Attachment 8.5 – Supporting Documents

Water Quality and Other Expected Benefits

Project E – Sierra National Forest Fuels Reduction Project

Madera Region – IRWM Implementation Grant Application

Table of Contents

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Attachment 8.5, Post Fire Erosion Map

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Attachment 8.5.1
Post-fire Erosion Potential from CDF

Average Values for Project Areas:

Double Gate: 21.4
Kelty: 22.7
Cedar Valley: 32.0
Gray's Mtn: 34.8
Foster 24.4
Nehouse: 13.6
Grave/Yard: 3.6
Swortzel: 4.7
Topping: 5.6
Walker Mine 6.0

Sierra National Forest
Walker Mine
Topping
Swortzel
Grave/Yard
Double Gate
Kelty
Cedar Valley
Grays Mtn
Nehouse
Mammoth Pool Reservoir
Bass Lake
Foster
Madera County

N
W E
S

0 2.5 5 Miles

Legend

- Madera IRWG Boundary
- Project Areas
- USFS Administrative Boundary

CDF Post-fire erosion

tons/acre/year

- No fuel data available
- 0 - 5
- 5.000000001 - 10
- 10.00000001 - 15
- 15.00000001 - 20
- 20.00000001 - 25
- Major Streams

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Attachment 8.5, Water Erosion Prediction Project (WEPP) Model Estimate

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Attachment 8.5.2 – Water Erosion Prediction Project (WEPP) Model Estimates of Erosion

The WEPP model is a physically based runoff and erosion model that is widely used by the USFS for analyzing management activities on National Forest lands. It includes a stochastic weather generator (CLIGEN) to predict rainfall and snow melt process based on the climate station selected. Full documentation of WEPP and the Forest Service interfaces for the WEPP model (FSWEPP) used for various applications can be found at http://forest.moscowfsl.wsu.edu/fswepp/ FSWEPP is a suite of simplified front-end interfaces for running the WEPP model, depending on the management activities under investigation. During post-fire investigations Burned Area Emergency Response (BAER) teams use WEPP as one of many tools to estimate post-fire erosion and runoff.

The Disturbed WEPP interface was used for this analysis. The intent is to provide relative estimates of erosion based on burn severity rather than actual site-specific predictions of erosion and sediment delivery. Therefore a representative hillside of 100 square meters was used. The hillside is divided into an upper, middle, and lower section based on slope. Assuming the hillside begins at a divide and ends in drainage, the hillside sections are 0-, 30-, and 20-percent, respectively. A sandy loam soil texture was used with an assumed 20% rock content. The Yosemite climate station (elevation ~4000 feet) was used as an examination of the climate data shows it to be very similar to that of the project area. The model was run for 30 years in all cases.

Existing Unburned Condition

For the unburned condition, a ground cover of 85% was used as this represents a typical ground cover in a 5-15 year old forest (the age range of the plantations). This ground cover is attained by using the "calibrate vegetation" feature and adjusting the starting cover as appropriate. The WEPP model predicts an average of 0.08 tons/acre of erosion and sediment delivery for the unburned condition (Table 1).

Table 1 . WEPP model results for the unburned condition with 85% ground cover.

Return Period	Precipitation (in.)	Runoff (in.)	Erosion ($t\ ac^{-1}$)	Sediment ($t\ ac^{-1}$)
30 year	61.56	1.81	0.92	0.9222
15 year	50.17	0.27	0.48	0.4812
6 year	44.90	0.09	0.08	0.0817
3 year	39.48	0.02	0.00	0.0012
1.5 year	34.86	0.00	0.00	0.0000
Average	**37.96**	**0.09**	**0.08**	**0.0757**

Low Burn Severity

For the low burn severity, the same input parameters were used except the treatment type of low burn was selected and the vegetation calibrated to provide a 66% ground cover. This is a reasonable value since during prescribed burns, a 50-70% minimum ground cover depending on slope is part of the management requirements used prevent excessive erosion following treatments. Results show an average erosion and sediment delivery rate of 1.15 tons/acre (Table 2.), well within the natural variability.

Table 2. WEPP model results for the low burn severity condition with a 66% ground cover

Return Period	Precipitation (in.)	Runoff (in.)	Erosion (t ac^{-1})	Sediment (t ac^{-1})
30 year	61.56	1.40	5.99	5.9867
15 year	50.17	1.05	3.64	3.6444
6 year	44.90	0.69	2.51	2.5111
3 year	39.48	0.38	1.07	1.0741
1.5 year	34.86	0.13	0.45	0.4561
Average	**37.96**	**0.33**	**1.15**	**1.1525**

Moderate Burn Severity

The Disturbed WEPP interface does not have an option for moderate burn severity. Therefore the low burn severity option was used and the vegetation calibrated to provide a 45% ground cover. Results show an average erosion and sediment delivery rate of 4.37 tons/acre (Table 3).

Table 3. WEPP model results for the moderate burn condition with a 45% ground cover.

Return Period	Precipitation (in.)	Runoff (in.)	Erosion (t ac^{-1})	Sediment (t ac^{-1})
30 year	61.56	3.82	19.46	19.4556
15 year	50.17	2.98	13.11	13.1130
6 year	44.90	1.46	7.10	7.0976
3 year	39.48	1.18	4.29	4.2870
1.5 year	34.86	0.46	2.48	2.4823
Average	**37.96**	**0.95**	**4.37**	**4.3699**

High Burn Severity

The high burn model was calibrated to a ground cover of 15%. During high severity burns, almost all the ground litter and duff is consumed and water repellency of the soil can be increased. Average annual erosion and sediment delivery is increased to 28.05 tons/acre and

runoff has increased considerably as well (Table 3.). This is comparable to the values shown on the CDF post-fire erosion map (CDF 2004), except the CDF map does have areas of much higher erosion rates. This is due to higher slopes and the probability that a ground cover of 15% may be too high in some high burn severity areas.

Table 3. WEPP model results for a high severity burn with 15% ground cover

Return Period	**Precipitation (in.)**	**Runoff (in.)**	**Erosion ($t\ ac^{-1}$)**	**Sediment ($t\ ac^{-1}$)**
30 year	61.56	12.27	88.81	88.8139
15 year	50.17	7.58	59.00	59.0034
6 year	44.90	6.00	47.22	47.2181
3 year	39.48	4.42	28.84	28.8421
1.5 year	34.86	2.50	19.04	19.0400
Average	**37.96**	**4.00**	**28.05**	**28.0528**

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Attachment 8.5, Special Status Aquatic Species in Madera RMWG

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Attachment 8.5.3
Special Status Aquatic Species in the Madera RWMG area

Sierra National Forest

Walker Mine

Topping

Swortzel

Gravel Yard

Kelty

Double Gate

Cedar Valley

Grays Mtn

Nehouse

Mammoth Pool Reservoir

Bass Lake

Foster

Madera County

N

W E

S

0 2.5 5 Miles

Legend

- Project Areas
- Madera IRWG Boundary
- Foothill Yellow Legged Frog Habitat
- Western Pond Turtle Habitat
- Mountain Yellow Leg Frog Habitat
- California Red Legged Frog Habitat
- USFS Administrative Boundary

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Attachment 8.5, Protected Activity Centers and Pacific Fisher Probability of Occupancy

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Attachment 8.5.4 Protected Activity Centers (PACs) and Pacific Fisher Pobability of Occupancy

Sierra National Forest

Walker Mine
Topping
Swortzel
Gravel Yard
Double Gate
Kelty
Cedar Valley
Grays Mtn
Nehouse
Mammoth Pool Reservoir
Bass Lake
Foster
Madera County

N
W
E
S

0 2.5 5 Miles

Legend

- Project Areas
- Madera IRWG Boundary
- USFS Administrative Boundary
- Goshawk PAC
- Great Grey Owl PAC
- Spotted Owl PAC

Fisher Probability of Occupancy

- 0 - 19
- 20 - 39
- 40 - 59
- 60 - 79
- 80 - 100

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