Aquatic Existing Situation

The Lassen National Forest has approximately 4,732 miles of roads on the Forest. This includes 3,472 miles of Forest Development roads and roughly 1,260 miles of State, county and private roads. Roads vary greatly and provide beneficial aspects by providing access to recreational experiences while at the same time they can cause adverse environmental impacts. By assessing different indicators for each road potential opportunities can be developed that critically weight benefits, and hazards. Understanding the direct and indirect effect of a road on aquatics, riparian zones, and water quality provides a foundation for selection of opportunities. These opportunities include a myriad of treatments that is tempered against the benefit side of that road.

Recent documentation on the interface of roads and riparian areas sites many problems such as the following. “Roads are the largest single human-caused source of sedimentation and habitat degradation” on the Forest. (HFQLG EIS, PG 3-7) This is generally a result of two main factors: poor location and design that increases risk to other resources especially aquatic resources. The impacts of these roads are sediment to streams and riparian areas, which degrade both, water quality and aquatic habitat. (HFQLG EIS PG 3-7). Inadequate or failed culverts block fish movement and aquatic passage.

Roads disconnect important ecosystem features that include streams, floodplains, meadows, surface flows and subsurface flows. In addition to the physical disruption created by a culverted road crossing there is also an indirect impact on habitat quality and loss of habitat.

To understand the effect of roads on aquatic, riparian areas, and water quality it is important to consider the basic soil and geomorphology of the Lassen National Forest. It is these resources and the processes that have evolved which shape the response of the system to roads. The soils of the Lassen National forest directly and indirectly support all other resources. Soil water holding capability, erosion potential, soil texture, depth, and susceptibility to mass wasting are important characteristics to be used in determining the suitability of the soil for road construction and long term road management. Roads that are placed on soils with high erosion potential can be costly to maintain. Roads that intercept fine textured soils can affect soil hydrologic properties and result in mass wasting or changes in vegetative composition.

Most of the Forest soils are from weathered volcanic rock material and have a low to moderate erosion potential. There are some areas of granitic soils, nonmarine sediments, metavolcanics, and metasediments across the forest. Over the northern and eastern portions of the Forest, the volcanic bedrock is highly fractured and water will percolate directly into the ground with little overland flow. The south and west portions of the Forest have more surface runoff.

Natural erosion potential on the forest is low to moderate and generally changes in erosion potential are in response to management activities. Sheet and rill erosion are common on all Forest roads but the hazard is limited by precipitation, slope, and values at risk. Large storm events on steep slopes with unstable rhyolitic soils have caused gully erosion and mass wasting to occur on the Almanor RD. There are some large gullies and high erosion potential associated with steeper slopes, and coarse textured soils on the Eagle Lake District. The best indicator of erosion potential is the combination of steep slopes over 20% and coarse textured soils.

Geomorphology

In the northern portion of the Forest the Hat Creek Rim area has gentle to moderately sloped lava flows. There are steep rises between lava flows where steep canyons cut through the flows. Slopes vary from very steep in the inner gorge of the Pit River to nearly level at Hat Creek. The terrain is rough on recent lava flows and cinder cones are present in this area. Most of the major faults are aligned toward the north-northwest. Some large landslides caused by failure of diatomaceous sediments are found on the north side of the Pit River. Mass wasting is common below the Hat Creek Rim, along the Soldier Mountain fault-line scarp, and along the Pit River.

To the east of Hat Creek Rim the landforms change to gently to moderately sloping volcanic plateaus and moderately steep-to-steep shield volcanoes. There are few Pliocene cinder cones. The elevation range is from 3500-6067 feet on Dixie Peak on Bald Mountain. Faulting, fluvial erosion and deposition, lacustrine deposition, and freeze-thaw are the main geomorphic processes.

The southeastern part of the Southern Cascade Range is in the Blacks Mountain Susanville Peak area. This area has steep shield and composite volcanoes that rise above the lava plateau. Faults are aligned toward the north or northwest. Low-lying areas have accumulated alluvial and lacustrine basin fill. Elevation ranges from 5000 to 7687 feet on Antelope Mountain. Volcanic, tectonic, mass wasting, and fluvial erosion processes dominate with fluvial and lacustrine deposition in depressions.

The dominant feature in the Forest is Lassen Peak. Glacial ice covered higher peaks and much of the plateau just east of the Peak during the Pleistocene. However recent activity has obliterated most of the glacial features on the southeast edge of the plateau. The elevation range is from about 4500 feet at Lake Almanor up to 10,457 feet on Lassen Peak. Volcanic, mass wasting, glacial and fluvial processes dominate.

The last area is comprised of volcanic mountains and plateaus that cross the western front of the Lassen from Snow Mountain near Burney to beyond Sterling

City. The elevation range is from 2000 to 5000 feet and the main processes are both volcanic and fluvial. Mass wasting is important on steep mountain and canyon sideslopes. Rhyolite lava flows and silicic pryoclastic deposits are found in this area.

The variability of the geomorphology is important when designing, evaluating, and determining the effect and potential hazard that a road poses to the aquatic resources. Many areas throughout the forest are gentle, stable slopes that given both their elevation, precipitation, and geology are much less prone to mass wasting or erosion than others.

Water Resources

The Lassen National Forest has 1,650 miles of streams, producing an average stream flow of 1,308,000 acre feet each year. There are natural lakes that include Eagle Lake and reservoirs such as Lake Britton and Lake Almanor. In addition there are numerous small alpine and shallow pothole lakes throughout the Caribou and Thousand Lakes Wildernesses. On drier sites common on Eagle Lake and Hat Creek Ranger District there are stockponds, wildlife ponds, and small reservoirs designed to capture limited stream flow and snow runoff. Many of these ponds and reservoirs dry up each season as water slowly evaporates or percolates down through the porous substrate.

Water flowing form the Forest is vital for fisheries, wildlife, riparian habitat, livestock and downstream uses. The Forest includes important tributaries used by anadromous fish of the Sacramento River system including Butte, Battle, Deer Creek, Mill Creek, and Antelope Creek.

Water quality on the Forest is affected by management activities. Roads serve as a major source of sediment when located in near stream areas. The proximity of a road to a stream or riparian area has a high correlation with the amount of sediment delivered to the channel as well as alteration of physical processes including surface and subsurface flows. The number of stream crossings along a road also increases the hazard associated with that road. Stream crossings can often plug or fail and many of the stream crossings on the Lassen are not appropriately sized to accommodate the 100-year storm and associated bedload and debris. In many cases it is difficult and costly to increase culvert size on all culverts. By modifying the road design with diversion prevention dips helps to reduce the hazard associated with stream crossings.