F-78-R-6
F-113-R-1 & 2
Region 2

Montana Fish, Wildlife & Parks

Fisheries Division
Federal Aid Job Progress Report

Date: May 25, 2003

Montana Statewide Fisheries Management

Federal Grant: F-78-R6, F-113-R1/R2
Fiscal Years: 2000-2002
Project Title: Middle Clark Fork River Drainage Fisheries Investigations

SABHRS Project Number: 3240

Project Reporting Period: July 1999-Dec 2002

Abstract: Fisheries inventories, monitoring and investigations, as well as environmental reviews, permitting, stocking plans and other activities were completed in the middle Clark Fork River drainage in 1999-2002. This report outlines five of the major projects completed under Montana Fish, Wildlife & Parks' overall fisheries management program in the Clark Fork basin: (1) Trout population estimates on the middle Clark Fork River main stem, (2) Fluvial bull trout red counts in middle Clark Fork River tributaries, (3) Identification, analysis and remediation recommendations for fish passage barriers at road crossings in the Fish Creek drainage, (4) *Oncorhynchus* genetic sampling; surveys to identify genetically pure westslope cutthroat trout populations in middle Clark Fork River tributaries and (5) Fish species composition and distribution in middle Clark Fork tributaries. Results of ongoing enhancement projects, including those on Rattlesnake Creek and Marshall Creek, will be reported in the subsequent progress report.

Prepared by: W. Ladd Knotek, Project Fisheries Biologist

Contributing MFWP Personnel: David Schmetterling, Fisheries Research Specialist
Raven Rashap, Fisheries Technician
Jennifer Corbin, Information Services Unit

TROUT POPULATION ESTIMATES ON THE MIDDLE CLARK FORK RIVER MAIN STEM

Introduction

Mark-recapture population estimates are a common and reliable method for monitoring trends in adult salmonid abundance, size structure and species composition in main stem river systems. Montana Fish, Wildlife and Parks (FWP) has used a boat mounted electrofishing system to sample and monitor several sections of the middle Clark Fork River of west-central Montana over the past 2 decades. In 1999-2002, we sampled two of the six established long term monitoring sections on the main stem Clark Fork River to monitor trout population abundance and health. In this report, monitoring data for the Milltown (through East Missoula) and Superior (through the town of Superior) sections are reported.

Methods

We used a boom suspended electrofishing unit mounted on an 18 foot aluminum jet boat to sample fish in the Superior and Milltown sections of the Clark Fork River in 1999-2002. The Milltown section was sampled in June of 1999, 2001 and 2002 and the Superior section was sampled in October of 1999. Electrofishing was conducted from upstream to downstream using smooth DC from a system comprised of a Coffelt VVP-15 rectifier and 5000 Watt generator. In each section, trout >7 inches were netted, anesthetized, identified to species, measured, marked with an anal fin clip and examined for hooking scars and cranial deformities. Trout were then released within the monitoring section in the reach from which they were captured.

When possible, we waited at least five days after marking runs before initiating recapture. On recapture runs, all fish were again measured and given a lower caudal fin clip to prevent sampling individual fish multiple times. Rainbow trout, westslope cutthroat trout, and hybrids were identified by physical characteristics including spotting patterns and coloration. Only westslope cutthroat trout considered pure by visual identification were used to calculate estimates for westslope cutthroat trout. Fish believed to be hybrids were considered rainbow trout when calculating population estimates. In the Milltown section, northern pike were marked with colored floy tags and any fish captured on recapture runs were eradicated.

Superior Section

The Superior monitoring section on the main stem Clark Fork River extends for ~ 4.3 miles from the mouth of Cedar Creek (T16N R26W Section 3) to the Interstate-90 bridge (T17N R26W Section 29). We sampled this reach at night on October 4-7, 1999 (marking runs) and on October 12-14, 1999 (recapture). River discharge was at normal base flow (~ 2500 cfs) during the entire sampling period.

Milltown Section

We attempted to monitor the Milltown section annually to assess acute and chronic impacts of elevated toxic pollutants and the recent introduction and establishment of northern pike. The Milltown monitoring section includes ~ 3.6 miles from the railroad bridge just downstream of Milltown Dam (T13N R18W Section 20) to a large riffle gradient brake downstream of the

Interstate-90 bridge (T13N R29W Section 24). We sampled the Milltown section during the day on the descending limb of the hydrograph (in June) when discharge is between 4,000 and 8,000 cfs. Electrofishing efficiency decreases substantially when flows are outside this range.

In 1999, we marked fish on June 23 and experienced mechanical problems that limited the number of fish marked. Marking runs were continued on June 28 and the recapture runs were completed on June 29. Because of low sampling effort and the assumption of random mixing of marked and unmarked fish may have been violated, the validity of this estimate may be in question. However, recapture efficiency and confidence intervals were within acceptable ranges for species where estimates were achieved.

In 2000, no sampling was attempted in the Milltown section due to low flow conditions. In 2001, sampling was attempted, but recapture runs could not be completed due to low discharge. We completed sampling and obtained valid population estimates in 2002 as river discharge was within the desired range. We sampled the Milltown section on June 26-27 (marking runs) and on July 2-3 (recapture) in 2002.

Population Estimates

Population estimates were calculated using the modified Petersen mark recapture equation and standard equation for calculating variance:

$$N = \frac{(M+1)(C+1)}{R+1} - 1$$

$$V(N) = \frac{(M+1)(C+1)(M-R)(C-R)}{(R+1)^2 (R+2)}$$

where: N = population point estimate
M = the number of marked fish
C = the number of fish captured in the recapture sample
R = the number of marked fish captured in the recapture sample
V (N) = variance for point estimate

Confidence intervals (CI) were calculated using the equation $N \pm 1.96 (V(N))^{-2}$ and calculated at the 95% confidence level.

Results

Superior Section - 1999

Valid population estimates were obtained in the Superior section for rainbow trout and westslope cutthroat trout during fall sampling in 1999 (Table 1). Densities of catchable (> 7 in or 178 mm) rainbow trout were estimated at 373 per mile (+/- 54 per mile 95% CI). Densities of catchable westslope cutthroat trout were estimated at 34 per mile (+/- 11 per mile 95% CI). An estimate was obtained for bull trout, but is likely not valid due to small sample size. Only two brown trout were captured during the electrofishing estimates. Although quantitative estimates could not be achieved, mountain whitefish (*Prosopium williamsoni*) and sucker (*Catostomus spp.*) populations were abundant.

Rainbow trout captured in the Superior section averaged 332 mm total length TL (SD 79.9) and had a visible hooking scar rate of 8.6%. Westslope cutthroat trout captured in this section averaged 335 mm TL (SD 62.3) and had a hooking scar rate of 46.5%. Size distributions for these populations are shown in Figures 1 and 2. No cranial deformities were noted in any fish sampled, suggesting no obvious evidence of whirling disease infection.

Table 1. Population estimates, parameters, and confidence intervals for catchable trout (> 7 inches) sampled in the Clark Fork River Superior section in 1999.

SPECIES	M	C	R	POINT ESTIMATE	95% CI	ESTIMATE PER MILE	95% CI PER MILE
RBT	496	322	99	1604	+/- 232	373	+/- 54
WCT	62	36	15	145	+/- 45	34	+/- 11
BULL*	4	3	1	9	+/- 6	2.1	+/- 1.4
BROWN	2	-	-	-	-	-	-

* Sample sizes for bull trout were lower than recommended for a valid estimate

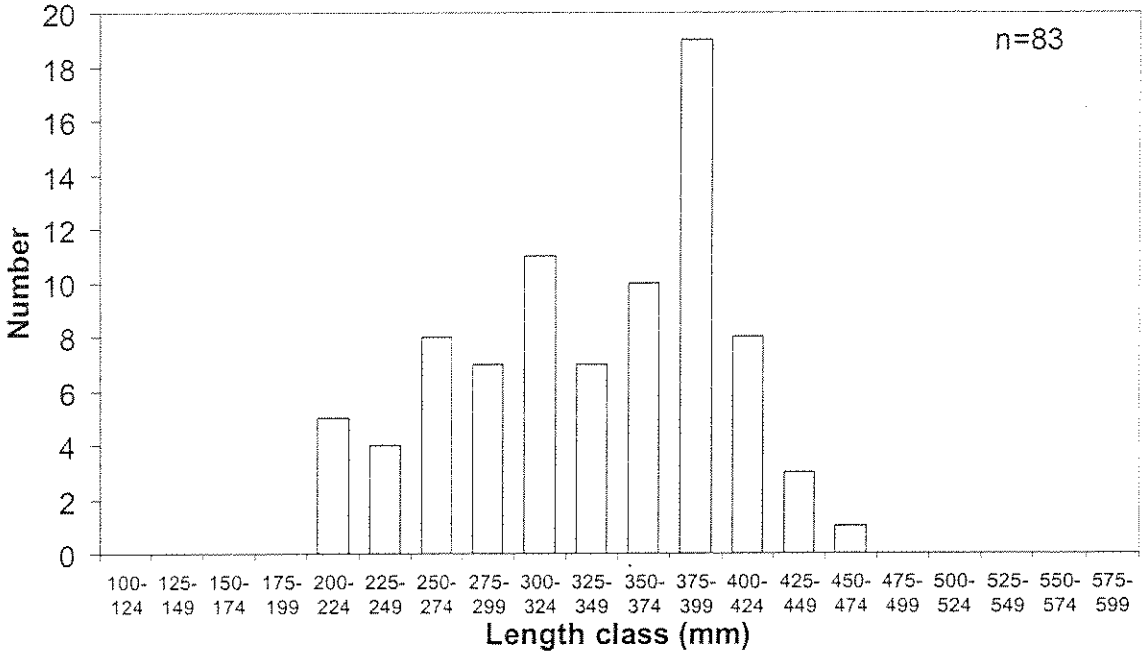

Figure 1. Length frequency histogram of westslope cutthroat trout captured in the Clark Fork River Superior section in October 1999.

Milltown Section - 1999

Valid population estimates were obtained for rainbow trout, westslope cutthroat trout, brown trout and northern pike in the Milltown section during June 1999 (Table 2). Densities of catchable size (>7 in or 178 mm) trout in the Milltown section were estimated at 148 per mile (+/- 57 CI) for rainbow trout, 20 per mile (+/- 12 CI) for westslope cutthroat trout and 45 per mile (+/- 22 CI) for brown trout. Northern pike were established in the section at a density of 19

per mile (+/- 9 CI). We captured three bull trout (470-620 mm), but could not calculate an estimate. Rainbow trout in the Milltown section averaged 294 mm TL (SD 88.3), westslope cutthroat trout averaged 311 mm TL (SD 54.8) and brown trout averaged 334 mm TL (SD 111) mm. Length frequency distributions for these species are not shown due to small sample size relative to subsequent years.

The incidence of cranial deformities for rainbow trout was 0.5% (1 fish of 183 total). Hooking scar rates were 7.7% for rainbow trout, 18.1% for westslope cutthroat trout and <1% for brown trout.

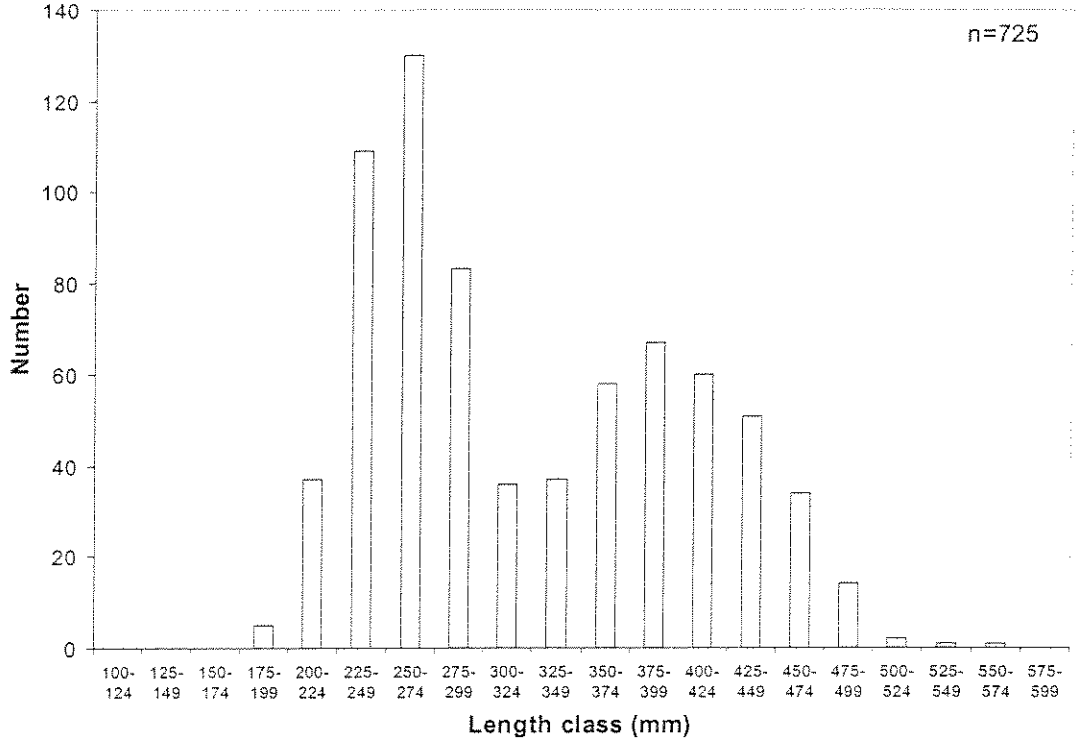

Figure 2. Length-frequency histogram for rainbow trout in the Clark Fork River Superior section in 1999.

Table 2. Population estimates, parameters, and confidence intervals for catchable trout (> 7 inches) and northern pike (> 18 inches) sampled in the Clark Fork River Milltown section in 1999.

SPECIES	M	C	R	POINT ESTIMATE	95% CI	ESTIMATE PER MILE	95% CI PER MILE
RBT	137	61	15	534	+/- 206	148	+/- 57
WCT	23	14	4	71	+/- 42	20	+/- 12
BROWN	53	23	7	161	+/- 80	45	+/- 22
N. PIKE	32	14	6	70	+/- 32	19	+/- 9

Milltown Section – 2000-2001

In 2000 and 2001, western Montana experienced drought conditions and Clark Fork River discharge was too low to allow for valid population estimates. No sampling was attempted in 2000. In 2001, we completed one marking run but could not complete recapture efforts due to low flows.

Fish captured in 2001 did provide information on trout condition, disease infection rates and size structure, and verified the continued presence of adult northern pike in the section. Visible hooking scar rates were <10% for westslope cutthroat trout and rainbow trout. Visible symptoms of whirling disease (primarily sloped cranium) were evident in rainbow trout and rainbow trout X westslope cutthroat trout hybrids at a frequency of ~ 4%.

Milltown Section – 2002

Population estimates were obtained for rainbow trout, westslope cutthroat trout, brown trout and northern pike in the Milltown Section in 2002 (Table 3). River flows and temperatures were preferable for efficient marking and recapture runs. Densities of catchable (> 7 in or 178 mm) trout were estimated at follows: rainbow trout 404 per mile (+/- 63 per mile 95% CI), westslope cutthroat trout 21 per mile (+/- 7 per mile 95% CI), brown trout 113 per mile (+/- 23 per mile 95% CI). Trout size distributions are displayed in Figure 3. Northern pike densities had increased to 76 per mile (+/- 37 per mile 95% CI). The length range for northern pike (Figure 4) was 18-36 inches (457-914 mm). Estimates were unusually high for brown trout and northern pike relative to long term monitoring data. We only sampled 3 bull trout in 4 days of electrofishing and no population estimate was possible. Although quantitative estimates could not be achieved, mountain whitefish and sucker populations were abundant.

In 2002, 5.6% of rainbow trout had obvious cranial deformities, which indicate an increase in whirling disease infection. Hooking scar rates, based on observation of obvious scars on the maxilla and premaxilla, were 9.3 % for rainbow trout, 28.0% for westslope cutthroat trout and 4.1% for brown trout.

Table 3. Population estimates, parameters, and confidence intervals for catchable trout (> 7 inches) and northern pike (> 18 inches) sampled in the Clark Fork River Milltown section in 2002.

SPECIES	M	C	R	POINT ESTIMATE	95% CI	ESTIMATE PER MILE	95% CI PER MILE
RBT	420	296	85	1453	+/- 230	404	+/- 63
WCT	26	30	10	75	+/- 26	21	+/- 7
BROWN	122	135	40	407	+/- 84	113	+/- 23
N. PIKE	52	51	9	275	+/- 132	76	+/- 37

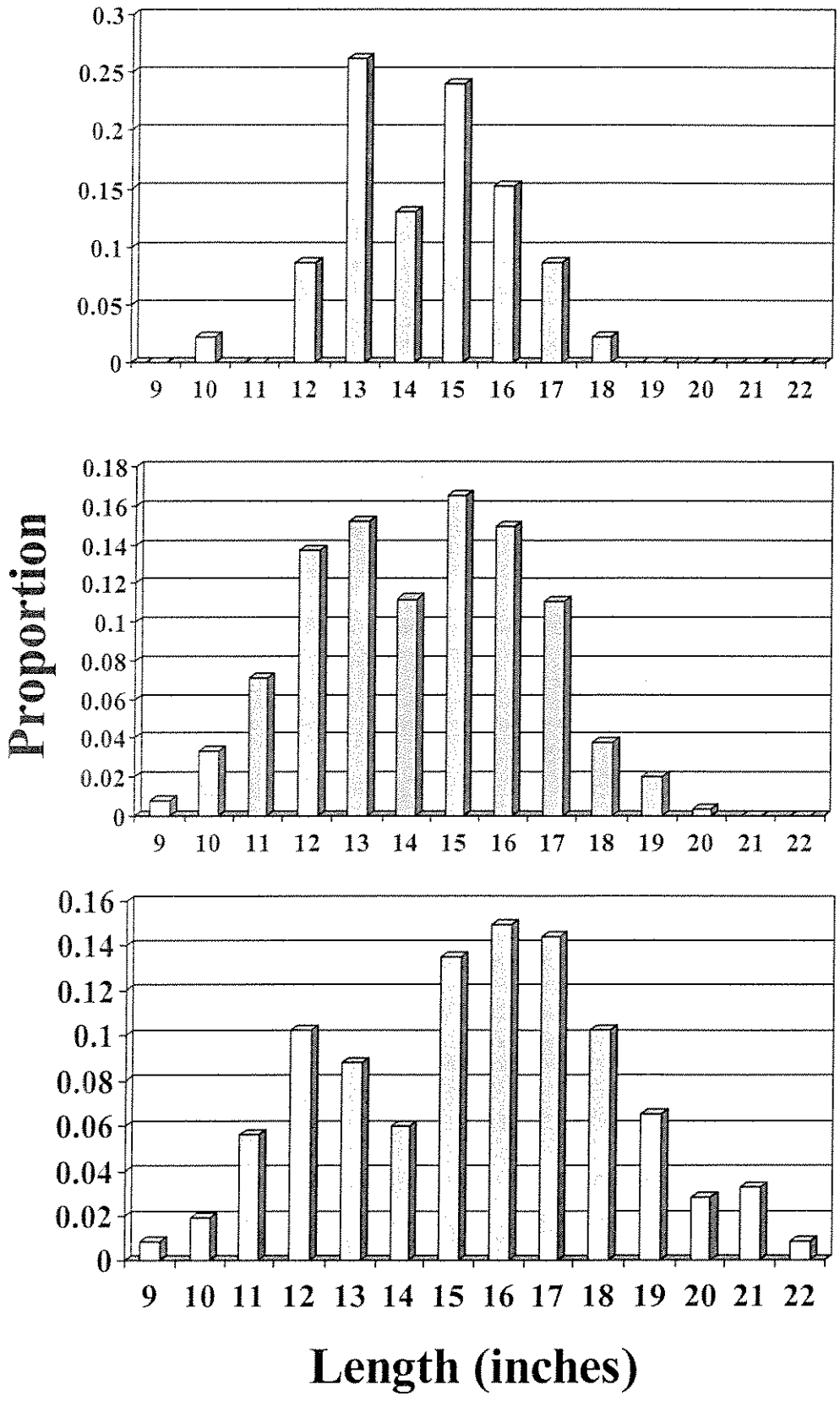

Figure 3. Length frequency histograms for westslope cutthroat trout (top, n=46), rainbow trout (middle, n=631) and brown trout (bottom, n=217) sampled in the Clark Fork River Milltown section, 2002.

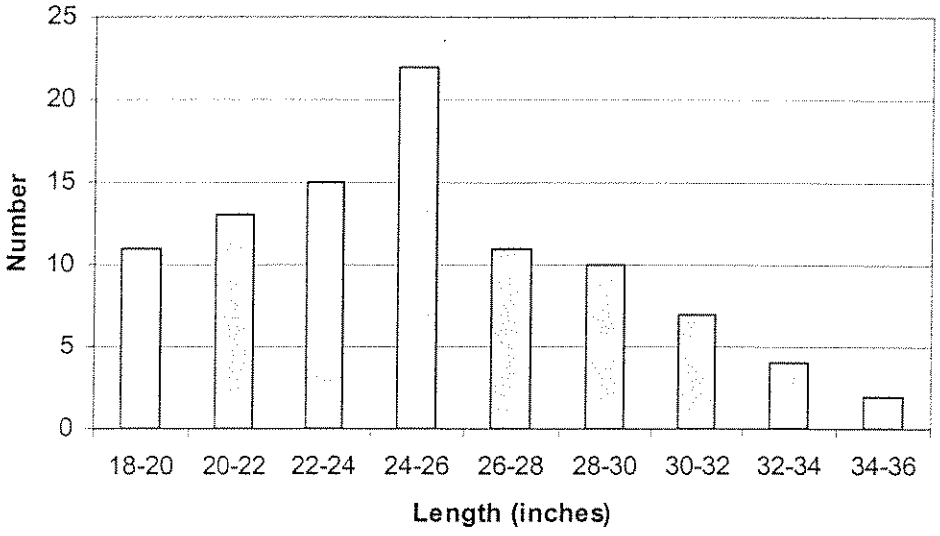

Figure 4. Size distribution for northern pike sampled in the Clark Fork River Milltown section in 2002.

Discussion

Superior Section Population Monitoring

Fish population estimates in the Superior section in 1999 suggest no significant changes in rainbow trout densities (Figure 5) and an increase in westslope cutthroat trout density (Figure 6) relative to past population estimates. Berg (1992) estimated densities of catchable rainbow trout (>7 in) to be between 219 and 532 fish per mile in the Superior section from 1985 to 1989. The 1999 estimate is within this range of point estimates. Brown trout abundances were extremely low as in previous sampling efforts (Berg 1992). Brown trout densities are likely remain low in this reach of the Clark Fork due to limited main stem side channel and large tributary spawning habitat availability, but results were also biased by the timing of our sampling; adult brown trout were presumed to be in tributaries spawning in fall.

Westslope cutthroat trout density (34/mile) was the highest measured in the period of record (1984-1999, Figure 6). Berg (1997) estimated westslope cutthroat trout densities between 15 and 27 trout per mile in 1988-89. We could not test whether this was a significant increase because variance calculations and confidence limits are lacking in Berg's (1992) synopsis. Mountain whitefish and sucker spp. continue to be very abundant in this reach and bull trout persist at extremely low levels (see below).

Rainbow trout have remained the most abundant trout species in the middle Clark Fork River (> 70% of the trout species composition) and in angler creels within the Superior section (FWP 1995). However, westslope cutthroat trout have responded to restrictive angling regulations and are becoming more prevalent. Anglers have reported a disproportionate increase in catch rate for this species because westslope cutthroat trout are much more susceptible to angling than rainbow trout (Peters and Schmetterling 1996; Doug Dryden, FWP, personal communication). Increases in westslope cutthroat trout abundance is likely due to catch-and-release regulations instituted in

the mid-1990s. This is a consistent trend among main stem rivers in west-central Montana (MFWP, unpublished data).

In the Clark Fork River, favorable flow conditions throughout the 1990's and regulation changes from a five to three fish limit for rainbow trout were expected to prompt an increase in rainbow trout abundance. Benefits of catch-and-release practices by most anglers have also undoubtedly carried over to rainbow trout. Unlike westslope cutthroat trout, the lack of a consistent increase in rainbow trout in response to regulation changes suggests that problems other than harvest (e.g., juvenile recruitment) may be limiting rainbow trout in the lower Clark Fork River. Degraded tributary habitat and fish passage barriers in the lower reaches of these tributaries are suspected to be limiting factors for all fluvial trout species in the lower Clark Fork River. Whirling disease may also be a contributing factor (see page 12).

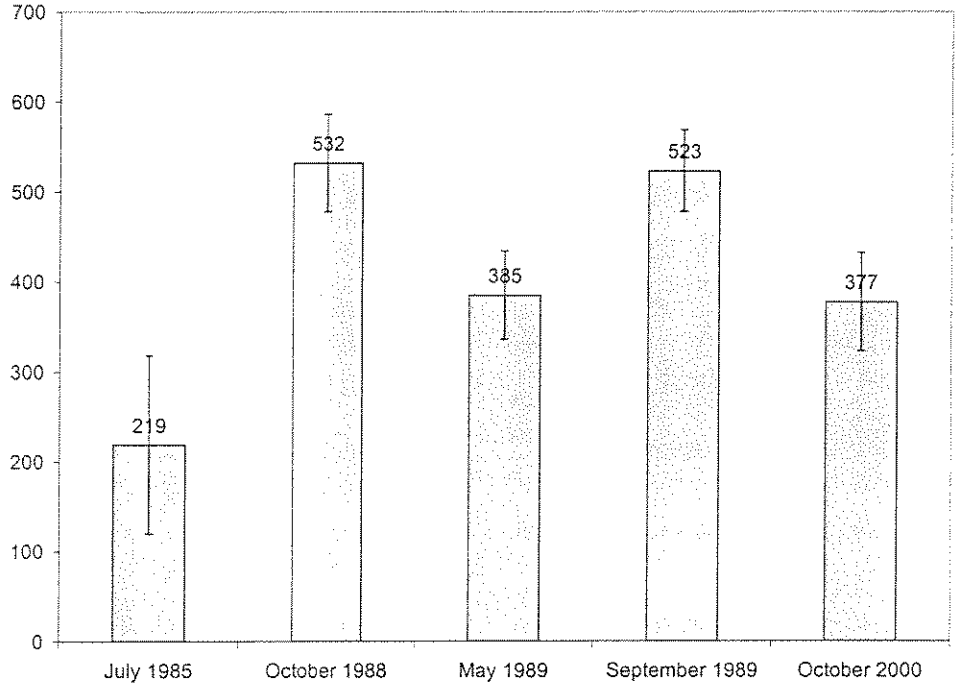

Figure 5. Population estimate trends for catchable rainbow trout in the Clark Fork River Superior section in 1985-2000 . Confidence intervals for point estimates are displayed for each estimate.

Milltown Section Population Monitoring

Milltown section monitoring in 1999-2002 indicated stable, depressed native trout populations, abundant, but fluctuating non-native trout populations (Figures 7& 8) and a growing northern pike population (Figure 9). The presence of Milltown Dam, poor connectivity with many tributaries and the emergence of northern pike in Milltown Reservoir and the associated river systems are likely contributing to continued depression of fluvial westslope cutthroat trout and bull trout populations. Similar to the Superior section and other main stem rivers in west-central Montana, westslope cutthroat trout have responded well to catch-and-release regulations and should continue to increase as habitat enhancement and restoration projects are implemented. Berg (1997) was not able to estimate westslope cutthroat trout abundance in the Milltown section in 1984-1991 due to low abundance. We were able to complete valid estimates (19.7 and 20.9

catchable trout per mile) in 1999 and 2002 in this section. Bull trout status is described below (page 11).

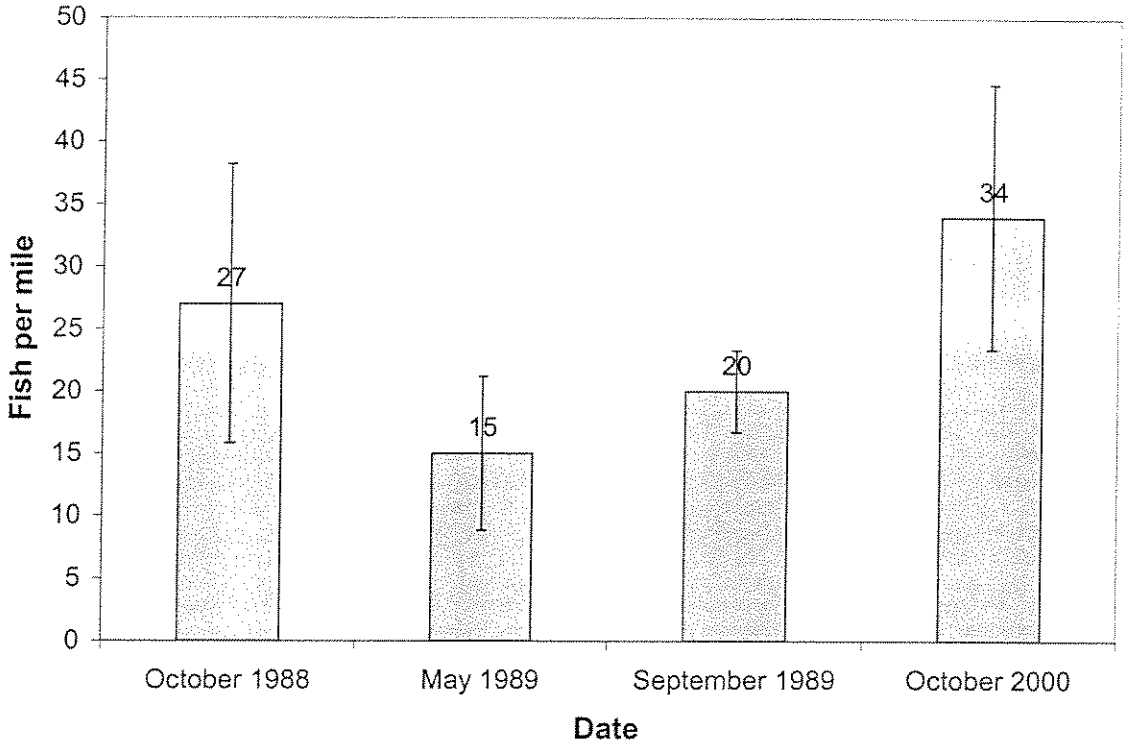

Figure 6. Population estimate trends for catchable westslope cutthroat trout in the Clark Fork River Superior section in 1988-2000. Confidence intervals for point estimates are displayed for each estimate.

Rainbow trout and brown trout densities appeared to decline, then recover from environmental influences from 1999-2002 in the Milltown section. Rainbow trout densities estimated in 1999 were the lowest in the period of record (Figure 7). Brown trout abundance was also lower than the long term average (Figure 8). Major population declines were observed in 1996 after ice flow and high flow events in the Clark Fork and Blackfoot Rivers upstream of Milltown Dam mobilized high concentrations of heavy metals in the Clark Fork River downstream of the dam (Berg 1999). During this event, copper levels were elevated to nearly 17 times higher than the baseline value for acute levels (Montana DEQ, unpublished data, 1997). Fish population declines were attributed to toxic (acute) levels of copper and arsenic associated with mining wastes previously deposited in the system. By 2002, rainbow trout and brown trout populations had apparently recovered; rainbow trout densities were estimated to be near long term averages and brown trout densities were at the highest levels on record (Figures 6&7).

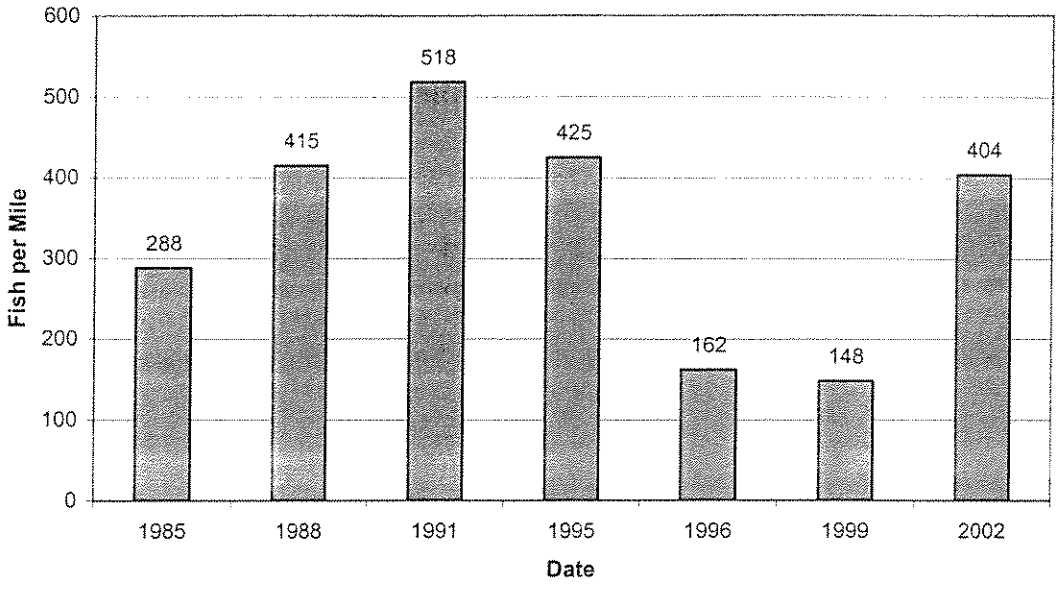

Figure 7. Population estimate trends for catchable rainbow trout in the Clark Fork River Milltown section in 1985-2000.

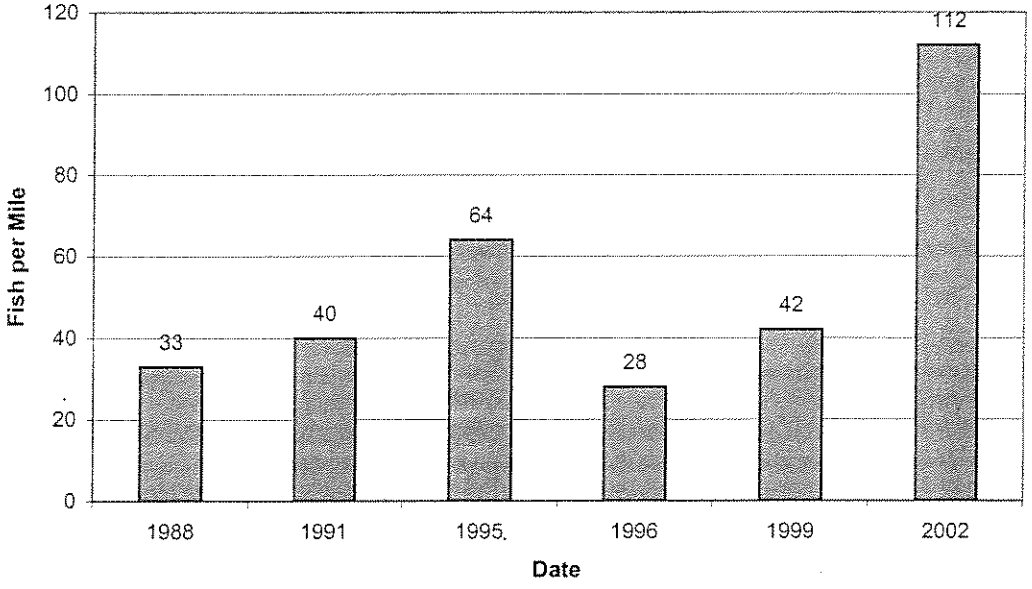

Figure 8. Population estimate trends for catchable brown trout in the Clark Fork River Milltown section in 1985-2000.

Similar to the Superior section, the Milltown portion of the Clark Fork River appears to be a recruitment-limited fishery (Berg 1999). In addition to the upstream and downstream (seasonal) fish passage barrier created by Milltown Dam, many of the tributaries supporting recruitment in this section of river are highly degraded and have fish passage barriers in their lower reaches, which limit the ability of fluvial fish to access spawning, rearing and refuge habitat. Schmetterling (*In review*) and Swanberg (1997) moved westslope cutthroat and bull trout over Milltown Dam and found (through radio telemetry) that these fish migrated in the Blackfoot and Clark Fork Rivers up to 140 km to spawn. These data suggest that trout were returning to their

natal tributaries to spawn and that the dam was a major impediment to the fluvial life history expression in these systems. It is anticipated that fish passage improvements at Milltown Dam, reduction in northern pike abundance and a range of tributary enhancements will increase native and non-native fluvial trout populations in the Middle Clark Fork River.

Northern pike numbers continue to increase in the Clark Fork River downstream of the dam (Milltown section, Figure 9). Tagging and radio telemetry projects in the Milltown area indicate that the northern pike population in Milltown Reservoir is increasing and serving as the major upstream source for pike sampled in the Milltown section. Northern pike apparently moved downstream from the Clearwater Drainage (via the Blackfoot River) where they were illegally introduced in the early 1990s. Pike were first discovered in the Milltown area in 1999. We will continue to monitor pike abundance in the reservoir and river and assess impacts of predation on salmonid populations.

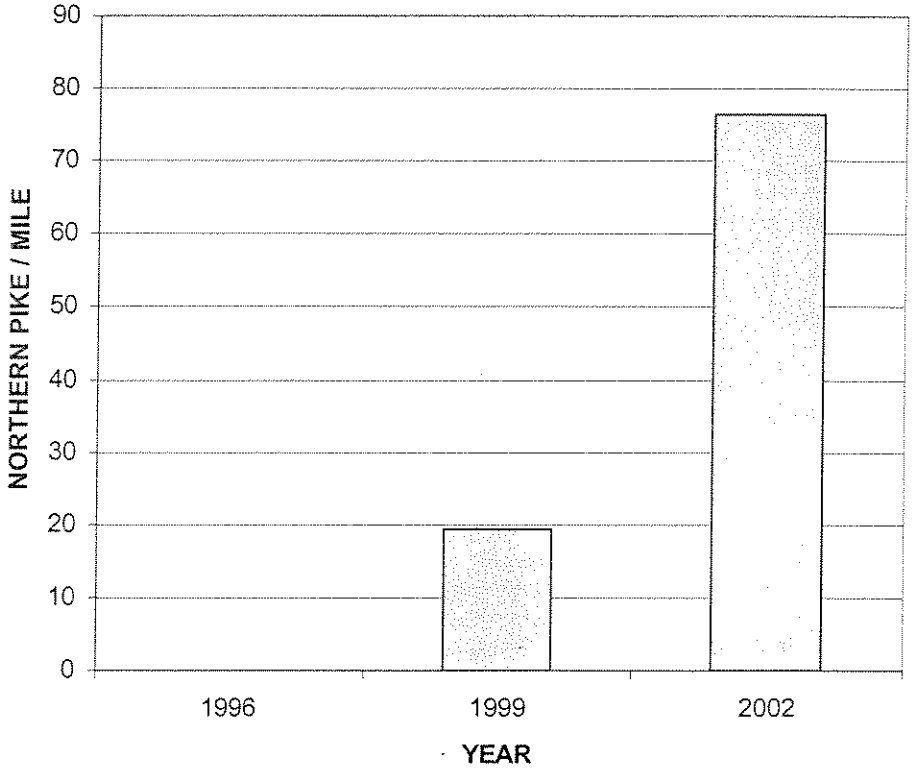

Figure 9. Northern pike abundance estimates in the Clark Fork River Milltown section since 1996.

Bull Trout

Fluvial bull trout populations continue to exist at extremely low abundances in the middle Clark Fork River. We can no longer obtain a valid estimate in most monitoring sections, but densities appear to be 1-2 adults per mile in most river reaches. Recent tributary surveys indicate that only 4-5 streams in the Clark Fork River reach between confluences on the Blackfoot and Flathead Rivers may still support migratory populations (see pertinent sections in this report). The overall decline in number of populations and abundance is surely related to upstream fish passage and habitat problems in tributaries, installation of hydroelectric facilities on the main stem and

overharvest. However, it is not known why remaining populations (which have good habitat condition and connectivity) have not responded to protective angling restrictions and recovery efforts. Similar streams in the Blackfoot Drainage where these measures were employed have experienced rapid increases in bull trout abundance (Pierce et al. 2002). We suspect that overharvest and main stem river conditions are contributing to the continued suppression of fluvial bull trout. We have undertaken telemetry, harvest assessment and monitoring activities to address these concerns.

Whirling Disease

The incidence of whirling disease was assessed by recording the frequency of cranial deformities in rainbow trout during monitoring surveys. Other species were not assessed due to smaller sample sizes and lower susceptibility to the disease. This is not a diagnostic technique, but provides an indication of the severity of contamination. Laboratory assays for the disease will provide a better indication of the level of infection in the Clark Fork River and allow us to monitor the disease more closely.

Whirling disease appears to be moving in a downstream direction, consistent with trends in infection in the Blackfoot River drainage (Pierce et al. 2002). The increased rate of cranial deformities in rainbow trout in the Milltown section in 1999-2002 indicates that the severity of the disease is increasing. It is not known what long term effect whirling disease will have on middle Clark Fork River trout populations or whether we will be able to distinguish impacts from other problems such as elevated toxic metal levels, northern pike predation, fish passage barriers, and habitat degradation.

Hooking Scar Rates

Visible hooking scars serve as an index of catch-and-release fishing pressure and catch rates. Increased incidence of hooking scars reflect increases in fishing pressure in monitoring reaches (Table 4). Fishing pressure on the middle Clark Fork River increased 36% from 1991-2001 (MFWP 1992, MFWP 2002). Westslope cutthroat trout exhibited a disproportionately high hooking scar rate relative to other trout species in both river monitoring sections. This is consistent with numerous studies demonstrating the high susceptibility of cutthroat trout to angling (see Varley 1984).

Table 4. Comparison of trout hooking scar rates for Clark Fork River population estimate sections in 1999-2002.

River Section	Year	Rainbow Trout	Westslope Cutthroat Trout	Brown Trout
Superior	1999	8.6%	46.5%	-
Milltown	1999	7.7%	18.1%	3.4%
Milltown	2001	9.8%	23.8%	3.7%
Milltown	2002	9.3%	28.0%	4.1%

High incidence of hooking scars also reflects the prevalence of catch-and-release angling on the Clark Fork River and other west-central Montana waters. Although some losses due to harvest

are negated by catch-and-release fishing, there is generally a 5-10% mortality rate associated with capture and handling of released fish (Taylor and White 1992).

Literature Cited

Berg, R.K. 1999. A compilation of fishery survey information for the middle Clark Fork River drainage 1984-96. Montana Fish, Wildlife & Parks, Missoula, Montana.

Montana Fish, Wildlife & Parks. 1992. Montana statewide angling pressure 1991. Montana Fish, Wildlife & Parks, Helena, Montana.

Peters, D. and D. Schmetterling. 1996. Clark Fork River creel census: Rock Creek to Flathead River. Statewide Fisheries Investigation, F-78-R-2. Montana Fish, Wildlife & Parks, Missoula, Montana. 23 pp.

Montana Fish, Wildlife & Parks. 2000. Montana statewide angling pressure 1999. Montana Fish, Wildlife & Parks, Helena, Montana.

Pierce, R.W., C. Podner, and J. McFee. 2002. The Blackfoot River fisheries inventory, restoration and monitoring progress report for 2001. Montana Fish, Wildlife & Parks, Missoula, Montana.

Schmetterling, D.A. *In review.* Reestablishing connectivity in a fragmented river system: movements of westslope cutthroat trout and bull trout after transport over Milltown Dam, Montana. North American Journal of Fisheries Management

Swanberg, T.R. 1997. Movements of bull trout (*Salvelinus confluentus*) in the Clark Fork River system after transport upstream of Milltown Dam. Northwest Science 71(4)313-317.

Taylor, M.J. and K.R. White. 1992. A meta-analysis of hooking mortality of nonanadromous trout. North American Journal of Fisheries Management 12:760-767.

Varley, J.D. 1984. The use of restrictive regulations in managing wild salmonids in Yellowstone National Park, with particular reference to cutthroat trout, *Salmo clarki.* Pages 145-156 in J.M. Walton and D.B. Houston, eds. Proceedings of the Olympic wild fish conference, Peninsula College, Fisheries Technology Program, Port Angeles, Washington.

Methods

We completed redd surveys in suspected spawning areas throughout the upper Fish Creek drainage in 2000-2002 and in Cedar Creek in 2002. Initial surveys were also completed in Little Joe Creek in 2002. Although fluvial redds were located in Little Joe Creek, redd count monitoring sections were not established. Locations of initial surveys were based on historical and anecdotal information, bull trout spawning habitat requirements, and the distribution of juvenile bull trout from electrofishing surveys. Redd counts were conducted during the first two weeks of October in both years, which is within 2-3 weeks after the spawning period ends.

Experienced field crews completed surveys by walking the channel and visually searching for redds. Redds were identified by the presence of a pit or depression and associated tail area of clean (bright) gravel (Spalding 1997). The total number of redds in a particular reach was totaled to determine a 'count' for monitoring purposes. Only definitive redds were included in counts. All redds were > 3 ft in length from head of pit to tail and likely represent fluvial spawning adults. 'Resident' adults have not been documented in Fish, Cedar or Little Joe Creeks.

Results and Discussion

Fish Creek

Redd surveys were completed throughout Cache Creek (Fish Creek tributary) in 2000 and 2001 where discharges were > ~5 cfs and habitat was suitable for spawning. No definitive redds were observed, although electrofishing surveys indicate low abundance of bull trout.

All other surveys were within the West Fork and North Fork Fish Creek drainages. These areas are believed to support the majority of bull trout spawning in Fish Creek based on electrofishing surveys. Cedar Log and Straight Creeks have incised, high gradient channels with multiple waterfalls. No bull trout redds were located in 2001 surveys. Four other reaches in the West and North Forks that contained redds were selected as annual monitoring sites. Two of these sections are located in each fork (Figure 1):

North Fork

Section I: Mouth of Fletcher Gulch downstream to Greenwood Cabin (~1/4 mile downstream of Greenwood Cr. mouth)
T14 N, R26W, Section 29 to T14 N, R26W, Section 22
Approximately 2.5 miles

FLUVIAL BULL TROUT REDD COUNTS IN MIDDLE CLARK FORK RIVER TRIBUTARIES

Background

Redd counts are a common tool for monitoring escapement of adult fluvial bull trout (Dunham et al. 2001; Spalding 1997). Redds, or nests, are excavated by spawning females and can be counted by trained personnel in consistent stream sections to serve as an index of adult spawner abundance, level of spawning activity and as an indication of anticipated recruitment in the succeeding generation. In western Montana, bull trout generally spawn during the first 3 weeks of September and have high fidelity to natal tributaries (Fraley and Shepard 1989). Fluvial bull trout redds are easy to identify as adults (>16 in) and redds (> 3 ft long) are large (Kondolf and Wolman 1993; Fraley and Shepard 1989).

Electrofishing surveys throughout tributaries of the middle Clark Fork Basin (Bitterroot River confluence to Flathead River Confluence) in 1999-2001 indicated that as few as three fluvial bull trout populations remain (see tributary sampling section). Historically and as late as the mid-1900s, bull trout were found in as many as 12 middle Clark Fork tributaries (MFWP historical files). In 1999-2001, bull trout were detected in Grant Creek, Albert Creek, Petty Creek, Fish Creek (West Fork), Cedar Creek and the St. Regis River (Little Joe Creek) drainages. The Petty Creek population is not considered viable because of extremely low densities, hybridization and severe habitat degradation. The Albert Creek and Grant Creek populations are likely not migratory due to severe dewatering in lower reaches and anthropogenic fish passage barriers. The remaining three populations are considered fluvial based on observation of migratory adults and the absence of resident adults or subadults (age 4+) in electrofishing surveys.

With the exception of the St. Regis River, Fish Creek is the largest tributary drainage of the middle Clark Fork River between confluences with the Bitterroot River and Flathead River. Fish Creek is unique in that most of the upper portions lie in undeveloped roadless areas (the proposed Great Burn Wilderness) and still support excellent fish habitat. Recent electrofishing surveys suggest that Fish Creek supports the most abundant remaining fluvial bull trout population in the middle Clark Fork (MFWP, unpublished data). Tributaries with the highest juvenile densities (indicating spawning reaches) are the West Fork, North Fork and Cache Creek (Ladd Knotek, MFWP, unpublished data).

Electrofishing surveys were completed throughout the St.Regis River drainage in 1999-2001. We only detected bull trout in one tributary, Little Joe Creek. Bull trout were found at all sites sampled in the North and South Forks of Little Joe Creek. Bull trout were detected at all five sites sampled in the Cedar Creek drainage in 2002. Both Cedar Creek and Little Joe Creek are third order, northwest facing tributary drainages that have maintained high water quality and habitat complexity despite large scale habitat alteration from mining, road construction and timber harvest.

Section II: Mouth of Crater Creek downstream to the mouth of the North Fork of Fish Creek.
T14 N, R26W, Section 26 to T13 N, R25W, Section 6
Approximately 3.5 miles

West Fork

Section III: Cedars Camp downstream to the junction with Indian Creek (West Fork Fish Creek)
T13 N, R26W, Section 28 to T13 N, R25W, Section 25
Approximately 2.5 miles

Section IV: Trail crossing on Indian Creek downstream to the bridge at Clearwater Crossing/USFS Trail Head (West Fork Fish Creek/Indian Creek)
T13N, R26W, Section 36 to T13N, R25W, Section 6
Approximately 4.5 miles

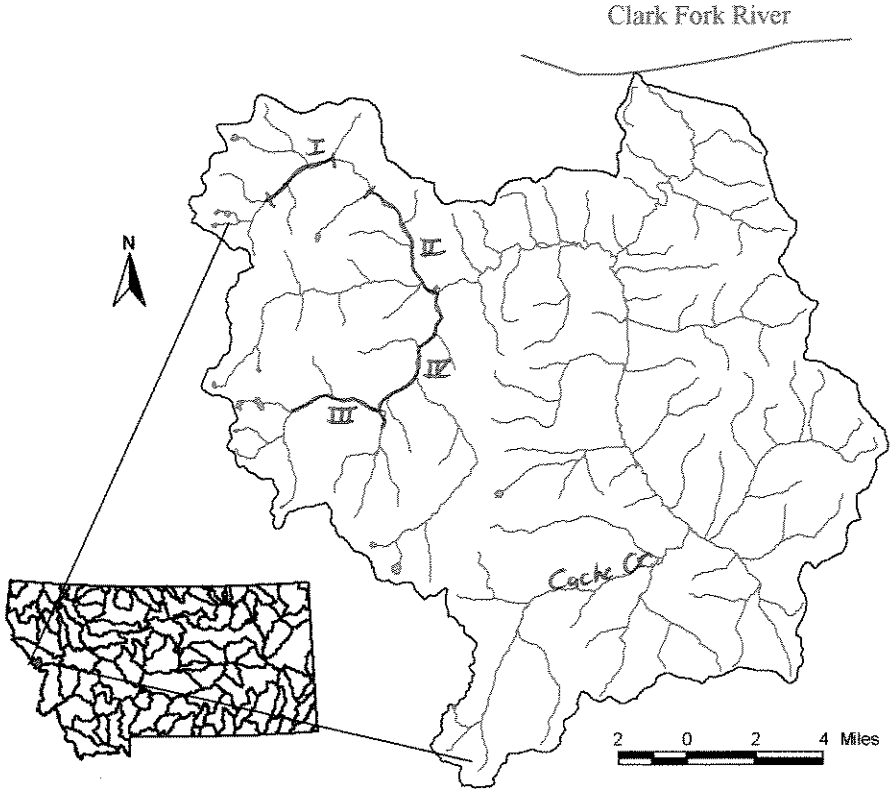

Figure 1. Location of redd count monitoring sections in the Fish Creek drainage (in red).

These reaches contained all of the bull trout redds located in our surveys (Table 1). Bull trout likely also spawn in other sections of the drainage, but at levels that are currently too low for useful long term monitoring. Therefore, it should be recognized that redd counts serve as a useful *index* of spawning activity and adult escapement, but are not a measure of absolute abundance.

Table 1. Bull trout redd counts in annual monitoring sections in Fish Creek.

	Section I	Section II	Section III	Section IV
2000	13	2	No Count	No Count
2001	0 *	4 *	2	8
2002	2	0	No Count	6

* Drought conditions - many reaches dry or inaccessible

Portions of the Fish Creek watershed surveyed for bull trout redds lie entirely in roadless tributary drainages with relatively little habitat degradation and low human accessibility. Redd count numbers were surprisingly low, even in selected monitoring sections. This is likely due to the drought conditions in 2000-2001, but may also reflect the influence of overharvest and the presence of impassible dams on the Clark Fork River. Natural stream dewatering influenced the distribution of redds in 2001 as the most heavily used North Fork spawning reaches of 2000 were completely dry or inaccessible. Low redd counts in 2002 could not be explained. It is unclear whether the drought conditions affected the total number of redds or the number of repeat spawning adults over consecutive years. Annual monitoring sections selected include reaches with the best perceived spawning habitat during high flow and low flow periods. Continued monitoring during higher water conditions and occasionally repeating basin-wide counts should help us to assess the impacts of the drought and the location of annual monitoring sections.

Cedar Creek

Redd surveys in upper Cedar Creek were completed on October 3, 2002 by four MFWP personnel. All areas presumed capable of supporting spawning (based on substrate, gradient, and discharge) were surveyed. Two redd count monitoring (index) sections were chosen based on the distribution of redds (below) which included a total of 10 redds (Table 2) . Areas immediately upstream of redd count monitoring sections (Upper Lost Creek, Oregon Gulch, Cedar Creek) may be capable of supporting spawning in higher water years and will be re-surveyed to determine if additional monitoring sections will be added.

Section I: Confluence of Oregon Gulch and Lost Creek downstream to confluence of Oregon Gulch and main stem Cedar Creek
T14 N, R27W, Section 21 to T14 N, R27W, Section 14
Approximately 2.5 miles

Section II: South Fork Cedar Creek: Mouth of Montreal Gulch downstream to Cayuse Gulch.
T15 N, R27W, Section 9 to T14 N, R27W, Section 27
Approximately 3.5 miles

Table 2. Bull trout redd counts in monitoring sections established in Cedar Creek.

	Section I	Section II	TOTAL
2002	7	3	10

Little Joe Creek

Electrofishing surveys suggested that juvenile bull trout were present throughout most of Little Joe Creek. Both forks of Little Joe Creek have similar hydrology and geomorphology, with high habitat complexity. Initial redd surveys in 2002 included a subsample of predicted spawning reaches and indicated that fluvial redds could be located. In 2003, we will survey the entire drainage and attempt to establish redd count (index) monitoring reaches.

Summary

We are in the process of establishing and confirming bull trout spawning index reaches in middle Clark Fork River tributaries that still support fluvial populations. These data will be collected annually to create a baseline for assessing long term trends in population abundance.

Regardless of drought impacts and validity of redd count index sections, it is clear that remaining fluvial bull trout populations in the middle Clark Fork Drainage are extremely depressed relative to historic levels. It is also clear that the number of remaining populations and spatial distribution of bull trout is a small fraction of the historic and desired condition. Immediate steps should be taken to secure and enhance remaining populations before extinction becomes a legitimate risk.

References

Dunham, Jason; Rieman, Bruce; Davis, Kevin. 2001. Sources and magnitude of sampling error in redd counts for bull trout. North American Journal of Fisheries Management 21:343-352.

Fraley, J. J., and B. B. Shepard. 1989. Life history, ecology, and population status of migratory bull trout (Salvelinus confluentus) in the Flathead Lake and River system, Montana. Northwest Science 63:133-143.

Kondolf, G. M., and M. G. Wolman. 1993. The sizes of salmonid spawning gravels. Water Resources Research 29:2275-2285.

Spalding, S. 1997. Montana bull trout redd survey manual – including annotated bibliography. Montana Fish, Wildlife and Parks, Helena, Montana. 8 pp.

IDENTIFICATION, ANALYSIS, AND REMEDIATION RECOMMENDATIONS FOR FISH PASSAGE BARRIERS AT ROAD CROSSINGS IN THE FISH CREEK DRAINAGE

Introduction

Maintaining, removing and creating fish passage barriers are common tools for conserving native fish in the western United States. In Montana, upstream fish passage barriers are used to conserve genetically 'pure' westslope cutthroat trout *Oncorhynchus clarki lewisi* (WCT) populations in some areas, while barriers are removed in others (MDFWP 1999) to restore stream connectivity, promote genetic exchange between local populations, and facilitate recovery of migratory populations (Allendorf and Leary 1988; McIntyre and Reiman 1995, Schmetterling 2002). Responsible use of these techniques requires multidisciplinary expertise and many considerations ranging from fisheries to engineering.

Life history tactics of fluvial WCT put them at risk of population fragmentation because of the timing at which they use tributaries (Schmetterling 2001). WCT migrate to tributaries during high flow periods in the spring to spawn (Schmetterling 2001). Many road culverts are not designed to accommodate fish passage at high flows or any discharge (Baker and Votapka 1990) and thus are not compatible with the requirements of native fish. Consequently, the middle Clark Fork River drainage in western Montana generally consists of fragmented tributary drainages with resident native fish populations and a recruitment-limited main stem fishery dominated by introduced rainbow trout *O. mykiss* and brown trout *Salmo trutta*. Native salmonid recovery actions must balance preservation of genetically pure localized populations (found primarily in tributaries) with re-establishment of connectivity for recovery of migratory stocks.

Removal of selected fish passage barriers in Clark Fork River tributaries should allow genetic exchange among metapopulations, promote fluvial life-history forms that support recreational fisheries and reduce extinction risk of small, isolated populations (Hilderbrand and Kirschner 2000). In this study, we surveyed road crossings in Fish Creek and its tributaries to identify and characterize upstream salmonid passage barriers. Fish Creek is a 4th order tributary of the middle Clark Fork River (Figure 1) with many private and public stream crossings (Figure 2) and supports a diverse fish assemblage in terms of fish species distribution, genetic composition and life-history expressions.

Methods

We identified road crossings on perennial stream reaches of the Fish Creek watershed, mapped their locations and described their type, i.e. corrugated metal culvert, bridge, ford or other. On culverts we measured culvert dimensions, slope, length, outlet height (above plunge pool), depth of outlet plunge pool, and channel bankfull widths. In addition, we measured stream velocities at many culverts during high flows and collected other ancillary information for analysis with the FISH XING computer model (Mike Furniss, USFS Rocky Mountain Experiment Station, Fort Collins, Colorado).

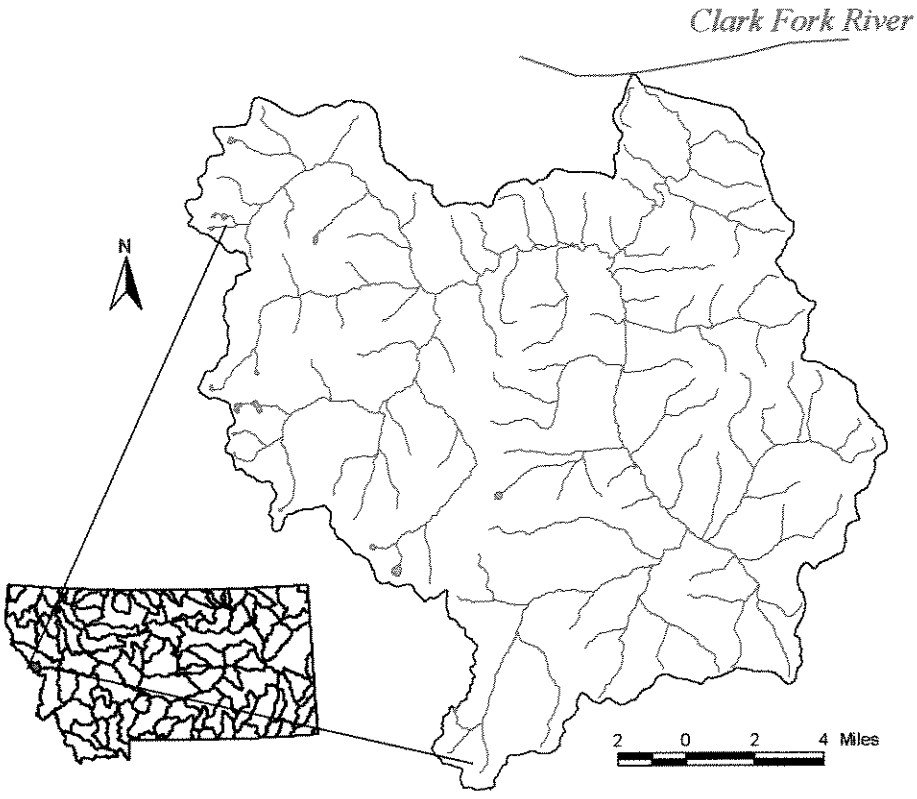

Figure 1. Fish Creek drainage in western Montana

All crossings on fish-bearing stream reaches were categorized as providing adequate passage for multiple salmonid species and life stages at: (1) base and bankfull flow levels – open to fish passage, (2) no flow levels – complete passage barriers, or (3) selected flow levels – partial passage barriers. Standards for categorization were based primarily on culvert flow velocities, culvert length, and the height of vertical drop at culvert outlets and inlets, but also incorporated fish species and size present and professional judgement.

We used FISH XING to validate our field assessment of partial barriers and developed a watershed-level prioritization scheme for fish passage enhancement projects since funding and resources are limited. Factors considered in prioritization included: fisheries management goals, fish species composition and distribution, fish life-histories and habitat needs, stream habitat quality and quantity upstream of the barrier, fish disease, location of other anthropogenic and natural fish passage barriers, potential for mass failure at the crossing, transportation system management plans and objectives, and cost. In general, fisheries improvement projects which promoted connectivity of large reaches of high quality habitat and would benefit fluvial salmonids were given the highest priority. Projects with limited suitable fish habitat upstream of the crossing, contingency on other projects or high costs relative to fish community benefits were rated lower. Genetic and disease testing were treated as contingencies in the prioritization where these data were unavailable.

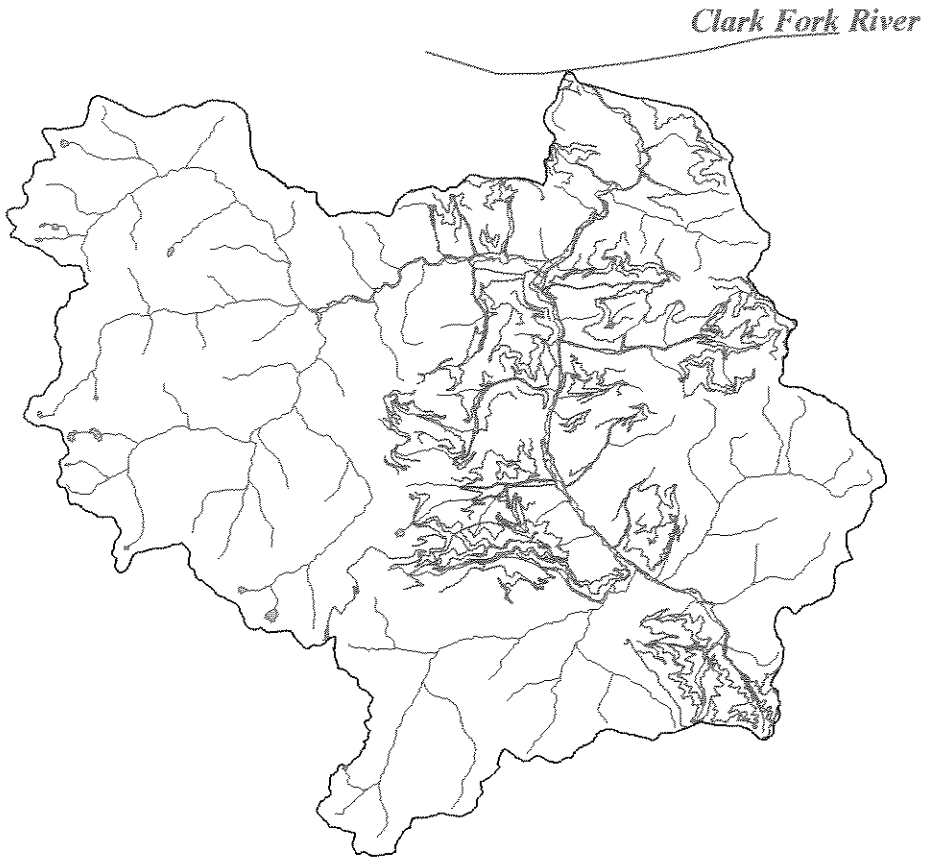

Figure 2. Road matrix (red) in the Fish Creek drainage.

Results

We surveyed 65 road crossings of Fish Creek and its tributaries (Appendix , Figure 3). Thirteen of the crossings traversed intermittent, fishless stream reaches and were removed from the analysis and prioritization. Of the remaining 52 road crossings (Table 1), culverts were the most common (n=38) and accounted for the majority of fish passage problems. Seven culverts were complete fish passage barriers and 11 were partial fish passage barriers (Table 1). Five culverts identified as barriers were disregarded when we did not find fish upstream and downstream of the crossing.

Table 1. Summary of fish passage at stream crossings in Fish Creek based on site measurements and visual observation.

Crossing Type	n	No Observed Fish Passage Problem	Selective Fish Passage Barrier	Complete Fish Passage Barrier
Culvert	38	20	11	7
Bridge	12	12		
Ford or Other	2	1	1	

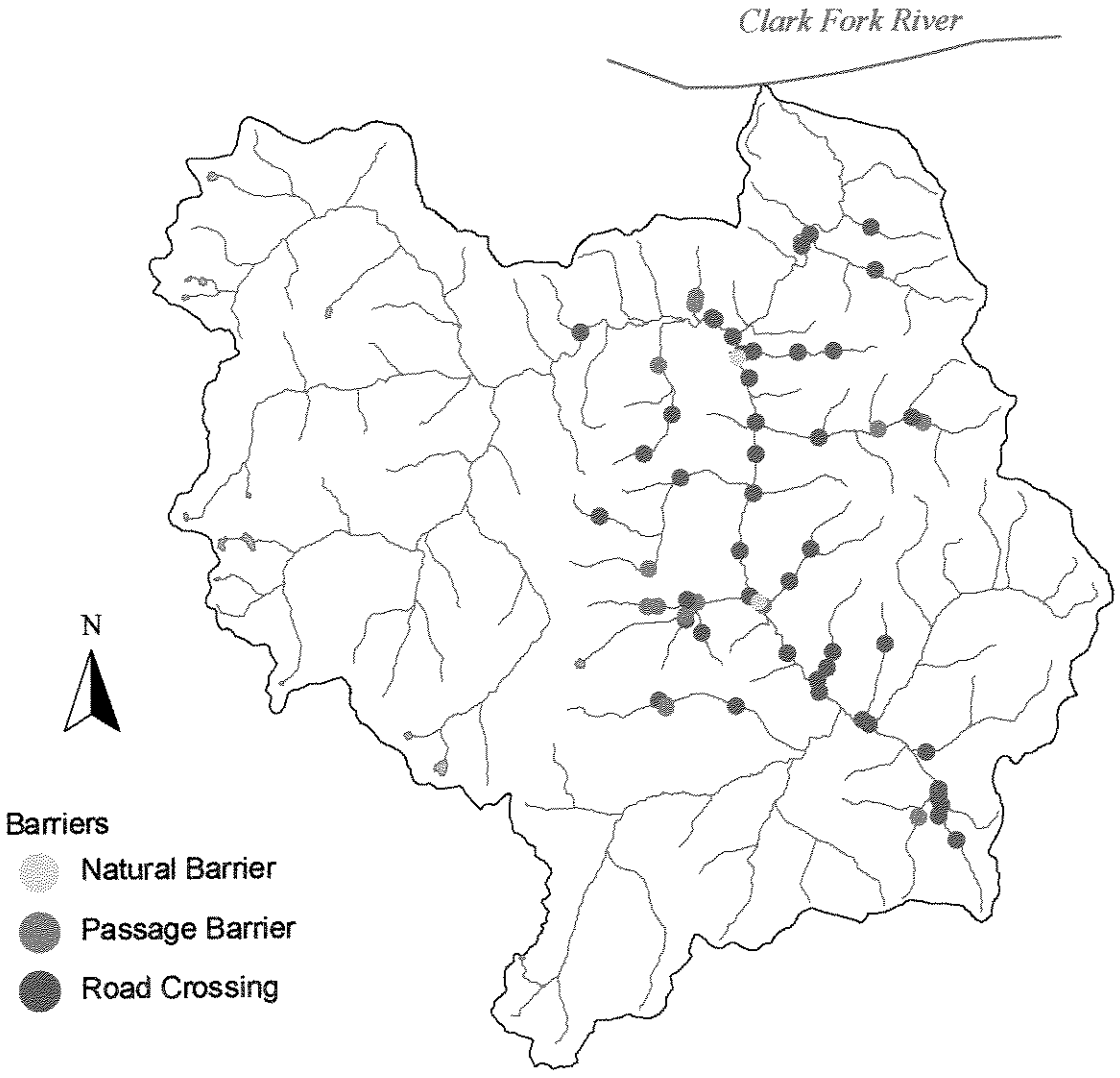

Figure 3. Locations of road crossings evaluated in the Fish Creek drainage. Crossings determined to be upstream fish passage barriers are shown in green and natural barriers are in yellow.

The 13 culverts classified as problematic for upstream fish passage were then prioritized (see Table 2) and the list was forwarded to the affected land management agencies. In 2002, several of the prioritized crossings were corrected by Plum Creek Timber Company in as recommended. The Lolo National Forest also expressed interest in repairing the top priority crossing on Surveyor's Creek.

Table 2. Prioritized list of suggested fish passage improvement projects associated with road crossings in Fish Creek, Montana.

Crossing Location	Priority	Barrier Type	Primary Considerations (see below)	Recommended Correction
N. Fork Surveyor's Creek	1*	Complete	1,2,3,4,5	Replace Culvert
Lower Bear Creek	2	Selective	1,2,3,4	Retrofit Existing Culvert
Middle Deer Creek	3	Selective	1,2,3,4	Replace Culvert
Oriole Creek	4	Selective	1,2,4	Replace Culvert
Upper Surveyor's Creek	5	Selective	1,2,4	Replace Culvert
Upper Thompson Creek	6*	Complete	1,4	Replace Culvert
Mid N. Fk Surveyor's	7	Selective	1,4,7	Replace Culvert
Upper N. Fk Surveyor's	8	Selective	1,4,7	Replace Culvert
Lower Trail Creek	9*	Complete	1,3,4,6,7	Replace Culvert
Upper Trail Creek	10*	Selective	1,3,4,6,7	Replace Culvert
Upper Deer Creek	11*	Complete	1,4,6	Re-set Culvert on Grade
Wig Creek	12	Selective	2,3,6	Replace Culvert
U. Thompson Cr. Trib	13	Complete	1,4,6,8	Replace Culvert

* Prioritization contingent on results of genetic and disease testing

Primary considerations for prioritization of fish passage improvement projects at road crossings:

[1] Reach occupied primarily by native fish
[2] Improved passage to > 1 mile of suitable fish habitat upstream of crossing
[3] Reach upstream of culvert suitable for spawning and rearing of native fluvial salmonids
[4] Improved connectivity within reach occupied by resident WCT population
[5] High risk of mass failure at road crossing – road system integrity threatened
[6] Quantity of suitable fish habitat upstream of crossing limited by stream flow, gradient or natural barriers
[7] Improved fish passage contingent on correction of culvert problem upstream or downstream
[8] Costs extensive relative to benefits to fish populations

Conclusions

Fish Creek, typical of timber-managed watersheds in the western United States, contains an extensive road network with numerous stream crossings. We identified many of these crossings as complete or selective barriers to upstream salmonid passage. In general, analysis using FISH XING confirmed our conclusions from field assessments, but was more conservative using subjective parameters suggested by the software's designers (Mike Furniss, USFS, pers. comm.). For instance, we observed fluvial WCT (425 mm TL) spawning upstream of a culvert that was predicted by the model to be impassible at all flows for that size and species. Model parameters including fish swimming speeds and water velocity corrections due to culvert corrugations should be refined as the model is developed.

As a result of this project, we proposed a prioritized list of road crossing improvements which consisted primarily of culvert replacements, rather than modifying existing structures. Despite the number and complexity of considerations in this case study, prioritization of remediation projects which solely address upstream salmonid passage was readily achievable. However, we

recommend that this type of analysis be combined with road standards (Forestry Best Management Practices) and other land use surveys in evaluating limiting factors and improvement measures at a watershed scale. In addition, non-salmonid species such as sculpins (Cottus spp.) should also be included when distribution and movement information is available. These and other complexities may further complicate decision-making, but should not preclude use of a practical, science-based approach in guiding watershed restoration activities.

References

Allendorf, F. W., and R. F. Leary. 1988. Conservation and distribution of genetic variation in a polytypic species, the cutthroat trout. Conservation Biology 2:170-184.

Baker, C. O., and F. E. Votapka. 1990. Fish passage through culverts. Report No. FHWA-FL-90-006. U. S. Department of Transportation, Federal Highway Administration, Washington, D. C.

Hilderbrand, R. H., and J. L. Kershner. 2000. Conserving inland cutthroat trout in small streams: how much stream is enough? North American Journal of Fisheries Management 20:513–520.

McIntyre, J. D., and B. E. Reiman. 1995. Westslope cutthroat trout. Pages 1-15 *in* M. K. Young, editor. Conservation assessment for inland cutthroat trout. U.S. Forest Service General Technical Report RM-256. Fort Collins, Colorado.

Montana Department of Fish, Wildlife and Parks. 1999. Memorandum of understanding and conservation agreement for westslope cutthroat trout (Oncorhynchus clarki lewisi) in Montana. Montana Fish, Wildlife and Parks, Helena.

Schmetterling, D. A. 2001. Seasonal movements of fluvial westslope cutthroat trout in the Blackfoot River drainage, Montana. North American Journal of Fisheries Management, In press.

Schmetterling, D. A. 2003. Reestablishing connectivity in a fragmented river system: movements of westslope cutthroat trout and bull trout after transport over Milltown Dam, Montana. North American Journal of Fisheries Management, *In Press*.

ONCORHYNCHUS GENETIC SAMPLING:

SURVEYS AND ANALYSES TO IDENTIFY GENETICALLY PURE WESTSLOPE CUTTHROAT TROUT POPULATIONS IN MIDDLE CLARK FORK RIVER TRIBUTARIES

Background

Hybridization with closely related, introduced salmonids is one of the greatest threats to westslope cutthroat trout (*Oncorhynchus clarki lewisi*) and other native salmonid populations (Allendorf et al. 2001). In the case of westslope cutthroat trout populations in Montana (upper Columbia and Missouri River drainages), Yellowstone cutthroat trout (*O. clarki bouvieri*) and rainbow trout (*O. mykiss*) have historically been introduced in lakes, rivers and streams to supplement sport fisheries. Hybrids of these introduced species and native westslope cutthroat trout (WCT) have been identified in most locations where populations are sympatric. Other westslope cutthroat trout populations have concurrently been isolated by various anthropogenic or natural barriers that prevent hybridization. Although these (often physical) barriers help ensure genetic purity of westslope cutthroat trout populations in the short term, they often prevent genetic exchange among local populations and suppress migratory life history expressions (Rieman and Dunham 2000). Therefore, management and conservation of westslope cutthroat trout populations requires a balance of connectivity and isolation across different drainages and spatial scales (Schmetterling, *In review*).

Identification of genetically 'pure' westslope cutthroat trout populations is one of the basic requirements of native fish restoration and conservation planning in western Montana watersheds. In this ongoing analysis, we began systematically collecting and testing *Oncorhynchus* genetic material from tributary drainages of the middle Clark Fork River system. This information was collected to assist in developing conservation plans, prioritizing fisheries enhancement projects and evaluating fish passage issues.

Methods

Samples were collected by backpack electrofishing tributary streams of the middle Clark Fork River n 1999-2002. The distribution and number of sample sites per stream varied depending on the spatial scale, access and observed species composition based on morphological characteristics. For example, genetic samples were not collected at sites that supported predominantly rainbow trout. We attempted to collect a series of longitudinal samples within each drainage or tributary (e.g., low, med and high in the drainage) supporting predominately westslope cutthroat trout. However, small inaccessible streams generally had fewer sites. At each sample site, we collected multiple size classes whenever possible to represent different age classes and generations.

The target sample size for each population (usually several sites within each drainage or tributary) was a minimum of 25 randomly selected (*Oncorhynchus* spp.) individuals. This sample size is based on the probability of detecting hybridization with 95% confidence given a known number of markers analyzed (See Table 1 and Appendix 1). In the Clark Fork River drainage, hybridization with rainbow trout (RBT, 6 diagnostic loci) is currently a much greater risk than with Yellowstone cutthroat trout (YCT, 4 diagnostic loci). Power of detecting hybridization does not increase substantially with sample sizes greater than 25 in the case of WCTxRBT.

Table 2. Results of *Onchorynchus* genetic testing in Clark Fork River tributaries in 1999-2001 using PINES analysis. Percent WCT denotes the contribution of westslope cutthroat trout alleles as a percentage of the entire sample.

Stream	No. Sites	n	Upstream Boundary	Downstream Boundary	Power# (%)	% WCT	Hybridizing Species
Swartz Creek	5	51	T11N R18W S24 /25 (headwaters)	T12N R17W S34 (near mouth)	99	85	RBT
Deer Creek	3	51	T12N R18W S6 (headwaters)	T13N R18W S28 Deer Cr. Rd Xing	99	**100**	-
Marshall Cr.	2	24	T14N R18W S33 (headwaters)	T13N R18W S6 (Moye pond)	94	**100**	-
Marshall Cr.	2	31	T13N R18W S6 (Moye pond)	T13N R18W S18 (mouth)	99	95	RBT
Rattlesnake Cr.	1	24	T13N R19W S2 Mtn Water Dam	T13N R19W S2 USFS Bridge	~ 95	61	RBT
Pattee Creek	2	10**	T12N R19W S2 (headwaters)	T12N R19W S4	70	**100****	-
Nemote Cr.	4	27	T15N R24W S9/ 22 (headwaters)	T15N R25W S24 (forks confl.)	96	**100**	-
Nemote Cr.	2	15	T15N R25W S24 (forks confl.)	T15N R25W S16 (frontage road)	~70	93	
Johnson Cr.	3	25	T17N R25W S20 (headwaters)	T17N R25W S31	96	**100**	-
First Cr.	3	17**	T17N R25W S36 (headwaters)	T16N R25W S16	75	**100**	-
Deer Cr. (Fish Cr. trib)	4	12**	T13N R24W S11 (headwaters)	T13N R24W S7	62	**100****	-
Oriole Cr. (Fish Cr. trib)	3	26	T12N R24W S27 (headwaters)	T12N R24W S22 (below rd xing)	96	**100**	-
Trail Cr. (Fish Cr. trib)	3	25	T14N R25W S26 (headwaters)	T14N R25W S35 (below rd xings)	95	**100**	-
Surveyors Cr. (Fish Cr. trib)	2	16	T12N R25W S34 (headwaters)	T12N R25W S36 (Above rd xings)	72	**100****	-
Surveyors Cr. (Fish Cr. trib)	2	16	T12N R25W S36 (below rd xings)	T12N R25W S36 (near mouth)	72	>90	RBT
Straight Cr. (Fish Cr. trib)	4	18**	T13N R26W S17 (headwaters)	T13N R26W S2	~89	**100****	-
Straight Cr. (Fish Cr. trib)	1	7	T13N R26W S2	T13N R26W S1 (near mouth)	~60	>90	RBT
Silver Cr. (St. Regis R. trib)	2	25	T19N R31W S33 (headwaters)	T19N R31W S14 (above barrier)	96	**100**	-
Silver Cr. (St. Regis R. trib)	1	13	T19N R31W S14 (below barrier)	T19N R31W S14 (mouth)	~75	93	RBT
Dry Creek	6	43	T16N R28W S9 (headwater forks)	T17N R27W S28 (dry reach)	99	98	RBT
Rock Cr.	3	24	T14N R25W S17 (headwaters)	T14N R25W S1 (above barrier)	94	**100**	-
Sevenmile Creek	2	26	T19N R27W S27 (lower USFS)	T18N R27W S2 (above barrier)	96	**100**	-

** Additional samples have been collected and will be tested to increase power of detection.

Power or percentage chance of detecting 1% hybridization given sample size and number of diagnostic loci

Stream	No. Sites	n	Upstream Boundary	Downstream Boundary	Power# (%)	% WCT	Hybridizing Species
Tamarack Cr.	3	25	T19N R28W S12 /22 (headwaters)	T18N R27W S9 (above barrier)	96	**100**	-
Siegel Cr.	2	24	T18N R31W S1 (headwaters)	T19N R31W S27	94	**100**	-

The seven stream reaches that exhibited rainbow trout markers are all directly connected to waters supporting predominately rainbow trout. It is not known why some (non-isolated) westslope cutthroat trout populations hybridize with rainbow trout and others don not, but factors such as spawning behavior, water temperature, gradient, level of habitat degradation and discharge have been suggested (Schmetterling, *In review*). Others maintain that hybridization may be imminent when fish movement and genetic exchange are possible (Robb Leary, University of Montana Wild Trout and Salmon Genetics Laboratory, personal communication). However, seven populations in our survey have apparently remained genetically pure despite nearly a century of open access by rainbow trout populations.

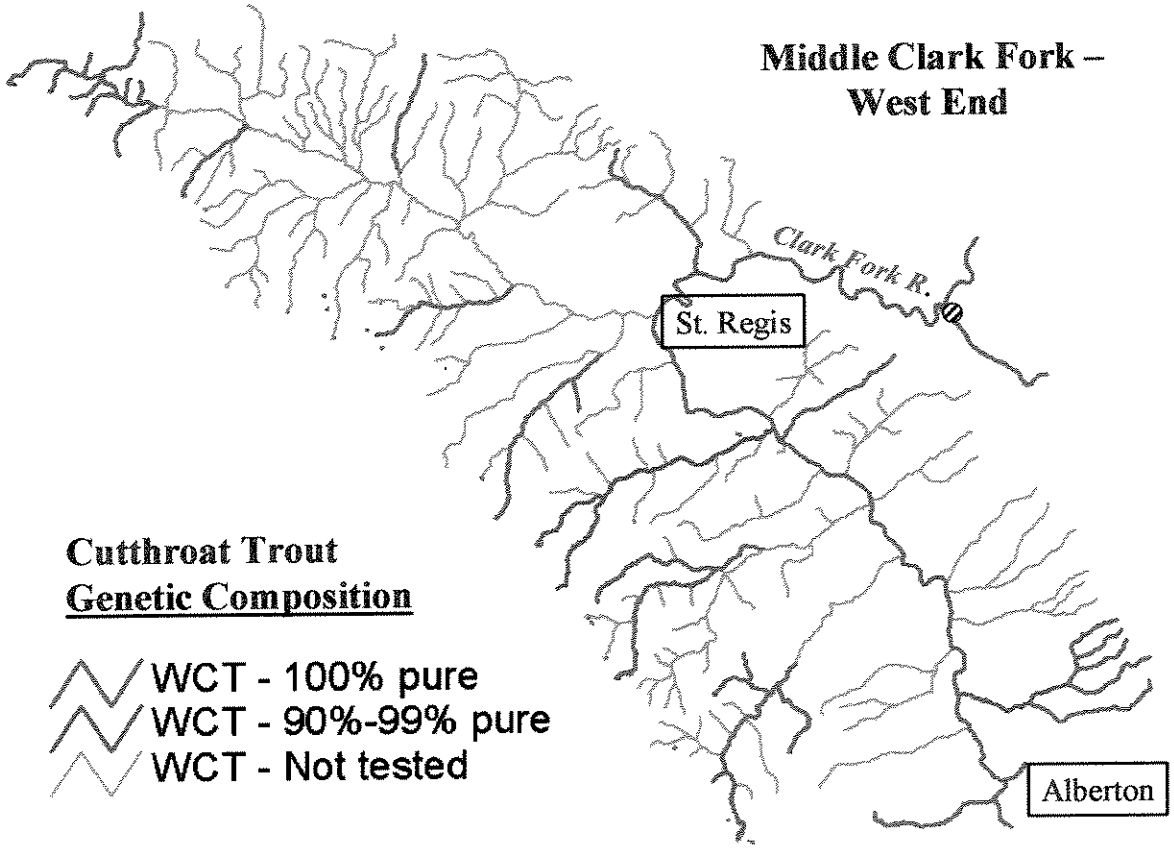

Figure 1. Map of *Oncorhynchus* genetic testing results to date in lower Clark Fork River tributaries.

Table 2 displays genetic sampling results from 1999-2001. These results, when combined with previous sampling begin to provide a picture of the genetic status of westslope cutthroat populations in the middle Clark Fork River drainage (Figure 1). In addition to the samples analyzed in Table 2, many others have been collected since 1999, but not analyzed due to funding shortages (Table 3). Samples will continue to be collected, prioritized and analyzed throughout the middle Clark Fork system as resources allow. These results will be critical as we develop fisheries conservation and management plans for the drainage.

Table 3. List of genetic samples collected from middle Clark Fork River tributaries in 1999-2002 that have not been analyzed.

Stream	Sample Size	Stream	Sample Size
Albert Creek	25	**NINEMILE CREEK DRAINAGE**	
Allen Creek	27	Beecher Creek	24
Cedar Creek	57	Big Blue Creek	27
Crystal Creek	44	Burnt Fork Creek	23
Deep Creek	25	Butler Creek	30
Dirty Ike Creek	25	Eustache Creek	31
Donovan Creek	27	Kennedy Creek	27
Greenough Creek	25	Mattie V Creek	8
Kendall Creek	27	McCormick Creek	25
Lavelle Creek	25	St. Louis Creek	33
Mill Creek	24	Stoney Creek	29
Miller Creek	26		
Pattee Creek	15	**ST. REGIS RIVER DRAINAGE**	
Rock Creek	25	Big Creek (3 forks)	94
Roman Creek	26	Brimstone Creek	27
Second Creek	25	Deer Creek	29
Sevenmile Creek	26	Dominion Creek	27
Sixmile Creek	37	E. Twin Creek	27
Quartz Creek	28	Hanaker/Dena Mora Creek	24
Meadow Creek	28	Henderson Creek	27
Trout Creek	21	N. Fork Little Joe Creek	26
Turah Creek	15	Rainy Creek	25
Wallace Creek	26	Savenac/Cook Creek	24
West Mountain Creek	27	Twelvemile Creek	30
		Twomile Creek	27
FISH CREEK DRAINAGE		Upper main stem	27
Bear Creek	24		
Burdette Creek	27	**LOLO CREEK DRAINAGE**	
Lupine Creek	25	Mormon Creek	21
Montana/Cache Creek	41	W. Fork Lolo Creek	25
Thompson Creek	23		
Wig Creek	25	**TOTAL**	**1538**

Literature Cited

Allendorf, F.W., R.F. Leary, P. Spruell and J.K. Wenburg. 2001. The problems with hybrids: setting conservation guidelines. Trends in Ecology and Evolution 16(11): 613-622.

Rieman, B.E. and J.B. Dunham. 2000. Metapopulations and Salmonids: a synthesis of life history patterns and empirical observations. Ecology of Freshwater Fish 9:51-54.

Schmetterling, D.A. *In review.* Spatial and temporal dynamics of hybridization between rainbow and westslope cutthroat trout in the Blackfoot River drainage of Montana.

Appendix 1. Probability of detecting one percent hybridization with one to 10 diagnostic loci and sample sizes of one and 25 and in subsequent increments of five up to 50 individuals (table provided by Robb Leary, University of Montana Wild Trout and Salmon Genetics Laboratory).

Number of Fish (N)	Number of diagnostic loci									
	1	2	3	4	5	6	7	8	9	10
1	.020	.039	.059	.077	.096	.114	.131	.149	.166	.182
2	.039	.077	.114	.149	.182	.214	.245	.275	.304	.331
3	.059	.114	.166	.214	.260	.304	.344	.383	.419	.453
4	.077	.149	.214	.275	.331	.383	.430	.474	.515	.553
5	.096	.182	.260	.331	.395	.453	.505	.553	.595	.634
6	.114	.214	.304	.383	.453	.515	.590	.619	.662	.701
7	.131	.245	.344	.430	.505	.570	.627	.676	.718	.755
8	.149	.275	.383	.474	.553	.619	.676	.724	.765	.800
9	.166	.304	.419	.515	.595	.662	.718	.765	.804	.836
10	.182	.331	.453	.553	.634	.701	.755	.800	.836	.866
11	.198	.357	.485	.587	.669	.735	.787	.830	.863	.890
12	.214	.383	.515	.619	.701	.765	.815	.855	.886	.910
13	.230	.407	.543	.648	.729	.792	.840	.877	.905	.927
14	.245	.430	.570	.676	.755	.815	.861	.895	.921	.940
15	.260	.453	.595	.701	.779	.836	.879	.910	.934	.951
16	.275	.474	.619	.724	.800	.855	.895	.924	.945	.960
17	.289	.495	.641	.745	.819	.871	.909	.935	.954	.967
18	.304	.515	.662	.765	.836	.886	.921	.945	.962	.973
19	.317	.534	.682	.783	.852	.899	.931	.953	.968	.978
20	.331	.553	.701	.800	.866	.910	.940	.960	.973	.982
21	.344	.570	.718	.815	.879	.921	.948	.966	.978	.985
22	.357	.587	.735	.830	.890	.930	.955	.971	.981	.988
23	.370	.603	.750	.843	.901	.938	.961	.975	.984	.990
24	.383	.619	.765	.855	.910	.945	.966	.979	.987	.992
25	.395	.634	.799	.866	.919	.951	.970	.982	.989	.993
30	.453	.701	.836	.910	.951	.973	.985	.992	.996	.998
35	.505	.755	.879	.940	.970	.985	.993	.996	.998	.999
40	.553	.800	.910	.960	.982	.992	.996	.998	.999	1.000
45	.595	.836	.934	.973	.989	.996	.998	.999	1.000	1.000
50	.634	.866	.951	.982	.993	.998	.999	1.000	1.000	1.000

FISH SPECIES COMPOSITION AND DISTRIBUTION IN MIDDLE CLARK FORK RIVER TRIBUTARIES

Introduction

Tributaries of the middle Clark Fork River, defined as the reach from the mouth of Rock Creek to the mouth of the Flathead River, support a moderately diverse fish and amphibian community that is dominated by native and introduced salmonids. In this investigation, we completed basin-wide electrofishing surveys of tributaries to gain information on species distribution, genetic composition and population abundance.

Methods

Fish sampling surveys were conducted in tributary stream reaches throughout the middle Clark Fork River drainage. Electrofishing was completed by two or three person crews in 1999-2002 during March-October, but predominantly in July and August. We attempted to collect longitudinal samples within each drainage that represented all fish-bearing reaches. Sites were selected based on location, stream morphology and accessibility. Single pass sampling sections varied in length from 'spot shocking' used primarily to obtain a genetic sample to over 500 m where fish abundance was low. At most sites, we attempted to sample 100 m of continuous habitat in tributary streams to obtain representative samples covering multiple replicates of the major habitat types.

Sampling was completed using either a Smith Root model 12-B battery powered backpack electrofisher or a Coffelt gas powered backpack unit using direct current at appropriate settings. Fish sampled were anesthesized, identified to species (when possible), measured and returned to the stream when recovered. At most sites, *Oncorhynchus* genetic samples were taken using the methods described in the previous section of this report. We also noted the presence of amphibians at each site where they were observed. Water temperature, overall habitat conditions and any obvious habitat problems were also noted on data sheets.

Results and Discussion

More than 310 electrofishing sampling sections were completed on 102 Clark Fork River tributaries in 1999-2002. This represents approximately 90% of the fish bearing tributary reaches in the drainage. Summarized results of these surveys are presented in Tables 1-4. Table 1 includes sampling from 38 direct tributaries of the middle Clark Fork River. Tables 2-4 display results from tributaries within the 3 largest drainages in the study area; Ninemile Creek, Fish Creek and the Saint Regis River (Tables 2, 3 and 4 respectively). Fish and amphibian species composition varied significantly among streams and longitudinally within streams. Fish density was also variable, but our data only represent

an estimate because variables such as discharge, water conductivity and personnel significantly affect capture efficiency.

Survey distribution and methods were designed primarily to determine the distribution and spatial interaction of salmonid species. Specific sampling results are not reported here and more comprehensive analyses will not be completed until the remaining 10% of unsampled reaches in the drainage is finished. However, several trends are apparent with respect to salmonids in tributary sampling. Trout residing in tributaries were generally < 275 mm, indicating resident populations and juvenile migratory fish. Spawning by fluvial rainbow trout, westslope cutthroat trout, bull trout and/or brown trout has been documented in most tributaries where connectivity and upstream fish passage from the Clark Fork River is still intact. We did not encounter adult, fluvial fish due to the timing of our sampling. Fish species composition varied among tributary drainages, but native trout (westslope cutthroat trout and bull trout) generally dominated upper portions of tributary watersheds and introduced trout were more abundant in lower portions where they had gained access through historic stocking or immigration from the main stem river system. However, where habitat had been seriously altered and degraded in upper tributary streams, introduced fish (particularly brook trout) appeared to out compete native trout.

Patterns in species composition were somewhat consistent among the streams sampled. Westslope cutthroat trout are nearly ubiquitous in middle Clark Fork River tributaries. They appear to be absent only in streams with severe habitat degradation or dewatering. However, there is a range in genetic purity within and among these populations due to hybridization with rainbow trout and Yellowstone cutthroat trout (described below). Most westslope cutthroat trout we observed appeared to be resident in tributary reaches. The fluvial component of most populations has been lost due to unintentional installation of upstream fish passage barriers (i.e., transportation crossings) and efforts are underway in many tributaries to re-establish connectivity with the Clark Fork River. Similarly, fluvial bull trout populations have declined dramatically. Bull trout were only detected in six tributary drainages in our study area (see report section 2). It is believed that habitat alterations have had a tremendous impact on bull trout populations because of their strict habitat requirements and nearly obligate fluvial life history. Bull trout are also extremely vulnerable to over harvest and illegal harvest because of the timing and location of staging and spawning.

Fluvial brown trout and rainbow trout dominated portions of larger (3^{rd} and 4^{th} order) streams within 3-4 miles of the stream mouth. Other tributary systems that supported these fluvial non-native trout populations typically had warmer summer water temperatures, lower stream gradient and altered habitat than those that supported solely native trout. Some obvious hybridization between westslope cutthroat trout and rainbow trout was observed where these populations overlapped, but the degree of hybridization is believed to be determined by a number of interacting factors including stream gradient, water temperature, habitat quality and discharge. The species composition of mountain lakes also appears to be influencing community composition downstream. As with brook trout, rainbow trout and Yellowstone cutthroat trout were consistently found in upper

tributary reaches located downstream of high elevation lakes which support supporting wild populations. These lake populations were introduced by well-intending managers and fisherman in the early and mid twentieth century with the hopes of improving lake fisheries.

Oncorhynchus genetic samples were collected from >90% of streams where previous sampling had not been completed. Methods and results of these analyses are reported in the previous section of this report. Genetic testing is important for identifying where genetically pure westslope cutthroat trout populations still remain. In addition, it is helpful in confirming *Oncorhynchus* species distribution and composition as juvenile westslope cutthroat trout, Yellowstone cutthroat trout and rainbow trout are difficult to differentiate. In comparing limited genetic testing results with our identification of *Oncorhynchus*, we found that visual identification was accurate in most cases.

Brook trout were present in many first and second order stream reaches that were at lower (near Clark Fork River) elevations. Brook trout seemed to dominate in smaller streams with high groundwater activity, degraded habitat and/or lakes upstream with viable wild brook trout source populations. Brook trout appeared to decrease the density of westlope cutthroat trout where the species were sympatric and had displaced them in a few reaches. Brook trout hybridization with bull trout was also evident in two tributaries (Grant and Rattlesnake Creeks) where smaller (<400 mm) bull trout adults exist.

We found few fish species other than trout in the tributaries sampled in our survey. Sculpins (*Cottus* spp.) and mountain whitefish (*Prosopium williamsoni*) were the only other fish that was sampled routinely in tributaries. Mountain whitefish is a very abundant fluvial species that spawns in lower reaches of major tributary streams. We found abundant juveniles at sites near the mouth of several large tributaries. Sculpin distribution and abundance was not consistent , however, and further analysis of their distribution and status is warranted. Tailed frogs (*Ascaphus truei*) and spotted frogs (*Rana pretiosa*) were noted at many of the sites throughout the drainage.

Future Direction

Results presented in this report represent a cursory summary of fish sampling results in most middle Clark Fork River tributaries. When remaining reaches are sampled and remaining Oncorhynchus genetic analyses are completed, more comprehensive evaluation of these data will be undertaken. These investigations will focus on the observed trends and patterns in species distribution, genetic composition and population abundances among and within tributaries. In addition, surveys of high elevation lake fish populations and evaluation of fish passage conditions will be important for evaluation of results..

Table 1. Summary of fish sampling on Clark Fork River tributaries, 1999-2002

Stream Name	Section	Location (T,R,S)	Physical Description of Location	Date Sampled	Section Length	Species	Total # Captured	Range of Lengths (mm)	Mean Length (mm)	Sculpins Present	Tailed Frogs	Spotted Frogs	Additional Comments
Albert Cr.	1	14N,21W, 16	2nd road crossing, downstream from culvert	9/14/2000	~ 20 m	WCT	21(+50)	57-165	100				high densities of WCT
	2	14N,21W,18	Fords across stream	9/14/2000	~ 25 m	DV	9	107-248	165.9				high densities of WCT/DV. 4 fords in area, great spawning
	2	14N,21W,18	Fords across stream	9/14/2000	~ 25 m	WCT	25 (+ 100)	52-196	132.12				Dry in section 15 and 16 on 9/14
	3	14N,21W, 13	Ford across stream, up near trailhead	9/14/2000	~ 25 m	DV	2	105-111	108				Good spawning habitat/extremely high densities of WCT.
	3	14N,21W, 13	Ford across stream, up near trailhead	9/14/2000	~ 25 m	WCT	27	44-203	131.1				Several fords that should be addressed
Allen Cr.	1	12N,18W,24	Section 24ca (see map on data sheet)	8/17/2002	~200m	WCT	28	58-148	109				Good habitat, high densities of WCT
	2	12N,17W,19	~1.25 Mi. downstream of site 1	8/17/2002	~200m	WCT	13	67-153	112				
Cedar Cr.	1	16N,27W,22	~2 Mi. up from Rd. intersection	8/2/2002	~200m	WCT	22	62-232	126	X	X		
	1	16N,27W,22	~2 Mi. up from Rd. intersection	8/2/2002	~200m	DV	11	39-210	70	X	X		This site had many DV yoy, likely spawning area
	2	15N,27W,8	At Bridge Xing	8/2/2002	~200m	WCT	18	58-221	151	X	X		Primarily B4 channel in sections 2-4
	2	15N,27W,8	At Bridge Xing	8/2/2002	~200m	DV	3	42-212	150	X	X		
	3	15N,27W,8	At Bridge Xing	8/2/2002	~175m	WCT	26	67-240	135	X	X		
	3	15N,27W,8	At Bridge Xing	8/2/2002	~175m	DV	4	96-141	118	X	X		
	4	16N,27W,22	CCR mine site	8/2/2002	~175m	WCT	7	65-235	134	X	X		
	4	16N,27W,22	CCR mine site	8/2/2002	~175m	DV	13	91-197	123	X	X		
	5	16N,27W,22	~.5 Mi below forks	8/9/2002	~200m	WCT	18	78-256	131	X			
	5	16N,27W,22	~.5 Mi below forks	8/9/2002	~200m	DV	2	197-227	212	X			
	6	16N,27W,22	Bear gulch	8/9/2002	~200m	WCT	14	92-178	122	X			
	6	16N,27W,22	Bear gulch	8/9/2002	~200m	DV	2	187-203	195	X			
	6	16N,27W,22	Bear gulch	8/9/2002	~200m	MWF	1	172	172	X			
	7	16N,26W,4	~1 Mi. above I-90	8/9/2002	~150m	WCT	10	112-285	153	X			
	7	16N,26W,4	~1 Mi. above I-90	8/9/2002	~150m	DV	1	266	266	X			
	7	16N,26W,5	~1 Mi. above I-90	8/9/2002	~150m	MWF	2	89-101	95	X			
Cramer Cr.	1	12N,15,16W,35	mouth of west fork	7/21/1999	~100 m	WCT	4	95-190	133.75	X			
	1	12N,15,16W,35	mouth of west fork	7/21/1999	~ 100 m	EBT	23	60-230	111.3	X			Spoon 1980 found no EBT above mining, EBT are now in upper sections
	2	12N,15/16W, 30	above tailings in section 30	7/21/1999	~ 100 m	WCT	13	125-220	172.8	X			
	2	12N,15/16W, 30	above tailings in section 30	7/21/1999	~ 100 m	EBT	14	60-210	157.5	X			
	3	12N,15/16W,20	lower section of 20	7/21/1999	~ 100 m	WCT	13	62-185	115.2	X			
	3	12N,15/16W,20	lower section of 20	7/21/1999	~ 100 m	EBT	13	55-185	125.4	X			
	4	12N,15/16W,20	upper section of 20	7/21/1999	~ 100 m	WCT	26	70-175	117.9	X			EBT now in upper sections, Spoon found none up there in 1980
	4	12N,15/16W,20	upper section of 20	7/21/1999	~ 100 m	EBT	8	105-150	128.1	X			WCT abundant
Crystal Cr.	1	12N,18W,11	Plum Cr., middle of sec. 11	9/15/2000	> 100 m	WCT	38	48-210	128			X	
	1	12N,18W,11	Plum Cr., middle of sec. 11	9/15/2000	> 100 m	EBT	18	53-205	106			X	Diversion needs to be screened. Stream dry below perched culvert.
	2	12N,18W,9-10	Boarder of sec 9-10. PC/FS land	7/24/2002	~200m	WCT	20	50-168	100			X	Stream dry below perched culvert near mouth
	2	12N,18W,9-10	Boarder of sec 9-10. PC/FS land	7/24/2002	~200m	EBT	2	125-152	138			X	Good LWD
	3	12N,18W,10	Just above private land	7/24/2002	~200m	WCT	8	75-205	134			X	
	3	12N,18W,10	Just above private land	7/24/2002	~200m	EBT	10	75-165	85			X	
Deep Cr. (msla)	1	13N,21W,7	Gilman creek, plum creek land upstream of old bridge	9/12/2000	spot	WCT	32	40-240	115.3				
	2	13N,21W, 5	Deep creek crossing, plum creek land	9/12/2000	spot	WCT	28, + 20 add	50-250	102.25				Extremely high densities of WCT, section 7 road crossing, bridge
	3	13N,21W,8	Deep Creek crossing, private section 8	9/12/2000	spot	WCT	10	50-125	70.3				high densities of WCT throughout, culvert crossings sections 5,7,8 look OK
													No water from section 4 downstream-no fish
Deep Cr. (superior)	1	16N,25W, 34	Forest Service, lower boundary	5/22/2000	~ 30 m	No fish	0	0	0		X		high flows, extremely low efficiencies
	2	16N,25W, 26	Stream crossing w/in forest service boundary	5/22/2000	~ 30 m	No fish	0	0	0		X		Dry in lower sections in late summer
	3	16N,25W,25	Fork in road, deep. Mouth of north fork eddy creek	5/22/2000	160 meters	WCT	13	46-126	89.5		X		
	4	16N,25W,30	Road crossing section 30	5/22/2000	145 meters	WCT	12	72-164	102.6		X		
Deer Cr. (E of Msla)	1	12N,18W,6	0.5 miles below forks	7/9/1999	~ 60 m	WCT	22	57-182	107.7		X		
	2	12N,18W,6	0.5 miles below forks	7/9/1999	~ 50 m	WCT	39	62-188	114.2		X		Excellent habitat, simgle pass, 5 tailed frogs
	3	12N,18W,28	County road crossing, upstream	7/9/1999	~ 30 m	WCT	40	73-225	114.9		X		Excellent habitat, single pass, 5 tailed frogs, 1 ripe male
													county road upstream, 1 ripe male
Dirty Ike Cr.	1	12N,17W,15	~1 Mi up Dirty Ike Cr. Rd. (unmarked)	8/8/2002	~200m	WCT	18	59-191	103				
	2	12N,17W,15	Rd. xing ~1.25 Mi upstream of site 1	8/8/2002	~200m	WCT	10	65-207	132				Spot shocking. Very dense veg, Low fish densities.
													Dewaters above sec. 15 in upper reaches
Donovan Cr.	1	12N,17W,8	Access private land (Halverson). 5715 Donovan Cr. Rd	8/12/2002	~150m	WCT	17	76-357	161		X		
	1	12N,17W,8	Access private land (Halverson). 5715 Donovan Cr. Rd	8/12/2002	~150m	EBT	8	59-200	144		X		Private land in sec. 1 contains numerous diversions and "pools"
	2	12N,17W,8	Pine Tree Ln. 6670- Private	8/12/2002	~125m	WCT	13	73-217	127		X		
	2	12N,17W,8	Pine Tree Ln. 6670- Private	8/12/2002	~125m	EBT	17	46-221	120		X		
	3	12N,17W,8	1.3 miles above frontage rd	8/25/2000	> 100 m	WCT	23	40-255	135		X		
	3	12N,17W,8	1.3 miles above frontage rd	8/25/2000	> 100 m	EBT	25	60-220	111		X		Mostly riffle habitat, no riparian vegetation
	4	12N,17W,8	6245 Pine Cone Dr.	8/25/2000	> 100 m	WCT	25	45-250	121		X		
	4	12N,17W,8	6245 Pine Cone Dr.	8/25/2000	> 100 m	EBT	15	50-220	123		X		Good habitat, good riparian vegetation

Table 1. Summary of fish sampling on Clark Fork River tributaries, 1999-2002 (cont)

Stream Name	Section	Location (T,R,S)	Physical Description of Location	Date Sampled	Section Length	Species	Total # Captured	Range of Lengths (mm)	Mean Length (mm)	Sculpins Present	Tailed Frogs	Spotted Frogs	Additional Comments
Dry Creek	1	17N,27W,28	FS road crossing, upstream of bridge	7/25/2000	~ 150 m	LL	10	95-265	201.9	X			abundant brown trout, mod. Sculpins, densities low overall
	1	17N,27W,28	FS road crossing, upstream of bridge	7/25/2000	~ 150 m	WCT/HYB	8	72-245	164.3	X			subdivision in section 27, mouth of Dry fork dry,
	1	17N,27W,28	FS road crossing, upstream of bridge	7/25/2000	~ 150 m	EBT	2	132-140	136	X			culvert at Ann Arbor gulch perched
	2	17N,27W, 31	Mouth of wilson gulch	7/25/2000	~ 125 m	LL	12	84-294	210	X			
	2	17N,27W, 31	Mouth of wilson gulch	7/25/2000	~ 125 m	WCT	23	85-217	165.3	X			
	2	17N,27W, 31	Mouth of wilson gulch	7/25/2000	~ 125 m	EBT	2	102-174	138	X			
	3	17N,27W,3	Ann Arbor upstream of culvert barrier	7/25/2000	~ 30 m	WCT	7	90-153	115	X			
	4	17N,27W,3	Mainstem dry, ann arbor mouth	7/25/2000	~ 100 m	WCT	9	101-233	152	X			
	4	17N,27W,3	Mainstem dry, ann arbor mouth	7/25/2000	~ 100 m	EBT	2	141-222	101.5	X			
	5	17N,27W,4	upstream of culvert on 4th of July gulch	7/25/2000	~ 40 m	WCT	8	52-150	112.9	X			
	6	17N,27W,9	Torino Creek, tributary	7/25/2000	~ 75 m	EBT	11	79-170	125.4	X			
	7	17N,27W,4	Torino Creek, downstream of culvert	7/25/2000	spot	WCT	8	76-222	160.8	X			
	7	17N,27W,4	Torino Creek, downstream of culvert	7/25/2000	spot	EBT	3	113-158	136.3	X			
	8	17N,27W,27,34	Dry creek, 0.5 miles upstream, trailhead	7/25/2000	> 100 m	WCT/YCT	13	85-203	135	X			
First Creek	1	16N,25W,10	Crossing in section 10,	8/30/1999	~ 100 m	WCT	12	77-180	114.5				
	2	16N,25W,9,10	0 25 miles downstream of powerlines	5/24/2000	~ 150 m	WCT	2	155-162	158.5				low shocking efficiency and low densities
	3	16N,25W,2,3	up overgrown spur road just after crossing in section 10	5/24/2000	> 200 m	WCT	12	122-186	140.8				
Grant Creek	1	13N,19W,5	Expo Pky bridge upstream approx. 95m (large log jam)	7/7/2001	> 100 m	WCT	16	72-272	187.8				
	1	13N,19W,5	Expo Pky bridge upstream approx. 95m (large log jam)	7/7/2001	> 100m	EBT	17	52-248	137.1				High density and high condition factor on all fish
	2	13N,19W,5	Downstream 50m from I-90 culvert	7/7/2001	50 m	WCT	27	77-255	158				Low efficiency electrofishing, many YOY of mixed species
	2	13N,19W,5	Downstream 50m from I-90 culvert	7/7/2001	50 m	EBT	17	120-265	167.6				
	3	13N,19W,13	Mullan Rd. Crossing upstream 50m	7/7/2001	50 m	NPM/SCL	1 each	70/55					
	4	13N,19W,5	Broadway St. crossing, above and below culvert	7/7/2001	~200m	WCT	5	100-210	132	X			Intermittent section, Ditch-like
	4	13N,19W,5	Broadway St. crossing, above and below culvert	7/7/2001	~200m	LL	1	160	160	X			DV observed jumping into culvert
	5	14N,19W,32	Irrigation headgate up through bird sanctuary	7/25/2001	~150m	WCT	28	83-255	149.6	X			
	5	14N,19W,32	Irrigation headgate up through bird sanctuary	7/25/2001	~150m	EBT	25	45-200	138.2	X			High fish densities,burn marks, high fish condition
	6	14N,19W,21	Road 698 Bridge, Snowbowl Rd.	7/25/2001	~100m	WCT	11	98-182	126	X			
	6	14N,19W,21	Road 698 Bridge, Snowbowl Rd.	7/25/2001	~100m	EBT	2	204-230	217	X			
	6	14N,19W,21	Road 698 Bridge, Snowbowl Rd.	7/25/2001	~100m	DV	2	230-270	250	X			
	7	14N,19W,15	150m upstream of bridge on Road	7/25/2001	~150m	WCT	22	65-241	148	X			Both presumed hybrids
	7	14N,19W,15	150m upstream of bridge on Road	7/25/2001	~150m	DV	6	152-212	195.6	X			
	8	14N,19W,10	Approx. 500m Upstream of Dexter Roberts' house	7/25/2001	> 50 m	WCT	15	98-230	156.8	X			One presumed hybrid
	8	14N,19W,10	Approx. 500m Upstream of Dexter Roberts' house	7/25/2001	> 50 m	DV	7	151-226	178.2	X			Excellent habitat. WCT and DV only
	9	15N,19W,35	~ 3.5 miles upstream of Dexter's house, waterfall	7/25/2001	> 50 m	WCT	11	97-210	145	X			
Greenough Creek	1	12N,17W,30	Road crossing, upstream of culvert, USFS	9/15/2000	50 m	WCT	21	46-170	106.2				Waterfall appraaently natural barrier
	2	12N,17W,25	Road crossing section 25, USFS	9/15/2000	50 m	WCT	12	85-190	123.75				Section 1 culvert a selective barrier, velocity
Johnson Creek	1	17N,25W,36	Bottom of section 36, road crossing	8/30/1999	> 100 m	No fish	0	0	0				
	2	17N,25W,36	Top of section 36, road crossing	8/30/1999	~ 80 m	WCT	15	75-230	124.5		X		145 seconds of shocking time
	3	17N,25W,30	Road crossing in section 30	8/30/1999	~ 50 m	WCT	10	75-180	122.8		X		site 2 243 seconds of shocking time
	4	17N,25W,26	Section 20, road crossing	8/30/1999	~ 20 m	WCT	10	88-231	160.3		X		site 3 197 seconds of shocking time. culvert perched, needs baffles
Kendall Cr.	1	12N,17W,8	Past Plum Cr. Gate ~300m -Highest point before Rd. leaves Cr	8/20/2002	~150m	WCT	29	60-154	94		X	X	132 seconds of shocking time. Culvert misaligned, needs baffles.
	2	12N,17W,5	Private land-~125m below Rd. Xing to Xing	8/20/2002	~150m	WCT	43	68-200	113		X	X	Possible barriers in both sections from Rd. Xings.
	2	12N,17W,5	Private land-~125m below Rd. Xing to Xing	8/20/2002	~150m	RBT	1	145	145		X	X	High fish densities in both sections
Marshall Creek	1	13N,18W,6	Above pond at Moye's place	7/6/1999	~22m	WCT	23	77-185	117.2				Hybridization suspected
	2	13N, 18W,7	50 yds. Below pond	7/6/1999	~30m	WCT	21	90-205	129.1				
	3	13N,18W,7	Just below Rd. 2122 junction	7/6/1999	> 30 m	WCT	25	85-200	108.8				
	4	13N,18W,7	Pump station approx. .5 mile from mouth	7/6/1999	~30m	WCT	8	75-125					
Meadow Cr.	1	15N,26W,24	Up locked FS gate off Rd. By abandoned mine	7/29/2002	~200m	WCT	10	98-182	141		X		Road infringing on stream in several lower sections
	2	15N,26W,26	~.5 Mi above site 1	7/29/2002	~200m	WCT	21	55-151	97		X		stream dewatered in lower reaches
Mill Creek	1	15N, 20W, 36	down 150 meters from large culvert (spring hill road)	7/26/2000	~ 150 m	RBT	11	105-246	143.3				Better habitat above mine in sec. 2
	1	15N, 20W, 36	down 150 meters from large culvert (spring hill road)	7/26/2000	~ 150 m	LL	27	46-385	183.7				culvert barrier at all flows. High densities of brown trout. No genetics
	2	15N,20W, 18	near mouth of cottonwood gulch	7/26/2000	~ 50 m	LL	19	106-286	179.2				
	2	15N,20W, 18	near mouth of cottonwood gulch	7/26/2000	~ 50 m	EBT	6	122-213	172				High gradient, plunge-pool High densities brown trout, moderate EBT.
	3	15N,20W, 6	mouth of Bear cr. up to culvert under bear creek road	7/26/2000	~ 100 m	WCT	12	75-147	116.6				
	3	15N,20W, 6	mouth of Bear cr. up to culvert under bear creek road	7/26/2000	~ 100 m	EBT	17	101-194	138.9				moderate densities of WCT, high densities EBT, low gradient. Cattle in cree
	4	15N,20W, 36	bear creek, 1st culvert on spur road, upstream of culvert	7/26/2000	~ 100 m	EBT	28	78-180	140.5				Upstream is hosed from grazing
	5	15N,20W,25	2nd road crossing, bear creek	9/11/2000	~ 75 m	WCT	7	62-192	118.7				EBT dominated, low gradient. Cattle, no WCT.
	5	15N,20W,25	2nd road crossing, bear creek	9/11/2000	~ 75 m	EBT	40(+ 30)	50-210	129.5				upstream of 2nd road crossing on Bear creek, very high densities of EBT
	6	15N,20W,6	upstream of bear cr. culvert on mill creek	9/11/2000	spot	WCT	7	77-212	106.6				

Table 1. Summary of fish sampling on Clark Fork River tributaries, 1999-2002 (cont)

Stream Name	Section	Location (T,R,S)	Physical Description of Location	Date Sampled	Section Length	Species	Total # Captured	Range of Lengths (mm)	Mean Length (mm)	Sculpins Present	Tailed Frogs	Spotted Frogs	Additional Comments
Nemote Creek	1	15N,24W,13,14	Miller creek crossing	9/29/1999	> 50 m	WCT	32(+ 21)	45-195	95				high densities of WCT, approx. 200 seconds
	2	15N,24W,17	Mainstem crossing, section 17	9/29/1999	> 50 m	WCT	3	57-72	65.7				channel blown out, dry upstream, low densities. Approx. 350 sec
	3	15N,24W,21	South fork, plum creek land	9/29/1999	> 50 m	WCT	23	47-175	119.8				shocked at crossing down, only 1 fish likely dries up. Approx. 200 sec
	4	15N,24W,15	USFS land section 15	9/29/1999	> 50 m	WCT	9	135-195	160				grazing impacts in entire section, low fish densities. Approx. 374 sec.
	5	15N,24W,19	0.25 miles up from road crossing, south fork	9/11/2000	spot	WCT	14	45-175	108.9				extremely high densities of WCT
	6	15N,24W,16	sheridan creek road crossing, down culvert	9/11/2000	spot	WCT	16	40-170	114.5				high densities of WCT
Pattee Cr	1	12N,18W,4	Site is located off Takima St. and Pattee canyon St. intersection	4/24/2002	200 m	WCT	10	113-228	138				
	2	12N,19W,2	Located under culvert @ intersection of Pattee and Lupine Dr.	4/24/2002	~ 70 m	WCT	8	70-180	130				
Petty Creek	1	13N,23W,36	South fork, first road crossing	8/5/1999	> 50 m	WCT	6	121-210	160.3	X	X		
	1	13N,23W,36	South fork, first road crossing	8/5/1999	> 50 m	EBT	22	51-195	126.9	X	X		
	2	13N,22W,31	east fork	8/5/1999	~100m	WCT	6	70-210	142.5	X	X		
	2	13N,22W,31	east fork	8/5/1999	~100m	EBT	34	45-235	129	X	X		> 20 young of the year EBT
	3	13N,22W,30	Mainstem, just downstream of Mike Creek	8/5/1999	> 50 m	WCT	16	64--270	181.6	X	X		1 hybrid
	3	13N,22W,30	Mainstem, just downstream of Mike Creek	8/5/1999	> 50 m	EBT	16 +12 yoy	105-225	134.8	X	X		
	4	13N,22W,30	Mouth of Mike Creek	8/5/1999	> 50 m	WCT	8	66-228	198	X	X		
	4	13N,22W,30	Mouth of Mike Creek	8/5/1999	> 50 m	EBT	4 +3 yoy	46-245	170.7	X	X		
	5	14N,23W,27	West fork	8/5/1999	> 50 m	WCT	5	104-137	117	X	X		numerous EBT and Tailed frogs
	6	14N,23W,36	Mainstem	8/5/1999	> 50 m	WCT	16	104-315	180.6	X	X		one hybrid
	6	14N,23W,36	Mainstem	8/5/1999	> 50 m	EBT	10	60-215	140.3	X	X		
	6	14N,23W,36	Mainstem	8/5/1999	> 50 m	DV	1	70	70	X	X		
	7	14N, 22W,30	Mainstem	8/5/1999	> 50 m	WCT	28	69-295	148.3	X	X		5 hybrids
	7	14N, 22W,30	Mainstem	8/5/1999	> 50 m	RBT	1	231	231	X	X		
	7	14N, 22W,30	Mainstem	8/5/1999	> 50 m	EBT	13	58-215	135	X	X		
Quartz Cr.	2	14N,26W,3	Where Rd. intersects Cr.	7/30/2002	~200m	WCT	6	81-227	146		X		
	3	14N,26W,2	1 Mi. below site 2	7/30/2002	~150m	WCT	17	84-226	147		X		
	4	15N,25W,32	2.5 Mi. below site 3	7/30/2002	~150m	WCT	8	83-165	111		X		
Rattlesnake Cr	1	14N,18W,11	Upper mainstem crossing	9/23/1999	~120m	WCT	12	107-255	194.9	X	X		Low shocking efficiency
	1	14N,18W,11	Upper mainstem crossing	9/23/1999	~120m	EBT	9	110-220	146.3	X	X		
	1	14N,18W,11	Upper mainstem crossing	9/23/1999	~120m	DV	1	201	201	X	X		
	2	14N,18W,15	Just above Beescove Cr.	9/23/1999	~120m	WCT	15	90-256	151.3	X	X		
	2	14N,18W,15	Just above Beescove Cr.	9/23/1999	~120m	EBT	34	157-230	122.2	X	X		
	2	14N,18W,15	Just above Beescove Cr.	9/23/1999	~120m	DV	20	65-285	144.6	X	X		2 hybrid DV included
	3	14N,18W,21	Between Beescove Cr. and Pilcher Cr.	9/23/1999	> 100 m	WCT	18	82-178	120.8	X	X		2-3 DV Redds observed
	3	14N,18W,21	Between Beescove Cr. and Pilcher Cr.	9/23/1999	> 100 m	DV	7	78--320	153.4	X	X		
	3	14N,18W,21	Between Beescove Cr. and Pilcher Cr.	9/23/1999	> 100 m	EBT	36	60-222	114.9	X	X		
	4	14N,18W,20	Between Beescove Cr. and Pilcher Cr.	9/23/1999	Spot	WCT	10	95-212	130	X	X		Not species composition, only DV and WCT saved
	4	14N,18W,20	Between Beescove Cr. and Pilcher Cr.	9/23/1999	Spot	DV	6	66-415	198.1	X	X		
	4	14N,18W,20	Between Beescove Cr. and Pilcher Cr.	9/23/1999	Spot	LL	1	142	142	X	X		
	5	13N,19W,2	Just upstream of Rattlesnake dam	7/3/2002	Spot	WCT	25	59-164	104	X	X		Most WCT looked hybridized
	5	13N,19W,2	Just upstream of Rattlesnake dam	7/3/2002	Spot	DV	3	59-111	91	X	X		
	5	13N,19W,2	Just upstream of Rattlesnake dam	7/3/2002	Spot	EBT	1	108	108	X	X		
Rock Creek (Msla)	1	14N,21W,18	old crossing	9/14/2000	~ 100 m	WCT	23	40-182	115.2				Extremely high densities of WCT
	2	14N,21W,19	old stream crossing, now just a trail	9/14/2000	~ 70 m	WCT	15	99-191	132.6				Extremely high densities of WCT. Stream very overgrown w/ vegetation
	3	14N,21W,30/25	Forest Service boundary. Upstream of crossing, culvert	9/14/2000	~ 70 m	WCT	21	66-166	113.4				High densities of WCT, lots of wood. Dry in sections 20, 21, 22 on 9/14
Rock Creek (near Fish Cr.)	1	15N,25W,11	Lower road crossing	7/23/1999	~ 60 m	No fish	0	0	0		X		channel dry in upper half sect 11, reappeared at lowest road Xing sect 1
	2	15N,25W,15	Plum Creek Bridge	7/23/1999	~ 50 m	WCT	8	62-202	130.6		X		230 second of shocking time, 52 degrees F
	3	15N,25W,16	Road crossing, section 16	7/23/1999	~ 75 m	WCT	10	52-150	102.8		X		shocking time 373 seconds.
	4	15N,25W,11	Chicken Creek	7/23/1999	Spot shocked	WCT	7	35-130	57.9		X		tributary to lower chicken creek
Roman Cr.	1	15N,21W,15	Site begins upstream of culvert @ locked gate. (FS 16311)	8/6/2002	~200m	WCT	23	56-198	117		X		no fish in 150 m located 0.75 mile upstream of site 1
	2	15N,21W,21	~150m below culvert	8/6/2002	~150m	WCT	12	61-185	101		X		
Second Creek	1	16N,24W, 14	1.9 miles up road #283, second creek road	5/24/2000	~ 100 m	WCT	11	98-186	131		X		
	2	16N, 24W, 13	Down from culvert, 2.1 miles up from forks	6/1/2000	~180 m	WCT	10	89-182	123.9		X		culvert at forks is crushed and blocked at the inlet, bad alignment
	3	16N,24W, 24,25	Downsteam of culvert at forks	6/1/2000	~ 300 m	WCT	1	212	212		X		Forest service notified
Seven Mile Cr.	1	19N,27W,34	Thinglestad's, Private	5/2/2002	~100m	WCT	14	75-164	109		X		High water condition, low shocking efficiency
	2	19N,27W,27	USFS land	5/2/2002	~300m	WCT	12	43-133	91		X		
Siegel Cr.	1	18N,25W,36	spot shocked ~ 300 m up to Rd. Xing	6/20/2000	~ 300 m	WCT	20	45-240	120				Sections 35,21 dry, upper culvert a barrier - spawners stacked below
Sixmile Cr.	1	15N,21W,7	.5 Mi. from end of Rd. Reach begins at tree fort on river Left	8/5/2002	~200m	WCT	18	55-175	117		X		Good habitat
	1	15N,21W,7	.5 Mi. from end of Rd. Reach begins at tree fort on river Left	8/5/2002	~200m	EBT	1	152	152		X		
	2	15N,22W,12	~1 Mi. downstream of sec.1 by intersection of Rd.	8/5/2002	~200m	WCT	16	93-154	116		X		
	2	15N,22W,12	~1 Mi. downstream of sec.1 by intersection of Rd.	8/5/2002	~200m	EBT	14	79-201	126		X		
	3	15N,22W,14	19755; Six mile Rd., ~200 below bridge	8/5/2002	~200m	WCT	14	77-164	114		X		
	3	15N,22W,14	19755; Six mile Rd., ~200 below bridge	8/5/2002	~200m	EBT	~40	NA	NA		X		
	3	15N,22W,14	19755; Six mile Rd., ~200 below bridge	8/5/2002	~200m	RBT	4	65-104	83		X		
	3	15N,22W,14	19755; Six mile Rd., ~200 below bridge	8/5/2002	~200m	LL	1	152	152		X		

Table 1. Summary of fish sampling on Clark Fork River tributaries, 1999-2002 (cont)

Stream Name	Section	Location (T,R,S)	Physical Description of Location	Date Sampled	Section Length	Species	Total # Captured	Range of Lengths (mm)	Mean Length (mm)	Sculpins Present	Tailed Frogs	Spotted Frogs Frogs	Additional Comments
Slowey Gulch	1	18N,26W,30	Junction of Slowey Gulch Rd. and Fourmile Rd.	7/16/2002	~200m	WCT	14	45-163	102		X		
	2	18N,26W,30	~.3 Mi up Slowey Gulch Rd. Start above culvert	7/16/2002	~175m	WCT	15	59-115	88		X		Stream dry below Little Pittsburg mine
	3	18N,26W,20	1.2 Mi up Slowey Rd. from site 2. Start where creek crosses Rd	7/16/2002	~150m	No fish	NA	NA	NA		X		
	4	18N,26W,36	Just below mine	7/16/2002	~150m	WCT	15	102-152	123		X		
Swartz Creek	1	11N, 18W,5	Just above mouth on west fork	7/6/1999	~55 m	WCT	16	52-173	95.13		X		18 tailed frogs sampled
	1	11N, 18W,5	Just above mouth on west fork	7/6/1999	~55 m	EBT	6	95-234	132.3		X		
	2	11N,18W,5	100 yards upstream of west fork	7/6/1999	~ 125 m	WCT	14	55-206	125.3		X		high water and very low efficiency, abundant tailed frogs
	2	11N,18W,5	100 yards upstream of west fork	7/6/1999	~ 125 m	EBT	20	90-225	133.8		X		
	3	11N,18W, 8	mouth of the middle fork	7/6/1999	~ 50 m	WCT	17	60-135	93.7	X	X		
	3	11N,18W, 8	mouth of the middle fork	7/6/1999	~ 50 m	EBT	2	87(2)	87	X	X		culvert looks good
	4	11N,18W,4	upper road crossing at section 18	7/6/1999	~ 30 m	WCT	13	55-190	115	X	X		
	4	11N,18W,4	upper road crossing at section 18	7/6/1999	~ 30 m	EBT	6	83-160	121.3	X	X		
	5	11N,18W,18	upstream of handley's bridge	7/6/1999	> 50 m	WCT	6	100-275	200	X	X		Brown trout had white/black fin margins
	5	11N,18W,18	upstream of handley's bridge	7/6/1999	> 50 m	EBT	20	90-200	137.5	X	X		
	5	11N,18W,18	upstream of handley's bridge	7/6/1999	> 50 m	LL	13	90-300	221.2	X	X		
Tamarack Creek													
	1	18N,27W,8&9	1/4 mile upstream from HWY 135, rip-rap d.stream of cattleguar	9/20/1999	~114m	EBT	88	55-246	107.1				unstable banks from livestock, LWD recruitement good
	2	19N,27W,32	Across from Long Gulch sign upstream from elec. Fence	9/20/1999	~105m	WCT	10	57-183	103.3		X	X	"Hosed" from livestock, banks degraded, perched culvert, High sediment
	3	19N,27W,19	1mi. Up FSRd.1194 from FSRd.284. Shocked u.stream of culve	9/20/1999	~87m	WCT	36	47-196	106.1		X	X	almost a perched culvert
	4	19N,28W,25	6 mile marker on F.S. Rd. 284	9/20/1999	~76m	WCT	47	55-220	101.3				Good LWD recruitment
Trout Creek	1	16N,25W,23	Just above private land, mainstem	8/4/2000	~ 90 m	MWF	15+	88-118	95.6	X			high MWF densities, high sculpin populations
	1	16N,25W,23	Just above private land, mainstem	8/4/2000	~ 90 m	LL	2	222-228	225	X			
	1	16N,25W,23	Just above private land, mainstem	8/4/2000	~ 90 m	EBT	7	20-200	113.9	X			
	1	16N,25W,23	Just above private land, mainstem	8/4/2000	~ 90 m	RBT	18	93-225	141.7	X			
	1	16N,25W,23	Just above private land, mainstem	8/4/2000	~ 90 m	WCT	2	130-140	135	X			
	2	16N,25W,5	Van Ness creek mouth	8/4/2000	~ 90 m	WCT	5	86-250	181.8	X			Inefficient shocking, 56 degrees F
	2	16N,25W,5	Van Ness creek mouth	8/4/2000	~ 90 m	RBT	3	132-177	161.3	X			Crossing dual culvert, partial barrier
	2	16N,25W,5	Van Ness creek mouth	8/4/2000	~ 90 m	RBxCT	2	184-193	188.5	X			
	2	16N,25W,5	Van Ness creek mouth	8/4/2000	~ 90 m	EBT	5	106-176	139.2	X			
	2	16N,25W,5	Van Ness creek mouth	8/4/2000	~ 90 m	MWF	1	111	111	X			
	3	16N,25W,19	Windfall creek, crossing bridge	8/4/2000	~ 75 m	WCT	12	107-191	141.8	X			1 spotted frog, crossing is a bridge, old mining claim
	4	16N,25W,24	road crossing mainstem, section 24	8/4/2000	~ 90 m	WCT	6	80-270	170	X			very low efficiencies, high sculpin population
	4	16N,25W,24	road crossing mainstem, section 24	8/4/2000	~ 90 m	RBxCT	2	140-158	149	X			
	4	16N,25W,24	road crossing mainstem, section 24	8/4/2000	~ 90 m	EBT	2	140-156	148	X			
	5	16N,25W,8/17	Hoodoo Creek, trout creek road crossing	9/17/2000	~ 150 m	EBT	29	52-165	118.7	X			high density EBT low gradient, meadow ~150 YOY EBT
	6	16N,25W,9	Hoodoo Creek crossing	9/17/2000	~ 100 m	EBT	24	46-203	126.4	X			high gradient, abundant EBT, culvert both velocity and perched barrier
	7	16N,25W,11	Road crossing south fork trout creek	9/17/2000	~ 150 m	EBT	16	135-220	181.1	X			approx. 75 yoy's
	7	16N,25W,11	Road crossing south fork trout creek	9/17/2000	~ 150 m	YCT	5	203-222	211.6	X			EBT abundant, WCT rare, all resembled yellowstone, ~same age class
	8	16N,25W,10	Tributary from Hoodoo Lake	9/17/2000	~ 30 m	EBT	12	91-170	131.2	X			EBT moderate. High gradient, culvert misaligned , perched 6"
	9	16N,25W,4	North Fork Trout Creek	9/17/2000	~ 100 m	EBT	18	84-210	139.5	X			EBT abundant, high gradient, should have WCT. Crossings are bridges
	10	16N,25W,33	1.0 upstream on North Fork from crossing	9/17/2000	~ 60 m	EBT	9	95-170	133.8	X			low density of fish, high gradient
Turah Cr.	1	13N,18W,2	50m below interstate 90	5/9/1999	Spot shock	WCT	2	143-165	102		X		
	1	13N,18W,2	50m below interstate 90	5/9/1999	Spot shock	EBT	8	85-170	133		X		
	2	13N,18W,2	30m above interstate 90	5/9/1999	Spot shock	WCT	1	105	105		X		
	2	13N,18W,2	30m above interstate 90	5/9/1999	Spot shock	EBT	33	65-162	109		X		
	3	13N,18W,2	.25mi above I-90	5/9/1999	Spot shock	WCT	6	62-127	87		X		Section 3 has large pond and irrigation diversions (Burton Property)
	3	13N,18W,2	.25mi above I-90	5/9/1999	Spot shock	EBT	7	85-140	103		X		
	4	13N,18W,36	Above Dr. Burton's property	9/25/2002	Spot shock	WCT	5	96-190	165		X		
	4	13N,18W,36	Above Dr. Burton's property	9/25/2002	Spot shock	EBT	6	52-135	101		X		
Wallace Cr.	1	12N,16W,19	Reach starts where wallace cr. Rd. forks	8/8/2002	~200m	No fish	NA	NA	NA		X		NA
	2	12N,17W,24	Reach starts ~200m Below dam	8/8/2002	~200m	WCT	24	39-172	90		X		No fish present above old dam
	3	12N,17W,24	~1.5 Mi up Wallace Cr. Rd. (Private)	8/8/2002	~200m	MWF	7	NA	NA		X		Lower reaches hosed, dewatered
	4	12N,17W,24	~1mi above site 3 (private)	8/8/2002	~200m	WCT	11	81-138	107		X		
West Mountain C	1	15N,23W,20	Shour Property; Access last house on W. Mtn. Rd.	8/5/2002	~200m	WCT	28	68-184	109				Good habitat, Creek subs out in bottom half of sec. 20
	2	15N,23W 29	~200m above culvert on Rd. Xing	8/5/2002	~150m	WCT	35	42-197	96				Possible barrier between W. Mtn. Rd culvert and I-90 culvert

Table 2. Summary of fish sampling in Ninemile Creek drainage 2001-2002

Stream Name	Section	Location (T,R,S)	Physical Description of Location	Date Sampled	Section Length	Species	Total # captured	Range of Lengths	Mean Length	Sculpins Present	Tailed Frogs	Spotted Frogs	Additional Comments
Barrette Cr.	1	16N,23W,20	Rd 5520 xing	08/19/01	~ 100m	EBT	8	79-106mm	90mm				Fairly good habitat, section 20. Need upper site, hike in site.
	1	16N,23W,20	Rd 5520 xing	08/19/01	~ 100m	RBT	6	71-182mm	103mm				
	1	16N,23W,20	Rd 5520 xing	08/19/01	~ 100m	LL	3	81-109mm	96mm				
Beecher Cr.	1	17N,23W,16	Lowest Rd. xing (9 mile rd)	08/23/01	~ 100m	WCT	9	76-141mm	103mm	X			Good crossing, bridge. Many YOY's mixed sps. Moderate densities of fish. Pats Creek dry.
	1	17N,23W,16	Lowest Rd. xing (9 mile rd)	08/23/01	~ 100m	EBT	8	40-210mm	131mm	X			
	2	17N,23W,9	West Fk. Beecher Cr. foothills xing	08/23/01	~ 100m	WCT	9	62-156mm	104mm	X			culvert is a selective barrier, perched 6"(undersized). High densities of
	2	17N,23W,9	West Fk. Beecher Cr. foothills xing	08/23/01	~ 100m	EBT	23	52-175mm	131mm	X			EBT, moderate densities of WCT.
	3	17N,23W,10	East Fork of Beecher, foothills xing	08/20/01	~ 100m	WCT	8	57-126mm	89mm	X			crossing high amount of siddecast, WCT only above culvert.
Big Blue Cr.	1	17N,23W,30	Upper most Rd. xing 5498	09/18/01	~ 100m	WCT	4	75-155mm	114mm				Low fish densiteis, new bridge crossing. Water clarity still unclear
	1	17N,23W,30	Upper most Rd. xing 5498	09/18/01	~ 100m	EBT	4	89-175mm	111mm				because of culvert replacement.
	2	17N,23W,30	Lowest Rd. xing (9 mile rd)	09/18/01	~ 100m	RBT	4	87-137mm	93mm				Low gradient. Low fish densities, all non-natives.
	2	17N,23W,30	Lowest Rd. xing (9 mile rd)	09/18/01	~ 100m	LL	3	95-139mm	114mm				
	2	17N,23W,30	Lowest Rd. xing (9 mile rd)	09/18/01	~ 100m	EBT	7	87-210mm	131mm				
	1	17N,23W,19	Foothills Rd. 5498 to Xing.	08/21/02	~150m	WCT	21	56-174mm	111mm				Good habitat.
	1	17N,23W,19	Foothills Rd. 5498 to Xing.	08/21/02	~150m	EBT	18	46-175mm	122mm				High EBT populations
	2	17N,24W,25	Down ~1mi from site 1.Hike down from Rd	08/21/02	~175m	WCT	12	66-158mm	89mm				
	2	17N,24W,25	Down ~1mi from site 1.Hike down from Rd	08/21/02	~175m	EBT	16	76-173mm	103mm				
Bird Cr.	1	16N,23W,11	Xing of Rd 5520, section 11	08/18/01	~ 100m	RBT	8	71-135mm	95mm				Fair habitat. Culvert looks ok. Possible selective barrier, lower section of
	1	16N,23W,11	Xing of Rd 5520, section 11	08/18/01	~ 100m	EBT	9	57-126mm	94mm				bird PRIVATE
	1	16N,23W,11	Rd. 5520 Xing. Upstream of culvert	09/03/02	~150m	WCT	10	86-170mm	121mm				Low fish densities, good looking habitat, culvert a barrier
	1	16N,23W,11	Rd. 5520 Xing. Upstream of culvert	09/03/02	~150m	EBT	4	92-145mm	109mm				
Burnt Fork Cr.	1	17N,24W,22	Lowest Rd. xing (9 mile rd)	08/20/01	~ 100m	WCT	8	51-111mm	86mm				Burnt to a crisp. Good habitat
	1	17N,24W,22	Lowest Rd. xing (9 mile rd)	08/20/01	~ 100m	RBT	8	40-90mm	61mm				
	1	17N,24W,22	Lowest Rd. xing (9 mile rd)	08/20/01	~ 100m	EBT	7	60-123mm	81mm				
	2	17N,24W,15	West Fk Burnt FK. Foothills xing	08/23/01	~ 125m	WCT	7	108-138mm	118mm				Low densities . Culvert perched 1.0', velocity problems
	3	17N,24W,14	East Fk Burnt Fk, foothills xing	08/20/01	~ 100m	WCT	8	103-174mm	130mm				New culvert. Good habitat upstream of culvert. Moderate densities of
	3	17N,24W,14	East Fk Burnt Fk, foothills xing	08/20/01	~ 100m	EBT	2	52-104mm	78mm				WCT.
Butler Cr.	1	16N,22W,19	Bridge xing on rd. 5507	08/06/01	~ 300m	RBCT	1	92mm	92mm				Good habitat. High densities of EBT. 30 YOY's
	1	16N,22W,19	Bridge xing on rd. 5507	08/06/01	~ 300m	EBT	17	42-192mm	116mm				
	2	15N,22W,35	Bridge xing on 9-mile rd; rd 412	08/06/01	~ 150 m	EBT	10	54-140mm	92mm				All non-natives
	2	15N,22W,35	Bridge xing on 9-mile rd; rd 412	08/06/01	~150m	LL	2	121mm	121mm				
	2	15N,22W,35	Bridge xing on 9-mile rd; rd 412	08/06/01	~150m	RBT	1	96mm	96mm				
	3	16N,22W,20	Downstream of Dam	09/03/02	~100m	WCT	52	55-192mm	123mm				Rock Step/pool. High WCT densities
	4	16N,22W,20	Downstream of Dam	09/03/02	~100m	WCT	19	61-192mm	121mm				Above dam- lower WCT densities. Rock step/pool
Camp Cr.	1	17N,24W,24	Uppermost xing on foothills Rd.	09/20/01	~ 100m	EBT	12	59-114mm	83mm		X		good habitat. Culvert replacement looks good.
	2	17N,24W,24	Spur Rd. 5501 at Xing	09/20/01	~ 100m	EBT	9	63-114mm	81mm		X		Low densities of fish. Excellent habitat, road decomissioned before it
	2	17N,24W,24	Spur Rd. 5501 at Xing	09/20/01	~ 100m	RBT	3	79-143mm	108mm		X		crosses camp creek.
	3	17N,24W,25	Main 9 mile rd xing	09/20/01	~ 100m	EBT	3	64-83mm	75mm		X		High amount of algea. Fair habitat. Extremely low fish densities, besides
	3	17N,24W,25	Main 9 mile rd xing	09/20/01	~ 100m	RBT	4	48-104mm	65mm		X		YOY's
Cedar Cr.	1	16N,23W,4	Xing on Rd. 5515	08/21/01	~ 100m	RBT	11	53-125mm	88mm	X			Culvert needs to be assessed. Upper part of Cedar Cr drainage needs to
	1	16N,23W,4	Xing on Rd. 5515	08/21/01	~ 100m	EBT	10	87-131mm	103mm	X			be sampled. Lower section is on private, also need samples.
	1	16N,23W,4	Xing on Rd. 5515	08/21/01	~ 100m	LL	3	97-105mm	101mm	X			
	1	16N,23W,34	Below USFS land on Bar One Ranch	06/25/02	~200m	No fish	N/A	N/A	N/A				Marginal habitat. Landowner claims no dewatering?
	2	16N,23W,4	~.5mi upstream of FS Rd. 5515 xing	06/25/02	~200m	RBT	2	95-114mm	104mm				Good habitat, should not dewater. Spot shocking pools. >200m
	2	16N,23W,4	~.5mi upstream of FS Rd. 5515 xing	06/25/02	~200m	EBT	2	157-172mm	164mm				
Devil's Cr.	1	17N,25W,13	Rd. 9920 Xing	08/17/01		No fish							< than 2 cfs

Table 2. Summary of fish sampling in Ninemile Creek (cont)

Stream Name	Section	Location (T,R,S)	Physical Description of Location	Date Sampled	Section Length	Species	Total # captured	Range of Lengths	Mean Length	Sculpins Present	Tailed Frogs	Spotted Frogs	Additional Comments
Eustache Cr.	1	17N,25W,2	Upstream ~175m from xing on Rd. 97	08/01/01	~ 100m	No fish	N/A	N/A	N/A		X		
	2	17N,25W,11	Downstream ~250m from xing on Rd. 97	08/01/01	~ 100m	No fish	N/A	N/A	N/A		X		Culvert; complete barrier. 25', Perched.
	3	17N,25W,13	spur Rd. to the right	08/01/01	~ 100m	WCT	15	60-129mm	81mm		X		Moderate densite of WCT, site 1 and 2 up/down of uppermost culvert.
	3	17N,25W,13	spur Rd. to the right	08/01/01	~ 100m	EBT	1	100mm	100mm		X		
	4	17N,24W,18	~275m upstream of confluence of St.Louis	08/01/01	~ 100m	WCT	9	40-201mm	126mm		X		Moderate densities of WCT. Rare Ebt, good habitat, large deep pools.
	4	17N,24W,18	~275m upstream of confluence of St.Louis	08/01/01	~ 100m	RBT	1	82mm	82mm		X		
	4	17N,24W,18	~275m upstream of confluence of St.Louis	08/01/01	~ 100m	EBT	2	98-145mm	122mm		X		
	5	17N,25W,13	~1mi upstream of site 4	09/03/02	~100m	WCT	9	73-140mm	105mm		X		Little habitat diversity
	5	17N,25W,13	~1mi upstream of site 4	09/03/02	~100m	EBT	1	150mm	150mm		X		
Fire Cr.	1	16N,23W,29	Access Fire Cr. Ranch. Irrigation diversion	06/20/02	~200m	EBT	12	75-170mm	114mm		X		Not Fire Cr. In fact, an irrigation diversion
	1	16N,23W,29	Access Fire Cr. Ranch. Irrigation diversion	06/20/02	~200m	LL	2	150-155mm	152mm		X		Good LWD all sections
	2	16N,23W,30	Ist culvert on Fire Cr	06/20/02	~200m	No fish	N/A	N/A	N/A		X		
	3	16N,23W,30	~1mi upstream of site 2	06/20/02	~200m	EBT	1	110mm	110mm				
Josephine Cr.	1,2,3	16N,23W	Dry, No data sheet	08/23/01	N/A	N/A	N/A	N/A	N/A				Josephine Creek was dry throughout
Kennedy Cr.	1	16N,23W,27	Dry		N/A	N/A	N/A	N/A	N/A				
	1	16N,23W,27	Dry		N/A	N/A	N/A	N/A	N/A				
	2	16N,22W,13	Dry		N/A	N/A	N/A	N/A	N/A				
	2	16N,22W,13	Dry		N/A	N/A	N/A	N/A	N/A				
	1	16N,23W,23	Kennedy Cr. Rd.; private land at end of Rd.	08/21/02	~150m	EBT	26	47-162mm	96mm		X	X	Poor habitat- residential "backyard". EBT dominate degredated habitat
	2	16N,23W,13	~.75mi up from site 1. By F.S gate	08/21/02	~200m	WCT	22	60-146mm	94mm		X	X	Habitat getting better as distance from residential increases
	2	16N,23W,13	~.75mi up from site 1. By F.S gate	08/21/02	~200m	EBT	4	72-92mm	82mm		X	X	
	3	16N,23W,23	Above culvert in Y in Rd.	08/21/02	~200m	EBT	~20				X	X	No lengths taken
	4	16N,23W,18	~1mi. Up from F.S gate. Above Irr. Div.	08/21/02	~175m	WCT	24	52-167mm	84mm		X	X	Old mine- good habitat otherwise. Sampled above diversion. likely barrier.
Little Bear Cr.	1	17N,24W,4	Rd. Xing 5520	08/18/01	N/A	No fish	N/A	N/A	N/A				Lower Little Bear Cr. Restricted travel.
Little Blue Cr.	1,2	17N,23W	xing of main 9 mile rd, xing 5500	08/17/01	N/A	N/A	N/A	N/A	N/A				DRY, all sections of little blue were dry
Marion Cr.	1	16N,23W,7	Main 9 mile rd xing	08/23/01	N/A	dry	N/A	N/A	N/A				This section of Marion Creek was dry, irrigation, private
	2	16N,23W,5	Little Marion cr. xing, section 5	08/23/01	N/A	dry	N/A	N/A	N/A				Little Marion Cr. was dry
	3	16N,23W 33	PC land, Marion Cr. xing	08/23/01	~ 100m	EBT	8	59-135mm	86mm				Fair habitat, logging, low densities of fish
Martina Cr.	1	17N,24W,29	Rd. Xing 5520	08/18/01	N/A	dry	N/A	N/A	N/A				Xing was dry. Need contact of landowner in lower Martina Cr.
Mattie V Cr.	1	17N,24W,27	1st culvert xing	07/30/01	~ 75m	WCT	1	129mm	129mm				Good habitat, large amount of LWD. Step pools, low densities of fish.
	1	17N,24W,27	1st culvert xing	07/30/01	~ 75m	EBT	9	72-144mm	110mm				
	2	17N,24W,27	RD xing on Rd # 16832	07/30/01	~150m	WCT	7	79-124mm	103mm				Good habitat. Extremely low fish densities, culvert possible selective
	2	17N,24W,27	RD xing on Rd # 16832	07/30/01	~150m	EBT	4	84-110mm	99mm				barrier. Less than bankfull width
	3	17N,24W,27	3rd xing upstream of the mouth	07/30/01	~100m	No fish	N/A	N/A	N/A				N/A
McCormick Cr.	1	16N,23W,15	Bridge xing rd. 392	08/22/01	~100m	HYB(rbct)	6	79-124mm	93mm				High densities, all species. No genetics taken, hybrids. Aprrox. 150
	1	16N,23W,15	Bridge xing rd. 392	08/22/01	~100m	RBT	8	39-101mm	72mm				YOY's.
	1	16N,23W,15	Bridge xing rd. 392	08/22/01	~100m	LL	2	89-126mm	108mm				
	1	16N,23W,15	Bridge xing rd. 392	08/22/01	~100m	EBT	10	56-142mm	103mm				
	2	16N,23W,12	Bridge xing to private land, section1/12	08/22/01	~100m	WCT	18	65-145mm	90mm				High density of fish. Xing to private land is a bridge. WCT appeared
	2	16N,23W,12	Bridge xing to private land, section1/12	08/22/01	~100m	EBT	5	79-130mm	105mm				slightly hybridized.
	3	16N,23W,10	Little Mccormick crossing, DRY	08/22/01	N/A	N/A	N/A	N/A	N/A				Little McCormick Cr. was dry
	1	16N,23W,15	F.S Rd.392 to F.S boundry; upstream	08/02/02	~150m	WCT	33	47-168mm	98mm		X	X	High densities, many species
	1	16N,23W,15	F.S Rd.392 to F.S boundry; upstream	08/02/02	~150m	EBT	9	41-151mm	91mm		X	X	
	1	16N,23W,15	F.S Rd.392 to F.S boundry; upstream	08/02/02	~150m	LL	2	160-202mm	181mm		X	X	
Moncure Cr.	1	16N,23W,19	Xing of Rd 5520, section 19	08/19/01	~300'	RBT	10	85-131mm	103mm				Culvert xing was ok, moderate densities of WCT
	1	16N,23W,19	Xing of Rd 5520, section 19	08/19/01	~100m	EBT	4	68-107mm	93mm				
	1	16N,23W,19	Xing of Rd 5520, section 19	08/19/01	~100m	LL	5	87-126mm	104mm				
	2	16N,24W,24	Upper Rd xing 18163, switchback	08/19/01	~100m	N/A	N/A	N/A	N/A				DRY

Table 2. Summary of fish sampling in Ninemile Creek (cont)

Stream Name	Section	Location (T,R,S)	Physical Description of Location	Date Sampled	Section Length	Species	Total # captured	Range of Lengths	Mean Length	Sculpins Present	Tailed Frogs	Spotted Frogs	Additional Comments
Nine Mile Cr.	1	15N,22W,7	Xing on Rd5511, main 9 mile RD	08/25/01	~100m	EBT	4	89-207mm	155mm	?			Many MWF,
(main stem)	1	15N,22W,7	Xing on Rd5511, main 9 mile RD	08/25/01	~100m	RBT	11	109-317mm	238mm	?			
	1	15N,22W,7	Xing on Rd5511, main 9 mile RD	08/25/01	~100m	LL	9	103-419mm	224mm	?			
	2	15N,22W,7	400 yds downstream from bridge, section7	08/25/01	~100m	LL	10,+25	107-407mm	261mm	?			Good habitat, Possible some problems B/C of homes.
	2	15N,22W,7	400 yds downstream from bridge, section7	08/25/01	~100m	RBT	6	109-401mm	241mm	?			
	3	16N,23W,17	Jan Dershams house, down from bridge	08/14/01	~ 75m	RBT	12	40-335mm	142mm	?			
	3	16N,23W,17	Jan Dershams house, down from bridge	08/14/01	~ 75m	LL	13	60-481mm	225mm	?			Lots of YOY's, Directly behind house, High densities of fish, mixed species. Lots of wood, deep pools
	3	16N,23W,17	Jan Dershams house, down from bridge	08/14/01	~ 75m	WCT	2	280-370mm	325mm	?			
	3	16N,23W,17	Jan Dershams house, down from bridge	08/14/01	~ 75m	MWF	2	220-335mm	278mm	?			
	4	16N,23W,17	500 yds upstream of house	08/14/01	~100m	RBT	8	90-325mm	196mm	?			
	4	16N,23W,17	500 yds upstream of house	08/14/01	~100m	LL	10	105-455mm	331mm	?			
	4	16N,23W,17	500 yds upstream of house	08/14/01	~100m	EBT	2	219-235mm	227mm	?			
	4	16N,23W,17	500 yds upstream of house	08/14/01	~100m	LNS	1	107mm	107mm	?			
	5	16N,23W,17	AT headgate of dersham ditch	08/14/01	spot	LL	~50	YOY's		?			
	5	16N,23W,17	AT headgate of dersham ditch	08/14/01	spot	RBT	~50	YOY's		?			
	6	16N,24W,1	350yds from Audiono bridge	08/20/01	~ 75m	LL	14	118-241mm	161mm	?			High fish densities, good habitat, Non genetics, Many YOY's
	6	16N,24W,1	350yds from Audiono bridge	08/20/01	~ 75m	EBT	9	86-171mm	138mm	?			
	6	16N,24W,1	350yds from Audiono bridge	08/20/01	~ 75m	RBT	16	60-155mm	100mm	?			
	6	16N,24W,1	350yds from Audiono bridge	08/20/01	~ 75m	MWF	4	83-91mm	88mm	?			
	7	16N,24W,1	0.25mi up from Audino bridge	08/20/01	~100m	RBT	8	139-265mm	194mm	?			Good stream habitat, good pool:riffle ratio. Banks need vegetation, good fish densities.
	7	16N,24W,1	0.25mi up from Audino bridge	08/20/01	~100m	EBT	3	121-175mm	147mm	?			
	7	16N,24W,1	0.25mi up from Audino bridge	08/20/01	~100m	LL	3	191-256mm	222mm	?			
	8	16N,24W,1	0.50 mi up from Audino bridge	08/20/01	spot	mixed				?			Extremely deep pool, many fish
	9	17N,24W,22	Mile post 17/18, spur road off to left	08/30/01	~ 75m	RBT	8	56-121mm	79mm	?			Fair habitat, good pool:riffle ratio.
	9	17N,24W,22	Mile post 17/18, spur road off to left	08/30/01	~ 75m	LL	6	94-164mm	127mm	?			
	9	17N,24W,22	Mile post 17/18, spur road off to left	08/30/01	~ 75m	EBT	2	131-146mm	138mm	?			
	10	17N,24W,21	1.0 mile upstream of little burnt fork	08/30/01	~ 50m	EBT	6	45-210mm	151mm	?			Habitat looks good, old ford.
	10	17N,24W,21	1.0 mile upstream of little burnt fork	08/30/01	~ 50m	RBT	7	87-110mm	99mm	?			
Pine Cr.	1	16N,23W,6	9-mile road crossing	08/25/01	~100m	RBT	8	75-169mm	111mm				Pine Creek had some of the highest flows of any tributarie to nine mile creek. There were moderate densities of all species in sampling section 1. Dominated by non-natives.
	1	16N,23W,6	9-mile road crossing	08/25/01	~100m	HYB(rbct)	5	87-142mm	116mm				
	1	16N,23W,6	9-mile road crossing	08/25/01	~100m	LL	5	87-126mm	104mm				
	1	16N,23W,6	9-mile road crossing	08/25/01	~100m	EBT	10	71-186mm	110mm				
	2	17N,23W,32	Old spur road, section 32	08/25/01	~100m	HYB(rbct)	4	89-146mm	114mm				Good habitat. Moderate densities of all fish species that are listed.
	2	17N,23W,32	Old spur road, section 32	08/25/01	~100m	RBT	4	85-161mm	111mm				
	2	17N,23W,32	Old spur road, section 32	08/25/01	~100m	EBT	7	69-141mm	110mm				
	3	17N,23W,29	Spur road off 5500, FS land, section 29	08/25/01	~100m	HYB(rbct)	9	71-126mm	97mm				Good habitat. Moderate densities of all fish species that are listed. Low gradient.
	3	17N,23W,29	Spur road off 5500, FS land, section 29	08/25/01	~100m	EBT	6	55-117mm	87mm				
Sawpit Cr.	1	17N,24W,20	Xing of Rd 5520	08/17/01	N/A	N/A	N/A	N/A	N/A				DRY
Soldier Cr.	1	17N,24W,24	Crossing on Foothills rd, above culvert	09/20/01	~100m	EBT	10	63-105mm	83mm	X			New culvert, good habitat upstream of crossing.
	2	17N,24W,26	0.50 mi spur road, rd 5501	09/20/01	~100m	EBT	6	53-110mm	82mm	X			Good habitat, dense cover. Spur road 0.11 mi after soldier
	2	17N,24W,26	0.50 mi spur road, rd 5501	09/20/01	~100m	RBT	7	43-131mm	81mm	X			
	3	17N,24W,26	Crossing main 9mile road	09/20/01	~100m	EBT	7	58-112mm	76mm	X			Good habitat, low fish densities.
	3	17N,24W,26	Crossing main 9mile road	09/20/01	~100m	RBT	7	46-79mm	57mm	X			
St. Louis Cr.	1	17N,24W,18	Lowest culvert crossing,	08/01/01	~100m	WCT	9	68-150mm	97mm	X	X	X	Moderate densities of WCT. Culvert not a barrier. Aligned correctly.
	1	17N,24W,18	Lowest culvert crossing,	08/01/01	~100m	EBT	6	52-146mm	113mm	X	X	X	
	2	17N,24W,8	End of spur rd #17432, 300' upstream	08/01/01	~100m	WCT	15	60-135mm	99mm	X	X	X	High densities of WCT. No other fish. Good habitat.
	3	17N,24W,8	Uppermost xing on foothills rd	08/01/01	~ 75m	WCT	13	61-172mm	127mm	X	X	X	High densities of WCT, good habitat. Culvert is a barrier.
Stoney Cr.	1	15N,22W,5	Rd. Xing 5489, ~150m up from culvert	08/06/01	~ 150m	WCT	14	66-150mm	101mm	X			Culvert excellent; fish appeared hybridized
	2	15N,22W,33	Rd. Xing 456, culvert	08/06/01	~100m	WCT	15	56-171mm	107mm	X			Culvert good. High densities. Good habitat
Twin Cr.	1	17N,24W,26	xing closest to the mouth	07/30/01	~ 75m	EBT	12	40-147mm	83mm		X	X	Culvert looks fine, low fish densities, fair habitat
	2	17N,24W,27	Rd xing section 27, above culvert	07/30/01	~ 50m	EBT	18	32-170mm	95mm		X	X	Culvert looks okay
	3	17N,24W,27	uppermost Rd xing, section 27	07/30/01	~ 100m	N/A	N/A	N/A	N/A				N/A

Table 3. Summary of fish sampling on Fish Creek, 1999-2000

Stream Name	Section #	Location (T,R,S)	Physical Description of Location	Date Sampled	Section Length	Species	Total # Captured	Range of Lengths	Mean Length	Sculpins Present	Tailed Frogs	Spotted Frogs	Additional Comments
Trail Creek	1	14N,25W,26	Downstream of culvert 1	5/6/1999	~ 50 m	WCT	21	57-148	94				single pass
	2	14N,25W,26	Upstream of culvert 1	5/6/1999	~ 50 m	WCT	7	51-87	65.9				single pass
	3	14N,25W,35	Upstream of culvert 2	5/6/1999	~ 50 m	WCT	12	86-135	109.25				2 ripe males, one with underbite
Bear Creek	1	13N,24W,2	PC land, 1st road crossing	8/4/1999	~ 80 m	WCT	42	62-215	104.2	X	X	X	760 sec. Shocking time, widths=7,8,8,7,9 ft
	2	13N,24W11	2nd road crossing, PC land	8/4/1999	~ 30 m	WCT	16	43-115	86.1	X	X	X	180 sec. Shocking time, 10deg C, wid=3.5,4 ft
	3	13N,24W,35	near mouth, bear point	8/4/1999	~ 300 m	WCT	7	80-230	149.1	X	X	X	section 3, Inefficient with backpack shocker (approx. 25 cfs),
	3	13N,24W,35	near mouth, bear point	8/4/1999	~ 300 m	DV	7	130-173	152.7	X	X	X	low densities of fish. The 16 additional EBT were between the
	3	13N,24W,35	near mouth, bear point	8/4/1999	~ 300 m	RBxCT	1	142	142	X	X	X	
	3	13N,24W,35	near mouth, bear point	8/4/1999	~ 300 m	EBT	19 (+16)	60-300	177.7	X	X	X	sizes of 48-60 mm.
Deer Creek	1	13N,24W,7	Lowest road crossing	5/20/1999	~ 100 m	WCT	2	97-183	140				
	1	13N,24W,7	Lowest road crossing	5/20/1999	~ 100 m	EBT	7	100-212	136				section 1 heavily overgrown with algae on 5/20
	2	13N,24W,9	Road crossing	5/20/1999	~ 50 m	WCT	9	87-145	118.3				
	3	13N,24W,10	Road crossing, above culvert	5/20/1999	~ 30 m	WCT	8	45-135	88.5				7deg C, great spawning habitat, observed spawn
	4	13N,24W,8	1.5 miles from mouth, near spur road	5/20/1999	~ 100 m	WCT	19	65-205	126.3				above perched culvert, moose
													10deg C, 419 sec shocking
Thompson Creek	1	13N,24W,13	lower end of section 13	9/8/1999	~ 60 m	WCT	24	46-198	111.3	X			
	1	13N,24W,13	lower end of section 13	9/8/1999	~ 60 m	EBT	7	103-136	121.4	X			approx. 400 seconds of shocking time. 48 degrees F,
	2	13N,24W,14	road crossing section 14	9/8/1999	~ 75 m	WCT	8	147-245	180	X			sculpins in moderate populatins
	2	13N,24W,14	road crossing section 14	9/8/1999	~ 75 m	EBT	16	60-205	104.5	X			42 degrees F.
	3	13N,24W,26	road crossing section 26	9/8/1999	~ 75 m	WCT	7	85-182	145.3	X			
													40 degrees F, moderate populations of scul.
Wig Creek	1	12N,24W,29	mouth below natural falls	5/25/1999	spot	WCT	9	65-172	117.3				
	1	12N,24W,29	mouth below natural falls	5/25/1999	spot	DV	1	160	160				spot shocking, temp 10 degrees C
	2	12N,24W, 29	above falls, downstream of culvert	5/25/1999	spot	WCT	1	120	120				
	3	12N,24W,29	above culvert, barrier	5/25/1999	spot	WCT	3	115-425	220				stopped shocking due to fluvial spawning activity, culvert is
	4	12N,24W,31	below wig cr lodge, upstream crossing	7/21/1999	~50 m	WCT	17	75-200	113.8				partial barrier selective, small fish, ripe female
													12 degrees C, 358 shocking time
Oriole Creek	1	12N,24W,22	Road xing down from culvert barrier	7/9/2000	~ 40 m	WCT	11	75-158	118.4		X		
	2	12N,24W,22	upstream of culvert barrier	7/9/2000	~. 60 m	WCT	10	60-174	127.3		X		relatively high densities of WCT
	2	12N,24W,22	upstream of culvert barrier	7/9/2000	~ 60 m	EBT	1	152	152		X		Culvert is an upstream migration barrier, high desities of
	3	12N,24W,27	approx. .25 miles up from road 4212 xing	7/9/2000	~ 70 m	WCT	17	58-160	114.1		X		WCT, moderate densities tailed frogs
													flows approx. 2 cfs
Burdette Creek	1	12N,23W,9	Trail xing, lower section 9	6/14/2000	~ 150 m	WCT	31	70-200	136.3	X	X		
	1	12N,23W,9	Trail xing, lower section 9	6/14/2000	~ 150 m	RBxCT	1	180	180	X	X		552 sec of shocking time, spawning observed in all sections,
	1	12N,23W,9	Trail xing, lower section 9	6/14/2000	~ 150 m	EBT	11	120-230	172.2	X	X		rosgen C5 channel type
	1	12N,23W,9	Trail xing, lower section 9	6/14/2000	~ 150 m	SCUL	12	50-115	86.5	X	X		sculpins and ebt are found in moderate populations in section
	2	12N,23W,35	Confluence of tributary in section 35	6/14/2000	~ 95 m	WCT	33	55-275	141.6	X	X		1
	2	12N,23W,35	Confluence of tributary in section 35	6/14/2000	~ 95 m	EBT	6	90-200	137.5	X	X		sculpins located in this area in rare numbers, section 2
	3	12N,23W,25	Just upstream of trails end	6/14/2000	~ 75 m	WCT	16	85-180	128.1	X	X		dominated by B4c rosgen channel type
	3	12N,23W,25	Just upstream of trails end	6/14/2000	~ 75 m	EBT	5	100-165	119.2	X	X		230 seconds of shocking time, section 3 B4c rosgen channel
													type
Lupine Creek	1	12N,24W,12	.25 miles below major trib	7/11/2000	~ 150 m	WCT	18	82-162	114.3	X			
	1	12N,24W,12	.25 miles below major trib	7/11/2000	~ 150 m	EBT	5	123-160	139.2	X			hike in area, approx. 3 cfs
	2	12N,24W,11	downstream of N/S draw	7/11/2000	~ 100 m	WCT	15	68-170	127.2	X			
	2	12N,24W,11	downstream of N/S draw	7/11/2000	~ 100 m	EBT	22	73-189	138.9	X			moderate sculpins
	3	12N,24W,15	.25 miles above private section	7/11/2000	~ 100 m	WCT	14	107-195	148.4	X			
	3	12N,24W,15	.25 miles above private section	7/11/2000	~ 100 m	EBT	25	60-175	164.2	X			moderate sculpins, approx. 5 cfs
Surveyors Creek	1	12N,25W,35	.25 miles above south fork, xing PC land	7/7/2000	~ 100 m	WCT	9	86-149	106.2	X	X		
	2	12N,25W,35	below road xing on norht fork	7/7/2000	~ 100 m	WCT	17	90-137	102	X	X		low fish densities, walked 1/3 mile above culvert at site 1, no
	3	12N,25W,36	below road xing north fork	7/7/2000	~ 100 m	WCT	9	47-140	107.5	X	X		barriers
	3	12N,25W,36	below road crossing, north fork	7/7/2000	~ 100 m	EBT	5	45-158	104.4	X	X		low fish densities.
	4	12N,25W,36	mainstem, below road on PC	7/7/2000	~ 150 m	WCT	10	64-212	101.3	X	X		
	4	12N,25W,36	mainstem, below road on PC	7/7/2000	~ 150 m	EBT	2	128-165	146.5	X	X		

Table 3. Summary fish sampling on Fish Creek (page 2)

Stream Name	Section #	Location (T,R,S)	Physical Description of Location	Date Sampled	Section Length	Species	Total # Captured	Range of Lengths	Mean Length	Sculpins Present	Tailed Frogs	Spotted Frogs	Additional Comments
Montana Creek (trib to Cache Creek)	1	12N,24W,10	upper xing, road 4218	7/9/2000	~ 100 m	WCT	16	49-189	110.7	X		X	moderate densities,approx. 15 cfs, low shocking efficiency
	2	12N,24W,11	upper xing O'neil creek	7/9/2000	~ 100 m	No Fish	0	0	0	X		X	habitat looks good, looks perennial must have natural barrier
	3	12N,24W,18	MT creek lowest site	7/9/2000	~ 200 m	WCT	12	58-170	111.2	X		X	low densities, #2 Cache creek
Cache Creek	1	12N,24W,13	middle of section 23	7/13/2000	~ 400 m	WCT	13	60-295	119.3	X	X	X	moderate densities of sculpins and tailed frogs, temperature
	1	12N,24W,13	middle of section 23	7/13/2000	~ 400 m	DV	6	48-160	97.3	X	X	X	15 degrees C.
	1	12N,24W,13	middle of section 23	7/13/2000	~ 400 m	EBT	12	95-180	131.1	X	X	X	
	2	12N,24W,24	Lower end sect 24	7/13/2000	~ 300 m	WCT	16	60-200	109.4	X	X	X	temperature 16 degrees C, moderated spotted frogs
	2	12N,24W,24	Lower end sect 24	7/13/2000	~ 300 m	DV	3	50-180	93.3	X	X	X	
	2	12N,24W,24	Lower end sect 24	7/13/2000	~ 300 m	EBT	16	70-210	115.6	X	X	X	
	3	12N.24W,19	Whites creek, ~ 3/4 mile above mouth	7/9/2000	~ 150 m	WCT	17	66-170	124.5	X	X	X	moderate densities, temperature 10 degrees C
	3	12N.24W,19	Whites creek, ~ 3/4 mile above mouth	7/9/2000	~ 150 m	RBxCT	1	160	160	X	X	X	
	3	12N.24W,19	Whites creek, ~ 3/4 mile above mouth	7/9/2000	~ 150 m	EBT	4	99-165	129	X	X	X	

Table 4. Summary of fish sampling in the St. Regis River drainage 2001-02

Stream Name	Section	Location (T,R,S)	Physical Description of Location	Date Sampled	Section Length	Species	Total # captured	Range of Lengths	Sculpins Present	Tailed Frogs	Spotted Frogs	Mean Length	Additional Comments
Big Cr. (E. Fork)	1	18N,30W,9	Above McKinney Cr. On Rd. # 386	8/16/2002	~200m	WCT	9	80-243mm	X	X	X	147mm	Thick understory. Good habitat
	1	18N,30W,9	Above McKinney Cr. On Rd. # 386	8/16/2002	~200m	EBT	17	48-207mm	X	X	X	133mm	Thick understory. Good habitat
	2	18N,30W,17	~1mi. Above site 1. below lodgepole Cr.	8/16/2002	~200m	WCT	8	73-205mm	X	X	X	135mm	
	2	18N,30W,17	~1mi. Above site 1. below lodgepole Cr.	8/16/2002	~200m	EBT	25	54-267mm				153mm	
Big Cr. (M. Fork)	1	19N,30W,27	~1mi. Above confluence w/ St. Regis.	8/15/2002	~200m	WCT	13	77-177mm	X	X		116mm	Possible hybrids in lower drainage
	1	19N,30W,27	~1mi. Above confluence w/ St. Regis.	8/15/2002	~200m	RBT	1	109mm	X	X		109mm	
	1	19N,30W,27	~1mi. Above confluence w/ St. Regis.	8/15/2002	~200m	EBT	2	69-126mm	X	X		97mm	
	2	19N,30W,33	Below all forks of Big Cr.	8/15/2002	~200m	WCT	15	68-141mm	X	X		91mm	
	2	19N,30W,33	Below all forks of Big Cr.	8/15/2002	~200m	EBT	14	48-235mm	X	X		104mm	
	3	19N,30W,32	.5 mi. above confluence	8/15/2002	~200m	WCT	28	76-133mm	X	X		138mm	
	3	19N,30W,32	.5 mi. above confluence	8/15/2002	~200m	EBT	1	245mm	X	X		245mm	
	4	18N,30W,13	Between sections 12,13	8/15/2002	~150m	WCT	22	77-210mm	X	X		138mm	
Big Cr. (W. Fork)	1	19N,30W,30	Directly below end of Rd.	8/15/2002	~150m	WCT	13	98-202mm	X	X	X	145mm	Large culvert between sites 1&2 on old Rd. Xing
	1	19N,30W,30	Directly below end of Rd.	8/15/2002	~150m	EBT	8	42-251mm	X	X	X	125mm	Probably not a barrier during high water events
	1	19N,30W,30	Directly below end of Rd.	8/15/2002	~150m	LL	1	312mm	X	X	X	312mm	
	2	19N,31W,36	~1.5 mi up from site 1. Above big culvert	8/15/2002	~125m	WCT	18	80-253mm	X	X	X	129mm	Good habitat in upper drainage.
	2	19N,31W,36	~1.5 mi up from site 1. Above big culvert	8/15/2002	~125m	EBT	7	79-267mm	X	X	X	155mm	
Borax Cr.	1	19N,32W,4	Before underpass on I-90 on frontage rd.	8/30/2002	~200m	WCT	23	68-267mm	X	X	X	139mm	Probable barrier at "culvert/tunnel"
Brimstone Cr.	1	20N,31W,25	Up Randolph Cr. Rd. past substation.	8/30/2002	~200m	WCT	25	54-159mm		X	X	76mm	8" hanging culvert at bottom of site
	2	19N,32W,3	Frontage rd. W to tunnel at rd. crossing	8/30/2002	~200m	WCT	33	69-198mm		X	X	110mm	Healthy WCT Populations at both sites
Cook Cr.	1	19N,30W,11	Up F.S. Rd. 3811 to power lines	8/28/2002	~200m	no fish							Access difficult
	2	19N,30W,14	Private Rd. below last house on Rd.	8/28/2002	~200m	EBT	13	81-125mm	X	X	X	94mm	low densities of WCT
	3	19N,30W,22	Below confluence of Cook/Savenac Cr.	8/28/2002	~200m	WCT	7	99-184mm	X	X	X	130mm	
	3	19N,30W,22	Below confluence of Cook/Savenac Cr.	8/28/2002	~200m	LL	1	232mm	X	X	X	232mm	
	3	19N,30W,22	Below confluence of Cook/Savenac Cr.	8/28/2002	~200m	EBT	27	42-220mm	X	X	X	123mm	
Deer Cr.	1	18N,30W,22	~200m above last Rd. xing on Deer Cr	8/14/2002	~200m	WCT	24	91-181mm	X	X		131mm	Good access. More WCT found at higher sites.
	2	18N,30W,2	~1mi. Upstream of site 3, by Up Up Cr.	8/14/2002	~200m	WCT	13	89-256mm	X	X		160mm	
	2	18N,30W,2	~1mi. Upstream of site 3, by Up Up Cr.	8/14/2002	~200m	EBT	10	52-257mm	X	X		156mm	
	3	18N,30W,36	~.5mi. Up from mouth of St. Regis R.	8/14/2002	~200m	WCT	2	135-186mm	X	X		160mm	
	3	18N,30W,36	~.5mi. Up from mouth of St. Regis R.	8/14/2002	~200m	EBT	12	95-193mm	X	X		132mm	
	3	18N,30W,36	~.5mi. Up from mouth of St. Regis R.	8/14/2002	~200m	MWF	1	89mm	X	X		89mm	
	4	18N,30W,2	~1mi. Above site 3. Through campground	8/14/2002	~150m	WCT	8	81-167mm	X	X		120mm	
	4	18N,30W,2	~1mi. Above site 3. Through campground	8/14/2002	~150m	EBT	11	76-235mm	X	X		154mm	
Denna Mora Cr.	1	19N,32W,10	~1.5mi up Rd. Above culvert by private	8/22/2002	~200m	WCT	7	77-210mm	X	X		152mm	Low densities of fish. Good habitat. New Const.
	2	19N,32W,11	~100m above confluence of St. Regis R.	8/22/2002	~200m	WCT	9	67-177mm	X	X		112mm	of culvert and roads
	2	19N,32W,11	~100m above confluence of St. Regis R.	8/22/2002	~200m	EBT	6	72-156mm	X	X		114mm	
Dominion Cr.	1	19N,31W,18	~.5mi. Up from confluence with St. Regis	8/16/2002	~200m	WCT	19	62-147mm				100mm	Hanging Culvert ~1.5' at Rd. X-ing between sites.
	1	19N,31W,19	~.5mi. Up from confluence with St. Regis	8/16/2002	~200m	EBT	1	100mm				100mm	Possible barrier. Culvert is ~12-15' long.
	2	19N,31W,19	~1mi Above site 1. Rd. intersects Cr.	8/16/2002	~200m	WCT	22	62-189mm				111mm	
Hanakar Cr.	1	19N,32W,3	From confluence of St.Regis R. up	8/22/2002	~250m	WCT	8	67-169mm		X	X	110mm	
	2	19N,32W,10	~1mi up Rd.	8/22/2002	~100m	no fish							No aquatic life in section 2. Looks like good habitat.
Henderson Cr.	1	19N,29W,4	Start where Frontage Rd. crosses Cr.	8/14/2002	~200m	WCT	7	76-165mm	X	X	X	119mm	
	1	19N,29W,4	Start where Frontage Rd. crosses Cr.	8/14/2002	~200m	EBT	8	68-186mm	X	X	X	113mm	
	1	19N,29W,4	Start where Frontage Rd. crosses Cr.	8/14/2002	~200m	LL	1	98mm	X	X	X	98mm	
	2	19N,29W,5	Hike upstream ~1mi. From site 1	8/14/2002	~200m	WCT	23	63-152mm		X	X	86mm	Good habitat. Thick understory
	2	19N,29W,5	Hike upstream ~1mi. From site 1	8/14/2002	~200m	EBT	5	45-172mm		X	X	114mm	
Little Joe Cr. (South Fork)	1	17N,28W,3	~.5mi. Up S. Fk. Little Joe Cr.	11/12/1999	~225m	WCT	22	86-289mm	?	X		196mm	No WCT genetics taken
	1	17N,28W,3	~.5mi. Up S. Fk. Little Joe Cr.	11/12/1999	~225m	DV	8	118-309mm	?	X		208mm	

Table 4. Summary of fish sampling in the St. Regis River drainage (cont.)

Stream Name	Section	Location (T,R,S)	Physical Description of Location	Date Sampled	Section Length	Species	Total # captured	Range of Lengths	Sculpins Present	Tailed Frogs	Spotted Frogs	Mean Length	Additional Comments
Little Joe Cr. (North Fork)	1	17N,28W,4	~1mi. Upstream on N. Fk. Little joe Cr.	11/12/1999	~75m	WCT	21	95-264mm	?	X		184mm	
	1	17N,28W,4	~1mi. Upstream on N. Fk. Little joe Cr.	11/12/1999	~75m	EBT	4	194-230mm	?	X		211mm	
	1	17N,28W,4	~1mi. Upstream on N. Fk. Little joe Cr.	11/12/1999	~75m	DV	2	156-168mm	?	X		162mm	
	2	17N,28W,5	~2.1mi. Upstream on N. Fk. Little Joe Cr.	11/12/1999	~80m	WCT	6	182-240mm	?	X		210mm	
	3	17N,28W,7	~4mi. Upstream on N. Fk. Little Joe Cr.	8/29/2002	~200m	WCT	44	60-217mm	?	X		130mm	LWD/step pool. High densities of fish
	3	17N,28W,7	~4mi. Upstream on N. Fk. Little Joe Cr.	8/29/2002	~200m	DV	3	92-104mm	?	X		96mm	
	4	17N,28W,5	~2 mi. upstream on N. Fk. Little Joe Cr.	8/29/2002	~200m	WCT	16	80-240mm	?	X		147mm	Rock Controlled, some LWD. Lower fish densities
	5	17N,28W,5	~2 mi. upstream on N. Fk. Little Joe Cr.	8/29/2002	~200m	DV	13	108-232mm	?	X		168mm	
McManus Cr.	1	19N,30W,5	Rd. xing under power lines	9/4/2002	~100m	EBT	18	91-125mm	X			106mm	Low gradient. Impacted habitat throughout
	2	19N,30W,7	Rd. 288 xing	9/4/2002	~150m	EBT	17	63-230mm	X			126mm	
	3	19N,30W,20	Immediately above I-90	9/4/2002	~150m	WCT	7	78-146mm	X			111mm	
	3	19N,30W,20	Immediately above I-90	9/4/2002	~150m	EBT	19	49-190mm	X			111mm	
Rainy Cr.	1	19N,32W,13	~.5mi.up from confluence of St. Regis R.	8/16/2002	~175m	WCT	11	83-226mm	X		X	141mm	Good habitat. Dense stands of thuja spp.
	1	19N,32W,13	~.5mi.up from confluence of St. Regis R.	8/16/2002	~175m	EBT	5	100-181mm	X		X	145mm	
	2	19N,32W,14	~1mi. Up from site 1	8/16/2002	~200m	WCT	18	68-187mm	X		X	126mm	
	2	19N,32W,14	~1mi. Up from site 1	8/16/2002	~200m	EBT	9	88-212mm	X		X	138mm	
Randolph Cr.	1	20N,31W,30	Just above Taft substation. Above culvert	8/30/2002	~200m	WCT	13	64-175mm		X	X	105mm	Culvert -start of site 1 not a barrier: "stepped culvert"
	1	20N,31W,30	Just above Taft substation. Above culvert	8/30/2002	~200m	EBT	18	65-169mm		X	X	104mm	
	2	20N,31W,6	1.9mi. Below site 1. Before Y in Rd.	8/30/2002	~200m	WCT	19	76-196mm		X	X	126mm	
	2	20N,31W,6	1.9mi. Below site 1. Before Y in Rd.	8/30/2002	~200m	EBT	11	88-215mm		X	X	149mm	
Rivers Cr.	1	19N,30W,5	First switchback on Rivers Rd.	8/15/2002	~200m	WCT	2	128-147mm				137mm	Low densities, low flows. Likely intermittent.
Savenac Cr.	1	19N,30W,10	F.S. Rd. 3811, by power lines	8/28/2002	~200m	WCT	10	85-211mm	X			143mm	Low densities and low shocking effeciences
	1	19N,30W,10	F.S. Rd. 3811, by power lines	8/28/2002	~200m	EBT	6	67-180mm	X			120mm	
	2	19N,30W,3	~1mi. Above site 1. below lodgepole Cr.	8/28/2002	~200m	WCT	7	111-251mm	X			156mm	
	2	19N,30W,3	~1mi. Above site 1. below lodgepole Cr.	8/28/2002	~200m	EBT	10	101-170mm	X			139mm	
Silver Cr.	1	19N,31W,14	Near mouth below culvert barrier	7/14/2001	~150m	WCT	24	72-191mm	X	X		101mm	
	1	19N,31W,14	Near mouth below culvert barrier	7/14/2001	~150m	EBT	6	109-129mm	X	X		116mm	
	1	19N,31W,14	Near mouth below culvert barrier	7/14/2001	~150m	MWF	1	184mm	X	X		184mm	
	2	19N,31W,14	Old wooden bridge xing. ~1mi from mouth	7/14/2001	~200m	WCT	14	60-245mm	X	X		127mm	Low fish densities
	2	19N,31W,14	Old wooden bridge xing. ~1mi from mouth	7/14/2001	~200m	EBT	5	138-233mm	X	X		184mm	
	3	19N,31W,22	At forks	7/14/2001	~100m	WCT	15	62-212mm	X	X		145mm	
	3	19N,31W,22	At forks	7/14/2001	~100m	EBT	6	96-241mm	X	X		141mm	
St. Regis R. (upper)	1	20N,32W,32	Upstream from bridge of first xing	8/22/2002	~150m	WCT	23	62-224mm	X	X	X	116mm	Good habitat
	1	20N,32W,32	Upstream from bridge of first xing	8/22/2002	~150m	EBT	13	84-220mm	X	X	X	131mm	
	2	20N,32W,32	Access from lookout pass. Lower Rd.	8/22/2002	~175m	WCT	44	55-214mm	X	X	X	115mm	
	2	20N,32W,32	Access from lookout pass. Lower Rd.	8/22/2002	~175m	EBT	6	118-163mm	X	X	X	136mm	
Timber Cr. (W. Fork)	1	19N,30W,16	Up F.S. Rd. 288 to Rd. Xing	8/30/2002	~150m	no fish							Intermittent at times
Timber Cr. (E. Fork)	1	19N,30W,9	County Rd. before Jct w/ F.S. Rd.16161	8/28/2002	~200m	EBT	~30	not taken	X		X		Difficult access. Culvert at site 1 hanging ~1'
Twelve Mile Cr.	3	18N,29W,36	E. Fk. Twelve mile Cr.	7/21/2000	~100m	EBT	10	94-170mm	X			124mm	Data missing for 2 sites near mouth
	4	18N,29W,23	Confluence w/ Flat Rock Cr.; then up	7/21/2000	~250m	WCT	26	80-235mm	X			144mm	Relatively high densities
	4	18N,29W,23	Confluence w/ Flat Rock Cr.; then up	7/21/2000	~250m	EBT	6	148-250mm	X			184mm	
	5	18N,29W,1	2nd bridge crossing downstream from	7/21/2000	~150m	WCT	13	112-225mm	X			163mm	High densities, abundant sculpins
	5	18N,29W,1	Mineral Mtn. Rd.	7/21/2000	~150m	EBT	8	85-166mm	X			142mm	
	6	18N,29W,22	Switchback. Head end of Twelve Mile Cr.	7/21/2000	~100m	WCT	11	90-160mm	X			120mm	sampled above and below culvert in this section
	6	18N,29W,22	Switchback. Head end of Twelve Mile Cr.	7/21/2000	~100m	EBT	2	125-140mm	X			132mm	
	7	18N,29W,24	Walk 20 min. up from Trailhead	9/17/2000	~100m	WCT	8	51-152mm	X			106mm	Sculpin and EBT numerous. Good habitat
	7	18N,29W,24	Walk 20 min. up from Trailhead	9/17/2000	~100m	EBT	28	55-245mm	X			136mm	

Table 4. Summary of fish sampling in the St. Regis River drainage (cont.)

Stream Name	Section	Location (T,R,S)	Physical Description of Location	Date Sampled	Section Length	Species	Total # captured	Range of Lengths	Sculpins Present	Tailed Frogs	Spotted Frogs	Mean Length	Additional Comments
Twin Cr. (West Fork)	1	19N,29W,24	Up cotton Ln. from W. Twin Rd.	8/27/2002	~200m	WCT	13	82-179mm	X	X		129mm	Dewatered. Impacted by power lines
	1	19N,29W,24	Up cotton Ln. from W. Twin Rd.	8/27/2002	~200m	EBT	12	96-238mm	X	X		177mm	
Twin Cr. (East Fork)	1	19N,29W,18	Gated F.S. land. ~200m below culvert	8/27/2002	~175m	WCT	23	76-191mm		X	X	125mm	Distinct separation of WCT/EBT habitat
	1	19N,29W,18	Gated F.S. land. ~200m below culvert	8/27/2002	~175m	EBT	1	177mm		X	X	177mm	Lower reaches heavily impacted. Numerous EBT
	2	19N,29W,19	Above private house. Out of pastureland	8/27/2002	~200m	WCT	15	60-117mm		X	X	84mm	
	2	19N,29W,19	Above private house. Out of pastureland	8/27/2002	~200m	EBT	11	79-165mm		X	X	109mm	
Two Mile Cr.	1	17N,28W,3	Uppermost Rd. xing Rd. 431	8/31/2001	~90m	WCT	12	72-224mm	X			118mm	High densities of WCT. Good habitat
	2	18N,29W,31	Cr. Directly adjacent to Rd. 431. 3.5 Mi up	8/31/2001	~90m	WCT	9	39-130mm	X			88mm	WCT looked hybridized
	3	18N,29W,29	Near mouth- Dry due to irrigation	8/31/2001		Dry			X				
	4	18N,29W,3	Coyle Cr. Near mouth	8/31/2001	?	WCT	11	62-192mm	X			128mm	
Ward Cr.	1	18N,29W,30	~200m below bridge to bridge	8/13/2002	~200m	WCT	41	45-197mm	X	X	X	114mm	Good habitat
	2	18N,29W,29	Cedar Cr.-Above culvert on Rd. Xing	8/13/2002	~125m	WCT	14	56-102mm	X	X	X	76mm	Good habitat. Culvert on Rd. xing ~30m squashed.
	3	18N,29W,28	Unnamed Cr.-Above culvert on Rd. Xing	8/13/2002	~100m	WCT	11	41-97mm	X	X	X	73mm	Hanging culvert ~2.5' . 35m long. Slightly squashed
	4	18N,29W,27	Below fork in F.S. Rd. 3816	8/13/2002	~200m	WCT	12	55-117mm	X	X	X	88mm	Numerous sculpin. Beaver ponds in progess
	5	18N,29W,32	~1mi. Up Ward Cr. Rd.	8/13/2002	~200m	WCT	19	75-238mm	X	X	X	127mm	