Riparian Area Condition
Item 22

OBJECTIVE: Ensure compliance with Forest Plan standards for fisheries, water, and wildlife.

DATA SOURCE: Interdisciplinary team reviews and monitoring information from resource specialists.

FREQUENCY: Annually

REPORTING PERIOD: 1998

VARIABILITY: Deviation from riparian area and fisheries objectives.

EVALUATION:

Forest Plan objectives for fish and riparian areas center around preventing adverse effects on fish habitat by maintaining riparian flora, fauna, and water quality. This monitoring item discusses activities and monitoring associated with timber harvest, construction, fire management, facilities management, and grazing in riparian areas, all of which can affect riparian function. Although fire is a natural process on the landscape, it can have temporary adverse effects on fish habitat. Currently the Forest Plan does not acknowledge the role of fire in riparian areas, or specify the effects of fires and fire suppression on fisheries and riparian areas. These issues need to be analyzed in the Forest Plan revision. Monitoring of recreation effects to riparian areas is discussed in Items 2, 28, and 29, as well as the wilderness monitoring sections. Restoration of riparian areas is covered in Item 19, Watershed Effects and Restoration. Fisheries monitoring may be found in Items 21 and 41.

Previous monitoring reports have documented the need to address various riparian issues, including describing desired conditions for riparian areas, determining how to measure livestock impacts, and establishing thresholds for impacts. A system of assessing riparian health, called "Proper Functioning Condition," was developed by the Bureau of Land Management and is being adopted by the Forest Service nationally. This direction is expected to help us answer some questions regarding riparian management.

MONITORING RESULTS:

Timber Harvest and Construction

Riparian timber harvest was monitored this past year as the **Lost Trail Powder Mountain Ski Area Expansion** project got underway. Forest sale administrators and an interdisciplinary team followed and reviewed the work. Crossings were placed over streams and wet areas where equipment was operating. Harvest occurred along or in several riparian areas, including along East Fork Camp Creek, which coincides with one of the lift corridors, as disclosed in the Lost Trail EIS. Most of these areas were helicopter logged and the slash hand piled to minimize effects on soils and riparian vegetation. Stumps were left in these areas rather than being pulled out, in order to reduce soil and hydrologic disturbance. Some slash still remains in riparian areas, and will be removed by hand. Mitigation measures were successfully implemented throughout most of the numerous riparian areas. The contractors did an excellent job of keeping equipment out of the East Fork Camp Creek riparian area.

Three specific areas were identified which did not meet the intended mitigation. One riparian area was ground logged and another wet pocket was affected by a skidder, leading to more soil compaction than was anticipated. This latter small area (50x50 feet), which lies in a ski run, is not expected to recover its natural riparian vegetation. Another very small riparian area (3x3 feet) on a ski run was impacted by an excavator, which did change the hydrologic function of that area. Riparian vegetation still remains there and it will be monitored to see if the area recovers. Revegetation of disturbed areas is ongoing, and we will continue to monitor its implementation and effectiveness. Overall, the harvest in riparian areas went as planned, with mitigations implemented as specified in the EIS. In addition, construction of the Huckleberry Lift towers in riparian areas met all the mitigation, including working the excavator from adjacent dry hillsides, piling excavated soil out of the riparian areas, working during dry periods, etc. Effectiveness of all the mitigation will be monitored in the East Fork of Camp Creek below the

ski area. A stream channel survey was conducted before implementation and will be remeasured annually to assess the ski area expansion's effect on the stream.

The interdisciplinary monitoring team also reviewed conditions at the **Lost Trail Fen**, which lies adjacent to the road and parking lot at Lost Trail Ski Area. The ski area expansion activity has successfully avoided impacts to the fen, but ongoing snow plowing operations have resulted in some rocks and debris from the road ending up along the fen's edge. District employees worked with the ski area owner to minimize additional impacts during the 1998-1999 ski season. Some of the debris and the lack of vegetation on the fill slope above the fen probably resulted from Highway 93 reconstruction activities over the past few years. A project is needed which would remove some of the debris and revegetate the fill slope with shrubs, trees, and grass.

Fire Management

Prescribed management-ignited fires are generally designed to avoid riparian areas in order to prevent adverse effects on fisheries. It is becoming clear, however, that many of these areas burned historically. Future fire management on the Bitterroot NF will need to consider using prescribed fire in riparian areas to restore natural disturbance patterns.

We have reported in previous years on a riparian study in ponderosa pine and larch stands along Larry Creek. One of the thinning units was treated with a management-ignited prescribed fire in September of 1997. The **Larry Creek Research Burn** (unit #2, the middle unit) was inspected by two fisheries biologists following the fire, once in the fall of 1997 and again during peak flows in 1998. The burn was light and did not expose much soil. Hydrophobic soil conditions did not occur since the fire just burned in the duff layer. Large woody debris was charred, but remained relatively intact and abundant following the burn. Riparian zones immediately adjacent to Larry Creek did not burn. These areas were damp and the fire went out before reaching the stream channel. The fire line was rehabilitated after the fire. Overall, this burn did not appear to cause any immediate stream impacts. Vegetation response in this unit was minimal in the spring of 1998, with only a few patches of snowberry sprouts and mullein. Understory vegetation will be measured by researchers in coming years to learn the effects of the harvest and burn treatments in this Larry Creek project. A small wildfire along the north side of Larry Creek adjacent to unit #2 was also inspected. It burned out the small fir trees in the riparian area, but left behind the big pines and a green carpet of forbs and grasses.

The **Big Creek management-ignited Fire** received substantial monitoring in the spring of 1998. Information on the riparian effects are noted here, while vegetation monitoring is found in the Silvicultural and Fuel Prescriptions section, and air quality effects are covered in the Air Resource section. The resource team which monitored fire effects found no effect to Big Creek from this burn. The burn generally avoided the Big Creek riparian habitat conservation area (RHCA), which extends 300 feet from the bank of the creek. In one or two spots on the far east end of the unit the fire backed down and burned scattered portions of the outer 150 feet of the RHCA. The burn intensity in these areas was very light. Only a few trees showed signs of scorched needles within the RHCA. The burn did not touch Big Creek itself.. On the uplands, approximately 20 percent of the trees showed scorch. The burn intensity for actual burned acres was about 90 percent light, nine percent moderate, and high for one to two acres. The soil duff layer was generally intact and protected, with no measurable sediment input or water increases expected. On the uplands, the fire burned a mosaic through scattered areas of some smaller intermittent Big Creek tributaries. Burn intensity was light, soil integrity was protected, and no measurable sediment input from these intermittent streams is anticipated.

Facilities Management

In the spring of 1998, a significant leak was discovered in **Tin Cup Dam**. There was an effort to alleviate the immediate danger of dam failure by lowering the water level behind the dam. To do this, the spillway was lowered, first by using hand crews and later with an excavator. Finally, after the water level in Tin Cup Lake had dropped, the dam was partially breached. From the start, this project had potential to affect fish and stream conditions in Tin Cup Creek. Monitoring by Forest Service personnel occurred continually (24 hours per day) throughout the project. In addition, transects measuring stream sedimentation were read before, during, and after the emergency repair work (Table 29). Suspended sediment samples were taken in June in Tin Cup Creek near the Forest Service boundary, approximately ten miles downstream of the dam. The results are shown in Table 30.

TABLE 29 - PERCENT SURFACE FINES IN TIN CUP CREEK BEFORE, DURING, AND AFTER THE TIN CUP DAM EMERGENCY

Transect #	Transect Location	Baseline % Fines September 1996	% Fines After November 1997 Repairs	% Fines In October 1998
1	9.5 m below dam	34	31	Not measured 1/
2	20.5 m below dam	27	41	40
3	34.0 m below dam	40	95	99
4	74.0 m below dam	28	30	86
5	1.5 miles below dam	24	17	38
6	1.5 miles below dam	6	4	26
7	1.5 miles below dam	2	1	26

1/ Transect #1 could not be remeasured in October 1998 because the site was covered by the rip-rap on the downstream side of the dam.

TABLE 30 - SUSPENDED SEDIMENT IN TIN CUP CREEK DURING TIN CUP DAM EMERGENCY

Date	Suspended Sediment (mg/l) 1/
6/02	4.7
6/03	1.1
6/04	27.2
6/05	2.8
6/06	3.8
6/07 (AM)	5.3
6/07 (PM)	5.4
6/08	3.3
6/09	2.6
6/10 (AM)	1.8
6/10 (PM)	2.2
6/11	5.9

1/ The stream would appear clear at suspended sediment levels of 10 or less milligrams per liter.

Monitoring during the hand work phase of the project indicated that very little sediment reached the stream channel from that effort. The portion of the project having the most impact on fisheries in Tin Cup Creek occurred when the spillway was excavated using heavy equipment. This involved removal of sediments from the spillway and from the lake bed where it entered the spillway. The material in this area contained high levels (more than 80 percent) of fines, mostly very fine silts and clays that remained in suspension for considerable distances downstream. Suspended sediment levels in the spillway and stream below the spillway were heavy whenever the excavator was digging in the water. Water exiting the spillway was a dark reddish-brown with near zero visibility when the excavator was removing the fines in the reservoir delta. Turbidity about 1.5 miles below the dam at the upper trail crossing was very similar to that occurring in the spillway. Data from the sediment transects, displayed in Table 29, show large increases in sediment at four of the seven transects. Large increases were not seen at transect #2 because the fast moving water cleared sediment from this site. Sediment increased at transect #3 as a result of 1997 work at the dam, cleared out during the 1998 runoff, then increased again due to the 1998 work. Attempts were made to minimize sediment and turbidity from the digging, but options and success were limited given the urgency of the situation and the very fine sediments present.

The excavation of the spillway likely had a major impact on fish habitat quality, at least between the dam and the Kerlee Lake tributary. Bull trout are not present in this reach, but westslope cutthroat trout are distributed

throughout the reach, and probably received the brunt of the impact. Significant measurable sedimentation was visible between the lake and upper trail crossing and beyond. This was definitely more turbidity than fish typically face during peak runoff. Although some fish were expected to die from the turbidity, especially westslope cutthroat trout between the dam and upper trail crossing, widespread mortality did not appear to occur and no fish carcasses were observed during walk-through and snorkel surveys conducted in July and August following high water. The biggest impacts to fish are indirect, and come from reduced habitat quality caused by siltation of spawning gravels, stream bottom crevices, and stream margins. It could take several years to flush all of the sediment from this project. Spawning in 1998 was likely affected for westslope cutthroat trout in Tin Cup Creek, especially between the dam and the Kerlee Lake tributary. Bull trout should fare better because they only occur below the Kerlee Lake tributary, where sediment impacts will probably be less adverse. Bull trout in section of Tin Cup Creek near the Kerlee Lake tributary probably had a poor spawning year in the autumn of 1998 due to siltation of spawning gravels from the Tin Cup project.

In October 1998, the sediment monitoring transects were remeasured and the recently completed work at the dam was inspected. Major sedimentation occurred throughout at least the first two miles of Tin Cup Creek downstream of the dam as a result of the spillway excavation. Sediment levels were high in the stream bed near the dam. All of the sediment transects showed large, visible increases in sediment, and substrate embeddedness was very high (cobbles are essentially glued together). Monitors that had been placed in clean boulder crevices in late May were completely covered by a three to four inch layer of thick, sludgy reservoir silts. Some of this sediment will flush downstream during the next runoff (late spring 1999), but it may take at least five to ten years for most of the sediment to wash downstream and disperse throughout the drainage. Some of the large deposits in the bottoms of pools may not leave for many decades. At the dam, long-term erosion control work included: recontouring of fill material, lining the breach with rip-rap, and revegetating bare soil with grass and shrubs.

Stream temperatures were continuously monitored throughout the project at three sites in Tin Cup Creek using HOBO-TEMP thermisters. Monitoring data showed that the rapid drawdown of the reservoir, combined with unusually warm weather, produced unnaturally high water temperatures in Tin Cup Creek for the first one to two miles below the dam from June through September of 1998. These maximum temperatures exceeded 20 degrees Celsius, which is four to six degrees higher than usual. The warm stream temperatures were unlikely to have directly killed any westslope cutthroat trout or bull trout, but probably did cause some physiological stress and reduced growth, which may have contributed to increased overwintering mortality during the winter of 1998-99. Our data also indicates that stream temperatures cooled as water moved downstream through the canyon. This cooling was caused by the influx of colder water from numerous side canyon tributaries. Maximum stream temperatures at the trailhead near the canyon mouth were consistently five to seven degrees Celsius colder than those exiting Tin Cup Dam, and this pattern occurred throughout the entire monitoring period. The data show that the only section of Tin Cup Creek which was significantly affected by warmer than usual water was the first two miles below the dam, a section of stream that contains abundant westslope cutthroat trout, but no bull trout.

Grazing

Meadow-Tolan Allotment. Monitoring points were set up in this allotment as discussed in the Allotment Management Plan. Initial readings on utilization and stream bank profiles were taken at these points near Meadow Creek. This information will serve as baseline data for measuring future grazing effects on the stream and adjacent vegetation. The fence along Meadow Creek, which was constructed in 1996 as part of INFISH mitigation, was effective in excluding cows during the 1998 grazing season. One of the new monitoring points is located inside this exclosure.

Bass Creek Allotment. The Larry Creek riparian area has been monitored over the past four years. Impacts have been negligible in the past, but this year three cattle crossings of Larry Creek were observed. The increased activity is likely due to the removal of grand fir thickets along the creek caused by the Larry Creek Research Burn and the small wildfire in 1997 that burned north of the creek. Construction of a 500-700 foot drift fence on the north side of the creek has been proposed to keep the cattle out.

Gold Creek Allotment. Monitoring of riparian conditions in the Muddy Springs and No Name Creek was conducted before, during, and after the grazing season in 1998. Photos were taken at pre-established photo points to track restoration of these riparian areas. In No Name Creek the drift fence was only partially effective this year. In one place a downed tree had knocked over the fence. Cows circumvented the fence and appeared to have spent considerable time in the riparian area. Some of the progress that was made in restoring the stream

channel and riparian vegetation in 1996 and 1997 was reversed in 1998 due to the ineffectiveness of the fence. Plans are in place to repair and extend the fence before the 1999 grazing season. In Muddy Springs, this was the first season cows were found inside the riparian area fence. The area of impact was small and there was no damage to the stream channel. We were unable to determine how the cows were getting inside the fence. Although the impact was minimal, the area will require close monitoring in 1999 to ensure that cows are kept out and that the recovered riparian area does not degrade.

Skalkaho Allotment. Riparian conditions along Gird Creek were monitored several times in the summer of 1998. There was evidence of cows in the riparian area, but the impacts were minor and very localized. Most of the impacts along Gird Creek were caused by cows trespassing from adjacent private land. That situation was addressed during the grazing season. Impacts from allotment cows were restricted to the immediate area surrounding the road stream crossings of Gird Creek and Fullerton Gulch.