# Unseen Benefits of Good Fire Road and Trail Maintenance

by Nicholas Salcedo
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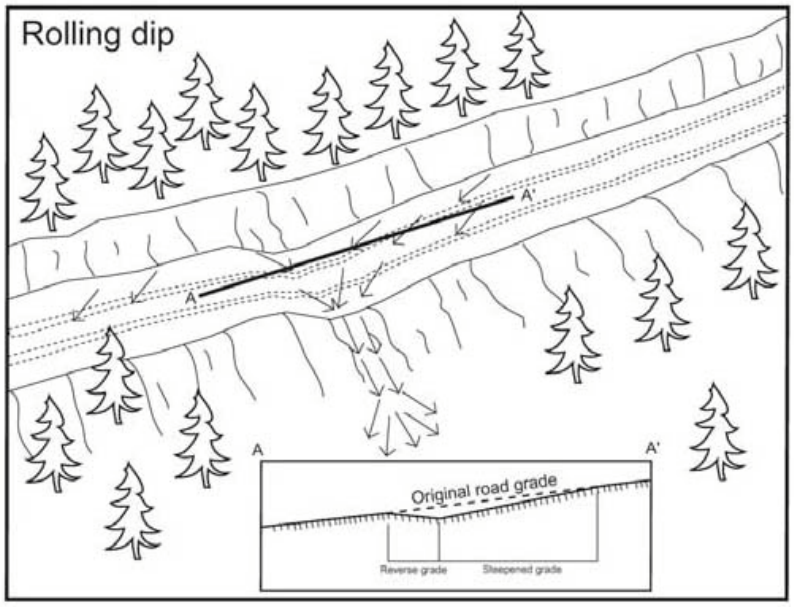
High on the slopes of Mt. Tamalpais, White Hill, and Bald Hill, rains form rivulets that begin their journey through the watershed, ultimately reaching the main stem of Corte Madera Creek and then San Francisco Bay. All along the way, upland land-use activities affect the water quality and channel sculpting by the creek and its tributaries. Much has been written about how surface runoff carries pollutants— especially commercial, industrial or domestic waste—into creeks, lakes and, ultimately, San Francisco Bay. However, in rural and undeveloped areas, the main pollutants are fine sediments, which wash down roads and trails and enter the creek at creek crossings. A recent study in the Redwood Creek watershed found that roads and trails accounted for 25% of the human- caused sediment input to that creek. Sediment from roads and trails generally enter a creek in two ways. The first is when persistent erosion causes water to run down the road, or its adjacent ditch, concentrating the sediment-laden water until it discharges into the creek. The second is caused when a culvert or bridge is overwhelmed and large amounts of sediment from the road and the creek banks wash into the creek.

To protect habitats of salmon and steelhead, Marin Municipal Water District has prepared a draft plan aimed at reducing erosion from roads and trails on its land. Some sediment contains heavy metals or excessive organic matter, both of which can harm water quality. Sediments can also damage salmon and steelhead habitat by smothering eggs, clogging the gills of juveniles and adults, filling in pools needed by fish, diminishing food supplies, and causing water temperatures to become too high. Because of the importance of steelhead, the District will give a high priority to implementing the sediment reduction strategies for subwatersheds that drain into Corte Madera Creek. Streams that drain into the reservoirs also have a high priority for treatment to protect our water supplies.

Controlling erosion from roads and trails involves simple techniques, judiciously applied. Common techniques include disconnecting road-surface drainage from the creeks by outsloping the road surface, and installing rolling dips, waterbars that divert the water off the trail, and culverts that empty channeled water into a swale. All of these designs keep surface runoff from concentrating into a small stream with enough force to be erosive, and instead direct the runoff away from the creek, to a place where it can infiltrate or slow down so that it is added to the natural drainage system slowly, allowing sediments to settle from the water before it contaminates the streams.

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At creek crossings, water must be allowed to pass under the road without eroding the road embankment. In many cases, the culverts are not big enough to carry the water produced in a large storm (the official standard calls for culverts to accommodate runoff from a 100- year storm, or the storm that has a 1% chance of happening in any one year). The strategy here is to install larger culverts, using good designs.

In the upland areas of the Corte Madera Creek watershed, each single site does not discharge enough sediment to cause a problem; however, the large number of these small problem areas cumulatively contributes significant amounts of sediment. Bit-by-bit, road-by-road, trail-by-trail, and creek crossing-by-creek crossing, this work is improving the creeks and the conditions for wildlife.



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