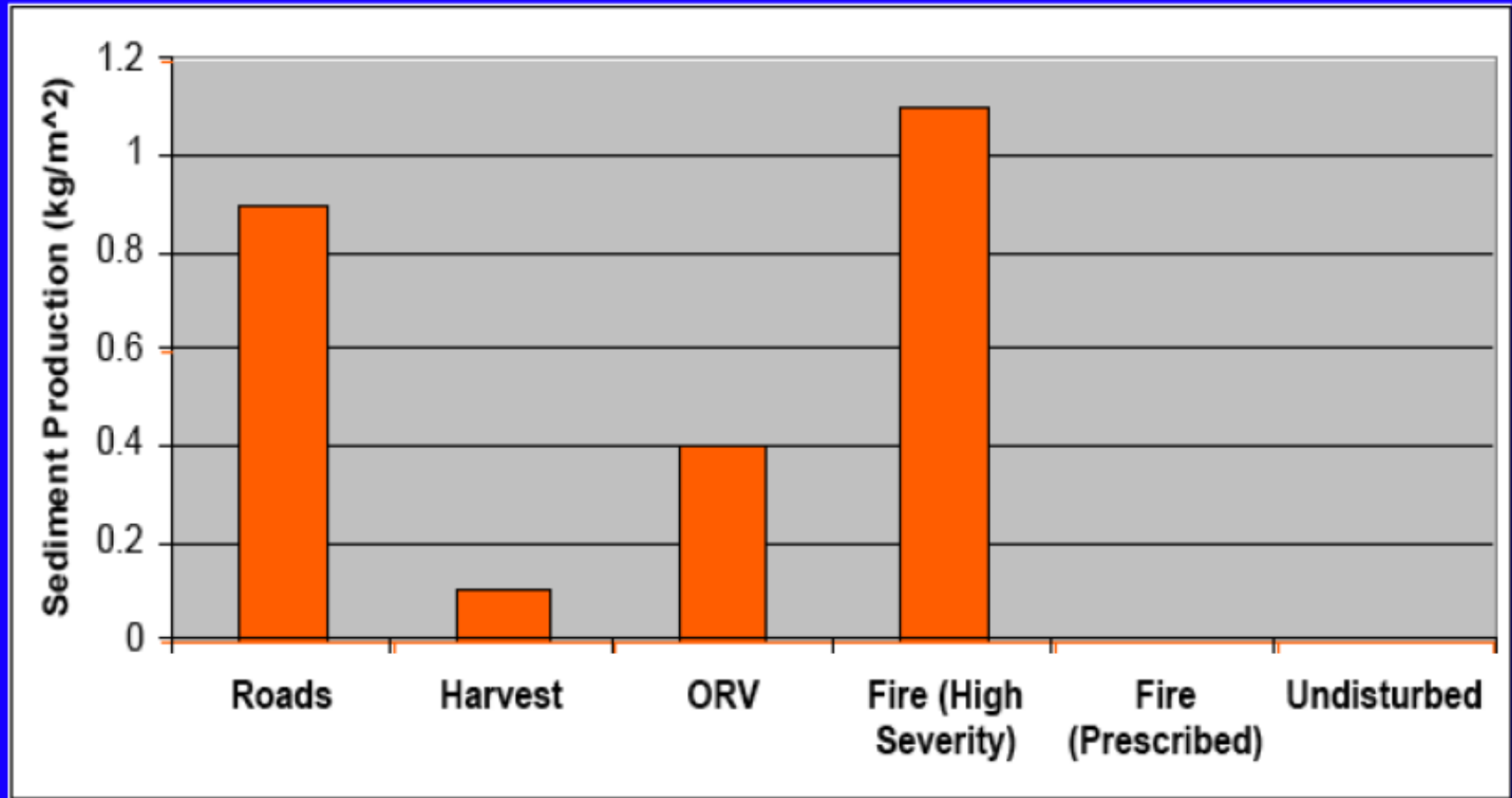


A photograph of a dirt road in a forest. The road is unpaved and appears to be in poor condition, with a large pile of dirt and gravel on the right side, suggesting erosion. The background shows a dense forest of trees.

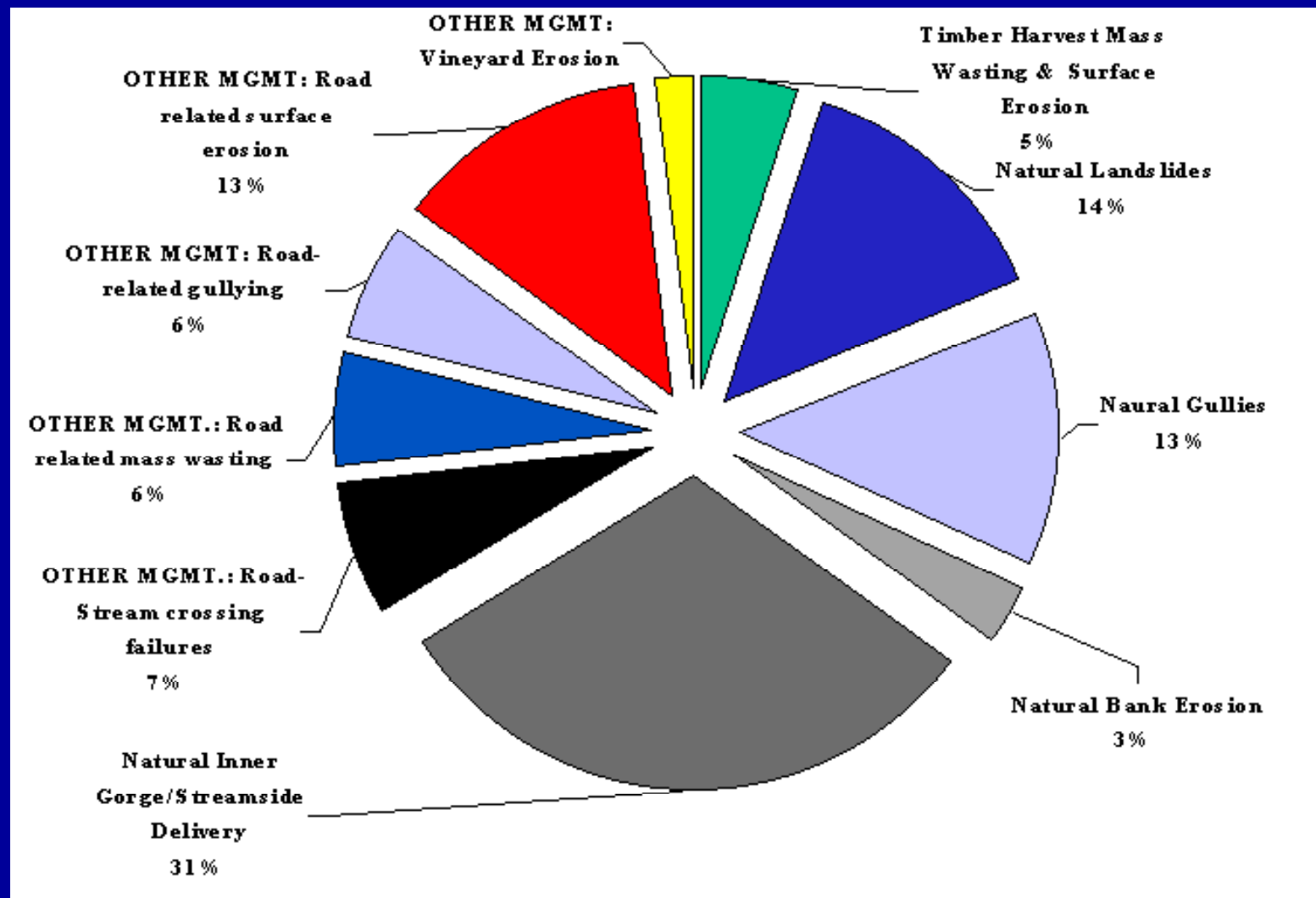
**Improving and Maintaining  
Roads to Reduce Impacts on  
Erosion and Water Quality**

# Why Are Roads a Concern?



Data from Drew Coe, Central Valley Regional Water Quality Control Board, based on studies in El Dorado County

# Roads Are The Main Source of “Unnatural” Sediment in Forested Watersheds



# The First Step: Evaluating Your Roads and Diagnosing Problems

University of California  
Cooperative Extension

## Assessing the Condition of Your Roads

The purpose of this worksheet is to enable you to evaluate the condition of the roads on your property. Understanding road conditions will help you plan and prioritize actions that will improve your ability to manage your property. The assessment process includes several steps:

- Identifying access routes to your property and your rights and responsibilities concerning them.
- Mapping existing roads on your property.
- Deciding which roads you need for management.
- Deciding if you need new roads.
- Evaluating the condition of your existing roads, including both those you will use and those you won't use.

*Note:* The worksheet asks for yes-no answers. A don't know answer may imply a need-to-know.

### Access to Your Property

If a public road adjoins or abuts your property and you have a legal encroachment permit to use it for access, you are in good shape. However, just because you have a driveway from a public road to your property does not necessarily mean that it is legal. Check your deed or check with the jurisdiction (city, county or state) that has responsibility for the public road. If you have access from a road on land owned by a federal agency such as the Forest Service, check with the agency's local offices.

If you have access to your property through another property or by private road, you need to know if you have legal rights of access. This is usually recorded on your deed as a right-of-way. If you don't have deeded access, then you need to know what rights you have to use the road. You also need to know what responsibilities you have for maintaining the road and what uses are restricted (e.g., hauling logs). In the absence of a legal right to use the road, you are vulnerable to the whims of your neighbor and need to negotiate that right.

1. Does a public road provide access to your property (e.g., county road or state highway)?

Yes       No       Don't Know

2. Does a private (including public agency) road provide access to your property (e.g., subdivision road, road through adjoining private or public lands)?

Yes       No       Don't Know

3. Do you have deeded access to your property?

Yes       No       Don't Know



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## Rural Roads: A Construction and Maintenance Guide for California Landowners

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Many thousands of miles of privately maintained rural roads extend throughout California, and they are used for resource management as well as residential and recreational access by over 500,000 landowners (Fig. 1). The California Department of Forestry and Fire Protection (CAL FIRE) estimates that another 2.7 million acres of forest and rangeland will be developed over the next 40 years, requiring the construction of thousands of miles of new roads (CAL FIRE 2003). Poorly located, designed, or maintained roads are the primary cause of water quality degradation in rural watersheds.

This publication is designed to help rural landowners understand how to improve and maintain existing roads. It also provides guidance on planning new roads. It is written for people who have little to no previous experience in managing a road. If you have recently purchased a rural parcel or have become responsible for road maintenance on an existing parcel—or otherwise feel unprepared for maintaining roads—this publication should help you. It mainly addresses single-lane dirt or rock-surfaced rural roads, also known as “low-volume” roads because they are not expected to carry high traffic levels.

This publication should enable you to

- understand the basic principles of good road design and maintenance
- recognize current and potential road erosion and drainage problems
- consider remedial treatments that may be needed
- develop rough estimates for the costs of road improvements and maintenance
- communicate clearly with contractors who may perform work on your roads



Figure 1. Low-volume road that has been newly graded and out-shaped. San Bernardino County, Advisor Richard Harris.

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# Common Problems

# Road Prism Erosion

Road surface rills and sheet erosion, in-board ditch erosion, fill slope erosion at crossings, cut bank sloughing



# Unstable Fills

Roads close to streams or intercepting groundwater, “perched” fills on steep slopes, un-compacted fills



Often these problems are due to poor road location and cannot be solved without road re-location or major re-construction.

# Poor Drainage

The ultimate cause of most road-related problems



Through cut roads are like troughs that cannot drain

Potholes are caused when roads are too flat to drain



# Gullies

They are always associated with a drainage problem and cannot be solved by “filling the hole”



Both of these gullies originated at points of road drainage discharge

# Deficient Stream Crossings or Culverts



# Inadequate Cross Drains

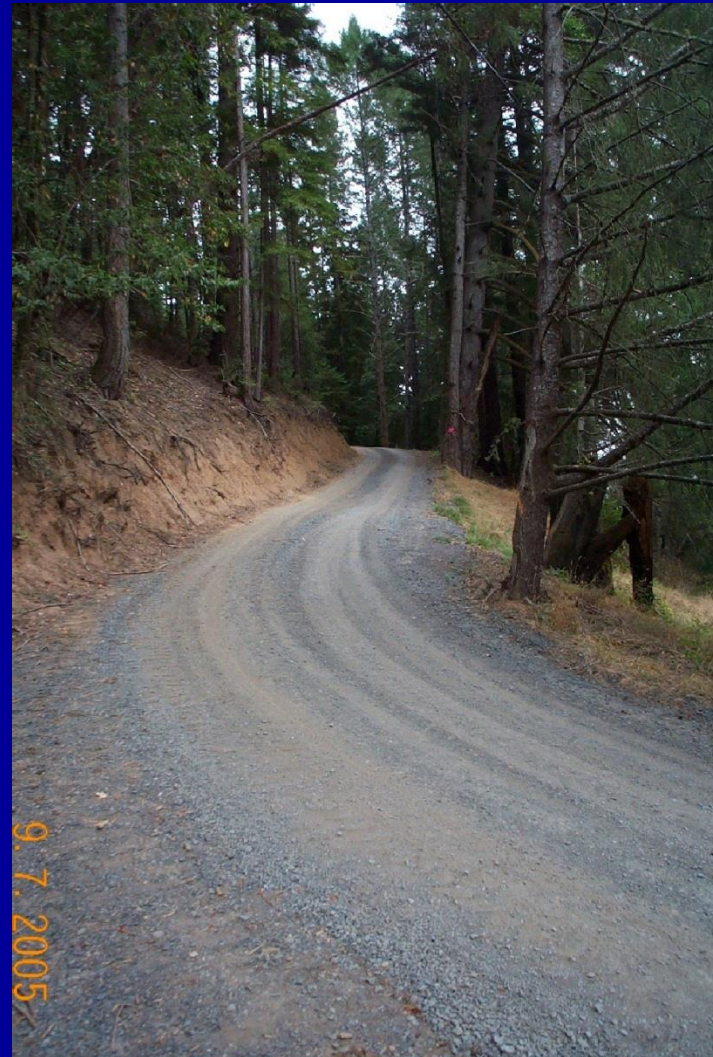


Cross drains are culverts or rolling dips that intercept and “relieve” ditch flow. They may be inadequately sized or spaced. As a result, ditches may erode or excessive runoff may be diverted down the road, causing rills and gullies.

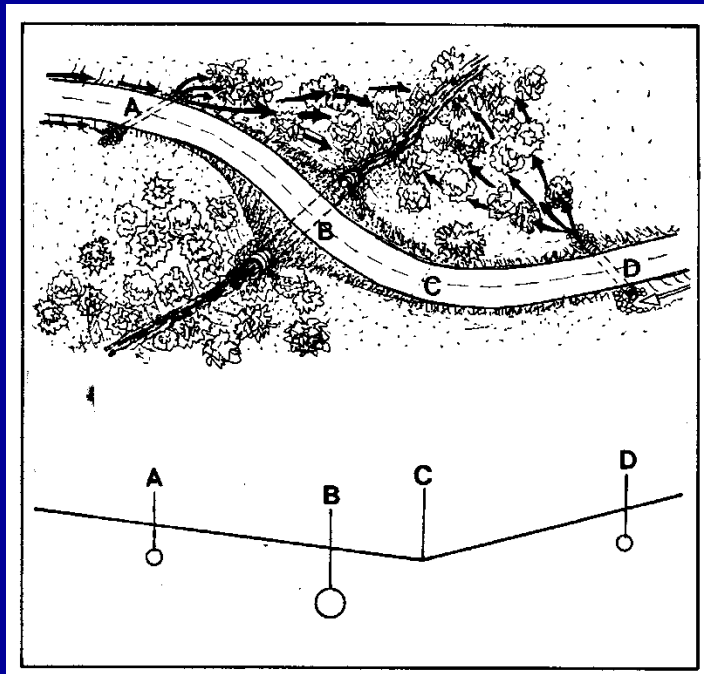
# Upgrading Existing Roads

## Improving Drainage

- Out-sloping where appropriate
- Increasing the frequency or size of cross drains
- Replacing deficient stream crossings
- Eliminating stream diversion potential



# Eliminating Diversion Potential - ensuring that if a crossing is plugged or overtopped, flow will return to the channel and not go down the road



Sufficiently sized stream crossing is placed at “B”. “C” is critical dip axis. “A” and “D” are cross drains placed to intercept road runoff and disperse it over land instead of into the stream.

# Upgrading Existing Roads

## Improving Stability

- Stabilizing failing or vulnerable fill slopes
- Eliminating causes of gully erosion and protecting drainage outfall sites



# Upgrading Existing Roads

Reduce Fine Sediment Production and Delivery



Usually involves surfacing and reducing “hydrologic connectivity”

# Surfacing



Surfacing may be done on an entire all-season road or at critical locations such as stream crossings.



# Eliminating Connectivity

- The goal is to intercept and disperse road runoff and sediment before it enters the stream.
- Can be accomplished with cross drains or out-sloping that disperses runoff onto vegetated slopes.



# Upgrading Existing Roads

## Additional Treatments



Trash racks placed above stream crossings.



Water bars on temporary or seasonal roads.

# Maintaining Roads

## Annual Tasks

- Inspect your roads BEFORE the winter hits, and then during and after major storms.
- Clear debris and sediment from culvert inlets. Check upstream for accumulated debris. Check for erosion at outlets.
- Inspect rolling dips (if applicable) or cross drains to determine that they are functioning and that no erosion is occurring at outlets.
- Avoid frequent grading. Use a shovel to clear inboard ditches. Avoid grading ditches.
- Inspect cut and fill slopes for signs of instability.
- Keep records of problem sites. Mark these in the field for easy identification during storms.

The single most important thing to do is to keep crossings and culverts clear



A photograph of a dirt road winding through a forested area. The road is composed of light-colored soil and gravel, with visible tire tracks. On the left side, there is a steep, rocky embankment. The background is filled with dense green trees. The text "Thank You!" is overlaid in the center of the image.

Thank You!