**Lolo National Forest Fisheries and Aquatic Monitoring Report Summary, FY2000**

The past year has presented several workload challenges to the Lolo Fisheries program. In an effort to maintain efficiency, we have had to prioritize tasks and reduce time expenditures on some tasks that are undertaken. Relative to the annual monitoring report, we completed designed field monitoring as planned, qualitatively assessed general trends, and concluded that there were no significant findings that would cause us to suggest substantial changes to the FY2000 program of work or to the way the forest conducts business. Based on this, we have not produced a detailed report of monitoring results from FY1999 activities. A general summary of each of the Fisheries Monitoring Items, however, is provided in the following paragraphs.

**ITEM 2-1**
**Fish Habitat Improvement**

| ACTIVITY, PRACTICE OR EFFECT MEASURED | REPORTING PERIOD | VARIABILITY (+/-) WHICH WOULD INITIATE FURTHER EVALUATION |
|---|---|---|
| Improvement of Fish Habitat. | 5 years | Forest must accomplish 75% of habitat improvement programmed for a 5 year period. |

Fisheries Biologists, Hydrologists, and District Resource Staff accomplished two fish habitat improvement projects in FY 99 (Little Joe Creek and West Fork Swamp Creek). Approximately 14 miles of stream habitat were restored. Projects were focused on providing migration passage and reducing road densities, which directly affected stream habitat. They included road obliteration, streambank and riparian restoration, and culvert barrier removals. The Little Joe project specifically benefited bull trout, while the West Fork Swamp Creek project primarily benefited westslope cutthroat trout.

**ITEM 2-2**
**Aquatic Habitat And Fish Population Assumptions**

| ACTIVITY, PRACTICE OR EFFECT MEASURED | REPORTING PERIOD | VARIABILITY (+/-) WHICH WOULD INITIATE FURTHER EVALUATION |
|---|---|---|
| Validation of aquatic habitat quality and fish population assumptions in Forest Plan. These were used to predict effects of management activities and evaluate actual effects. | Annual | A decline in aquatic habitat/fish population for more than one year. |

In FY99, we completed field monitoring on the six established components of the fisheries and aquatics monitoring plan (paired watersheds, reference reaches, baseline inventory, implementation, effectiveness, and special projects). Paired watersheds showed similar patterns and trends as noted in the FY99 Monitoring Report, which was expected due to the short

timeframe since inception. Twelve reference reaches were surveyed on the forest as part of a multi-forest Aquatic Reference Condition Assessment for Forest Plan Revision. Reference data has not been compiled or analyzed to date due to a loss of funding on the planning team. Baseline inventories were completed on several reaches across the forest, and showed the same patterns observed over the last decade (Lolo NF Fisheries and Aquatic Monitoring Report, 1999). Implementation monitoring included three forest monitoring trips to review individual projects (Savanac/Big Creek, Dry Camp and McCormick). These showed general consistency with fisheries objectives, with the only exception being minor portions of Big Creek where long-term channel stabilization techniques and habitat development appeared to be less than optimal. Effectiveness monitoring consisted of continuing the Puyear Revegetation monitoring, with similar results as in 1998. Redd surveys were continued in the Rock Creek watershed to round out the special projects category. Similar trends in redd densities and locations were observed as in past years.

**EMERGING ISSUES:** The petition to list westslope cutthroat was determined to be not warranted by the United States Fish and Wildlife Service (USFWS) at the present time.

## ITEM 2-3
## Riparian Activities and Effects

| ACTIVITY, PRACTICE OR EFFECT MEASURED | REPORTING PERIOD | VARIABILITY (+/-) WHICH WOULD INITIATE FURTHER EVALUATION |
|---|---|---|
| Assessment of riparian activities on riparian dependent resources | Annual | Visible or measurable decline in aquatic habitat/fish population for more than 1 year |

**Introduction:** The objective of this monitoring item is to determine whether activities within riparian areas are affecting riparian dependent resources, particularly fish populations and aquatic habitat.

Wildlife and aquatic habitat restoration goals on the Lolo NF have led to a series of road closure projects often requiring major culvert removals. One such project was selected for detailed monitoring.

Road 17384 was constructed in the late 1970's. As part of the construction, 24 inch culverts were installed to cross small perennial and intermittent streams and a 72 inch x 96 inch "squash pipe" culvert was installed to cross Siegel Creek at a point about three miles upstream from its confluence with the Clark Fork River. Seigel Creek is a tributary of the Clark Fork in the “Cutoff” reach about four miles from where the river joins the Flathead River.

Average bankfull width of Seigel Creek in the reach where the large culvert was installed is 12 feet. Stream width was necked down to approximately 8 feet to pass through the culvert. Figure 1 depicts the culvert in 1979.

Figure 1. Main crossing of Seigel Creek by Road 17384 in 1979.

By 1998 the channel of Seigel Creek had reacted to the increased velocities through the undersized culvert by scouring the streambed to a depth of 5.8 feet below the bottom of the culvert and widening the channel at the outlet to 15 feet. The plunge pool maximum depth from the surface was 3.2 feet.
(Figure 2). The baseflow drop distance of 2.8 feet at the outlet of the culvert created a barrier to fish passage upstream. Scour and in-channel sediment production also continued.

Figure 2. Culvert from Figure 1 as it appeared in 1998.

An environmental analysis of a road obliteration and channel restoration project was completed by Plains Ranger District personnel. Removal of the culvert and rehabilitation of the crossing site took place in late summer 1998.

**Methods:** Based on an analysis of the access needs of the area served by Road 17384, a Level III closure of the road was recommended. A Level III closure consists of: removing all structures at stream crossings, restoring stream drainageways, outsloping or water-baring the road surface, ripping the road prism, seeding and fertilizing and scattering slash and brush over disturbed areas. Best Management Practices (BMP's) were followed throughout the project.

The on-site monitoring during this watershed/fisheries restoration project consisted of assessing the effects to the existing vegetation on the road from equipment use, instream sediment sampling of two culverts removed on live streams, and photographic documentation at all the culvert removal sites (one dry intermittent channel and two live perennial channels).

All culvert removals were conducted in the following stages:

1. Brush/fill removal and clean water diversion where applicable (Figure 3, large culvert),
2. Culvert removal (Figure 4, small culvert),
3. Channel shaping and stabilization (Figure 5, large culvert; Figure 6, small culvert).

Figure 3. Main Seigel Creek culvert with fill partially removed (note straw bales for sediment control and main flow still through pipe).

Figure 4. Removing 24 inch Seigel Creek tributary culvert.

Figure 5. Main Seigel culvert site after removal (note plastic sheeting and by-pass culvert used to isolate streamflow from disturbance).

Figure 6. Twenty-four inch culvert site after removal, channel stabilization and bank reshaping.

Data Collection (1998): The restoration and monitoring were conducted at base flow. Sediment samples were taken using a DH48 integrated grab sampler on the unnamed tributary (24" corrugated metal pipe) and the DH48 and two automated sediment samplers on the Siegel Creek sites. Additional monitoring at the main Siegel Creek site included periodic stream temperature, Riffle Stability Index (RSI) pebble counts, percent surface fine counts, stream discharge, bedload samples and narrative reach summary information.

During the main culvert removal, grab sample intervals were at 5, 15 and 30 minutes depending on removal stage. Pre-removal sediment concentration ranges were 1-2 mg/l (less than 2 lbs/day load) both upstream and just downstream of the culvert. Sediment load was calculated in pounds/day and tons/day using the average discharge of 2.76 cfs during the removal phase on 08/04/98. The average sediment load for the discharge in tons/day during the removal phase was 0.07 tons per sampling interval with a peak load measurement for this activity of 0.4 tons/day. At 1.5 miles downstream sediment remained at or near pre-project concentrations.

Automated sediment samplers were used above the project (as a control) and 150 feet downstream of the project. Samples were taken at 15, 30 or 60-minute intervals depending on removal stage. Pre-removal sediment concentrations were 1-2 mg/l. The control site concentrations remained between 0.8 mg/l and 3.0 mg/l with an average load of less than 2 lbs/day over the course of the project. The average sediment load during the removal phase in tons/day was .04 tons per sampling interval. The peak load measurement for this stage was 0.30 tons/day. Sediment concentrations continued decreasing after removal. The sediment samplers continued to monitor for 24 hours after the final project stage; sediment loads decreased below 0.01 tons/day.

Preliminary conclusions from this 1998 monitoring indicate sediment levels from the culvert removal did increase for a short period during activity. Sediment concentration levels decreased to near pre-removal levels in about 24 hours. Most of the sediment released during this removal

appeared to settle out in the first several hundred feet downstream of the project. Of about 500 cubic yards of material removed from the crossing, between 1 and 2 cubic yards were released to the stream.

Follow-up Data Collection (1999): The Seigel Creek culvert removal and road restoration area were re-visited on August 26, 1999. Additional monitoring was done to assess recovery and effectiveness of the stabilization measures.

The Seigel Creek culvert removal sites and associated channel reconstruction showed no signs of bank instability, downcutting, headcutting, or excessive channel adjustment (Figures 7 and 8). Permanent photo points were established at all activity locations.

Grab samples were taken above and below the large culvert removal site for sediment concentration determination. Discharge at the time of the visit was about 3 cfs, concentration was 1 to 3 mg/l. A surveyed channel cross-section was established in the lower riffle below the last reconstructed pool. A Wolman Pebble Count/RSI procedure was re-done below the reconstructed channel. Percent Surface Fines (PSF) using the Grid Toss Method was measured within the reconstructed pool tail-outs and in the PSF locations located prior to the culvert removal.

The 24 inch culvert removal sites along Road 17384 are stable with no adverse channel adjustments. Only one tributary has perennial flow and a hand grab sample was taken at this location for Total Suspended Sediment (TSS) concentration. Flow was about 0.75-1 cfs and concentration was about 2 mg/l.

Figure 7. Seigel Creek large culvert removal site in August 1999.

Figure 8. Seigel Creek tributary small culvert removal site in August 1999.

**Results:** Data tables of PSF, TSS and RSI at the large culvert removal site for 1998 and 1999 comparisons are outlined below.

**Table 2-3A.** Percent Surface Fines (PSF): Grid Toss Method at Pool Tail Outs.

| ***Location*** | ***% Pre-Culvert Removal 1998*** | ***% Post Removal Prior to Spring Runoff*** | ***% Post Runoff 1 year After Project, 1999*** |
|---|---|---|---|
| Above Project Pool 1 | 6% | 2% | 7% |
| Below Project Pool 1 | 4% | 21% | 9% |
| Pool 2 | 6% | 3% | 8% |
| Pool 3 | 3% | 5% | 10% |
| Pool 4 | 6% | 8% | 8% |
| Reconstructed Lower Pool 1 | n/a | 85% | 8% |
| Middle Pool 2 | n/a | 80% | 7% |
| Upper Pool 3 | n/a | 64% | 7% |

**Table 2-3B.** Total Suspended Sediment (TSS): Hand Grab Samples using a DH-48 Sampler.

| ***Location*** | ***Pre-Culvert Removal Sediment Load, 1998*** | ***Post Culvert Removal Sediment Load, 1998*** | ***1 year after Project Sediment Load, 1999*** |
|---|---|---|---|
| Above Project | .001tons/day | .001tons/day | .01tons/day |
| Immediately Below Project at First Riffle | .001tons/day | Range .001-.4tons/day | .02tons/day |

**Table 2-3C.** Riffle Stability Index (RSI), Includes Wolman Pebble Count.

| ***Year*** | ***D50*** | ***D84*** | ***Mean Mobile Particle**** |
|---|---|---|---|
| 1998 Pre-Project | 52mm | 100mm | 46.83mm |
| 1999 Post-Project | 33mm | 128mm | 76.95mm |

*Taken from first point bar downstream.

**Evaluation:** Conclusions from two years monitoring suggest that PSF within the constructed pools at the large culvert removal site have declined to near pre-construction levels. Instream PSF below the project are still above pre-project levels. Sediment load in Seigel Creek in 1999 was slightly higher both above and below the project area, a reflection of runoff conditions. The D50 size class of bottom material had a 2 mm decrease immediately below the removal area while the point bar mean largest mobile particle had a 30 mm increase. This indicates the newly formed channel with more natural dimensions is adjusting sediment transport through the reach with stream discharge.

The road stabilization, water bars, outslopes and recontoured areas were photographed and no adverse problems were observed. Seeding in the recontoured areas and at waterbars had excellent germination. Spotted knapweed is a problem in areas not seeded and fertilized. No weed treatment was done prior to this road closure.

Bank vegetation recovery is still in the early stages. Planted dogwood cuttings from onsite had about a 60 percent survival rate at the large culvert site. Observations suggest the smaller and younger cuttings placed several inches below bankfull stage had the best success rate at this site. Willow and dogwood are not present at the smaller culvert sites and no cuttings were planted there. Bank vegetation other than seeded grass is slow to regenerate. Grass seeding (standard Lolo mix) had excellent germination and at present has out-competed the noxious weeds in the adjacent bank areas.

Finally, the 500 cubic yards of fill that were vulnerable to release in a culvert failure were removed from the channel with between one and two cubic yards loss and no adverse affects to channel stability.

**Recommendation:** Continued yearly monitoring will provide recovery trends over time. The channel cross-section and profile measurements will be used to assess channel adjustments in dimension and stability in following years.