California Department of Parks and Recreation
Off-Highway Motor Vehicle Recreation Divison

(14)

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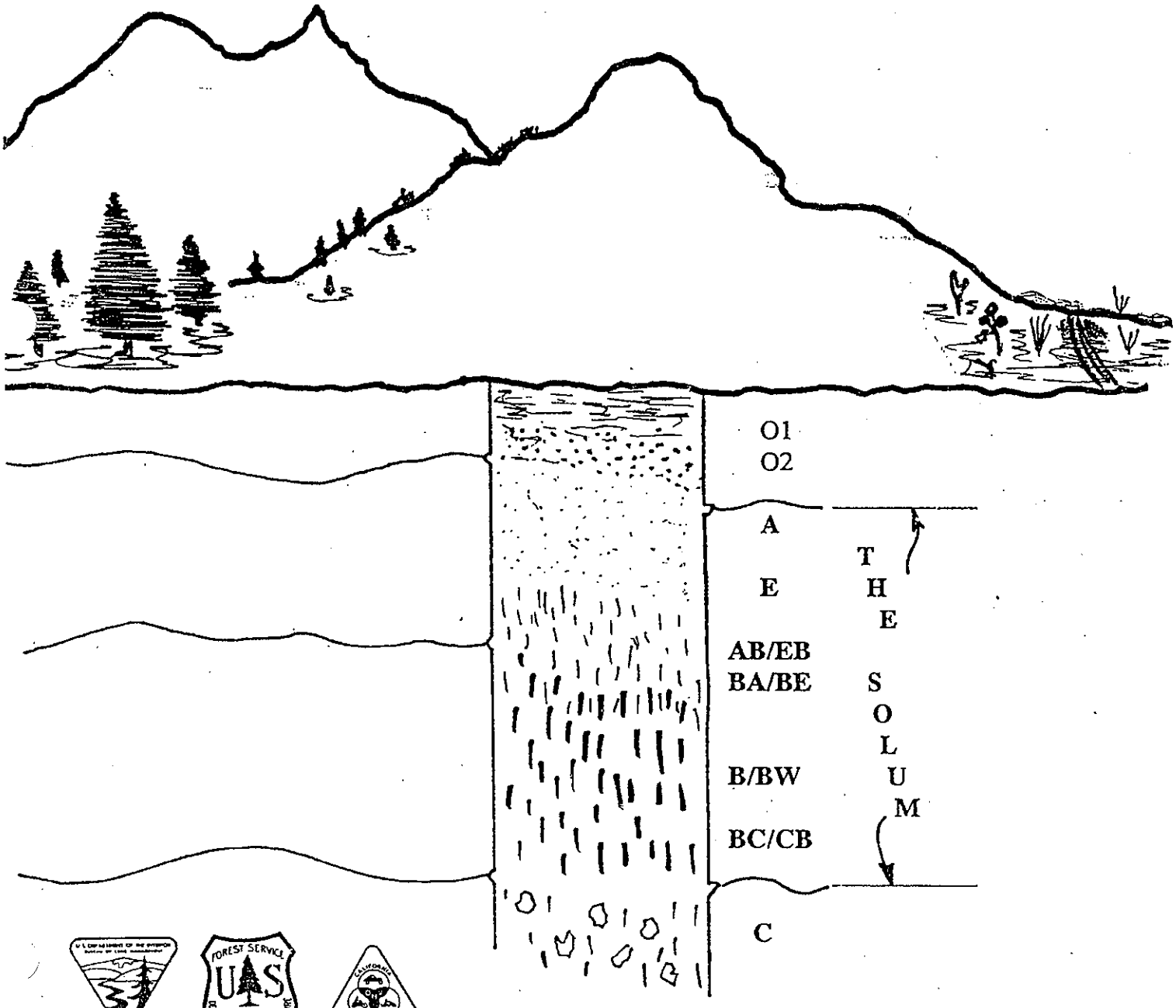
SOIL CONSERVATION GUIDELINES/STANDARDS
for
Off-Highway Vehicle Recreation
MANAGEMENT



SOIL CONSERVATION GUIDELINES/STANDARDS

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CHRONOLOGY

California Department of Parks and Recreation
Soil Conservation Guidelines/Standards
For
Off-Highway Vehicle Recreation Management

The following is a chronology of development of the resource management plan for soil conservation.

The California Department of Parks and Recreation was required by Chapter 1027/87 of the Public Resources Code to "...adopt a generic soil loss standard by January 1, 1991, at least sufficient to allow rehabilitation of off-highway motor vehicle areas and trails." An interagency committee of soil experts (as directed by the legislation) with representatives from the USDA Soil Conservation Service, USDA Forest Service, USDI Bureau of Land Management, California Department of Conservation, and the California Department of Parks and Recreation began meeting in October 1988 to develop this document. The committee members are a mixture of geologists, soil scientists and hydrologists. The committee held twelve meetings conducted bimonthly through October 1990. Additional committee meetings were held in January and September 1991. Most of the meetings were held in Sacramento, but several visits were made to OHV areas on state and federal land throughout California. The meetings focused on technical discussions of the application of different soil loss predictors and their application to various soil types and situations.

At the November, 1988 OHMVR Commission meeting, the commission resolved that a representative of the OHV user groups should be included on the Soils Committee in developing this document (although not part of the legislation). A geological representative from CORVA, Mr. Donald Fife, was added to the committee. The Commission also instructed that public meetings be held although not specified in the legislation. Six such meetings were conducted (two in August 1989, two in February 1990, one in November 1990, and one in September 1991). These meetings where

held in Los Angeles and Sacramento to facilitate public involvement.

The development of soil conservation guidelines/standards may seem like a very straightforward task, but it quickly became clear to the Committee that existing numerical estimates of soil loss (such as those calculated by the Universal Soil Loss Equation) could not be applied to most areas disturbed by off-highway vehicles. Devising a quantitative 'soil loss tolerance' representing a quantity of soil (inches per year or tons per acre) that could be lost from an impacted area does not result in the type of soil loss standards that the legislation requires, viz. "...sufficient to allow rehabilitation". Therefore, the committee took the tack of requiring agencies that operate OHV areas to develop site specific plans. These plans must be submitted, found reasonable, and approved before a project is funded. Thus, each individual plan sets its' own performance standard. These standards must be reviewed by qualified scientists and found adequate or the project will not be approved.

Many individuals* have been involved with the development of this document. The Inter-Agency Soils Committee led by Dr. Roy Woodward labored long and hard to provide a solid document that will enable land managers to maintain OHV use while minimizing soil loss. Many OHMVR Division employees provided written comments and assisted in the public workshops. And finally, the public review process helped form a document that addresses concerns from a diverse constituency.

The Off-Highway Motor Vehicle Recreation Commission voted unanimously recommending the Director approve this document at their November 14, 1991 meeting in San Bernardino, California (Motion Number 34-11/91).

*Committee members and contributors are listed in Section Q.

INTRODUCTION

This resource management plan for soil conservation is applicable to off-highway vehicle areas and trails that are new projects (local and federal) funded by the California Off-Highway Vehicle Fund (green-sticker program). This plan is also applicable to existing and new State Vehicular Recreation Area operations. These guidelines/standards are intended to be applicable for resource management and maintenance for off-highway vehicle use. Land managers are aware of multiple use roads/trails on public lands. Therefore, it is the land managers responsibility to determine the recreational activity causing specific resource damage and initiate appropriate action. For Special Permitted Events, refer to Section D (Design Criteria and Monitoring/Mainteance Requirements).

This document provides guidelines to help achieve the following standard:

> Off-highway motor vehicle areas and trails will be maintained in a condition that will allow for feasible rehabilitation by natural resource managers.

The legislation, Senate Bill 877 (Chapter 1027, Garamendi (1987)) specifically delineated that:

Public Resources Code Section 2, 5090.02...

(1) Existing off-highway motor vehicle recreational areas, facilities, and opportunities be expanded and be managed in a manner consistent with this chapter, in particular to maintain sustained long-term use.

(2) New off-highway motor vehicle recreational areas, facilities, and opportunities be provided and managed pursuant to this chapter in a manner that will sustain long-term use.

(3) When areas or trails or portions thereof cannot be maintained to appropriate established standards for sustained long-term use, they shall be closed to use and repaired, to prevent accelerated erosion. Those areas shall remain closed until they can be managed within the soil loss tolerance or shall be closed and rehabilitated.

Public Resources Code Section Section 4.5. 5090.11...

"Rehabilitation" means, upon closure of the unit or any portion thereof, the restoration of land to the adjacent contours, the plant communities, and the plant covers comparable to those on surrounding lands or at least those which existed prior to off-highway motor vehicle use.

Public Resource Code Section 11, 5090.35...

(a) The protection of public safety, the appropriate utilization of lands in the system, the conservation of land resources in the system are of the highest priority in the management of the system; and, accordingly, the division shall promptly repair and continuously maintain areas and trails, anticipate and prevent accelerated and unnatural erosion, and restore lands damaged by erosion to the extend possible.

(b) Notwithstanding Section 5090.23, the department, in consultation with the United States Soil Conservation Service, the United States Forest Service, the Bureau of

Land Management, and the Department of Conservation shall adopt a generic soil loss requirement, at least sufficient to allow rehabilitation of off-highway motor vehicle areas and trails. Requirements of this chapter which are dependent upon the adoption of this soil loss guide/standard shall not become operative until the guide/standard is adopted.

Public Resource Code Section 20, 5090.53...

(a) Money in the fund may be granted pursuant to Section 5090.50 or expended pursuant to Section 5090.55 for projects to fulfill the conditions outlined below and for public health and safety facilities.

(b) However, no funds may be granted pursuant to Section 5090.50 or encumbered pursuant to Section 5090.55 for the acquisition of land for, or the development or construction of, a <u>new trail</u>, <u>trailhead</u>, <u>area</u>, or <u>other facility</u> for the use of off-highway motor vehicles after July 1, 1989, unless all of the following conditions are met:

(1) The recipient has completed wildlife habitat and soil surveys and has prepared a wildlife habitat protection program to sustain a viable species composition for the project area.

(2) The recipient agrees to monitor the condition of soils and wildlife in the project area each year in order to determine whether the soil loss requirements adopted pursuant to Section 5090.35 are being met.

(3) The recipient agrees that, whenever the soil loss requirement protection program is not being met in any project area, the recipient will temporarily close and repair, to prevent accelerated erosion, that area, or any portion thereof, until the soil loss requirement adopted pursuant to Section 5090.35 are capable of being met.

(4) The recipient agrees to enforce the registration of off-highway motor vehicles and the other provisions of Division 16.5 (commencing with Section 38000) of the Vehicle Code and to enforce the other applicable laws regarding the equipping and use of off-highway motor vehicles.

Further, it is highly recommended that land managers utilize, where appropriate and to the extent possible, this resource management guide on existing trails and areas.

When new projects are proposed they should include the "PRINCIPLES" name(s) and their background qualifications. Their acceptability shall be the responsibility of the Off-Highway Motor Vehicle Recreation Division.

* The Interagency Soils Committee will reconvene periodically to evaluate the effectiveness of this document and review new soil erosion monitoring systems that could facilitate the management of off-highway vehicle use areas.

Section A

Background Information for New Projects:

I. Project Description and Maps

A) Provide project maps of sufficient detail to assess project impacts. USGS 7.5 minute topographic maps should be used as the minimum map scale. Show the location of project features such as parking areas, trails/roads, open areas, and closed areas.

B) Provide a written explanation of the project and what kinds of off-highway vehicle activity will be allowed.

II. Technical Evaluation

A) Use the Erosion Hazard Rating system (Section F) to:

1) Assess the pre-project sheet/rill erosion potential of the project site.

2) Assess the Erosion Hazard Rating of the area following introduction of off-highway vehicle activity; take into account vegetation removal and soil compaction when making use-condition predictions. Describe what extraordinary measures will be taken to prevent accelerated erosion for any part(s) of the site that rate 'High' or 'Very High'.

B) Assess if runoff from the pre-project site meets local Water Quality Standards. Water Quality Standards are

determined locally for individual watercourses. Check with local administrative agencies and determine if sediment in existing streams meets these standards. If the streams are considered to have excessive sediment loads then no off-highway vehicle project should be allowed in the watershed unless it can be shown that the off-highway vehicle project or other mitigation measures would improve the existing conditions.

C) Assess the condition of any existing roads/trails that have not had managed OHV use with the Monitoring System to ensure adequate design and minimize erosion (Section G). Roads/Trails that are in need of maintenance should be repaired. If the Roads/Trails will not be part of the proposed off-highway vehicle project, it is recommended that they be closed, rehabilitated and signed.

D) Provide a map (7.5 minute topographic map or larger scale) of resource features including plant communities, rare plant populations, soil types, and active erosion features. Soil data and descriptions should also be presented as a standard written soils report. Plant community descriptions should include species composition, density and size classes of shrubs and trees, and cover estimates of herbaceous species. Explain who performed field surveys and how these were conducted.

Soil survey should be of Order II (six acre minimum map delineation when contrasting soils occur, all map units are sampled) or a field verified Order III detail (forty acre minimum map delineation, only representative map units need be sampled). Describe

any potential toxic soil areas (asbestos, heavy metals, etc.) and identify on the project map.

Major active erosion features should be avoided during construction of off-highway vehicle areas. If such features exist in the vicinity of the off-highway vehicle area they should be carefully described and monitored for potential impacts from the off-highway vehicle project.

E) Perform a Revegetation Potential Assessment (Section H). Any portion of the project area that rates "Impossible" must not be adversely impacted.

F) The soil should be assessed to determine the mechanical erosion potential for the project area. This potential should be considered when designing trail slopes and trail configuration.

G) Provide a written evaluation with recommendations, by a full journey level classification requiring a four-year degree with major studies in soil science, botany and hydrology (Federal agencies use Soil Scientist and Hydrologist classification GS-9 or personnel with equivalent qualifications and experience), of how the proposed project might affect soil loss and what rehabilitation alternatives exist for the project site. The project proposal shall include participants background qualifications and will be subject to review by the Off-Highway Motor Vehicle Recreation (OHMVR) Division resource specialists. Job descriptions for these classifications will be available upon request by the OHMVR Division. These resource specialists should work to become certified in soil erosion and sediment control similar to the Soil

and Water Conservation Society's "Professional Soil Erosion and Sediment Control Specialist" certification.

This evaluation should be reviewed and approved by an "Authorized Officer" managing the program.

Section B

Erosion Control/Vegetation Management Plan for New Projects:

I. Erosion Control/Habitat Management Strategies

A) Describe any strategies that shall be implemented during the life of the project to conserve soil and habitat resources. Specifically describe what areas of the site must be avoided and how this will be accomplished. Describe what techniques will be used to prevent or mitigate soil erosion in off-highway vehicle use areas.

II. Riparian Guidelines

A) Follow buffer concept described in Appendix 4, or use the responsible agency's riparian guidelines (whichever provides the most protection).

B) All stream crossings should conform to local water quality Best Management Practices.

III. Sediment and Water Runoff Control Structures for the Purpose of Storing Soil for Rehabilitation and Preventing Accelerated Erosion.

A) Describe in detail any planned sediment/water runoff control structures (sediment basins, check dams, etc.) Describe why such structures are needed. Justify the size and location of any such structures. Explain how these structures will be maintained.

B) Describe the effect of any collected or diverted sediments or water. An important component of sediment can be topsoil. If topsoil is collected in sediment dams explain where the soil will be taken once the sediment dam is cleaned out. Also, explain where trapped or diverted water will eventually end-up and how will it get there.

C) Describe sediment management plans and explain how sediment will be stabilized in new location(s).

IV. Maintenance Plan

A) Describe what maintenance is required, who will perform the maintenance, and estimated costs for all maintenance, erosion control structures, fences, and signs. Resource monitoring will be performed regularly and any identified problems must be treated in a timely fashion. Explain how resource guidelines (staying on trails, stopping use of closed areas, seasonal closures, vandalism, etc.) will be enforced.

B) Describe short-term erosion control strategies; i.e., what species and techniques will be used, how much it will cost, describe any planned rotation of off-highway vehicle use area and what criteria will be used to determine when the area can be reopened to off-highway vehicle use. Follow your agency's guidelines on using temporary cover of native or exotic species. Ongoing revegetation is encouraged to protect soils from erosion. Describe in detail what specific treatments will be applied to the proposed off-highway vehicle site.

C) Describe how a "Rehabilitation" closure will be accomplished. In detail, explain how the off-highway vehicle site (or portion of the site) could be "Rehabilitated" as called for in 5090.11.

Section C

Monitoring Plan for New Projects:

I. Establish and maintain a Monitoring Plan file for each specific off-highway vehicle project. The purpose of the Monitoring Plan file is to provide for timely inspection and maintenance of every off-highway vehicle area. This file should contain all pertinent maps and evaluations prepared for the Project Background (Section A and Section M). All subsequent monitoring data (including original data forms) should be included in this file.

II. To prevent accelerated erosion annually monitor stream bank stability at crossings. Determine the cause of significant negative changes and repair if off-highway vehicle related. Monitoring must be performed by a full journey level classification requiring a four-year degree with major studies in soil science, botany and hydrology (Federal agencies use Soil Scientist and Hydrologist classification, GS-9 or personnel with equivalent qualifications and experience).

III. It is recommended to annually evaluate the status of any rare plant populations. Determine the cause of significant negative changes and repair if off-highway vehicle related. Evaluation must be performed by a botanist or equivalent qualified classification.

IV. Annually submit a monitoring report prepared by qualified personnel trained in the use of the Erosion Hazard Rating System (Section F) and the Monitoring System (Section G) and reviewed by a full journey level classification requiring a

four-year degree with major studies in soil science, botany and hydrology (Federal agencies use Soil Scientist and Hydrologist classification, GS-9 or personnel with equivalent qualifications and experience). This report is to evaluate the status of all off-highway vehicle use areas (roads, trails, tracks, hillclimbs, open ride areas, staging/parking/camping areas or any other) using both the Monitoring System (Section G) and the Erosion Hazard Rating System (Section F) as outlined in this document.

This monitoring report should be reviewed and approved by an "Authorized Officer" managing the program.

This report shall be submitted to the OHMVR Division Headquarters Office for evaluation by resource specialists and will be made available for review by other agencies and the public.

Also include a written evaluation in the monitoring report describing if:

1) Accelerated erosion is exceeding the rate of soil formation.

2) Water quality has been impaired by this project.

3) Additional maintenance or changes in use patterns are required for any part of this project.

4) Rehabilitation is necessary for any part of this project.

5) Previously rehabilitated areas can be reopened to off-highway vehicle use.

6) Wind erosion potential is High at the project site. The Soil Conservation Service predicts erosion rates to provide technical assistance to land users, to inventory natural resources, and to evaluate the effectiveness of conservation programs and conservation treatment applied to the land. (Soil Conservation Service National Agronomy Manual, Part 502.) Contact your local Resource Conservation District or Soil Conservation Service Office for assistance in dealing with wind erosion.

7) Gully erosion potential is high at the project site (see Section O).

8) Mechanical erosion potential is high at the project site.

Section D

Design Criteria and Monitoring/Maintenance Requirements:

INTRODUCTION

In this section, project types are listed and discussed. Under project types, the Pre-Project heading explains important design criteria to be evaluated during the project design phase. The Post-Project heading details monitoring and maintenance required for that project type. It is important to consider, during project planning and operations, that research has supplied adequate technical data that suggests a strong correlation exists between the extent of bare or disturbed soil surface and the amount of sediment produced. Special consideration may be required for Special Events that are conducted by permitting agency. Refer to Appendix 1.

Also, it is imperative that project managers realize the magnitude in which gullies play in sediment production. Gullies are difficult to repair and account for most of the sediment production from eroding sites. If the proposed off-highway vehicle site has existing active gullies, it is not appropriate for off-highway vehicle use unless the active gullies are mended unless otherwise specified. The project site will be specifically delineated in the Grant Application.

Type III watercourses are naturally occurring and in a stable condition and should not be confused with gullies. These determinations will be made by qualified resource specialists.

For all developed facilities design should focus on the use of such techniques as sheeting, cambering and appropriate road cut construction to minimize the concentration of water volume and velocity.

PROJECTS

I. Roads/Trails/Firebreak/Fuelbreaks

Pre-Project:

A) Areas with an Erosion Hazard Rating (Section F) of 'high' or 'very high' shall be restricted to a system of Roads/Trails (Exception - see Hill Climbs). If the area has a 'high' or 'very high' Erosion Hazard Rating describe special measures to prevent erosion.

B) Maximum disturbance from Roads/Trails and all other off-highway vehicle related activity shall not exceed the ability to rehabilitate the site.

C) Develop a plan for maintenance of Roads/Trails and signs. Explain who will perform maintenance and at what frequency. In general, state what signs will be used and where.

D) If Firebreaks/Fuelbreaks are constructed they shall conform to all other Roads/Trails standards or prevent all off-highway vehicle access. Practical experience has shown that Firebreaks/Fuelbreaks are commonly used by off-highway vehicles. Anticipate this use and construct, modify and maintain Firebreaks/Fuelbreaks by using techniques such as sheeting, cambering or appropriate water bar placement to minimize the concentration of water volume and velocity otherwise off-highway vehicle access must be prevented.

E) Roads/Trails, at a minimum, shall follow the AMA Guide To Off-Road Motorcycle Trail Design and Construction

(Section N). Also consult the Monitoring system (Section G). Try to fit the development to the terrain and avoid the use of culverts and other water diversion structures.

F) Do not allow use on areas with active gullies present if such use will contribute to or increase gully formation.

G) Do not allow use on areas rated 'impossible' for Revegetation if such use will adversely effect the area (Section H).

H) Evaluate wind, gully and mechanical erosion potential. Plan the roads/trails where these erosion potentials are manageable.

Post-Project Management/Monitoring:

A) Follow the Erosion Control/Vegetation Management Plan (Section B) and the Monitoring Plan (Section C).

B) The Monitoring System (Section G) shall be used and followed annually.

C) Any repairs, rehabilitation, or reroutes necessary to stabilize the site shall be consistent with the Erosion Control/Vegetation Management Plan (Section B) and shall be performed with proper planning and management techniques. If possible, only the damaged section of the road/trail will be close during rehabilitation. Applications for major rehabilitation projects shall be submitted during the next off-highway vehicle grant cycle.

II. Hillclimbs

Pre-Project:

A) Do not allow use on areas with active gullies present if such use will contribute to or increase gully formation.

B) Do not allow use on areas rated 'impossible' for Revegetation (Section H).

C) No off-site soil loss shall occur above natural factors. All soil losses from the hillclimb shall be contained in the proximity (within 500 yards) of the hillclimb and be available for replacement on the disturbed site.

D) Maximum extent of disturbance at any site shall not exceed the ability to rehabilitate the site. Recommended hillclimb areas should have no more than 2 hillclimbs in 100 yards of any slope face. Rare instance may occur where clay type soils can withstand more use (i.e., Carnegie SVRA). These areas will be evaluated by a State Park Resource Ecologist (or equivalent classification. Of all off-highway vehicle uses, hillclimbs are the most likely to create situations of extreme and difficult to repair soil erosion.

E) Existing hillclimbs should be managed for sustained use or closed and rehabilitated.

F) Hillclimbs may be allowed in areas with Erosion Hazard Rating (Section F) of 'high' or 'very high'. You must

comply with all other hillclimb requirements and provide details of how soil erosion will be prevented and how the site can be rehabilitated if necessary.

Post-Project Management/Monitoring:

A) Follow the Erosion Control/Vegetation Management Plan (Section B) and the Monitoring Plan (Section C).

B) The Erosion Hazard Rating System (Section F) shall be used annually.

C) Any necessary repairs, rehabilitation, or soil replacement shall be consistent with the Erosion/Control/Vegetation Management Plan (Section B) and shall be performed with proper planning and management techniques if such use will adversely effect the area.

D) If the hillclimb activity is a Permitted Event, follow the guidelines of the Permitted Event (Section D. VII).

III. Open Riding

Pre-Project:

A) Areas with an Erosion Hazard Rating (Section F) of 'high' or 'very high' shall be restricted to a system of Roads/Trails.

B) Do not allow use on areas with active gullies present if such use will contribute to or increase gully formation.

C) Do not allow use on areas rated 'impossible' for Revegetation (Section H).

D) Maximum extent of disturbance at any site should not exceed the ability to rehabilitate the site. If the amount of disturbed surface area does not exceed 10% of the total off-highway vehicle use area, under most circumstances, and with good maintenance, soil loss can be kept to a minimum.

E) Evaluate wind, gully and mechanical erosion potential. Plan the use area where these erosion potentials are manageable.

Post-Project Management/Monitoring:

A) Follow the Erosion Control/Vegetation Management Plan (Section B) and the Monitoring Plan (Section C).

B) Plan to regularly revegetate excessively disturbed areas. Open ride sites will exhibit a broad spectrum of use ranging from completely denuded areas to areas that had a single off-highway vehicle drive-over. Revegetate site when the monitoring system or erosion hazard rating system identifies needs.

C) The Erosion Hazard Rating System (Section F) shall be used annually.

D) Areas rating 'high' or 'very high' on the Erosion Hazard Rating System (Section F) shall have any necessary repairs or rehabilitation consistent with the Erosion Control/Vegetation Management Plan (Section B) performed with proper planning and management

techniques. If the area is converted to a Road/Trail System, or some other type of off-highway vehicle use, revegetation of previously disturbed off-highway vehicle open areas should be planned and carried out in a systematic manner.

IV. Tracks

Track development may require significant amounts of landform modification. This is permissible as the ability to rehabilitate the site is not exceeded. The track area is often prone to erosion (during and after use) because of the intense vehicle use. Tracks can also congregate large groups of people who must be managed (see Permitted Event).

Pre-Project:

A) No development on Erosion Hazard Rating (Section F) of 'very high'.

B) Do not allow use on areas with active gullies present if such use will contribute to or increase gully formation.

C) Plan for infield cover during nonuse (vegetation, mulch, etc.) on appropriate sites. Keeping a cover on the infield will help prevent soil erosion.

D) Plan for watering the track during use periods to prevent wind and mechanical erosion on appropriate soils. Hard, compacted soils may not benefit from watering, but other soils should be watered. Determine your specific conditions and explain in the Erosion Control/Vegetation Management Plan (Section B) what

watering plan will be followed. Explain if chemical treatments to retain soil water will be applied.

E) State the frequency of use and explain the maintenance techniques and schedule. If the track is only used occasionally, then occasional maintenance is appropriate (usually before and immediately after track use). If the track is continuously available for use, then regular maintenance is a must. Describe your maintenance plan including who will perform any necessary repairs.

F) Consider impacts from spectator access, viewing zones and parking areas.

Post-Project Management/Monitoring:

A) Follow the Erosion Control/Vegetation Management Plan (Section B) and the Monitoring Plan (Section C).

B) Maintain track and infield area to minimize off-site impacts. Tracks should be strawed/chipped and disked. During nonuse period, the track should be monitored and any erosion problems addressed. Prevent any accelerated off-site soil movement.

C) The Monitoring System (Appendix 2) shall be used and followed annually.

D) Volunteer or unauthorized tracks should be either designated and managed as tracks or closed and rehabilitated upon discovery.

V. Staging/Parking/Camping Areas

Pre-Project:

A) No development on Erosion Hazard Rating (Appendix 1) of 'very high'.

B) Do not allow use on areas with active gullies present if such use will contribute to or increase gully formation.

C) Erect barriers to limit spread of bare areas. Make sure that use areas are clearly designated and erect or grow barriers that will not allow vehicles to use unauthorized areas. Provide adequate areas for turning large vehicles.

D) Consider methods to prevent wind and mechanical erosion. Determine your specific conditions and explain in the Erosion Control/Vegetation Management Plan (Section B) what plan will be followed.

E) The size of vehicle disturbance area shall be determined by the Erosion Hazard Rating System and the permitting agency.

Post-Project Management/Monitoring:

A) Follow the Erosion Control/Vegetation Management Plan (Section B) and the Monitoring Plan (Section C).

B) Maintain Erosion Hazard Rating (Section F) of 'moderate' or 'low'.

C) Conduct regular enforcement and maintenance of all Staging/Camping areas to prevent off-site impacts. Erect barriers and signs as necessary.

D) The Erosion Hazard Rating System (Section F) shall be used annually.

VI. Trials Riding

Pre-Project:

A) No use on Erosion Hazard Rating (Section F) of 'high' or 'very high'.

B) Do not allow use on areas with active gullies present if such use will contribute to or increase gully formation.

C) Do not allow use on areas rated 'impossible' for Revegetation (Section H).

Post-Project Management/Monitoring:

A) Follow the Erosion Control/Vegetation Management Plan (Section B) and the Monitoring Plan (Section C).

B) The Erosion Hazard Rating System (Section F) shall be used annually.

C) Maintain Erosion Hazard Rating (Section F) of 'moderate' or 'low'.

D) If the Trials Riding activity is a Permitted Event, follow guidelines of the Permitted Event (Section D. VII).

Section E

Definitions:

Firebreak/Fuelbreak

Any corridor where vegetation is removed (firebreak), or significantly reduced (fuelbreak) for the purpose of fire control.

Gully

An incised portion of the landscape created by accelerated erosion - not a natural drainage feature (see Section O).

Hillclimb

Any part of an area being used by off-highway vehicles that has a slope of 25 degrees or more, 125 feet long in one continuous run and averages over 8 foot width (no more than 20 feet wide).

Marsh

Flat, wet, treeless areas usually covered by standing water and supporting native growth of grasses and grasslike plants. (A Glossary of Terms Used in Range Management, 1974.)

Meadow

Openings in forests and grasslands of exceptional productivity in arid regions, usually resulting from high water content of the soil, as in stream-side situations and areas having perched water tables. (A Glossary of Terms Used in Range Management, 1974.)

Off-Highway Vehicle

Off-Highway Motor Vehicle includes, but is not limited to the following:

(1) Any motorcycle or motor-driven cycle, except for any motorcycle which is eligible for a special transportation identification device issued pursuant to California Vehicle Code Section 38088.

(2) Any snowmobile or other vehicle designed to travel over snow or ice.

(3) Any motor vehicle commonly referred to as a sand buggy, dune buggy, or all-terrain vehicle.

(4) Any four-wheel drive motor vehicle commonly referred to as a Jeep.

(5) Other types include: "Oddessy", "Pilot", custom-built, etc., that are motorized.

All off-highway vehicle type vehicles must be registered by the California Department of Motor Vehicles with either a "green sticker", or "street", license plate to be operated on public lands.

Off-Site

Beyond the borders of the designated off-highway vehicle area. Off-site need not mean transport onto land under a different ownership.

Open Riding

Refers to expansive areas that are used by off-highway vehicles, where vehicle use is not limited to designated Roads/Trails. Established routes of travel often exist or become established in Open Ride areas, but almost any portion of the site may become impacted by off-highway vehicles at any time.

Project Site

Areas directly impacted by the proposed project.

Public Lands

Federal, state, county or city owned or administered lands.

Riparian

Vegetation growing in close proximity to a watercourse, lake, swamp or spring, and often dependent on its roots reaching the water table. (4953-Terminology of Forest Science, 1971.)

River Wash

Barren alluvial land, usually course-textured, exposed along streams at low water and subject to shifting during normal high water. (R.L. Hausenbuiller, 1978.)

Road

Any designated route of sufficient width to allow passage by a four-wheel vehicle (full size - not quad).

Staging/Parking/Camping

These areas include all sites (designated or undesignated) that are used for these activities. Staging areas commonly include areas to unload off-highway vehicles from trucks or trailers and areas to fuel, maintain, and wash the vehicles during and after use. This includes areas in the vicinity of restrooms and bulletin boards.

Tracks

A facility designed and constructed for confined use of races and practice riding.

Trail

Any designated route not a road.

Trials Riding

Off-highway vehicle use (most commonly motorcycles) to complete a difficult obstacle course within a measured amount of time. The obstacles are most commonly natural features (large rocks, stumps). The course is often designed to be very difficult and must be completed at a very slow pace with the result that mechanical damage on natural resources by the vehicle is usually very minimal.

Section F

California Soil Survey Committee

EROSION HAZARD RATING (EHR) SYSTEM FOR SHEET AND RILL EROSION

Overview

- The EIR system is designed to appraise the relative risk of accelerated sheet and rill erosion.
- It does not rate gully erosion, dry ravel, wind erosion or mass wasting.
- This system is a highly developed checklist and is not a mathematical model.
- Model such as USLE and WEPP quantify soil erosion (i.e., tons/acre).
- The EHR method provides adjective ratings associated with the likelihood and severity of soil erosion to occur.
- It is designed for use by non-technical watershed specialists.
- The major factors used in the system are outlined below. Other soil factors were considered but not used because they were not definitive in this type of system.

I. SOIL ERODIBILITY - Factor range is 1 to 5
Soil detachability and transport are represented by soil texture, slope and aggregate stability adjustments.

II. RUNOFF PRODUCTION - Factor range is 1 to 8
A. Climate - 2 year, 6 hour precipitation intensity.
B. Water movement in the soil - Infiltration, permeability and depth to layer that restricts water movement.
C. Runoff from adjacent and/or intermingled areas - Rock outcrop, or other impervious or nearly impervious surfaces.
D. Uniform slope length.

III. RUNOFF ENERGY - Factor range is 0 to 1
Slope gradient

IV. SOIL COVER - Factor range is 0 to 5
Quantity, quality and distribution reflects cover effectiveness.

EROSION HAZARD RATING - SOIL ERODIBILITY X RUNOFF PRODUCTION X RUNOFF ENERGY X SOIL COVER

California Soil Survey Committee
EROSION HAZARD RATING TRAINING WORKSHOP
How the EHR System Evolved

In summer 1986 the California Department of Forestry's Soil-Vegetation Survey program and the USDA Soil Conservation Service were finalizing plans to conduct joint mapping and combined soil and vegetation survey publications. Erosion Hazard Ratings (EHR) drew attention during a presentation on these joint mapping plans at a State Board of Forestry meeting. Board members and CDF officials asked that the Soil-Vegetation Survey and SCS staffs carefully evaluate the EHR system used for the joint CDF/SCS reports to insure that a unified and technically sound system, acceptable to both agencies, was used[1].

As a result, in December 1986 the California Soil Survey Committee, made up of representatives from SCS, CDF, USFS, BLM, & UC, formed a task group to evaluate EHR methods used by National Cooperative Soil Survey (NCSS) participating agencies in California.

Task group members included: Trinda Bedrossian, geologist, CDMG; Chuck Goudey, soil scientist, USFS; Dick Herriman, soil scientist, SCS; Gordon Huntington, soil specialist, UCD; John Munn soil erosion studies program manager, CDF; John Popelka, forester, CDF; Jim Purcell, forester, CDF; Mike Singer, professor, UCD; Dave Smith, soil scientist, SV Survey (CDF/SCS); Bob Zasoski, professor, UCD.

A. The task group's initial findings were that: (1) the NCSS agencies in California were each using different methods to determine EHR's, (2) the different methods could result in conflicting ratings along soil survey area boundaries and confusion among users of soil reports, (3) the link between soil survey report EHR's and site-specific conditions was not always clear, (4) none of the individual methods used by the agencies was entirely suited for use as a standard method, and (5) the task group would proceed to develop a standard EHR method to propose for future use.

Existing EHR systems included:

1. "USFS Region 5 EHR computation worksheet.
2. "Bare soil under probable slope" method used by SCS (USLE is usually used by SCS for site-specific determinations).
3. "Judgement of mapper assuming significant disturbance of vegetative cover and 30 to 50 percent slopes" used by CDF Soil-Vegetation Survey.
4. Methods proposed by SCS staff that are modified applications of USLE (Berry 1983, Pappas 1984).

Other findings of the group were that: (6) USLE is not reliable for use in forest and range lands in California, (7) WEPP is being developed as a replacement for USLE but is not yet available, (8) a simple, qualitative EHR method would be useful even in the presence of WEPP.

B. Scoping for a new method found:

1. Factors and processes of erosion vary such that different types of erosion (i.e. sheet and rill, gully, stream channel, mass movement, etc.) can not be easily handled together in a single EHR system.

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[1] CDF is charged with administering the State's Forest Practices Act using policy set by the Board. EHR determinations are a critical portion of Timber Harvest Plans submitted to CDF as required by the Act. The joint CDF/SCS reports are likely to be referred to by foresters writing Timber Harvest Plans.

2. The task group would focus on developing a sheet and rill erosion hazard rating system. The group also recommends that other EHR systems be worked on for gully, mass movement, dry ravel, etc.

The group proceeded to conduct a thorough evaluation of factors that influence sheet and rill erosion. A field test of a subsequent draft method was distributed among various agency personnel in 1988. The results of the field test show that consistent ratings were being made by persons using the method in various areas of the state; responses from the field were generally that the method was useful and reliable. Some final adjustments were made and the method, in its current form was released by CSSC in July 1989.

C. Other Items to Note:

1. CSSC encourages a one-year trial use period by the cooperating agencies. An evaluation is planned at the end of that period.
2. Use of the method on irrigated cropland is a question, and it should be closely looked at there. It is expected to work well on forest, range, and dryland grain cover types.

USDA - Forest Service (Ref: FSH 2509.22)
California Soil Survey Committee

COMPUTATION OF EROSION HAZARD RATING (EHR)

Sheet and Rill Erosion

Alternative

I. SOIL ERODIBILITY FACTORS
A. TEXTURE (from table 1 in instructions)
B. AGGREGATE STABILITY ADJUSTMENTS (see instructions)
C. SOIL ERODIBILITY RATING = Sum of A + B

II. RUNOFF PRODUCTION FACTORS

A. CLIMATE (2 year, 6-hour precipitation):

Inches	<1.0	1.0 - 1.7	1.8 - 2.2	2.3 - 2.7	>2.7
Rating	1	2	3	4	5

B. WATER MOVEMENT IN THE SOIL:

Infiltration	Rapid	Rapid	Rapid	Moder-ate	Rapid or Moderate	Rapid or Moderate	Slow
Permeability	Any	Moderate	Moderate	Any	Slow	Slow	Any
RL Depth (in)	>40	20-40	<20	>40	20-40	<20	Any
Rating	1	2	3	3	4	6	8

C. RUNOFF FROM ADJACENT AND INTERMINGLED AREAS:

Amount	Low	Moderate	High
Rating	0	2	5

D. UNIFORM SLOPE LENGTH:

Length (ft)	<25	25 - 50	>50
Rating	1	3	6

E. RUNOFF PRODUCTION FACTOR = Sum of A + B + C + D

F. RUNOFF PRODUCTION RATING = Runoff Production Factor divided by 3

III. RUNOFF ENERGY RATING = Slope percent divided by 100

IV. SOIL COVER FACTORS
A. QUANTITY AND QUALITY (From table 2 in instructions)
B. COVER DISTRIBUTION: Uniform = 0 Patchy = 1
C. SOIL COVER RATING = Sum of A + B

V. RATINGS PRODUCT = Product of Ratings I x II x III x IV

VI. ADJECTIVE RATING = From table below

<4	LOW
4 - 12	MODERATE
13 - 29	HIGH
>29	VERY HIGH

Soil/Stop _____

Project/Location _____

Name/Date _____

Destroy Previous Editions

RS-2500-14 (2/90)

ABBREVIATED INSTRUCTIONS FOR EROSION HAZARD RATING COMPUTATION

(See FSH 2509.22, Chapter 50 for detailed instructions)

I.A. - TEXTURE.

SLOPE STEEPNESS

TEXTURAL CLASS	0-15%	16-30%	31-45%	46-60% +
Sand	1	1	2	3
Loamy Sand	1	2	3	3
Sandy Loam	2	2	3	3
Sandy Clay Loam	2	2	3	3
Sandy Clay	1	1	1	1
Clay	1	1	1	1
Clay Loam	2	2	2	2
Loam	3	3	3	3
Silty Clay	2	2	2	2
Silty Clay Loam	3	3	3	3
Silt Loam	4	4	4	4
Silt	4	4	4	4

I.B. - AGGREGATE STABILITY ADJUSTMENTS.
When sodium content decreases aggregate stability use +1. When iron, structure, organic matter, or rock fragments (not surface) increases aggregate stability Use -1. Soil erodibility factor is never adjusted to 0.

II.A. - CLIMATE. Values from map or local station data.

II.B.1. - INFILTRATION OF THE SURFACE SOIL.

Rapid. Sands, loamy sands, sandy loams, and porous fine sandy loams and loams; generally very porous. >2 in/hr.

Moderate. Loams, silt loams and friable clay loams; also includes, the more porous soils of finer textures, and the less porous soils of coarser textures. 0.6 to 2.0 in/hr.

Slow. Clay loams and clays that are firm, sticky and plastic; generally, with very few pores. <0.6 in/hr.

Compensate as needed for compaction and hydrophobicity. Adjust to next slower class(s) depending upon severity of reduced infiltration.

II.B.2. - PERMEABILITY OF THE SUBSOIL.
Soil, rock or other kinds of layers within 40 inches of the soil surface are evaluated.

Soil	*Nonsoil Material*
Rapid. Sands,loamy sands sandy loams & fine sandy loams: very porous. (>.2 in/hr)	Fractured or loose material. Water movement not impeded.
Moderate Loams, silt loams & friable clay loams: porous. (0.6 to 2.0 in/hour)	Fractured or weathered material can be dug with a shovel.
Slow. Clay loams & clays that are firm, sticky & plastic: few or very few larger pores. (<0.6 in/hour)	Very few widely spaced fractures. Weathered material usually is dense.

II.B.3. - RESTRICTING LAYER (RL) DEPTH.
Depth to layer that is rated for subsoil or substrata permeability (subsoil layers, cemented layers, clay layers, compacted laye. weathered or unweathered rock Shallow soils over highly fractured bedrock that are permeable to water are not considered to be shallow

II.C.- RUNOFF FROM ADJACENT AND INTERMINGLED AREAS.
Includes rock outcrop, soil areas with water movement (II. B.) factors totaling 6 or more, and disturbed areas (compacted areas, roads, and developed areas).

Low. Less than 15 percent of adjacent or intermingled areas contain impervious or nearly impervious surfaces.

Moderate. Between 15 and 50 percent of adjacent or intermingled areas contain impervious or nearly impervious surfaces.

High. More than 50 percent of adjacent or intermingled areas contain impervious or nearly impervious surfaces.

II.D. - UNIFORM SLOPE LENGTH. Distance that occurs before a significant change in water movement or flow direction may take place.

III. - RUNOFF ENERGY. Slope percent divided by 100 and rounded to nearest hundredth.

IV. SOIL COVER

IV.A. - QUANTITY AND QUALITY
Amount of surface area covered by low growing vegetation (grasses, forbs, and prostrate shrubs), plant litter and debris, and surfac -k fragments larger than about 3/4 inch. Shrub and tree cover is ac area covered by their canopies.

PERCENT GROUND COVER

PERCENT SHRUB & OR TREE CANOPY	0-10	11-30	31-50	51-70	71-90	>90
0 - 10	5	4	3	2	1	0
11 - 30	4	4	3	2	1	0
31 - 50	4	3	3	2	1	0
51 - 70	3	3	3	2	1	0
71 - 90	3	3	2	2	1	0
>90	3	2	2	1	0	0

IV.B - COVER DISTRIBUTION.

Uniform if more than 50 percent of an area is within one of the percent ranges listed above.

Patchy if more than 50 percent of an area falls outside a single percentage range.

Soil Erodibility Factor Background

The slope adjusted relative erodibility factors given in Table 1 have been developed to compensate for differences in the Transport of detached soil particles with changes in slope steepness.

Measurements of soil splash have shown that the detachment rates for medium and coarse sands are much greater than for finer textured soils. Smaller size particles, however, have slower settling velocities and can be transported in suspension on gentle slopes, while larger particles must be rolled by the current or pushed in short "jumps" as they are temporarily injected into the runoff flow by raindrop splash. Therefore, transport of fine particles is much greater than larger particles on gentle slopes, but this difference becomes smaller as runoff transport capacity increases on steeper slopes.

As a result, soil erodibility is primarily controlled by particle transportability on gentle slopes and by soil detachability on steeper slopes where transport capacity is sufficient to maintain movement of larger size particles. This means that the relative erodibility of soils with substantial sand content cannot be represented by a single value on all slopes.

Assumptions used in calculating the relative erodibility values for different slope groups included:

1. Erodibility of soils in the 0-15% slope group is correctly described by the soil texture equation of the Universal Soil Loss Equation (USLE) K-value (Wischmeier, W.H. and D.D. Smith, 1978, Predicting rainfall erosion losses - a guide to conservation planning, USDA, Agr. Hndbk. No. 537, p. 10, eq. 3), using typical values of particle size proportions for soils in each texture class.

2. Particle transportability is proportional to settling velocity in turbulent flow (Chow, V.T. (ed.), 1964, Handbook of applied hydrology, McGraw-Hill, New York, eq. 17-II-2).

3. Runoff transport capacity is proportional to the 5/2 power of slope steepness in degrees (Gilbert, G.K., Geology of the Henry Mountains).

These assumptions and the manner in which they were combined are subject to many different problems, so rounding results to even the nearest integer may overstate the final erodibility factor accuracy, and there is much room for discussion and future improvement.

Soil Erodibility Factor Determination

Soil erodibility factors shown in Table 1 of the EHR Instructions were determined using the following procedures:

1) K-values were calculated for each texture class (see attached Table 1).

2) Transportability factors for clay, silt, and sand size particle size classes were calculated based on the following equation:

$$Vs = ((4/3)(S-1)(gD/Cr))^{1/2}, \text{ where}$$

Vs = settling velocity in turbulent flow,
S = specific gravity of particles,
g = acceleration of gravity,
Cr = coefficient of resistance, and
D = particle diameter.

This reduces to $Vs1/Vs2 = (D1^{1/2})/(D2^{1/2})$, and leads to the relative transport factors shown in attached Table 2.

3) Particle size transport correction factors for each slope group were determined by comparing relative transport values from step 2) to transport capacity values calculated from the 5/2 power of slope steepness in degrees (attached Table 3) and assuming that all of a given size fraction is transported when the average transport capacity ratio is greater than or equal to the transport factor.

4) Slope correction factors were calculated for each texture class and slope group combination based on transport factors from step 3) and the average proportion of sand, silt, and clay for each texture class (attached Table 4).

5) Slope correction factors from step 4) were applied to the K-values from step 1) to give total erodibility values for each texture class and slope group combination (attached Table 5).

6) Relative erodibility values for each slope group were developed by normalizing the total erodibilily results (attached Tables 6 and 7). This was accomplished by:

   a) dividing each total erodibility value within a given slope class by the average factor for that class, and

   b) dividing each resulting value in the table by the smallest of the average texture group values.

7) Final relative erodibility values were determined by rounding the preliminary values and adjusting them (in the case of silty soils) so that the erodibility values on steeper slopes were equal or greater than values for gentler slopes (attached Table 8).

SLOPE CORRECTED SOIL ERODIBILITY FACTORS CALCULATION JRM 11/07/89

Table 1: SOIL ERODIBILITY FACTOR CALCULATION

Texture K-Value = 2.1*(((%Si+%vfS)*(100-%C))^1.14)/10000

Texture Class	%Si+vfS	%C	Texture K-Value	Rel. Erod.
S	15	5	0.827	1.22
LS	20	10	1.080	1.59
SL	25	15	1.304	1.92
SCL	30	25	1.392	2.05
SC	20	40	0.680	1.00
C	35	50	1.045	1.54
CL	45	35	1.878	2.76
L	40	20	2.080	3.06
SiC	50	45	1.750	2.57
SiCL	60	35	2.606	3.83
SiL	70	10	4.503	6.62
Si	90	5	6.378	9.38

Table 2: PARTICLE TRANSPORTABILITY CALCULATION

Particle Size	Minimum Diam (u)	Maximum Diam (u)	Average D^1/2	Relative Transp.	Transp. Factor
Clay	0	2	0.707	1.00	1.0
Silt	2	50	4.243	6.00	6.0
Sand	50	1000	19.347	27.36	30.0
Co. Sand	50	2000	25.896	36.62	

Table 3: PARTICLE SIZE TRANSPORT CORRECTION FACTORS

Slope Steepness %	deg.	Trans Capacity	Avg Trans Capacity	Relative Transp. Factors Clay	Silt	Sand
				1.0	6.0	30.0
0	0.00	0				
15	8.53	213	106	1.0	6.0	30.0
30	16.70	1140	676	1.0	6.0	30.0
45	24.23	2889	2014	1.0	6.0	30.0
60	30.96	5335	4112	1.0	6.0	30.0

Table 4: SOIL ERODIBILITY x SLOPE STEEPNESS CORRECTION FACTORS

Texture Class	Particle Distribution --%C--	--%Si--	--%S--	- - Slope Correction Factors - - 0-15%	16-30%	31-45%	46-60%+
S	5	5	90	1.0	6.1	17.4	27.4
LS	10	10	80	1.0	5.8	15.9	24.7
SL	15	20	65	1.0	5.5	13.7	20.9
SCL	25	15	60	1.0	5.0	12.5	19.2
SC	40	10	50	1.0	4.2	10.5	16.0
C	50	30	20	1.0	3.6	6.1	8.3
CL	35	35	30	1.0	4.4	8.1	11.5
L	20	35	45	1.0	5.2	10.8	15.8
SiC	45	45	10	1.0	3.8	5.0	6.2
SiCL	35	50	15	1.0	4.3	6.2	7.9
SiL	10	60	30	1.0	5.6	9.4	12.7
Si	5	90	5	1.0	5.8	6.4	7.0

Table 5: SLOPE CORRECTED SOIL ERODIBILITY FACTORS

Texture Class	- - - - Slope Steepness - - - - 0-15%	16-30%	31-45%	46-60%+
S	0.83	5.02	14.40	22.62
LS	1.08	6.25	17.12	26.66
SL	1.30	7.15	17.83	27.20
SCL	1.39	6.91	17.43	26.66
SC	0.68	2.84	7.12	10.88
C	1.05	3.73	6.37	8.68
CL	1.88	8.18	15.28	21.50
L	2.08	10.74	22.53	32.87
SiC	1.75	6.63	8.83	10.76
SiCL	2.61	11.22	16.14	20.46
SiL	4.50	25.25	42.26	57.18
Si	6.38	36.79	40.80	44.32
Avg.	2.13	10.89	18.84	25.82

Table 6: SLOPE CORRECTED SOIL ERODIBILITY FACTORS DIVIDED BY COLUMN MEANS

Texture Class	Slope Steepness 0-15%	16-30%	31-45%	46-60%+	Row Average
S	0.389	0.461	0.764	0.876	0.623
LS	0.508	0.574	0.909	1.033	0.756
SL	0.613	0.657	0.946	1.053	0.817
SCL	0.655	0.635	0.925	1.033	0.812
SC	0.320	0.261	0.378	0.421	0.345
C	0.492	0.343	0.338	0.336	0.377
CL	0.883	0.751	0.811	0.833	0.819
L	0.978	0.986	1.195	1.273	1.108
SiC	0.823	0.608	0.469	0.417	0.579
SiCL	1.225	1.030	0.857	0.793	0.976
SiL	2.117	2.318	2.243	2.215	2.223
Si	2.999	3.377	2.165	1.717	2.564

ble 7: SLOPE CORRECTED SOIL ERODIBILITY FACTORS DIVIDED BY COLUMN MEANS AND SMALLEST ROW AVG. FACTOR

Texture Class	Slope Steepness 0-15%	16-30%	31-45%	46-60%+	Row Average
S	1.127	1.337	2.215	2.540	1.805
LS	1.471	1.663	2.634	2.993	2.190
SL	1.777	1.903	2.743	3.053	2.369
SCL	1.897	1.840	2.682	2.993	2.353
SC	0.927	0.756	1.096	1.221	1.000
C	1.425	0.994	0.979	0.974	1.093
CL	2.559	2.177	2.350	2.414	2.375
L	2.835	2.857	3.465	3.690	3.212
SiC	2.385	1.763	1.358	1.208	1.679
SiCL	3.552	2.985	2.483	2.297	2.829
SiL	6.136	6.718	6.500	6.420	6.444
Si	8.691	9.787	6.276	4.976	7.432

Table 8: SIMPLIFIED FACTORS

Texture Class	Slope Steepness			
	0-15%	16-30%	31-45%	46-60%+
S	1	1	2	3
LS	1	2	3	3
SL	2	2	3	3
SCL	2	2	3	3
SC	1	1	1	1
C	1	1	1	1
CL	2	2	2	2
L	3	3	3	3
SiC	2	2	2	2
SiCL	3	3	3	3
SiL	4	4	4	4
Si	4	4	4	4

California Soil Survey Committee

Erosion Hazard Rating Training

Slope Factor Comparisons

Slope tangent was chosen for the Runoff Energy Rating because it is easily derived from slope percent, the most common measure of slope steepness, and provides an estimate of slope effect that is a logical compromise between the theoretical energy gradient (sine of slope) and the USLE slope factor, based on comparison of the percent change and factor ratios given below.

The USLE slope factor was not used because data used in its development were primarily from slopes of less than 20 percent and criticism that this factor over-estimates erosion on steep slopes. The relative effects of slope steepness are shown in the factor ratios given below.

Slope Angle (deg)	Sine Slope x 100		Percent Slope		USLE Slope Fac.	
	Value	% Chg.	Value	% Chg.	Value	% Chg.
0	0.0	-	0.0	-	0.07	-
5	8.7	-	8.7	-	0.96	-
10	17.4	99	17.6	102	2.83	195
15	25.9	49	26.8	52	5.63	99
20	34.2	32	36.4	36	9.28	65
25	42.3	24	46.6	28	13.67	47
30	50.0	18	57.7	24	18.70	37
35	57.4	15	70.0	21	24.20	29
40	64.3	12	83.9	20	30.02	24
Ratios						
35:5	6.58		8.00		25.23	
30:15	1.93		2.15		3.32	

California Soil Survey Committee
EROSION HAZARD RATING TRAINING WORKSHOP
Soil Cover Factors

Soil cover plays a major role in protecting soil from the forces of sheet and rill erosion. The effect of soil cover is to (1) absorb raindrop impact (soil particle detachment caused by the force of raindrop impact is the critical first step in the process of sheet and rill erosion) and (2) impede the movement (transport) of detached soil particles in overland flow. Important considerations are the kind, amount, and distribution of soil cover:

A. KIND:

1. Canopy cover intercepts raindrops and thereby protects the soil surface from the direct force of falling raindrops. Water concentrated in stem flow can have an influence where it intercepts the ground or drops from a tree or shrub. Canopy cover is based on the proportion of the ground surface covered by tree and shrub canopy. Canopy cover is important, but not to the extent that ground cover is.

2. Ground cover is more effective than canopy cover in resisting the erosive effects of raindrop impact and surface runoff.

What is effective ground cover?

a. rock fragments > 3/4 inch. The 3/4 inch size is a somewhat arbitrary cutoff picked because it is generally accepted that smaller rock fragments are displaced by raindrop impact.

b. woody debris that is big enough and stable enough to resist raindrop impact and to resist being dislodged by overland flow (and thereby float away).

c. duff and litter that is thick enough to resist raindrop impact.

d. low growing vegetation (grasses, forbs, prostrate shrubs).

B. AMOUNT:

A matrix was developed by the task group to rate the amount of cover (refer to Table 2 of Instructions).

The values placed in the matrix are based on experience of the originators; they were refined based on results from initial testing (refer to attached diagram).

More weight is given in the matrix to ground cover than to canopy cover (consistent with statements under "KIND").

Soil cover is often difficult to estimate. For comparison, subtract estimated bare soil from 100 to help evaluate soil cover estimates.

C. DISTRIBUTION:

The soil cover rating is adjusted if cover is patchy as opposed to uniform. Variations in the continuity of soil cover could influence erosion on a site, and an upward adjustment is made to the soil cover rating for patchy cover (> half of an area falls outside a single cover percentage range).

Section F

CALIFORNIA SOIL SURVEY COMMITTEE

EROSION HAZARD RATING (EHR) SYSTEM
FOR
SHEET AND RILL EROSION
July 1989

Many land use activities have the potential to cause erosion rates that exceed natural soil erosion or soil formation rates. Examples include cultivation, construction (e.g., developments, roads and trails), off-highway vehicle use, ski areas, mining, wildfires, prescribed burning, timber harvesting and grazing. Potential consequences of accelerated erosion include reductions in the productive capacity of the soil and adverse effects on water quality. Many interrelated factors are involved in determining whether land use activities will cause accelerated erosion, and to what degree accelerated erosion causes adverse effects.

The California Soil Survey Committee (CSSC) Erosion Hazard Rating (EHR) System has been developed by an interagency task group under the direction of the CSSC. The purpose of this effort was to provide a consistent method for use by different agencies and individuals that helps to, (1) evaluate the likelihood that a specific soil disturbing activity will cause accelerated sheet and rill erosion, (2) evaluate the relative risk for adverse consequences, and (3) identify approximate soil cover amounts needed to achieve an acceptable risk level. This EHR system is a highly developed checklist and is not a mathematically exact equation. It is designed to appraise the relative risk of accelerated sheet and rill erosion. The system does not rate gully erosion, dry ravel, wind erosion, or mass wasting.

Erosion hazard ratings can be used for activity planning and implementation, site specific determinations, and in reports to reflect relative erosion hazards over large areas (e.g., soil survey reports and evironmental documents). Slightly different techniques are used for these different applications.

Erosion hazard ratings made during early stages of activity planning provide a means to predict relative post-activity erosion hazard conditions and to integrate necessary erosion control measures into project design. Different EHR's for a specific site can be calculated by varying those factors that can be changed by the planned activity or by post-activity erosion control measures. This allows a comparison of the planned activity with alternative treatments and mitigation measures so that a desired post activity erosion hazard can be selected.

For planned activities and site specific determinations, ratings are computed for representative, homogenous units within the activity area. The climatic factor usually is constant over an activity area, but variations in soil, topograhic and cover related factors may occur. A new rating is calculated where changes are noted, and adjustments in planned treatments or mitigation measures may also need to coincide with these changes.

Soil cover and topographic changes can be easily detected by ground checking. Changes in soil related factors are more difficult to detect, but can be anticipated by changes in topography, vegetation, rock fragments, soil color and other surface soil conditions. Soil maps can serve as a guide to variations in soil related factors.

Some of the EHR factors are "standardized" when the system is used to rate relative erosion hazards in soil survey reports, soil management reports and other enironmental documents. The soil cover factor is often assumed to be constant to allow comparison of relative erosion hazards among different mapped areas. The "maximum" erosion hazard, obtained by assuming zero percent organic cover (living and dead), is frequently used in this way to clearly display the risks of removing soil cover. The amount of soil cover needed to reduce erosion hazards to desired risk levels can also be given in the report, or report users can determine the required amount by adjusting the report EHR with different soil cover percentages. Only the organic component of soil cover is adjusted to zero percent. Whereas, surface rock fragments are still rated for soil cover. Variations in other EHR factors can be accommodated by using ranges or central values. Adjustments and use of EHR factors should be described in the reports.

Each soil within a map unit should be rated separately, and overall ratings for soil map units are also commonly desireable. Map units containing multiple soils with different EHR's can be rated in different ways (e.g., using the most limiting rating, weighted averages based on component percentages, or ratings that represent different mixes). The specific method used will depend on the objectives and uses of the report.

The following instructions explain the use of the CSSC EHR computation form. The numbers, letters and titles used in these instructions correspond to those on the form.

I. SOIL ERODIBILITY FACTORS

A. Texture.

Soil textural classes and slope steepness are used to identify relative soil erodibility factors. Soil texture class erodibility factors for the 0-15 percent slope group are based on textural components of the Universal Soil Loss Equation K-value calculation, and are adjusted to compensate for particle size class transport differences due to increasing slope gradient. Select the numerical rating for the appropriate surface texture and slope grouping from Table 1.

Table 1: Relative Soil Texture Erodibility Factors

Textural Class	Slope Steepness			
	0-15%	16-30%	31-45%	46-60%
Sand	1	1	2	3
Loamy sand	1	2	3	3
Sandy Loam	2	2	3	3
Sandy clay loam	2	2	3	3
Sandy clay	1	1	1	1
Clay	1	1	1	1
Clay loam	2	2	2	2
Loam	3	3	3	3
Silty clay	2	2	2	2
Silty clay loam	3	3	3	3
Silt loam	4	4	4	4
Silt	4	4	4	4

Soil Erodibility Factor Descriptors:

1 = Low 2 = Moderate 3 = High 4 = Very high

B. Aggregate Stability Adjustments.

Soil characteristics other than texture can also increase or decrease aggregate stability. These may be the result of unique conditions where adjustments are best made based on local experience or measurements.

Sodium affected soil can have less aggregate stability than texture alone would indicate. Soil survey reports serve as a guide to the occurence of sodium affected soils. When sodium content is considered to be a factor that lessens aggregate stability, the adjustment factor is +1.

Soils high in iron tend to have greater aggregate stability than texture alone would indicate. This characteristic has been associated with soils classified with oxidic family modifiers. Soil survey reports serve as a guide to the occurance of these soils. Other soil characteristics can also significantly influence or be indicative of increased aggregate stability. These include visibly strong soil structure, organic matter, and rock fragment content. Rock fragment content in this context refers only to conditions where rock fragments directly affect aggregate stability. Rock fragment content that provides protection from raindrop impact is rated as a component of soil cover.

When soil characteristics occur that significantly increase aggregate stability, the adjustment factor is -1. However, the soil erodibility factor is never adjusted to zero.

C. Soil Erodibility Rating. Enter the sum of A. and B.

II. RUNOFF PRODUCTION FACTORS

A. Climate.

The 2-year, 6-hour precipitation map (figure 1) is used as a guide to the relative occurence of significant storm events. Values from the map are used to determine the rating. Larger scale maps are contained in "Precipitation Frequency Atlas of the Western United States," NOAA Atlas 2, Volume XI-California, U.S. Department of Commerce, 1973. More specific information for local areas may be used if available.

B. Water Movement in the Soil.

Infiltration, permeability, and the depth to permeability reduction are inter-related factors that govern the rate of water movement into and through the soil. These factors are evaluated together to account for interactions among the factors.

1. Infiltration of the surface soil. Infiltration is the rate of water movement into the soil. Either existing or post activity soil conditions are used to determine the likelihood of producing surface runoff. Use the following soil texture, porosity and consistence desciptions as a guide to rating undisturbed conditions.

Rapid. Sands, loamy sands, sandy loams, and porous fine sandy loams and loams; generally very porous. (>2 inches/hour).

Moderate. Loams, silt loams and friable clay loams; also includes, the more porous soils of finer textures, and the less porous soils of coarser textures. (0.6 to 2.0 inches/hour).

Slow. Clay loams and clays that are firm, sticky and plastic; generally with very few continuous pores. (<0.6 inches/hour).

Infiltration rates can be reduced by various management activities. This may be the result of compaction by equipment or animal use on nearly dry or moist soils; puddling from equipment or animal use on wet soils; puddling caused by raindrop impact on bare soils with loam or finer textures and relatively low organic matter content; or hydrophobic conditions caused by fire (some forest soils very high in organic matter are also naturally hydrophobic when dry).

Existing soil conditions and the potential effects of planned activities on infiltration rates should be evaluated to determine if the natural soil rating needs to be modified. Surface soil indicators of reduced infiltration potential include platy soil structure and soil pores that are mostly spherical or discontinous.

Ratings should be adjusted to the next slower class depending upon the severity of reduced infiltration.

2. Permeability of the subsoil. Permeability is the rate at which water moves down through the soil. The permeability of rock or other kinds of layers within 40 inches of the soil surface are also evaluated here. Subsoil and substrata permeability rates are compared to surface infiltration rates to evaluate the likelihood of water accumulating in the soil. A restricting layer should have a permeability rating that is at least one class slower than the surface infiltration rating. Use the following desciptions as a guide to the ratings.

	Soil	Nonsoil Material
Rapid	Sands, loamy sands, sandy loams, and fine sandy loams; generally very porous. (>2 inches/hour).	Highly fractured or loose material. Water movement is not impeded.
Moderate	Loams, silt loams, and friable clay loams; also includes, the more porous soils of finer textures, and the less porous soils of coarser textures. (0.6 to 2.0 inches/hour).	Fractured or weathered material that can be dug with a shovel
Slow	Clay loams and clays that are firm, sticky & plastic; generally with very few pores. (<0.6 inches/hour).	Very few widely spaced fractures. Unweathered or weathered materials are dense.

3. Restricting layer (RL) depth. The depth from the soil surface to the layer rated as restricting the downward movement of water. This includes subsoil layers, cemented layers, clay layers, compacted layers, and weathered or unweathered rock. Shallow soils over highly

fractured bedrock that is permeable to water are not considered to be shallow for these purposes.

Soil depth and the nature of subsurface materials can be observed in road cuts and small soil pits.

C. Runoff from Adjacent and Intermingled Areas.

The amount of, and proximity to, impervious or nearly impervious surfaces can increase the production of surface runoff. Impervious or nearly impervious surfaces include rock outcrop, floodplains, soil areas with water movement (II. B.) factors totaling 6 or more, and severely disturbed areas (e.g., compacted areas, roads, and developed areas). This factor allows for rating complex soil patterns and miscellaneous areas. Use the following as a guide to the ratings.

Low. Less than 15 percent of adjacent or intermingled areas contain impervious or nearly impervious surfaces.

Moderate. Between 15 and 50 percent of adjacent or intermingled areas contain impervious or nearly impervious surfaces.

High. More than 50 percent of adjacent or intermingled areas contain impervious or nearly impervious surfaces. ROADS.

D. Uniform Slope Length

Slope length and surface variation are used to reflect the magnitude of slope gradient effects on surface runoff. The surface microrelief is evaluated by the distance between significant changes in water movement or flow direction (e.g., the distance between intercepting ground cover, benches, mounds, flats and other soil surface features).

E. Runoff Production Factor. Enter the sum of A., B., C. and D.

F. Runoff Production Rating. Divide the Runoff Production Factor by 3 and round to the nearest tenth. (Division by three is used to keep the rating in a numeric range that reflects the importance of runoff production relative to the other rating factors).

III. RUNOFF ENERGY FACTOR

Slope gradient is used to represent the relative sediment transport capacity of surface runoff. The runoff energy rating is the measured percent slope divided by 100 and rounded to the nearest hundredth (keep two decimal points). For example, 35 percent slope is recorded as .35. Use .01 for slopes less than 1 percent.

IV. SOIL COVER FACTORS

A. Quantity and Quality.

Ground cover is more effective than shrub or tree cover in resisting the erosive effects of raindrop impact and surface runoff. Table 2 accounts for these differences. Ground cover is based on the amount of surface area covered by low growing vegetation (grasses, forbs, and prostrate shrubs).

plant litter and debris, and surface rock fragments larger than about 3/4 inch (3/4 inch is used because smaller rock fragments are displaced by raindrop impact and it coincides with Soil Conservation Service Soil Interpretation Record data, SCS SOI-5). Shrub and tree cover is based on the proportion of the ground surface covered by their canopies. Select the rating number that coincides with the appropriate percentages of ground cover versus shrub and/or tree cover.

Table 2: Soil Cover Factors.

		GROUND COVER					
	Percent	0 - 10	11 - 30	31 - 50	51 - 70	71 - 90	>90
SHRUB	0 - 10	5	4	3	2	1	0
AND/	11 - 30	4	4	3	2	1	0
OR	31 - 50	4	3	3	2	1	0
TREE	51 - 70	3	3	3	2	1	0
CANOPY	71 - 90	3	3	2	2	1	0
	>90	3	2	2	1	0	0

Soil cover is often difficult to consistently estimate. For comparison, subtract estimated bare soil from 100 to help evaluate soil cover estimates.

B. Cover Distribution

This rating compensates for variations in the continuity of soil cover. For example, an area may have a tree canopy that is consistently between 30 and 50 percent, but the ground cover is mostly "patchy" (i.e., 70 to 100 percent in part of the area and 50 to 70 percent in other parts). Patchy areas are too small to stratify as separate hazard rating areas.

Soil cover is considered to be uniform if more than half of an area is consistently within one of the percent ranges listed in Table 2. The cover is considered patchy when more than half of an area falls outside a single percentage range.

C. Soil Cover Rating. Enter the sum of A. and B.

V. RATINGS PRODUCT.

Multiply ratings for I, II, III and IV; then round to the nearest whole number.

VI. ADJECTIVE RATING

Numeric ratings are placed into adjective groups of low, moderate, high and very high to aid application and communication. Areas with numeric values within the range of each adjective rating group, generally have similar accelerated erosion risks and consequences if corrective measures are not applied.

The adjective erosion hazard ratings are described below in terms of the likelihood, risk, and consequences of accelerated erosion. This reference can be made by comparing the erosion hazard rating for natural cover and

soil conditions with the erosion hazard rating for the present condition or a planned treatment. As the risk of accelerated erosion increases, so does the likelihood that accelerated erosion will exceed soil formation rates. The risk becomes especially critical for shallow and moderately deep soils over consolidated materials.

The ratings are based on the long-term average occurence of 2-year, 6-hour storm events. Erosion hazard risks are greater when storm frequency, intensity and/or duration exceed long-term average occurence, and risks are less when occurence is below "average". The risks and consequences for adjective erosion hazard ratings are described below.

Low EHR (less than 4 numeric rating). Accelerated erosion is not likely to occur ~~following disturbance,~~* except in the upper part of the Low EHR numerical range, or during periods of above average storm occurence. If accelerated erosion does occur, adverse effects on soil productivity and to nearby water quality are not expected.

Erosion control measures are usually not needed for these areas.

Moderate EHR (4 to 12 numeric rating). Accelerated erosion is likely to occur ~~following disturbance~~ *in most years. Adverse effects on soil productivity (especially to shallow and moderately deep soils) and to nearby water quality may occur for the upper part of the Moderate EHR numerical range, or during periods of above average storm occurence.

The need for erosion control should be evaluated for these areas. A wide selection of measures and application methods are available.

High EHR (13 to 29 numeric rating). Accelerated erosion will occur ~~following disturbance~~*in most years. Adverse effects on soil productivity (especially to shallow and moderately deep soils) and to nearby water quality are likely to occur, especially during periods of above average storm occurence.

Erosion control is necessary for these areas to prevent accelerated erosion. The selection of measures and methods of application are somewhat limited.

Very high EHR (more than 29 numeric rating). Accelerated erosion will occur ~~following disturbance~~* in most years. Adverse effects on soil productivity and to nearby water quality are very likely to occur, even during periods of below average storm occurence.

Erosion control is essential for these areas to prevent accelerated erosion. The selection of measures and methods of application are limited.

Erosion hazard reduction.

Runoff production and soil cover are erosion hazard factors commonly altered by soil disturbing activities. Erosion hazard ratings can be reduced by compensating for the effects of planned activities on these factors, or by applying mitigation measures after an activity or to an exisiting condition.

For example, moderate, high or very high erosion hazards can be reduced to desired risk levels by leaving or adding appropriate kinds and amounts of soil

* Deleted by EHR Committee action.

cover. This can be approximated by calculating EHR's with different amounts of soil cover (Part IV of EHR computation) until the desired rating is reached.

Existing organic matter (living and dead) on a site can be manipulated in various ways to reduce the erosion hazard. These include, stubble mulching on sloping cropland, forage residues on rangeland and logging residues on forestland.

If adequate soil cover is not available on a site, it can be added using a number of different materials. These include, wood fiber (hydro-mulch), straw, wood chips, netting, seeding with rapid growing erosion control plants, and establishing permanent vegetative ground cover on vineyards, orchards, ski slopes, and other severely disturbed areas.

Reduced infiltration and increased surface runoff caused by activity related compaction can be alleviated by tillage.

Shortening the slope length factor is another means of reducing the erosion hazard. Techniques include, terracing, contour tillage and windrowing organic materials on the contour.

The cost of installing effective erosion control measures usually increases with increasing EHR's. Although erosion control measures are commonly a cost effective means of avoiding adverse effects, the cost effectiveness and ability to implement erosion control measures on areas with very high EHR's deserves careful evaluation. Planning activities to retain enough existing soil cover is often the most cost effective means of meeting a desired level of erosion hazard risk with the least adverse effects.

Section G

Monitoring System:

Use the following system to evaluate all portions of the off-highway vehicle site over which off-highway vehicles have passed. The intent of these guidelines is to provide a process to collect data to meet monitoring needs, prioritize maintenance, program funds, and give Land Managers information for use in making decisions on how off-highway vehicle areas will be managed and maintained. Monitoring is best done as an interdisciplinary activity with representatives from Recreation, Resources, and Engineering/Maintenance participating as a team on the ground.

Begin by mapping all portions of the off-highway vehicle site over which off-highway vehicles have passed. Divide the mapped area into management segments and rate each segment with the following Data Sheet. Color map segments according to the appropriate rating.

All areas rated Yellow must be repaired before the next annual monitoring. All areas rated Red must initiate action to repair, close and rehabilitate within six months and a new monitoring evaluation entered in the file stating the status of the segment.

Data Sheet

Observer: _____ Date: _____

Agency/Unit: _____ Area Name or I.D.: _____

7.5 Minute Quad Name: _____

Segment Length: feet _____ Type of Use: _____

Comments / Summary / Specific Recommendations (continue on back).

_____
_____
_____
_____
_____

A. Rate off-highway vehicle use as Green (area o.k.), Yellow (needs maintenance), or Red (needs rehabilitation).

1. Green (Area Satisfactory - all of the following are No and all category Yellow and Red are No. If any of the Green category ratings are Yes the segment must be rated Yellow or Red).

	Yes	No
a. Drains and water transportation/dispersal systems needs work.	____	____
b. Trail tread surface inadequate and needs working.	____	____
c. Resource damage occurring outside designated trails or open areas.	____	____
d. Short cutting across switch backs.	____	____
e. Signing inadequate for resource protection/ user direction.	____	____
f. Segment NOT designated for use occurring.	____	____
g. Vegetation cover is inadequate to prevent accelerated erosion.	____	____
h. Significant erosion features occur on the segment.	____	____
i. Impacted area cannot be readily revegetated/ restored.	____	____

2. Yellow (needs maintenance - one or more Yes, but all category Red are No).

	Yes	No
a. Trail segment is overgrown with brush. Brushing required (clearing width 1.5 to 3 feet - greater clearing removes trail containment value).	____	____
b. Drains or water dispersal systems need opening or reshaping.	____	____
c. Tread surface needs working.	____	____
d. Signing is minimally adequate, but lack of sign may lead to problems such as those described in Red.	____	____
e. Evidence of unauthorized use off a designated route.	____	____
f. Impacted area cannot be revegetated/restored with ordinary effort.	____	____

3. Red (needs major maintenance or rehabilitation - one or more Yes.)

	Yes	No
a. Requires major maintenance, repair, re-route, or reconstruction.	____	____
b. Needs additional drainage construction or hard surfacing.	____	____
c. Drains or water dispersal systems require reconstruction.	____	____
d. Evidence of off-site damage (sediment, dust, excess runoff).	____	____
e. Needs major tread surface work.	____	____
f. Evidence of severe unauthorized use off a designated route.	____	____
g. Signing inadequate for resource protection - problems apparent.	____	____
h. Route NOT designated for all uses being made of it.	____	____
i. Segment does not meet current construction guidelines and problems are apparent.	____	____
j. Revegetation of impacted area requires major effort (such as returning topsoil to the site).	____	____

B. Cause Evaluation Ranking : When a trail segment falls in the category Yellow or Red reflect evaluators judgement of the cause by ranking the causes of resource damage, resource conflict, or user conflict/safety.

	Yes	No
a. Awareness of resource protection off-highway vehicle users lacking.	____	____
b. Barriers (natural or constructed) lacking.	____	____
c. Constructed without adequate natural drains, water bars, or water dispersal systems.	____	____
d. Excess soil moisture at time of use (needs wet weather closure or hard surfacing).	____	____
e. Land management agency presence is lacking (e.g. foot or vehicle patrols).	____	____
f. Grade too steep in relation to type and amount of use, soil type, or runoff concentration.	____	____
g. Intensity of storms unusual or unique - not typical.	____	____
h. Segment not designed for the major type of use or amount of use occurring.	____	____
i. Location segment is poor (e.g. located in riparian, dead-end trail, located on unstable side slope, etc.).	____	____
j. Mechanical erosion makes maintenance ineffective.	____	____
k. Not enough signing for resource protection.	____	____
l. Vandalism (e.g. shooting signs, tread damage, damage to vegetation).	____	____
m. Other (list or notes)_____	____	____

Comments:

_____

_____

_____

_____

NOTE: The color system should be converted to cross hatching and other symbols and defined by the map legend so maps can be reproduced.

Section H

Revegetation Assessment:

Perform a subjective assessment of the revegetation potential of the area following off-highway vehicle use; rate the area either Possible or Impossible. Prepare a written justification of your rating using the criteria described below. The rating should be performed by vegetation and soil specialists with knowledge of the specific project site and supported with data from pertinent field trials, if available. This assessment should apply to short-term maintenance revegetation as well as long-term rehabilitation plantings. The assessment should explore the use of natural revegetation. Contact local revegetation experts at the University of California Extension Service, USDA Soil Conservation Service, or Resource Conservation District for assistance.

Consider the following criteria:

1) Access to the site: Can state-of-the-art revegetation techniques be used in this area? Is the site accessible to revegetation crews or machinery during appropriate revegetation periods?

2) Season of revegetation: Can timely treatments be applied to take advantage of precipitation and temperature? Can disturbed sites be stabilized before the rainy season?

3) Availability of planting material: What plant species will be used? How will propagation material (seeds, containerized plants, etc.) be obtained? (Follow your agencies guidelines for using native plant species).

4) Work force: Who and/or what equipment is available to perform the site preparation and planting?

5) Site preparation/treatments. What site preparation (disking, mulching, fertilizing, fencing) is necessary? Is any specialized equipment necessary?

6) Follow-up requirements: Will weed or herbivore control, fertilization, watering, control of off-highway vehicle's and other recreationists, or other post-planting treatments be necessary?

7) Soils: What soil factors (depth, droughtiness, fertility, texture, permeability, wetness, salinity, alkalinity, pH, toxic properties, others) will effect revegetation of this site? How will off-highway vehicle use (erosion or compaction) effect revegetation?

8) Time: How long will it take to obtain vegetative cover sufficient to control excessive soil erosion?

9) How will revegetation efforts be funded?

Section I

Riparian Buffer Guidelines:.

Type I Watercourse

Definition: Type I watercourses have domestic water supplies on site or are within 100-feet downstream of the off-highway vehicle area. Or, these watercourses support permanent or seasonal fisheries and they include habitat to sustain fish migration and spawnings.

Type II Watercourse

Definition: Type II watercourses support permanent or seasonal fisheries within 1,000-feet downstream of the off-highway vehicle area and provide aquatic habitat for non-fish aquatic species (excludes Type III waters that are tributary to Type I waters).

Guide to Type I and Type II Watercourses: The Riparian vegetation should be retained. No off-highway vehicle activity is allowed within 15 feet of the edge of the watercourse. Stream crossings must be bridged or engineered to prevent erosion.

Type III Watercourse

Definition: Type III watercourses do not support aquatic life. These watercourses show evidence of being capable of transporting sediment downstream to Type I or II watercourses.

Guide to Type III Watercourses: Off-highway vehicle activity is restricted in the watercourse when water is flowing unless

analysis shows the impact is acceptable. Off-highway vehicle activity is allowed in the watercourse when water is not flowing.

Other Riparian Types

Off-highway vehicle activity is not allowed in meadows, marshes, or similar wetlands. Trails through mountain meadows are not permitted unless properly mitigated.

NOTE: These watercourse definitions were developed from the State Forest Practice Rules 14CCR 916.5.

Section J

Tread Lightly Program:

The Tread Lightly program is a multi-agency venture to inform the public about proper recreation use of public lands. The program has many forms of educational tools (brochures, posters, video presentations, bumper stickers, etc.) to teach and remind off-highway vehicle users what their responsibility is when visiting designated off-highway vehicle areas. Information about participating in the program can be obtained by contacting your off-highway vehicle Grant Administrator at the California Department of Parks and Recreation.

Section K

Develop A System For Informing Off-Highway Vehicle Users Of Area Closures And Resource Related Management Changes:

An important feature of soil management is allowing for unexpected or occasional, but unpredictable, events. Most wild land areas used by off-highway vehicle's are susceptible to many unforeseen occurrences including floods, droughts, or fires. Some areas experience regular annual events that will require closure of off-highway vehicle use areas (fire season, wet or windy weather). It is imperative that the Erosion Control/Vegetation Management Plan (Section C) include a method of informing off-highway vehicle users when specific areas are closed for rider safety and as a protection for the natural resources.

Experience has shown that when off-highway vehicle areas are unexpectedly closed a few off-highway vehicle users who travel (often long distances) to the site will ignore the closed restrictions and use the areas anyway. Sometimes, upon finding a designated off-highway vehicle area closed, some off-highway vehicle users will trespass and ride/drive on adjacent land not managed for off-highway vehicle use. Such off-highway vehicle use usually occurs at critical times most damaging to natural resources and can create severe soil erosion problems that will be expensive to repair and will effect future use of the site by authorized users. In many cases these problems could be prevented by timely, easy to use, methods of informing off-highway vehicle users when an area is not presently open to off-highway vehicle use.

Several systems for informing off-highway vehicle users about area closures are currently in use by different agencies. It is

required that you design a system that will fit the needs of your area and be useful to the majority of your off-highway vehicle users. Systems presently in use include:

Signs

Signs at key locations leading to, and at, the site are essential. The signs should be unambiguous clearly stating which area is closed, include starting and ending dates for the closure (if ending dates are unknown this should be stated), and provide a telephone number to call for further information. Post signs on bulletin boards in off-highway vehicle use areas ahead of time when seasonal closures are planned.

Telephone Information

Persons likely to receive telephone inquiries about closure of off-highway vehicle areas should be informed which off-highway vehicle areas are open or closed and when closed areas might reopen.

Callers should not be left to guess whether or not an off-highway vehicle area is open or given a run-around trying to find someone who can give them this information. Develop a system for informing office and field personnel about an off-highway vehicle area closure.

News Media

Closures of off-highway vehicle areas should be announced in newspapers, and on radio and television as soon as information becomes available. Local off-highway vehicle groups should also

be notified so that this information could be included in pertinent newsletters.

Other Methods

Use your imagination about how to inform your off-highway vehicle user's. At least one National Forest has their own local AM radio broadcast frequency with up to the minute information about recreational opportunities in the area.

Be sure to inform your off-highway vehicle Grant Administrator at the California Department of Parks and Recreation whenever a closure takes place.

Section L

Recommendations for Coordinating Planning Of Off-Highway Vehicle Projects with Local Agencies/Groups:

Experience has shown that successful construction and operation of off-highway vehicle areas requires the cooperation of diverse groups and individuals. It is critical that all interested parties become involved as early as possible during the planning process. The following is a partial list of who should be contacted. Your specific project may require formal consultation with public agencies or public hearings depending upon the circumstances.

Off-Highway Vehicle User Groups

Contact local or regional off-highway vehicle user groups who will potentially use the area. Find out what types of activities they want and what their past experience (if any) has been in the project area.

Local Landowners

Any landowners bordering or potentially effected by the project should be notified and invited to participate in the planning process.

Environmental Groups

Examples of groups to contact include the California Native Plant Society, Sierra Club, and any local organizations specific to your

area. Find out what concerns might exist and let these groups suggest possible mitigation measures.

Resource Conservation District

Local RCD's exist for most of California and can provide valuable insight for managing watersheds to minimize erosion and sediment.

USDA Soil Conservation Service

Local SCS soil specialists can be invaluable for preparing the Erosion Control/Vegetation Management Plan (Section C). They also have important statewide resources to assist in overcoming soil related problems.

California Department of Fish and Game

The California Department of Fish and Game (DFG) has responsibility for the wildlife resources that might potentially be effected by an off-highway vehicle project. DFG should be contacted and consulted on a regular basis during the planning process.

Others

Other groups who might have an interest in an off-highway vehicle project would be local Planning Boards or Agencies, Air Pollution Control Districts, Water Quality Control Districts, Law Enforcement Agencies, and many other private and governmental entities.

Develop a system to notify interested parties and keep them informed during the planning and operation of your off-highway vehicle area.

Section M

Maintaining A Photographic Record Of Your Site:

A picture is worth a thousand words and in the absence of extensive quantitative data can be invaluable to assess the before-and-after effects of any project. Begin to keep a photographic record of the off-highway vehicle site beginning with the initial planning surveys of the area. These photographs should be part of the original proposal and subsequent photos should become part of the Monitoring Plan file.

We recommend that, at a minimum, black and white print photographs be taken from sufficient viewpoints and in sufficient numbers to give an impression of the initial condition of the site. Special emphasis should be given to any existing soil erosion problems or resource concerns. These photo-points should be clearly marked and revisited at least biannually throughout the life of the project so that new photos can be taken and compared with previous pictures.

Ideally, air photographs at a scale of at least 1:24,000 could be obtained for each project area, but such photographs are expensive to acquire and often difficult to interpret. If air photographs are obtained they should be made part of the Monitoring Plan file and updated as often as feasible.

If possible, a narrated pre-project video of the site should be prepared. This need not be professionally produced; a 'home-quality' video can be very informative. Emphasize resource successes or concerns and make new videos following major natural or man-made site modifications.

Section N

A Guide To Off-Road Motorcycle Trail
Design and Construction:

This guide is a minimum standard to use when constructing and maintaining off-highway vehicle trails. If your agency has other trail construction guidelines which accomplish the same resource protection measures as this guide, they may be used.

The guide is available from:

American Motorcyclist Association
P.O. Box 6114
Westerville, Ohio 43081-6114

Section O
Gully Size Reference

A channel or miniature valley with a cross-sectional area of at least one square foot cut by concentrated runoff but through which water commonly flows only during and immediately after heavy rains or during the melting of snow that has an average cross-sectional area that is:

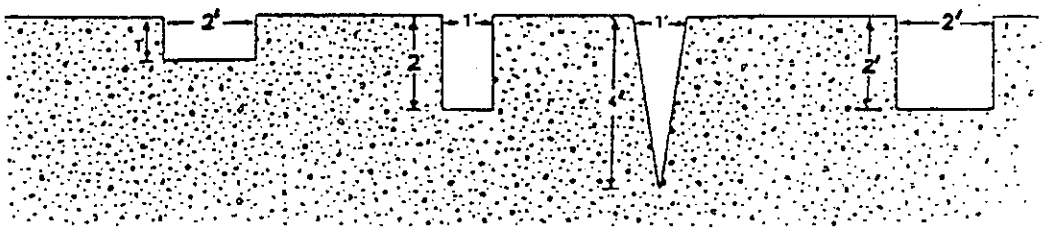
Small — At least two square feet but does not exceed four square feet.

Moderate — Greater than four square feet but does not exceed 20 square feet.

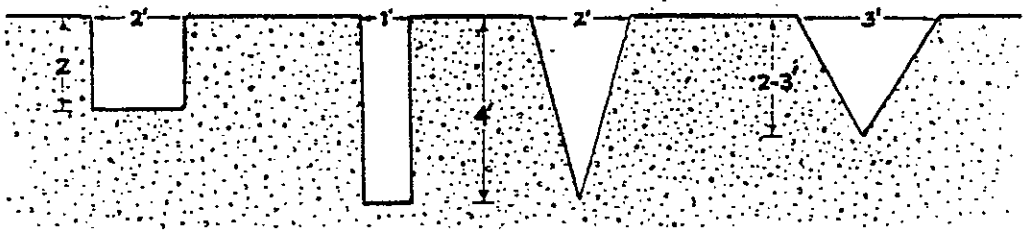
Large — Greater than 20 square feet.

EXAMPLES OF CROSS - SECTIONS

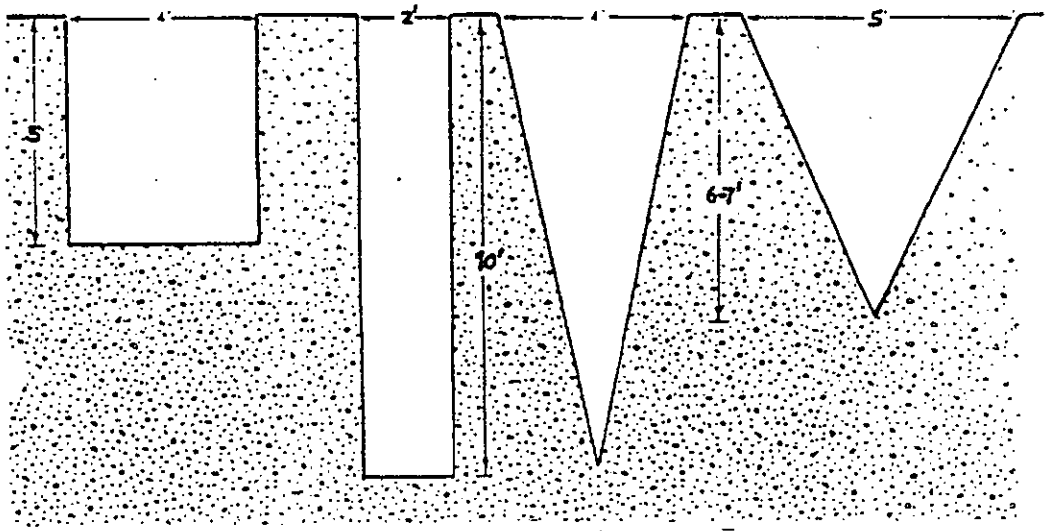
Average Cross-Sectional Area = 2 sq. ft.:



Average Cross-Sectional Area = 4 sq. ft.:



Average Cross-Sectional Area = 20 sq. ft.:

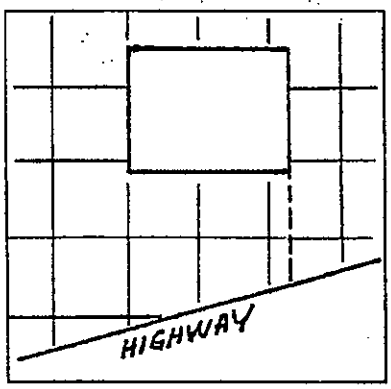


Section P

Project Examples

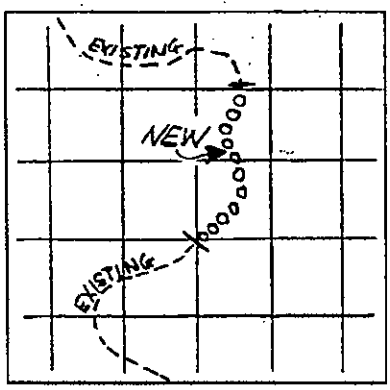
Acquisition/Easements/Old/New
Sites and Areas

New Acquisition -
No Prior Use



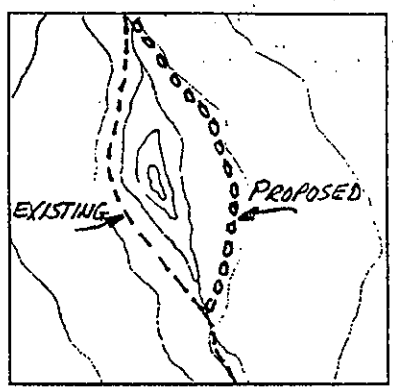
-1-

Right of Way -
No Prior Use



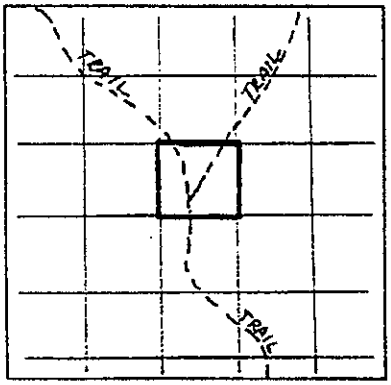
-2-

Trail Relocation -
Major



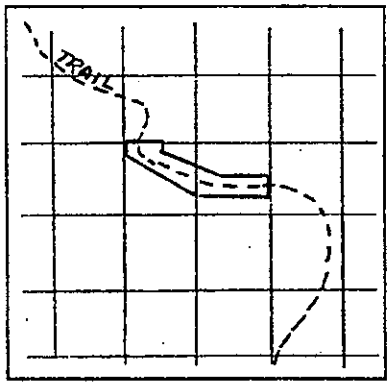
-3-

New Acquisition -
Prior Use



-4-

Right of Way -
Prior Use



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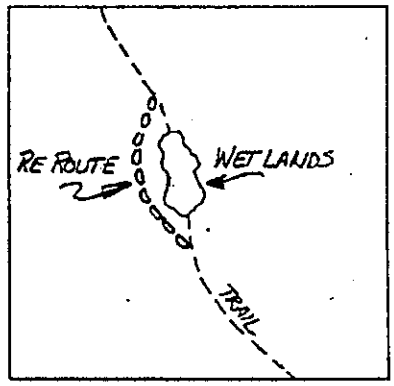
Trail Relocation -
Minor



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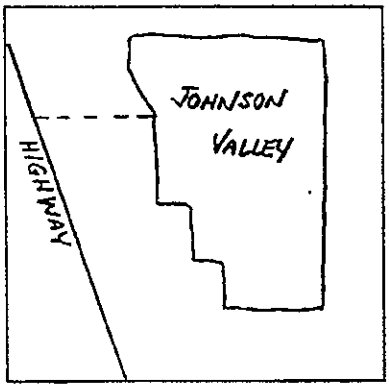
Open Areas -
Pre-existing



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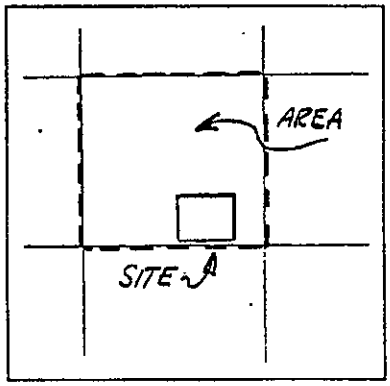
Site/Area



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Miscellaneous

NOTE:
1,2,&3-Must Use Guide/Standard
4,5,6&7-Exempt From Guide/ Standard
4&5-Include a Side Agreement That OHV Use Pre-existed

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Section Q

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Appendix 1

Permitted Events

Where federal and local (cities/counties) lands are used for permitted (special) events, they will comply with that agencies permit requirements. Agencies should review and utilize, to the extent possible, these other items A thru F in their assessment.

These activities result in special use of a designated off-highway vehicle area. Permitted events concentrate many riders or spectators in one area to include enduros, motocross, and hare-scrambles, 4x4, ATV's, etc., among others. Permitted events not well planned can have a tremendous and rapid impact on natural resources.

A) Follow the Erosion Control/Vegetation Management Plan (Section B) and the Monitoring Plan (Section C).

B) Comply with all other aspects of the Soil Conservation Guidelines/Standards.

C) Consider impacts from spectator access, viewing zones and parking areas.

D) Maintain Erosion Hazard Rating (Section F) of 'moderate' or 'low'.

E) Monitor the site during and immediately following each event using the Erosion Hazard Rating (Section F) and Monitoring System (Section G).

F) Revegetation efforts should be planned and implemented prior to the next rainy season for any disturbed areas that have unauthorized use or which exceed the Erosion Control/Vegetation Management Plan (Section B).