

BEAR CREEK WATERSHED ANALYSIS

FISHERIES

CHARACTERIZATION

The Bear Creek Watershed Analysis Area includes Bear Creek and all of its tributaries. It is a fourth order stream that drains an area of approximately 200 square kilometers. Native fish in this drainage includes Yellowstone cutthroat trout, mountain whitefish, longnose and speckled dace, and mottled and Piute sculpin. Non-native fish include brown trout. Key fish species and habitat characteristics are discussed below.

Yellowstone cutthroat trout are a Regional Forester Sensitive Species and listed as a Species of Concern in the State of Idaho. U.S. Fish and Wildlife Service received a petition to list Yellowstone cutthroat trout as Threatened in August 1998. In February 2001, the US Fish and Wildlife Service finalized their finding on the petition. They indicated the petition did not provide substantial information to indicate listing was warranted.

Two life history patterns of Yellowstone cutthroat trout occur in the Bear Creek Watershed Analysis Area; resident and adfluvial. While resident fish spend the majority of their lives in a relatively short segment of stream, adfluvial fish migrate into tributaries from Palisades Reservoir to spawn, returning to the reservoir for the remainder of the year. These fish likely exhibited a fluvial life history pattern prior to the construction of Palisades Dam. The migratory life history pattern converted to adfluvial with the flooding of the reservoir. The offspring of adfluvial fish spend a year or two in the nursery streams and eventually migrate downstream to larger water.

Yellowstone cutthroat trout occur in two physical varieties based upon markings; large-spotted and fine-spotted. Both occur in Bear Creek.

Brown trout were introduced into Palisades Reservoir and the South Fork Snake River and have occasionally been observed in lower Bear Creek. Although they don't interbreed with native cutthroat trout, they are voracious predators that likely prey upon their young.

Native Fish in the Analysis Area

<u>Common Name</u>	<u>Scientific Name</u>	<u>Status</u>
Yellowstone cutthroat trout	(<i>Oncorhynchus clarki bouvieri</i>)	S, SC-A
Mountain whitefish	(<i>Prosopium williamsoni</i>)	
Mottled sculpin	(<i>Cottus bairdi</i>)	
Piute sculpin	(<i>Cottus beldingi</i>)	
Longnose dace	(<i>Rhinichthys cataractae</i>)	
Speckled dace	(<i>Rhinichthys osculus</i>)	
Redside shiners	(<i>Richardsonius balteatus</i>)	
Mountain sucker	(<i>Catostomus platyrhynchus</i>)	

Introduced non-native fish in the analysis area

<u>Common Name</u>	<u>Scientific Name</u>
Brown trout	(<i>Salmo trutta</i>)
Status Codes	

S: USDA Forest Service Regional Forester Sensitive species designation (Forest Service Manual 2670.5). Those plant and animal species identified by the Regional Forester for which population viability is a concern as evidenced by:

- A. Significant current or predicted downward trends in population numbers or density.
- B. Significant current or predicted downward trends in habitat capability that would reduce a species existing distribution.

SC: Idaho Fish & Game Species of special concern: native species that are either low in number, limited in distribution, or have suffered significant population reductions due to habitat losses, but is not likely to become threatened in the near future. There are 3 categories:

- A. SC-A: Species, which meet one or more of the criteria listed above and for which Idaho presently contains, or formerly constituted, a significant portion of their range (i.e. priority species).

Fisheries resources in the analysis area have been affected by the construction of Palisades Reservoir, grazing, roads, trails, wildfire, and recreation (including angling).

In this document, the fisheries resources in the analysis area are described in Characterization (this chapter), Reference Conditions, Current Conditions, Trends, and Recommendations. Generally, data prior to 1990 is considered reference conditions and 1990-present is considered current conditions in the Fisheries write-ups. This is primarily due to the data that was available for this analysis and most recent fisheries surveys occurring in the analysis area after 1990.

Data sources include scientific publications, interagency planning reports, interviews with individuals who live and work in the watershed, past internal and interagency letters and memos, meeting notes, and stream, fish, and riparian surveys by USDA Forest Service, Idaho Department of Fish & Game, and Idaho Department of Environmental Quality.

ISSUES/KEY QUESTIONS

Yellowstone cutthroat trout, a Regional Foresters Sensitive Species, occur in the analysis area. Bear and Elk Creeks are considered Yellowstone cutthroat trout strongholds by the Caribou-Targhee National Forest. Past and current management activities in the analysis area, including grazing, trail and road building/use/maintenance, recreation, and reservoir construction/operation have affected the quality of habitat available to these fish.

1. How and to what extent has the historic habitat of Yellowstone cutthroat trout been affected by land management activities?
2. What are the dominant sediment delivery mechanisms in the analysis area and how did they compare with natural processes? Where are the high risk areas?
3. What upstream migration barriers for fish exist in the analysis area? What actions are required to address these barriers?
4. How and to what extent has native fish in the analysis area been affected by the introduction of non-native fish? What actions are required to address these concerns?
5. What survey and monitoring should be conducted to gain a better understanding of the quality and quantity of aquatic species habitat and populations?

CURRENT CONDITIONS

Bear Creek

Raleigh Consultants (1991), contracted by the Palisades Ranger District in 1991, surveyed Bear Creek to assess the fish habitat conditions, identify habitat impacts, and identify habitat restoration opportunities. In their report, they discussed the value of the stream to Yellowstone cutthroat trout in that it provides quality spawning and rearing habitat. They attribute the reported recent decrease in angler success in Bear Creek to overfishing and recommend more restrictive angling regulations.

Bear Creek was sampled by Department of Environmental Quality in 2000 and analyzed using the macroinvertebrate biotic index (MBI). The upper site indicated the sampled headwater area did not fully support cold water biota potentially because it was impacted by fine sediment. The lower site indicated the lower watershed fully supports cold water biota (Zaroban and Sharp 2001).

The Caribou-Targhee Forest Fisheries Crew performed a fish distribution survey on Bear Creek in 2000. The stream was divided into 2 reaches; lower and upper. The lower reach began near the mouth of Spring Creek and extended to Chaparral Hollow. The riparian vegetation was dominated by willow and dogwood. In the upper parts of the reach, lodgepole pine, cottonwood, Douglas fir, and subalpine fir increased in frequency. Vegetation density ranged from high to low. Where stream bank vegetation density was low, bank cutting and sloughing were more prominent. Although impacts from past livestock grazing was observed, no current livestock grazing impacts were documented. Although the trail was located close to the stream at times, most of the time it was located a distance from the stream that had little influence upon aquatic or riparian habitat. Stream channel stability was rated as good (USDA Forest Service 2000).

The upper reach extended from the mouth of the South Fork of Bear Creek upstream approximately 2 miles. The riparian vegetation was dominated by a dense willow complex that paralleled the stream. Beaver activity was extremely frequent throughout the reach. Livestock grazing was more noticeable in this reach than the lower reach. Livestock trails were common in the riparian area and vegetation was heavily grazed upon. The stream substrate was dominated by cobble and gravel and surface fines were common. Stream channel stability was rated as poor (USDA Forest Service 2000).

Yellowstone cutthroat trout and mountain whitefish were the only salmonids collected during the survey. Both large spotted and fine spotted varieties of Yellowstone cutthroat trout were collected in Bear Creek (USDA Forest Service 2000).

Elk Creek

Elk Creek was sampled by Department of Environmental Quality in 2000 and analyzed using the macroinvertebrate biotic index (MBI). Three sites were sampled; representative sites in the upper, middle, and lower watershed. All three sites had cold water macroinvertebrates, indicating temperature was not a problem. However, the uppermost site had the fewest

coldwater macroinvertebrate indicators, which is probably a result of the headwater nature of the habitat (Zaroban and Sharp 2001).

Forest Fisheries Biologist Capurso visited Elk Creek in September 2002. He noted FS Road 058 was laid out relatively well, keeping its distance from Elk Creek for the most part. There were a couple areas where the road encroached on the stream, but topography prohibits moving those road segments away from the stream. One of these places was heavily rip-rapped. A culvert under FS Road 058 (had a concrete apron) had a small plunge at its outlet, but appeared to be passable at any time of the year for fish. FS Road 063 was also responsibly placed along West Fork of Elk Creek. However, it had more impacts upon that stream through sediment delivery at encroachment locations and one fish passage barrier culvert at the crossing of an unnamed tributary to the West Fork of Elk Creek. This culvert is located 1.55 miles up from the intersection with FS Road 058. There appears to be approximately 1 mile of habitat upstream of this fish barrier.

PAST CONDITIONS

Bear Creek

The first documented historic account of Bear Creek comes from the journals of Robert Stuart in 1812. He and 6 other men explored southeast Idaho in a large route that included the Portneuf, Bear, Salt, and Snake Rivers. They fished along the way. On September 20, 1812, they camped at the confluence of Bear Creek and the South Fork Snake River. They described their camp as a good fishing place (Webster 1968).

Bear Creek was named by Mike Yeaman (settled on Sulphur Bar in 1886) and Thomas Hainline (first owner of the H. Hill Ranch), who killed a bear at the mouth of the stream in 1890. In 1906, Bear Creek was called Pyramid Creek on the original proclamation map but the new name did not stick (Webster 1968).

During the construction of Palisades Dam, a haul road built across Bear Creek near its mouth blocked cutthroat trout spawner access to the stream from 1951 to 1956 when construction was completed (IDFG 1981).

During the summer of 1980, Bear Creek was surveyed by Targhee Forest Fish Biologist Jim Smith using the old GAWS methodology. This survey apparently occurred after a high flow event the previous spring. From the Bear Creek Campground to the Currant Creek Guard Station, he reported extensive cutting from high spring flows. Where the stream did not cut, willow stabilized the stream banks. Channel braiding was noted and the stream was described as shallow and fast with few pools. The stream substrate was mostly cobble. There was 63% cobble, 20% boulder, 14% gravel, and 3% sand and silt. Approximately 55% of the stream banks were unstable. During the survey, stream channel stability was rated in this reach as good. The same year, Idaho Department of Fish & Game electrofished 2 locations within this reach. Near the mouth of Elk Creek they collected 36 trout per 100 meters and just above the corral at the end of the campground road, they collected 31 trout per 100 meters (USDA Forest Service 1980). The sampling occurred in the fall and very few large fish from the reservoir were collected, indicating most cutthroat trout spawners use the stream in the spring and move back down to the reservoir (IDFG 1981).

From Currant Creek Guard Station to White Spring Creek, there was extensive bank cutting due to land movement and high flows. There were many braided channels. Bank vegetation was reported as grasses and forbs with few willows. The stream was described as shallow and wide with few pools. The stream substrate was dominated by 68% cobble, 19% gravel, and 9% sand and silt. Stream banks were 87% unstable. During the survey stream channel stability was rated in this reach as fair (USDA Forest Service 1980).

The survey report recommended the placement of half log structures in Bear Creek between Bear Creek Campground and White Spring Creek to increase pool development. Smith wisely suggested to initiate the project with a few structures and monitor their success prior to additional work. He also suggested cooperation with the landscape architect to minimize visual impacts (USDA Forest Service 1980).

From White Spring Creek to South Fork Bear Creek, there was still some bank cutting in places due to high spring flows, but much of the bank was bedrock. There were some deposition of fine sediment on the upper banks. The stream substrate was dominated by 29% cobble, 22% boulder, 10% gravel, and 7% sand and silt. Approximately 22% of the stream banks were unstable. The banks were well vegetated and pools were more frequent than the lower stream reaches. Pools mostly occurred behind boulders. During the survey stream channel stability was rated in this reach as good (USDA Forest Service 1980).

Upper Bear Creek (upstream of the mouth of the South Fork Bear Creek) was assessed for channel stability, substrate composition, and bank stability. Bank stability was rated as fair. Stream substrate was dominated by 44% gravel, 44% sand and silt, and 5% cobble. Stream bank instability was rated at 50% (USDA Forest Service 1980).

The South Fork Bear Creek had considerable cutting due to many sharp meanders in the stream and low bank rock content. Bank undercutting and silt deposition was described as extensive. Most of the stream bottom was coated in fine sediment and pools were being filled. Stream substrate composition was dominated by 49% cobble, 26% gravel, 21% sand and silt, and 3% boulder. Approximately 59% of the banks were rated as unstable. Clean spawning gravel was scarce. Beaver dams were breached, leaving mud flats upstream. During the survey, stream channel stability was rated in this reach as fair (USDA Forest Service 1980).

The North Fork Bear Creek, from its mouth to Milk Creek, had frequent raw stream banks and some pools had extensive deposits of silt and sand. Stream substrate composition was dominated by 56% cobble, 21% gravel, 13% sand and silt, and 1% boulder. Banks were rated as 81% unstable. The writer recommended restoration measures between the mouth and Milk Creek that included stream bank riprap and single-log pool making structures. During the survey stream channel stability was rated in this reach as fair. From the mouth of Milk Creek to where the trail leaves the North Fork in Section 24, the stream flowed through a steep, constricted valley with some wider valley inclusions. Stream banks were stabilized by bedrock, boulders, and tree roots, minimizing stream bank erosion. The stream substrate was dominated by 42% cobble, 34% gravel, 13% boulder, and 6% sand and silt. The stream banks were approximately 24% unstable. During the survey, stream channel stability was rated in this reach as good (USDA Forest Service 1980).

In August 1981, Palisades District Ranger Norm Huntsman signed a decision document to place habitat improvement structures in Bear and Elk Creeks to provide cover and develop pools. These were placed in the streams in 1982 and consisted of log structures. Most structures were half logs placed in the stream parallel with the flow.

Bear Creek has had a long history of fish stocking (1947-1984). However, this fish stocking has apparently not affected native fish populations through genetic introgression or interspecies competition. Except in 1962, only Yellowstone cutthroat trout (Henry's Fork origin) were stocked in the stream from 1947 to 1984. Stocking did not occur every year and seldom occurred more than once a year. Only one stocking each occurred in the 1970's and 1980's. The one stocking in the 1980's consisted of fine spotted Yellowstone cutthroat trout from Jackson

Hatchery (current source for reservoir stocking). In 1962, 23,700 2-3 inch kokanee were released in Bear Creek. Apparently, that run never established like it did across the reservoir at Big Elk Creek.

Elk Creek

In 1980, Elk Creek was surveyed by Targhee Forest Fish Bio Jim Smith using the old GAWS stream survey methodology. From its mouth upstream 1 km, he noted sheep grazing. The stream banks were well armored with high bank rock content, some bedrock, and good vegetation. Stream substrate composition was estimated at 79% cobble, 16% gravel, 4% boulder, and 1% sand and silt. Stream bank instability was estimated at 40%. Beaver activity was noted. During the survey, stream channel stability was rated in this reach as fair. The same year, Idaho Department of Fish & Game electroshocked this reach and documented a trout population of 39 per 100 m. All of these fish were Yellowstone cutthroat trout and 25% of them were fry (USDA Forest Service 1980).

An additional reach was sampled from 1 km to 1.5 km from the mouth of Elk Creek. This reach had high bank rock content, dense tree and brush riparian vegetation in places, and stable flows. The stream banks were heavily impacted by sheep. Vegetation on the stream banks and upper slopes were damaged and vegetation was grazed to bare ground in places. Stream substrate composition was estimated at 99% cobble and 1% gravel. Stream banks were estimated as 82% unstable. Stream banks were caved in by sheep trampling in places where trees and shrubs were not dense enough to protect them. Beaver activity was noted. There were several areas where the stream was cutting into the fill slope of FS Road 058. During the survey, stream channel stability was rated in this reach as fair. Smith recommended better herding or adjustments in grazing schedules to initiate restoration of observed impacts. He also suggested the placement of single-log structures to increase pool frequency (USDA Forest Service 1980).

The West Fork of Elk Creek was surveyed from its mouth upstream to where it became intermittent. The stream was described as very stable, with the stream substrate and banks composed mostly of boulders and large cobble. The stream substrate was estimated at 56% cobble, 25% boulder, and 19% gravel. No stream banks were unstable. Dense vegetation occurred on the stream banks. There were some damage to stream banks and riparian vegetation by sheep in the lower part of the reach. Pools were frequent and occurred primarily behind boulders. During the survey, stream channel stability was rated in this reach as good (USDA Forest Service 1980).

TRENDS

Bear Creek

The trend in Bear Creek appears to be stable. Considering the reduction of past livestock numbers that used the watershed, there may be a long term improving trend. Although slight impacts from livestock grazing and the trail were reported in current conditions, these impacts do not appear to have a serious impact upon aquatic or riparian habitat. Due to the high power nature of Bear and Elk Creek (high flows and high bedload), there are few signs of the habitat structures placed in Bear Creek in 1982. The most obvious structures that remain are the half logs that are now nearly buried in the substrate of Bear Creek.

Elk Creek

The trend in Elk Creek appears to be stable. Considering the reduction of past livestock numbers that used the watershed, there may be a long term improving trend. Due to the high power nature of Elk Creek (high flows and high bedload), there are few signs of the habitat structures placed in 1982. The road system up Elk and the West Fork of Elk is established and will not likely expand in the future. Although these roads affect the streams in the drainage, these impacts appear to be relatively slight (considering sedimentation) and have not increased since the construction of the roads. The culvert posing a barrier to upstream-migrating fish under FS Road 063 is a negative trend that occurred at road construction. However, this trend, a legacy of the construction of the road, is easily reversible.

RECOMMENDATIONS

Restoration/Protection Measures

Remove the impassable culvert at FS Road 063 where it crosses an unnamed tributary to West Fork Elk. Create a trailhead at this location and construct a trail bridge over the tributary. The road beyond this point would be converted to a trail that would extend to the historic trailhead. This would open up an additional mile of habitat for Yellowstone cutthroat trout in West Fork Elk Creek and decrease road-related sedimentation from FS Road 063. If the additional 2 miles of road are needed beyond this crossing for some other resource reason, replace this culvert with a bridge or bottomless arch to insure upstream passage of fish. The slope of the stream at this crossing does not facilitate the placement of a culvert with the intent of successful fish passage.

Monitoring/Inventory Measures

Perform a Caribou-Targhee Forest Fish Distribution Survey on Elk and West Fork Elk Creeks.

LITERATURE CITED

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**BEAR CREEK WATERSHED ANALYSIS
FISHERIES PHOTOS**



Snowmelt in lower Bear Creek, 1990.



Habitat improvement logs in Bear Creek, photo taken 1990.



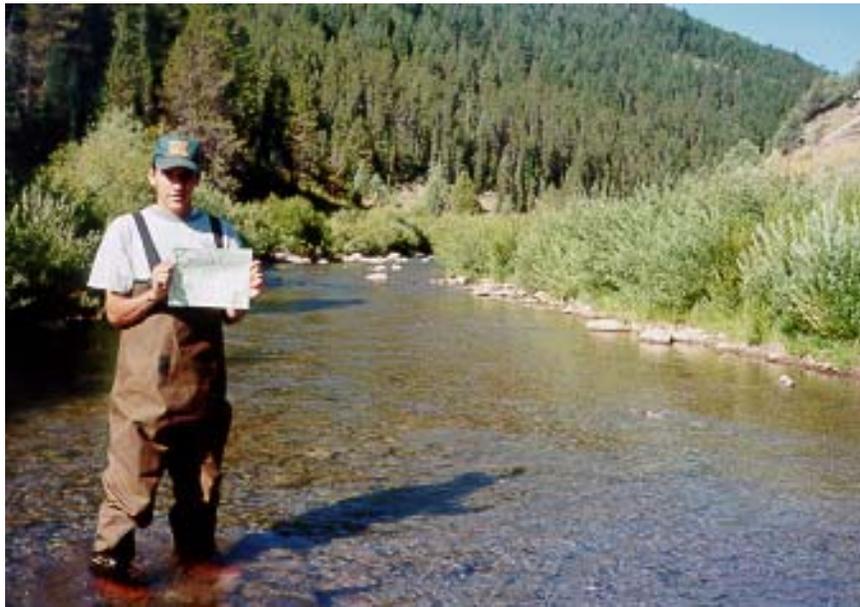
Beaver dam in Bear Creek, 2000.



Fine spotted cutthroat trout from Bear Creek, 2000.



Fine spotted Yellowstone cutthroat trout from Bear Creek, 2000.



Typical habitat in lower Bear Creek, 2000.



Section of raw stream bank in lower Bear Creek, 2000.



Upper Bear Creek, 2000.



Habitat improvement logs in Elk Creek, photo taken 1987.



Habitat improvement log in Elk Creek, photo taken 1990.



FS Road 063 culvert for tributary to West Fork Elk Creek. Barrier to upstream migration.



FS Road 058 crossing over Elk Creek. Metal culvert with a concrete apron.