Forest Practice Rules Implementation and Effectiveness Monitoring

F0RPRIEM

Road Monitoring Results

CAL FIRE FORPRIEM Monitoring Program
Clay Brandow
BOF Meeting — Sacramento, CA
June 18, 2014

Outline

I. Background Info
II. Methods
III. Road Results
- ▸THPs
- ▸ NTMP - NTOs

IV. QA/QC
V. Summary
VI. Report Schedule

Representative Sample

- **THPs Randomly Selected**
  - **Statewide**
  - **HMP (1996 -- 2002)**
  - **MCR (2001-- 2004)**
  - **FORPRIEM (2008 -- present)**
    - **10% sample**

- **NTMP – NTOs Randomly Selected**
  - **FORPRIEM (2011-- present)**
    - **North Coast Hydrologic Basin only (2011-12)**
      - **20% sample**
    - **Statewide - 2013 to present**

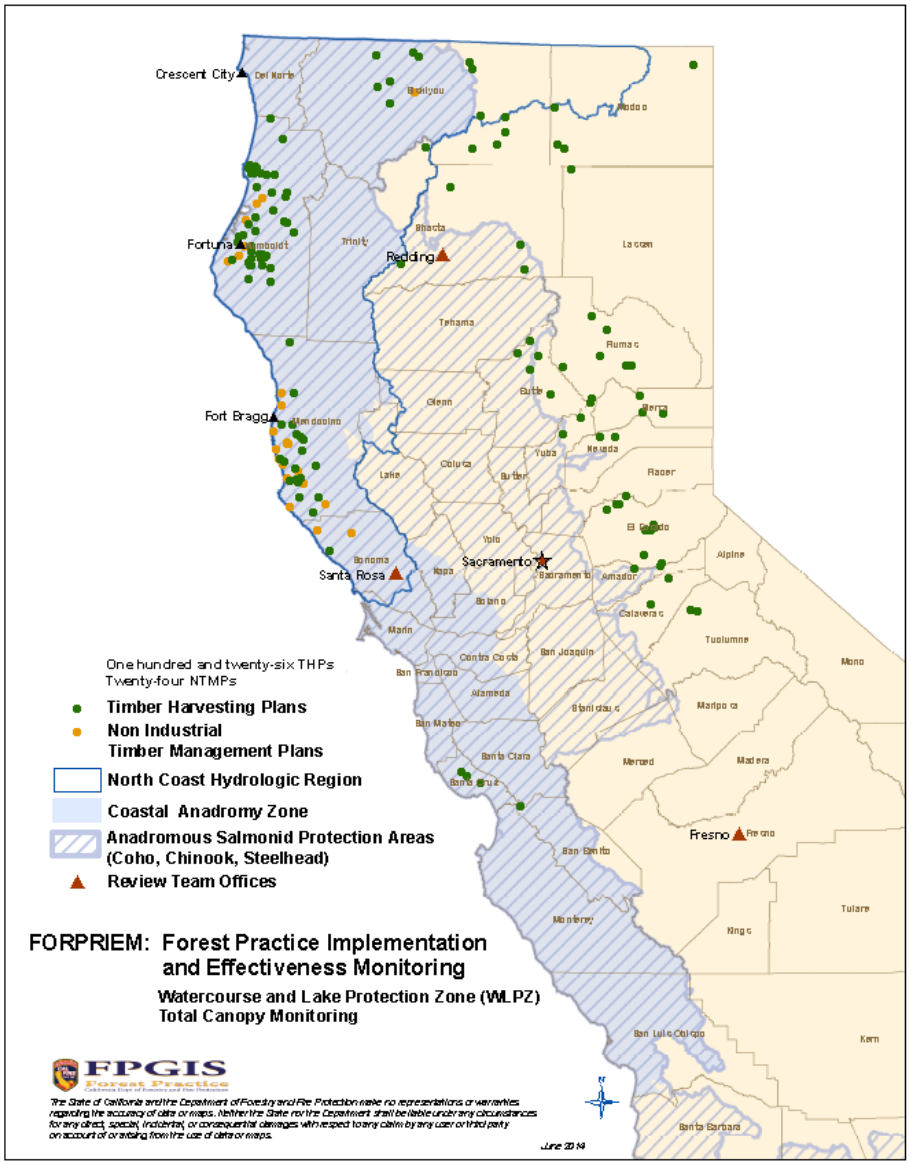
FORPRIEM Plans Sampled

THPs 126

~Coast District 66
~Northern District 43
~Southern District 17

NTMP - NTOs 24

~Coast District 22
~Northern District 1
~Southern District 1



FORPRIEM Road Segments

1) Using the Plan Map divide the roads into 660-foot (1/8-mile) segments.
2) Number the segments.
3) Randomly select one road segment per Plan for monitoring using a random number generator or random number table.
4) Monitor the road segment once for Implementation and once for Effectiveness.

Note: Implementation and Effectiveness Monitoring may be done on the same site visit, if the road segment has overwintered at least one-year.

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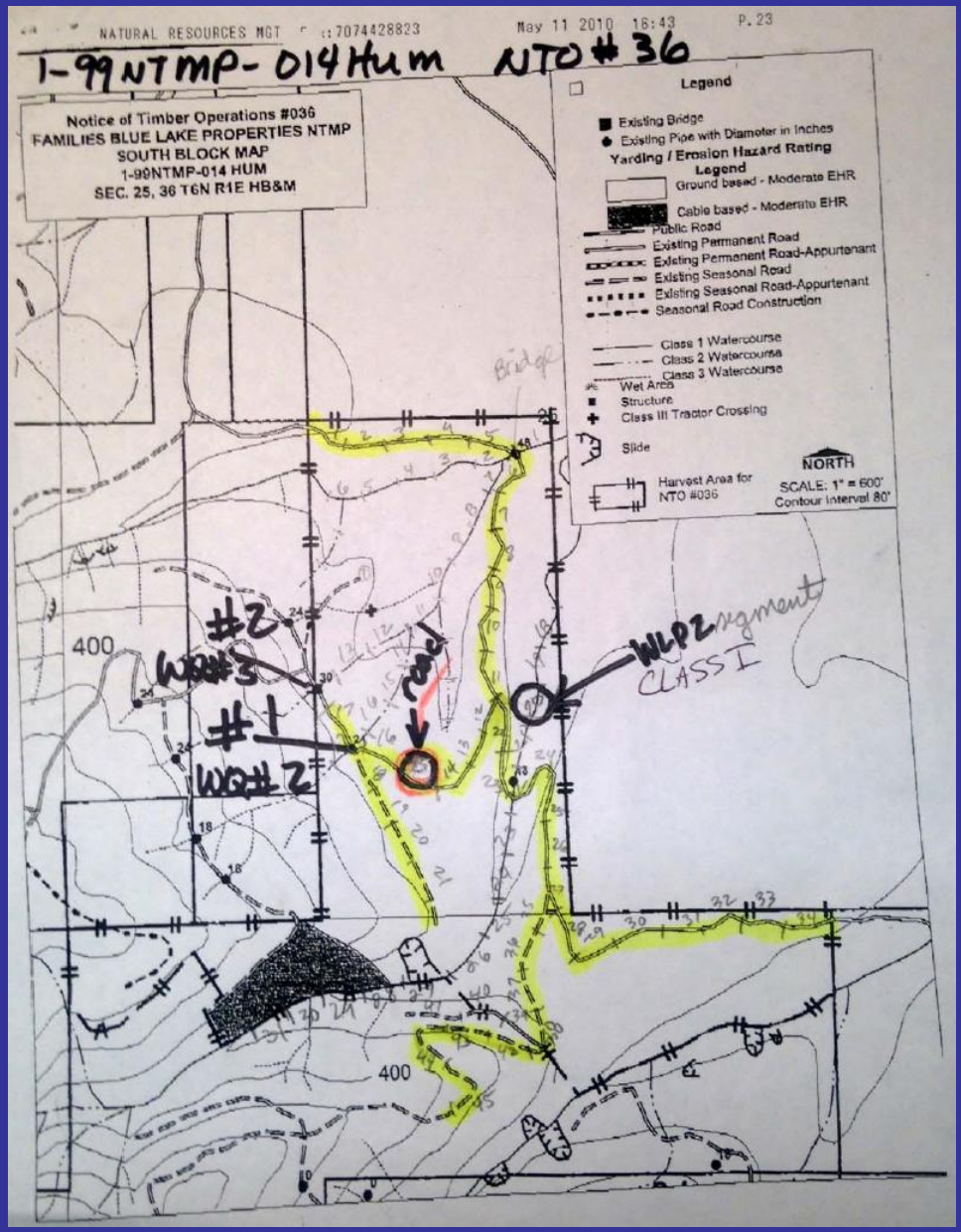
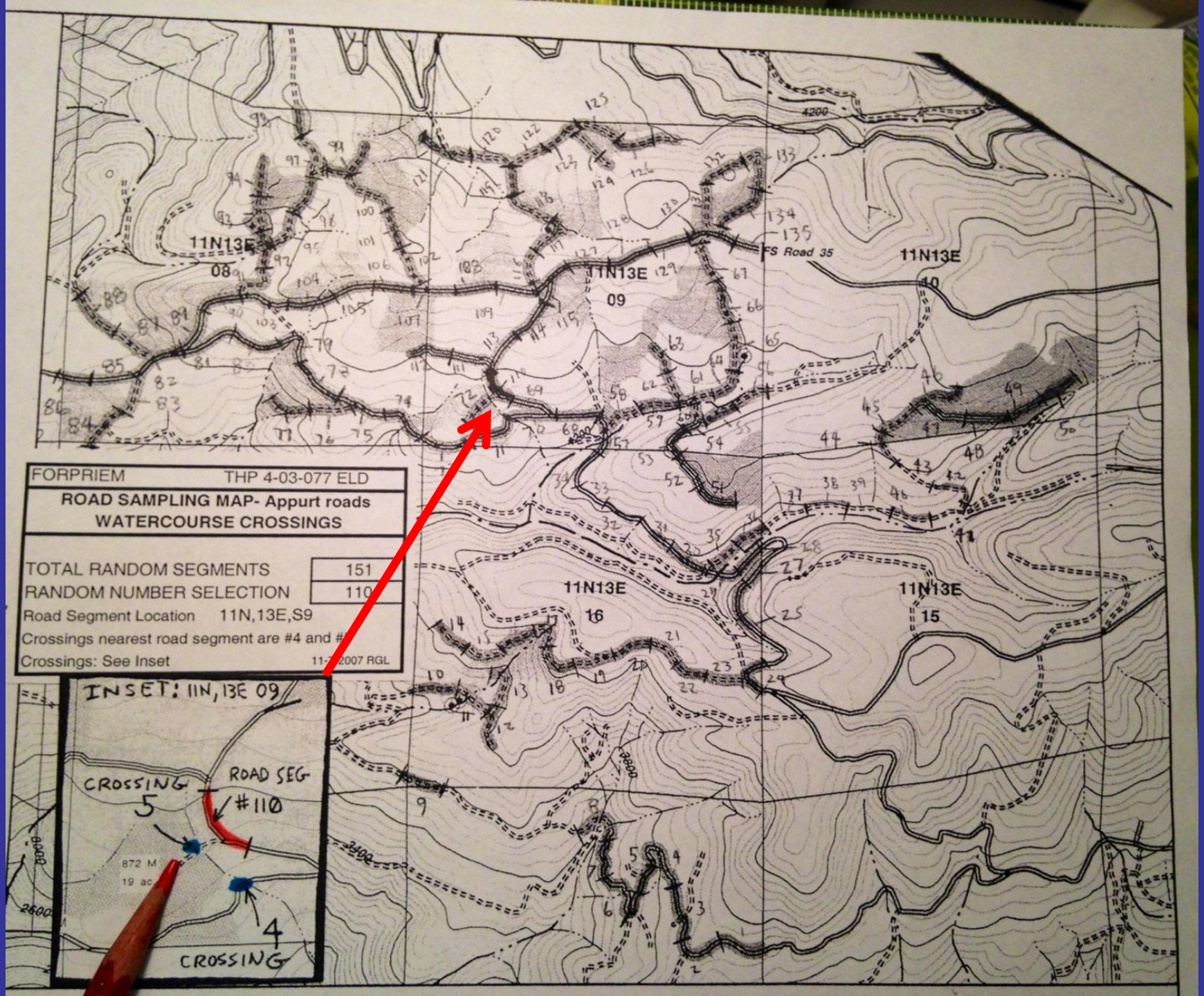



FORPRIEM THP 4-03-077 ELD
ROAD SAMPLING MAP- Appurt roads
WATERCOURSE CROSSINGS
TOTAL RANDOM SEGMENTS 151
RANDOM NUMBER SELECTION 110
Road Segment Location 11N,13E,S9
Crossings nearest road segment are #4 and #
Crossings: See Inset
11-2007 RGL
INSET: 11N, 13E 09
CROSSING 5
ROAD SEG #110
872 M
19 ac
4
CROSSING
11N13E 08
11N13E 09
11N13E 10
11N13E 16
11N13E 15
FS Road 35

FORPRIEM Road Segments

- **125 THP Road Segments**
  - 125 with Implementation Monitoring
  - 119 with Implementation & Effectiveness Monitoring
- **24 NTMP-NTO Road Segments**
  - 23 with Implementation Monitoring
  - 1 with Implementation & Effectiveness Monitoring

Note: 6 THP Road Segments and 1 NTMP-NTO Road Segment still pending Effectiveness Monitoring.

FORPRIEM Road Monitoring Tools

- Pocket Tape Measure (lengths, widths & depths)
- String Box (distances)
- Clinometer (gradients)

Three (3) Key

Terms

- Road Sample **Segment**
  (660 feet or 1/8 mile.)
- Waterbreak **Interval**
  (Distance between waterbreaks.)
- Road Sample **Increment**
  (10-feet or 66 per segment.)

Three (3) Key Road FPRs rated for Implementation:

- Waterbreak Construction.
- Discharge into Cover.
- Waterbreak Spacing.

ROAD IMPLEMENTATION FORM

THP No. 1 - 04 - XXX **Observer(s)** C Brandow P Cafferata Munn **Date** 2-29-07

Appendix A-3
Page 2 of 6

Distance from the Starting Point in 10-Foot Increments

Revised 9/14/07

	000 010	010 020	020 030	030 040	040 050	050 060	060 070	070 080	080 090	090 100	100 110	110 120	120 130	130 140	140 150	150 160	160 170	170 180	180 190	190 200	200 210	210 220
Road Construction CF=Cut & Fill, TC=Thru-Cut TF=Thru-Fill FB= Full Bench Cut	TF	—	—	—	—	—	TF	CF	—	—	—	—	—	—	—	—	—	—	—	—	—	CF
Watercourse Xing B, C, P-A, OBA, F, A, O			C																			
Road Surface 0S=Out-Sloped IS=In-Sloped FL= Flat CR=Crowned	FL	—	—	—	—	—	FL	0S	—	—	—	—	—	—	—	—	—	—	—	—	—	0S
Outside Berm																						
Inside Ditch & Ditch Relief Culvert, Dip or Other	—	C			D	—	—	—														
Rate Maintenance of Inside Ditch & Ditch Relief: (Circle E, A, MA or D)	E (A) MA D	E (A) MA D	E A MA D	E A MA D	E (A) MA D	E (A) MA D	E (A) MA D	E (A) MA D	E A MA D	E A MA D	E A MA D	E A MA D	E A MA D	E A MA D	E A MA D	E A MA D	E A MA D	E A MA D	E A MA D	E A MA D	E A MA D	E A MA D
Waterbreaks WB, RD, NL					NL				RD							RD						
Percent Road Gradient between Waterbreaks		-3%				+5%						+13%							+4%			
Percent Side Slope between Waterbreaks		6%				10%						25%							30%			
Rate Waterbreaks constructed with a depth ≥6" into firm roadbed: (circle E, A, MA or D)	E A MA D	E A MA D	E A MA D	E A MA D	E (A) MA D	E A MA D	E A MA D	E A MA D	E (A) MA D	E A MA D	E A MA D	E A MA D	E A MA D	E A MA D	E A MA D	E (A) MA D	E A MA D	E A MA D	E A MA D	E A MA D	E A MA D	E A MA D
Rate Waterbreaks discharge into cover and not onto erodible fills: (circle E, A, MA or D)	E A MA D	E A MA D	E A MA D	E A MA D	E A MA (D)	E A MA D	E A MA D	E A MA D	E (A) MA D	E A MA D	E A MA D	E A MA D	E A MA D	E A MA D	E A MA D	E (A) MA D	E A MA D	E A MA D	E A MA D	E A MA D	E A MA D	E A MA D
Other implementation problems explained in comments section.					X																	

* **E** (Exceeds Rule), **A** (Acceptable), **MA** (Marginally Acceptable), **D** (Departure)

10' Increment

WB Interval

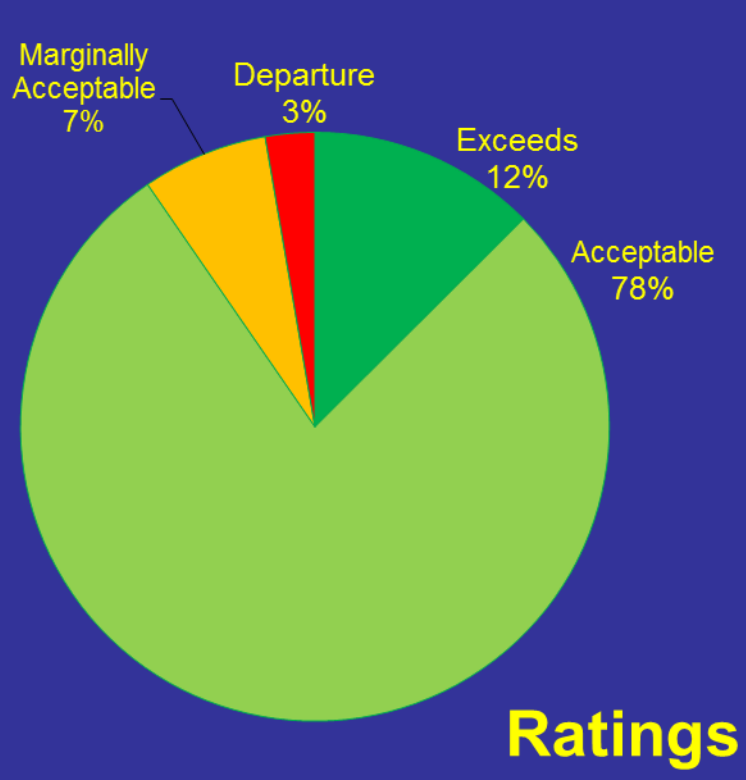
660' Road Segment

Figure 8.
Page 2 of 6.

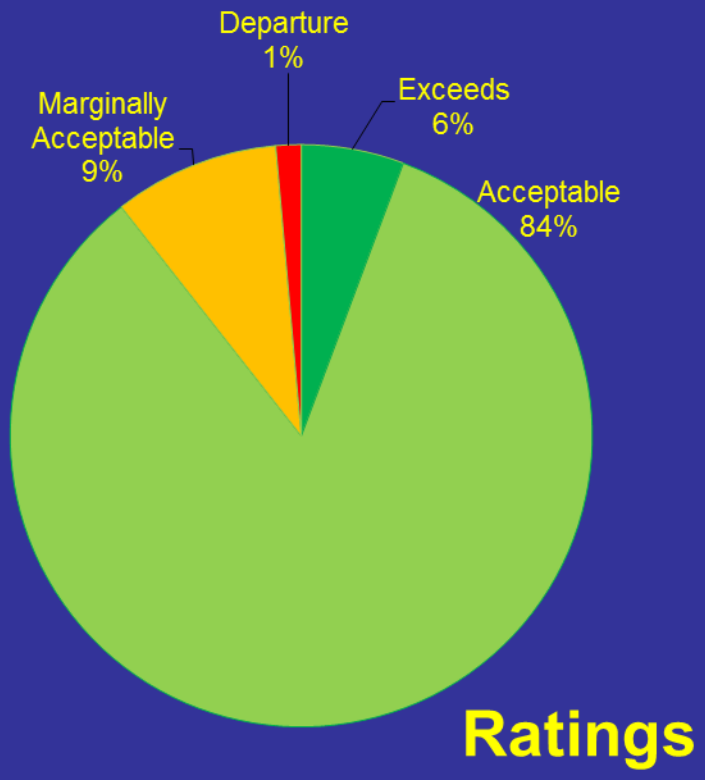
Waterbreak Construction

14 CCR section 914.6, 934.6, 954.6 (g)

THPs



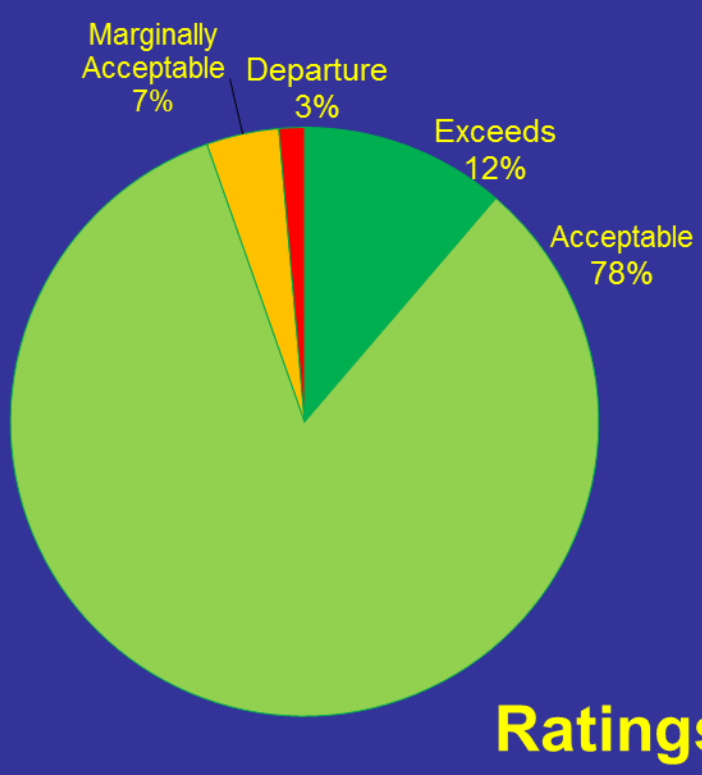
NTMP – NT0s



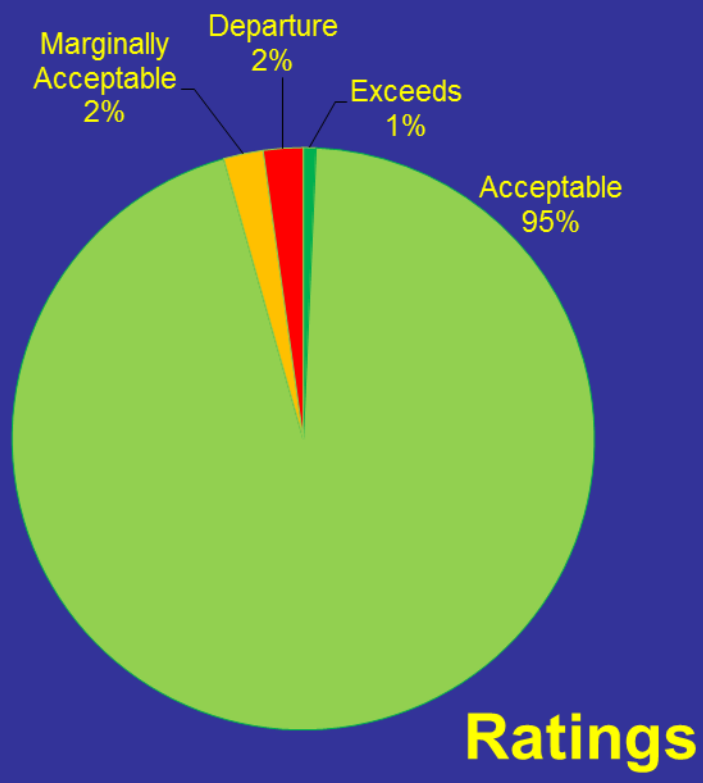
Waterbreak
Discharge into Cover

14CCR section 914.6, 934.6, 954.6 (f)

THPs



NTMP – NT0s



Moving on to **Waterbreak Spacing**

Waterbreak Spacing

914.6, 934.6, 954.6 Waterbreaks [All Districts, with variation]

The following standards are applicable to the construction of waterbreaks:

(a) except as otherwise provided for in the rules:

(1) All waterbreaks shall be installed no later than the beginning of the winter period of the current year of timber operations.

(2) Installation of drainage facilities and structures is required from October 15 to November 15 and from April 1 to May 1 on all constructed skid trails and tractor roads prior to sunset if the National Weather Service forecast is a "chance" (30% or more) of rain within the next 24 hours.

(b) Waterbreaks shall be constructed concurrently with the construction of firebreaks and immediately upon conclusion of use of tractor roads, roads, layouts, and landings which do not have permanent and adequate drainage facilities, or drainage structures.

(c) Distances between waterbreaks shall not exceed the following standards:

MAXIMUM DISTANCE BETWEEN WATERBREAKS

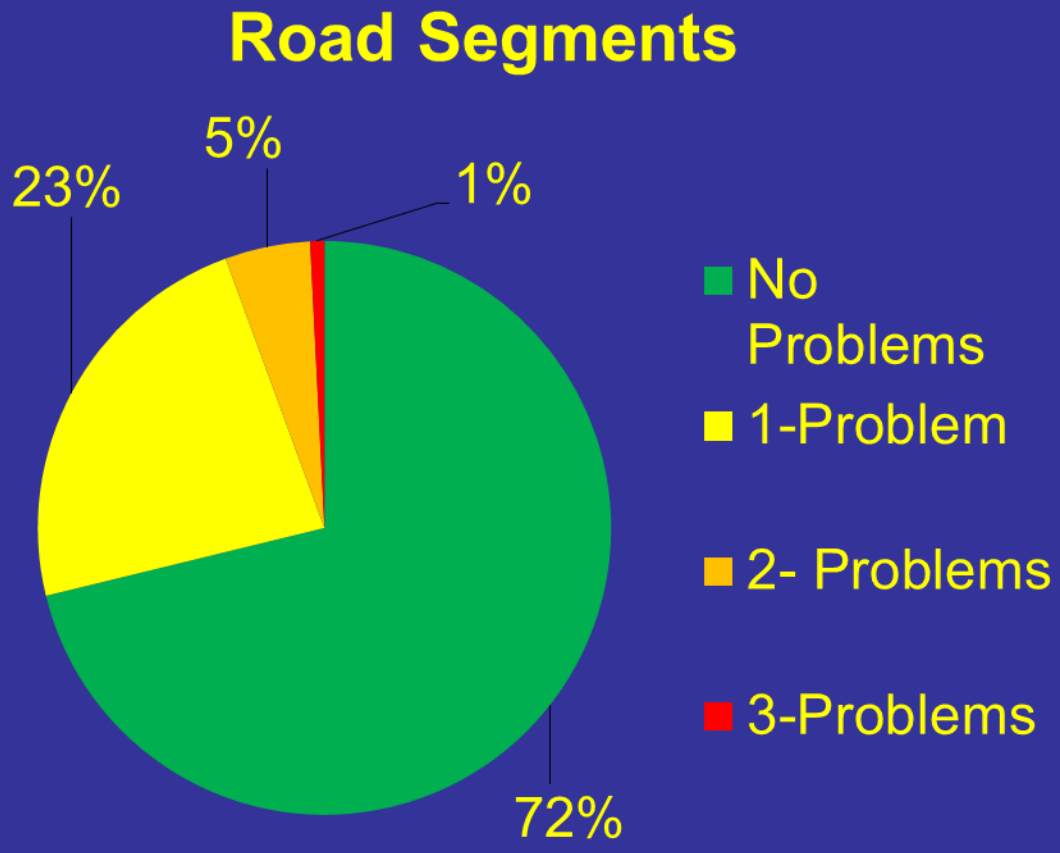
Estimated Hazard Rating	U.S. Equivalent Measure Road or Trail Gradient (in percent)				Metric Measure Road or Trail Gradient (in percent)			
	10 or less	11-25	26-50	>50	10 or less	11-25	26-50	>50
	Feet	Feet	Feet	Feet	Meters	Meters	Meters	Meters
Extreme	100	75	50	50	30.48	22.86	15.24	15.24
High	150	100	75	50	45.72	30.48	22.35	15.24
Moderate	200	150	100	75	60.96	45.72	30.48	22.35
Low	300	200	150	100	91.44	60.96	45.72	30.48

Waterbreak Spacing

- Roads in the sample were in the “10% or less” OR “11-25%” Gradient Categories for both THPs & NTMP – NTOs.
- THP Roads were all in either the Moderate, Low or High EHR Categories.
- NTMP – NTO Roads were all in either the Moderate or Low EHR Categories.

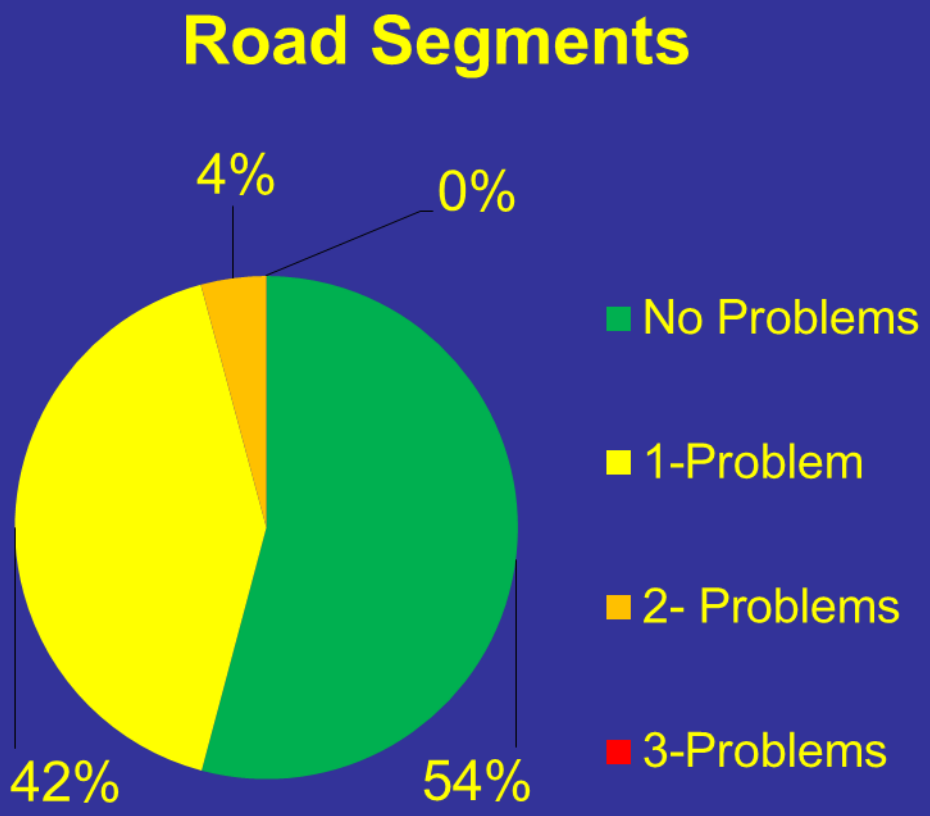
Estimated Hazard Rating	MAXIMUM DISTANCE BETWEEN U.S. Equivalent Measure Road or Trail Gradient (in percent)			
	10 or less	11-25	26-50	>50
	Feet	Feet	Feet	Feet
Extreme	100	75	50	50
High	150	100	75	50
Moderate	200	150	100	75
Low	300	200	150	100

THP Road Waterbreak Spacing by Sample Segment (660’ or 1/8 mile).



About 9% of the THP Waterbreak Intervals had spacing problems and 91% did not.

NTMP- NTO Road Waterbreak Spacing by Sample Segment (660' or 1/8 mile).



About 10% of the NTMP – NTOs Waterbreak Intervals had spacing problems and 90% did not.

Road Erosion & Sediment Transport

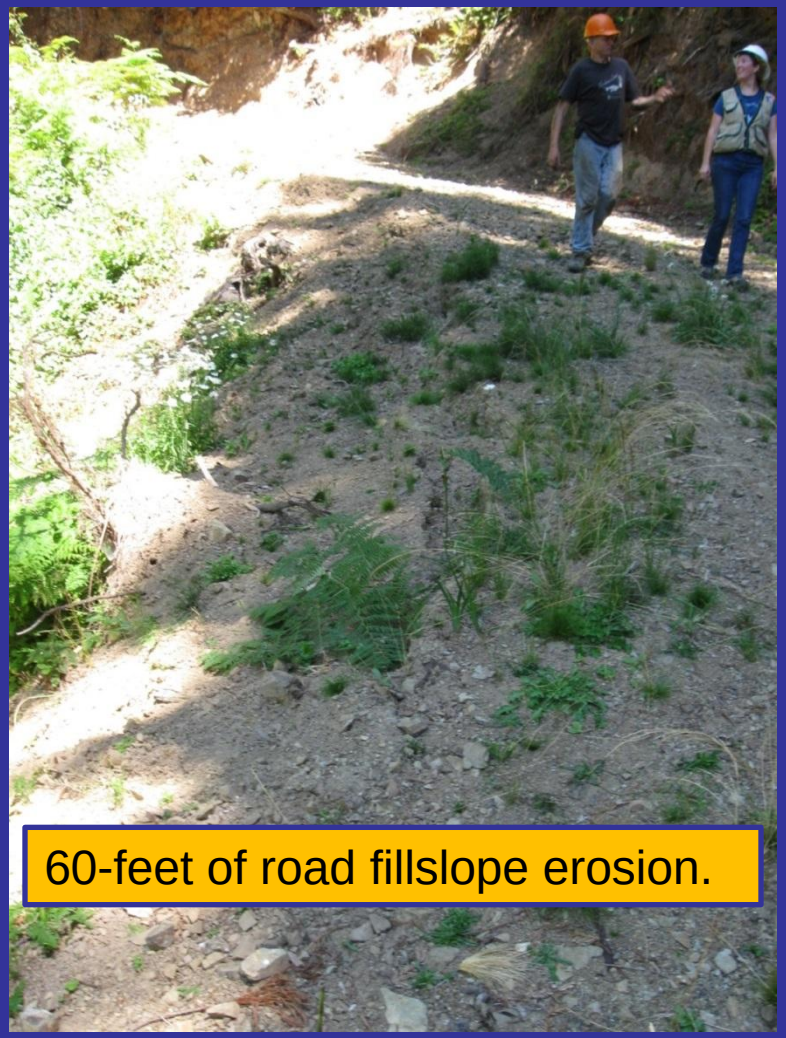
Source

Deposition

THP 2-04-193 SHA on August 16, 2013

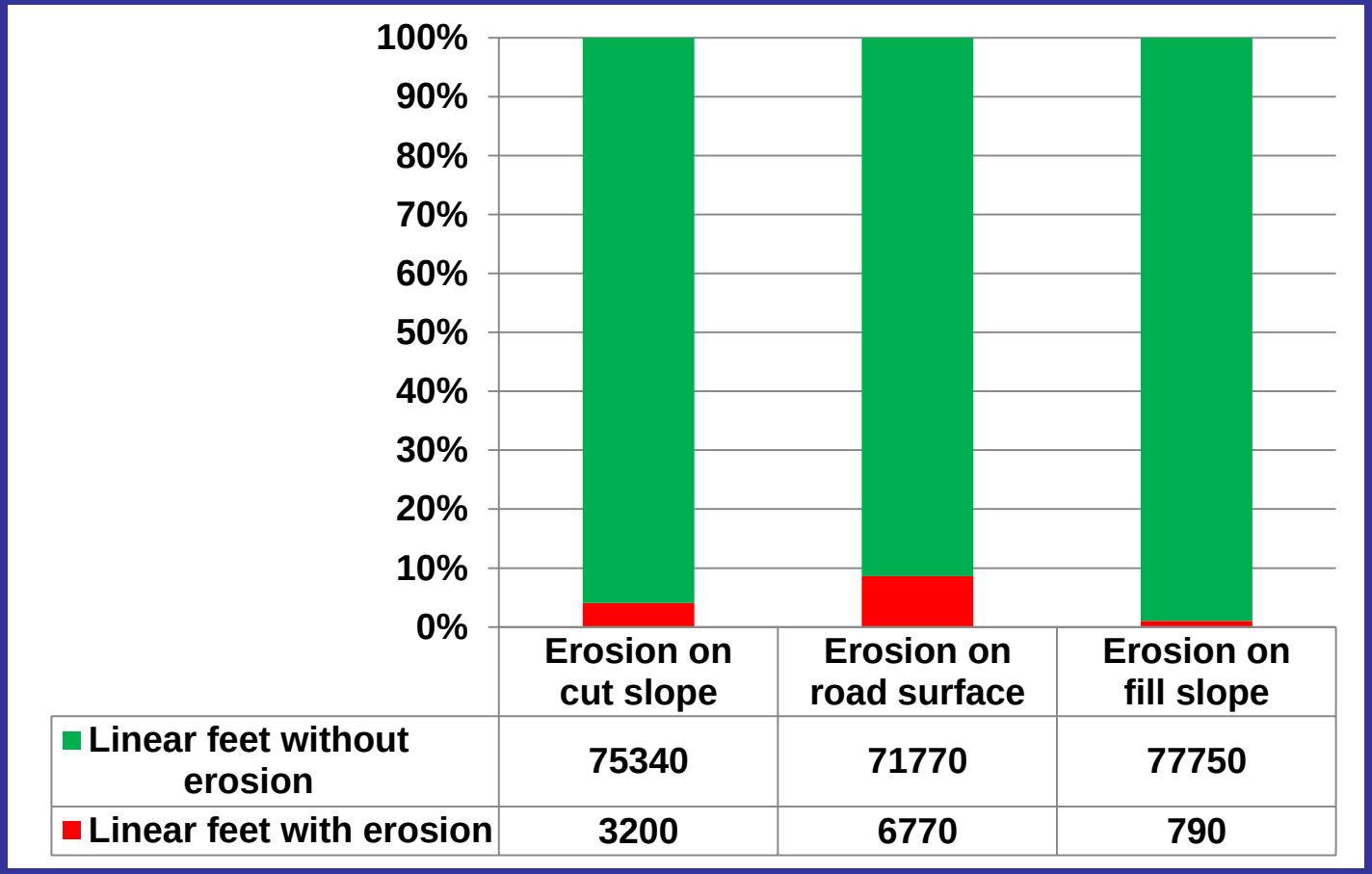
FORPRIEM Monitoring Mill Creek NTMP-NTO (1-97NTMP-018 MEN) with North Coast Water Board Staff August 16, 2011.

Tension Cracks on road fill surface.



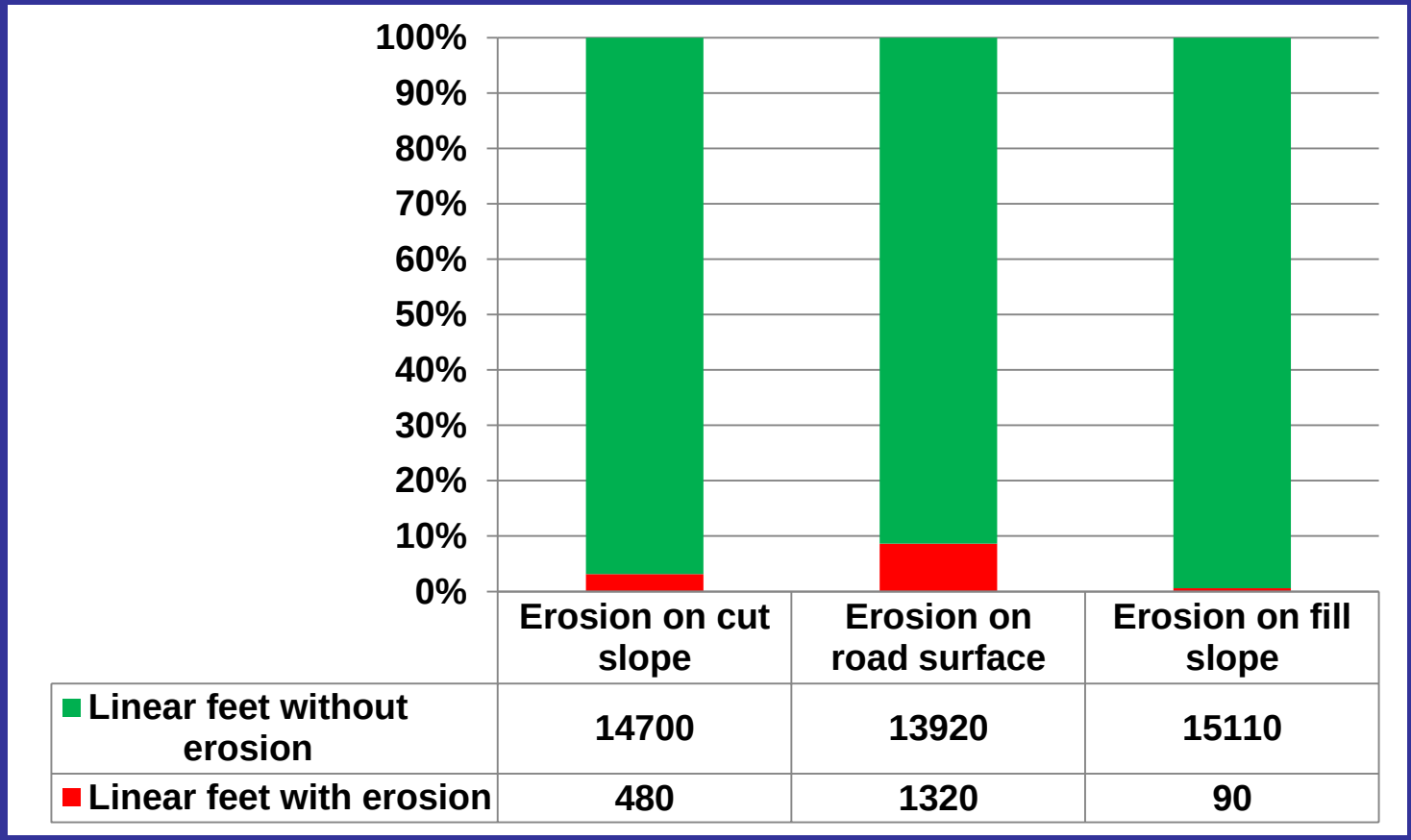
60-feet of road fillslope erosion.

FORPRIEM THP Road Effectiveness: Erosion Data



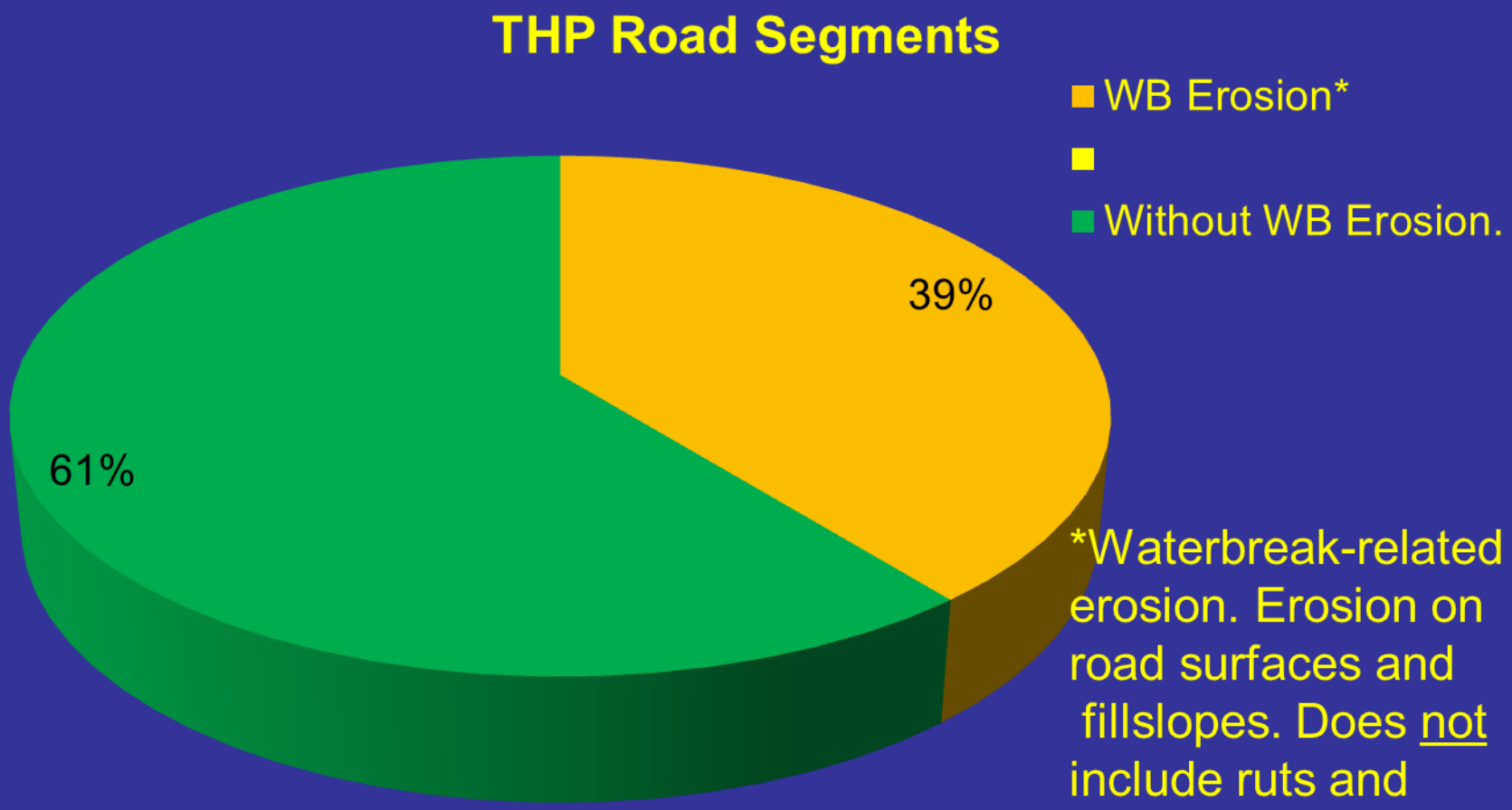
	Erosion on cut slope	Erosion on road surface	Erosion on fill slope
Linear feet without erosion	75340	71770	77750
Linear feet with erosion	3200	6770	790

FORPRIEM NTMP-NTO Road Effectiveness: Erosion Data



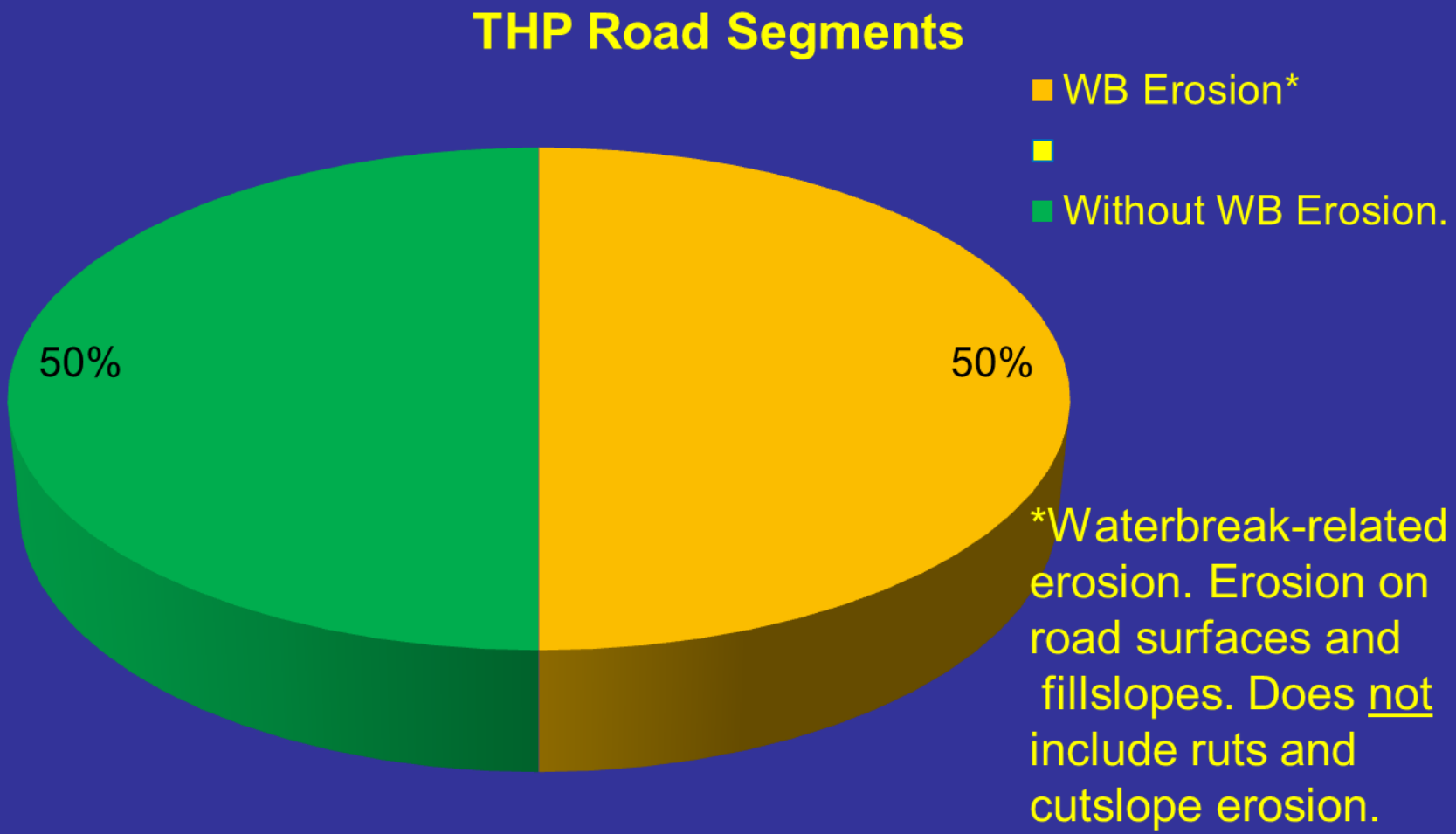
	Erosion on cut slope	Erosion on road surface	Erosion on fill slope
Linear feet without erosion	14700	13920	15110
Linear feet with erosion	480	1320	90

THP Road Erosion



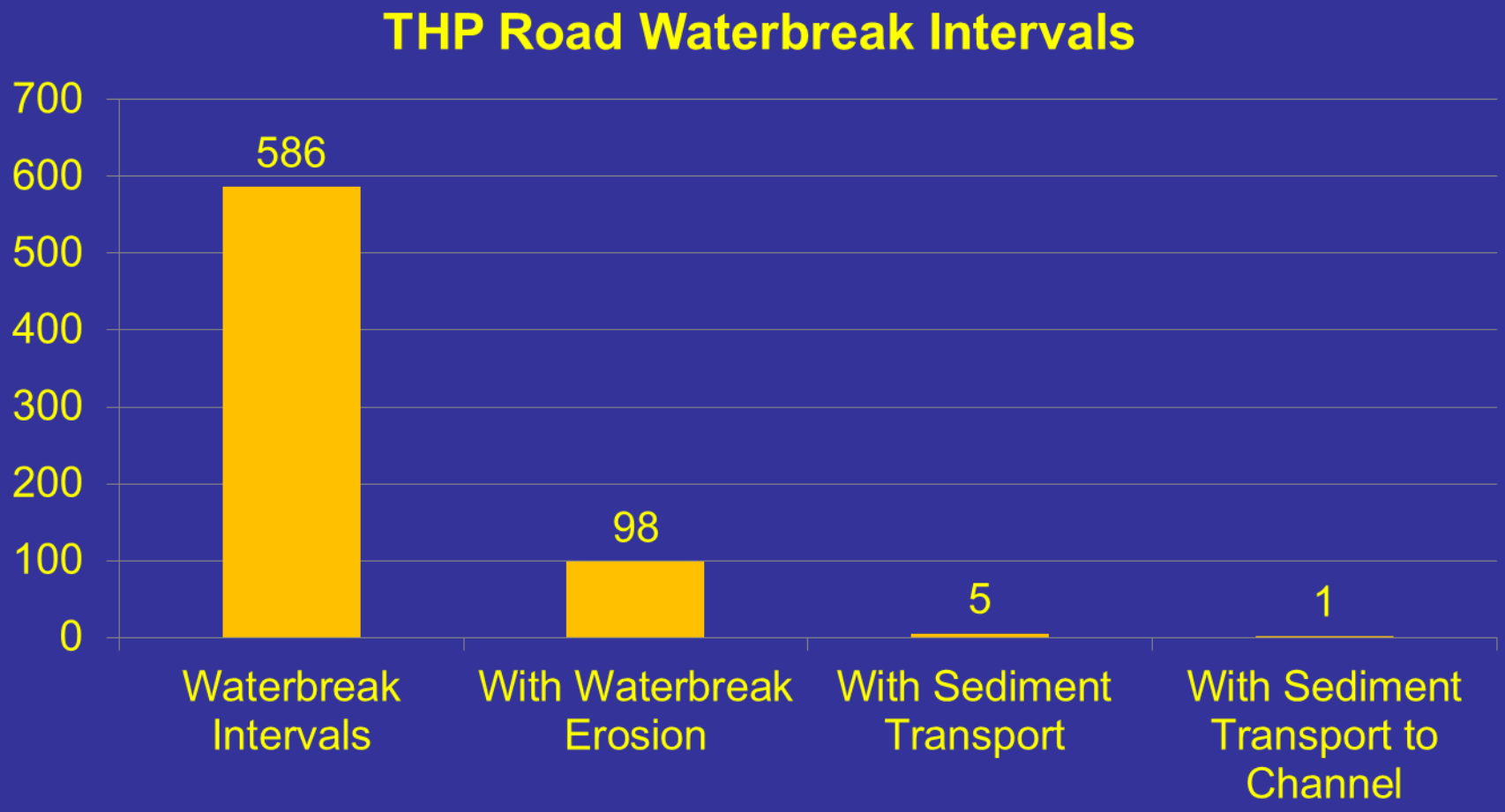
*Waterbreak-related erosion. Erosion on road surfaces and fillslopes. Does not include ruts and cutslope erosion.

NTMP - NTO Road Erosion

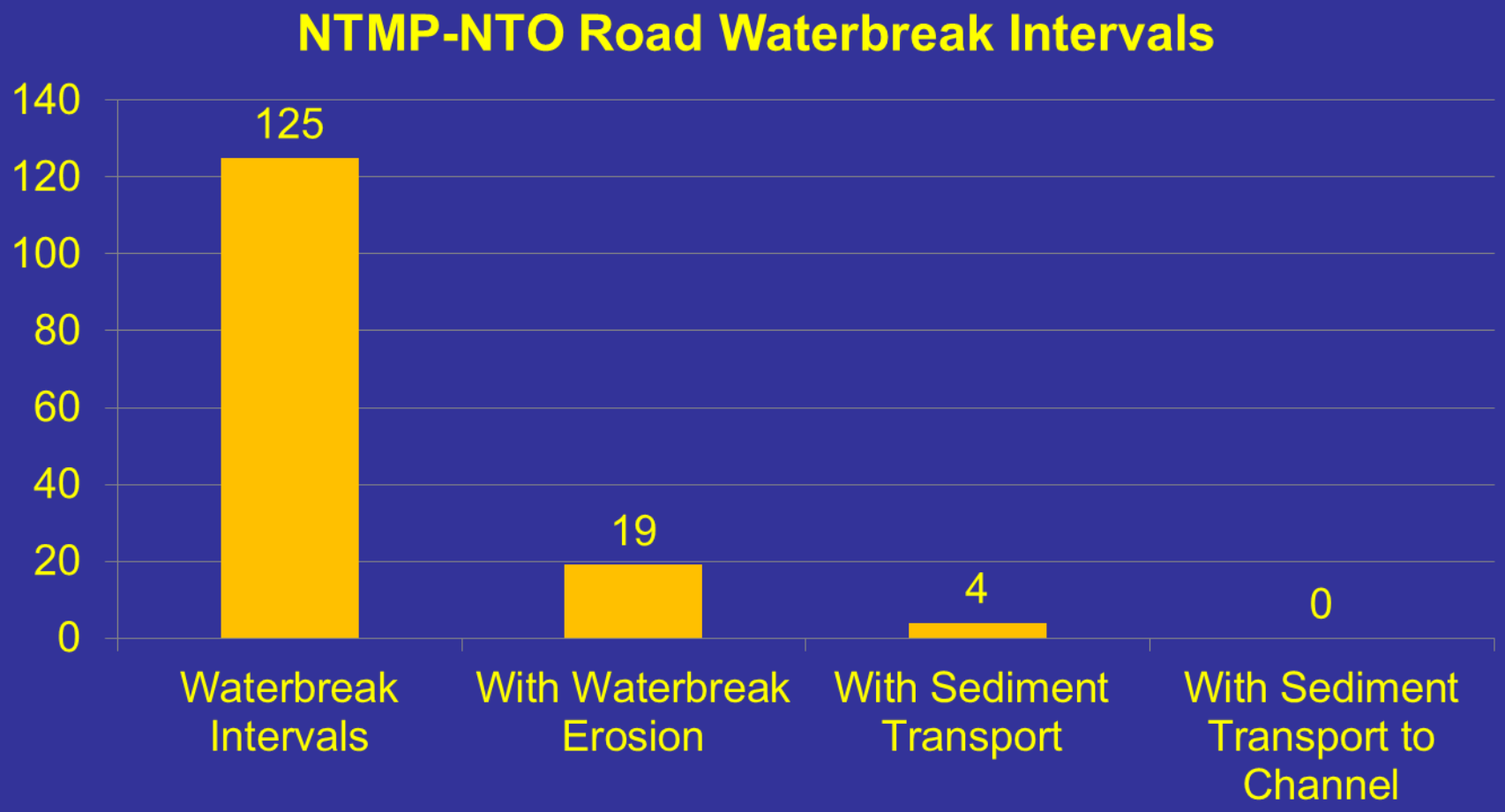


*Waterbreak-related erosion. Erosion on road surfaces and fillslopes. Does not include ruts and cutslope erosion.

THP Waterbreak Intervals Monitored for Effectiveness



NTMP - NTO Waterbreak Intervals Monitored for Effectiveness

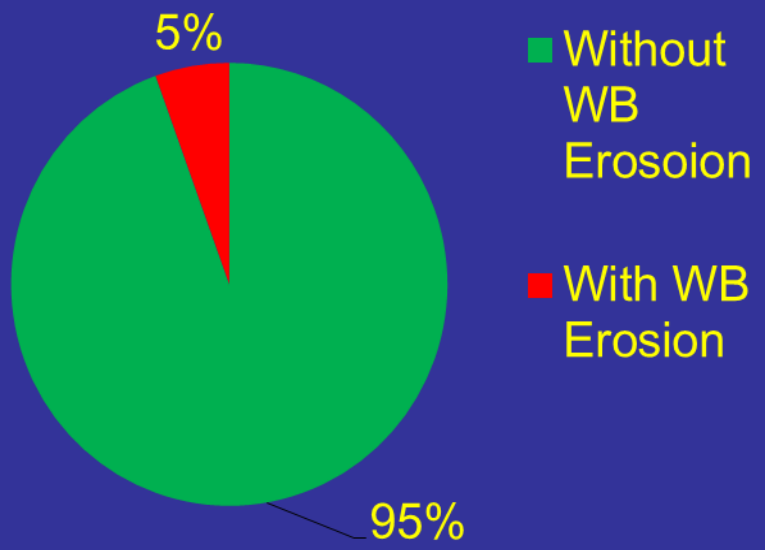


THP Waterbreak Spacing

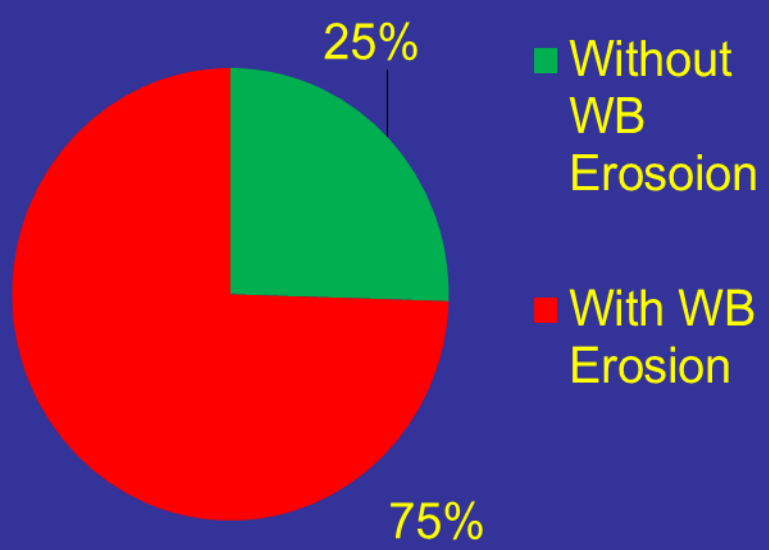
14CCR section 914.6, 934.6, 954.6 (c)

& Erosion

Waterbreak Intervals with Correct Spacing



Waterbreak Intervals with Incorrect Spacing

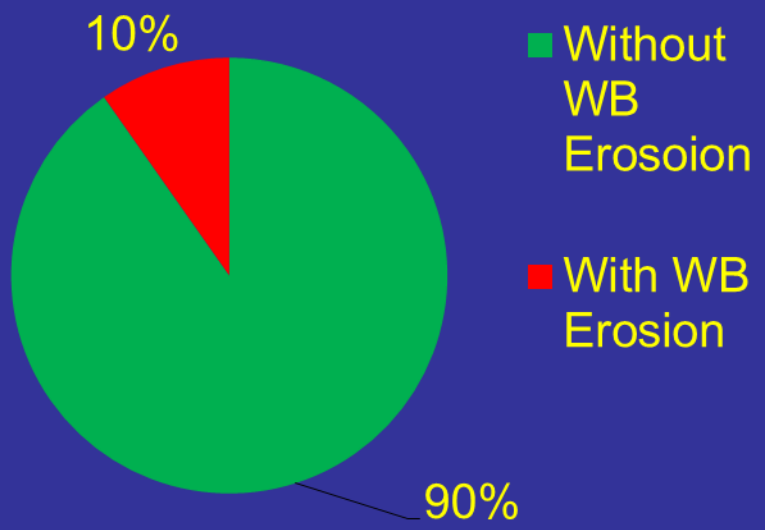


NYMP -NTO Waterbreak Spacing

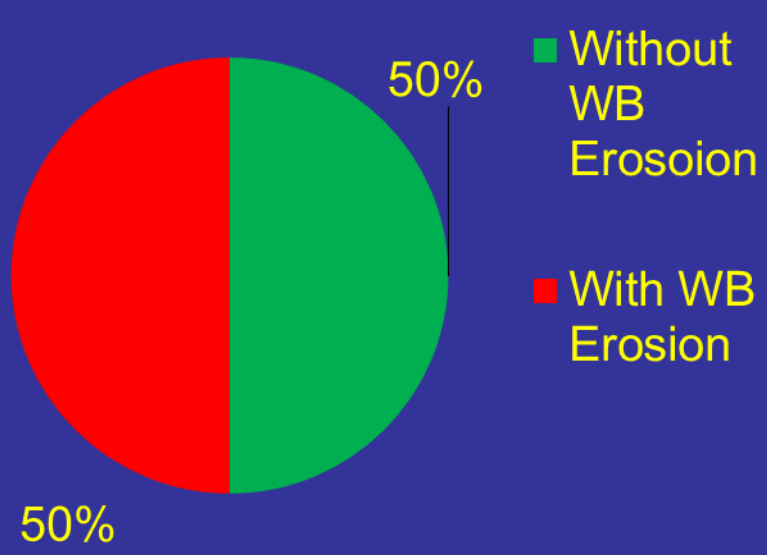
14CCR section 914.6, 934.6, 954.6 (c)

& Erosion

Waterbreak Intervals with Correct Spacing



Waterbreak Intervals with Incorrect Spacing



THP
Road Sediment Transport

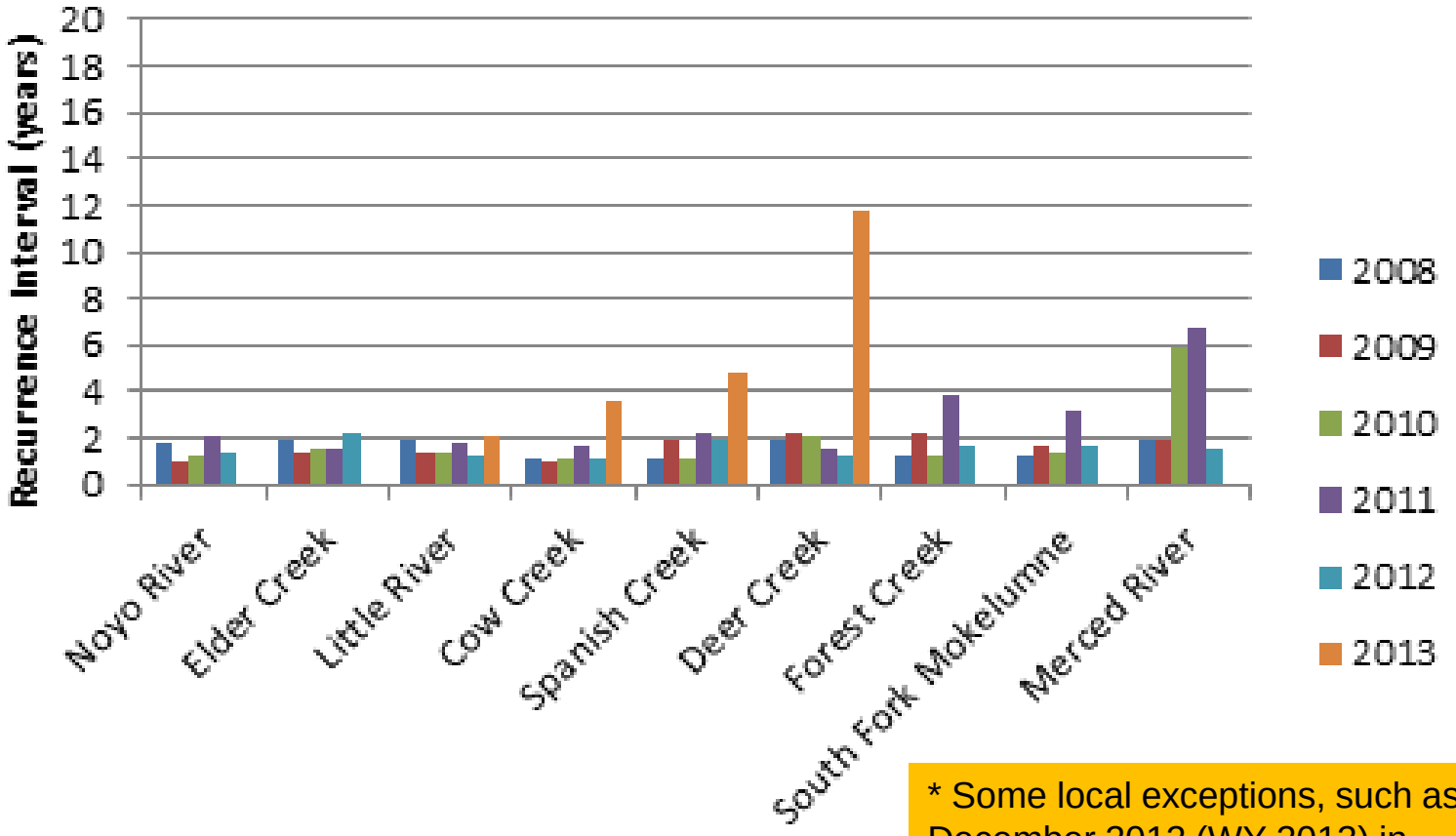
THP	Waterbreak Spacing	Waterbreak Construction	Discharge into Cover	Evidence of Discharge to Channel	Notes
THP 1-02-236 HUM	Major Departure	N/A	N/A	None Reported. Upper-slope road.	Mass wasting. Slide occurred just below the road: 300' long x 120' wide x 20' deep.
THP 1-05-134 MEN	Acceptable	Exceeds	Acceptable	No	Waterbreak outlet at natural grade but dozer carried soil beyond road surface.
THP 1-07-131 HUM	Acceptable	Acceptable	Acceptable	No	Rills on road. Sediment plume beyond end of WB. Does not reach watercourse.
THP 1-08-014 HUM	Acceptable	Marginally Acceptable	Marginally Acceptable	Yes	Ruts on road surface in thru-cut. Road surface sediment transported to Class II watercourse.
THP 4-04-033 ELD	Major Departure	Acceptable	Marginally Acceptable	No	Gully erosion on road surface.

NTMP - NTO
Road Sediment Transport

NTMP - NTOs	Waterbreak Spacing	Waterbreak Construction	Discharge into Cover	Evidence of Discharge to Channel	Notes
2-00NTMP-007-5	Acceptable	Acceptable	Acceptable	No	Rilling on road surface.
1-07NTMP-015-1	Departure	Exceeds	Departure	No	Gully on fillslope.
1-06NTMP-026-3	Acceptable	Acceptable	Acceptable	No	Minor surface erosion into grass cover.
1-97NTMP-001-14	N/A	N/A	N/A	Yes	Sinkhole over failed culvert.

Caveat:

The FORPRIEM monitoring period (2008-13) produced few intense storms with high flows*.



* Some local exceptions, such as December 2012 (WY 2013) in northeast California.

Slide on a Santa Cruz County Road.

Note: Public Roads were not in the sample population. All logging roads sampled were from Plans completed from 2008 thru 2013.

FORPRIEM sample includes a wide variety of logging roads.

QA/QC

- Field training initial/continuing by Unit.
- Regular communication with Inspectors.

QA/QC

Five THP – FORPRIEM Reports were randomly selected last year and re-monitored. All five had monitored Road segments. Re-monitoring produced consistent results. Some variation occurred where subjectivity was required.

QA/QC

FOR FUTURE MONITORING: Recommend posting **short training videos on the web** that Inspectors can review before right before doing the monitoring. These sort videos may also be of interest to sister agencies, industry and the public.

Summary

- **Generally, the Forest Practice Rules (FPRs), where properly implemented, appear to be working to limit Road-related erosion and prevent sediment transport.**

- **Compliance with the Waterbreak Construction Rule (**914.6 (g)**) is very good:** **THPs 97% and NTMP - NT0s 99%.**

- **Compliance with the Discharge into Cover Rule (**914.6 (f)**) is very good:** **THPs 97% and NTMP - NT0s 98%.**

- **Compliance with the Waterbreak Spacing Rule (**914.6 (c)**) is good:** **THPs 91% and NTMP - NT0s 90%.**

Summary (continued)

- **Waterbreaks with correct spacing (**914.6(c)**) have a much lower incidence of WB-related erosion than waterbreaks with incorrect spacing.**
  - **For THPs: 5% vs. 75%**
  - **For NTMP – NTOs: 10% vs. 50%**
- **Incidences of forensically observed sediment transport were very low during this monitoring period (2008-2013).**

Summary (continued)

- **Roads in this sample were all involved in Timber Harvesting during the proceeding one to five years.**
- **The FORPRIEM monitoring period (2008-2013) produced few intense storms with high flows*.**

FORPRIEM Report Schedule

- Finish a first draft of a FORPRIEM report by the end of July 2014.
- Complete the final draft by the end of August 2014.

Questions?