including amphibian surveys) are needed at several of the fishless lakes in this management unit. This work will help to direct and justify any future actions.

# Literature Cited


Adams, S.B., C.A. Frissell, and B.E. Rieman. 2001. Geography of invasion in mountain streams: Consequences of headwater lake fish introductions. Ecosystems (2001):296-307.

Adams, S.B., D.A. Schmetterling, and M.K. Young. 2005. Instream movement by boreal toads (Bufo boreas boreas). Herpetological Review 36(1): 27-33.

AFWA/USFS/BLM Agreement. 2006. Policies and guidelines for fish and wildlife management in National Forest and Bureau of Land Management Wilderness. 17 pp.

Anderson, R.O. and R.M. Neumann. 1992. Length, Weight, and Associated Structural Indices. *In* Fisheries Techniques; B.R. Murphy and D.W. Willis, eds. American Fisheries Society, Bethesda, Maryland. pp 447-482.

Bahls, P. 1992. The status of fish populations and management of high mountain lakes in the western United States. Northwest Science 66(3):183-193.

Bailey, P.E. and W.A. Hubert. 2003. Factors associated with stocked cutthroat trout populations in high-mountain lakes. North American Journal of Fisheries management 23:611-618.

Bjornn, T.C. and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. Pages 83-138 *in* Influences of Forest and Rangeland Management on Salmonid Fishes and their Habitats, W.R. Meehan, ed. American Fisheries Society Special Publication 19, Bethesda, Maryland.

Carter, D. 1997. Maintaining wildlife naturalness in wilderness. International Journal of Wilderness 3(3):17-21.

Donald, D.B. and R.S. Anderson. 1982. Importance of environment and stocking density for growth of rainbow trout in mountain lakes. Transactions of the American Fisheries Society 111:675-680.

Donald, D.B., R.S. Anderson, and D.W. Mayhood. 1980. Correlations between brook trout growth and environmental variables for mountain lakes in Alberta. Transactions of the American Fisheries Society 109:603-610.

Dunham, J.B., D.S. Pilliod and M.K. Young. 2004. Assessing the consequences of nonnative trout in headwater ecosystems in western North America. Fisheries 29(6): 18-26.

Finlayson, B.J., R.A. Schnick, R.L. Cailteux, L. DeMong, W.D. Horton, W. McClay, C.W. Thompson, and G.J. Tichacek. 2000. Rotenone use in fisheries management: administrative and technical guidelines manual. American Fisheries Society, Bethesda, Maryland.

Finlayson, B.J., R.A. Schnick, R.L. Cailteux, L. DeMong, W.D. Horton, W. McClay, C.W. Thompson, and G.J. Tichacek. 2001. Better fishing through management: how rotenone is used to help manage our fishery resources more effectively. American Fisheries Society, Bethesda, Maryland.

Fraley, J. 1996. Cooperation and controversy in wilderness fisheries management. Fisheries 21(5):16-21.

Funk, C.F. and W.W. Dunlap. 1999. Colonization of high-elevation lakes by long-toed salamanders (*Ambystoma macrodactylum*) after the extinction of introduced trout populations. Canadian Journal of Zoology 77:1759-1767.

Grisak, G., B. Marotz, G. Michael, M. Schnee, K. Tempel, and L. Fried. 2006. Hungry Horse Dam fisheries mitigation, habitat implementation. Progress report for 2005. Montana Fish, Wildlife & Parks, Kalispell.

Knapp, R.A. and K.R. Matthews. 2000. Non-native fish introductions and the decline of the mountain yellow-legged frog from within protected areas. Conservation Biology 14(2): 428-438.

Knapp, R.A., P.S. Corn and D.E. Schindler. 2001(a). The introduction of nonnative fish into wilderness lakes: good intentions, conflicting mandates, and unintended consequences. Ecosystems 4:275-278.

Knapp, R.A., K.R. Matthews, and O. Sarnelle. 2001(b). Resistance and resilience of alpine lake fauna to fish introductions. Ecological Monographs 71(3) 401-421.

Knotek, W.L. 2005. Middle Clark Fork River and Missoula Area: 2004 Fisheries Status Report. Federal Aid Report for F-78-R6 and F-113-R1/R2. Montana Fish, Wildlife, and Parks, Missoula, Montana. 66 pp.

Leary, R.F., G.K. Sage and F.W. Allendorf. 2006. Evaluation of stocking as a means of replacing introduced trout populations in lakes with westslope cutthroat trout. University of Montana Conservation Genetics Laboratory Report for Montana Fish, Wildlife and Parks.

Matthews, K.R. and R.A. Knapp. 1999. A study of high mountain lake fish stocking effects in the U.S. Sierra Nevada Wilderness. International Journal of Wilderness 5(1):24-26.

Matthews, K.R., K.L. Pope, H.K. Preisler and R.A. Knapp. 2001. Effects of nonnative trout on Pacific treefrogs (Hyla regilla) in the Sierra Nevada. Copeia 2001(4): 1130-1137.

Maxell, B.A. 2002. Amphibian and aquatic reptile inventories in watersheds in the South and Middle Forks of the Flathead River drainage that contains lakes being considered for application of piscicides and subsequent stocking of westslope cutthroat trout. Report to the Region 1 Office of the U.S. Forest Service and Montana Fish, Wildlife and parks. Montana Cooperative Wildlife Research Unit and Wildlife Biology Program, University of Montana, Missoula, MT. 62 pp.

Maxell, B.A., J.K. Werner, P. Hendricks, and D. Flath. 2003. Herpetology in Montana: a history, status summary, checklists, dichotomous keys, accounts for native, potentially native, and exotic species, and indexed bibliography. Olympia, WA: Society for Northwestern Vertebrate Biology. Northwest Fauna 5: 1-138.

Meyer, K.A., J.A. Lamansky Jr., and D.J. Schill. 2006. Evaluation of an unsuccessful brook trout electrofishing removal project in a small Rocky Mountain stream. North American Journal of Fisheries Management 26:849-860.

Meyer, K.A. and D.J. Schill (eds). 2007. Multi-state high mountain lake summit report. Idaho Department of Fish and Game Annual Report, Federal Aid Grant F-73-R-29, Boise, Idaho. 19 pp.

MFWP. 1995-2007. Montana statewide angling pressure summaries. Montana Fish, Wildlife & Parks, Helena, Montana.

MFWP. 2008. Montana Fishing Regulations booklet. 91 pp.

Montana Bull Trout Scientific Group (MBTSG). 1996. Assessment of methods for removal or suppression of introduced fish to aid in bull trout recovery. Prepared for the Montana Bull Trout Restoration Team and Montana Fish, Wildlife and Parks, Helena, Montana.

Parker, B.R., D.W. Schindler, D.B. Donald, and R. S. Anderson. 2001. The effects of stocking and removal of a nonnative salmonids on the plankton of an alpine lake. Ecosystems 4:334-345.

Peterson, D.P. and K.D. Fausch. 2003. Upstream movement by non-native brook trout (*Salvelinus fontinalis*) promotes invasion of native cutthroat trout (*Oncorhynchus clarki*) habitat. Canadian Journal of Fisheries and Aquatic Science 60:1502-1516.

Peterson, D.P., K.D. Fausch and G.C. White. 2004. Population ecology of an invasion: effects of brook trout on native cutthroat trout. Ecological Applications 14(3):754-772.

Pilliod, D.S. and C.R. Peterson. 2001. Local and landscape effects of introduced trout on amphibians in historically fishless watersheds. Ecosystems 4:322-333.

Pister, E.P. 2000. Wilderness fish stocking: History and perspective. Ecosystems 4:279-286.

Pope, K.L. and K.R. Matthews. 2001. Movement ecology and seasonal distribution of mountain yellow-legged frogs, *Rana muscosa*, in a high-elevation Sierra Nevada basin. Copeia 2001(3):787-793.

Schindler, D.E., R.A. Knapp, and P.R. Leavitt. 2001. Alteration of nutrient cycles and algal production resulting from fish introductions into mountain lakes. Ecosystems 4:308-321.

Scott, W.B. and E.J. Crossman. 1973. Freshwater Fishes of Canada. Bulletin 184, Fisheries Research Board of Canada, Ottowa.

Shepard, B. B. 2004. Factors that may be influencing nonnative brook trout invasion and their displacement of native westslope cutthroat trout in three adjacent southwestern Montana streams. North American Journal of fisheries Management. 24:1088-1100.

Shepard, B.B., B.E. May, and Wendi Urie. 2005. Status and conservation of westslope cutthroat trout within the western United States. North American Journal of Fisheries Management 25:1426-1440.

Stagliano, D.M., G.M. Stephens and W.R. Bosworth. 2007. Aquatic invertebrate Species of Concern on USFS Northern Region lands. Report to USDA Forest Service, Northern Region. Montana Natural Heritage Program, Helena, Montana and Idaho Conservation Data Center, Boise, Idaho. 95 pp.

Stiff, R.K. 2000. Protocols for sampling alpine lakes. Montana Fish, Wildlife and Parks, Billings, Montana

Stiff, R.K. 1998. Factors affecting growth of Yellowstone cutthroat trout (*Oncorhynchus clarki bourvieri*) in alpine lakes of the Absorka-Beartooth Wilderness, Montana. Master's thesis. Montana State University, Bozeman.

Werner, J.K., B.A. Maxell, P. Hendricks, and D.L. Flath. 2004. Amphibians and Reptiles of Montana. Mountain Press Publishing Company, Missoula, Montana. 262 pp.

Wiley, R.W. 2003. Planting trout in Wyoming high-elevation wilderness waters. Fisheries 28(1): 22-27.

# APPENDIX A

TABLES SUMMARIZING SURVEY INFORMATION FOR MOUNTAIN LAKES IN THE MIDDLE CLARK FORK REGION.

**Table 1. Summary information for fishless mountain lakes > 1 acre.**

| Lake | Location (T, R, S) | GPS Location Latitude | GPS Location Longitude | Stream Drainage | Approx. Surf. Acres (ha) | Approx. Max Depth | Approx. Elevation | Year Surveyed | Could* Support Fish? |
|---|---|---|---|---|---|---|---|---|---|
| Big Sunday Cr Lake | 18N, 31W, 4 | N 47.3533 | W 115.5533 | Silver Cr (St Regis) | ~1 (0.4) | Unknown | 5,875 ft | None | Unknown |
| Cache Lake (North) | 11N, 25W, 8 | N 46.7300 | W 114.7760 | Cache Cr (Fish Cr) | 6.5 (2.6) | 74 ft | 6,850 ft | 2006 | Yes |
| Cache Lake (Middle) | 11N, 25W, 8 | N 46.7240 | W 114.7740 | Cache Cr (Fish Cr) | 3.8 (1.5) | < 5 ft | 6,000 ft | 1975 | No |
| Cache Lake (South) | 11N, 25W, 18A | N 46.7120 | W 114.7850 | Cache Cr (Fish Cr) | ~1 (0.4) | 10 ft | 6,800 ft | 1975 | No |
| Cement Creek Lake | 14N, 26W, 18B | N 46.9785 | W 114.9360 | Trout Creek | 3.8 (1.5) | ~10 ft | 6240 ft | 1975 | No |
| Copper Cr Lake #2 | 19N, 32W, 6/7 | N 47.4280 | W 115.7170 | Copper (St Regis) | 1.7 (0.7) | <10 ft | 5,807 ft | 1970 | No |
| Deep Creek Lake | 15N, 27W, 22 | N 47.0440 | W 115.0050 | Trout Creek | 4.8 (1.9) | ~ 15 ft | 6,000 ft | 1970 | Yes |
| Deer Creek Lake #2 | 17N, 30W, 3 | N 47.2682 | W 115.3973 | Deer Cr (St. Regis) | ~1 (0.4) | No data | 5,945 ft | None | Unknown |
| Dry Cr Lake #1 | 16N, 28W, 21A | N 47.1345 | W 115.1400 | Dry Creek | 1.3 (0.5) | No data | 5,802 ft | None | Unknown |
| Eagle Peak Lake | 18N, 30W, 35A | N 47.2825 | W 115.3730 | Ward Cr (St Regis) | 3.1 (1.2) | ~ 30 ft | 6,200 ft | 1975 | Yes |
| East Windfall Lake | 14N, 26W, 5B | N 47.0060 | W 114.9153 | Trout Creek | 1.2 ((0.5) | ~ 15 ft | 6,400 ft | 1975 | Yes |
| Fletcher Lake | 14N, 27W, 25A | N 46.9505 | W 114.9465 | N.F. Fish Creek | 1.7 (0.7) | <5 ft | 6,040 ft | 1975 | No |
| Gold Peak Lake (Lower) | 18N, 30W, 25 | N 47.2945 | W 115.3650 | Ward Cr (St Regis) | 2.5 (1.0) | < 5 ft | 5,790 ft | 1975 | No |
| Heart Lake (Lower) | 16N, 28W, 32/29 | N 47.1095 | W 115.1652 | Dry Creek | 1.9 (0.8) | ~ 10 ft | 6,120 ft | 1975 | No |
| Heart Lake (Upper) | 16N, 28W, 32B | N 47.1083 | W 115.1680 | Dry Creek | 2.5 (1.0) | ~ 15 ft | 6,220 ft | 1975 | Yes |
| Hidden Lake (Dry Creek) | 16N, 28W, 29B | N 47.1223 | W 115.1692 | Dry Creek | ~1 (0.4) | ~18 ft | 5,710 ft | 1974 | Yes |
| Hidden Lake (Trout Creek) | 14N, 27W, 23 | N 46.9585 | W 114.9850 | Trout Creek | 5.1 (2.0) | ~ 15 ft | 6,077 ft | 1970 | Yes |
| Landowner Lake (Trout Cr) | 15N, 26W, 30C | N 47.0237 | W 114.9351 | Trout Creek | 2.4 (1.0) | No data | 6,190 ft | None | Unknown |
| Mary Lake | 18N, 30W, 35 | N 47.2730 | W 115.3780 | Ward Cr (St Regis) | 3.4 (1.4) | ~6 ft | 6,250 ft | 1970 | No |
| Mink Peak Lake | 16N, 28W, 33 | N 47.1010 | W 115.1410 | Cedar Creek | 1.9 (0.8) | <5 ft | 6,610 ft | 1975 | No |
| Mink Peak Lake #3 | 16N, 28W, 35 | N 47.1055 | W 115.1095 | Cedar Creek | 1.3 ((0.5) | No data | ~6,105 ft | None | Unknown |
| Montana Creek Lake (North) | 12N, 25W, 8 | N 46.8125 | W 114.7650 | Cache Cr (Fish Cr) | 1.8 (0.7) | No data | ~6,615 ft | None | Unknown |
| Mud Lake | 12N, 26W, 14/15 | N 46.7970 | W 114.8440 | W.F. Fish Creek | 5 (2.0) | ~5 ft | 6,216 ft | 2005 | No |
| O'Neil Cr Lake | 12N, 25W, 16 | N 46.7945 | W 114.7400 | Cache Cr (Fish Cr) | 1.4 (0.6) | No data | 5,772 ft | None | Unknown |
| Oregon Peak Lake | 15N, 28W, 11 | N 47.0697 | W 115.0974 | Cedar Creek | 2 (0.8) | ~13 ft | 5,650 ft | 1975 | Yes |
| Quartz Creek Lake #1 | 14N, 26W, 5C | N 46.9957 | W 114.9145 | Quartz Creek | 3.8 (1.5) | ~ 16 ft | 6,850 ft | 1975 | Yes |
| Quartz Creek Lake #2 | 14N, 26W, 9 | N 46.9835 | W 114.8943 | Quartz Creek | 1.9 (0.8) | ~ 15 ft | 6,280 ft | 1975 | Yes |
| St. Regis Lake #1 | 19N, 32W, 7 | N 47.4280 | W 115.7310 | St. Regis River | 2 (0.8) | < 6 ft | 5,650 ft | 1970 | No |
| St. Regis Lake #3 (upper) | 19N, 33W, 12 | N 47.4260 | W 115.7485 | St. Regis River | 6 (2.4) | < 5 ft | 5,650 ft | 1975 | No |
| Schley Lake | 12N, 25W, 8 | N 46.8075 | W 114.7640 | Cache Cr (Fish Cr) | 4.7 (1.9) | No data | 6,212 ft | None | Unknown |
| Straight Lake (Lower) | 13N, 26W, 18 | N 46.8893 | W 114.9310 | N.F. Fish Creek | 1.9 (0.8) | No data | 6,532 ft | None | Unknown |
| Torino Lake | 16N, 28W, 18B | N 47.1495 | W 115.1910 | Dry Creek | 2.5 (1.0) | < 5 ft | 6,310 ft | 1975 | No |
| Trio Lake - Middle | 14N, 27W, 36 | N 46.9350 | W 114.9450 | Ward Creek | 7 (2.8) | 24 ft | 6,144 ft | 2006 | Yes |
| Ward Peak Lake | 17N, 30W, 2 | N 47.2675 | W 115.3715 | Ward Cr (St Regis) | 3 (1.2) | ~ 11 ft | 6,200 ft | 1970 | No |
| W. Fork Fish Creek Lake #2 | 13N, 26W, 32 | N 46.8350 | W 114.9240 | W.F. Fish Creek | 1.9 (0.8) | ~12 ft | 6,700 ft | 1975 | Yes |
| W. Fork Fish Creek Lake #3 | 13N, 26W, 32 | N 46.8420 | W 114.9240 | W.F. Fish Creek | 5.6 (2.2) | ~ 15 ft | 6,570 ft | 1975 | Yes |
| Wilson Lake | 16N, 28W, 11 | N 47.1575 | W 115.0985 | Dry Creek | 2.9 (1.2) | ~ 12 ft | 6,021 ft | 1970 | Yes |
| Windfall Lake | 14N, 26W, 6 | N 47.0060 | W 114.9290 | Trout Creek | 4 (1.6) | ~ 6 ft | 6,685 ft | 2006 | No |

* Lakes greater than 12 ft maximum depth were considered capable of supporting fish

**Table 3. Physical attributes of fish-bearing mountain lakes in 2004-2006.**

| Lake | Water Code | Date Surveyed | Range of Measurements Collected | | | | Lake Type | Lake Aspect |
|---|---|---|---|---|---|---|---|---|
| | | | Secchi Depth ft (m) | PH | Conductivity (uS) | TDS (ppm) | | |
| Bonanza Lake - Lower | 05-8464 | 8/29/2005 | 35-39 (10.7-11.9) | 8.6-8.7 | 81-86 | 41-43 | glacial cirque | NE |
| Bonanza Lake - Upper | 05-8465 | 8/30/2005 | 34-37 (10.4-11.3) | 8.6-8.8 | 82-83 | 41-42 | glacial cirque | E |
| Cedar Log Lake - North | 05-8544 | 8/2/2005 | > 13 (> 4.0) | 8.7-8.8 | 71-74 | 35-37 | glacial cirque | E |
| Cedar Log Lake - South | 05-9150 | 8/3/2005 | 52-58 (15.8-17.7) | 8.1-8.2 | 62-66 | 31-33 | glacial cirque | NNE |
| Clear Lake | 05-8557 | 9/14/2005 | 23-24 (7.0-7.3) | 8.1-8.2 | No data | No data | glacial cirque | NNE |
| Cliff Lake | 05-8576 | 7/12/2005 | 23-24 (7.0-7.3) | 7.5-8.2 | 80-85 | 41 | glacial cirque | NNE |
| Copper (Silvex) Lake | 05-8607 | 8/15/2005 | > 6.7 (> 2) | 9.4-9.5 | 76 | 38 | Impoundment | NE |
| Crater Lake | 05-8624 | 7/23/2005 | 23-24 (7.0-7.3) | 8.0-8.1 | 77-84 | 38-41 | glacial cirque | NE |
| Crystal Lake | 05-8656 | 8/10/2006 | 36 (11.0) | 8.0-8.1 | No data | No data | glacial cirque | NNE |
| Dalton Lake | 05-8672 | 7/28/2005 | > 25 (> 7.6) | 8.4-8.5 | 92-94 | 46-47 | glacial cirque | ENE |
| Diamond Lake | 05-8720 | 7/14/2005 | 22-23 (6.7-7.0) | 7.4-8.2 | 89 | 44 | glacial trough | NE |
| French Lake | 05-8816 | 7/15/2005 | 31-35 (9.4-10.7) | No data | 112-119 | 56-57 | glacial cirque | E |
| Gold Lake | 05-8864 | 9/12/2006 | > 12.7 (> 3.9) | No data | No data | No data | glacial cirque | N |
| Harrington Lake | 05-8904 | 8/1/2006 | > 18 (> 5.5) | 8.1-8.4 | 73-75 | 35-37 | glacial cirque | N |
| Hazel Lake | 05-8912 | 7/15/2004 | No data | No data | No data | No data | glacial cirque | NE |
| Heart Lake (Big Creek) | 05-8927 | 9/9/2004 | No data | No data | No data | 67-91 | glacial cirque | NNE |
| Heart Lake (Trout Creek) | 05-8928 | 7/25/2005 | 38-45 (11.6-13.7) | 8.3 | 76-78 | 37-38 | glacial cirque | NNE |
| Hoodoo Lake | 05-8992 | 9/21/2005 | 36 (11.0) | 8.4-8.6 | 35-37 | 17 | glacial cirque | N |
| Hub Lake | 05-9024 | 6/14/2004 | No data | No data | No data | No data | glacial cirque | ESE |
| Lenore Lake | 05-9088 | 9/7/2005 | > 24 (> 7.3) | 9.0-9.1 | 83-85 | 40-43 | glacial cirque | NE |
| Lost Lake | 05-9136 | 9/21/2005 | 37-41 (11.3-12.5) | 8.3-8.6 | 55-62 | 27-29 | glacial cirque | N |
| Missoula Lake | 05-9248 | 7/8/2005 | 28-32 (8.5-9.8) | 8.1-8.3 | 113 | 56-57 | glacial cirque | NNE |
| Moore Lake | 05-9264 | 9/8/2005 | 31-32 (9.4-9.8) | 8.4-8.5 | 79-83 | 40 | glacial cirque | NNE |
| Oregon Lake – Upper | 05-9345 | 7/21/2005 | 23-26 (7.0-7.9) | 8.3-8.5 | 106-110 | 52-54 | glacial cirque | NE |
| Oregon Lake – Middle | 05-9344 | 7/20/2005 | 35-36 (10.7-11.0) | 8.5-8.6 | 79-86 | 39-43 | glacial trough | NE |
| Oregon Lake – Lower | 05-9343 | 8/25/2005 | 18-20 (5.5-6.1) | 9.1-9.3 | 96-97 | 47-48 | glacial trough | N |
| Pearl Lake | 05-9360 | 7/27/2005 | > 21 (> 6.4) | 8.6 | 58-62 | 29-31 | glacial cirque | WNW |
| Rudie Lake | 05-9440 | 8/11/2006 | 12 (3.7) | 8.1-8.2 | No data | No data | glacial cirque | NE |
| St. Regis Lake – Lower | 05-9504 | 8/24/2005 | 26-28 (7.9-8.5) | No data | No data | No data | glacial cirque | N |
| Siamese Lake – Lower | 05-9535 | 8/13/2004 | No data | No data | No data | 68-79 | glacial cirque | NE |
| Siamese Lake – Upper | 05-9536 | 8/14/2004 | No data | No data | No data | 88-90 | glacial cirque | NE |
| Silver Lake | 05-9552 | 8/22/2005 | 49-51 (14.9-15.5) | 8.8-9.0 | 66-67 | 33-34 | glacial cirque | NNE |
| Square Lake | 05-9568 | 8/24/2004 | No data | No data | No data | No data | glacial cirque | NE |
| Straight Lake | 05-9600 | 8/2/2006 | 31-32 (9.4-9.8) | 8.6-8.7 | 57-59 | 28-29 | glacial cirque | E |
| Surveyor Lake | 05-5370 | 6/30/2004 | No data | No data | No data | 93-120 | glacial cirque | NE |
| Tadpole Lake | 05-9640 | 9/14/2005 | 19-21 (5.8-6.4) | 8.3 | 47-50 | 23-29 | glacial cirque | NE |
| Trail Lake | 05-9680 | 7/29/2006 | > 20 (> 6.1) | 8.6-8.7 | 73-75 | 36-37 | glacial cirque | N |
| Trio Lake – Upper | 05-9698 | 8/2/2006 | 40 (12.2) | 8.0-8.1 | 64-65 | 32-33 | glacial cirque | E |
| Trio Lake – Lower | 05-9696 | 8/3/2006 | 54 (16.5) | 8.4 | 62-65 | 31-32 | glacial cirque | E |
| Vann Lake | 05-9811 | 9/1/2005 | > 18 (> 5.5) | 9.2-9.3 | 86-90 | 41-43 | glacial cirque | NE |

**Table 2. Summary information for fish-bearing mountain lakes.**

| Lake | Water Code | Location (T, R, S) | GPS Location Latitude | GPS Location Longitude | Stream Drainage | Approx. Elevation | Surface Acres (ha) | Max Depth ft (m) | Lake Volume (acre-ft) |
|---|---|---|---|---|---|---|---|---|---|
| Bonanza Lake - Lower | 05-8464 | 15N, 28W, 3 | N 47.0868 | W 115.1320 | Cedar Creek | 6,254 ft | 8.7 (3.5) | 57 (17.4) | 248.9 |
| Bonanza Lake - Upper | 05-8465 | 15N, 28W, 4 | N 47.0909 | W 115.1360 | Cedar Creek | 6,315 ft | 16.4 (6.6) | 83 (25.3) | 631.2 |
| Cedar Log Lake - North | 05-8544 | 12N, 26W, 14 | N 46.7971 | W 114.8320 | W.F. Fish Creek | 5,675 ft | 14.2 (5.8) | 13 (4.0) | 62.9 |
| Cedar Log Lake - South | 05-9150 | 12N, 26W, 24 | N 46.7876 | W 114.8170 | W.F. Fish Creek | 5,976 ft | 40.6 (16.4) | 148 (45.1) | 2,701.5 |
| Clear Lake | 05-8557 | 17N, 30W, 3 | N 47.2693 | W 115.4070 | Deer Cr (St Regis R) | 5,828 ft | 8.8 (3.6) | 42 (12.8) | 167.5 |
| Cliff Lake | 05-8576 | 16N, 28W, 18 | N 47.1388 | W 115.1900 | Dry Creek | 5,927 ft | 40.8 (16.5) | 180 (54.9) | 3,185 |
| Copper (Silvex) Lake | 05-8607 | 19N, 32W, 8 | N 47.4236 | W 115.7040 | Copper G. (St Regis R) | 4,983 ft | 3.5 (1.4) | 7 (2.1) | 8.8 |
| Crater Lake | 05-8624 | 14N, 26W, 33 | N 46.9273 | W 114.8810 | N.F. Fish Creek | 5,672 ft | 16.8 (6.8) | 33 (10.1) | 265 |
| Crystal Lake | 05-8656 | 18N, 30W, 28 | N 47.2972 | W 115.4200 | Deer Cr (St Regis R) | 5,445 ft | 14.3 (5.8) | 122 (37.2) | 945.8 |
| Dalton Lake | 05-8672 | 14N, 27W, 25 | N 46.9377 | W 114.9550 | N.F. Fish Creek | 6,288 ft | 6.2 (2.5) | 25 (7.7) | 81 |
| Diamond Lake | 05-8720 | 16N, 28W, 18 | N 47.1472 | W 115.1760 | Dry Creek | 5,408 ft | 18.3 (7.4) | 29 (8.8) | 229.7 |
| French Lake | 05-8816 | 14N, 26W, 18 | N 46.9669 | W 114.9370 | N.F. Fish Creek | 6,121 ft | 18.1(7.3) | 37 (11.3) | 370.9 |
| Gold Lake | 05-8864 | 18N, 30W, 23 | N 47.3013 | W 115.3780 | Deer Cr (St Regis R) | 5,970 ft | 1.9 (0.8) | 13 (3.9) | 10.7 |
| Harrington Lake | 05-8904 | 13N, 26W, 20 | N 46.8688 | W 114.9120 | N.F. Fish Creek | 5,815 ft | 7.8 (3.2) | 18 (5.5) | 63.1 |
| Hazel Lake | 05-8912 | 18N, 30W, 36 | N 47.2730 | W 115.3650 | Ward Cr (St Regis R) | 5,371 ft | 7.6 (3.1) | 23 (7.0) | 73.0 |
| Heart Lake (Big Creek) | 05-8927 | 18N, 30W, 29 | N 47.2842 | W 115.4550 | Big Cr (St Regis R) | 5,533 ft | 7.1 (2.9) | 60 (18.3) | 197.7 |
| Heart Lake (Trout Creek) | 05-8928 | 14N, 27W, 26 | N 46.9492 | W 114.9715 | Trout Creek | 5,755 ft | 61.6 (24.9) | 166 (50.6) | 3,555.1 |
| Hoodoo Lake | 05-8992 | 14N, 27W, 10 | N 46.9781 | W 115.0030 | Trout Creek | 5,850 ft | 11.4 (4.6) | 38 (11.6) | 233.3 |
| Hub Lake | 05-9024 | 18N, 30W, 35 | N 47.2758 | W 115.3750 | Ward Cr (St Regis R) | 5,700 ft | 5.6 (2.3) | 20 (6.1) | 37.8 |
| Lenore Lake | 05-9088 | 17N, 29W, 4 | N 47.2534 | W 115.2960 | Two-mile Cr (St Regis R) | 5,313 ft | 1.8 (0.7) | 24 (7.3) | 24.2 |
| Lost Lake | 05-9136 | 16N, 28W, 34 | N 47.1026 | W 115.1260 | Cedar Creek | 6,022 ft | 33.9 (13.7) | 181 (55.2) | 2,465 |
| Missoula Lake | 05-9248 | 15N, 28W, 11 | N 47.0634 | W 115.1160 | Cedar Creek | 6,058 ft | 11.4 (4.6) | 52 (15.9) | 293.7 |
| Moore Lake | 05-9264 | 16N, 29W, 3 | N 47.1804 | W 115.2510 | Little Joe Cr (St Regis R) | 5,316 ft | 14.3 (5.8) | 59 (18.0) | 454.9 |
| Oregon Lake – Upper | 05-9345 | 15N, 28W, 23 | N 47.0536 | W 115.0910 | Cedar Creek | 6,607 ft | 12.0 (4.9) | 49 (14.9) | 234.8 |
| Oregon Lake – Middle | 05-9344 | 15N, 28W, 13 | N 47.0569 | W 115.0850 | Cedar Creek | 5,900 ft | 26.6 (10.8) | 112 (34.2) | 1,310.4 |
| Oregon Lake – Lower | 05-9343 | 15N, 28W, 13 | N 47.0569 | W 115.0850 | Cedar Creek | 5,750 ft | 4.5 (1.8) | 28 (8.5) | 64.2 |
| Pearl Lake | 05-9360 | 14N, 27W, 25 | N 46.9445 | W 114.9590 | Trout Creek | 6,262 ft | 14.9 (6.0) | 21 (6.4) | 168.4 |
| Rudie Lake | 05-9440 | 18N, 30W, 28 | N 47.2882 | W 115.4160 | Deer Cr (St Regis R) | 5,641 ft | 7.1 (2.9) | 15 (4.6) | 37.6 |
| St. Regis Lake – Lower | 05-9504 | 19N, 33W, 12 | N 47.4264 | W 115.7433 | St. Regis River | 5,590 ft | 7.6 (3.1) | 40 (12.2) | 143.9 |
| Siamese Lake – Lower | 05-9535 | 13N, 26W, 29 | N 46.8547 | W 114.9100 | W.F. Fish Creek | 5,980 ft | 35.6 (14.4) | 90 (27.5) | 1,522.6 |
| Siamese Lake – Upper | 05-9536 | 13N, 26W, 29 | N 46.8536 | W 114.9220 | W.F. Fish Creek | 6,482 ft | 25.7 (10.4) | 55 (16.8) | 428.7 |
| Silver Lake | 05-9552 | 19N, 31W, 32 | N 47.3594 | W 115.5650 | Silver Cr (St Regis R) | 5,900 ft | 12.9 (5.2) | 60 (18.3) | 377.5 |
| Square Lake | 05-9568 | 17N, 30W, 1 | N 47.2644 | W 115.3590 | Ward Cr (St Regis R) | 5,660 ft | 12.4 (5.0) | 64 (19.5) | 341.9 |
| Straight Lake | 05-9600 | 13N, 26W, 30 | N 46.8610 | W 114.9390 | N.F. Fish Creek | 6,390 ft | 8.8 (3.6) | 44 (13.4) | 169.7 |
| Surveyor Lake | 05-5370 | 12N, 25W, 4 | N 46.8218 | W 114.7580 | S.F. Fish Creek | 5,956 ft | 20.1 (8.1) | 49 (14.9) | 526.4 |
| Tadpole Lake | 05-9640 | 18N, 31W, 4 | N 47.3503 | W 115.5440 | Big Cr (St Regis R) | 5,700 ft | 3.1 (1.3) | 37 (11.2) | 50.8 |
| Trail Lake | 05-9680 | 15N, 27W, 5 | N 47.0051 | W 115.0420 | Trout Creek | 5,780 ft | 11.5 (4.7) | 20 (6.1) | 148.0 |
| Trio Lake – Upper | 05-9698 | 14N, 27W, 36 | N 46.9290 | W 114.9460 | N.F. Fish Creek | 6,222 ft | 8.8 (3.6) | 57 (17.4) | 208.9 |
| Trio Lake – Lower | 05-9696 | 14N, 26W, 31 | N 46.9346 | W 114.9380 | N.F. Fish Creek | 5,827 ft | 14.0 (5.7) | 77 (23.5) | 534.9 |
| Vann Lake | 05-9811 | 12N, 26W 8 | N 46.8110 | W 114.8910 | W.F. Fish Creek | 6,075 ft | 4.7 (1.9) | 18 (5.5) | 47.4 |

**Table 4. Summary of fish population and amphibian information for fish-bearing mountain lakes.**

| Lake | Date Surveyed | Current Fishery* | Trout Natural Reproduction | Gill Net Catch Rate (#/net/hr) | Trout Size Range Sampled in (mm) | Trout Condition - Wr Mean (range) | Amphibians Observed** |
|---|---|---|---|---|---|---|---|
| Bonanza Lake - Lower | 8/29/2005 | EBT | High | 1.03 | 5.6-10.5 (143-267) | 84 (75-98) | CSF – adult/larv |
| Bonanza Lake - Upper | 8/30/2005 | EBT | High | 0.79 | 6.6-9.1 (168-230) | 82 (61-99) | None |
| Cedar Log Lake - North | 8/2/2005 | WCT/YCT | High | 2.24 | 6.9-12.2 (176-310) | 83 (72-105) | CSF – adult/larv |
| Cedar Log Lake - South | 8/3/2005 | YCT | Moderate | 0.96 | 6.9-12.6 (174-321) | 76 (68-87) | CSF – adult/larv |
| Clear Lake | 9/14/2005 | EBT | High | 0.87 | 6.4-9.8 (163-250) | 89 (77-102) | None |
| Cliff Lake | 7/12/2005 | WCT | Moderate | 1.96 | 4.6-13.3 (117-339) | 101 (88-116) | None |
| Copper (Silvex) Lake | 8/15/2005 | WCT | Low | 0.36 | 6.8-9.2 (173-233) | 86 (71-94) | CSF – adult, CGS |
| Crater Lake | 7/23/2005 | WCT | Moderate | 1.46 | 6.3-14.2 (161-360) | 101 (83-115) | None |
| Crystal Lake | 8/10/2006 | EBT | Low | 0.40 | 6.7-19.5 (171-495) | 95 (75-142) | CSF – adult |
| Dalton Lake | 7/28/2005 | WCT | Low | 0.57 | 10.7-15.7 (271-400) | 110 (101-127) | CSF – adult |
| Diamond Lake | 7/14/2005 | WCT/EBT | Low/High | 0.31 / 1.46 | 6.5-13.0 (166-330) | 78 (66-84) / 87 (62-101) | CSF – adult/larv |
| French Lake | 7/15/2005 | WCT/RBT | Moderate | 0.52 / 0.78 | 5.9-15.6 (150-395) | 99 (90-112) / 90 (73-100) | CSF – adult |
| Gold Lake | 9/12/2006 | WCT/RBT | High | - | 9.5-13.5 (241-343) | 87 (79-94) | CSF – adult/larv |
| Harrington Lake | 8/1/2006 | WCT | Low | 0.76 | 11.0-15.7 (279-400) | 99 (78-111) | CSF – adult |
| Hazel Lake | 7/15/2004 | WCT | Moderate | 1.00 | 5.4-12.6 (137-320) | 102 (88-116) | CSF – adult/larv, LTS – larv. |
| Heart Lake (Big Creek) | 9/9/2004 | WCT/RBT | Moderate | 0.40 / 0.40 | 5.7-15.8 (145-402) | 90 (79-102) / 87 (73-96) | None |
| Heart Lake (Trout Creek) | 7/25/2005 | EBT | High | 1.38 | 7.3-11.2 (186-285) | 87 (78-97) | CSF – adult |
| Hoodoo Lake | 9/21/2005 | EBT | High | 1.53 | 6.4-9.4 (162-240) | 89 (79-98) | CSF – adult/larv |
| Hub Lake | 6/14/2004 | WCT | High | 2.25 | 6.3-10.7 (160-271) | 94 (77-111) | CSF – adult/larv |
| Lenore Lake | 9/7/2005 | WCT | Low | 0.42 | 11.4-14.6 (289-372) | 108 (99-124) | None |
| Lost Lake | 9/21/2005 | EBT | Moderate | 0.58 | 6.5-8.1 (164-206) | 88 (72-100) | CSF – adult |
| Missoula Lake | 7/8/2005 | WCT | Low | 0.11 | 15.7-17.6 (398-447) | 128 (126-131) | CSF – adult |
| Moore Lake | 9/8/2005 | EBT | High | 0.85 | 7.0-10.5 (178-267) | 93 (85-108) | CSF – adult, LTS – larv., CGS |
| Oregon Lake – Upper | 7/21/2005 | EBT | High | 1.24 | 7.4-10.8 (187-275) | 92 (80-110) | None |
| Oregon Lake – Middle | 7/20/2005 | EBT | High | 1.29 | 6.3-10.5 (160-267) | 83 (70-93) | CSF – larv. |
| Oregon Lake – Lower | 8/25/2005 | EBT | High | 1.42 | 4.9-8.5 (125-215) | 94 (80-105) | CSF – adult/larv, CGS |
| Pearl Lake | 7/27/2005 | EBT | Low | 0.33 | 13.4-13.9 (340-353) | 141 (118-182) | CSF – adult/larv, WGS |
| Rudie Lake | 8/11/2006 | EBT | Moderate | 0.72 | 6.3-9.1 (159-230) | 87 (78-91) | CSF – adult |
| St. Regis Lake-Lower | 8/24/2005 | EBT | Low | 0.18 | 8.1-8.3 (205-210) | 89 (82-97) | None |
| Siamese Lake – Lower | 8/13/2004 | WCT | Moderate | 1.00 | 6.2-15.4 (158-390) | 93 (75-109) | CSF – adult |
| Siamese Lake – Upper | 8/14/2004 | WCT | High | 1.20 | 6.1-12.2 (155-309) | 80 (66-94) | CSF – adult |
| Silver Lake | 8/22/2005 | EBT | High | 0.89 | 10.7-12.7 (170-322) | 88 (78-101) | CSF – adult/larv |
| Square Lake | 8/24/2004 | WCT | Low | 0.85 | 9.1-14.3 (231-362) | 97 (82-131) | CSF – adult |
| Straight Lake | 8/2/2006 | WCT | High | 2.15 | 6.2-11.1 (158-281) | 86 (68-106) | None |
| Surveyor Lake | 6/30/2004 | WCT/RBT | High | 1.25 / 2.75 | 5.9-12.8 (151-325) | 91 (82-100) / 77 (63-89) | CSF – adult |
| Tadpole Lake | 9/14/2005 | WCT | Moderate | 0.80 | 6.1-13.8 (155-350) | 110 (84-132) | CSF – adult/larv |
| Trail Lake | 7/29/2006 | EBT | High | 5.10 | 4.6-13.8 (117-350) | 101 (86-119) | CSF – adult/larv |
| Trio Lake – Upper | 8/2/2006 | EBT | High | 0.70 | 5.6-9.8 (142-249) | 83 (63-99) | CSF – adult |
| Trio Lake – Lower | 8/3/2006 | RBT | High | 0.86 | 7.2-15.2 (183-385) | 89 (67-105) | CSF – adult, WGS |
| Vann Lake | 9/1/2005 | WCT | Low | 0.36 | 9.1-15.4 (231-390) | 91 (82-101) | CSF – adult/larv, LTS – larv. |

* Fish Species Codes: WCT = westslope cutthroat trout, YCT = Yellowstone cutthroat trout, CT = cutthroat trout, RBT = rainbow trout, EBT = brook trout

** Amphibian Species Codes: CSF = Columbia spotted frog, LTS = long-toed salamander, WGS = western garter snake, CGS = common garter snake, BT = boreal toad

**Table 5. Summary of fishery management information for fish-bearing mountain lakes.**

| Lake | Current Fishery[1] | Juv. Trout Abundance | Spawning Habitat[2] | Trout Natural Reproduction | Fish Planting Status (WCT) | Fishery Management Objective |
|---|---|---|---|---|---|---|
| Bonanza Lake - Lower | EBT | Moderate | Some Suitable | High | Not Stocked | Improve brook trout fishery (size structure); remove EBT if poss |
| Bonanza Lake - Upper | EBT | High | Marginal | High | Not Stocked | Improve brook trout fishery (size structure); remove EBT if poss |
| Cedar Log Lake - North | WCT/YCT | Moderate | Abundant | High | Not Stocked | Self-sustaining cutthroat fishery; convert to westslope CT if possi |
| Cedar Log Lake - South | YCT | Moderate | Some Suitable | Moderate | Not Stocked | Self-sustaining cutthroat fishery; convert to westslope CT if possi |
| Clear Lake | EBT | High | Some Suitable | High | Not Stocked | Improve brook trout fishery (size structure); remove EBT if poss |
| Cliff Lake | WCT | Low | Some Suitable | Moderate | Stocked | High density cutthroat trout fishery; harvest-oriented fishery |
| Copper (Silvex) Lake | WCT | Low | Marginal | Low | Stocked | Quality westslope cutthroat trout fishery |
| Crater Lake | WCT | Moderate | Some Suitable | Moderate | Stocked | Quality westslope cutthroat trout fishery |
| Crystal Lake | EBT | Low | Marginal | Low | Stocked (new) | Diversified trout fishery – WCT & EBT |
| Dalton Lake | WCT | Low | Some Suitable | Low | Stocked | Quality westslope cutthroat trout fishery |
| Diamond Lake | WCT/EBT | Low/Mod | Some Suitable | Low/High | Not Stocked | Diversified trout fishery – WCT & EBT; remove EBT if possib |
| French Lake | WCT/RBT | Low/Mod | Some Suitable | Moderate | Stocked | Quality hybrid cutthroat trout fishery; convert to WCT if possib |
| Gold Lake | WCT/RBT | Low/High | Abundant | High | Not Stocked (deleted) | Self-sustaining hybrid CT fishery; convert to westslope CT if poss |
| Harrington Lake | WCT | Low | Marginal | Low | Stocked | Quality westslope cutthroat trout fishery |
| Hazel Lake | WCT | Moderate | Some Suitable | Moderate | Stocked | Quality westslope cutthroat trout fishery |
| Heart Lake (Big Creek) | WCT/RBT | Low/Mod | Some Suitable | Moderate | Stocked | Quality hybrid cutthroat trout fishery; convert to WCT if possib |
| Heart Lake (Trout Creek) | EBT | High | Some Suitable | High | Not Stocked | Improve brook trout fishery (size structure); remove EBT if poss |
| Hoodoo Lake | EBT | High | Marginal | High | Not Stocked | Improve brook trout fishery (size structure); remove EBT if poss |
| Hub Lake | WCT | High | Abundant | High | Not Stocked (deleted) | Self-sustaining westslope cutthroat fishery |
| Lenore Lake | WCT | Low | Marginal | Low | Stocked | Quality westslope cutthroat trout fishery |
| Lost Lake | EBT | Moderate | Marginal | Moderate | Not Stocked | Improve brook trout fishery (size structure); remove EBT if poss |
| Missoula Lake | WCT | Low | Marginal | Low | Stocked | High density cutthroat trout fishery; harvest-oriented fishery |
| Moore Lake | EBT | High | Marginal | High | Not Stocked | Improve brook trout fishery (size structure); remove EBT if poss |
| Oregon Lake – Upper | EBT | Moderate | Marginal | High | Not Stocked | Improve brook trout fishery (size structure); remove EBT if poss |
| Oregon Lake – Middle | EBT | Moderate | Some Suitable | High | Not Stocked | Improve brook trout fishery (size structure); remove EBT if poss |
| Oregon Lake – Lower | EBT | Moderate | Some Suitable | High | Not Stocked | Improve brook trout fishery (size structure); remove EBT if poss |
| Pearl Lake | EBT | Low | Marginal | Low | Stocked (new) | Quality diversified trout fishery – WCT & EBT |
| Rudie Lake | EBT | High | Marginal | Moderate | Not Stocked | Remove EBT if possible; consider converting to fishless |
| St. Regis Lake-Lower | EBT | Low | Marginal | Low | Stocked (new) | Diversified trout fishery – WCT & EBT; hatchery supplemente |
| Siamese Lake – Lower | WCT | Moderate | Some Suitable | Moderate | Stocked | High density cutthroat trout fishery |
| Siamese Lake – Upper | WCT | Moderate | Some Suitable | High | Not Stocked (deleted) | Self-sustaining westslope cutthroat fishery |
| Silver Lake | EBT | Moderate | Some Suitable | High | Not Stocked | Improve brook trout fishery (size structure); remove EBT if poss |
| Square Lake | WCT | Low | Marginal | Low | Stocked | Quality westslope cutthroat trout fishery |
| Straight Lake | WCT | High | Abundant | High | Not Stocked (deleted) | Self-sustaining westslope cutthroat trout fishery |
| Surveyor Lake | WCT/RBT | Low/Mod | Some Suitable | High | Stocked | High density WCT & RBT fishery- harvest-oriented; convert to W |
| Tadpole Lake | WCT | High | Some Suitable | Moderate | Stocked | Quality westslope cutthroat trout fishery |
| Trail Lake | EBT | High | Some Suitable | High | Not Stocked | Improve brook trout fishery (size structure); remove EBT if poss |
| Trio Lake – Upper | EBT | High | Marginal | High | Not Stocked | Improve brook trout fishery (size structure); remove EBT if poss |
| Trio Lake – Lower | RBT | Moderate | Some Suitable | High | Stocked (new) | Quality WCT & RBT fishery; convert to WCT if possible |
| Vann Lake | WCT | Low | Some Suitable | Low | Stocked | Quality westslope cutthroat trout fishery |

[1] Species Codes: WCT = westslope cutthroat trout, YCT = Yellowstone cutthroat trout, CT = cutthroat trout, RBT = rainbow trout, EBT = brook trout

[2] Available trout spawning habitat in lake inlets and outlets - primarily applies to *Oncorhynchus* spp.

# APPENDIX B

SUMMARY OF THE 2007 MFWP STOCKING PROGRAM FOR MOUNTAIN LAKES IN THE MIDDLE CLARK FORK REGION.

## Table 1. Middle Clark Fork Mountain Lake Stocking Program Summary (2007)

| LAKE | FISHERY | NATURAL REPRODUCTION | MANAGEMENT OBJECTIVE | 2007 STOCKING RECOMMENDATION | BASE YEAR | FREQ |
|---|---|---|---|---|---|---|
| Cedar Log Lake - Little (North) | WCT/YCT | Moderate | Self-sustaining CT fishery | Removed from program | | |
| Cedar Log Lake - Big (South) | YCT | Moderate | Self-sustaining YCT fishery | Removed from program | | |
| Cliff Lake | WCT | Moderate | High density/Harvest | Change # stocked | 2000 | 7 yr |
| Copper (Silvex) Lake | WCT | Low | Quality fishery | No change | 2000 | 7 yr |
| Crater Lake | WCT | Moderate | Quality fishery | Change # stocked | 2000 | 7 yr |
| Crystal Lake | EBT/WCT | Low for EBT | Quality - Diversified | Added to program | 2000 | 7 yr |
| Dalton Lake | WCT | Low | Quality fishery | Change # stocked | 2000 | 7 yr |
| French Lake | RBT/WCT | Mod for RBT | Quality - Diversified | Change frequency | 2000 | 7 yr |
| Gold Lake | WCT | High | Self-sustaining fishery | Removed from program | | |
| Harrington Lake | WCT | Low | Quality fishery | Change # stocked | 2000 | 7 yr |
| Hazel Lake | WCT | Moderate | Quality fishery | Change # stocked | 2000 | 7 yr |
| Heart Lake (Big Creek) | RBT/WCT | Moderate | Quality - Diversified | Change # stocked & freq | 2000 | 7 yr |
| Hub Lake | WCT | High | Self-sustaining fishery | Removed from program | | |
| Lenore Lake | WCT | Low | Quality fishery | Change # stocked | 2000 | 7 yr |
| Missoula Lake | WCT | Low | High density/Harvest | No change | 2007 | 2 yr |
| North Cache Lake | WCT | Very Low | Fishless | Removed from program | | |
| Pearl Lake | EBT/WCT | Low | Quality - Diversified | Added to program | 2007 | 7 yr |
| Saint Regis Lake -Lower (Big) | EBT/WCT | Low for EBT | Quality - Diversified | Added to program | 2007 | 7 yr |
| Siamese Lake - Lower | WCT | Moderate | High density/Harvest | Change # stocked & freq | 2000 | 7 yr |
| Siamese Lake - Upper | WCT | Moderate | Self-sustaining fishery | Removed from program | | |
| Square Lake | WCT | Low | Quality fishery | Change # stocked | 2000 | 7 yr |
| Straight Lake | WCT | High | Self-sustaining WCT fishery | Removed from program | | |
| Surveyor Lake | RBT/WCT | High | High density/Harvest | Change # stocked & freq | 2007 | 4 yr |
| Trio Lake - Lower | RBT/WCT | High | Quality - Diversified | Added to program | 2007 | 7 yr |
| Tadpole Lake | WCT | Moderate | Quality fishery | Change # stocked | 2000 | 7 yr |
| W F Fish Creek Lake (Vann L) | WCT | Low | Quality fishery | Change # stocked | 2000 | 7 yr |
| Windfall Lake | WCT | N/A | Fishless | Removed from program | | |

**Management Objectives**

**HIGH DENSITY/HARVEST**: Angler catch > 1.5/hr, trout >300 mm common
**QUALITY FISHERY**: Angler catch > 1/hr, mean Wr > 100, trout > 360 mm common
**SELF-SUSTAINING FISHERY**: Wild trout population persists, no stocking required
**FISHLESS**: Minimal human use; promote natural processes & ecological diversity
**QUALITY - DIVERSIFIED:** WCT stocked on top of wild EBT or RBT

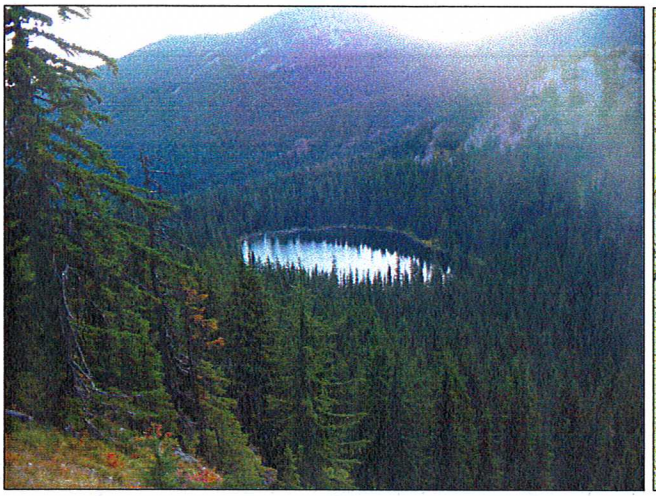
**Notes**

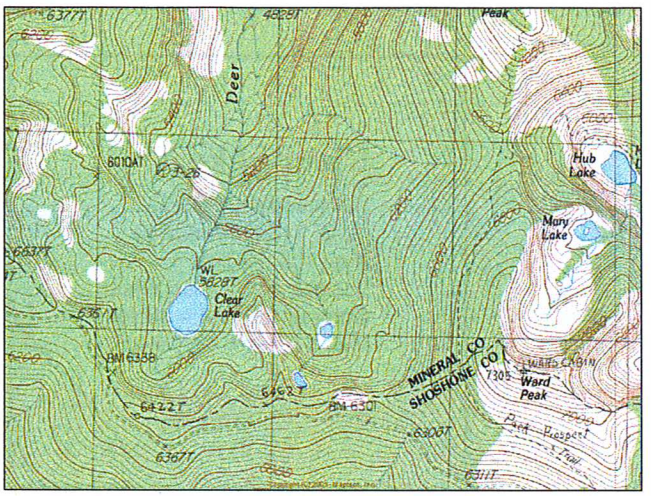
* Species Codes: WCT=westslope cutthroat trout, YCT=Yelowstone cutthroat trout, RBT=rainbow trout, EBT=brook trout
* All fish stocked are 1.5-2.0 inch M012 westslope cutthroat trout
* Stocking generally completed in July
* Lakes removed from program had adequate natural reproduction or will be managed as fishless
* Lakes added to program to diversify existing wild fisheries

# APPENDIX C

INDIVIDUAL LAKE SUMMARIES FOR FISH-BEARING MOUNTAIN LAKES IN THE MIDDLE CLARK FORK REGION.

# Clear Lake






**Description:** Clear Lake is a small (8.8 acres), remote glacial cirque lake located near the Idaho border in the Deer Creek (St. Regis River) drainage at 5,828 ft elevation. The lake lies on the Lolo National Forest (Superior Ranger District).

**Location:** T17N, R30W, Section 3; Latitude N 47.2693°, Longitude W 115.4070°; Nearest Town: St. Regis, MT

**Access:** Clear Lake is most easily accessed by taking USFS Road #282 (North Fork Little Joe Creek Road) southwest from St. Regis, MT. Once you reach the Idaho border, take USFS Road #391 northwest approximately 7.5 miles. At this point above the lake, there is a vehicle pull-out and small campsite from which one can see the lake. There is a short, steep unofficial trail (<0.5 mile) from the campsite to the lake.

**Campsites and Use:** Clear Lake lies in a remote setting, but can be accessed relatively easily if roads are passable. It receives light to moderate use. There is an established trail around the lake and a campsite near the outlet. 'Leave no trace' camping and recreating is encouraged in this area.

**Angling Opportunity:** Clear Lake supports a population of brook trout that has adequate natural reproduction. Brook trout harvest is encouraged. Shoreline topography and access lends well to shoreline angling.

**Stocking History**: Stocking records indicate that Clear Lake was stocked in 1936 with brook trout. No subsequent stocking has occurred or is planned.

**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was low and averaged 52 angler-days per year.

**Other Nearby Lakes:** There are several other lakes in the area. Square Lake is about two miles east of Clear Lake and has a similar trail from USFS Road #391. Hazel and Hub Lakes are near Square Lake, but accessing them from USFS Road #391 will require considerably more hiking via USFS Trails #262, #280, and/or #250. Rudie Lake and Crystal Lake are less than 2 miles north-northwest of Clear Lake, but would also require hiking approximately two miles on Trail #269.

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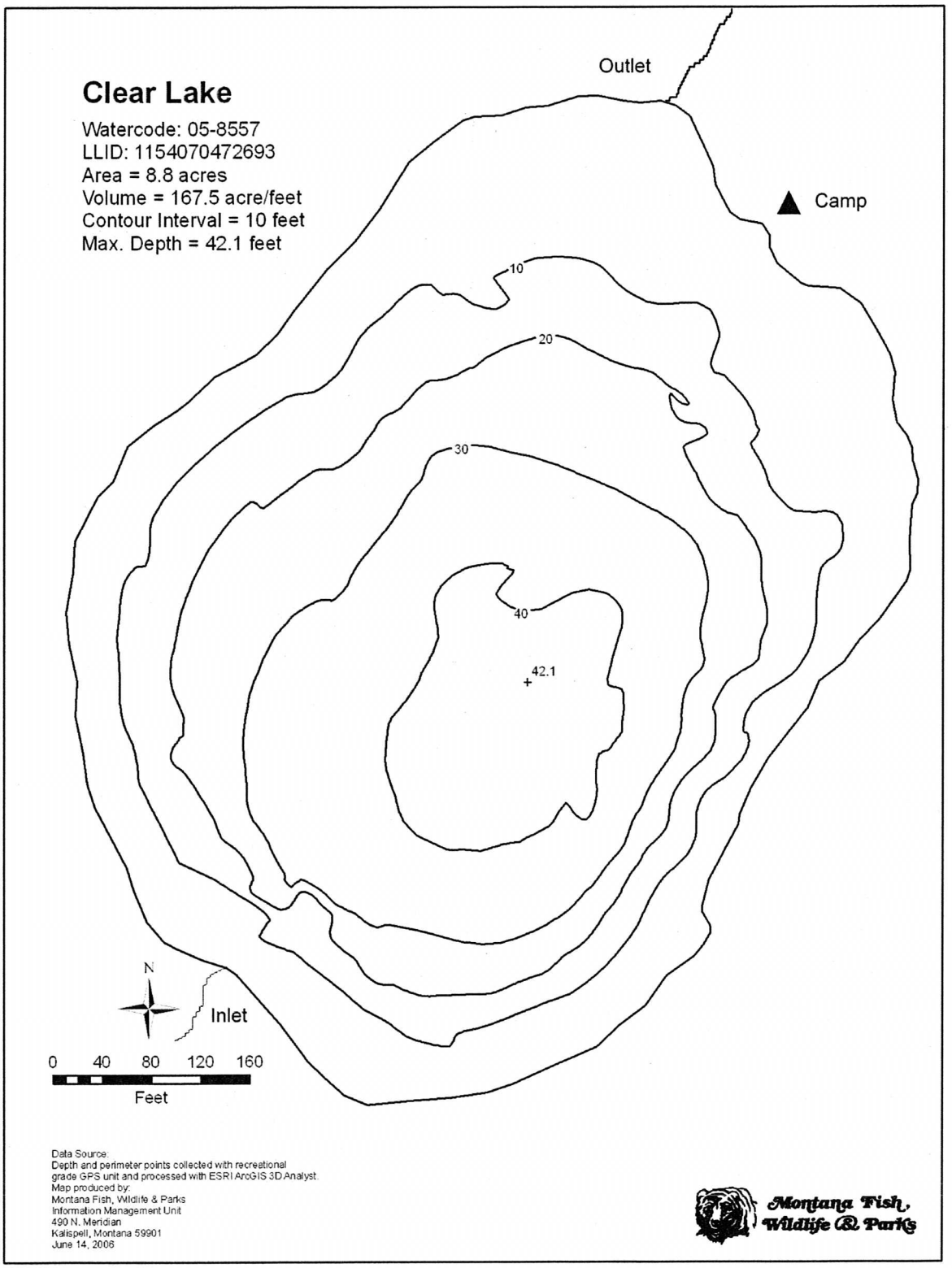
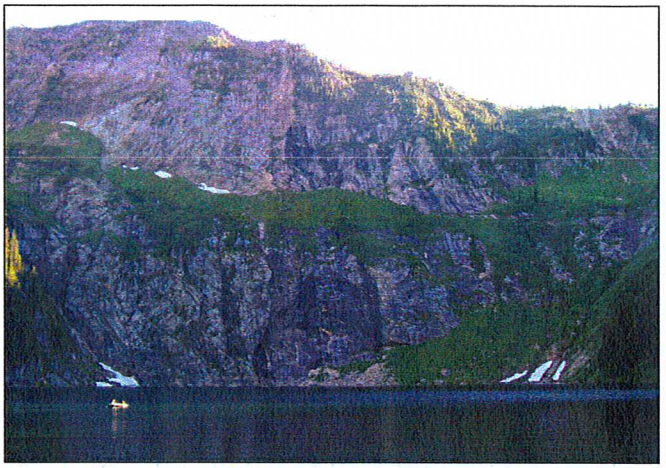
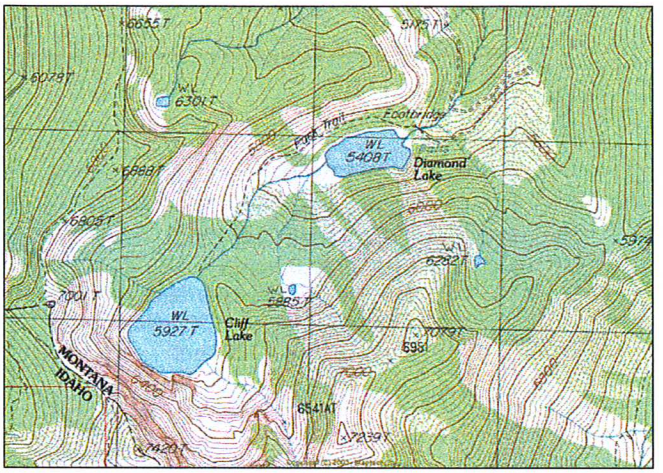

Clear Lake
Watercode: 05-8557
LLID: 1154070472693
Area = 8.8 acres
Volume = 167.5 acre/feet
Contour Interval = 10 feet
Max. Depth = 42.1 feet
Outlet
Camp
10
20
30
40
42.1
N
Inlet
0 40 80 120 160
Feet
Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
June 14, 2006
Montana Fish, Wildlife & Parks

# Cliff Lake






**Description:** Cliff Lake is a large (40.8 acres), very deep (180 ft), glacial cirque lake located near the Idaho border at the top of the Dry Creek drainage at 5,927 ft elevation. The lake lies on the Lolo National Forest (Superior Ranger District).

**Location**: T16N, R28W, Section 18,19; Latitude N47.1388°, Longitude W115.1900°; Nearest Town: Superior, MT.

**Access:** The easiest access to Cliff Lake is to take USFS Road #342 southwest from Interstate Highway 90. Just past mile 10 on Road #342, take USFS Road #7843 for 4 miles to Diamond Lake. The trailhead for Cliff Lake (USFS Trail #100) lies at the end of the road near the outlet of Diamond Lake. Cliff Lake lies approximately one mile above Diamond Lake on Trail #100.

**Campsites and Use:** Cliff Lake lies in a remote setting that receives moderate recreational use. There is an established trail around approximately half of the lake with multiple campsites and fire rings. 'Leave no trace' camping and recreating is encouraged in this area.

**Angling Opportunity:** Cliff Lake supports a population of westslope cutthroat trout. Steep, rocky shoreline topography makes angling from shore difficult or impossible over much of the perimeter. However, a trail follows approximately half of the shoreline and many fishing access points are available.

**Stocking History**: Cliff Lake has been stocked only with westslope cutthroat trout since 1982. The most recent plants occurred in 1993 and 2000. Prior to 1982, Cliff Lake was stocked several times with rainbow trout (1942 - 1962). MFWP plans to continue stocking westslope cutthroat trout every 7-10 years.

**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was low and averaged 102 angler-days per year.

**Other Nearby Lakes:** The only other lake near Cliff Lake is Diamond Lake. Diamond Lake lies at the end of USFS Road #7843 and the trailhead for USFS Trail #100, which leads to Cliff Lake.

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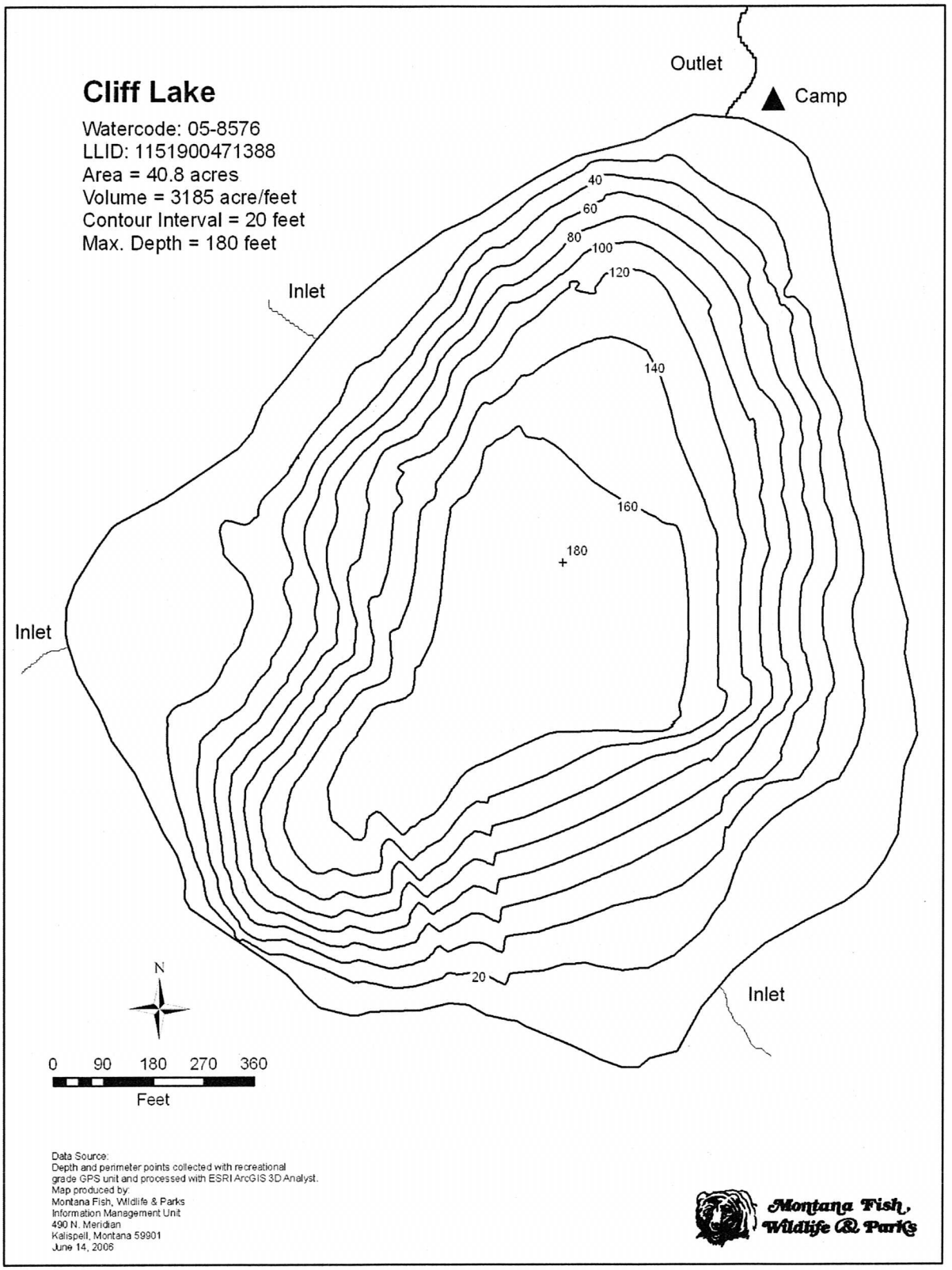
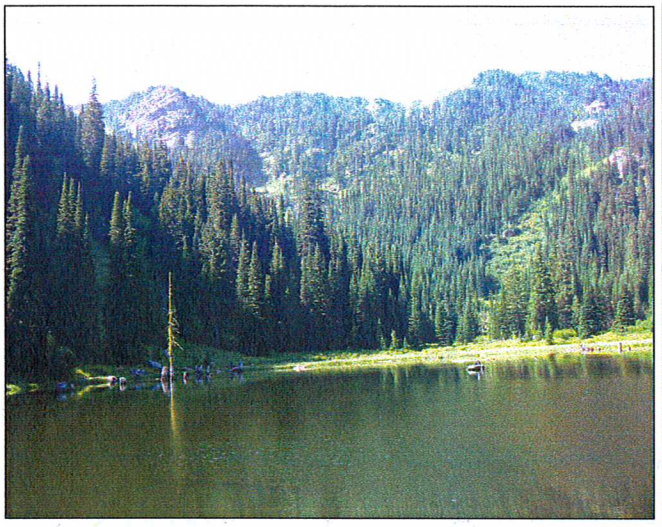
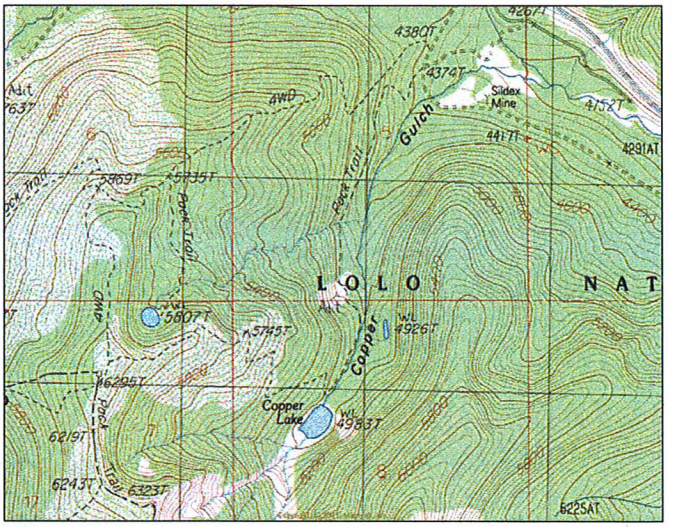

Cliff Lake
Watercode: 05-8576
LLID: 1151900471388
Area = 40.8 acres
Volume = 3185 acre/feet
Contour Interval = 20 feet
Max. Depth = 180 feet
Outlet
Camp
Inlet
Inlet
Inlet
40
60
80
100
120
140
160
180
20
N
0 90 180 270 360
Feet
Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
June 14, 2006
Montana Fish, Wildlife & Parks

# Copper Lake






**Description:** Copper Lake is a small (3.5 acre), shallow (7 ft max depth) glacial trough near Lookout Pass that has been impounded with a rock dam. The lake lies at 4,983 ft elevation near the Idaho border in the upper St. Regis River watershed on the Lolo National Forest (Superior Ranger District).

**Location**: T19N, R32W, Section 8; Latitude N47.4236°, Longitude W115.7040°; Nearest Town: St Regis, MT

**Access:** Copper Lake is most easily accessed by taking exit 0 from Interstate Highway 90 at Lookout Pass. From the highway exit, take the higher of the two secondary roads on the southwest side of the drainage. The lake trailhead (USFS Trail # 265) lies approximately 2.1 miles from the highway. Copper Lake lies 1.3 miles up Trail #265.

**Campsites and Use:** Copper Lake is relatively accessible and receives moderate to heavy use. OHV use appears to be common on Trail # 265. There is an established trail around the lake with multiple campsites and fire rings. 'Leave no trace' camping and recreating is encouraged in this area.

**Angling Opportunity:** Copper Lake supports a stocked population of westslope cutthroat trout. Shoreline topography and access lends well to shoreline angling.

**Stocking History**: Copper Lake has been stocked only with westslope cutthroat trout since 1989. There is no record of Copper Lake having been stocked prior to 1989. Since 1990, the lake was planted in 1993 and 2000. MFWP plans to continue stocking westslope cutthroat trout frequently in future years.

**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was low and averaged 15 angler-days per year.

**Other Nearby Lakes:** The St. Regis Lakes are less than two miles west of Copper Lake. These can be reached via a separate trail (USFS Trail #267) from an un-numbered USFS secondary road.

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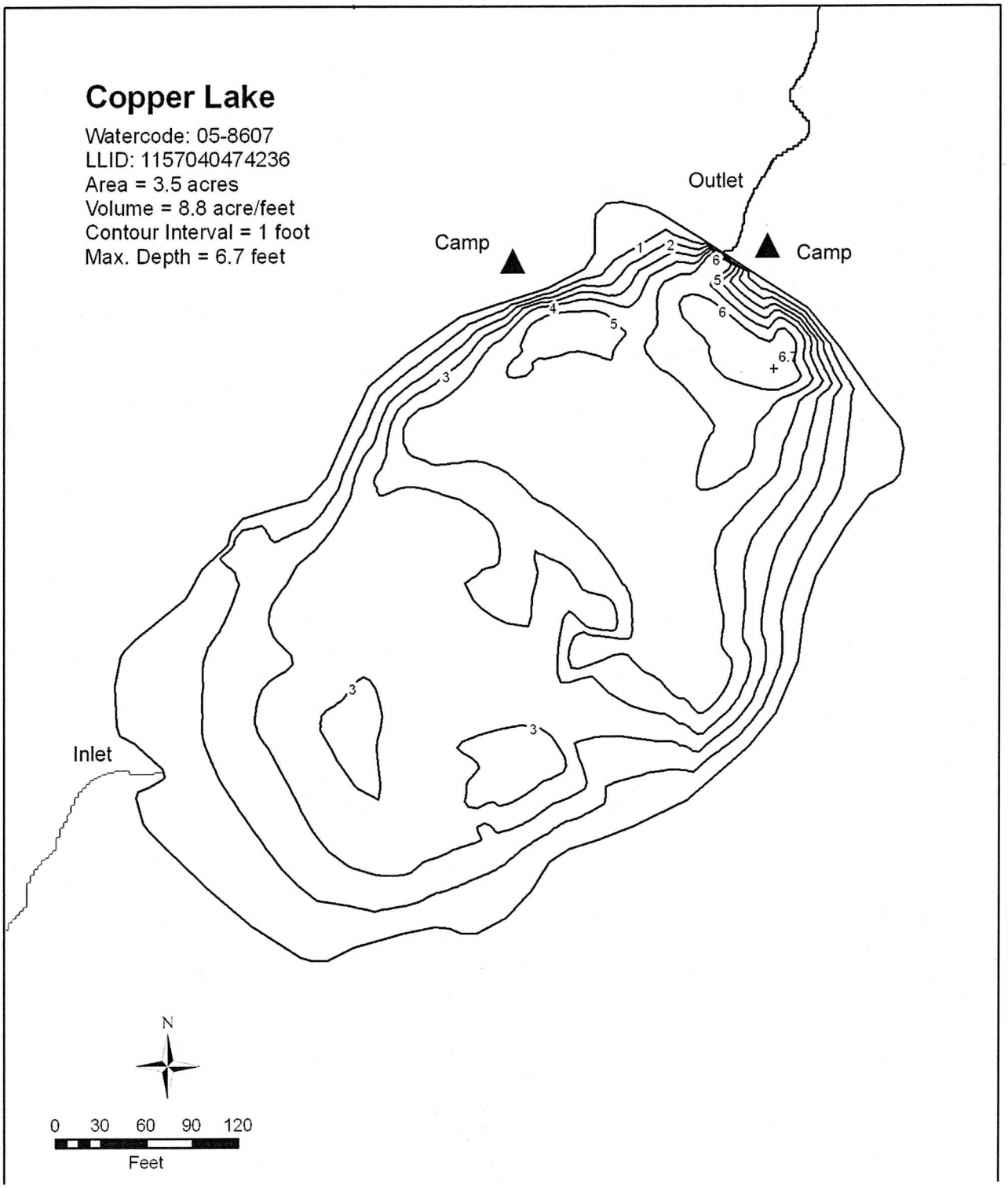
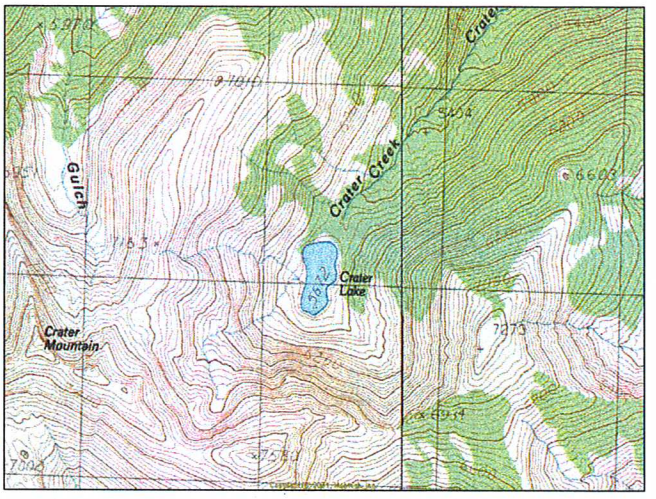

Copper Lake
Watercode: 05-8607
LLID: 1157040474236
Area = 3.5 acres
Volume = 8.8 acre/feet
Contour Interval = 1 foot
Max. Depth = 6.7 feet
Outlet
Camp
Camp
Inlet
1
2
6
5
4
5
6
6.7
3
3
3
N
0 30 60 90 120
Feet

# Crater Lake




**Description:** Crater Lake is a moderately sized (16.8 acre), remote, glacial cirque lake located in the North Fork Fish Creek drainage. The lake lies on the Lolo National Forest (Ninemile Ranger District) in the *proposed* Great Burn Wilderness Area.

**Location**: T14N, R26W, Section 34; Latitude N46.9273°, Longitude W 114.8810°; Nearest Town: Alberton, MT

**Access:** Crater Lake can most easily be accessed by taking Fish Creek Road (USFS Road #343) from Interstate Highway 90, then traveling west on USFS Road #7750 to the campground and Forest Service outpost (Clearwater Crossing) at the end of the road. Take the North Fork Fish Creek Trail (USFS Trail #103) approximately 4 miles to an unofficial pack trail to the southwest which leads to Crater Lake. The hike to the lake is only ~ 1.5 miles from the trail junction, but the trail is extremely steep.

**Campsites and Use:** Crater Lake lies in a remote setting that receives light use. However, there is a primitive trail around about half the lake and a campsite with a fire ring near he outlet. 'Leave no trace' camping and recreating is essential in this area as it is proposed wilderness.

**Angling Opportunity:** Crater Lake supports a population of westslope cutthroat trout. Shoreline topography on the south half of the lake is very steep, which limits access along the lake perimeter. However, several good access points exist for shoreline angling (primarily north half of lake).

**Stocking History**: Crater Lake has been stocked only with westslope cutthroat trout since 1971. There is no record of Crater Lake having been stocked prior to 1971. Since 1990, the lake was planted in 1993 and 2000. MFWP plans to continue stocking westslope cutthroat trout every 7-10 years in the future.

**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was low and averaged 21 angler-days per year.

**Other Nearby Lakes:** Crater Lake is relatively isolated. The nearest lake is French Lake, which would require traveling an additional 2.5 miles up the North Fork of Fish Creek (USFS Trail #103) and 2.6 miles on Trail #143 up French Creek to the lake. The Trio Lakes lie at the head end of the North Fork Fish Creek and would require a 4.5 mile trip up Trail #103 from the junction with the unofficial Crater Lake trail.

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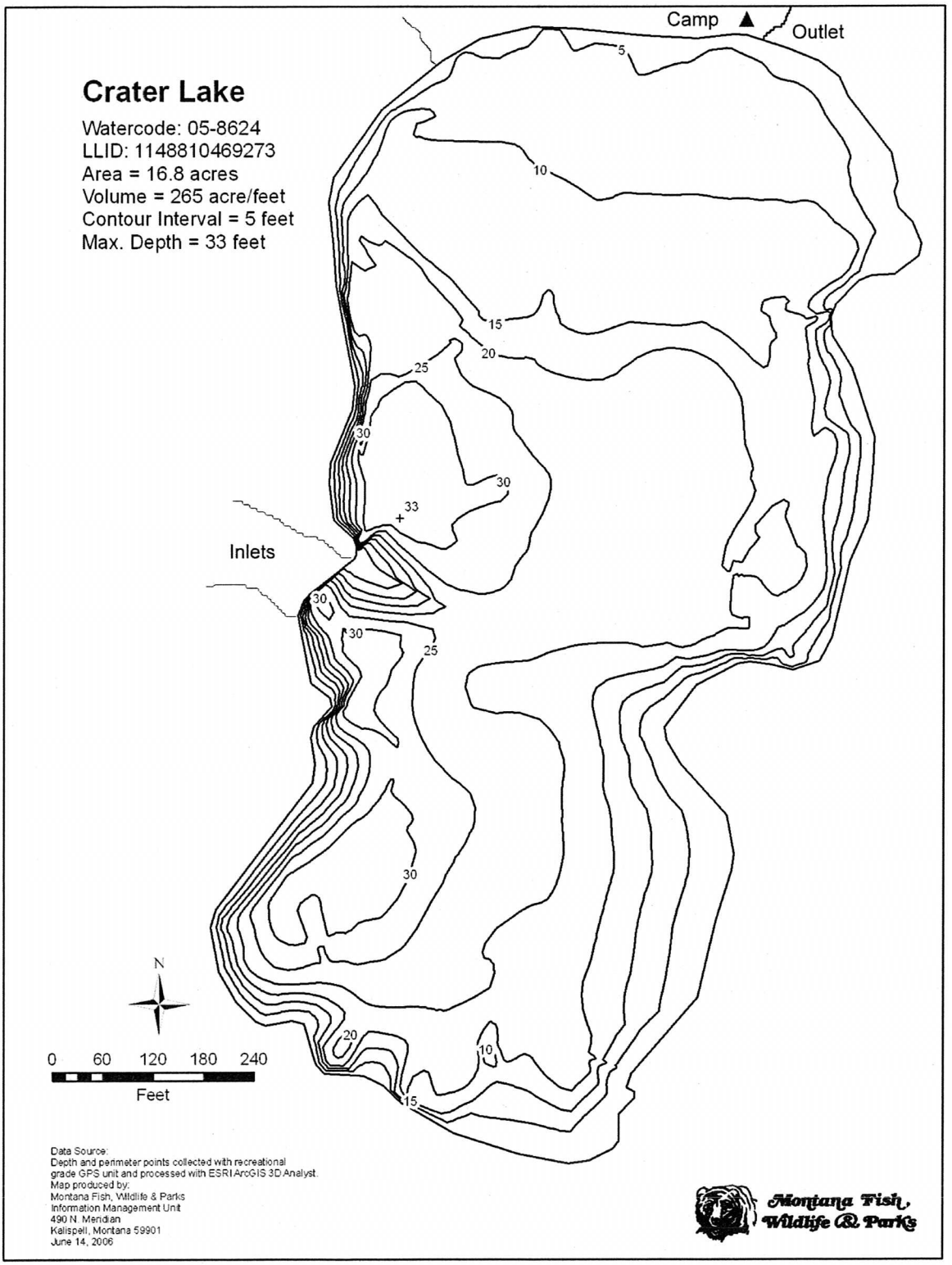
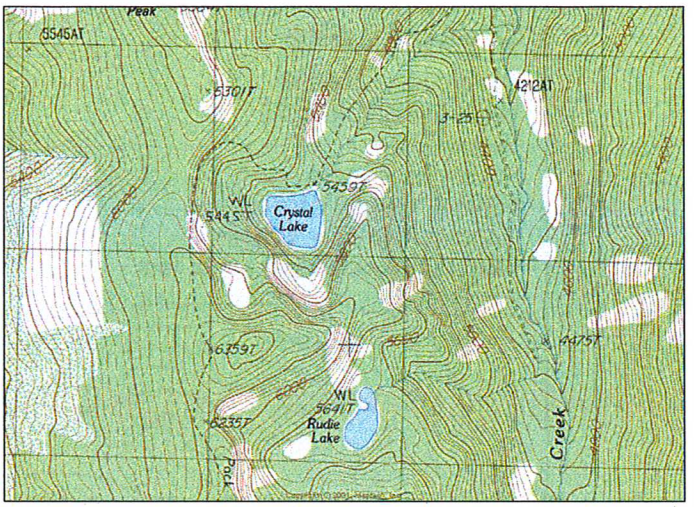

Crater Lake
Watercode: 05-8624
LLID: 1148810469273
Area = 16.8 acres
Volume = 265 acre/feet
Contour Interval = 5 feet
Max. Depth = 33 feet
Camp
Outlet
Inlets
5
10
15
20
25
30
33
N
0 60 120 180 240
Feet
Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
June 14, 2006
Montana Fish, Wildlife & Parks

# Crystal Lake




**Description:** Crystal Lake is a moderately sized (14.3 acres), deep glacial cirque lake located near the Idaho border in the Deer Creek (St. Regis River) drainage at 5,445 ft elevation. An earthen dam was also constructed at the northeast end to enhance water storage. The lake lies on the Lolo National Forest (Superior Ranger District).

**Location:** T18N, R30W, Section 28; Latitude N 47.2972°, Longitude W115.4200°; Nearest Town: St. Regis, MT

**Access:** There are two reasonable routes to Crystal Lake. The lake is most easily accessed by taking USFS Road #236 (Deer Creek Road) south from DeBorgia. Approximately 6.4 miles from DeBorgia, USFS Trail #269 runs southwest and Crystal Lake lies 1.4 miles up this trail. The other option is to take USFS Road #282 (Little Joe Creek Road) from St. Regis to the Idaho border. Once you reach the Idaho border, take USFS Road #391 northwest approximately 8.6 miles. Here, Trail #269 proceeds to the north, though it is not well marked. Crystal Lake lies just over 2 miles north on this trail. This would be a preferred route if you want to visit several lakes in one trip.

**Campsites and Use:** Crystal Lake lies in a semi-remote setting that receives moderate use. There is an established trail around the lake and multiple campsites with fire rings. 'Leave no trace' camping and recreating is encouraged in this area.

**Angling Opportunity:** Crystal Lake supports a population of brook trout that has moderate natural reproduction. Brook trout harvest is encouraged. Shoreline topography and access lends well to shoreline angling from ~ 90% of the lake's perimeter.

**Stocking History**: Brook trout were originally stocked in 1933. During the period 1949 to 1953, the lake was stocked with rainbow trout on three occasions. Crystal Lake has not been stocked since 1953, but MFWP plans to stock westslope cutthroat trout every 7-10 years in the future to diversify the fishery.

**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was low and averaged 62 angler-days per year.

**Other Nearby Lakes:** There are several other lakes in the vicinity of Crystal Lake. Rudie Lake lies about 0.5 mile southeast of Crystal Lake. To reach Rudie Lake, proceed south on USFS Trail #269 for 1.5 miles and take the remnant trail down to the lake. The trail to Rudie Lake is in poor condition and difficult to follow; expect some off-trail hiking. Clear Lake is 2 miles southeast of Crystal Lake and can easily be accessed via a short, steep trail from USFS Road #391, which runs along the Montana-Idaho divide. Hub, Hazel and Square lakes also lie nearby.

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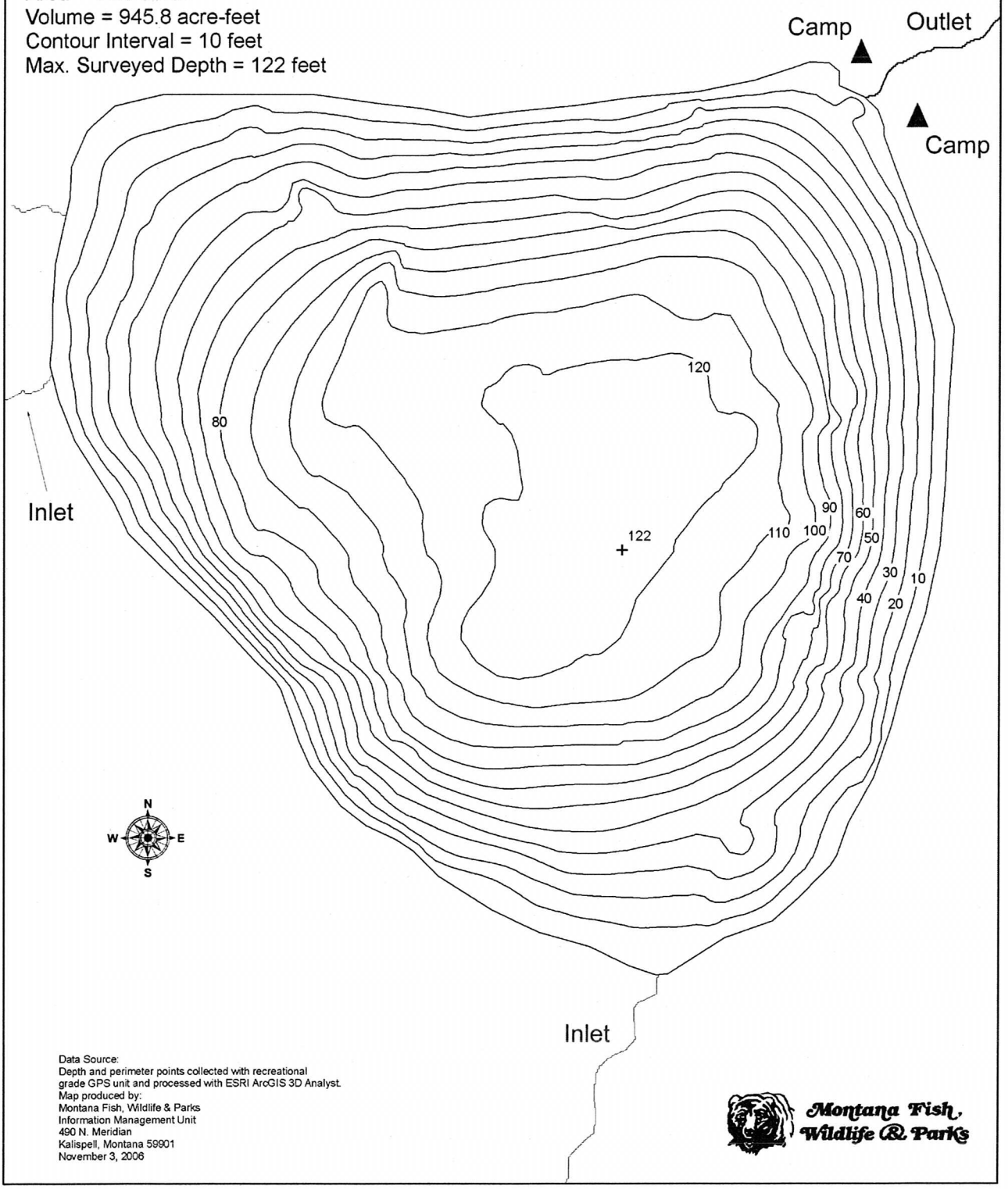
# Crystal Lake

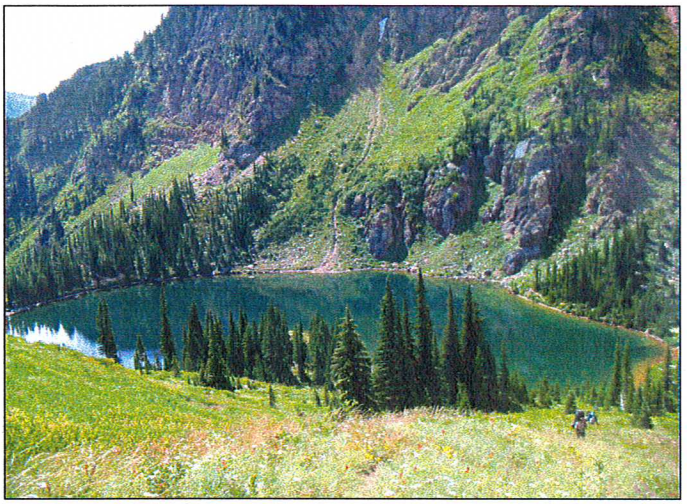
Watercode: 05-8656
LLID: 1154200472972
Survey Date:
Area = 14.3 acres
Volume = 945.8 acre-feet
Contour Interval = 10 feet
Max. Surveyed Depth = 122 feet

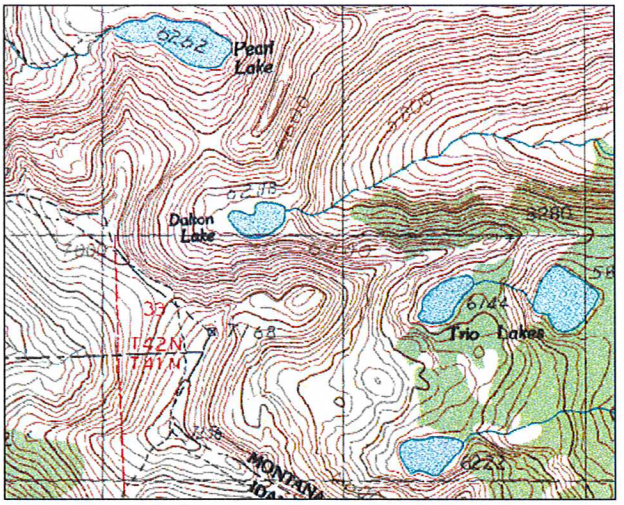



Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
November 3, 2006

Montana Fish, Wildlife & Parks

# Dalton Lake






**Description:** Dalton Lake is a small (6.2 acres), remote glacial cirque lake located near the Idaho border in the North Fork Fish Creek drainage at 6,292 ft elevation. The lake lies on the Lolo National Forest (Ninemile Ranger District) in the *proposed* Great Burn Wilderness Area.

**Location**: T14N, R27W, Section 25; Latitude N46.9377°, Longitude W114.9550°; Nearest City: Superior, MT

**Access:** Access to Dalton Lake can most easily be obtained by taking USFS Rd #250 (Trout Creek Road) from Superior, MT. From USFS Rd #250, there are two options to hike. One option is to hike USFS Trail #171 to Heart Lake, then Trail #175 past Pearl Lake, to a saddle between Pearl and Dalton Lakes. From the top of this saddle, one can see and hike to Dalton Lake on an established, but non-designated trail. The other option is to take Trail #738 (Stateline National Recreation Trail) east-southeast, along the Idaho border, from the top of Hoodoo Pass (USFS Rd # 250) and descend into the lake. Both routes are between 4.5 and 5 miles hiking distance, with moderate difficulty.

**Campsites and Use:** Dalton Lake lies in a remote setting that receives light recreational use. However, there is an established trail around the lake with multiple campsites and fire rings**.** 'Leave no trace' camping and recreating is essential in this area as it is proposed wilderness.

**Angling Opportunity:** Dalton Lake supports a westslope cutthroat trout population that has limited natural reproduction and is supplemented with stocking. Shoreline topography lends well to shoreline angling from most of the lake perimeter.

**Stocking History**: Dalton Lake has been stocked only with westslope cutthroat trout since 1969. Prior to 1969, Dalton Lake was stocked once with rainbow trout in 1949. The lake was last planted in 2000 and will likely be stocked every 7-10 years with cutthroat trout in the future.

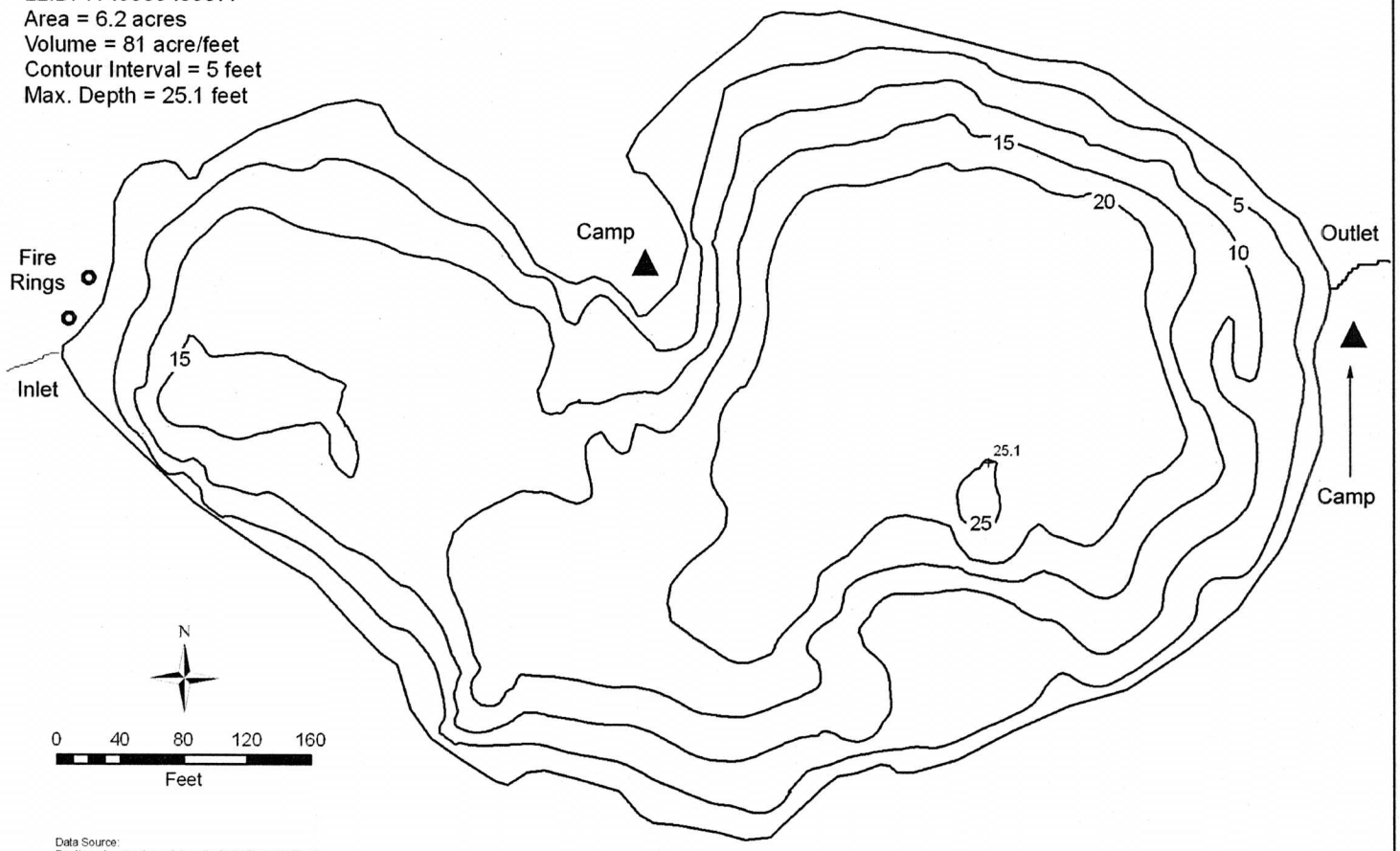
**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was low and averaged 56 angler-days per year.

**Other Nearby Lakes:** There are several other lakes nearby that lie in the upper Trout Creek and North Fork of Fish Creek drainages. Pearl Lake is just over the saddle north of Dalton Lake and Heart Lake is another mile beyond (northwest of) Pearl Lake. Both of these lakes lie in the Trout Creek drainage and would be passed on the way to Dalton Lake on USFS Trails #171 and # 175. Trio Lakes are just a short distance (less than one mile) southeast of Dalton Lake within the North fork Fish Creek drainage, but getting to them will likely require ascending to the Stateline Trail (#738), heading southeast about a mile and a half, then finding a way down to them (no known established trail).

Montana Fish, Wildlife & Parks

# Dalton Lake

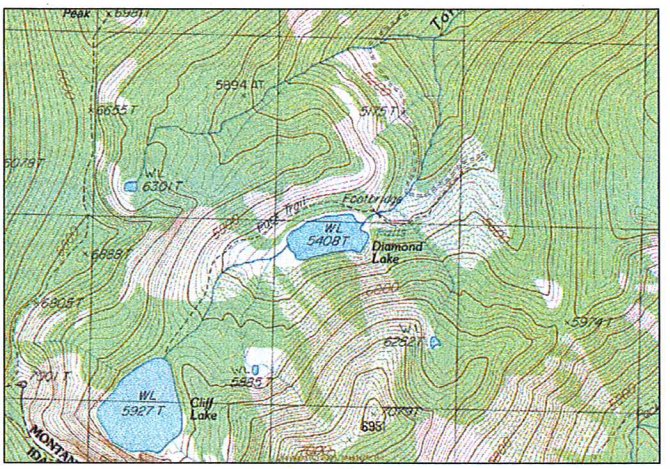
Watercode: 05-8672
LLID: 1149550469377
Area = 6.2 acres
Volume = 81 acre/feet
Contour Interval = 5 feet
Max. Depth = 25.1 feet




Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
June 14, 2006

Montana Fish, Wildlife & Parks

# Diamond Lake




**Description:** Diamond Lake is a moderately sized (18.3 acres), glacial trough lake located near the Idaho border in the Dry Creek drainage at 5,408 ft elevation. The lake lies on the Lolo National Forest (Superior Ranger District).

**Location**: T16N, R28W, Section 17/18; Latitude N47.1472°, Longitude W115.1760°; Nearest Town: Superior, MT.

**Access:** The easiest way to get to Diamond Lake is to take USFS Road #342 southwest from Interstate Highway 90. A little over 10 miles up the road, take USFS Road #7843 for approximately 4 miles. The road ends at Diamond Lake.

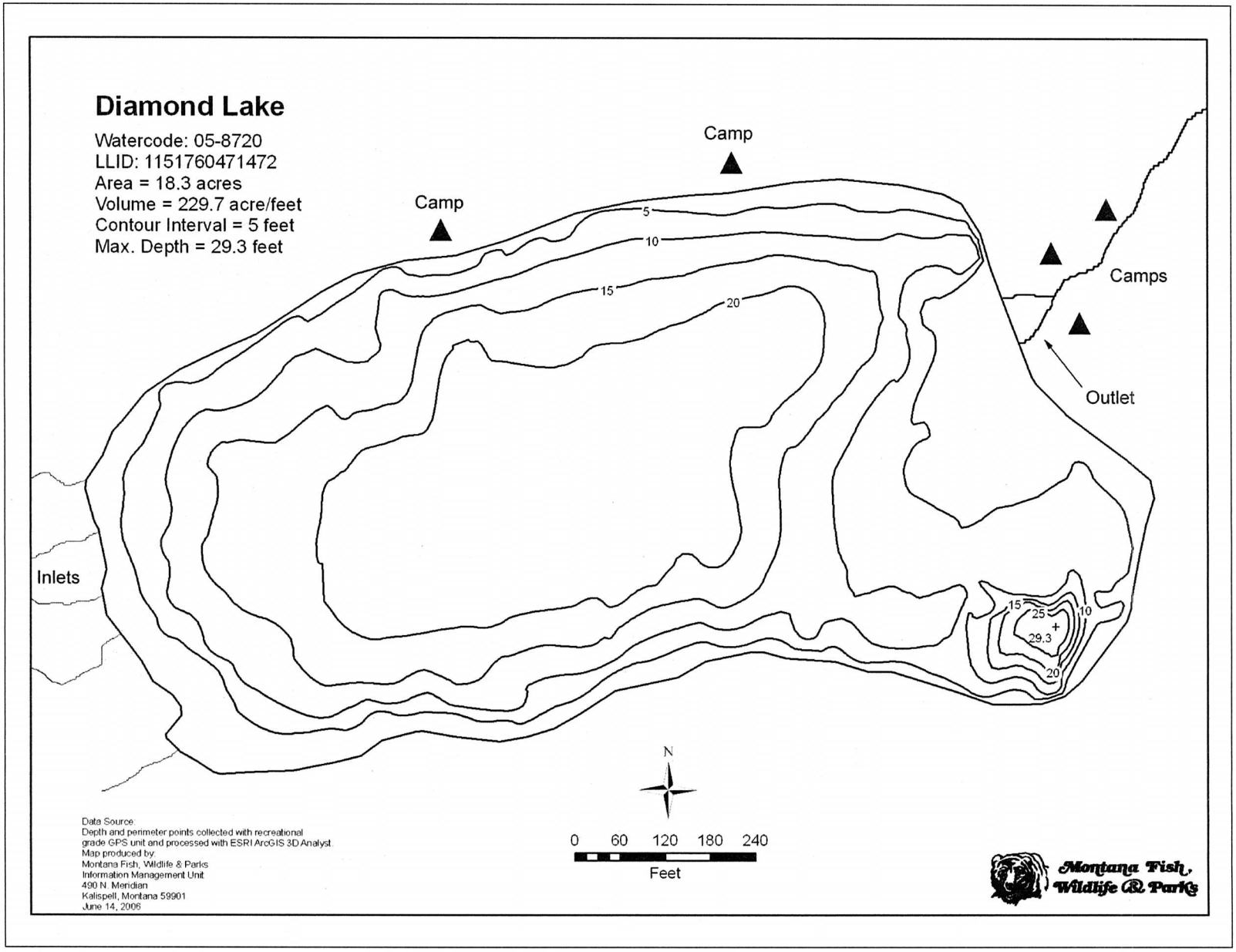
**Campsites and Use:** Diamond Lake lies in a remote area, but it receives fairly heavy use due to direct road access. There is an established trail around the west side of the lake, and multiple campsites and fire rings. 'Leave no trace' camping and recreating is encouraged.

**Angling Opportunity:** Diamond Lake supports a westslope cutthroat trout population that has limited natural reproduction, as well as a brook trout population that has abundant natural reproduction. Westslope cutthroat trout may be out-migrants from Cliff Lake. Brook trout harvest is encouraged. Shoreline topography and access lends well to shoreline angling. Non-motorized boats can also be easily transported from the road access.

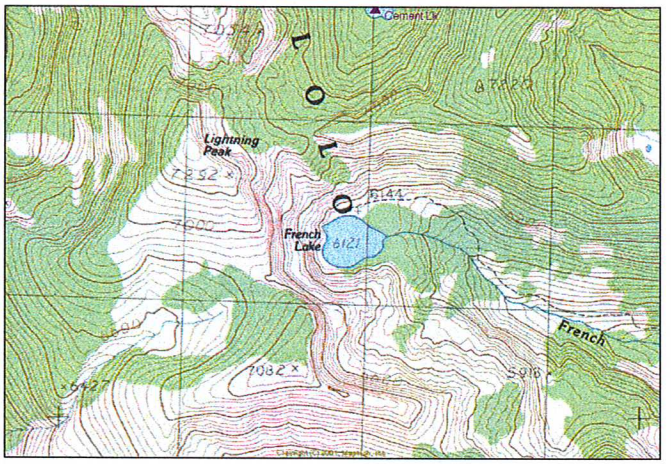
**Stocking History**: Diamond Lake has not been stocked since 1966. The lake was stocked four times with rainbow trout in the 1960's. It is not known when brook trout were introduced into the lake. Westslope cutthroat trout have likely drifted downstream from Cliff Lake. No additional stocking is planned.

**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was moderate/high for an alpine lake and averaged 251 angler-days per year.

**Other Nearby Lakes:** The only other lake nearby is Cliff Lake. To get to Cliff Lake from Diamond Lake, hike around Diamond Lake and up the drainage for approximately one mile to the southwest on USFS Trail #100. The trailhead for Trail #100 is at the end of USFS Road #7843 near the outlet of Diamond Lake.


Diamond Lake
Watercode: 05-8720
LLID: 1151760471472
Area = 18.3 acres
Volume = 229.7 acre/feet
Contour Interval = 5 feet
Max. Depth = 29.3 feet
Camp
Camp
Camps
Outlet
Inlets
5
10
15
20
15
25
10
29.3
20
N
0 60 120 180 240
Feet
Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
June 14, 2006
Montana Fish, Wildlife & Parks

# French Lake




**Description:** French Lake is a moderately sized (18.1 acres), remote, glacial cirque lake located in the North Fork Fish Creek drainage at 6,121 ft elevation. The lake lies on the Lolo National Forest (Ninemile Ranger District) in the *proposed* Great Burn Wilderness Area.

**Location**: T14N, R26W, Section 18; Latitude N46.9669°, Longitude W 114.9370°; Nearest Town: Alberton, MT

**Access:** Access to French Lake can most easily be obtained by taking Fish Creek Road (USFS Road #343) from Interstate Highway 90. From Road #343, go west on USFS Road #7750 until you get to the campground and Forest Service outpost (Clearwater Crossing) at the end of the road. Take the North Fork Fish Creek Trail (USFS Trail #103) approximately 7 miles to Trail #143. Take Trail #143 west for approximately 2.7 miles to the lake.

**Campsites and Use:** French Lake lies in a remote setting that receives light use, primarily from horse pack trips. However, there is an established trail around the lake with a campsite and fire ring. 'Leave no trace' camping and recreating is essential in this area as it is proposed wilderness.

**Angling Opportunity:** French Lake supports a wild rainbow trout population (likely hybridized) that is supplemented with stocked westslope cutthroat trout. Shoreline topography is very steep along portions of the perimeter, but >60% of the shoreline is accessible for angling.

**Stocking History**: French Lake has been previously stocked with rainbow trout and westslope cutthroat trout. In 1948-1953, the lake was stocked several times with rainbow trout. Since 1982, the lake has been planted twice with westslope cutthroat trout. MFWP plans to continue stocking westslope cutthroat trout every 7-10 years in the future.

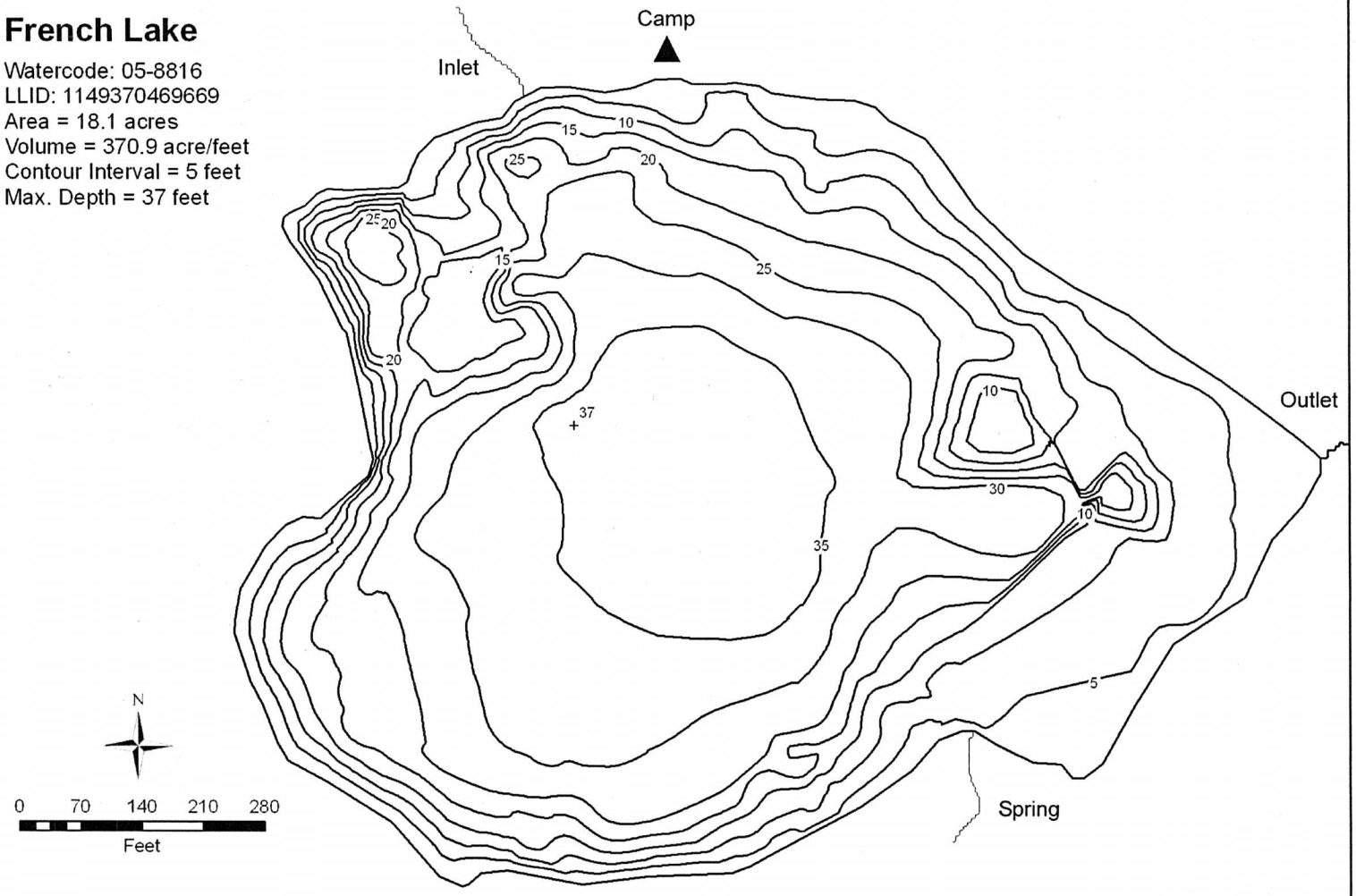
**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was very low and averaged 7angler-days per year.

**Other Nearby Lakes:** French Lake is rather isolated. The Trio Lakes are about 2.5 miles south of French Lake, but getting to them will require returning to the North Fork Fish Creek Trail (#103), continuing Southwest on Trail #103 for approximately 2.8 miles, then hiking up to the lakes (no known established trail). Crater Lake is less than 4 miles southwest of French Lake. To reach Crater Lake, return to the North Fork Fish Creek Trail (#103), travel back (southeast) towards Clearwater Crossing for approximately 2.5 miles, then ascend the unofficial Crater Lake trail. This trail involves a steep, two mile hike to reach the lake.

Montana Fish, Wildlife & Parks

# French Lake

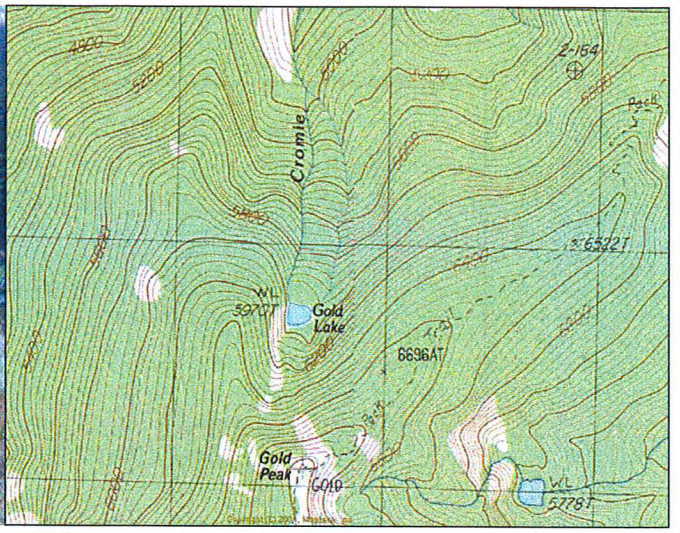
Watercode: 05-8816
LLID: 1149370469669
Area = 18.1 acres
Volume = 370.9 acre/feet
Contour Interval = 5 feet
Max. Depth = 37 feet




Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
June 14, 2006

Montana Fish, Wildlife & Parks

# Gold Lake




**Description:** Gold Lake is a very small (1.9 acres), remote forested cirque lake located in the Deer Creek drainage (St. Regis River) at 5,970 ft elevation. The lake lies on the Lolo National Forest (Superior Ranger District).

**Location**: T18N, R30W, Section 23; Latitude N47.3013°, Longitude W115.3780°; Nearest Town: St. Regis, MT.

**Access:** Access to Gold Lake can most easily be obtained by taking the DeBorgia exit from Interstate Highway 90, west of St. Regis. Take USFS Road #236 (Deer Creek Road) southwest ~ 5.5 miles, then go left onto USFS Road #3818. Take this road for ~ 1.1 miles to the end (gate). Hike the gated road another ~ 0.25 mile and it will cross a small, densely wooded drainage. Gold Lake can be reached by hiking (off trail) up the drainage for ~ 1.2 miles.

**Campsites and Use:** Gold Lake lies in a remote setting that receives light use. There is no known trail to the lake, nor is there is a campsite or fire ring. However, there is ample room to camp. 'Leave no trace' camping and recreating is encouraged in this area.

**Angling Opportunity:** Gold Lake supports a westslope cutthroat/rainbow trout population that has abundant natural reproduction and apparent hybridization. Shoreline topography and forest canopy lends well to shoreline angling on about half of the lake.

**Stocking History**: Stocking records indicate that Gold Lake has only been stocked with westslope cutthroat trout in 2000. There is no record of the rainbow trout plant or any other stocking that occurred prior to 2000.

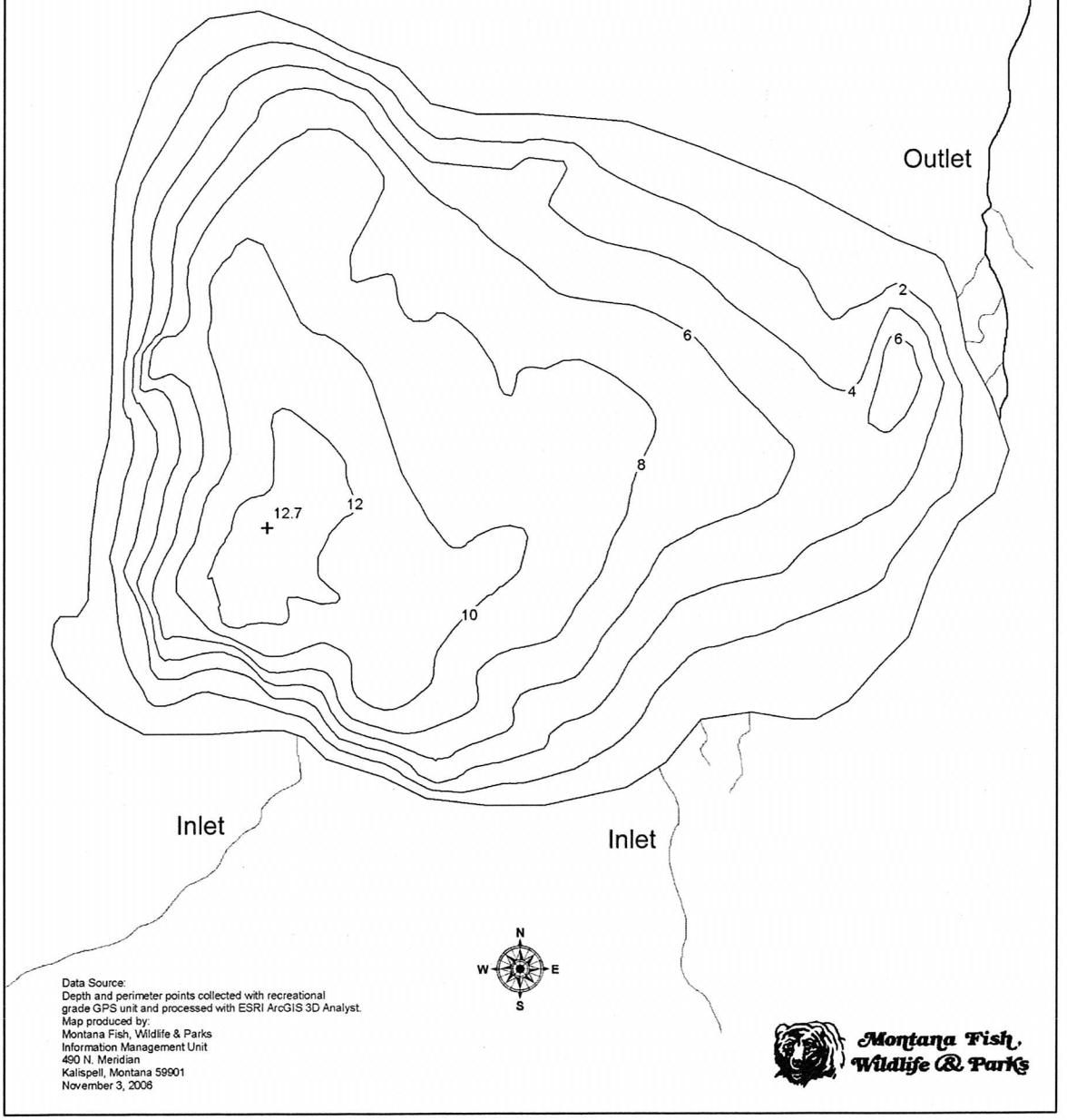
**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was zero. Although the lake is known to receive occasional angling use, no respondents in the random survey claimed to have fished the lake.

**Other Nearby Lakes:** Gold Lake is somewhat isolated from other lakes. Crystal Lake is less than 2 miles west-southwest of Gold Lake, but getting there will be most easily achieved by returning to USFS Road #236, driving southwest another 1.2 miles, and hiking USFS Trail #269 ~1.4 miles. Rudie Lake is ~ 0.5 mile south-southeast of Crystal Lake. Accessing Rudie Lake (from Crystal Lake) requires either hiking off-trail over steep, densely forested terrain, or by hiking Trail #269 another 1.5 miles and descending to the lake via an unofficial and unimproved trail.

Montana Fish, Wildlife & Parks

# Gold Lake (St. Regis)

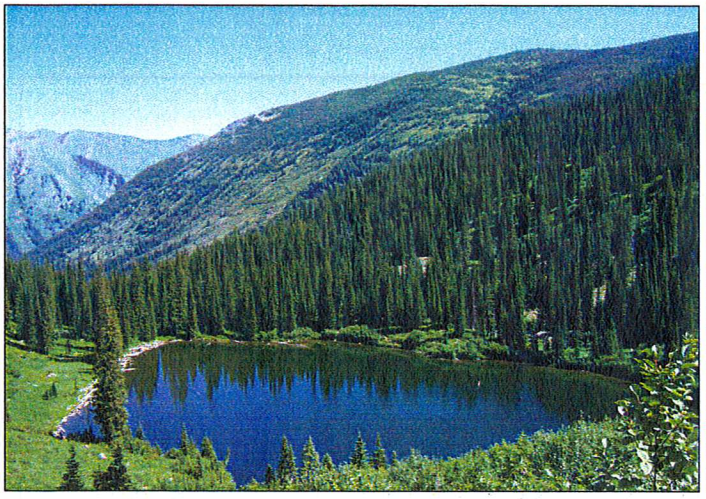
Watercode: 05-8864
LLID: 1153780473013
Survey Date:
Area = 1.9 acres
Volume = 10.7 acre-feet
Contour Interval = 2 feet
Max. Surveyed Depth = 12.7 feet

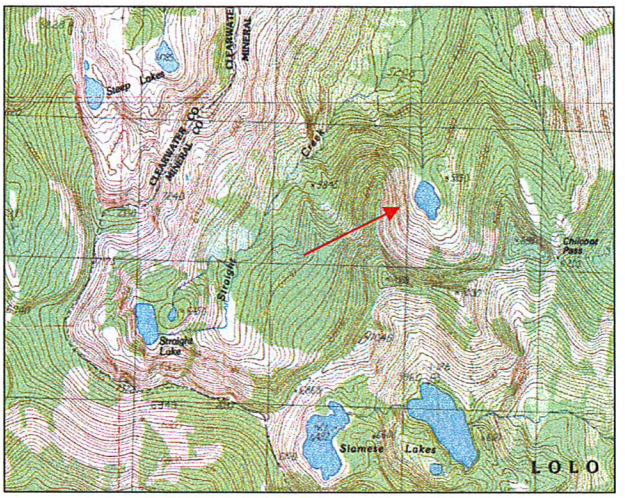



Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
November 3, 2008

Montana Fish, Wildlife & Parks

# Harrington (Straight Peak) Lake






**Description:** Harrington Lake is a small (7.8 acre) remote glacial cirque lake located in the Straight Creek (North Fork Fish Creek) drainage at 5,835 ft elevation. The lake lies on the Lolo National Forest (Ninemile Ranger District) in the *proposed* Great Burn Wilderness Area.

**Location**: T13N, R26W, Section 20; Latitude N46.8688°, Longitude W114.9120°; Nearest Town: Alberton, MT

**Access:** Harrington Lake is very remote with no designated trail access. The easiest way to access the lake from Montana is via the Fish Creek trail system. To get to the trailhead, take Fish Creek Road (USFS Road #343) from Interstate Highway 90. Then go west on USFS Road #7750 until you get to the campground, Forest Service outpost (Clearwater Crossing) and trailhead at the end of the road. Take the North Fork Fish Creek Trail (USFS Trail #103) approximately 0.7 miles then Trail #99 (Straight Creek Trail) for ~ 6 miles up the Straight Creek drainage. At this point, where Trail #99 leaves Straight Creek for Chilcoot Pass, leave the trail and continue up the East Fork of Straight Creek for ~ 0.4 mile to the lake.

**Camp Sites and Use:** Harrington Lake lies in a remote setting that sees very light use. The lake has no trail around it. Although there are no designated campsites, there are acceptable camping locations. 'Leave no trace' camping and recreating is essential in this area as it is proposed wilderness.

**Angling Opportunity:** Harrington Lake supports a population of westslope cutthroat trout that has limited natural reproduction and is supplemented with stocking. Shoreline topography lends well to shoreline angling, although thick vegetation around the lake perimeter makes travel difficult.

**Stocking History**: Stocking records indicate that Harrington Lake has been stocked only with westslope cutthroat trout in 1982 and 2000. It will likely be stocked with W. cutthroat trout every 7-10 years in the future.

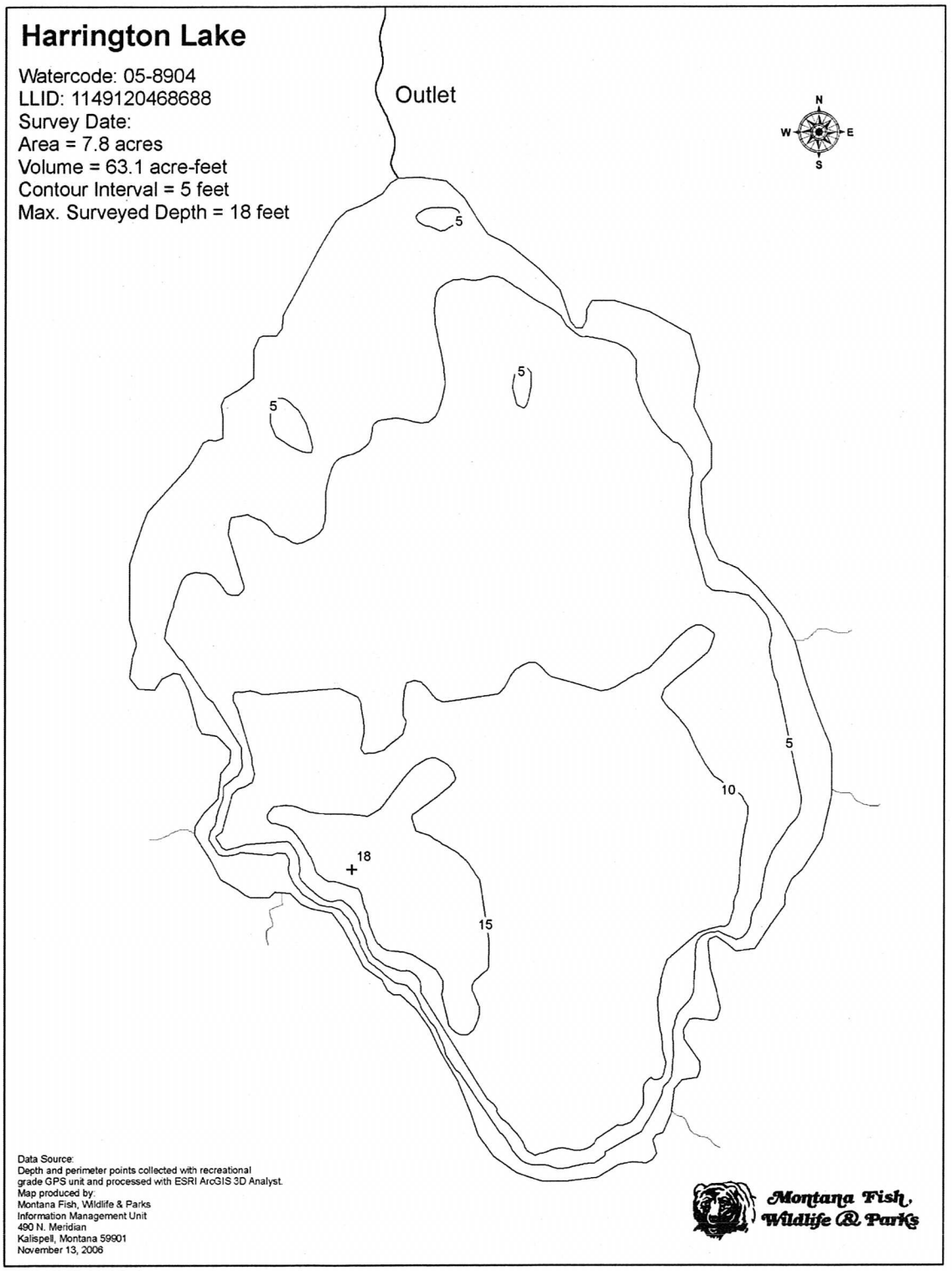
**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was zero. Although the lake is known to receive occasional angler visits, none of the random survey respondents had visited the lake.

**Other Nearby Lakes:** There are several other lakes in the vicinity of Harrington Lake. Getting to them will require off-trail hiking over steep terrain. Straight Lake is just 1.4 miles southwest of Harrington Lake. The easiest way to get there is to go down the stream drainage from Harrington Lake to its junction with the western fork of Straight Creek. Proceed up the west fork on an overgrown, undesignated trail for ~ 1.8 miles to Straight Lake. The Siamese Lakes lie ~ 1 mile south of Harrington Lake. To get to them, either ascend to the Stateline Trail (#738) from Straight Lake and hike east about a mile, then descend to the lakes, or hike off-trail to Trail #99 or Trail #114 near Chilcoot Pass, then take Trail #114 south to Lower Siamese Lake.

Montana Fish, Wildlife & Parks

# Harrington Lake

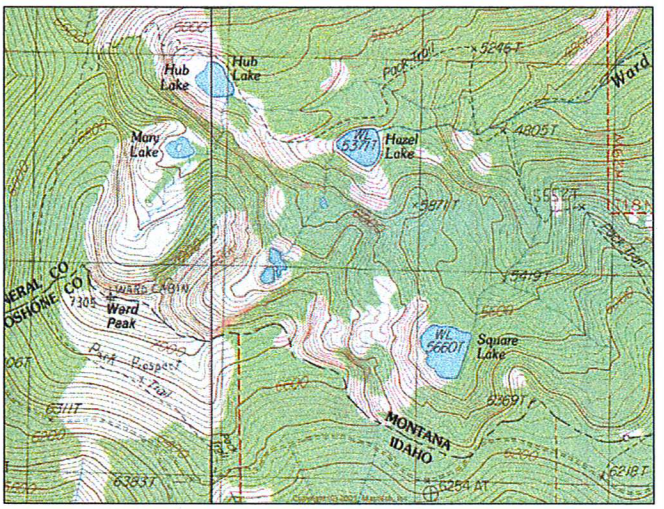
Watercode: 05-8904
LLID: 1149120468688
Survey Date:
Area = 7.8 acres
Volume = 63.1 acre-feet
Contour Interval = 5 feet
Max. Surveyed Depth = 18 feet




Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
November 13, 2006

Montana Fish, Wildlife & Parks

# Hazel Lake




**Description:** Hazel Lake is a small (7.6 acres), semi-remote glacial cirque lake located near the Idaho border in the Ward Creek (St. Regis River) drainage at 5,371 ft elevation. The lake lies on the Lolo National Forest (Superior Ranger District).

**Location:** T18N, R30W, Section 36; Latitude N 47.2730°, Longitude W115.3650°; Nearest Town: St. Regis, MT

**Access:** Hazel Lake can be accessed one of two ways. One way is to take Exit 26 off of Interstate Highway 90 to USFS Road #889 (Ward Creek Road). Take this road approximately 6.3 miles to the trailhead for USFS Trail #262. Take Trail #262 for ~1.3 miles, then Trail #280 for ~ 0.8 miles to Hazel Lake (fairly steep hike). The other option is to take USFS Road #282 (Little Joe Creek Road) from St. Regis, MT to the Idaho border. Once you reach the Idaho border, take USFS Road #391 northwest ~ 4 miles to the upper Trail #262 trailhead. From the trailhead, proceed down (north) to the Trail #280 junction (same one as above). Hazel Lake lies ~ 0.8 miles from the junction on a relatively steep grade.

**Campsites and Use:** Hazel Lake lies in a semi-remote setting that receives moderate use. There is an established trail around much of the lake and a campsite with a fire ring. 'Leave no trace' camping and recreating is encouraged in this area.

**Angling Opportunity:** Hazel Lake supports a population of westslope cutthroat trout that has limited natural reproduction and is supplemented by stocking. Shoreline topography and access lends well to shoreline angling on about half of the lake.

**Stocking History**: Hazel Lake has been stocked five times with westslope cutthroat trout from 1971-2000. It was also stocked twice prior (1941, 1953) with an unknown strain of cutthroat trout. Hazel Lake will likely be stocked every 7-10 years with westslope cutthroat trout in the future.

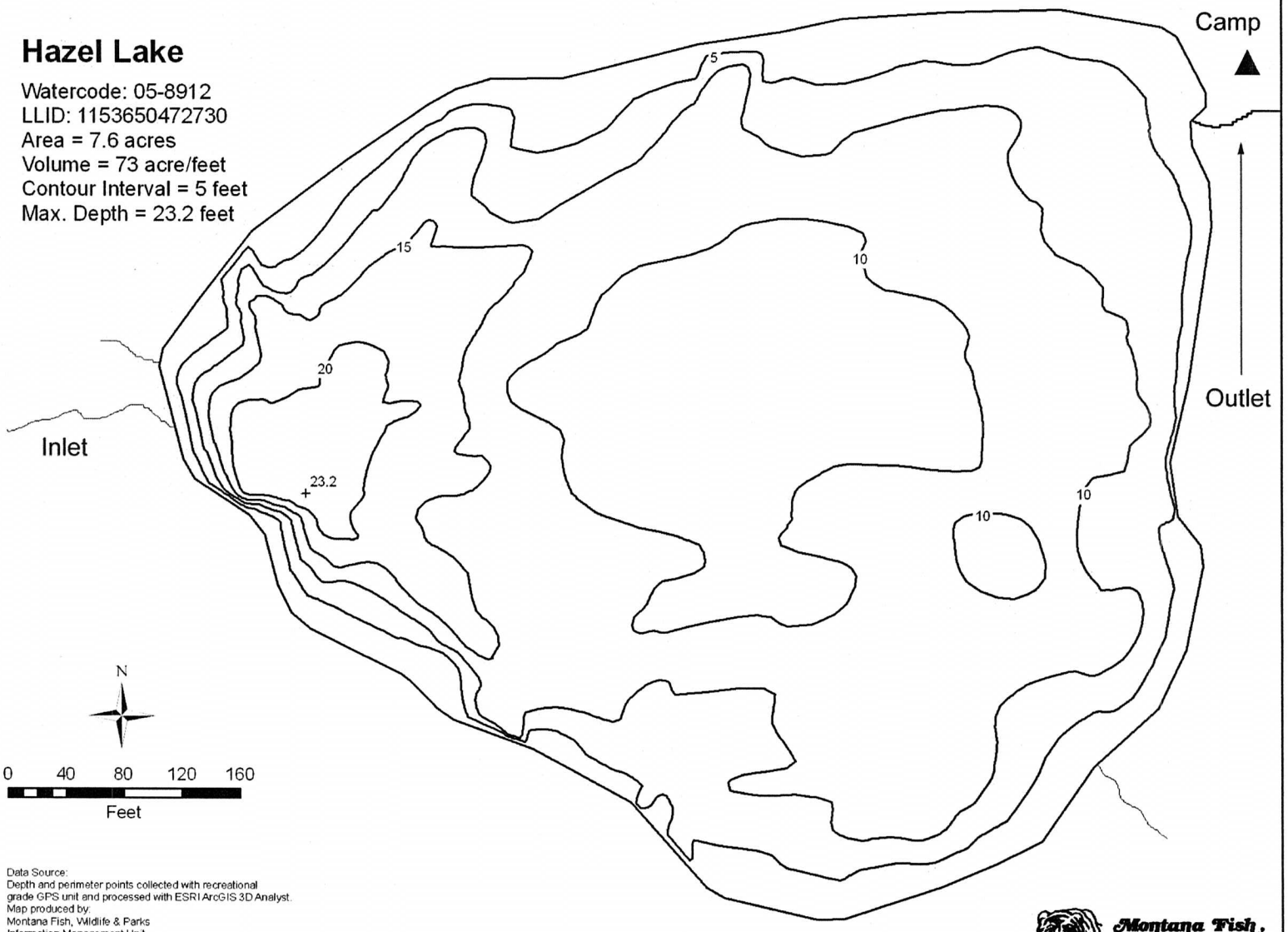
**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was low and averaged 46 angler-days per year.

**Other Nearby Lakes:** There are several other lakes in the area. Hub Lake is less than 0.5 mile past Hazel Lake to the west-northwest on Trail #280. Mary Lake lies above Hub Lake on the same trail. Square Lake lies ~ 0.6 mile south-southeast of Hazel Lake, but getting to it from Hazel Lake would require off-trail hiking over steep terrain. There is a non-designated trail to Square Lake from USFS Road #391, which runs along the Montana-Idaho boarder.

Montana Fish, Wildlife & Parks

# Hazel Lake

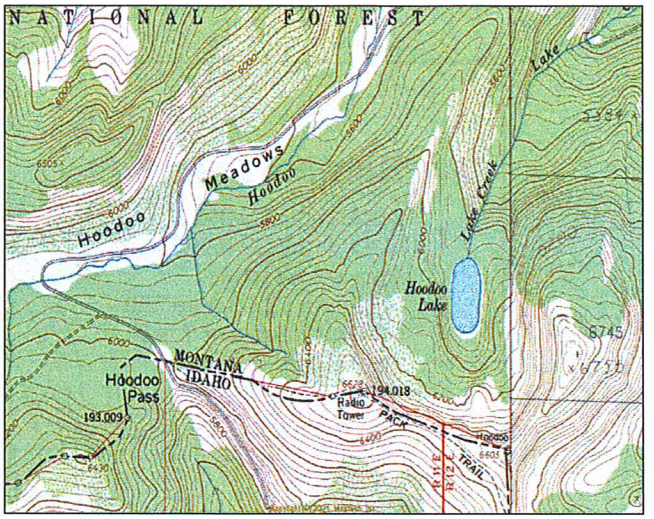
Watercode: 05-8912
LLID: 1153650472730
Area = 7.6 acres
Volume = 73 acre/feet
Contour Interval = 5 feet
Max. Depth = 23.2 feet




Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
June 14, 2006

Montana Fish, Wildlife & Parks

# Hoodoo Lake




**Description:** Hoodoo Lake is a moderately sized (11.4 acres), semi-remote glacial cirque lake located near the Idaho border in the South Fork Trout Creek drainage at 5,856 ft elevation. The lake lies on the Lolo National Forest (Superior Ranger District).

**Location**: T14N, R27W, Sections 10, 15; Latitude N46.9781°, Longitude W 115.0030°; Nearest Town: Superior, MT.

**Access:** Hoodoo Lake is most easily accessed by taking USFS Rd #250 (Trout Creek Road) from Superior, MT. From USFS Rd #250, there are two options to hike. One option is to hike USFS Trail #111 for ~ 1.4 miles to the lake. The other option is to take USFS Trail #738 (Stateline National Recreation Trail) east-southeast along the Idaho border from the top of Hoodoo Pass (USFS Rd # 250), then take Trail #111 down to the lake. This route is ~ 2 miles from the road to the lake.

**Campsites and Use:** Hoodoo Lake lies in a semi-remote setting that receives moderate use. There is an established trail around the lake with multiple campsites and fire rings. 'Leave no trace' camping and recreating is encouraged.

**Angling Opportunity:** Hoodoo Lake supports a brook trout population that has substantial natural reproduction. Harvest of brook trout is encouraged. Shoreline topography and access lends well to shoreline angling.

**Stocking History**: Stocking records indicate that Hoodoo Lake was planted in 1933 with brook trout. This population is now self-sustaining. The only other stocking record for Hoodoo Lake indicates that cutthroat trout were planted in 1931.

**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was low and averaged 34 angler-days per year.

**Other Nearby Lakes:** There are several other lakes in the general vicinity of Hoodoo Lake, but none are close. Heart, Pearl, and Dalton Lakes are approximately 3 miles southeast of Hoodoo Lake. Accessing them would require either ascending to the Stateline Trail (#738) and hiking 2.5 to 4.5 miles southeast or returning to USFS Road #250 and hiking up the South Fork of Trout Creek on USFS Trail #171 (~ 2.5 miles to the nearest lake). Trail Lake is 2.5 miles northwest of Hoodoo Lake. From Hoodoo Lake, return to USFS Road #250, take USFS Road #388 to Trail #156 and hike 2.5 miles to the lake.

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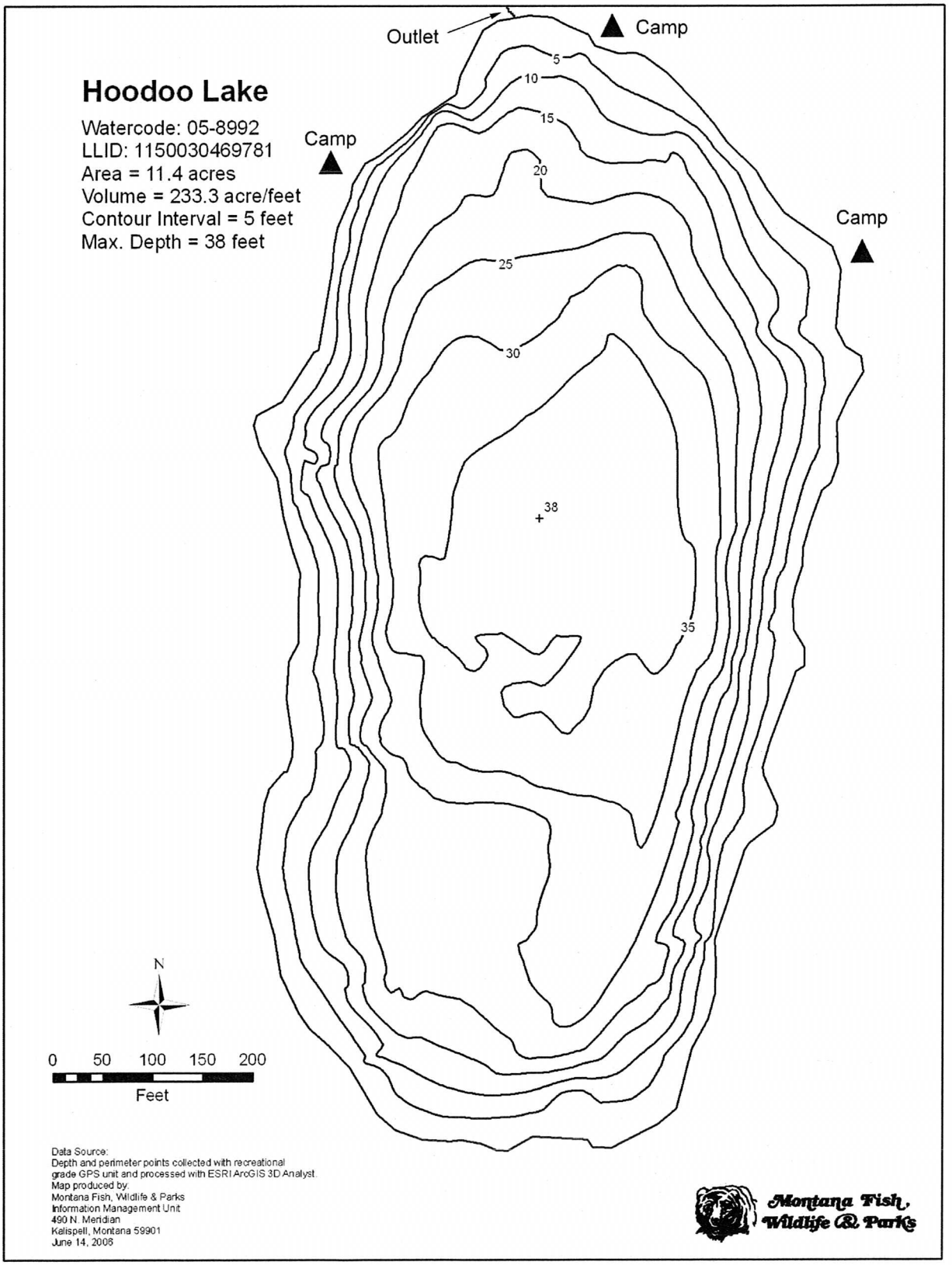


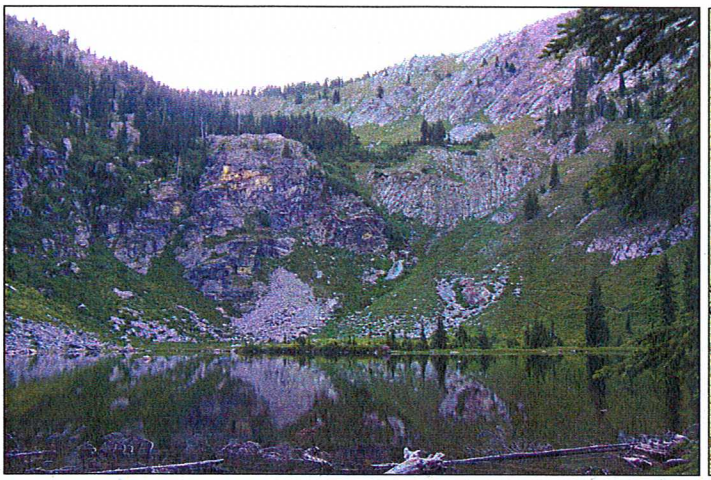

# Hoodoo Lake

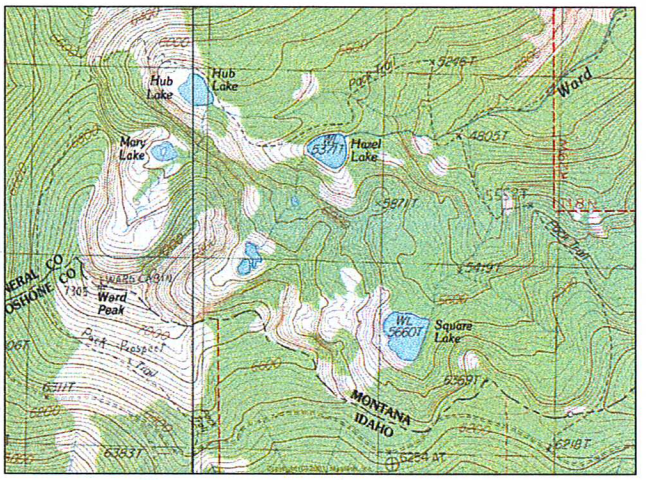
Watercode: 05-8992
LLID: 1150030469781
Area = 11.4 acres
Volume = 233.3 acre/feet
Contour Interval = 5 feet
Max. Depth = 38 feet

Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
June 14, 2006

Montana Fish, Wildlife & Parks

# Hub Lake






**Description:** Hub Lake is a small (5.6 acres), remote glacial cirque lake located near the Idaho border in the Ward Creek (St. Regis River) drainage at 5,698 ft elevation. The lake lies on the Lolo National Forest (Superior Ranger District).

**Location:** T18N, R30W, Section 35; Latitude N 47.2760°, Longitude W115.3760°; Nearest Town: St. Regis, MT

**Access:** There are several ways to access Hub Lake. The most common route is to take Exit 26 off Interstate Highway 90 to USFS Road #889 (Ward Creek Road). Take Road #889 for ~ 6.3 miles to the USFS Trail #262 trailhead. Approximately 1.3 miles up Trail #262, take Trail #280 to the north (right). This steep trail will lead past Hazel Lake to Hub Lake ~ 1.3 miles from the trail junction. Another option is to take USFS Road #282 (Little Joe Creek Road) from St. Regis to the Idaho border. Once you reach the Idaho border, take USFS Road #391 northwest ~ 4 miles to the Trail #262 trailhead. This trail runs north for ~ 1.4 miles to the same Trail # 280 junction mentioned above. Hub Lake can also be accessed off of USFS Road #391 by Trail #250 which lies another 1.4 miles to the east of Trail #280. Trail # 250 intersects Trail #280 near Hub Lake ~ 1.6 miles north of the trailhead.

**Campsites and Use:** Hub Lake lies in a semi-remote setting that receives light use. There are two established campsites with fire rings near the lake. 'Leave no trace' camping and recreating is encouraged in this area.

**Angling Opportunity:** Hub Lake supports a population of westslope cutthroat trout that has substantial natural reproduction. Shoreline topography and access lends well to shoreline angling for much of the lake's perimeter.

**Stocking History**: Hub Lake has been stocked only with westslope cutthroat trout since 1975. It was also stocked twice prior (1941, 1953) with an unknown strain of cutthroat trout. Stocking has been discontinued at Hub lake as the population appears to be self-sustaining.

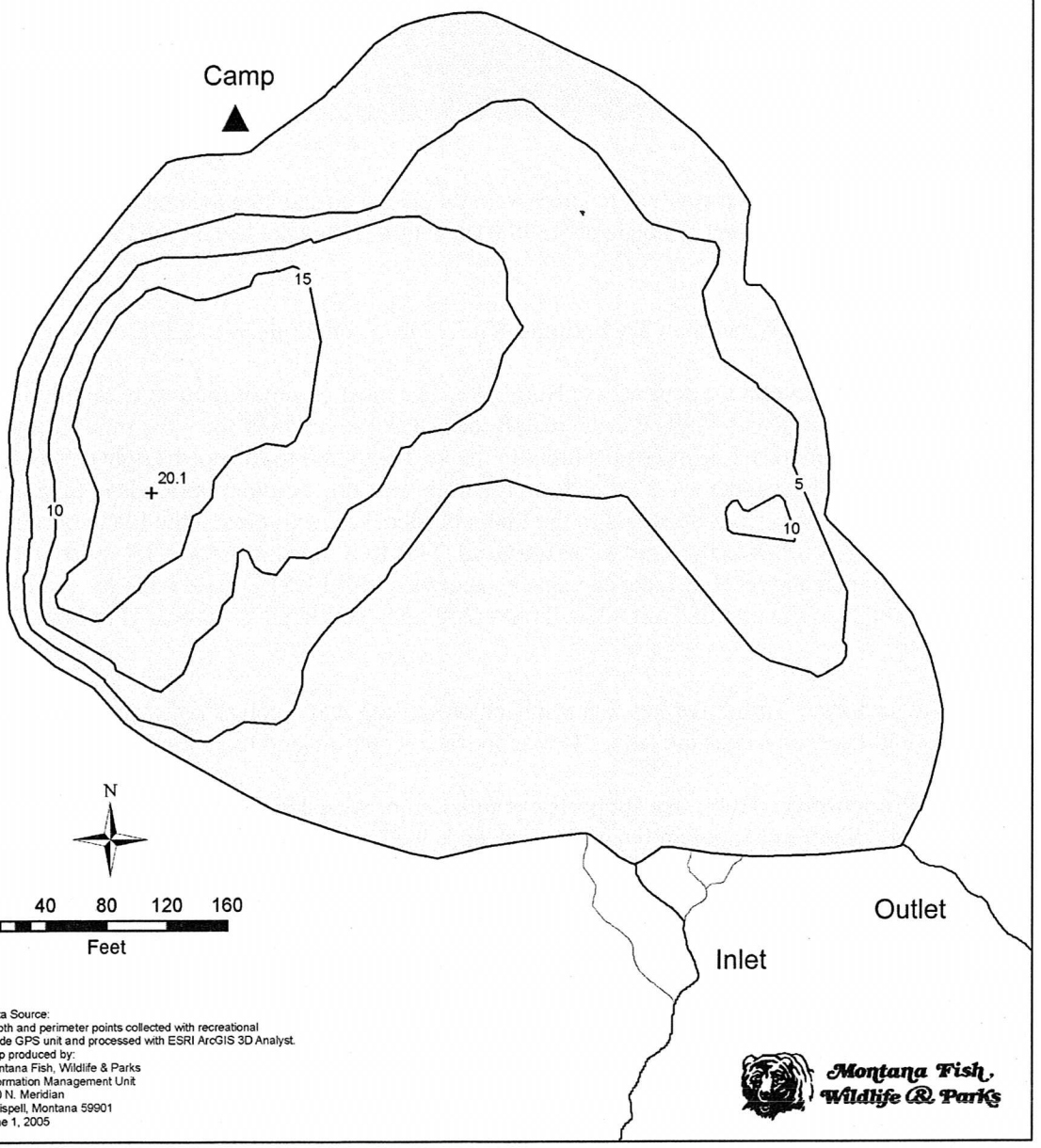
**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was low and averaged 51 angler-days per year.

**Other Nearby Lakes:** There are several other lakes in the area. Hazel Lake is < 0.5 mile east-southeast of Hub Lake and lies just off of USFS Trail #280. Square Lake is less than a mile southeast of Hazel Lake, but getting to it directly would require off-trail hiking over steep terrain. There is a trail to Square Lake from USFS Road #391on the Montana-Idaho divide. Clear Lake is ~ 1.5 miles west-southwest of Hub Lake, but getting there also requires access from USFS Road #391 via a steep trail from the divide.

Montana Fish, Wildlife & Parks

# Hub Lake

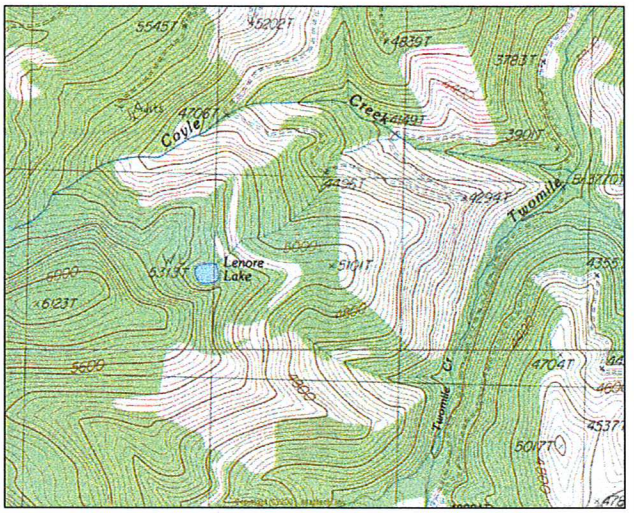
Watercode: 05-9024
Survey Date: 6/19/2004
Area = 5.6 acres
Volume = 37.8 acre/feet
Contour Interval = 5 feet
Max. Depth = 20.1 feet




Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
June 1, 2005

Montana Fish, Wildlife & Parks

# Lenore Lake




**Description:** Lenore Lake is a very small (1.8 acres), semi-remote glacial cirque lake located in the Twomile Creek drainage (St. Regis River) at 5,313 ft elevation. The lake lies on the Lolo National Forest (Superior Ranger District).

**Location**: T17N, R29W, Section 9; Latitude N47.2534°, Longitude W 115.2960°; Nearest Town: St. Regis, MT

**Access:** Access to Lenore Lake can most easily be obtained by taking the Twomile Creek Exit from Interstate Highway 90, just west of St. Regis, MT. Take USFS Road #431 southwest for ~ 6 miles, then bear right onto USFS Road #1180. Take this road for 1.7 miles and hike up the small drainage for ~ 0.5 mile to the lake. The hike is steep and there is no established trail.

**Campsites and Use:** Lenore Lake lies in a semi-remote setting that receives very light use. There is no known trail to the lake, but there is a campsite and fire ring. 'Leave no trace' camping and recreating is encouraged in this area.

**Angling Opportunity:** Lenore Lake supports a westslope cutthroat trout population that has no apparent natural reproduction and is maintained with stocking. Shoreline topography and thick forest canopy make shoreline angling difficult.

**Stocking History**: Lenore Lake has been stocked only with westslope cutthroat trout since 1977. Prior to 1977, Lenore Lake was stocked with rainbow trout several times (1949-1953). Stocking with westslope cutthroat trout will likely continue every 7-10 years in the future.

**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was zero. Although the lake is visited occasionally by anglers, none of the respondents is the random mail survey had fished at Lake Lenore.

**Other Nearby Lakes:** Lenore Lake is very isolated from other lakes. Square, Hazel, and Hub Lakes lie 3-4 miles west-northwest of Lenore Lake, but accessing them would require returning to USFS Road #1180, driving to the Idaho border, then driving west on USFS Road #391 before descending into the basin in which the lakes are located (USFS Trail #262 and #250).

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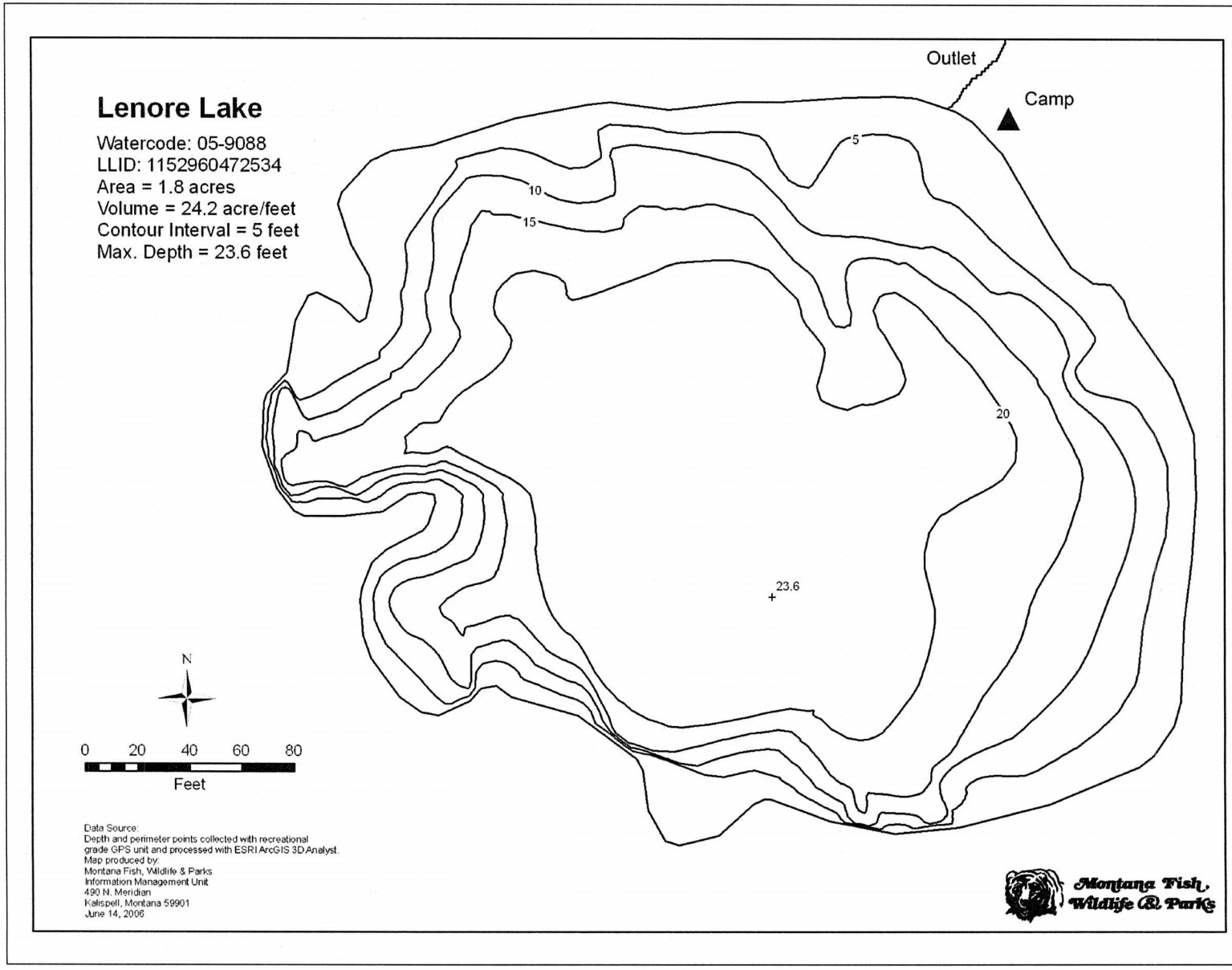
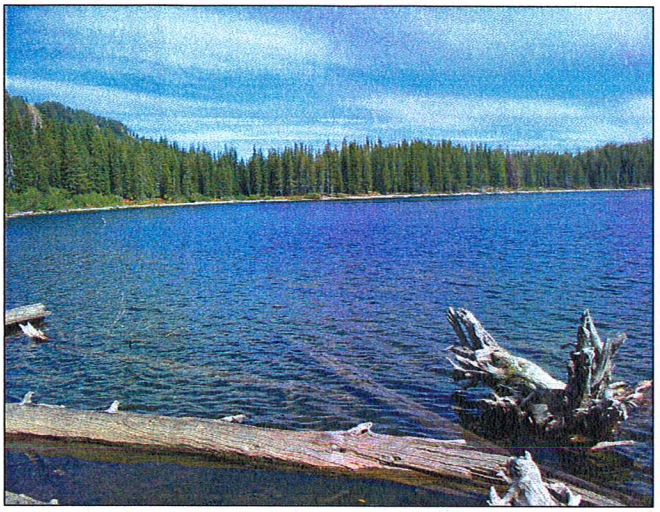
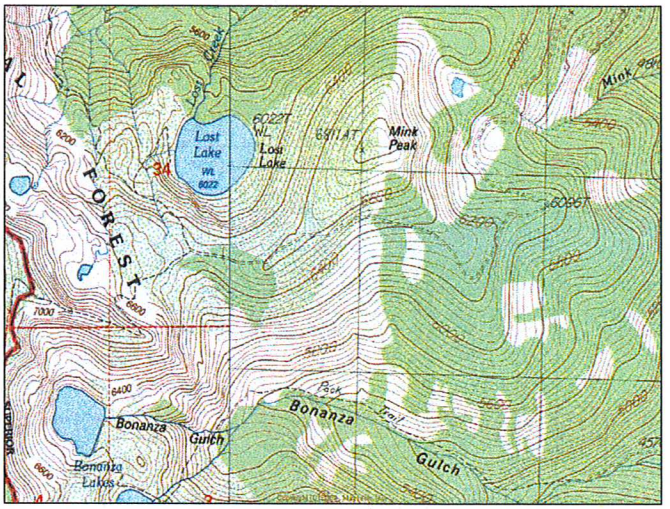

Lenore Lake
Watercode: 05-9088
LLID: 1152960472534
Area = 1.8 acres
Volume = 24.2 acre/feet
Contour Interval = 5 feet
Max. Depth = 23.6 feet
Outlet
Camp
5
10
15
20
23.6
N
0 20 40 60 80
Feet
Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
June 14, 2006
Montana Fish, Wildlife & Parks

# Lost Lake






**Description:** Lost Lake is a large (33.9 acres), remote glacial cirque lake located near the Idaho border in the Cedar Creek drainage at 6,022 ft elevation. The lake lies on the Lolo National Forest (Superior Ranger District).

**Location**: T16N, R28W, Section 34; Latitude N47.1026°, Longitude W115.1260°; Nearest Town: Superior, MT

**Access:** Lost Lake is most easily accessed by taking USFS Road #320 (Cedar Creek Road) from Superior, Montana for ~ 19 miles. Turn right on USFS Road #7763 near the Oregon Lakes trailhead. Take Road #7763 north for ~ 2.6 miles to USFS Road #7829. Go left on Road #7829 and drive to the end (~ 4.5 miles). Take the steep trail, roughly 1 mile in length, to the lake.

**Campsites and Use:** Lost Lake lies in a fairly remote setting that receives moderate use. There is an established trail around most of the lake with multiple campsites and fire rings**.** 'Leave no trace' camping and recreating is encouraged.

**Angling Opportunity:** Lost Lake supports a brook trout population that has a high rate of natural reproduction. Brook trout harvest is encouraged. Shoreline topography and access lends well to shoreline angling from most of the lake's perimeter.

**Stocking History**: Lost Lake has not been stocked since 1966. Rainbow trout were stocked into Lost Lake in both 1965 and 1966. Although the lake supports brook trout, there is no record of brook trout stocking.

**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was very low and averaged 5 angler-days per year.

**Other Nearby Lakes:** There are several other lakes near Lost Lake. The Bonanza Lakes lie ~ 0.5 mile south-southwest of the end of USFS Road #7829, although accessing them from this point would require off-trail hiking over steep terrain. The Oregon Lakes are < 1 mile south of the junction of Roads #320 and #7763. A short (~ 0.5mile) road going south from this junction leads to the trailhead. Missoula Lake is also nearby. Rather than taking Road #7763, go another 3.3 miles on Road #320. A USFS campground lies at the trailhead to the lake, which is less than 0.5 mile below.

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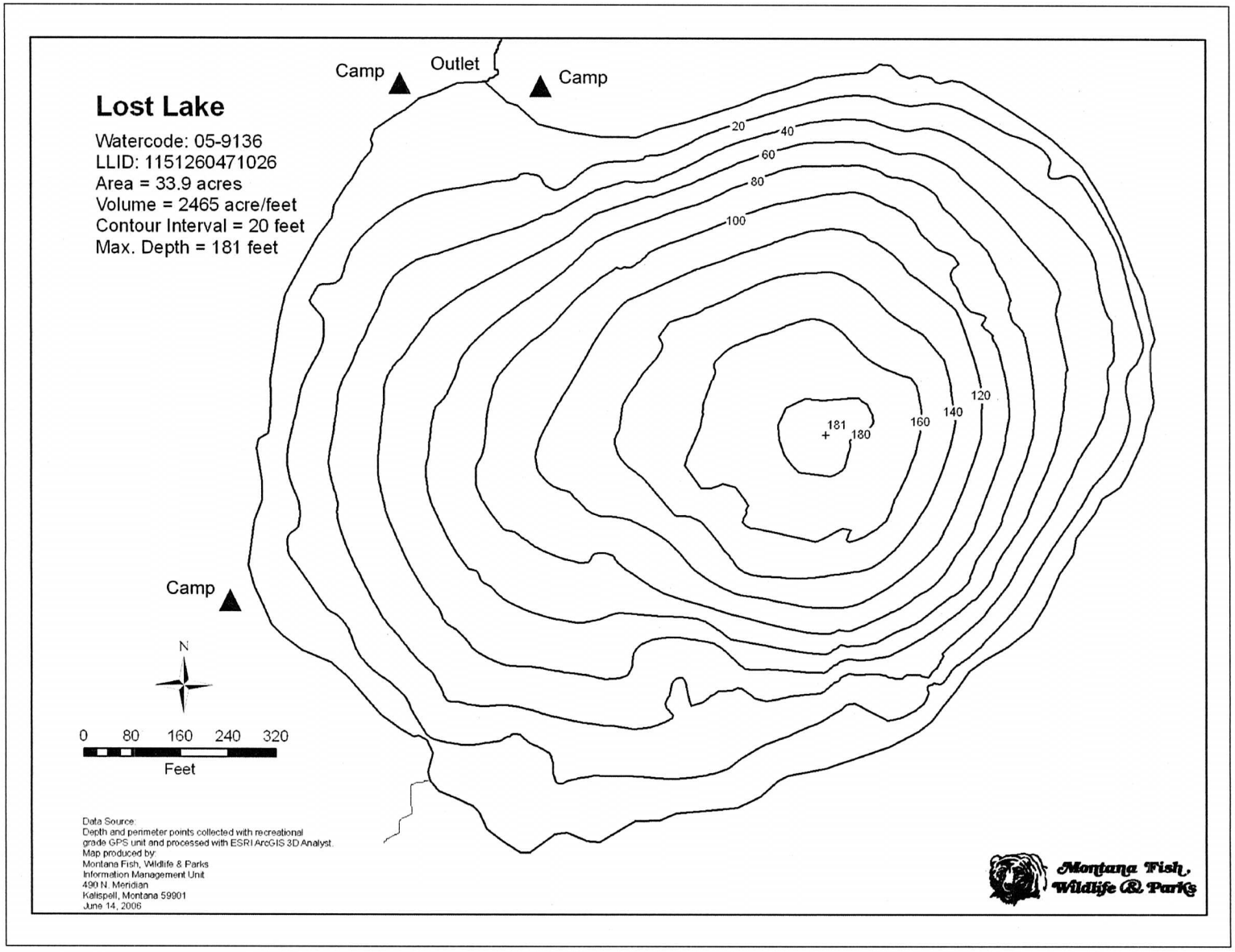
Lost Lake
Watercode: 05-9136
LLID: 1151260471026
Area = 33.9 acres
Volume = 2465 acre/feet
Contour Interval = 20 feet
Max. Depth = 181 feet
Camp
Outlet
Camp
Camp
20
40
60
80
100
120
140
160
180
181
N
0 80 160 240 320
Feet
Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
June 14, 2006
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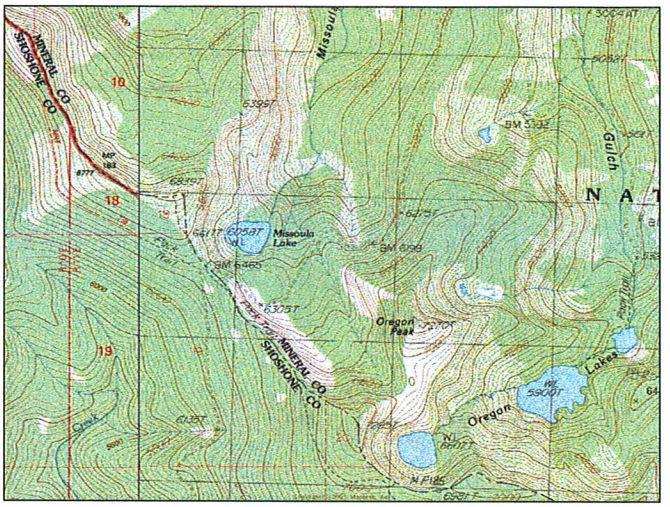
# Missoula Lake




**Description:** Missoula Lake is a moderately sized (11.4 acres), semi-remote glacial cirque lake located near the Idaho border in the Cedar Creek drainage at 6,058 ft elevation. The lake lies on the Lolo National Forest (Superior Ranger District).

**Location**: T15N, R27W, Section 15; Latitude N47.0634°, Longitude W115.1160°; Nearest Town: Superior, MT

**Access:** Access to Missoula Lake can most easily be obtained by taking USFS Road #320 (Cedar Creek Road) from Superior, Montana for ~ 22 miles. There is a developed USFS campground at the trailhead for lake access. The trail to the lake is < 0.5 miles.

**Campsites and Use:** Missoula Lake lies in a semi-remote setting, but receives heavy use. There is a trail around much of the lake, one campsite at the lake, and a developed USFS campground with fire rings and latrines just above the lake. 'Leave no trace' camping and recreating is encouraged.

**Angling Opportunity:** Missoula Lake supports a westslope cutthroat trout population that has limited natural reproduction. Shoreline topography and access lends well to shoreline angling from about half of the lake's perimeter. There are many frequently used angling locations around the lake.

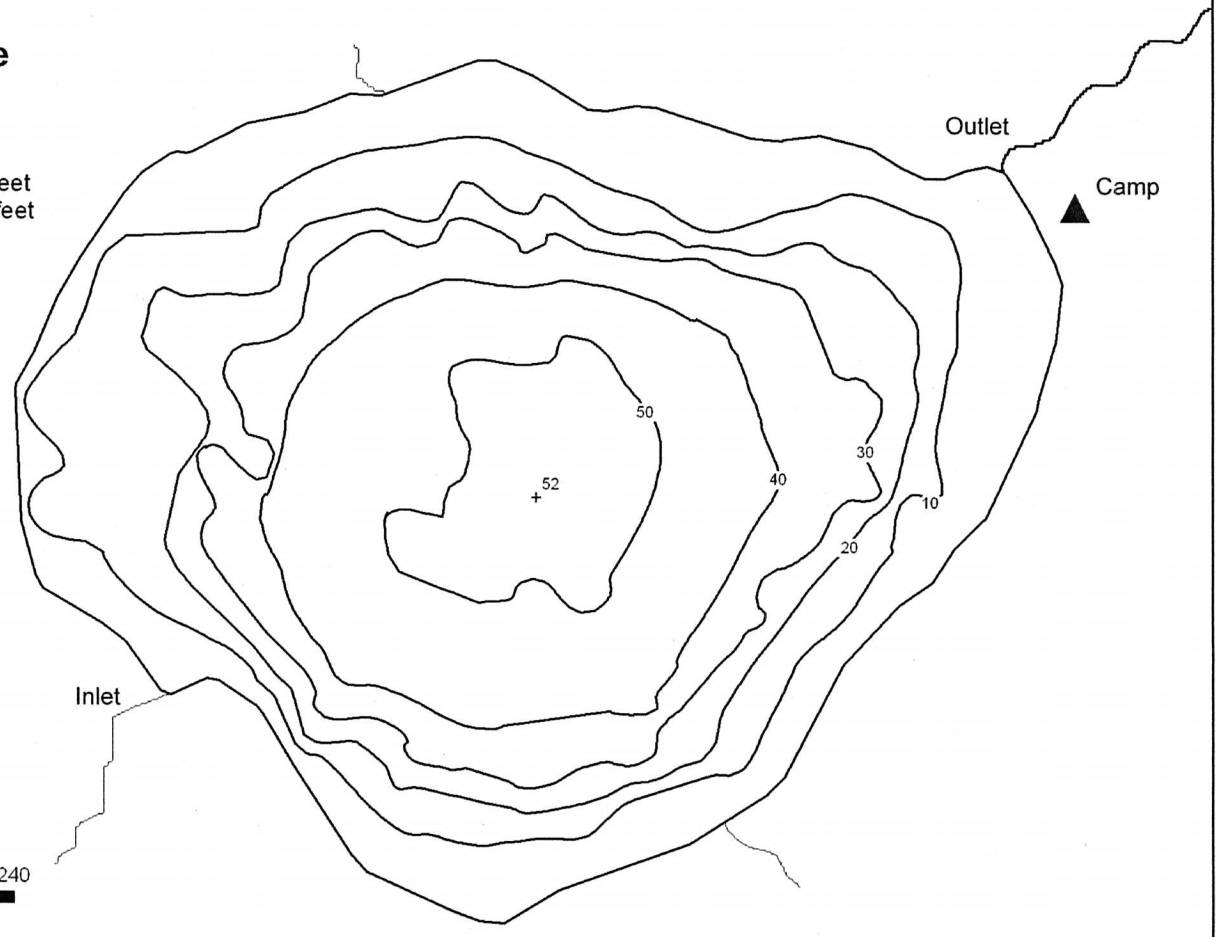
**Stocking History**: Missoula Lake has been stocked only with westslope cutthroat trout since 1993. Prior to that it had been stocked with rainbow trout and cutthroat trout. Since 1990, the lake was planted in 1993, 2000, and 2005. Frequent westslope cutthroat trout stocking will likely continue in the future.

**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was high for an alpine lake and averaged 144 angler-days per year.

**Other Nearby Lakes:** There are several other lakes in the vicinity of Missoula Lake. The Oregon Lakes are less than one mile south of the junction of USFS Roads #320 and #7763 (roughly 3 miles back towards Superior on road #320). A short (0.5 mile) road going south from this junction takes you to the trailhead, and Lower and Middle Oregon Lakes are within a mile. The Bonanza Lakes are less than two miles northwest of Missoula Lake, and can be accessed either off the Stateline National Recreation Trail (#738) above Missoula Lake, or by taking USFS Road #7763 and Trail #616.

# Missoula Lake

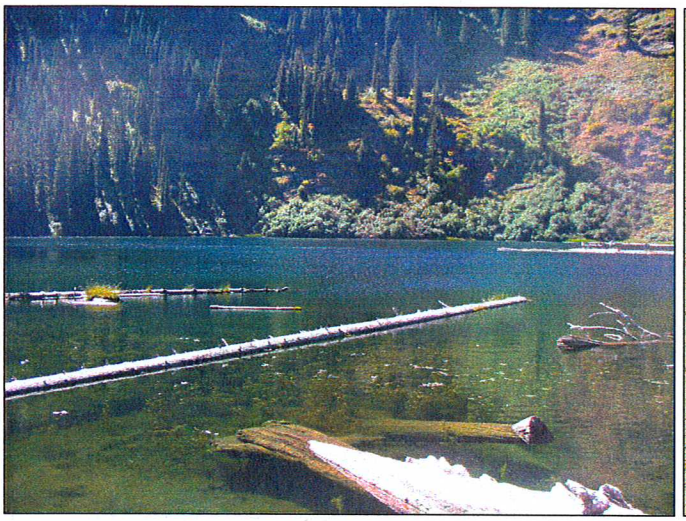
Watercode: 05-9248
LLID: 1151160470634
Area = 11.4 acres
Volume = 293.7 acre/feet
Contour Interval = 10 feet
Max. Depth = 52 feet

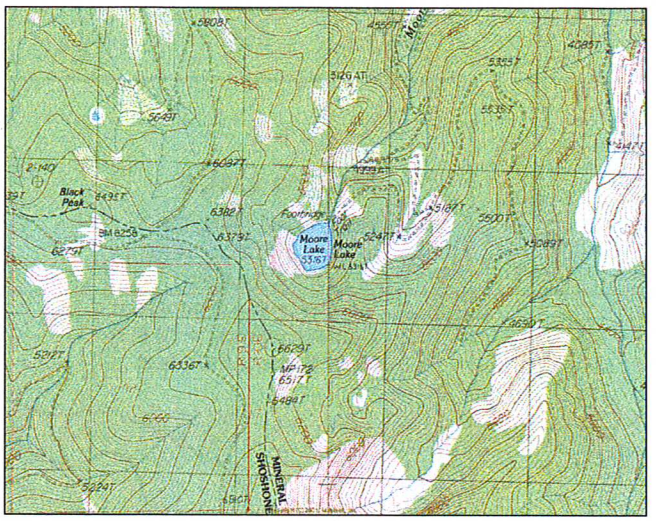



Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
June 14, 2006

Montana Fish, Wildlife & Parks

# Moore Lake






**Description:** Moore Lake is a moderately sized (14.3 acres), semi-remote glacial cirque lake located near the Idaho border in the South Fork Little Joe Creek drainage (St. Regis River) at 5,316 ft elevation. The lake lies on the Lolo National Forest (Superior Ranger District).

**Location**: T16N, R29W, Section 3; Latitude N47.1804°, Longitude W 115.2510°; Nearest Town: St. Regis, MT

**Access:** Access to Moore Lake can most easily be obtained by taking USFS Road #282 (Little Joe Road) from St. Regis, MT for ~ 3.2 miles to USFS Road #221. Go south on Road #221 for ~ 7 miles to USFS Road #3848. Take this road 1.4 miles, and then go left on the road to Moore Lake (USFS Road #3801). The road ends at the lake.

**Campsites and Use:** Moore Lake lies in a semi-remote setting that receives heavy use. There is a trail around much of the lake, ample room for camping, and a USFS latrine. 'Leave no trace' camping and recreating is encouraged.

**Angling Opportunity:** Moore Lake supports a brook trout population that has a high rate of natural reproduction. Brook trout harvest is encouraged. Shoreline topography and access lends well to shoreline angling from over half of the lake's perimeter.

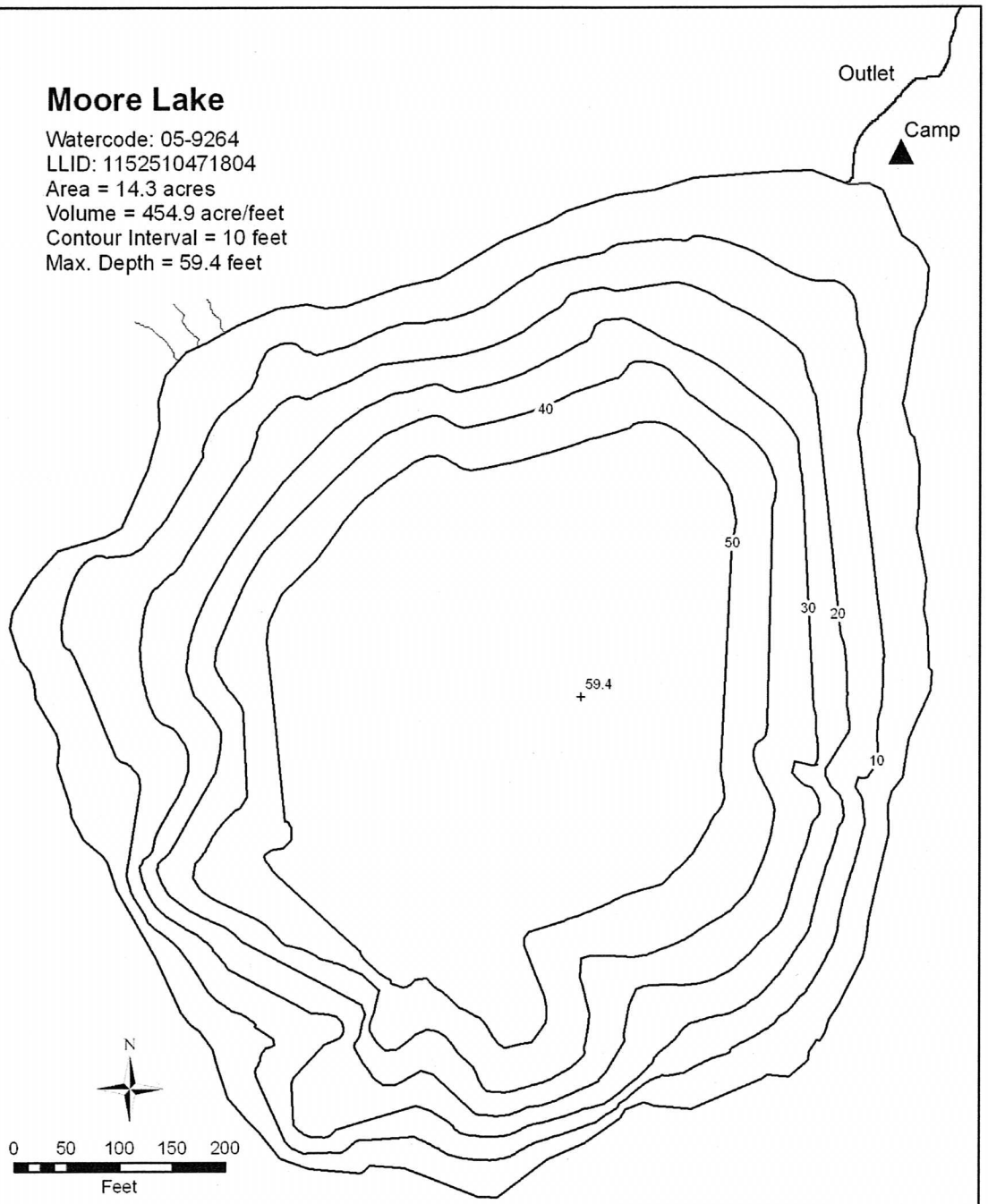
**Stocking History**: Stocking records indicate that Moore Lake has not been stocked since 1953. It was stocked with rainbow trout on three occasions from 1949 to 1953. Although a self-sustaining brook trout population exists in the lake, there is no record of this species being planted.

**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was high for an alpine lake and averaged 192 angler-days per year.

**Other Nearby Lakes:** Moore Lake is quite isolated from other lakes. Visiting other lakes in the area would require returning to the interstate highway at St. Regis and going to a lake in a completely different drainage.

# Moore Lake

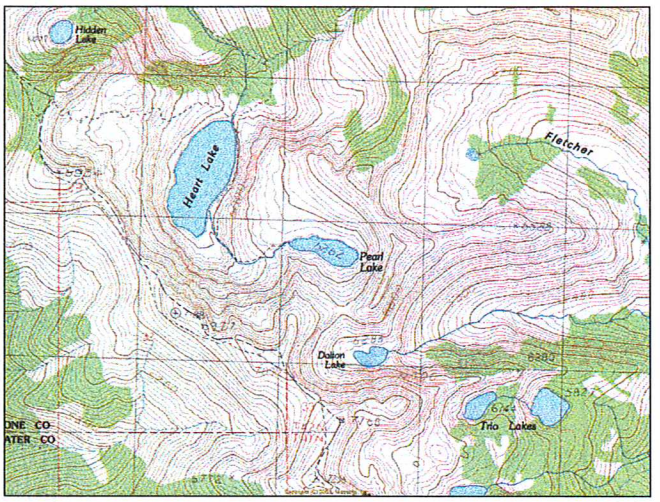
Watercode: 05-9264
LLID: 1152510471804
Area = 14.3 acres
Volume = 454.9 acre/feet
Contour Interval = 10 feet
Max. Depth = 59.4 feet




Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
June 14, 2006

Montana Fish, Wildlife & Parks

# Pearl Lake




**Description:** Pearl Lake is a moderately sized (14.9 acre), semi-remote shallow cirque lake located near the Idaho border in the South Fork Trout Creek drainage at 6,262 ft elevation, just upstream of Heart Lake. The lake lies on the Lolo National Forest (Superior Ranger District).

**Location**: T14N, R27W, Section 25; Latitude N46.9445°, Longitude W 114.9590°; Nearest Town: Superior, MT.

**Access:** Access to Pearl Lake can most easily be obtained by taking USFS Road #250 (Trout Creek Road) from Superior, MT. From Road #250, there are two options to hike. One option is to hike Trail #171 to Heart Lake, then Trail #175 to Pearl Lake. This route is approximately 3.5 miles. The other option is to take Trail #738 (Stateline National Recreation Trail) east-southeast, along the Idaho border, from the top of Hoodoo Pass (USFS Road #250), then take Trail #175 northeast to Pearl Lake. This route is approximately 5 miles.

**Campsites and Use:** Pearl Lake lies in a remote setting that receives moderate use. There is at least one a well-established campsite and a partial trail around the lake.

**Angling Opportunity:** Pearl Lake supports a population of brook trout that is supplemented with stocked westslope cutthroat trout. Shoreline topography and access lends well to shoreline angling from most of the lake's perimeter.

**Stocking History**: Pearl Lake has been stocked four times with westslope cutthroat trout from 1969-1978. Prior to that, it had been stocked once with brook trout in 1938. The lake has not been stocked since 1978, but will be re-instituted beginning in 2007 to diversify the fishery.

**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was low and averaged 40 angler-days per year.

**Other Nearby Lakes:** Pearl Lake is located near several lakes in upper Trout and Fish Creeks. Pearl Lake lies between Heart Lake (Trail #175) and Dalton Lake (non-designated trail), which are both within one mile. A more ambitious side trip from Pearl Lake would be to the Trio Lakes, which are only about a mile away (map distance). However, getting to them will likely require ascending to the Stateline Trail (#738), heading southeast ~1.5 miles, then finding a way down to them (no known established trail).

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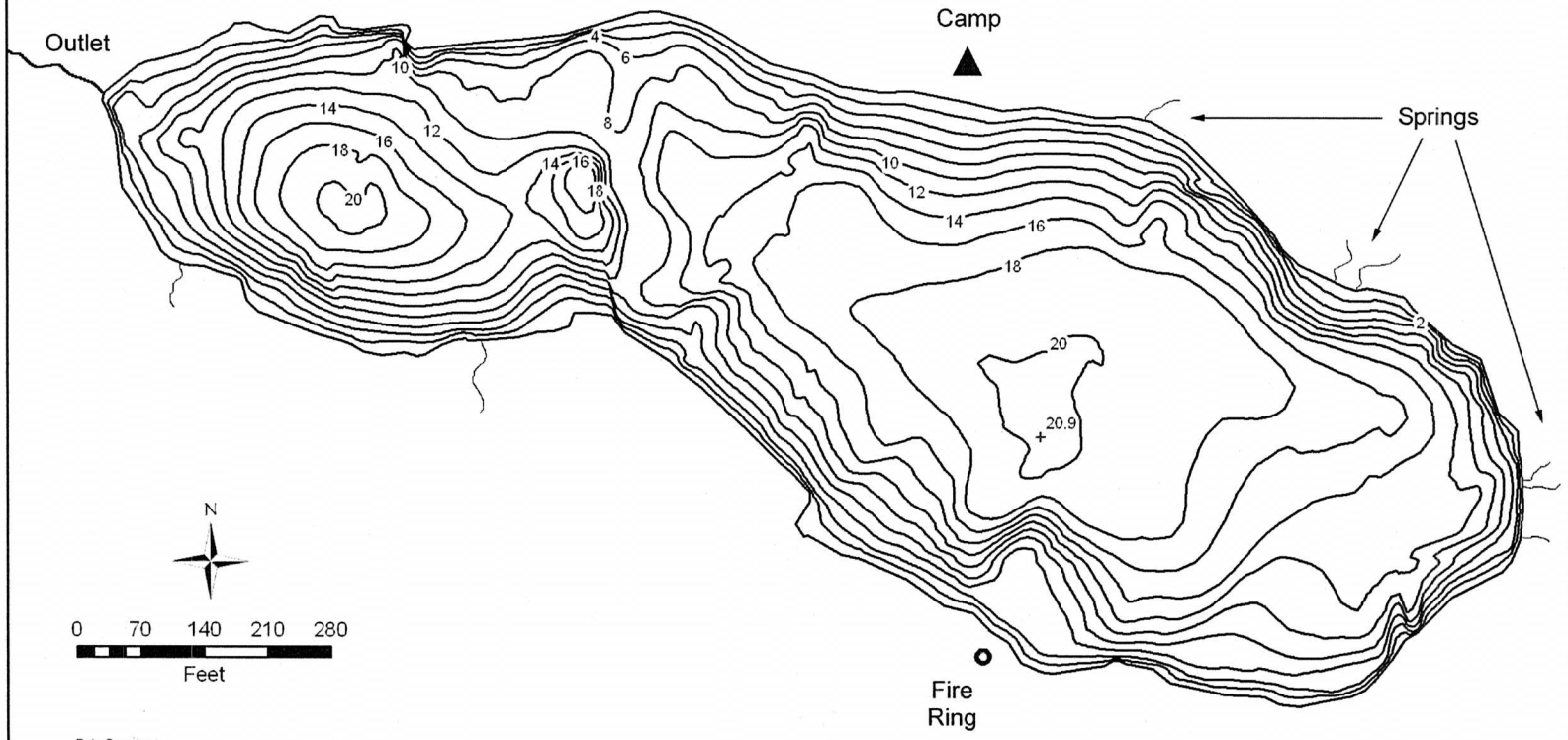
# Pearl Lake

Watercode: 05-9360
LLID: 1149590469445
Area = 14.9 acres
Volume = 168.4 acre/feet
Contour Interval = 2 feet
Max. Depth = 20.9 feet




Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
June 14, 2006

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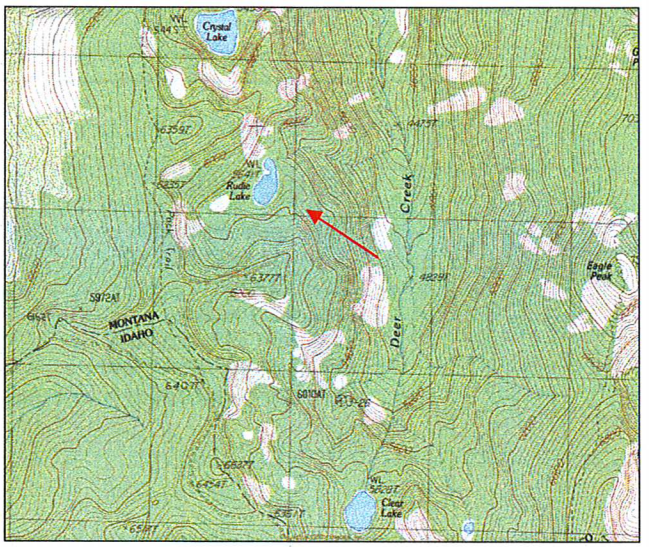
# Rudie Lake




**Description:** Rudie Lake is a small (7.1 acres), remote forested cirque lake located near the Idaho border in the Deer Creek (St. Regis River) drainage at 5,641 ft elevation. The lake lies on the Lolo National Forest (Superior Ranger District).

**Location:** T18N, R30W, Section 28; Latitude N 47.2882°, Longitude W115.4160°; Nearest Town: St. Regis, MT

**Access:** There are two good routes to Rudie Lake. One is to take USFS Road #236 (Deer Creek Road) south from DeBorgia, MT for 6.4 miles to the trailhead for USFS Trail #269. This trail passes Crystal Lake at mile1.4 and leads to the unmarked trail to Rudie Lake at mile 2.9. This is an old trail that descends the east side of a ridge towards Rudie Lake. The trail is not well established and off-trail hiking will be required. The other option is to take USFS Road #282 (Little Joe Creek Road) from St. Regis to the Idaho border. Once you reach the Idaho border, take USFS Road #391 northwest approximately 8.6 miles to Trail #269, which runs north. Approximately 0.7 mile down on this trail, you will be at the aforementioned old trail that goes down the east side of the ridge towards Rudie Lake. This would be a preferred route to visit multiple lakes in one trip.

**Campsites and Use:** Rudie Lake lies in a semi-remote setting that receives light use. There is an old, remnant trail around the lake and multiple campsites with fire rings. 'Leave no trace' camping and recreating is encouraged in this area.

**Angling Opportunity:** Rudie Lake supports a population of brook trout that has a high rate of natural reproduction. Brook trout harvest is encouraged. Shoreline topography and access lends well to shoreline angling from most of the lake's perimeter.

**Stocking History**: Although brook trout have evidently been introduced into Rudie Lake, there is no record of it having ever been stocked. At this time, there are no plans to stock Rudie Lake in the future.

**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was zero. Although the lake is known to receive some angling use, none of the respondents in the random survey had visited Rudie Lake during this period.

**Other Nearby Lakes:** There are several other lakes near Rudie Lake. Crystal Lake lies ~ 0.5 mile north-northwest of Rudie Lake off of USFS Trail #269. Clear Lake is 1.3 miles south-southeast of Crystal lake and easily accessed by a short, steep trail from USFS Road #391. Hazel, Hub, and Square Lakes are 2.5- 3.5 miles southwest of Crystal Lake and can be accessed via various trails from USFS Road #391 as well.

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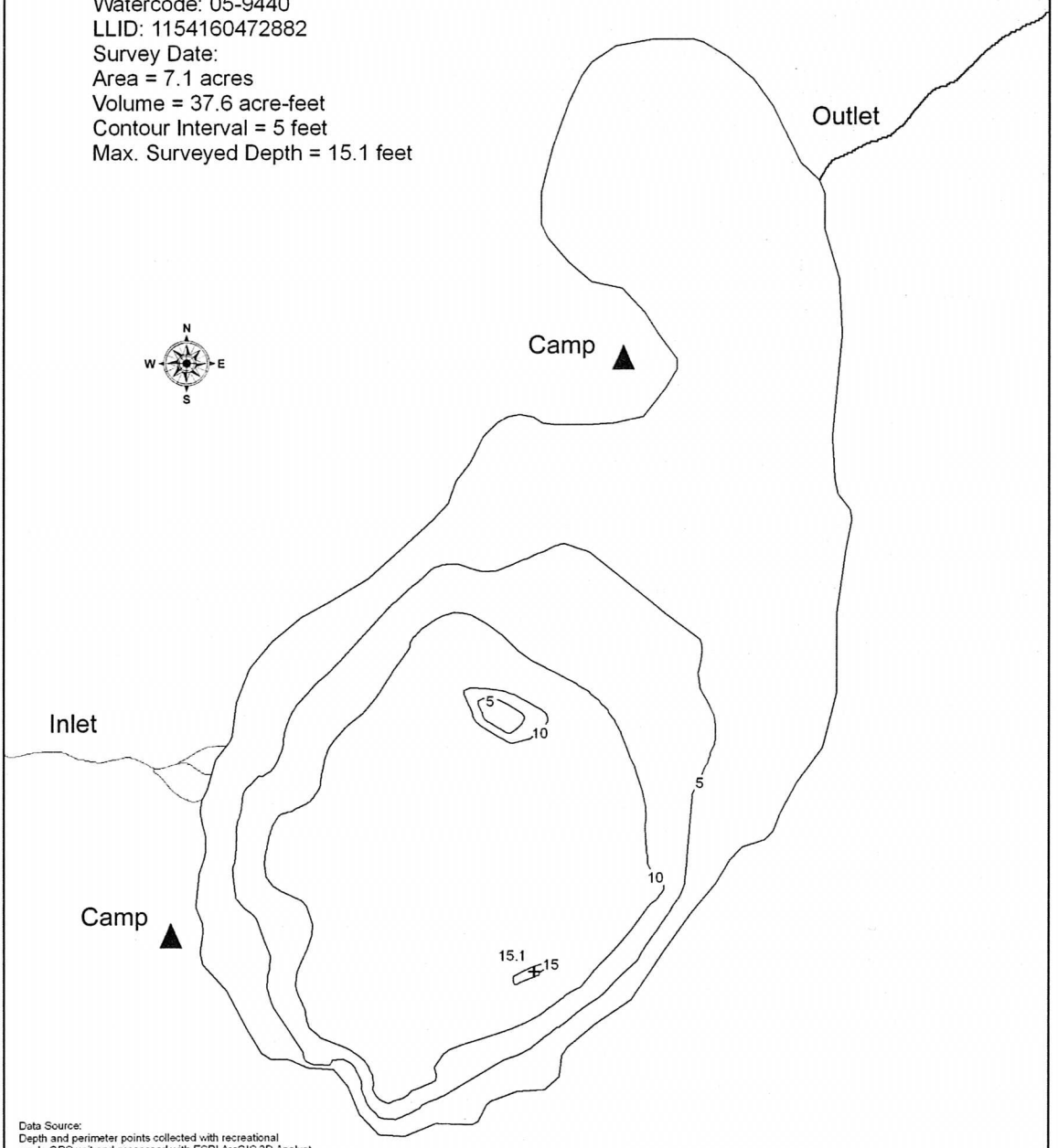
# Rudie Lake

Watercode: 05-9440
LLID: 1154160472882
Survey Date:
Area = 7.1 acres
Volume = 37.6 acre-feet
Contour Interval = 5 feet
Max. Surveyed Depth = 15.1 feet




Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
November 13, 2006

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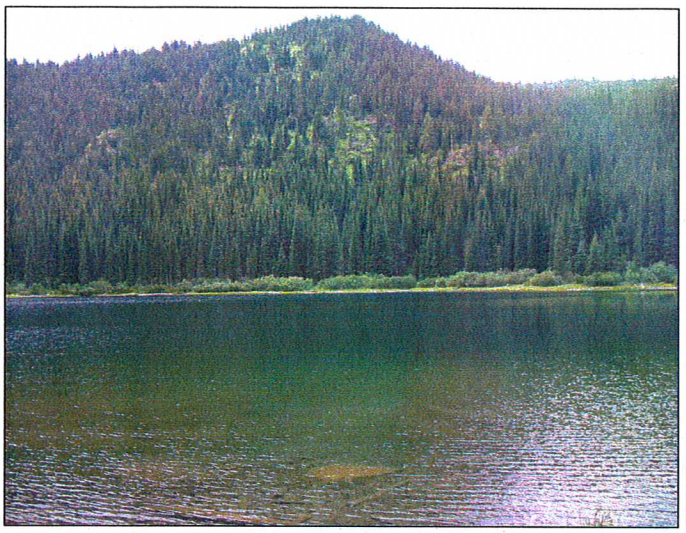
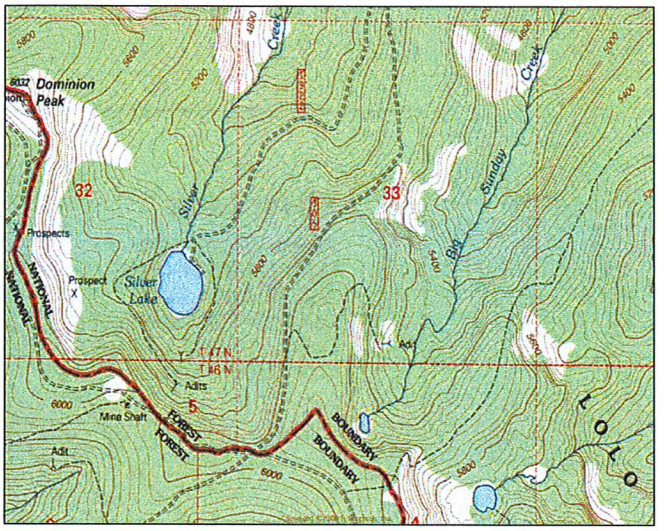
# Silver Lake






**Description:** Silver Lake is a moderately sized (12.9 acres), semi-remote glacial cirque lake located near the Idaho border in the Silver Creek (St. Regis River) drainage at 5,314 ft elevation. The lake lies on the Lolo National Forest (Superior Ranger District).

**Location**: T19N, R31W, Section 32; Latitude N47.3594°, Longitude W 115.5650°; Nearest Town: St. Regis, MT

**Access:** Access to Silver Lake can most easily be obtained by taking the Saltese Exit from Interstate Highway 90 west of St. Regis, MT, then going south on USFS Road #305. After ~ 3.5 miles, take USFS Road #9122 For ~1.3 miles. The road ends at the lake.

**Campsites and Use:** Silver Lake lies in a semi-remote setting that receives heavy use (for an alpine lake) due to its ease of access. There is an established trail around the lake with multiple campsites and fire rings. 'Leave no trace' camping and recreating is encouraged.

**Angling Opportunity:** Silver Lake supports a brook trout population that has substantial natural reproduction. Brook trout harvest is encouraged. Shoreline topography and access lends well to shoreline angling from most of the lake's perimeter.

**Stocking History**: Silver Lake has not been stocked since 1964. From 1932 to 1964, the lake was stocked with cutthroat trout, rainbow trout, brook trout, and brown trout. Brook trout are currently the only species known to be present.

**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was low and averaged 52 angler-days per year.

**Other Nearby Lakes:** There is just one other lake in the immediate vicinity of Silver Lake. Tadpole Lake is 1.1 miles southeast of Silver Lake. From Silver Lake, return to USFS Road #305 and drive to the Idaho border. From this point there are two options to access Tadpole Lake. The first is to proceed southeast on USFS Road #391 for 0.3 miles to Trail #255. Hike trail #255 northeast 0.5 mile, and then hike off-trail to the lake. The second option is to travel southeast on USFS Road #391 one mile, and hike an unofficial mile-long trail north to the lake. Be sure to not accidentally hike Trail # 1268, which heads northeast off the ridge immediately.

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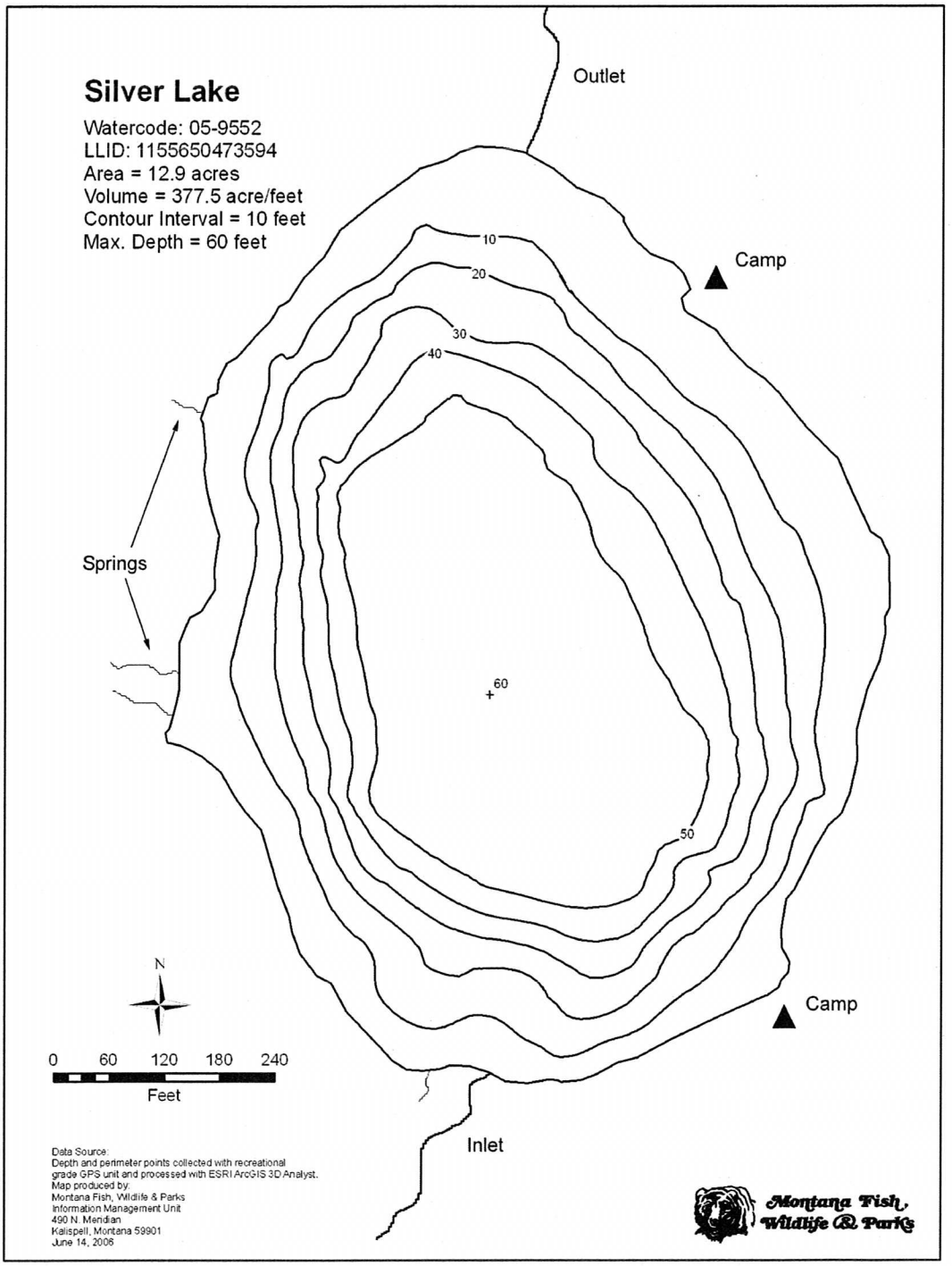
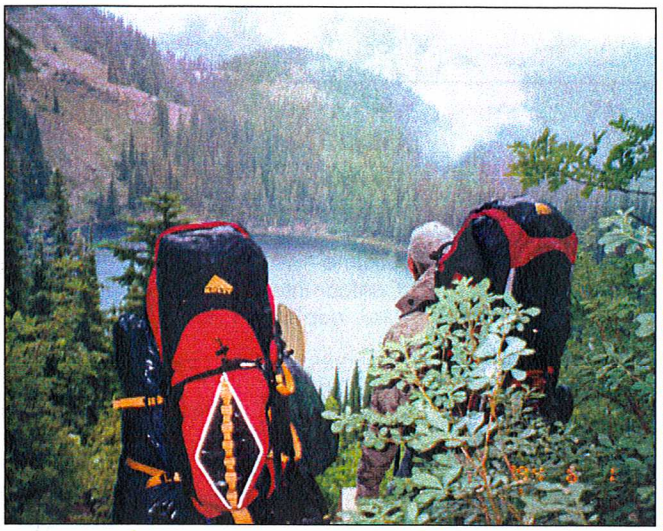
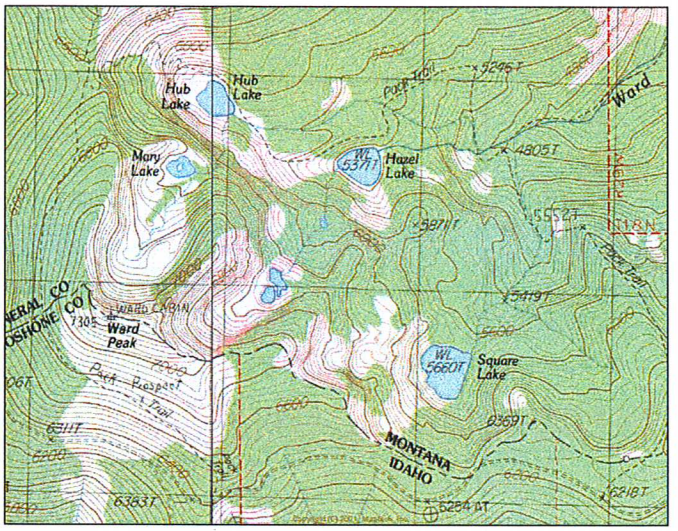

Silver Lake
Watercode: 05-9552
LLID: 1155650473594
Area = 12.9 acres
Volume = 377.5 acre/feet
Contour Interval = 10 feet
Max. Depth = 60 feet
Outlet
Camp
10
20
30
40
Springs
60
50
Camp
N
0 60 120 180 240
Feet
Inlet
Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
June 14, 2006
Montana Fish, Wildlife & Parks

# Square Lake






**Description:** Square Lake is a moderately sized (12.4 acres), semi-remote glacial cirque lake located near the Idaho border in the Ward Creek (St. Regis River) drainage at 5,660 ft elevation. The lake lies on the Lolo National Forest (Superior Ranger District).

**Location:** T17N, R30W, Section 1; Latitude N 47.2640°, Longitude W115.3600°; Nearest Town: St. Regis, MT

**Access:** Square Lake can be accessed by two routes. The first is to take USFS Road #282 (Little Joe Creek Road) from St. Regis, MT to the Idaho border. At the Idaho border, take USFS Road #391 northwest ~ 4.5 miles to a large parking area with a steep trail (<0.5 mile) to the lake. The second option is to take Exit 26 off Interstate Highway 90 west of St. Regis, MT to USFS Road #889 (Ward Creek Road). Take this road ~ 6.3 miles to USFS Tail #262. Approximately 1.6 miles up the trail, it will cross a small drainage which is the outlet of Square Lake. The lake lies ~ 0.5 mile up this drainage via an off-trail hike.

**Campsites and Use:** Square Lake lies in a semi-remote setting that receives light use. There are two campsites with fire rings at the lake. 'Leave no trace' camping and recreating is encouraged in this area.

**Angling Opportunity:** Square Lake supports a population of westslope cutthroat trout that has limited natural reproduction and is supplemented by stocking. Shoreline topography and access lends well to shoreline angling.

**Stocking History**: Square Lake has been stocked five times with westslope cutthroat trout since 1971. It was also stocked once prior (1953) with an unknown strain of cutthroat trout. There is no record of any other fish species stocked in Square Lake. Stocking with westslope cutthroat trout will likely continue every 7-10 years in the future.

**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was zero. Although the lake is known to receive some angling pressure, none of the randomly surveyed anglers that responded had visited the lake.

**Other Nearby Lakes:** There are several other lakes in the area. Hazel Lake and Hub Lake are less than one mile north-northwest of Square Lake, but getting to them will require off-trail hiking. The easiest access would be to return to Trail # 262 below Square Lake and travel northwest to Trail # 280, which leads to both lakes. Clear Lake is just over 2 miles west-northwest of Square Lake. Accessing this lake requires ascending to USFS Road #391, going west, and descending to the lake via a short, steep trail.

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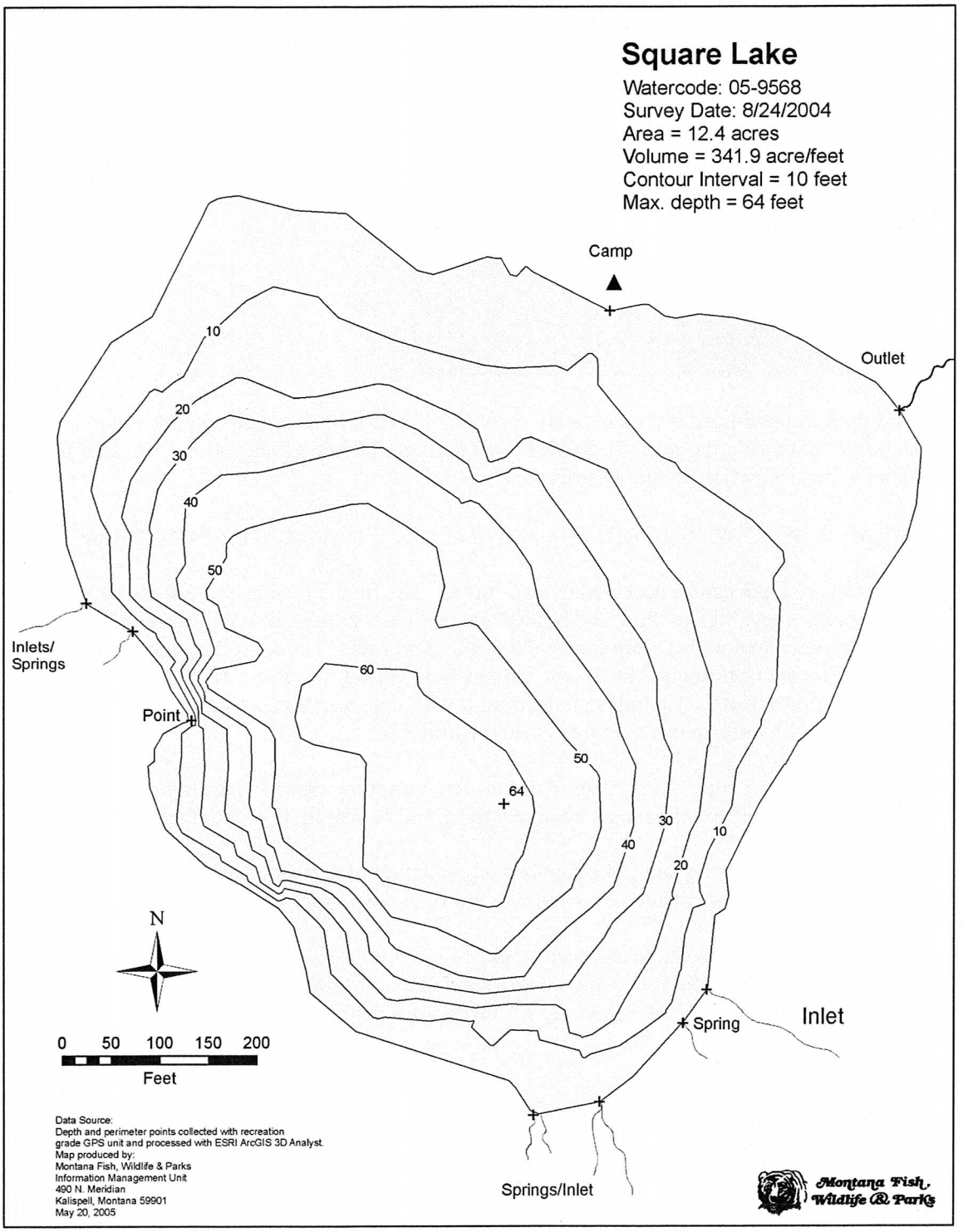
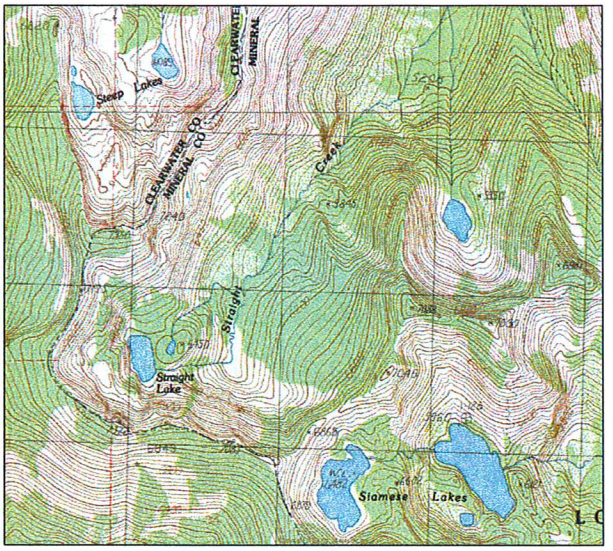

Square Lake
Watercode: 05-9568
Survey Date: 8/24/2004
Area = 12.4 acres
Volume = 341.9 acre/feet
Contour Interval = 10 feet
Max. depth = 64 feet
Camp
Outlet
Inlets/
Springs
Point
Spring
Inlet
Springs/Inlet
10
20
30
40
50
60
64
N
0 50 100 150 200
Feet
Data Source:
Depth and perimeter points collected with recreation grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
May 20, 2005
Montana Fish, Wildlife & Parks

# Straight Lake




**Description:** Straight Lake is a small (8.8 acre) remote glacial cirque lake located in the Straight Creek (North Fork Fish Creek) drainage at 6,390 ft elevation. The lake lies on the Lolo National Forest (Ninemile Ranger District) in the *proposed* Great Burn Wilderness Area.

**Location**: T13N, R26W, Section 30; Latitude N46.8610°, Longitude W114.9390°; Nearest Town: Alberton, MT

**Access:** Straight Lake is very remote lake with difficult access. One way to get there is to take Fish Creek Road (USFS road #343) from Interstate Highway 90, then proceed up the West Fork Fish Creek on USFS Road #7750 until you get to the campground and Forest Service outpost (Clearwater Crossing) at the end of the road. Take the North Fork Fish Creek Trail (#103) for ~ 0.7 miles, then Trail #99 (Straight Creek Trail) west-southwest for ~ 6 miles. Here, the trail will leave Straight Creek toward Chilcoot Pass. Continue up the Straight Creek drainage for about 2.3 miles on an old, unofficial trail. Straight Lake lies at the top of the drainage. Another option is to descend to Straight Lake from the Stateline National Recreation Trail (USFS Trail #738). There are several routes to reach the vicinity of the lake on this trail, but descending to the lake from the lake requires a very steep hike (no trail) that may be dangerous.

**Campsites and Use:** Straight Lake lies in a remote setting that sees light use. The lake has a light trail around it and one obvious campsite on the north end. 'Leave no trace' camping and recreating is essential in this area as it is proposed wilderness.

**Angling Opportunity:** Straight Lake supports a population of westslope cutthroat trout that has abundant natural reproduction. Shoreline topography and access lend well to shoreline angling on about half of the lake perimeter.

**Stocking History**: Straight Lake has been stocked only with westslope cutthroat trout (1989 & 2000). Stocking has been discontinued as the cutthroat trout population appears to be self-sustaining.

**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was zero. Although the Straight Lake does receive occasional angling use, none of the anglers that responded to the survey had visited the lake.

**Other Nearby Lakes:** There are several other lakes in the vicinity of Straight Lake. Getting to them will require off-trail hiking over steep terrain. Harrington Lake is just 1.4 miles northeast of Straight Lake. The easiest way to get there is to travel down the Straight Creek drainage ~ 1.8 miles (back to Trail #99), then hike off-trail up the adjacent tributary drainage for ~ 1 mile to Harrington Lake. The Siamese Lakes lie about a mile east of Straight Lake. To get to them, ascend to the Stateline Trail (#738) and hike east ~ 1 mile. The descent to the lakes (visible from the trail) is moderately steep and off-trail.

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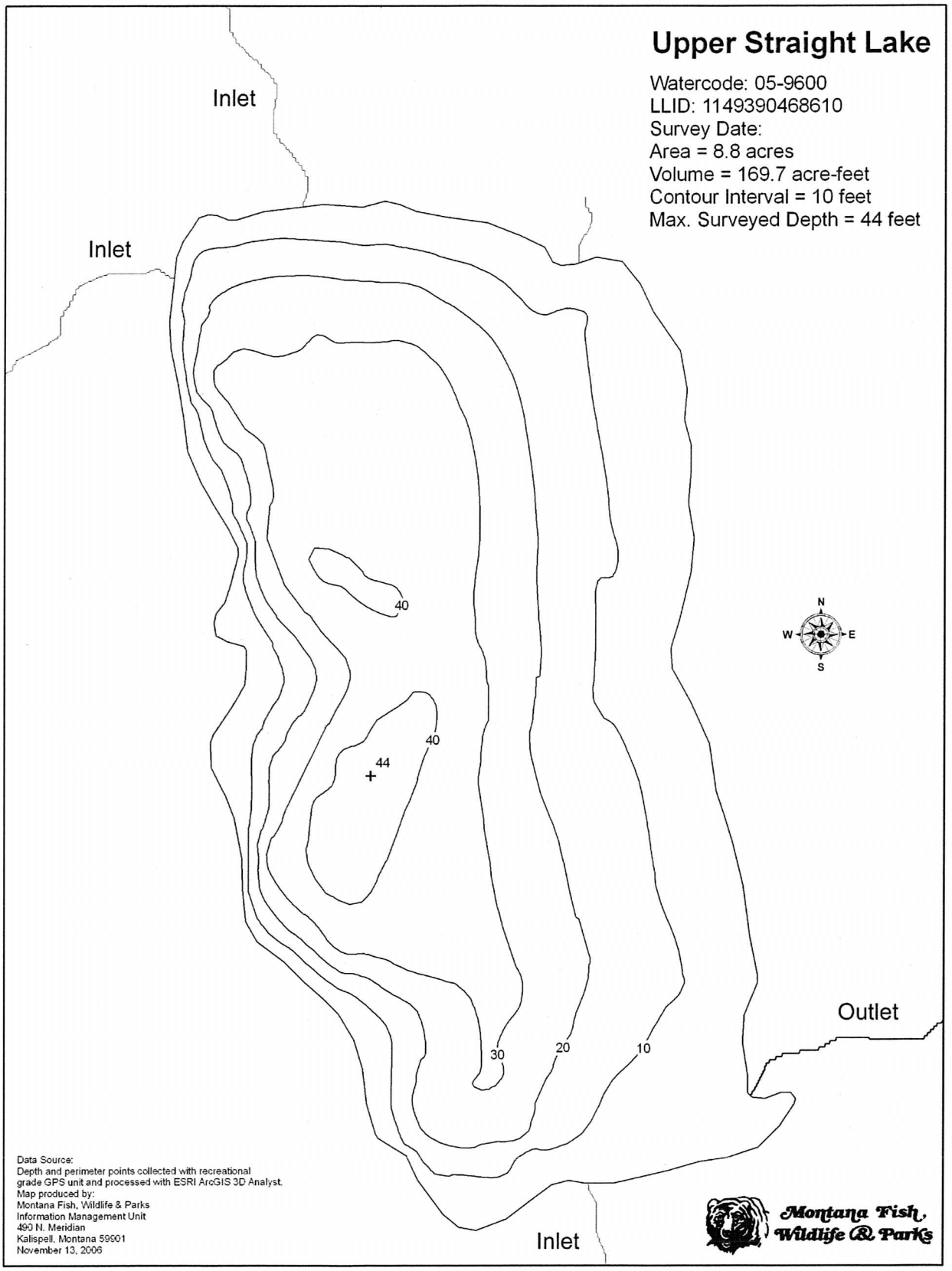
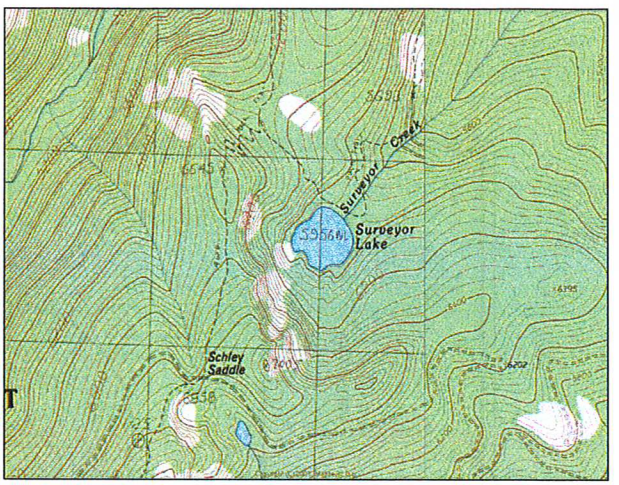

Upper Straight Lake
Watercode: 05-9600
LLID: 1149390468610
Survey Date:
Area = 8.8 acres
Volume = 169.7 acre-feet
Contour Interval = 10 feet
Max. Surveyed Depth = 44 feet
Inlet
Inlet
Inlet
Outlet
40
40
44
30
20
10
N
W
E
S
Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
November 13, 2006
Montana Fish, Wildlife & Parks

# Surveyor Lake




**Description:** Surveyor Lake is a large (20.1 acres), glacial cirque lake located in the South Fork Fish Creek drainage at 5,956 ft elevation. The lake lies on the Lolo National Forest (Ninemile Ranger District).

**Location**: T12N, R25W, Section 4; Latitude N46.8220°, Longitude W114.7590°; Nearest Town: Alberton, MT

**Access:** The easiest way to get to Surveyor Lake is to take USFS Road #343 (Fish Creek Road) south from Interstate Highway 90 or north from US Highway 12 to USFS Road #7734. Take USFS Road #7734 for ~ 6 miles to USFS Trail #117. Surveyor Lake lies less than 0.5 mile from the unmarked trailhead located near the Road #7734 crossing of Surveyor Creek.

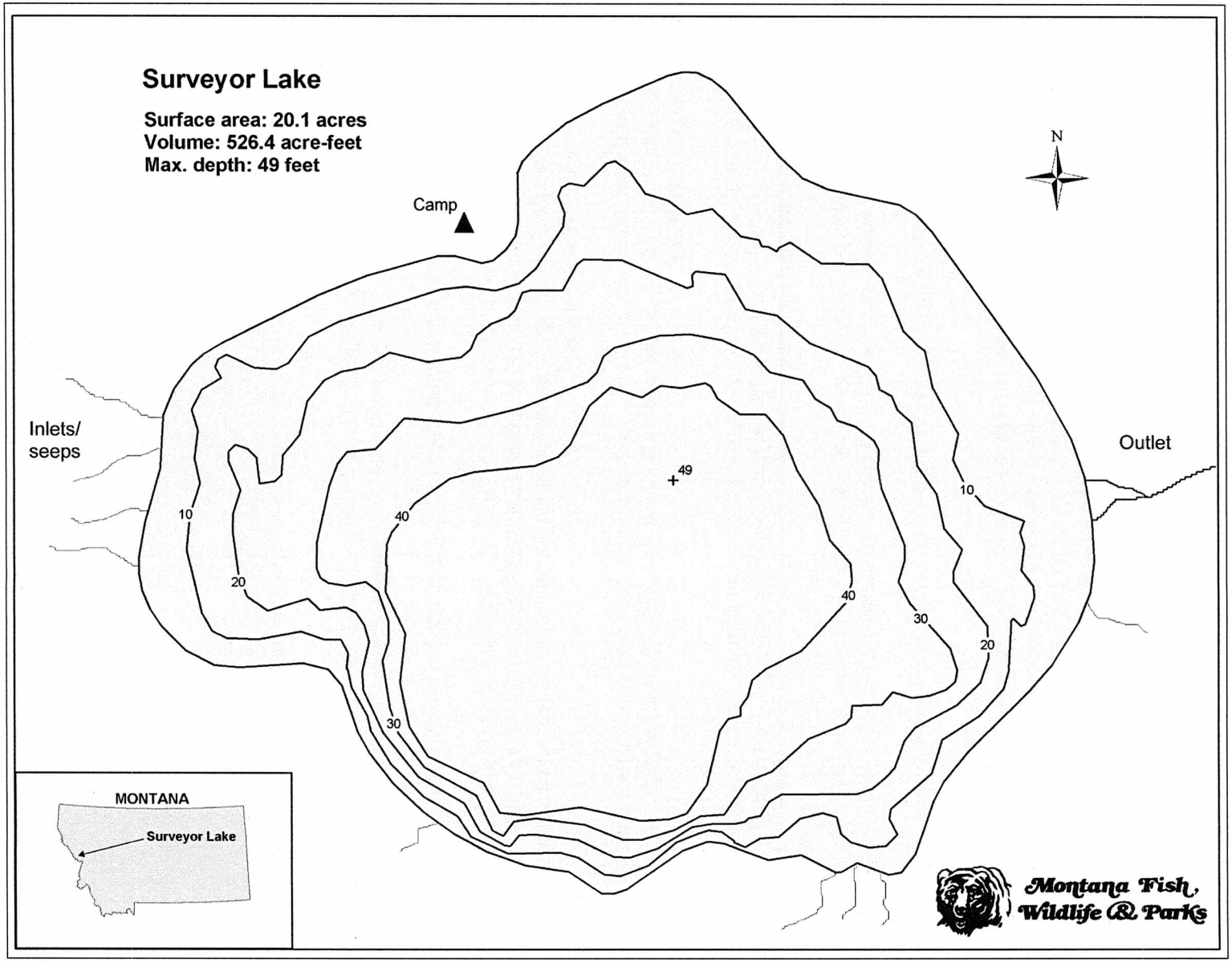
**Campsites and Use:** Surveyor Lake is in a semi-remote area, but with easy access it receives moderate use. There is an established trail around the lake with at least two campsites and fire rings. 'Leave no trace' camping and recreating is encouraged.

**Angling Opportunity:** Surveyor Lake supports a self-sustaining rainbow trout population that has been supplemented with stocked westslope cutthroat trout. Shoreline topography and access lend well to shoreline angling over most of the lake perimeter.

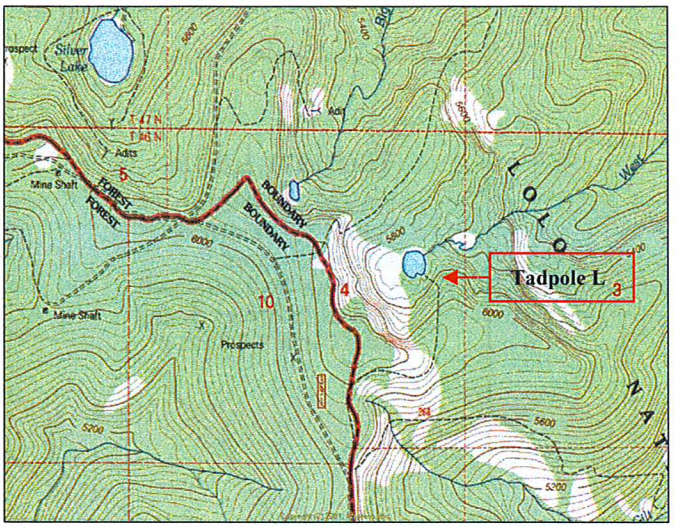
**Stocking History**: Surveyor Lake was historically stocked with rainbow trout (1948-1950) and was recently planted with westslope cutthroat trout (2000). Frequent stocking with westslope cutthroat trout will continue.

**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was low and averaged 47 angler-days per year.

**Other Nearby Lakes:** The only other lakes in the vicinity of Surveyor Lake are the two Cedar Log Lakes. They lie about 3.5 miles southwest of Surveyor Lake. Accessing them requires driving to the end of USFS Road #7734 to the Schley Mountain trailhead, then traveling 5-7 miles on Trails #110 and #738. Both lakes are reached by descending unofficial trails off of the respective USFS trails on the ridges above the lakes.


Surveyor Lake
Surface area: 20.1 acres
Volume: 526.4 acre-feet
Max. depth: 49 feet
Camp
N
Inlets/
seeps
Outlet
49
10
40
20
40
30
10
20
30
MONTANA
Surveyor Lake
Montana Fish, Wildlife & Parks

# Tadpole Lake




**Description:** Tadpole Lake is a small (3.1 acres), semi-remote glacial cirque lake located near the Idaho border in the Big Creek (St. Regis River) drainage at 5,718 ft elevation. The lake lies on the Lolo National Forest (Superior Ranger District).

**Location**: T18N, R31W, Section 4; Latitude N47.3503°, Longitude W115.5440°; Nearest Town: St. Regis, MT

**Access:** The easiest way to access Tadpole Lake is to take the Saltese Exit off of Interstate Highway 90 west of St. Regis, MT. Take USFS Road #305 until you reach the the Idaho border and USFS Road #391(~ 5.1 miles). From here, there are two options. The first is to proceed southeast on USFS Road #391 for 0.3 miles to USFS Trail #255. Hike Trail #255 northeast 0.5 mile, then hike off-trail to the lake. The second is to go southeast on USFS Road #391 for one mile, then hike a mile-long trail north to the lake. Be sure to not accidentally hike Trail #1268, which heads immediately northeast off of the ridge.

**Campsites and Use:** Tadpole Lake lies in a semi-remote setting that receives moderate use. There is an established trail around the lake with multiple campsites and fire rings. 'Leave no trace' camping and recreating is encouraged.

**Angling Opportunity:** Tadpole Lake supports a westslope cutthroat trout population that has limited natural reproduction and is supplemented with periodic stocking. Shoreline topography and access lends well to shoreline angling from most of the lake's perimeter.

**Stocking History**: Tadpole Lake has been stocked periodically with westslope cutthroat trout since 1977. There are no stocking records for Tadpole Lake prior to 1977. Stocking with westslope cutthroat trout will likely occur every 7-10 years in the future.

**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was very low and averaged just 8 angler-days per year.

**Other Nearby Lakes:** There is one other fish-bearing lake in the immediate vicinity of Tadpole Lake. Silver Lake is 1.1 miles northwest of Tadpole Lake. Taking USFS Road #9122 from USFS Road #305 will take you right to the lake. Visiting other lakes in the area would require either returning to Interstate Highway 90 or driving USFS Road #391 for a long distance in order to access a different stream drainage.

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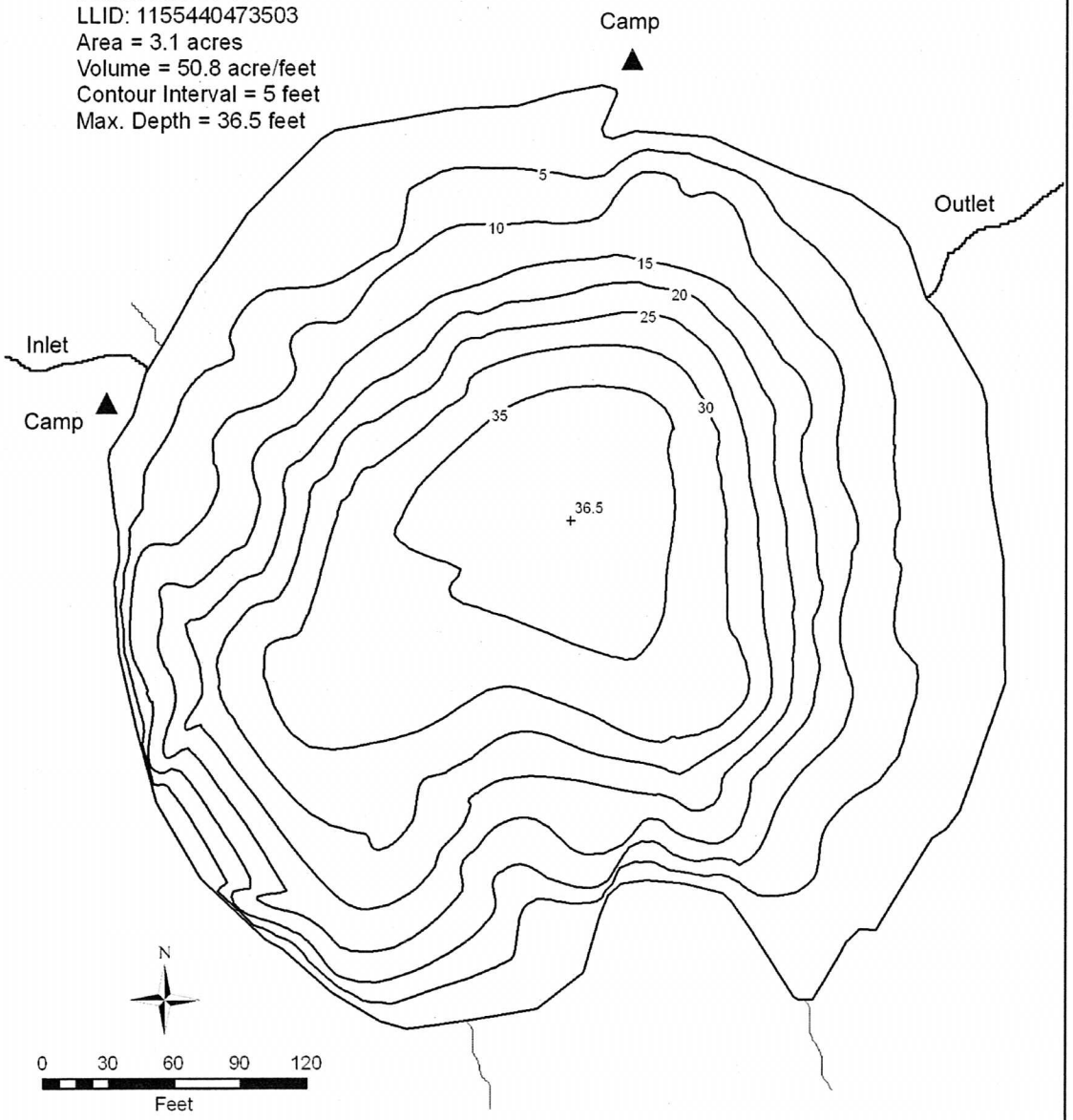
# Tadpole Lake

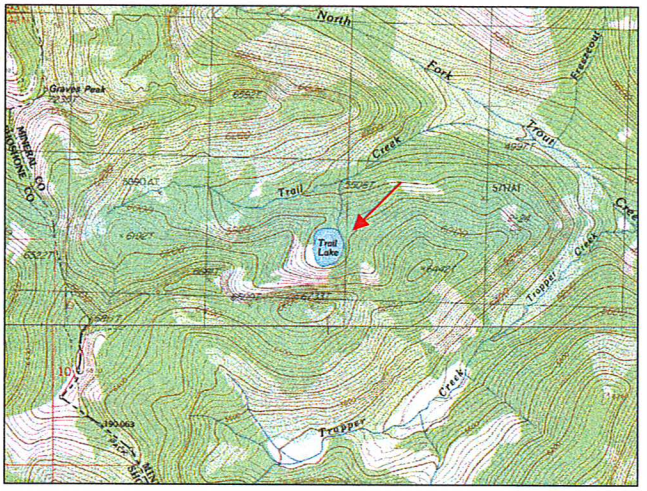
Watercode: 05-9640
LLID: 1155440473503
Area = 3.1 acres
Volume = 50.8 acre/feet
Contour Interval = 5 feet
Max. Depth = 36.5 feet




Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
June 14, 2006

Montana Fish, Wildlife & Parks

# Trail Lake




**Description:** Trail Lake is a moderately sized (11.5 acres), remote forested cirque lake located near the Idaho border in the North Fork Trout Creek drainage at 5,777 ft elevation. The lake lies on the Lolo National Forest (Superior Ranger District).

**Location:** T14N, R227W, Section 5; Latitude N 47.0051°, Longitude W115.0420°; Nearest Town: Superior, MT

**Access:** Take USFS Road #250 (Trout Creek Road) out of Superior, Montana for ~18 miles to USFS Road #388. Take this road ~ 2.8 miles to where it crosses the North Fork of Trout Creek. The trailhead for USFS Trail #156 lies at this crossing. Take Trail #156 ~ 2.2 miles to Trail Lake. The first ~ 1.5 miles of the trail is ORV accessible.

**Campsites and Use:** Trail Lake lies in a semi-remote setting that receives moderate use. There is a trail around the lake and multiple campsites with fire rings. 'Leave no trace' camping and recreating is encouraged in this area.

**Angling Opportunity:** Trail Lake supports a self-sustaining population of brook trout. Brook trout harvest is encouraged. Shoreline topography and access lends well to shoreline angling from most of the lake's perimeter.

**Stocking History**: Trail Lake has not been stocked since 1964, when ~ 2,000 rainbow trout were planted. Prior to that, 10,000 brook trout were planted in 1933, and 100,000 cutthroat trout were planted in 1931. At this time, there are no plans to stock Trail Lake in the future.

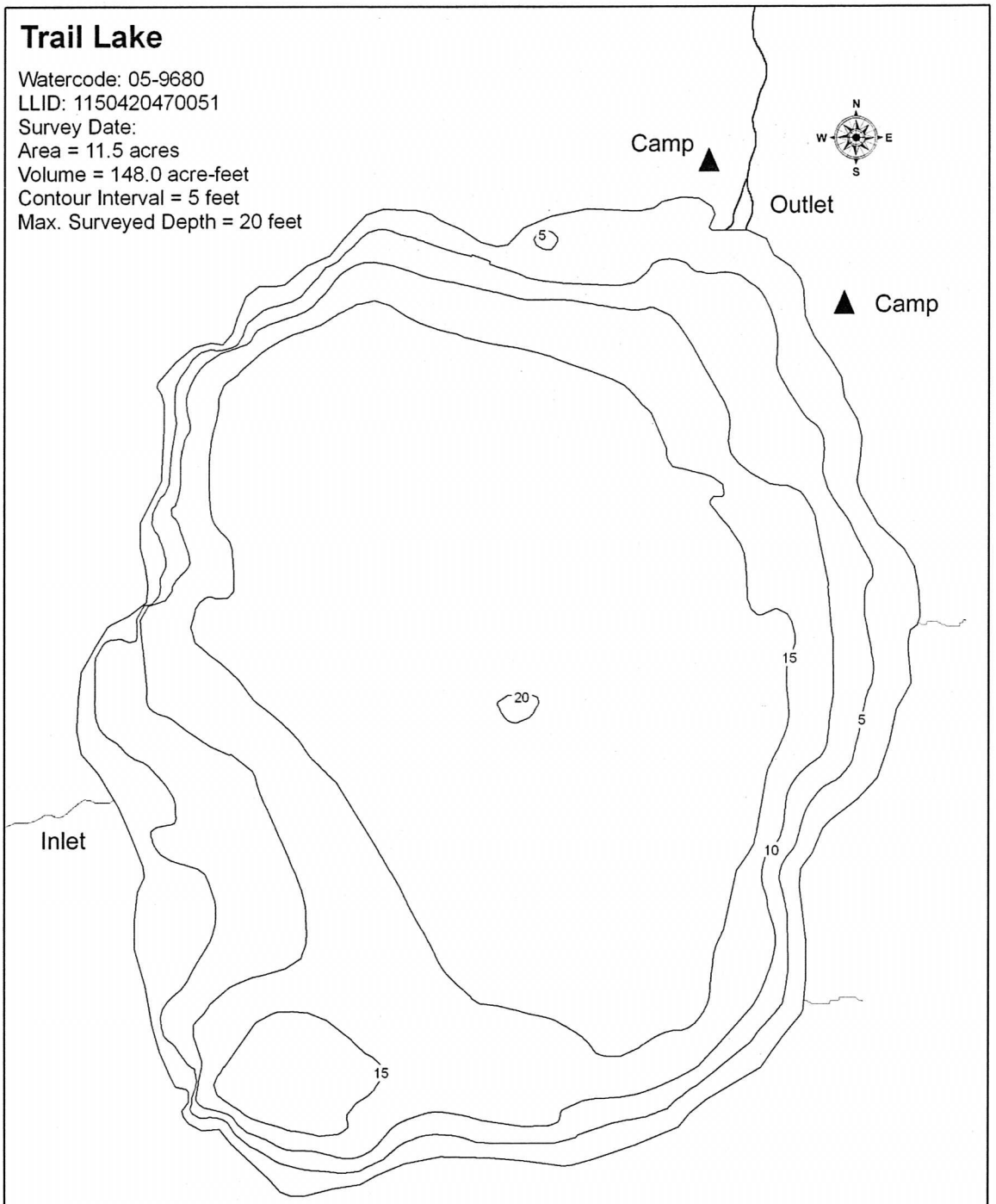
**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was moderate and averaged 57 angler-days per year.

**Other Nearby Lakes:** There are no other lakes in the immediate vicinity of Trail Lake. The nearest lake is Hoodoo Lake, which lies ~ 2.5 miles southeast of Trail Lake. Accessing Hoodoo Lake requires returning to USFS Road #250 and hiking either USFS Trail #111, or Trail #738 and then Trail #111. The Oregon Lakes are ~ 4 miles northwest of Trail Lake. To reach them, drive to the Cedar Creek drainage via USFS Roads #388 and #320, then hike Trail #109 to the lakes.

Montana Fish, Wildlife & Parks

# Trail Lake

Watercode: 05-9680
LLID: 1150420470051
Survey Date:
Area = 11.5 acres
Volume = 148.0 acre-feet
Contour Interval = 5 feet
Max. Surveyed Depth = 20 feet

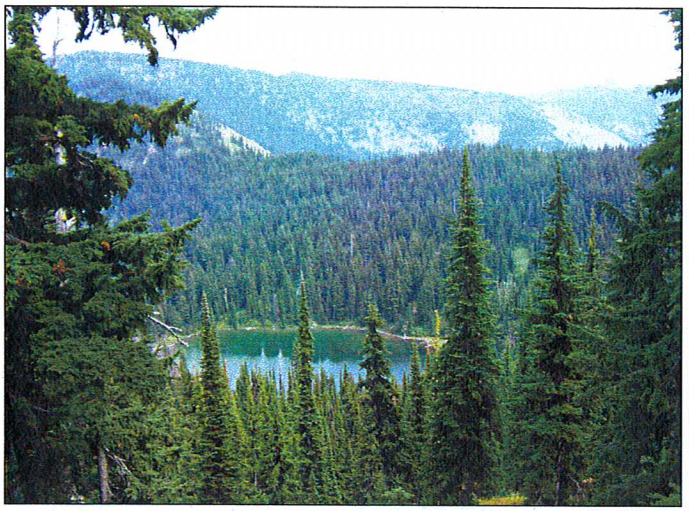


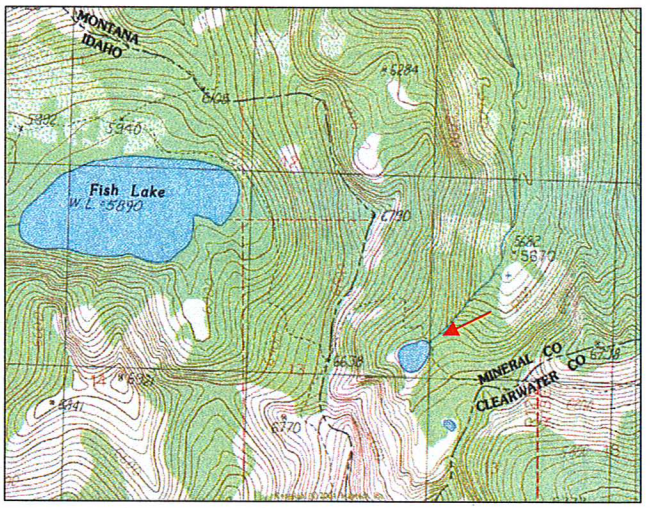

Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
November 13, 2006

Montana Fish, Wildlife & Parks

# Vann Lake

(West Fork Fish Creek Lake #1)






**Description:** Vann Lake (also known as "West Fork Fish Creek Lake #1") is a small (4.7 acres), remote glacial cirque lake located near the Idaho border in the West Fork Fish Creek drainage at 6,079 ft elevation. The lake lies on the Lolo National Forest (Ninemile Ranger District) in the *proposed* Great Burn Wilderness Area.

**Location**: T12N, R26W, Section 8; Latitude N46.8110°, Longitude W114.8910°; Nearest Town: Alberton, MT

**Access:** Access to Vann Lake is difficult. One option is to travel from Schley Mountain on USFS Trail #110 for 3.5 miles to Trail #738, then west on Trail #738 for ~ 7 miles. Another option is to drive to Clearwater Crossing via Fish Creek Road and USFS Road #7750, then take Trail #101 for ~ 10.5 miles to Trail #738 (at Fish Lake, Idaho). Travel southeast on Trail #738 another 1.8 miles to the lake. A third option is to drive to the head of Trail #419 (Lake Creek, Idaho) and take Trail #419 southeast 5.3 miles to Fish Lake (Idaho) and the intersection with #738, then southeast on #738 1.8 miles to Vann Lake.

**Campsites and Use:** Vann Lake lies in a remote setting that receives light use. There is no established trail around the lake, but there is a campsite at the outlet. 'Leave no trace' camping and recreating is essential in this area as it is proposed wilderness.

**Angling Opportunity:** Vann Lake supports a westslope cutthroat trout population that has limited natural reproduction and is supplemented with stocking. Shoreline topography and access lends well to shoreline angling.

**Stocking History**: Vann Lake has been stocked only with westslope cutthroat trout since 1982. There is no record of stocking at Vann Lake prior to 1982. Stocking with westslope cutthroat trout every 7-10 years will likely continue in the future.

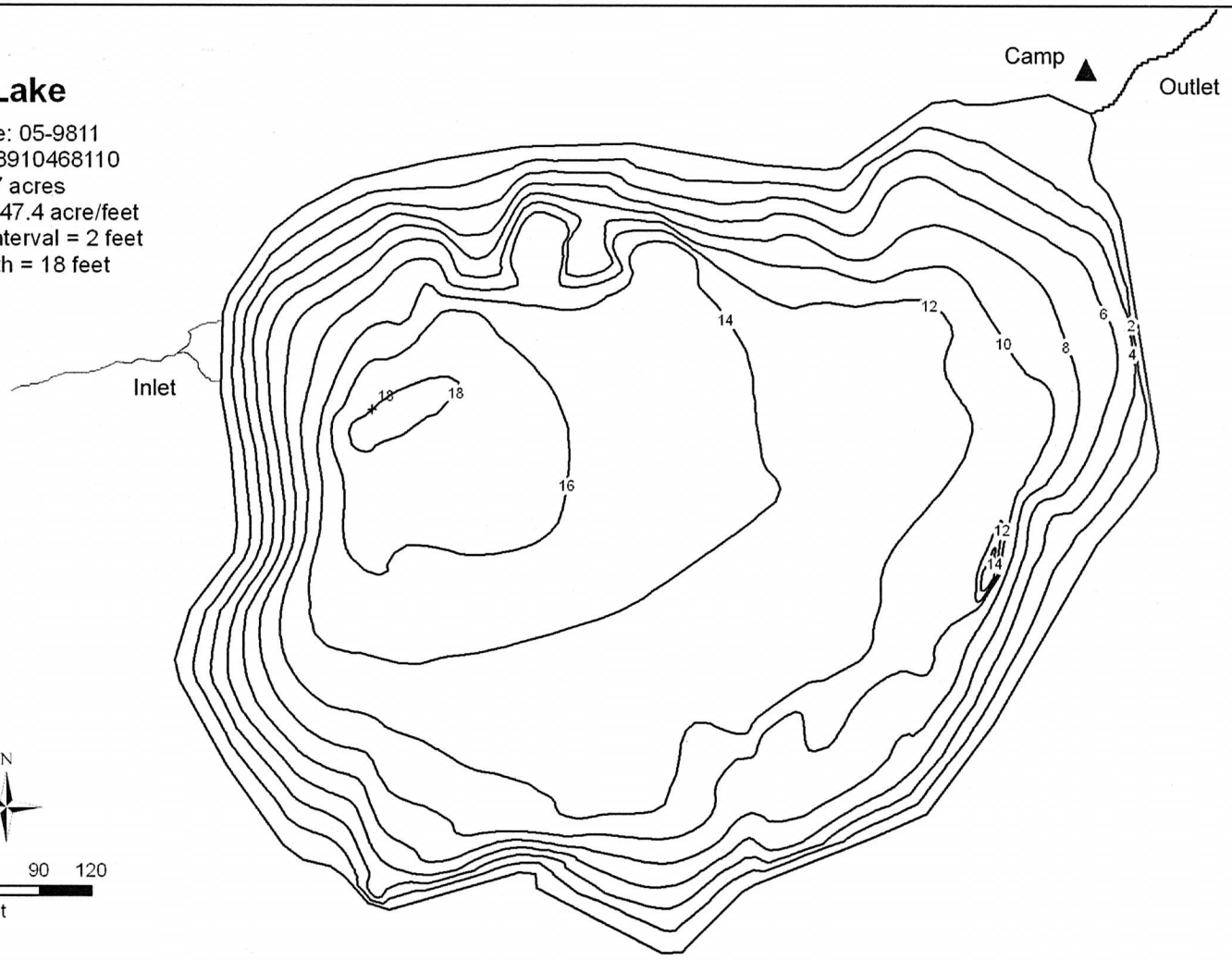
**Angling Pressure**: Estimated angling pressure from Montana state-wide mail surveys in 1995-2005 was zero. Although the lake is known to receive some angling pressure, none of the randomly selected survey respondents indicated that they had fished the lake.

**Other Nearby Lakes:** There are few alpine lakes in the vicinity of Vann Lake. Fish Lake, Idaho is < 1 mile northwest of Vann Lake and easily accessed via USFS Trail #738. The Cedar Log Lakes are ~ 3 miles east-southeast of Vann Lake and can be accessed by traveling 3.5 – 6 miles on Trail #738.

Montana Fish, Wildlife & Parks

# Vann Lake

Watercode: 05-9811
LLID: 1148910468110
Area = 4.7 acres
Volume = 47.4 acre/feet
Contour Interval = 2 feet
Max. Depth = 18 feet




Data Source:
Depth and perimeter points collected with recreational grade GPS unit and processed with ESRI ArcGIS 3D Analyst.
Map produced by:
Montana Fish, Wildlife & Parks
Information Management Unit
490 N. Meridian
Kalispell, Montana 59901
June 14, 2006

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