

## Rationale for Burned Watershed Rehabilitation

Doug Wickizer

*California Department of Forestry and Fire Protection*  
1416 Ninth Street, Room 1516-35, Sacramento, CA 95814  
Tel. (916) 653-0837

**Abstract.** As with everyone else in the business of working with the effects of wildfire, CDF lacks standard treatments to effectively complete post-fire treatments. No formal monitoring and adaptive management programs exist, primarily due to staffing and funding needs. However, in 1994 CDF created an interagency interdisciplinary working group which is reviewing the Emergency Watershed Protection Program and which will recommend policy and practices to guide future operations. We would welcome any other input the participants of this symposium could provide for the practical advancement of emergency watershed protection.

**Keywords:** Board of Forestry; California Department of Forestry; emergency rehabilitation; mitigation.

### Introduction

The rationale for post-fire watershed treatments is fundamentally spelled out in statute. First, the basic authority for performing post-fire watershed treatment is contained in both section 4675 and 4676 of the Public Resources Code. This code reads as follows:

Section 4675 Rehabilitation of state watershed lands; surveys and studies; plans and acts: contracts; performing work and inspecting lands

"It is in the public interest and to the benefit of the state that watershed lands are rehabilitated to conserve water and soil and to prevent destructive floods. In furtherance of this policy, the department may conduct surveys and studies, formulate plans, and perform all acts incidental to establishing and maintaining vegetative cover on watershed lands and maintaining watercourse channels free of natural impediments or destructive materials during peak flood flows, including any work necessary to accomplish these purposes.

With the approval of the Director of General Services, the department may enter into contacts with any federal agency or any person, as defined in Section 4101, for any purpose authorized by this section.

The department or any federal agency or person which has entered into a contract with the department for any purpose authorized by this section, may, in accomplishing the purpose, enter upon, perform required work upon and inspect any lands."

4676 Authorization of work for conservation of water and soil and flood control purposes; conditions-

- a. The director may authorize any work for any purpose authorized by Section 4675 as an exercise of the director's emergency powers and may request the assistance of any federal agency or person in connection with that work if any of the following conditions exist.
  1. Natural vegetative cover has been denuded to the extent that precipitation may create floods and serious soil depletion and erosion.
  2. The denuded area is of a size and the topography and soil characteristics of such a nature, that soil loss and floods will have a significant effect upon watershed values and the public health, safety, or welfare.
  3. Vegetative cover will not be restored by natural means in time to effectively prevent undue erosion and flood runoff.
  4. Woody plants and debris within or adjacent to the watercourse channels in or directly downstream from the denuded areas will significantly impede flood runoff or accelerate channel scour. Prior to commencing any work in response to this

condition, the director shall advise the Director of Fish and Game of the proposed work.

- b. The expenditure of state funds for emergency work authorized under subdivision (a) shall be limited to lands classified as a state responsibility area pursuant to Article 3 (commencing with Section 4125) of Chapter 1. Any contract for emergency work affecting both a state responsibility area and non-classified lands shall require that the cost of the work be shared proportionately between the department and the other responsible federal agency or person, as defined in section 4101."

The Department has recently completed a new Strategic Plan. The Plan includes the Department's mission which reads as follows:

"The Department of Forestry and Fire Protection protects the people of California from fires, responds to emergencies, and protects and enhances forest, range and watershed values providing social, economic, and environmental benefits to rural and urban citizens."

This mission statement encompasses the concept of post-fire watershed treatments. However, the Department does not have a specific internal set of implementation guidelines in place to address post-fire treatments for watershed rehabilitation. The Board does have the new general policy guidance and CDF does have an intermittent history of practices that have been used and a pattern of past plans prepared to implement watershed rehabilitation. This is incorporated in the working memory of assigned staff and in other ways.

The Board of Forestry just adopted a joint policy with the Fish and Game Commission that sets out standards for pre-, post-, and during-fire activities. The Fish and Game Commission will consider this policy at their May 1994 meeting.

The Department needs a strong set of internal implementation guidelines for post-fire treatment. This became clear as a result of the fire siege in southern California in 1993. There was a wide variety of opinion on how the fire-damaged area should be treated and what the impacts of wildfire were on the ecology of the affected areas. This divisiveness of view was centered around debates over the questions of 1) reseeding 2) the endangered species acts and wildlife issues and 3) what type, if any, of erosion control measures should be utilized. In response to this, the Department has established an Emergency Watershed Protection (EWP) Working Group with a policy Task

Force. The working group is to review the program and determine if changes are needed to address the public concerns and forward a report to the Board of Forestry and the Task Force. The Task Force is to take the Working Group Report and make policy recommendations to the Board of Forestry to set policy which will implement an effective EWP program.

What has been termed "watershed rehabilitation after wildfire" has, at best, been a confusing and often frustrating experience for those with the assignment. That is because agencies and the public have differing expectations of what constitutes watershed rehabilitation. A strict interpretation of the term "rehabilitation" implies efforts to return the affected watershed area to an unimpaired or much-improved condition.

One overriding caveat: economic and legal constraints preclude CDF from committing resources at this magnitude on lands it does not manage and/or own. Things are evolving and can perhaps best be described by the term "emergency watershed protection." This term reflects CDF's mission following catastrophic wildfire and is consistent with the terminology of the federal agencies.

Emergency watershed protection (EWP) constitutes those actions with the objectives of protecting downstream values of urban and wildland watersheds from excessive erosion and flooding, resulting primarily from those actions taken to control and/or suppress the fire and, secondarily, from the effects of the fire on the land. *This recognizes the distinct difference between environmental impacts which are suppression-related and human-caused and those which are wildfire-related and naturally occurring.*

In order to meet its responsibility for emergency watershed protection and other functions, CDF is an organization with a well-structured chain of command. It is institutionally composed of a Sacramento Headquarters Office, two Regional Headquarters, and twenty-two Ranger Units. Policy is set by the Board of Forestry and the Director at the Sacramento level, while operations and administration is achieved at the Region and Ranger Unit level. This structure and our location in communities allows us to provide our services in a way sensitive to local needs. The Department utilizes this structure together with a widely accepted command-and-control system to manage post-fire treatments.

CDF has worked over many years with the other fire and emergency response agencies both nationally and in California to develop the Incident Command System (ICS). This system provides uniform management for all agencies which respond to emergencies. Through the use of common terminologies in operational, logistical and planning components, agencies are able to maximize the effective use of resources.

There is one Incident Commander (I.C.) for each emergency incident. The I.C. is responsible for the complete management of the emergency incident. This includes both putting out the fire and the responsibility for emergency watershed protection following wildfire. The Incident Commander (I.C.) must evaluate the impacts to the watershed for every fire, regardless of size, occurring in areas of state responsibility (SRA). The ultimate responsibility to ensure that EWP tasks are completed in a timely manner lies with the Ranger Unit Chief. The goals of this Department are two-fold: 1) to keep damage to a minimum during suppression and 2) all EWP work will be initiated while the active suppression stage of the incident is occurring and will be completed shortly thereafter. For major fires, task completion will be scheduled to precede the onset of the winter period.

The evaluation for environmental damage, or EWP assessment, will address both impacts caused by suppression activities and impacts to the watershed caused by the wildfire itself. The EWP assessment does not currently require a written report on all incidents. However, a written plan is mandatory when a burned area reseeded will occur. As provided for in the statutes the Department must bear the costs of performing the EWP tasks set forth in a plan as part of the emergency incident management. The tasks spoken of are generally composed of mitigation measures to limit long-term impacts caused by wildfire and by fire suppression activities.

#### **Emergency Watershed Protection Standard Mitigation Measures**

The standard for mitigation measures, to provide emergency watershed protection for suppression-related environmental impacts, are based in large part on the standards and specifications found in the Forest Practice Act. They constitute the minimum level of protection to be afforded the watershed and are to be performed automatically as an integral part of incident related activities. Deviation from these standard practices is allowed, provided a need, based on site-specific conditions, for greater protection exists. Those practices proposed have to provide a level of protection commensurate with the risk to the critical resource.

In the process of controlling a fire, watershed damages may occur. The damage is caused by manpower and equipment used in activities such as the construction or reconstruction of roads, or construction of firelines. Standard mitigation to impacts would include: 1) waterbreak installation, 2) reshaping slopes to original contours, 3) mulching and/or seeding bare mineral soil, and 4) installation of temporary erosion control facilities or structures.

#### *Watercourse and lake protection zones*

When equipment is used in or near a watercourse, additional actions must be taken.

A watercourse is defined as a channel containing water or exhibiting a scoured bottom which has carried water and contains vegetation that grows in streams (i.e. willows, alders, etc.).

Additional mitigation includes: 1) seeding or mulching of bare mineral soil 2) removal of debris from below high water line and 3) removal of large woody debris, where damage exceeds potential benefit.

#### *In-stream improvements (water sources)*

All in-stream activities to improve water collection for fire suppression will be returned to pre-incident conditions, as much as possible. These activities include, but are not limited to, sumps, drafting locations and purposefully blocked culverts. All building and other material such as, plastics, canvas, plywood, dimension lumber, etc. will be removed from the site to a suitable disposal site or be recycled. All sumps, if constructed, will be filled-in. All trash, cardboard, hoses, fittings, and pumps will be removed from the site. During operations at the site, no petroleum, surfactant or other substance will be allowed to enter the water course or lake.

#### *Wildfire-caused watershed damage*

Damage to a watershed caused specifically by a wildfire is evaluated and mitigated concurrently with damage caused by suppression activity. However, whereas suppression damage is always mitigated, damage by the fire itself may not be. This difference in treatment occurs because:

1. Fire is a natural occurrence in the wildland and may be a necessary influence on the desired vegetation composition.
2. Very few wildfires burn with an intensity that completely destroys the soil duff layers and seed bank or root crowns of native plants. Therefore, the capacity for the vegetation to either resprout and/or germinate still exists on most burns.
3. Suppression damage usually involves disturbance to the ground surface exposing mineral soil while fire damage usually does not.
4. The wildfire may not be located or may not be of sufficient size that excessive erosion and flooding poses a significant effect upon downstream watershed values or the public health, safety or welfare.

### *Treatment*

Two types of treatment of burned watersheds are allowed by the Public Resources Code: 1) those necessary to establish and maintain a vegetative cover on watershed lands and 2) those necessary to maintain watercourse channels free of natural impediments or destructive materials during peak flows.

Establishing a vegetative cover is usually accomplished by seeding a burned area with native or naturalized grasses and/or herbaceous plants. The use of non-native species has been discouraged. The species selected are intended to provide rapid germination, fibrous root systems, and be capable of surviving for several seasons on the site.

Only burned areas that pose a significant risk to watershed values and the public health, safety and welfare applying with one or more of the following criteria are typically seeded:

1. Areas suffering of complete destruction of all organic material on slopes over 30% and covering a significant area (over 5 acres).
2. Riparian zones and major canyons significantly damaged by the wildfire to reduce the filtering effect provided by streamside vegetation.
3. Any other area identified by an inter-disciplinary team regarding mitigation of a significant threat to a resource or to the public (e.g., a subdivision immediately adjacent to a wildfire).

All other areas would be judged by an interdisciplinary team to contain sufficient revegetation capability either due to the presence of sprouting species or viable seed within the burned area.

Watercourse channels are cleared only of material that pose a significant risk of being transported by peak flows and capable of causing downstream damage. This is done by hand if possible. The use of heavy equipment in a watercourse should only be a last resort. CDF is not authorized to construct sediment dams or other flood control structures.

All costs associated with emergency watershed protection of suppression-caused damage can be borne by the Emergency Fund. Wildfire watershed damage must be considered a separate incident and require designation by the Director. This is accomplished through Sacramento Headquarters Resource Management Staff. Cooperation with other agencies to share costs, extend coverage, reduce costs and/or provide additional mitigation is possible through agreement. This also will require Director approval.

### **Emergency Watershed Protection Plans**

Emergency Watershed Protection Plans, prepared under the Incident Commander, fall into two categories. These are the:

1. EWP Checklist
2. EWP Formal Plan

These categories document a progression of detail and direction to guide field personnel as the incident's relative level of complexity increases from initial attack through extended attack to major fires. This structure provides a method whereby necessary tasks are both identified and tracked through the completion of the incident. It also provides a convenient means to tie those EWP activities performed to the incident's fire report. The purpose of completing these reports is to provide a clear record to all levels of the Department of what needs to be done and when it is accomplished.

#### *EWP checklist*

The checklist is designed to be carried on emergency equipment such as fire engines which are primarily responsible for initial attack responses and incident management. Since all fires, regardless of size, within SRA require an assessment for environmental damage resulting from suppression activities, a readily-available and useable form is needed to assist field personnel perform this task and document the results. The EWP checklist is shown below.

#### *EWP formal plan*

A written plan is required : (a) when standard mitigation measures do not provide the level of protection required by the incident (b) when the complexity of the incident requires strict documentation of EWP activities and (c) when reseeding caused by extreme fire is needed.

When the need to write an Emergency Watershed Protection plan exists, as discussed under policy, it will conform to the following five part format.

#### *I. Inventory of Resources to be Protected.*

This section of the formal EWP plan is divided into three subsections:

- A. Incident History
  1. Incident Name
  2. Incident Number
  3. Date of Origin

4. Total acres consumed
  - a. State Responsibility Area acres
  - b. Federal acres
  - c. Local Responsibility acres
- B. Suppression and Wildfire-Impacts  
Prepare at least one base map for each of the two categories of impacts showing:
  1. Site locations
  2. Number of occurrences
  3. Miles, chains, feet of control lines
  4. Division boundaries
  5. Acres involved
  6. Fire intensity - when and to what degreeMaps will be prepared at a scale of 1:24,000
- C. Watershed Description of Critical Resource  
Narrative: For each impacted watershed, prepare narrative statement(s) or map(s) or calculation(s) describing the:
  1. Soils
    - a. Source - Soil Conservation Service
    - b. Source - California Soil-Vegetation Maps
  2. Vegetation (pre-incident)
    - a. Source - California Soil-Vegetation Maps
    - b. Source - SCS Soil Inventory Reports
    - c. Source - extrapolate from adjacent USFS vegetative community information
    - d. Any equivalent local report or map
  3. Topography (slope)
    - a. Source - calculate using USGS 7.5 minute quadrangles
    - b. Source - Field measurements
  4. Watercourse Description
    - a. Stream Length
    - b. Stream Gradient - subdivide as appropriate
    - c. Difference in elevation
    - d. Description of Riparian/Riverine Vegetation
    - e. Channel loading
    - f. Organic residues - loading and location
    - g. Pools/riffles
  5. Calculate Erosion Hazard
    - a. Procedure for Estimating Surface Soil Erosion Hazard Rating California State Board of Forestry Technical Rule Addendum Number 1 (Revised) February 1, 1990, see Attachment
    - b. California Precipitation Intensity Maps Department of Water Resources, 1984 See Attachment 2 (standard): 1 hour duration with 2 year return interval
  6. Land ownership (public/private)

## II. Analysis

This section analyzes the information provided in Section I above. Based on the identification of impacts detailed, the standard mitigation measures previously discussed and an analysis of the appropriateness of using these mitigations are to be included in the formal report. This section can be very brief if standard mitigation will meet the needs of the incident and if there is no "outside" analysis for more extensive treatments. If "outside" analysis suggests more extensive or alternative mitigation measures, then a more intensive discussion is appropriate to either support or reject that analysis. Also, if "inside" analysis suggests that the standard mitigation measures are inadequate to meet the needs of the incident, then this becomes the forum to discuss what must additionally or alternately be done to provide protection for the watershed. When considering watershed damage caused by the wildfire, the minimum area triggering the need for reseeding is five acres.

## III. Incident Commander's Recommendations to the Ranger Unit Chief

This section details as line items those actions and activities recommended for inclusion in the Emergency Watershed Protection Action Plan. Actions are grouped together in packages of alternatives if various alternatives are proposed. The best or preferred alternative package will be presented first. An array of secondary alternative packages will follow. This section is designed to be action-oriented, so meaningless descriptions of "no-action alternatives" are not required for consideration. These recommendations represent "a purely scientific remedy" to the problems caused by the incident, and are not designed to improve beneficial outputs or conditions outside CDF authority. The structure of this section allows the unit manager to retain the option to reject all or part of an alternative package for cause. It also allows the unit manager to propose and select other or additional alternative packages or individual actions.