

FORPRIEM ver. 2.0

**BOF Effectiveness Monitoring
Committee Meeting**

April 14, 2016

Background Information

- FORPRIEM ver. 2.0 is a continuation of the FORPRIEM (Forest Practice Rules Implementation and Effectiveness Monitoring) program began in 2008 (Brandow and Cafferata 2014).
- FORPRIEM itself was a continuation of earlier BOF/CAL FIRE monitoring programs:
 - Modified Completion Report (MCR) monitoring—Brandow et al. 2006, and
 - Hillslope Monitoring Program (HMP)—BOF 1999, Cafferata and Munn 2002.

All of these programs are used to determine the adequacy of the implementation and short-term effectiveness of California's Forest Practice Rules developed to protect water quality and riparian/aquatic habitats.

Complete list of Agency Upslope Monitoring Conducted on Non-Federal Timberlands Since 1975

1. Soil Erosion Study Report-Phase I (Dodge et al. 1976)
2. Soil Erosion Study Report-Phase II (WESCO 1983)
3. "208" Report (SWRCB 1987)
4. Critical Sites Erosion Study, Vol. I- (Durgin et al. 1989), Vol. II- Lewis and Rice 1989)
5. Pilot Project Monitoring Project (Tuttle 1995, Rae 1995, Spittler 1995, Lee 1997)
6. Hillslope Monitoring Program (BOF 1999, Cafferata and Munn 2002)
7. Modified Completion Report Monitoring Program (Brandow et al. 2006).
8. Interagency Mitigation Monitoring Program (IMMP) Pilot Project Report (Longstreth et al. 2008)
9. Battle Creek Task Force Report (BCTF 2011)
10. FORPRIEM Report (Brandow and Cafferata 2014)

Plan Areas Monitored

Hillslope Monitoring Program

Randomly located:

- Road segments
- WLPZ segments
- Watercourse crossings
- Landings
- Skid trails

MCR and FORPRIEM

Randomly located:

- Road segments
- WLPZ segments
- Watercourse crossings

Highest risk areas on the landscape to water quality

Plan Areas Monitored

- Could other parts/aspects of Timber Harvesting Plans (THPs), NTMP-NTOs, and other harvesting documents be monitored?

- YES.
- Possibilities include:
 - Site preparation activities.
 - Chemical
 - Mechanical
 - Broadcast burning
- Others?



ACTION ISSUES

[Forestry Best Management Practices by State](#)

[The Burning Problem with Current Wildfire Funding](#)

FOREST ACTION PLANS: GUIDELINES FOR FORESTS

Forest action plans provide an analysis of forest conditions and trends in your area.

[FIND YOUR STATE](#)

FORESTRY BEST MANAGEMENT PRACTICES BY STATE

Submitted by acooke on Thu, 2015-06-04 13:01

This project, launched in 2015, maintains up-to-the-minute information about BMPs recommendations in the United States. Navigate using the map by zooming in or out using either your mouse or the map zoom tool on the left. Please note that only the 50 United States are represented in this map, not territories or international information.

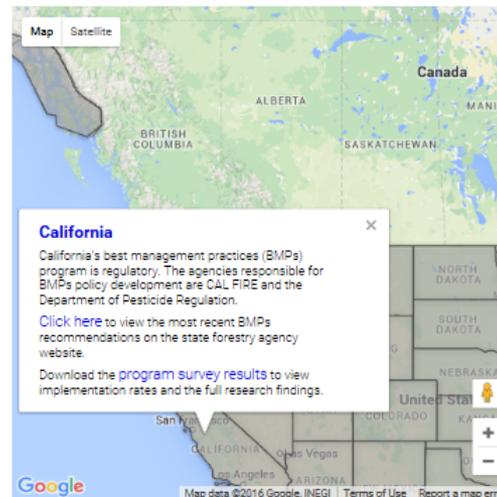
HOW TO USE THE NASF FORESTRY BEST MANAGEMENT PRACTICES (BMPS) MAP:

Click on a state to learn whether BMP regulation in that state is regulatory, quasi-regulatory or voluntary. Explore which agencies are responsible for BMP policy development. Click on the first hyperlink to view the latest state recommendations for BMPs implementation, and on the second hyperlink to view the research results from a study conducted by a team of researchers from Virginia Polytechnic Institute and State University (Virginia Tech).

The study, report and this map were funded by NASF, the USDA Forest Service and the Sustainable Forestry Initiative, Inc.'s Conservation and Community Partnerships Grant Program.

[Click here for more information about water quality and BMPs](#)

[Suggest an edit to this map.](#)



<http://www.stateforesters.org/action-issues-and-policy/state-forestry-BMPs-map>

State		California
BMP Manual	BMP Manual Date	2013
	BMP Manual	http://calfire.ca.gov/resource_mgmt/downloads/2016_ForestPracticeRules-Act.pdf
State BMP Regulation		Regulatory
BMP Monitoring	BMP Monitoring	Yes
	Most Recent Monitoring:	2014
	Next Planned Monitoring:	2016
	Agency(s) Involved in Monitoring:	CAL FIRE
	When Sites are Monitored	Pre-Harvest, During-Harvest, Post-Harvest

State BMP Implementation Rate (%)	State BMP Implementation Rate (%)	97 (SMZs, roads, crossings only)
	Year	2008-2013 (except where noted below)
	Timber Harvesting:	None Reported
	Forest Roads:	95
	Skid Trails:	95 (last evaluated from 1996-2001)
	Log Landings:	93 (last evaluated from 1996-2001)
	Stream Crossings:	97
	SMZ's:	99
	Wetlands:	None Reported
	Reforestation:	None Reported
	Mechanical Site Preparation:	None Reported
	Chemical Site Preparation:	None Reported
	Pesticide Applications:	None Reported
	Fertilizer Applications:	None Reported
	Prescribed Burning:	None Reported
	Wildfire Suppression:	None Reported
	Wildfire Rehabilitation:	None Reported
Public Lands:	None Reported	
Agencies Involved in BMP Guideline and Policy Development	Timber Harvesting:	CAL FIRE, CGS, CDFW, RWQCBs
	Forest Roads:	CAL FIRE, CGS, CDFW, RWQCBs
	Skid Trails:	CAL FIRE, CGS, CDFW, RWQCBs
	Log Landings:	CAL FIRE, CGS, CDFW, RWQCBs
	Stream Crossings:	CAL FIRE, CGS, CDFW, RWQCBs
	SMZ's:	CAL FIRE, CGS, CDFW, RWQCBs
	Wetlands:	CAL FIRE, CGS, CDFW, RWQCBs
	Reforestation:	CAL FIRE, CGS, CDFW, RWQCBs
	Mechanical Site Preparation:	CAL FIRE, CGS, CDFW, RWQCBs
	Chemical Site Preparation:	Regional Water Quality Control Boards
	Pesticide Applications:	CA Dept of Pesticide Regulation
	Fertilizer Applications:	Regional Water Quality Control Boards
	Prescribed Burning:	CAL FIRE
Wildfire Suppression:	CAL FIRE	
Wildfire Rehabilitation:	CAL FIRE	
Public Lands:	Other (USFS, BLM, NPS, etc.)	
Most Recent BMP Guidelines	Timber Harvesting:	1996 Written

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National Best Management Practices for Water Quality Management on National Forest System Lands

**Volume 2: National Core BMP Monitoring Technical Guide
(FS-990b)**



Forest Service BMP Tech Guide Volume 2
Review Draft – July 2015

Possible
reference to
consider

USFS BMP Monitoring Protocols for...

- Aquatic ecosystems management
- Chemical use management
- Non-recreation special uses management
- Wildland fire management
- Minerals management

- Rangeland management
- Recreation management
- Road management
- Vegetation management
- Water uses management

Brief Review of FORPRIEM Report (Brandow and Cafferata 2014)

MONITORING STUDY GROUP
CALIFORNIA STATE BOARD OF FORESTRY AND FIRE PROTECTION

Forest Practice Rules Implementation and Effectiveness Monitoring (FORPRIEM) Program

MONITORING RESULTS FROM
2008 THROUGH 2013

Ken Pimlott
Director
Department of Forestry and Fire Protection

J. Keith Gillespie
Chair
State Board of Forestry and Fire Protection

John Laird
Secretary for Natural Resources
The Resources Agency

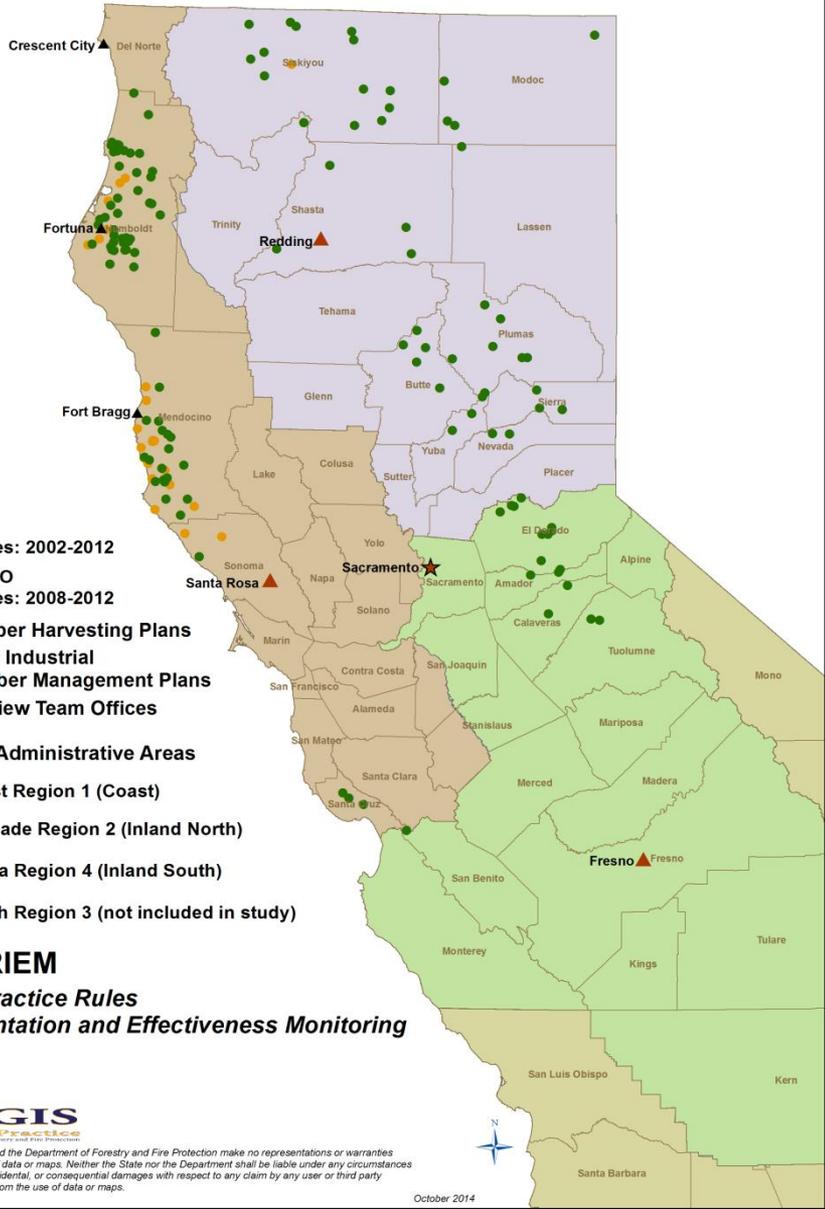
Edmond G. Brown Jr.
Governor
State of California



December 2014
SACRAMENTO, CALIFORNIA

FORPRIEM Plans Sampled

• <u>THPs</u>	<u>126</u>
– Coast District	66
– Northern District	43
– Southern District	17
• <u>NTMP/NTOs</u>	<u>24</u>
– Coast District	22
– Northern District	1
– Southern District	1



THP
 filing dates: 2002-2012
NTMP-NTO
 filing dates: 2008-2012

- Timber Harvesting Plans
- Non Industrial Timber Management Plans
- ▲ Review Team Offices

- CAL FIRE Administrative Areas**
- Coast Region 1 (Coast)
 - Cascade Region 2 (Inland North)
 - Sierra Region 4 (Inland South)
 - South Region 3 (not included in study)

FORPRIEM
Forest Practice Rules
Implementation and Effectiveness Monitoring
 2008-2013



The State of California and the Department of Forestry and Fire Protection make no representations or warranties regarding the accuracy of data or maps. Neither the State nor the Department shall be liable under any circumstances for any direct, special, incidental, or consequential damages with respect to any claim by any user or third party on account of or arising from the use of data or maps.



October 2014

FORPRIEM Methods

- **Roads**

- One randomly located 660-foot segment.
- FPR implementation and effectiveness evaluations.

- **WLPZs**

- One randomly located 200-foot WLPZ segment for Class I and II watercourses.
- 50-point systematic grid pattern with sighting tube for total canopy.
- Erosion event inventory.
- Ocular estimates for additional information.

- **Watercourse Crossings**

- Two randomly located crossings if available on Class I, II, or III watercourses.
- FPR implementation and effectiveness evaluations.

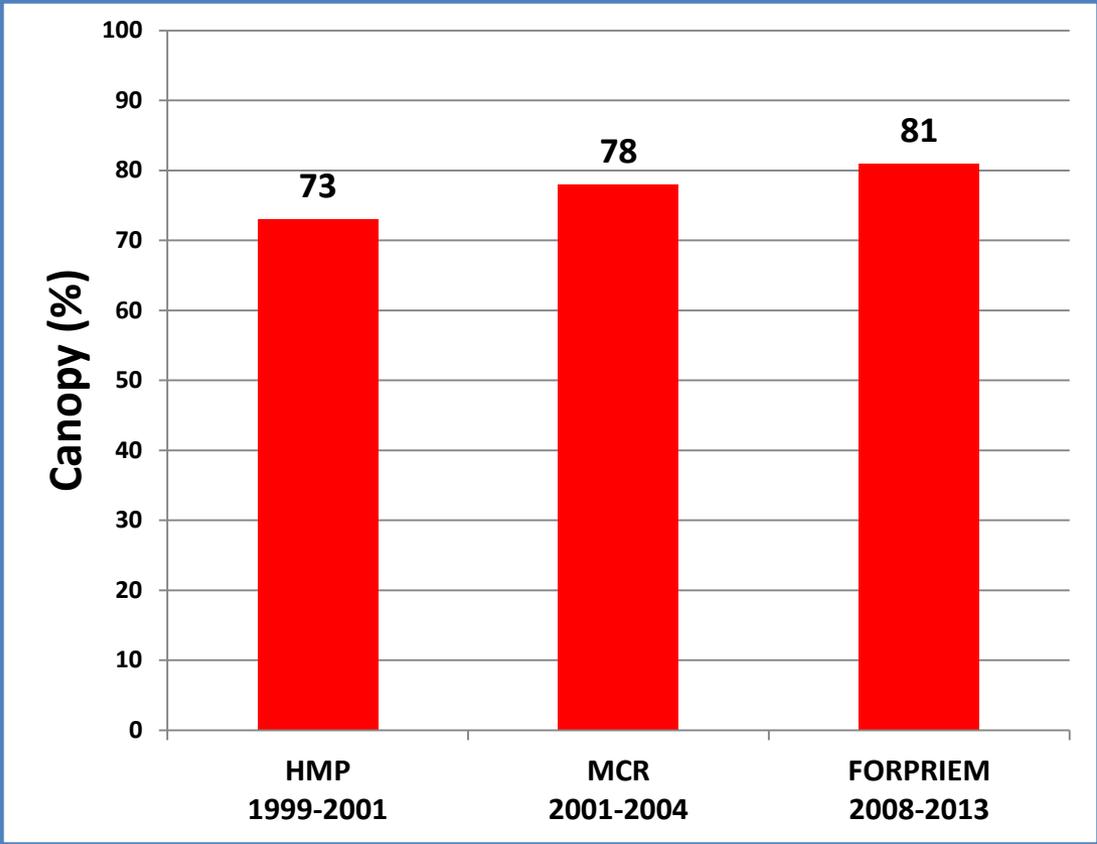
Effectiveness evaluated after at least one overwintering period

FORPRIEM (2014) Key Summary Points

- **THP – WLPZ percent total canopy for Class I watercourses appears to be improving over time.**

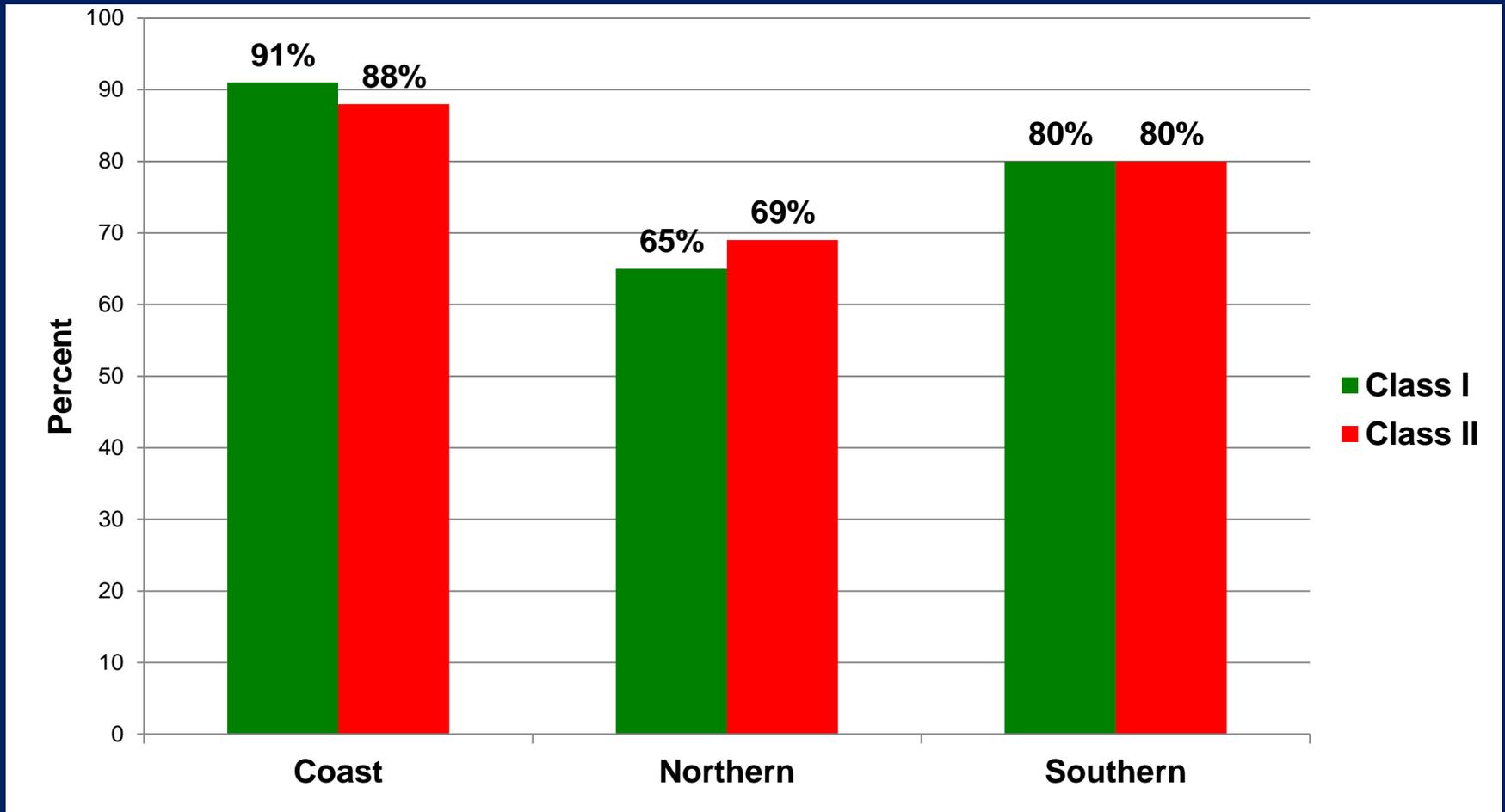


Comparison of THP Class I WLPZ percent total canopy measured with a sighting tube for three studies

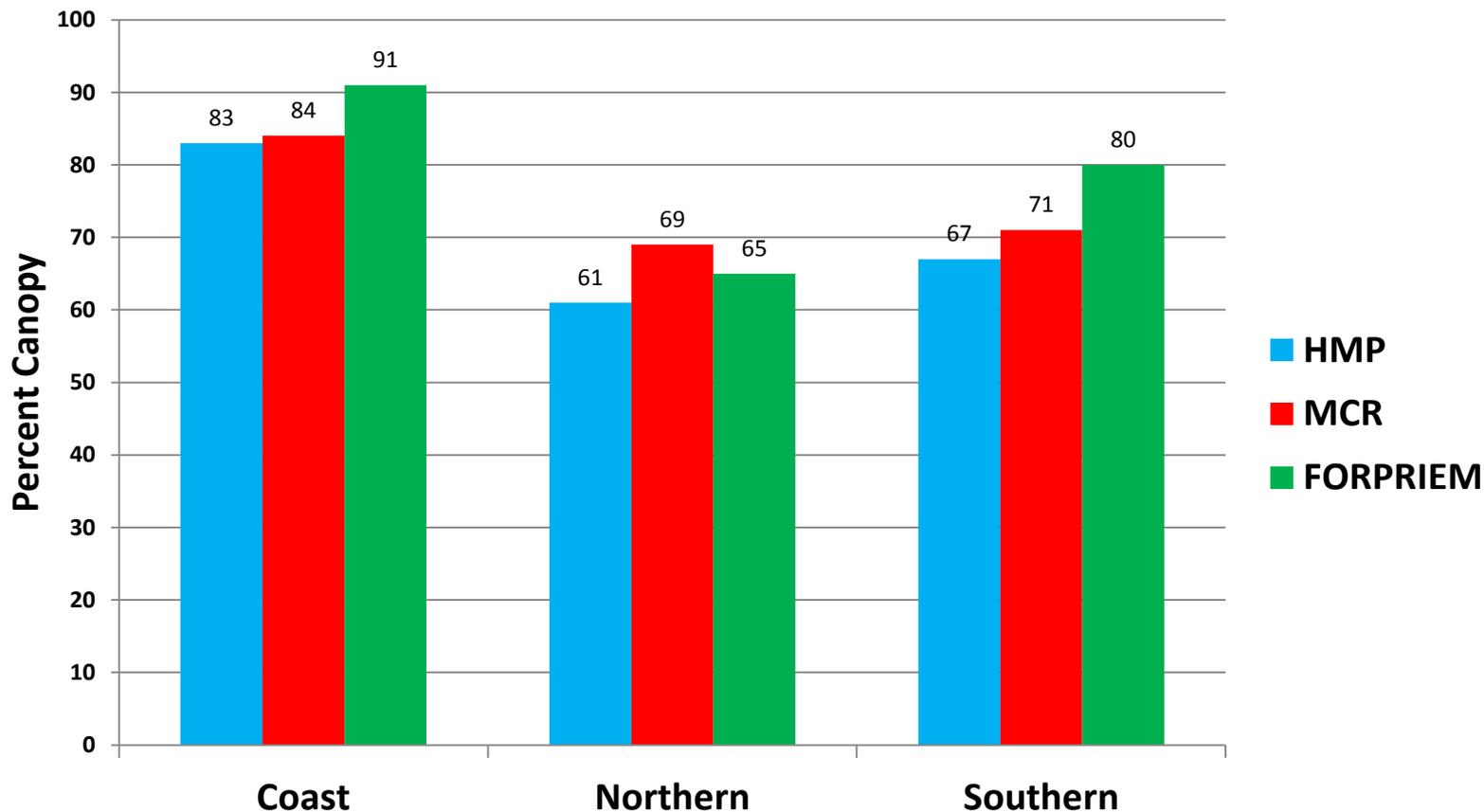


FORPRIEM THP

WLPZ Total Canopy by District



Comparison of THP Class I WLPZ percent total canopy by monitoring program and Region



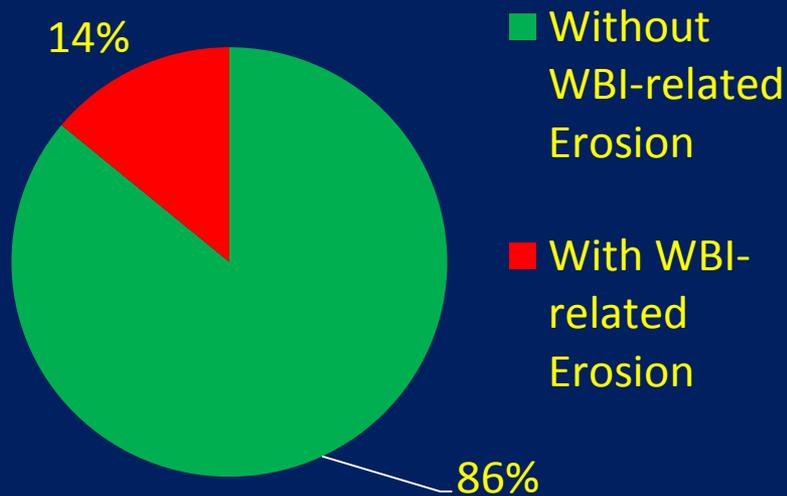
FORPRIEM (2014) Key Summary Points

- Generally, the Forest Practice Rules (FPRs), where properly implemented, appear to be working to limit road-related erosion and prevent sediment transport.
- Road segments with waterbreak intervals having correct spacing produced a much lower incidence of WBI-related erosion than waterbreak intervals with incorrect spacing.

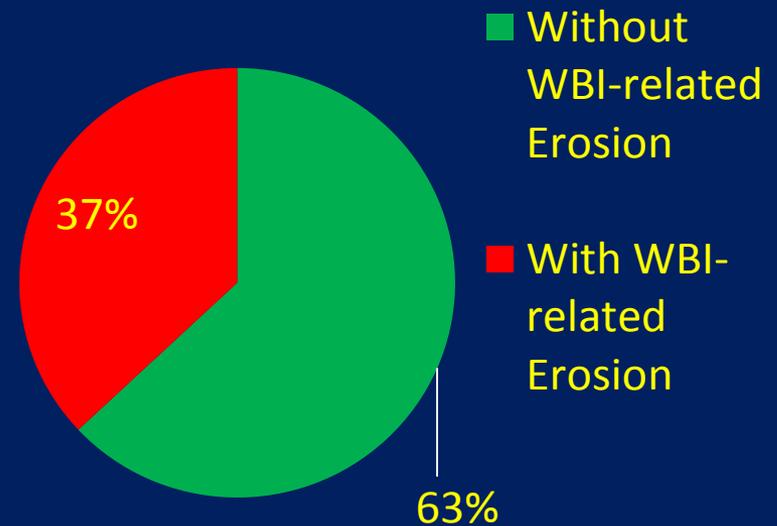


THP Waterbreak Spacing and Erosion

Waterbreak Intervals with Correct Spacing



Waterbreak Intervals with Incorrect Spacing

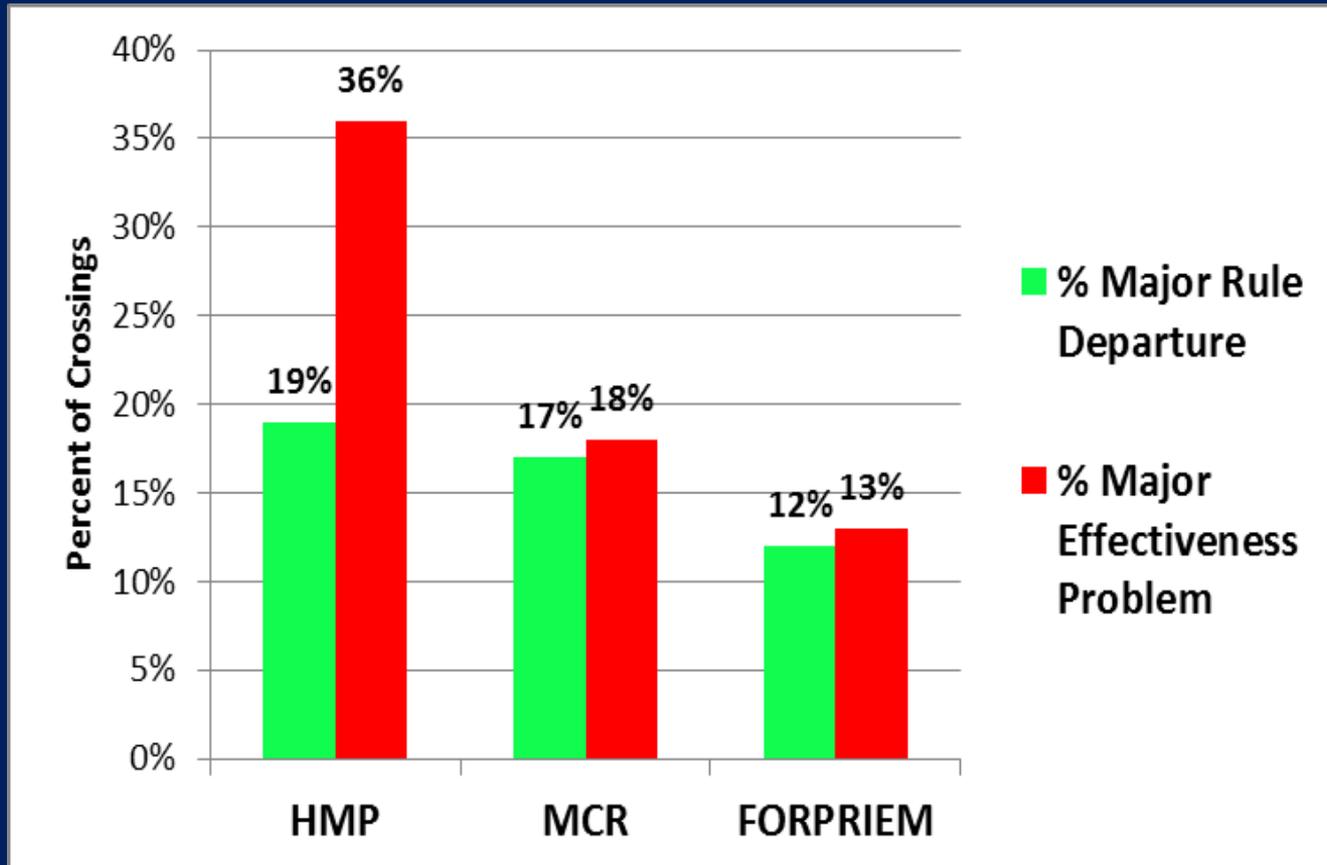


FORPRIEM (2014) Key Summary Points

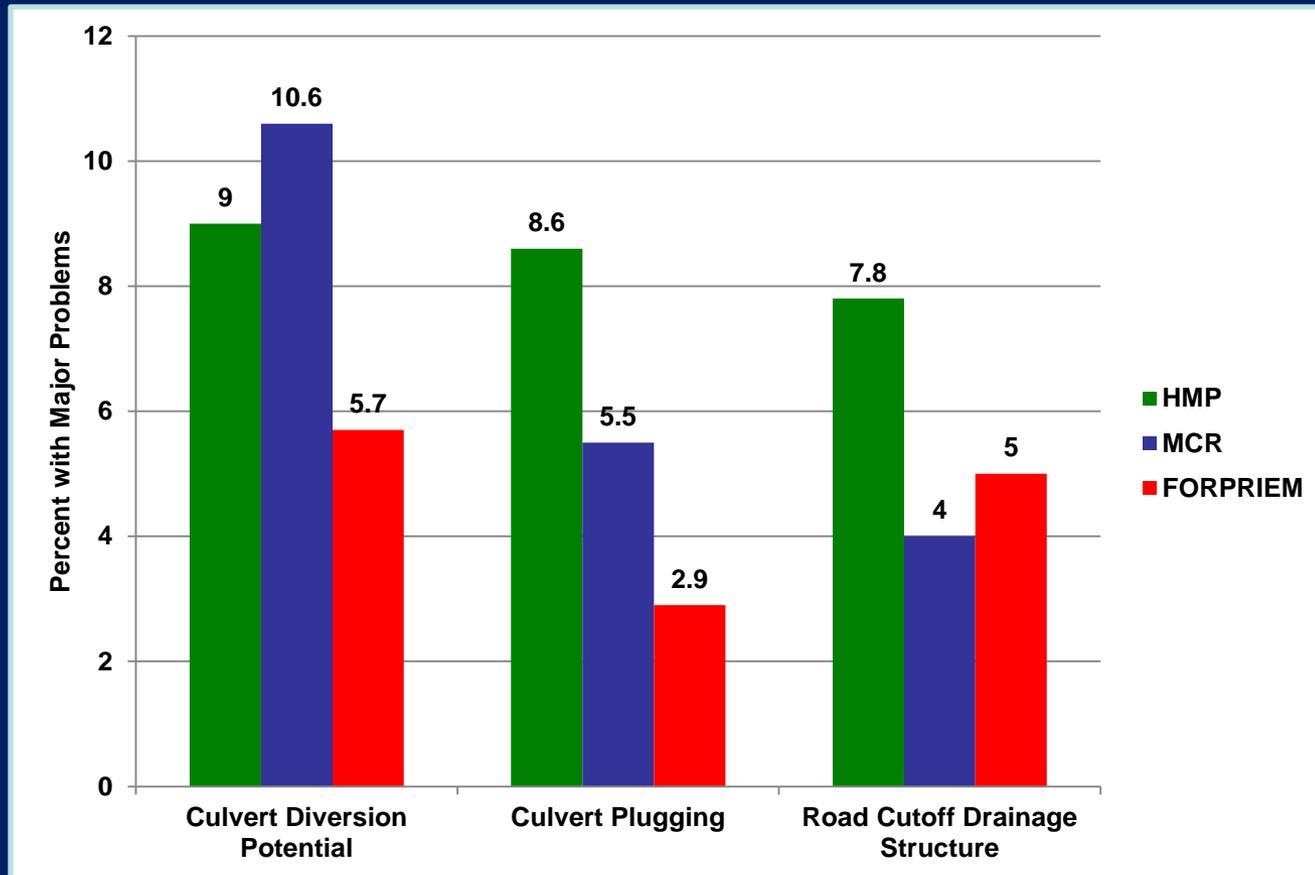
- THP watercourse crossing and road approach implementation and effectiveness appear to be improving over time.
- Crossing diversion potential and cutoff drainage structure function on road approaches remain high priority items for training efforts.



Comparison of THP watercourse crossing Forest Practice Rule implementation and effectiveness ratings for three monitoring programs spanning 1996 to 2013



Changes Over Time for Three Selected THP Major Effectiveness Categories



Diversion potential and culvert plugging appear to be improving over time for THPs.

FORPRIEM Report (2014)

Recommendations

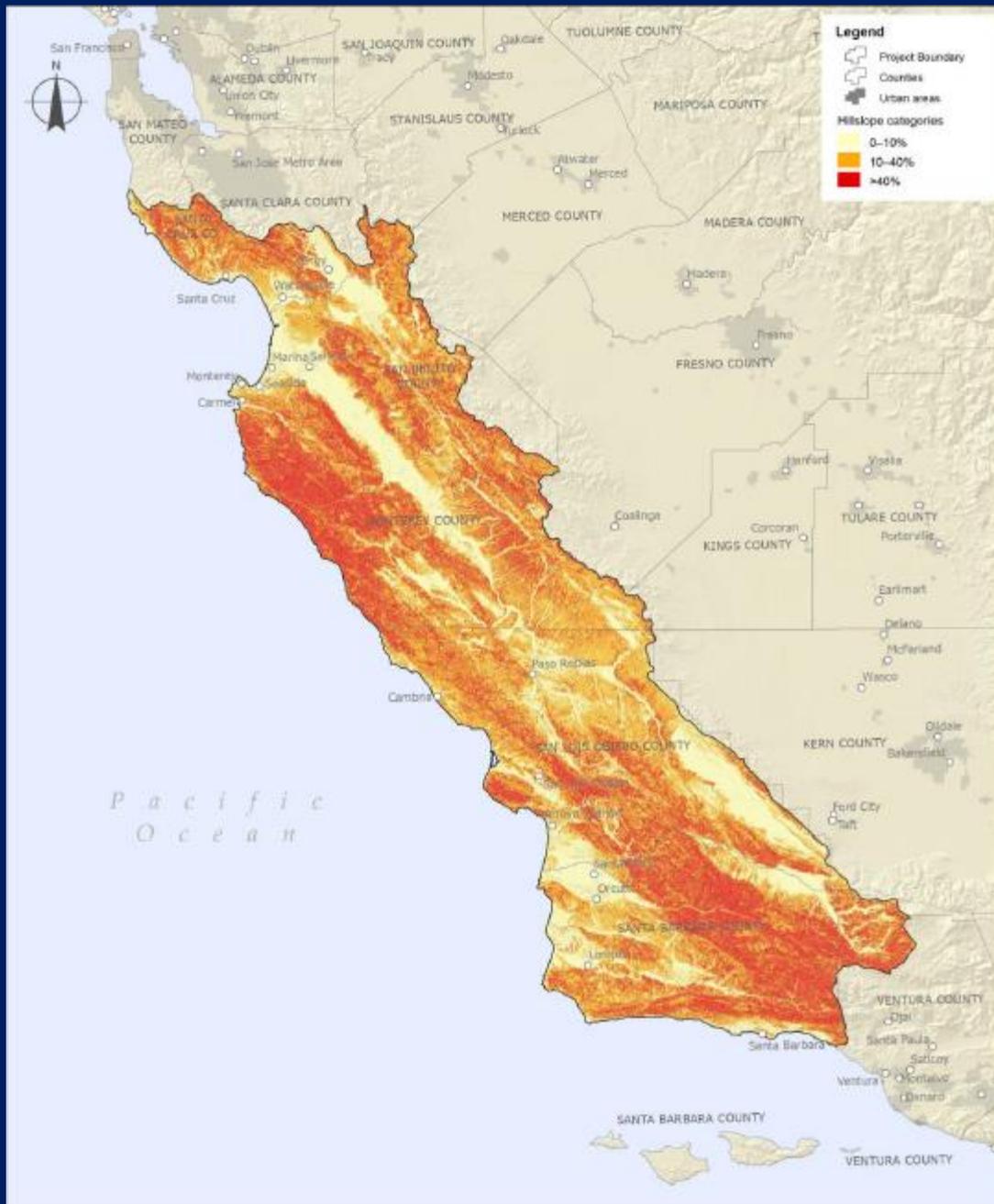
- **Modify the FORPRIEM methods to accommodate changes to the Forest Practice Rules, including the ASP Rules and Road Rules, 2013 rule packages.**
 - **Continue to sample NTMP-NTOs.**
 - **Enter data electronically.**
 - **Update FORPRIEM database to accommodate changes to the program.**
- **Gather input from the BOF's **Effectiveness Monitoring Committee**.**
 - **Investigate using a stratified random sampling approach to better test the effectiveness of the FPRs on a larger percentage of high risk sites.**

FORPRIEM ver. 2.0

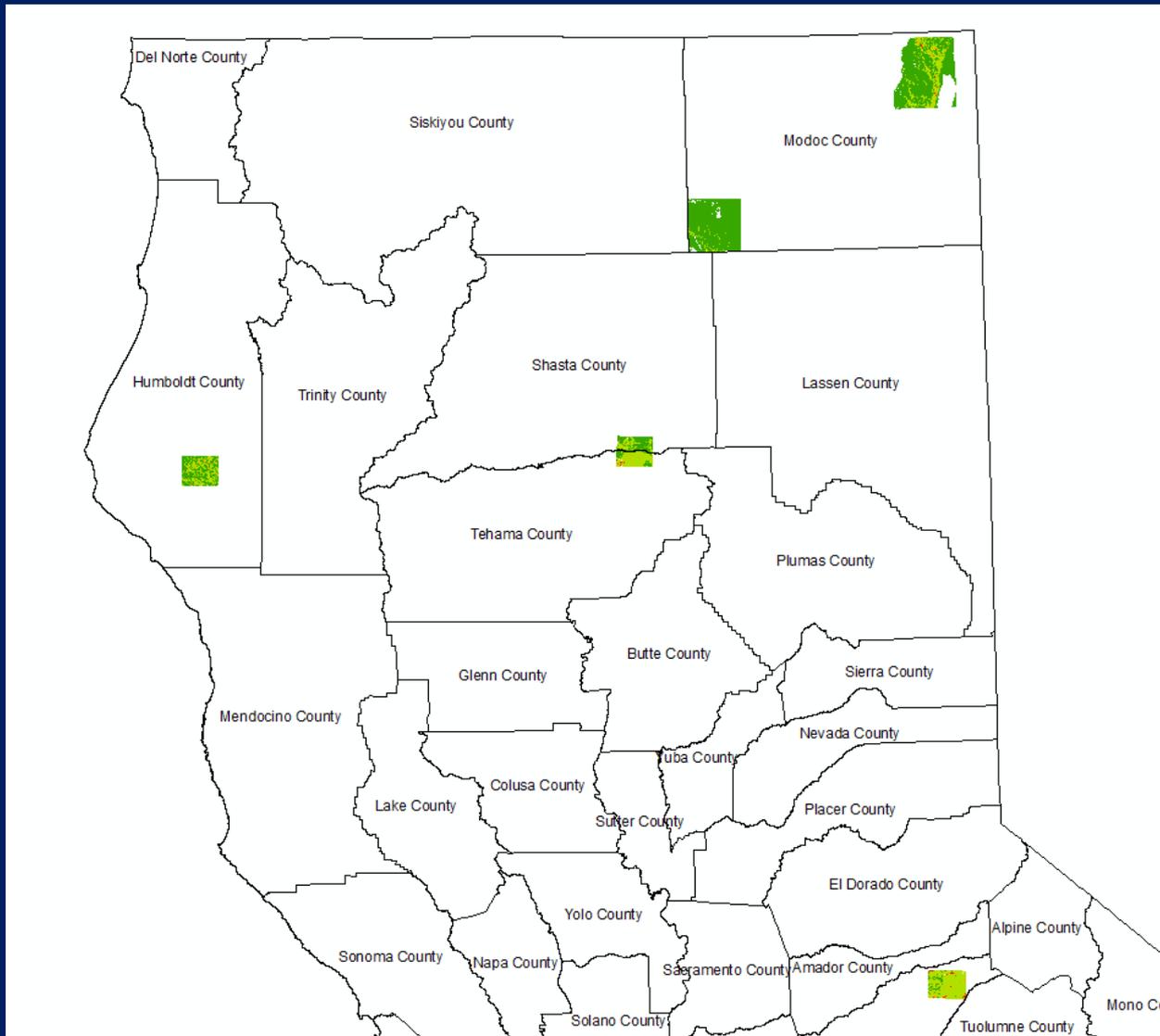
- Develop a stratified random sample of completed THPs and NTMP-NTOs to better test the FPRs on a larger percentage of higher erosion risk sites.

FORPRIEM ver. 2.0

- ArcGIS layers to assess hillslope erosion risk:
 - 10 m DEM slope (index for shallow landsliding)
 - Deep seated landslide susceptibility layer (Wills et al. 2011)
 - E-EHR (surface erosion hazard) [note incomplete soil survey data in Calaveras and Humboldt counties at this time] (program currently available from CAL FIRE GIS Program, Santa Rosa)
 - Drainage density (National Hydrology Dataset)

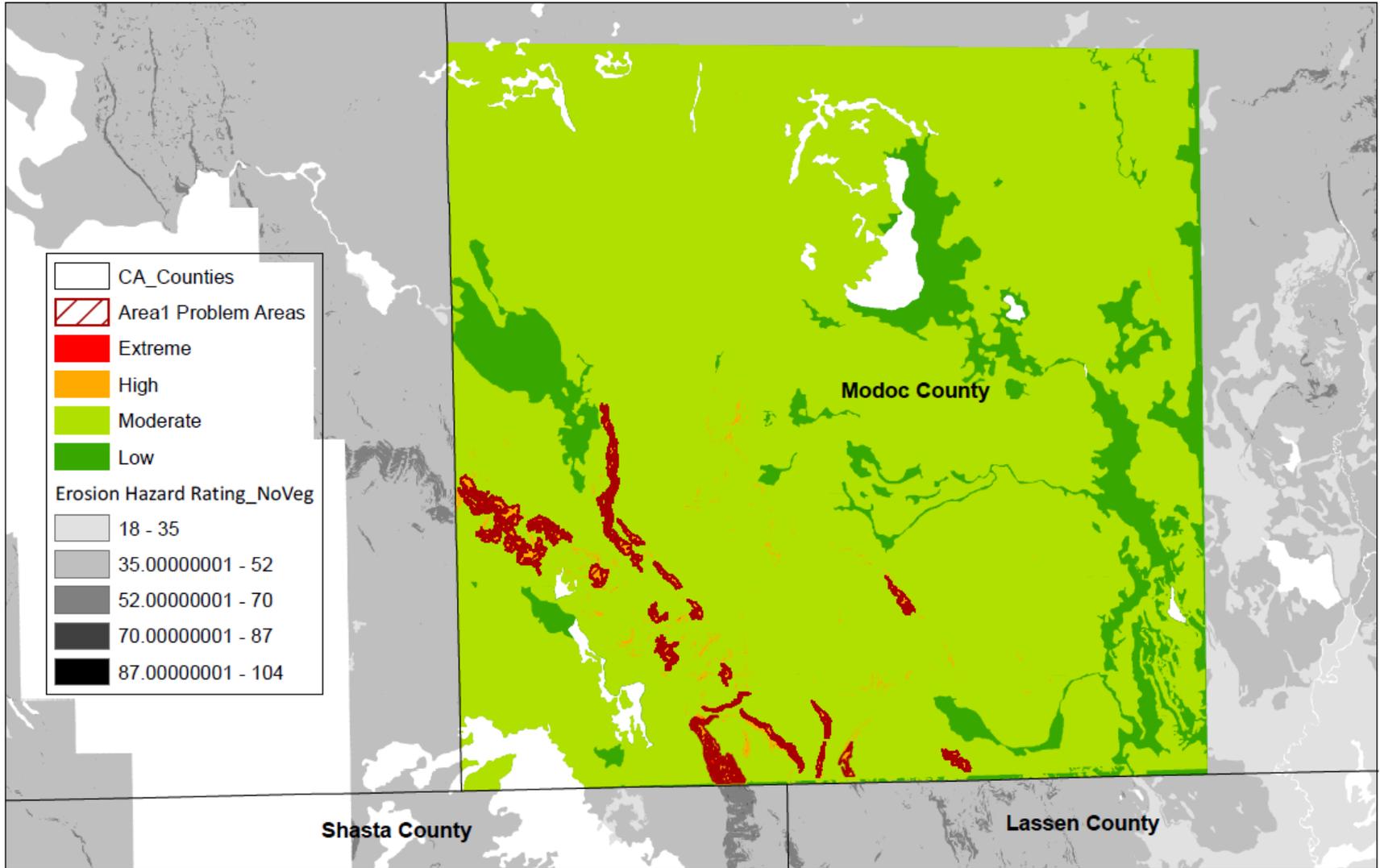


**10 m DEM
slope
California
Central Coast
Region**

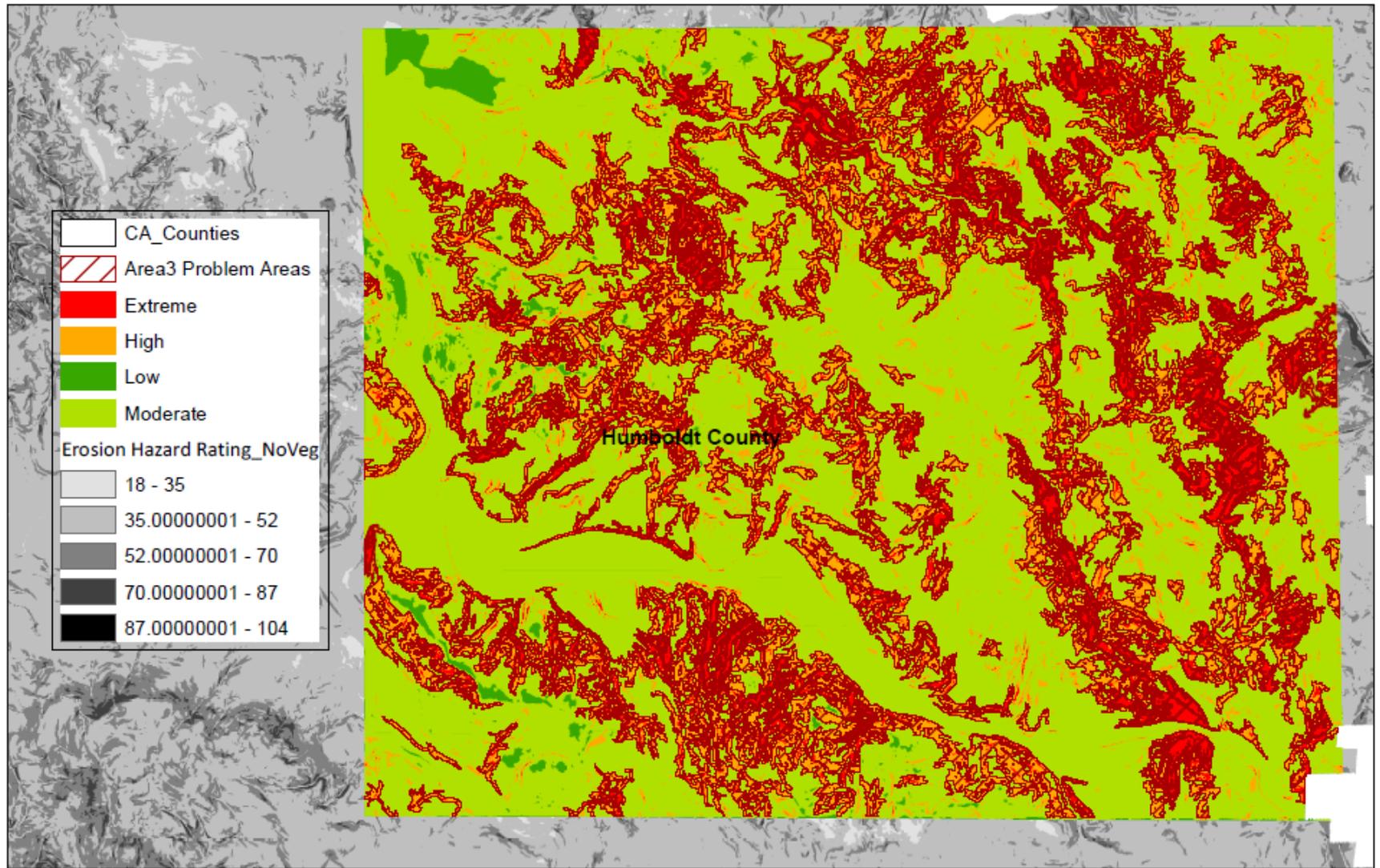


EHR and Drainage Density Test Areas

Erosion Hazard Ratings Test Area 1 for FORPRIEM 2.0



Erosion Hazard Ratings Test Area 3 for FORPRIEM 2.0



Drainage Density Test Area

EHR Test 1 Area example: (WBD HU 12 watersheds with HUC 12 labels)



WBD HU12, Area 1

GIS Test Areas in California— Drainage Density

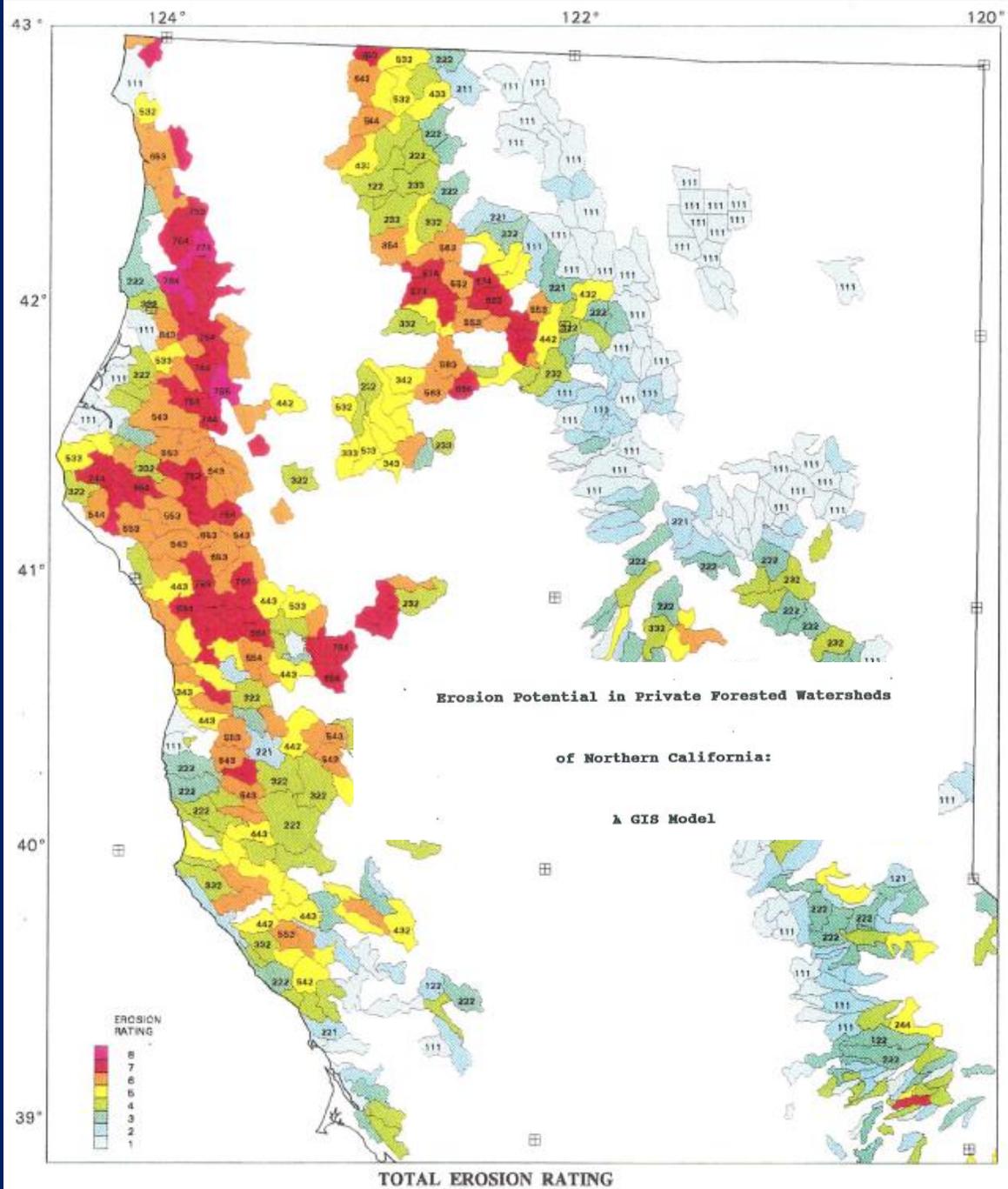
Test Area	No.	Calwater + 1:100K flowline (mi/mi ²)
SW Modoc	1	1.06
NE Modoc	2	0.86
S. Humboldt	3	1.37
E. Calaveras	4	1.89
Battle Cr WS	5	0.95

Simple Algorithm to Combine Parameters for a Composite Score

Category	High	Moderate	Low
Slope (%)	>60 (3)	30-59 (2)	<30 (1)
Erosion Hazard Rating	>66 (3)	50-65 (2)	<50 (1)
Deep-Seated Landslide Rating	8 to 10 (3)	5 to 7 (2)	0 to 3 (1)
Drainage Density (mi/mi ²)	>1.7 (3)	1.1 to 1.7 (2)	<1.10 (1)
	High	Moderate	Low
Planning Watershed Rating	10 to 12	6 to 9	4 to 5

FORPRIEM ver. 2.0 Planning Watershed Erosion Risk Rating

- [to be added]



**Erosion Potential
in Private
Forested
Watersheds of
Northern
California: A GIS
Model**

McKittrick
1994

FORPRIEM ver. 2.0 Tasks to Complete

- Integrate lessons learned in the HMP, MCR, IMMPP (Longstreth et al. 2008), BCTF (BCTF 2011), and FORPRIEM projects into FORPRIEM 2.0.
- Redesign the FORPRIEM field forms to collect data **meaningful to all the agencies**, as well as addressing the newer BOF rule package requirements (ASP rules, Road Rules, 2013, etc.).
- Investigate methods for electronic field data entry—using smart phones and Survey 123 or similar applications, and/or tablets.
- Learn how to collect WLPZ canopy data with hemispherical photography; acquire equipment.

FORPRIEM ver. 2.0 Tasks to Complete

- Investigate and develop procedures to selected monitoring sites by hillslope position (i.e., toe, midslope, ridgetop).
- Develop a spatially explicit database for data storage.
- Develop a detailed QA/QC program simultaneously with the main plan sampling program.
- Develop a methodology manual and training program for all Review Team agencies, so as to more fully integrate CGS, DFW, and RWQCB staff in data collection.

FORPRIEM ver. 2.0 Timeline

- **The goal is to:**
 - **Finish the draft methods in spring/early summer 2016,**
 - **Beta test the revised procedures in summer/early fall 2016,**
 - **Schedule training sessions in late 2016/early 2017, and**
 - **Implement the program by spring 2017.**
- **Data collection is anticipated to occur for a minimum of 3-5 years.**

FORPRIEM ver. 2.0 Funding

- No additional funding is required from the EMC.
- CAL FIRE will provide staff to collect data.
- It is anticipated that with AB 1492 funded positions in place, the other Review Team agencies will also assist in field data collection, as well as other aspects of the project.

FORPRIEM ver. 2.0 Summary Points

- FORPRIEM ver. 2.0 is a continuation of 3 earlier BOF/CAL FIRE monitoring programs (and 40 years of agency monitoring work).
- EMC input is being sought to produce a new program meaningful to all the Review Team agencies.
- No funding is being requested from the EMC.
- Considerable work remains to implement this program before spring 2017, including:
 - Completion of stratified random sampling approach.
 - Selecting parameters to monitor.
 - Developing field forms and electronic data entry.
 - Database development.
 - QA/QC program development.
 - Training program development.