

# **BAER**

## **Burned Area Emergency Response Engineering Report**

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**Objectives:** Evaluate the effect of the Yolla Bolly Complex fires on the Forest's infrastructure and the possible damage to the infrastructure, forest resources, and surrounding watershed due to increased runoff from burned slopes.

**Issues:** The issues of concern include current damage and the potential of damage caused by increased runoff. Engineering concerns include culvert blockage and failure, erosion of road surface and road bed, and road damage that poses a safety threat.

### **Observations:**

**A). Background information:** The majority of the fire lies within the wilderness. The fire boundary encloses approximately 16.5 miles of forest roads with the majority of those roads are in the Trough fire area. Overall the roads are in decent shape but do not have adequate drainage structures to handle the increased runoff expected from the fire damage.

**B). Reconnaissance Method:** All reconnaissance was completed by vehicle and foot access. Areas of high/moderate burn severity and specific values were the priority for field survey.

**C). Findings/Description of Emergency:** The roads generally run along the top of the ridges and there is not much concern with runoff issues effecting the roads, with the exception of the 27N27 road which runs through the middle of the trough fire. There are a few drainage crossings along that road that could be a concern. Other concerns that where seen on the roads surveyed include:

- Concern of pipes plugging or overtopping and washing away fill (Figures 1 & 2).
- Erosion at pipe and dip outlets with no energy dissipaters (Figure 3).
- Stump holes in road bed and fill slopes (Figure 4 & 5).
- Open cat lines and decommissioned roads that could suffer erosion and pose a safety concern if not closed.
- Degradation of road surface drainage profile causing runoff to flow down the road.
- Lower water demand from burned vegetation and increased flows will likely increase seepage onto road surface at existing spring when water table is recharged (Figure 6).
- Berms and/or through cuts that channel water on road surface with inadequate drainage relief and erosion protection.

**Treatment recommendations:**

**A). Management treatments:**

**27N27**

- Construct rocked critical dip to accommodate overtopping and protect the road fills-5 (\$13,500)
- Rock dissipater for outlets of shot gunned culverts- 3 (\$2,400)
- Repair stump holes-6 (\$1,800)
- Construct rocked rolling dip at spring location. (\$1,200)
- Construct rolling dip above and/or below bermed sections-3. (\$1,500)
- Note: Mobilization cost estimated at ~ \$12,000.

**27N27 and 27N02**

- Storm Patrol including 1 day of snag removal for safety of patrol person, 5 days of patrol, and 2.5 days of a backhoe and operator to fix any problems the patrol could not do with hand tools (\$9,000)

**B). Monitoring:** Monitoring or storm patrol of roads the first 1-3 years after fire.

**C). National Fire plan proposals, long term project proposals:** Closure of roads in proposed areas for resource protection and to reduce damage to road surfaces during wet weather periods. Decommissioning segments of roadways to trails, that are no longer needed for administrative access or that have a high probability to contribute large amounts of sediment deposits into tributaries. Further evaluation and replacement of undersized culverts.

**Consultations:** Members of the BAER Assessment Team and regional engineering personal.

**References:** Best Management Practices booklet by the USDA Forest Service. (Author unknown at this time)



Figure 1. Drainage channel above road crossing



Figure 2. Culvert inlet.



Figure 3. Erosion at shot gunned outlet of culvert.



Figure 4. Stump hole in fill slope under cutting road.



Figure 5. Stump hole in road shoulder.



Figure 6. Existing Spring seeping onto road and causing erosion.