

Appendix S

Targets for LWD and Effective Shade



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S. TARGETS FOR LWD AND EFFECTIVE SHADE

S.1 Introduction

This appendix describes how MRC set our long-term targets for large woody debris (LWD) and instream canopy. Appendix G, *Watershed Analysis: Background and Methods*,* explains how we derived our current targets and collected data relevant to those targets.

Table S-1 summarizes, for each watershed analysis, the level of effort expended during field surveys. To obtain the percentage of effort, we divided the sum of the surveyed miles of Class I habitat by the total miles of Class I habitat that MRC owns within a watershed analysis unit. The surveys included LWD (13.4.1.3), instream shade (13.4.1.4) and the initial surveys of fish habitat. MRC occasionally surveys Class II and Class III streams in watershed analysis, but the majority of surveying is within Class I streams. As of 2010, MRC staff have walked approximately 50 miles of Class I watercourse habitat, making observations for riparian stand recruitment potential, LWD quality, instream shade, and fish habitat typing.

Table S-1 Field Observation Effort

WAU	Field Survey Effort of Class I Stream as of 2010		
	Total Class I Miles in Plan Area	Class I Miles Observed	% of Class I Habitat Surveyed
Garcia River	23.1	5.7	24.6%
Albion River	34.9	2.6	7.5%
South Coast Streams	19.0	3.5	18.5%
Cottaneva Creek	12.9	3.7	29.1%
Elk Creek	20.5	7.0	34.3%
Noyo River	37.6	3.4	9.2%
Rockport Coastal Streams	17.5	5.3	30.5%
Big River	60.6	4.2	7.0%
Hollow Tree Creek	45.7	3.5	7.6%
Navarro River	133.2	8.6	6.4%
Greenwood Creek	20.5	1.8	8.6%
Northern Russian River	8.1	0.6	7.8%
TOTAL	433.5	50.1	11.5%

In 2010, however, MRC is still analyzing field data collected from the Watershed Analysis Units for South Coast streams and Rockport coastal streams. As a result, this appendix actually describes conditions from 2005; the data included here will be the basis for future targets for each planning watershed.

Figures S-1 and S-2 show how conditions for LWD demand and effective shade vary across the plan area.

* See specifically section G.2.4 on riparian function.

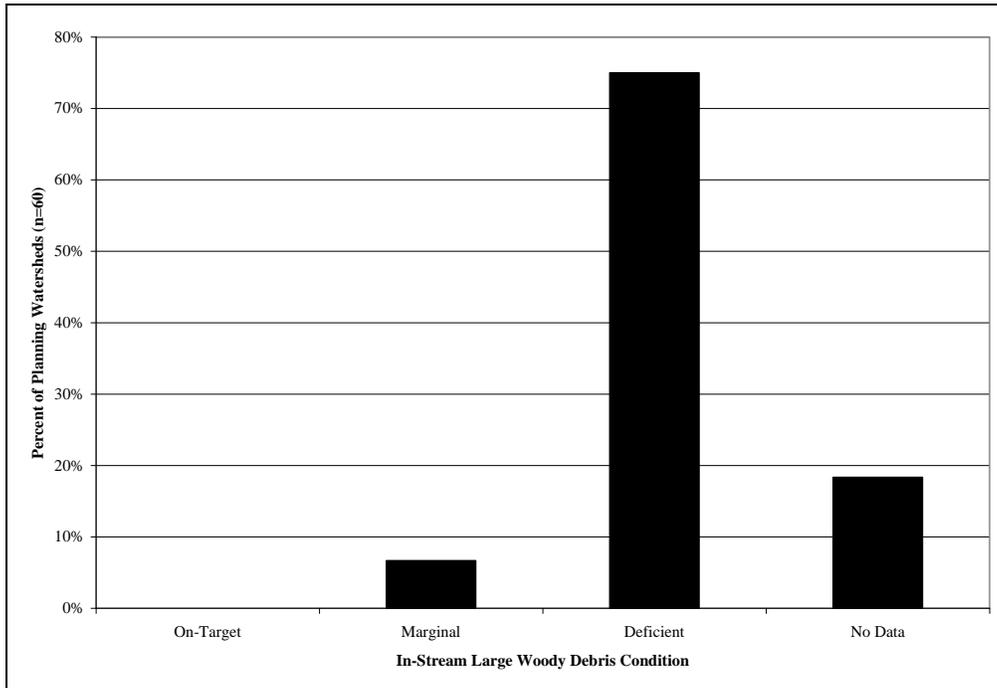


Figure S-1 LWD Conditions within the Plan Area by Planning Watershed as of 2005

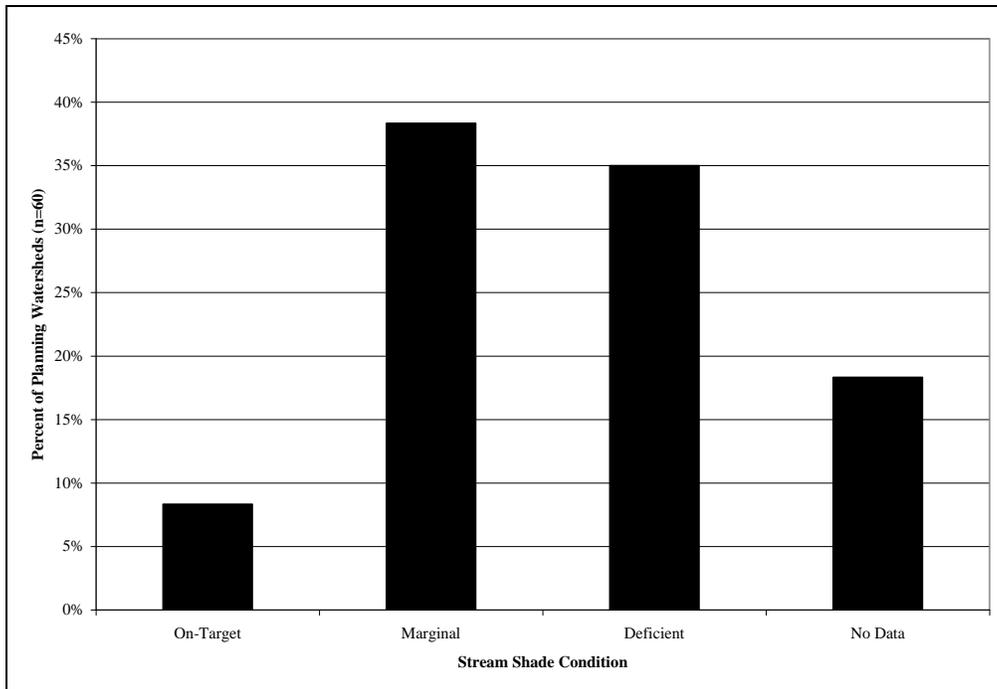


Figure S-2 Effective Stream Shade within the Plan Area by Planning Watershed as of 2005

S.2 LWD in the Plan Area

Our overall goal for instream LWD is to achieve on-target LWD quality ratings (Table S-2) in the planning watersheds. For each planning watershed, this means over 80% of the stream segments[†] will have low or moderate LWD demand. Similar criteria exist for marginal and deficient ratings for LWD demand, all of which depend in part upon the number of key LWD pieces in the stream.

Table S-2 LWD Quality Ratings by Planning Watershed

ON TARGET	Over 80% of surveyed segments by length have low or moderate LWD demand.
MARGINAL	50-80% of surveyed segments by length have low or moderate LWD demand OR over 80% of stream segments have at least half of their target number of key LWD pieces.
DEFICIENT	Less than 50% of surveyed segments by length have low or moderate LWD demand and low numbers of functional or key LWD.

S.2.1 Future targets for LWD

MRC developed future LWD targets to satisfy requirements for our HCP/NCCP. The process for setting these targets is as follows:

- Determine the number of key pieces of LWD per surveyed stream segment (Tables S-3 and S-4).

NOTE
In general, average diameter, length, and volume of pieces of wood increases as stream size increases, whereas the frequency of occurrence of woody debris decreases (Bilby and Ward 1989).
- Divide the total length of segments meeting the key piece target by the total length of segments surveyed in a planning watershed.
- Divide the total length of segments meeting 50% of the key piece target by the total length of segments surveyed in a planning watershed.
- Divide the total length of segments with moderate or high recruitment potential (Table S-5) by the total length of segments surveyed in a planning watershed.

NOTE
The recruitment potential of a stream describes the riparian stand conditions and the potential of that stand to deliver LWD. Recruitment potential increases, in general, with density, size, and proportion of conifer species.
- Determine the LWD demand for the segment (Table S-6).

NOTE
LWD demand is a function of recruitment potential and channel sensitivity rating (see Appendix G, *Watershed Analysis: Backgrounds and Methods*, section G.2.5).
- Set the 40-year target for LWD key pieces by increasing the current percentage of segments, by length, with low or moderate demand for LWD (Table S-7).

[†] MRC uses the term *segment* in 3 aquatic monitoring programs: watershed analysis, long-term channel monitoring, and focus watershed studies. A segment is typically 20-30 bankfull widths in length (roughly 300–1500 ft for most streams in the plan area). Each planning watershed will have anywhere from 3 to 30 field-observed segments, depending upon how much of the planning watershed MRC owns. The average planning watershed where MRC owns a majority of the watershed contains roughly 10–20 segments for watershed analysis and 1 long-term channel monitoring segment.

NOTE

Table S-7 is a matrix used to project LWD conditions for each planning watershed within the plan area. The values in the matrix are based on 2 assumptions:

1. Planning watersheds currently with low amounts of LWD and good recruitment potential will have the greatest potential for an increase in their number of segments on target.
2. Planning watersheds currently with high amounts of LWD and poor recruitment potential will have the lowest potential for future increases in in-stream LWD densities.

The values highlighted in red font in Table S-7 illustrate that a 20% increase of segments with low or moderate demand occur in a planning watershed with a moderately low number of key pieces (i.e., 25%-50%) in the segments meeting at least 50% of their key piece target and having very poor riparian stand conditions (i.e., < 25% of the segments have moderate or high recruitment potential).

7. Examine each planning watershed to determine if it meets its on-target requirements for LWD demand (Table S-2).

NOTE

MRC assumes that, in the future, the planning watersheds that currently meet at least 50% of the key piece requirement will see a greater increase in the percentage of their segments that are on-target than those that currently exceed 50% of the key piece requirement. Stream channel sensitivity to LWD should remain constant over the term of the HCP/NCCP. Figure S-3 depicts estimated LWD conditions at Year 40 of the plan.

8. Set the 80-year target for the percentage of segments meeting the LWD key pieces requirements at an optimal value of 90% due to our ability to introduce LWD into the streams where necessary.

Example for Calculating On-Target LWD

East Branch North Fork Big River

LWD demand for each surveyed segment is based on 3 components: (1) the amount of key pieces; (2) the recruitment potential (riparian stand conditions); and (3) stream channel sensitivity. As of 2005, only 1 segment (BE8 Bull Team Gulch) out of 4 surveyed meets the LWD target in the East Branch North Fork Big River planning watershed (Table S-8 and Figure S-3). We determined that this segment has low recruitment potential (poor riparian stand conditions) and a moderate sensitivity to LWD, based on a geomorphologic assessment. Since the segment meets the key piece requirements, it has an LWD demand of moderate (Table S-6). This single segment was 218 ft long. In its planning watershed, we surveyed a total of 1927 ft. Therefore, roughly 11% (218/1927) of the total length of segments surveyed in this planning watershed is currently on-target for LWD. As of 2005, 76% of the segments surveyed, by length, have moderate or high recruitment potential in the East Branch North Fork Big River planning watershed and 11% or 1 of the segments surveyed meets at least half of the key piece requirements for LWD (the same segment that met the full target). Based on this information and the assumptions for setting the values in Table S-7, we estimate that, in this planning watershed, the number of segments, by length, having low or moderate demand for LWD at Year 40 will increase by 40%—from 11% to 51%. This value is still too low for this planning watershed to be rated *on-target* for LWD quality at Year 40 of the HCP/NCCP. Therefore, it will be rated as *marginal* at Year 40 (Table S-2). At Year 80, however, we anticipate, due to our ability to artificially introduce LWD into the streams, that this planning watershed will be *on-target* for LWD quality.

Table S-3 Criteria for LWD Key Piece

Bankfull Width (ft)	Diameter (in.)	Length (ft)		Volume Alternative* (yds ³)
0-10	13	1.5 times the channel width		1
10-20	16	1.5 times the channel width		3
20-30	18	1.5 times the channel width	OR	5
30-40	21	1.5 times the channel width		8
40-60	26	1.5 times the channel width		15
60-80	31	1.5 times the channel width		25
80-100	36	1.5 times the channel width		34

TABLE NOTE

The length requirement is 1.0 times the channel width if the piece has a rootwad.

Table S-4 LWD Key Piece Targets per Stream Segment

Bankfull width (ft)	Target (Minimum) Number of Key Pieces per 100 Meters
<15	6.6
15-35	4.9
35-45	3.9
>45	3.3

Table S-5 Recruitment Potential

Vegetation Type	Size and Density Classes					
	Size Classes 1-2		Size Class 3		Size classes 4-5	
	(Young)		(Mature)		(Old)	
	Sparse	Dense	Sparse	Dense	Sparse	Dense
	(O,L)	(M, D, E)	(O,L)	(M, D, E)	(O,L)	(M, D, E)
RW	Low	Low	Moderate	High	High	High
RD	Low	Low	Moderate	High	High	High
CH	Low	Low	Low	Moderate	High	High
MH	Low	Low	Low	Moderate	Moderate	Moderate

Table S-6 Instream LWD Demand

Recruitment Potential Rating	Key LWD	Channel LWD Sensitivity Rating		
		Low	Moderate	High
LOW	On Target	Low	Moderate	High
	Off Target	High	High	High
MODERATE	On Target	Low	Moderate	Moderate
	Off Target	High	High	High
HIGH	On Target	Low	Moderate	Moderate
	Off Target	Moderate	High	High

Table S-7 LWD Key Piece Target Increases in Planning Watersheds by Year 40 of the HCP/NCCP

Increase in % of Segments with Low or Moderate Demand for LWD		% of Segments Meeting at least 50% of the Key Piece Target (as of 2005)			
		<25%	25-50%	50-75%	>75%
% of Segments with Moderate or High Recruitment Potential (as of 2005)	<25%	25%	20%	15%	10%
	25-50%	30%	25%	20%	15%
	50-75%	35%	30%	35%	20%
	>75%	40%	35%	30%	25%

TABLE NOTE

The bold red font illustrates the “Note” under section S.2.1, #7.

Table S-8 Instream LWD Demand

Recruitment Potential Rating	Key LWD	Channel LWD Sensitivity Rating		
		Low	Moderate	High
LOW	On Target	Low	Moderate	High
	Off Target	High	High	High
MODERATE	On Target	Low	Moderate	Moderate
	Off Target	High	High	High
HIGH	On Target	Low	Moderate	Moderate
	Off Target	Moderate	High	High

Table S-9 LWD data for East Branch North Fork Big River Planning Watershed (2000)

Planning Watershed	Stream Segment Name	Stream Segment ID#	Segment Length (ft)	Bankfull Width (ft)	Key LWD Pieces per 100m	LWD Key Target
EBNF Big River	Frykman Gulch	BE14	234	8.2	2.8	6.6
EBNF Big River	East Branch NF Big River	BE1	929	31.0	0.0	4.9
EBNF Big River	East Branch NF Big River	BE2	546	20.3	2.4	4.9
EBNF Big River	Bull Team Gulch	BE8	218	6.7	9.0	6.6

S.2.2 Future conditions for LWD

MRC estimates that at Year 40 of the HCP/NCCP approximately 5% of the plan area will be rated on-target for LWD, 12% will be marginal, and about 65% will be deficient (see Figure S-3). This is partly due to the fact that LWD demand is based not only on instream amounts of LWD, but also on riparian stand conditions. Artificial installations of LWD can improve instream conditions. We cannot, however, manipulate riparian tree growth; this is a long-term process that will improve overall LWD demand on our land. We estimate LWD quality ratings will be *on-target* for at least 90% of the plan area by Year 80 of the HCP/NCCP due to riparian conservation measures and instream LWD enhancements. Table S-10 and S-11 show current and future LWD targets within the plan area by planning watershed.

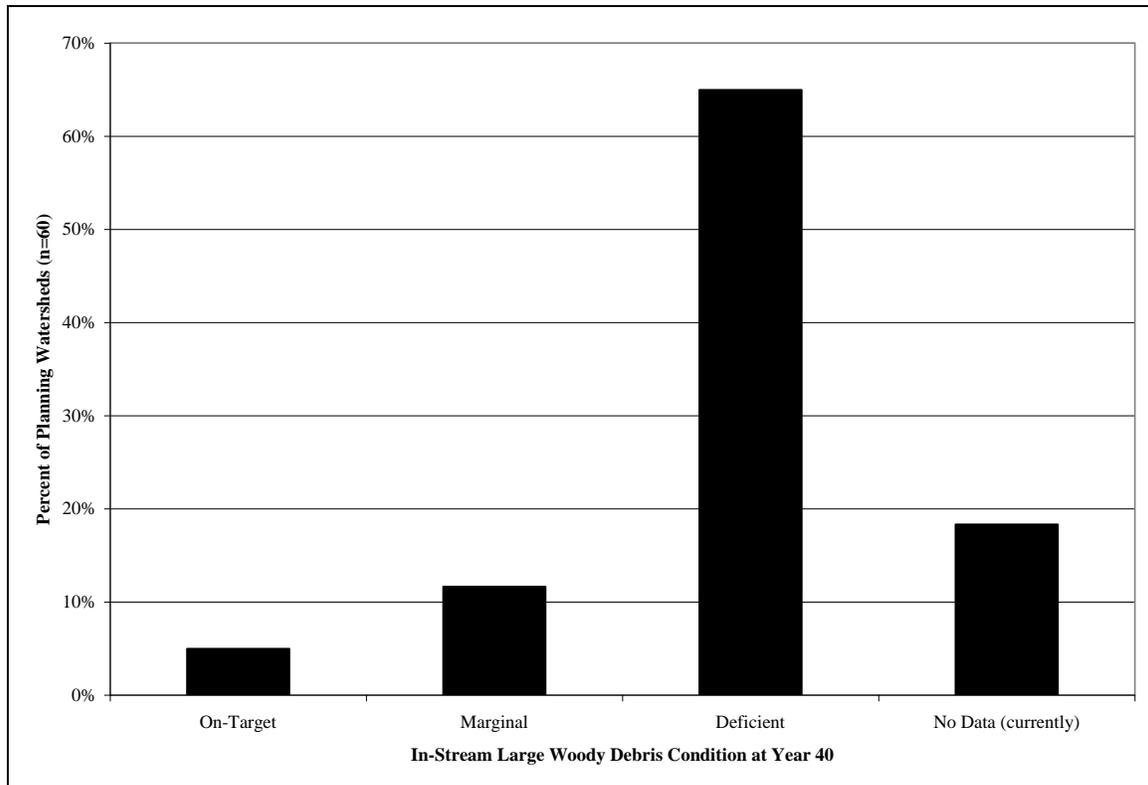


Figure S-3 LWD Conditions at Year 40 of the HCP/NCCP

Table S-10 Current LWD Targets within the Plan Area by Planning Watershed

Current LWD Targets within the Plan Area by Planning Watershed					
Planning Watershed	% of Stream Segments				2005 Rating
	Moderate or High Recruitment Potential	Low or Moderate Demand	Meets Key Piece Targets	Meets \geq 50% of Key Piece Targets	
Lower Albion River	32%	0%	9%	51%	deficient
Middle Albion River	87%	0%	0%	16%	deficient
South Fork Albion River	15%	0%	12%	48%	deficient
Upper Albion River	100%	0%	0%	0%	deficient
Lower Alder Creek	To be completed 2012				
North Fork Alder Creek	To be completed 2012				
East Branch North Fork Big River	0%	11%	11%	11%	deficient
Lower North Fork Big River	0%	23%	23%	23%	deficient
Mettick Creek	0%	6%	6%	19%	deficient
Rice Creek	0%	0%	0%	0%	deficient
Russell Brook	0%	7%	7%	21%	deficient
South Daugherty Creek	0%	9%	34%	61%	deficient
Two Log Creek	45%	4%	4%	4%	deficient
Lower Brush Creek	To be completed 2012				
Cottaneva Creek	39%	32%	32%	46%	deficient
Lower Elk Creek	69%	2%	2%	12%	deficient
Upper Elk Creek	62%	10%	10%	30%	deficient
East of Eureka Hill		28%	72%	72%	deficient
Rolling Brook		0%	0%	0%	deficient
South Fork Garcia River		19%	15%	20%	deficient
Lower Greenwood Creek	8%	14%	14%	14%	deficient
Upper Greenwood Creek	0%	19%	10%	28%	deficient
Lower Hollow Tree Creek	0%	0%	0%	0%	deficient
Middle Hollow Tree Creek	0%	0%	0%	0%	deficient
Upper Hollow Tree Creek	0%	0%	23%	45%	deficient
Mallo Pass Creek	To be completed 2012				
Dutch Henry Creek	0%	0%	0%	35%	deficient
Flynn Creek	0%	0%	0%	28%	deficient
Hendy Woods	0%	0%	0%	0%	deficient
John Smith Creek	0%	0%	46%	46%	deficient
Little N. Fork Navarro River	0%	0%	20%	74%	deficient
Lower S. Branch Navarro River	18%	0%	0%	28%	deficient
Middle Navarro River	0%	0%	0%	0%	deficient

Current LWD Targets within the Plan Area by Planning Watershed					
Planning Watershed	% of Stream Segments				2005 Rating
	Moderate or High Recruitment Potential	Low or Moderate Demand	Meets Key Piece Targets	Meets ≥ 50% of Key Piece Targets	
Middle S. Branch Navarro River	87%	0%	0%	5%	deficient
Mouth of Navarro River	0%	18%	18%	34%	deficient
North Fork Indian Creek	0%	0%	100%	100%	marginal
North Fork Navarro River	0%	0%	0%	100%	marginal
Ray Gulch ^C	19%	19%	52%	71%	deficient
Upper Navarro River	0%	30%	20%	30%	deficient
Upper S. Branch Navarro River	0%	0%	0%	20%	deficient
Upper Ackerman Creek	0%	0%	0%	0%	deficient
Hayworth Creek	51%	51%	51%	51%	marginal
McMullen Creek	0%	0%	0%	0%	deficient
Middle Fork N. Fork Noyo River	35%	9%	9%	22%	deficient
North Fork Noyo River	91%	0%	0%	16%	deficient
Olds Creek	66%	0%	0%	23%	deficient
Redwood Creek	60%	0%	0%	0%	deficient
Point Arena Creek	To be completed 2012				
Hardy Creek	To be completed 2012				
Howard Creek	To be completed 2012				
Juan Creek	To be completed 2012				

Table S-11 Future LWD Targets within the Plan Area by Planning Watershed

Future LWD Targets within the Plan Area by Planning Watershed								
Planning Watershed	Year 40				Year 80			
	Moderate or High Recruitment Potential	Meets Key piece Requirement for LWD	Meets ≥ 50% Key Piece Requirement for LWD	% Low or Moderate Demand for LWD	Moderate or High Recruitment Potential	Meets Key Piece Requirement for LWD	Meets ≥ 50% Key Piece Requirement for LWD by Year 80	% Low or Moderate Demand for LWD
Lower Albion River	61%	20%	50%	71%	90%	90%	90%	90%
Middle Albion River	89%	40%	45%	53%	90%	90%	90%	90%
South Fork Albion River	53%	20%	51%	69%	90%	90%	90%	90%
Upper Albion River	95%	40%	45%	45%	90%	90%	90%	90%
Lower Alder Creek		To be completed 2012			90%	90%	90%	90%
North Fork Alder Creek		To be completed 2012			90%	90%	90%	90%
East Branch North Fork Big River	45%	36%	51%	51%	90%	90%	90%	90%
Lower North Fork Big River	45%	48%	57%	57%	90%	90%	90%	90%
Mettick Creek	45%	31%	48%	55%	90%	90%	90%	90%
Rice Creek	45%	25%	45%	45%	90%	90%	90%	90%
Russell Brook	45%	32%	49%	56%	90%	90%	90%	90%
South Daugherty Creek	45%	24%	62%	76%	90%	90%	90%	90%
Two Log Creek	68%	34%	47%	47%	90%	90%	90%	90%
Lower Brush Creek		To be completed 2012			90%	90%	90%	90%
Cottaneva Creek	65%	57%	61%	68%	90%	90%	90%	90%
Lower Elk Creek	80%	37%	46%	51%	90%	90%	90%	90%
Upper Elk Creek	76%	40%	50%	60%	90%	90%	90%	90%
East of Eureka Hill	90%	90%	90%	90%	90%	90%	90%	90%
Rolling Brook	90%	25%	45%	45%	90%	90%	90%	90%
South Fork Garcia River	90%	44%	53%	55%	90%	90%	90%	90%

Future LWD Targets within the Plan Area by Planning Watershed

Planning Watershed	Year 40				Year 80			
	Moderate or High Recruitment Potential	Meets Key piece Requirement for LWD	Meets ≥ 50% Key Piece Requirement for LWD	% Low or Moderate Demand for LWD	Moderate or High Recruitment Potential	Meets Key Piece Requirement for LWD	Meets ≥ 50% Key Piece Requirement for LWD by Year 80	% Low or Moderate Demand for LWD
Lower Greenwood Creek	49%	39%	52%	52%	90%	90%	90%	90%
Upper Greenwood Creek	45%	39%	50%	59%	90%	90%	90%	90%
Lower Hollow Tree Creek	45%	25%	45%	45%	90%	90%	90%	90%
Middle Hollow Tree Creek	45%	25%	45%	45%	90%	90%	90%	90%
Upper Hollow Tree Creek	45%	25%	57%	68%	90%	90%	90%	90%
Mallo Pass Creek		To be completed 2012			90%	90%	90%	90%
Dutch Henry Creek	45%	25%	45%	63%	90%	90%	90%	90%
Flynn Creek	45%	25%	45%	59%	90%	90%	90%	90%
Hendy Woods	45%	25%	45%	45%	90%	90%	90%	90%
John Smith Creek	45%	25%	25%	25%	90%	90%	90%	90%
Little N. Fork Navarro River	45%	15%	55%	82%	90%	90%	90%	90%
Lower S. Branch Navarro River	54%	20%	45%	59%	90%	90%	90%	90%
Middle Navarro River	45%	25%	45%	45%	90%	90%	90%	90%
Middle S. Branch Navarro River	89%	40%	45%	48%	90%	90%	90%	90%
Mouth of Navarro River	45%	38%	54%	62%	90%	90%	90%	90%
North Fork Indian Creek	45%	100%	100%	100%	90%	90%	90%	90%
North Fork Navarro River	45%	10%	45%	95%	90%	90%	90%	90%
Ray Gulch	55%	34%	71%	81%	90%	90%	90%	90%
Upper Navarro River	45%	55%	55%	60%	90%	90%	90%	90%
Upper S. Branch Navarro River	45%	25%	45%	55%	90%	90%	90%	90%
Upper Ackerman Creek	45%	25%	45%	45%	90%	90%	90%	90%

Future LWD Targets within the Plan Area by Planning Watershed

Planning Watershed	Year 40				Year 80			
	Moderate or High Recruitment Potential	Meets Key piece Requirement for LWD	Meets ≥ 50% Key Piece Requirement for LWD	% Low or Moderate Demand for LWD	Moderate or High Recruitment Potential	Meets Key Piece Requirement for LWD	Meets ≥ 50% Key Piece Requirement for LWD by Year 80	% Low or Moderate Demand for LWD
Hayworth Creek	71%	76%	76%	76%	90%	90%	90%	90%
McMullen Creek	45%	25%	45%	45%	90%	90%	90%	90%
Middle Fork N. Fork Noyo River	63%	39%	50%	56%	90%	90%	90%	90%
North Fork Noyo River	91%	40%	45%	53%	90%	90%	90%	90%
Olds Creek	78%	35%	45%	57%	90%	90%	90%	90%
Redwood Creek	75%	35%	45%	45%	90%	90%	90%	90%
Point Arena Creek		To be completed 2012			90%	90%	90%	90%
Hardy Creek		To be completed 2012			90%	90%	90%	90%
Howard Creek		To be completed 2012			90%	90%	90%	90%
Juan Creek		To be completed 2012			90%	90%	90%	90%

S.3 Effective Shade

MRC assesses conditions for instream effective shade based on two factors: (1) stream temperature and (2) stream canopy cover. A stream is *on-target* for effective shade if stream temperatures at that location are below 15°C, even if canopy cover is deficient. We take measurements of instream canopy at discrete points rather than continuously throughout surveyed stream segments. Next we apply an average canopy value to that segment. Future targets for effective shade are based on the number of segments surveyed since we assume that canopy cover will likely increase evenly across our land. We do not make this assumption, however, in areas that receive restoration harvest treatments.

S.3.1 Future targets for effective shade

MRC develops future targets for effective shade according to the following guidelines:

1. Determine what the current temperature conditions are:
 - a. If the MWAT (averaged over 3 consecutive seasons) for the watercourse segment is below 15°C, current shade conditions provide *on-target* effective shade for all watercourse segments in that basin (see footnote #2).
 - b. If the MWAT for the watercourse segment is above 15°C, proceed to Step 2.
 - c. If there is no temperature data available for a watercourse segment, assume that the segment does not meet the temperature target and proceed to Step 2.
2. Determine if the watercourse segment, based on bankfull width, meets the average canopy requirement (Table S-12):

Table S-12 Canopy Requirements³

Rating	Bankfull Width (ft)	Percent Canopy Closure
On Target	< 30	> 90
On Target	30–100	> 70
On Target	100–150	> 40

3. Assess the effective shade of the entire planning watershed based on the number of segments (not weighted by stream length) that meet stream temperature or canopy cover requirements (Table S-13):

Table S-13 Effective Shade Ratings for Planning Watersheds

ON TARGET	Over 80% of surveyed watercourse segments have on-target effective shade.
MARGINAL	60-80% of surveyed watercourse segments have either (a) on-target effective shade or (b) over 70% canopy.
DEFICIENT	Less than 60% of surveyed watercourse segments have either (a) on-target effective shade or (b) less than 70% canopy.

³ Refer to Figures G-6, G-7, and G-8 in Appendix G, *Watershed Analysis: Background and Methods*, to learn how we derived this table.

4. Determine the canopy target at Year 40 of the HCP/NCCP:

$$CT = TS - 1 / TS$$

NOTE

For a planning watershed, the canopy target (CT) is equal to the total number of segments surveyed (TS) minus 1 divided by TS. MRC assumes that near-stream conservation measures should promote substantial growth of riparian stands over the long term, thus increasing instream canopy cover and possibly decreasing stream temperature values. We set the target at 50% in the event we only sample 1 segment. The maximum target is 90% due to sampling error. This is the target at Year 80 of the HCP/NCCP.

**Example for Calculating Effective Shade
East Branch North Fork Big River**

As of 2005, 2 out of 4 segments monitored in the East Branch of the North Fork of Big River planning watershed had maximum weekly average temperature (MWAT) values of less than 15 °C (Table S-15). One of the segments had high MWAT values. Canopy cover estimates from 2000, however, indicated that this segment (BE1) exceeded the target canopy cover value based on the bankfull width of that segment. Thus, as of 2005, 3 out of the 4 segments surveyed (75%) in the East Branch North Fork Big River planning watershed had either low enough MWAT values or high enough canopy cover values to exceed the desired target levels. MRC would rate this planning watershed as *marginal* for effective shade (Table S-11). MRC surveyed a total of 4 segments in the East Branch North Fork Big River planning watershed as part of the watershed analysis in 2000. We anticipate that, at Year 40 of the HCP/NCCP, 3 out of 4 of the segments surveyed will still be *on-target* for effective shade. As a result, we will still rate this planning watershed as *marginal*. At Year 80 of the HCP/NCCP, however, this value will increase to 90% (essentially all 4 segments), making this planning watershed *on-target* for effective shade.

Table S-14 Instream Canopy Cover and Stream Temperature Data (2000)

East Branch North Fork Big River Planning Watershed						
Planning watershed	Stream Segment Name	Stream Segment ID#	Most Recent 3-Year Average MWAT (°C)	Bankfull Width (feet)	Canopy Cover (%)	Table S-10: Canopy Cover Target (%)
EBNF Big River	Frykman Gulch	BE14	13.6	8.2	94	90
EBNF Big River	East Branch NF Big River	BE1	17.6	31.0	82	70
EBNF Big River	East Branch NF Big River	BE2	17.6	20.3	76	90
EBNF Big River	Bull Team Gulch	BE8	14.2	6.7	78	90

S.3.2 Future conditions for effective shade

MRC estimates that, at Year 40 of the HCP/NCCP, approximately 30% of the plan area will be *on-target* for effective shade (Figure S-4); at Year 80, 100% of the plan area will be *on-target* for effective shade due to riparian conservation measures. Table S-15 details future effective shade targets by individual planning watersheds in the plan area.

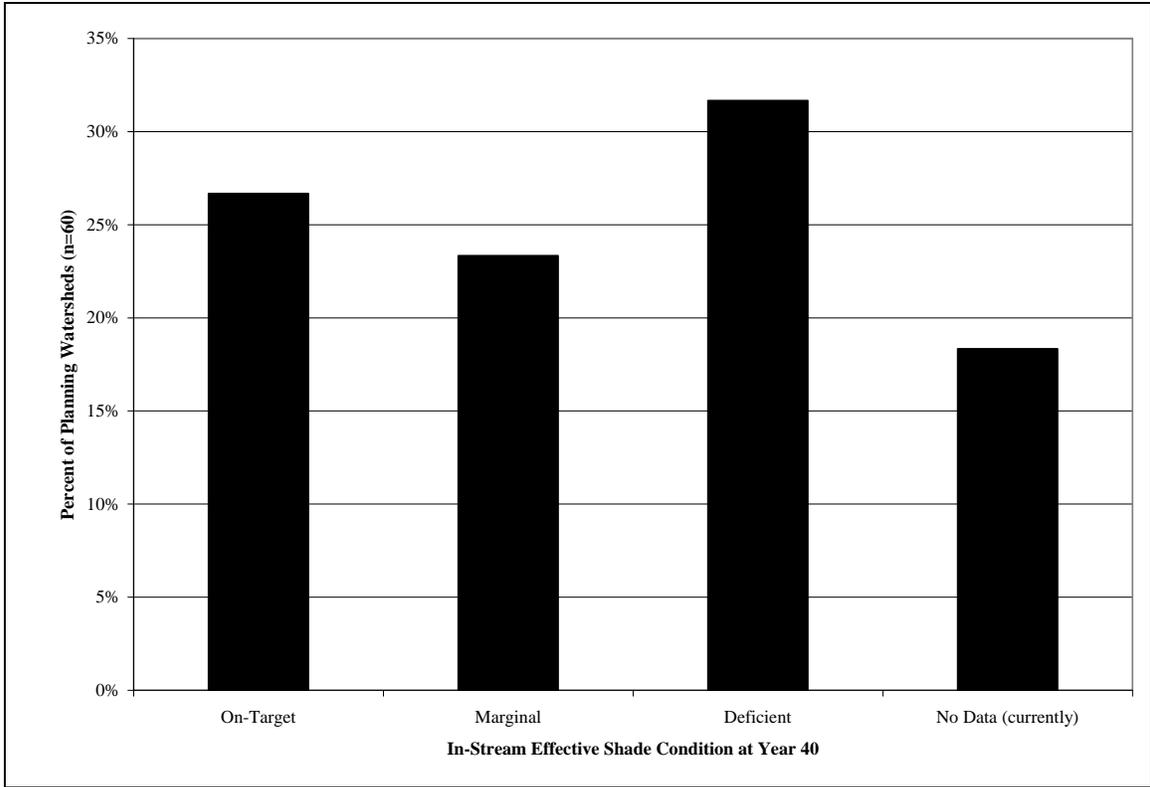


Figure S-4 Instream Effective Shade Conditions at Year 40 of the HCP/NCCP

Table S-15 Future Effective Shade Targets within the Plan Area by Planning Watershed

Future Effective Shade Targets within the Plan Area by Planning Watershed								
MRC Watershed Analysis Unit	Planning Watershed	Number of Segments		% Segments Currently On Target		Current Rating (as of 2005)	% Segments	
		Surveyed	MWAT < 15°C and/or Average Canopy > Target	MWAT < 15°C and/or Average Canopy > Target (col. 4/col. 3) ^a	>70% Average Canopy		On Target for Effective Shade by Year 40 col. 3-1)/col.3 ^b	On Target for Effective Shade by Year 80
Albion River	Lower Albion River	8	6	75%	100%	marginal	88%	90%
Albion River	Middle Albion River	4	2	50%	100%	marginal	75%	90%
Albion River	South Fork Albion River	6	3	50%	100%	marginal	83%	90%
Albion River	Upper Albion River	1	0	0%	100%	marginal	50%	90%
Alder Creek	Lower Alder Creek			To be completed 2012				90%
Alder Creek	North Fork Alder Creek			To be completed 2012				90%
Big River	East Branch North Fork Big River	4	3	75%	100%	marginal	75%	90%
Big River	Lower North Fork Big River	3	2	67%	67%	deficient	67%	90%
Big River	Mettick Creek	13	5	38%	46%	deficient	90%	90%
Big River	Rice Creek	2	0	0%	0%	deficient	50%	90%
Big River	Russell Brook	7	4	57%	57%	deficient	86%	90%
Big River	South Daugherty Creek	7	3	43%	86%	marginal	86%	90%
Big River	Two Log Creek	7	5	71%	71%	marginal	86%	90%
Brush Creek	Lower Brush Creek			To be completed 2012				90%
Cottaneva Creek	Cottaneva Creek	34	22	65%	94%	marginal	90%	90%
Elk Creek	Lower Elk Creek			To be completed 2012				90%
Elk Creek	Upper Elk Creek			To be completed 2012				90%
Garcia River	East of Eureka Hill	3	0	0%	67%	deficient	67%	90%
Garcia River	Rolling Brook	4	4	100%	75%	on-target	75%	90%

Future Effective Shade Targets within the Plan Area by Planning Watershed

MRC Watershed Analysis Unit	Planning Watershed	Number of Segments		% Segments Currently On Target		Current Rating (as of 2005)	% Segments	
		Surveyed	MWAT < 15°C and/or Average Canopy > Target	MWAT < 15°C and/or Average Canopy > Target (col. 4/col. 3) ^a	>70% Average Canopy		On Target for Effective Shade by Year 40 col. 3-1)/col.3 ^b	On Target for Effective Shade by Year 80
Garcia River	South Fork Garcia River	16	12	80%	73%	marginal	90%	90%
Greenwood Creek	Lower Greenwood Creek	8	5	63%	75%	marginal	88%	90%
Greenwood Creek	Upper Greenwood Creek	5	3	60%	80%	marginal	80%	90%
Hollow Tree Creek	Lower Hollow Tree Creek	2	0	0%	0%	deficient	50%	90%
Hollow Tree Creek	Middle Hollow Tree Creek	8	4	50%	75%	marginal	88%	90%
Hollow Tree Creek	Upper Hollow Tree Creek	12	8	67%	100%	marginal	90%	90%
Mallo Pass Creek	Mallo Pass Creek			To be completed 2012				90%
Navarro River	Dutch Henry Creek	2	0	0%	0%	deficient	50%	90%
Navarro River	Flynn Creek	3	2	67%	100%	marginal	67%	90%
Navarro River	Hendy Woods	1	0	0%	100%	marginal	50%	90%
Navarro River	John Smith Creek	2	1	50%	100%	marginal	50%	90%
Navarro River	Little N. Fork Navarro River	5	1	20%	100%	marginal	80%	90%
Navarro River	Lower S. Branch Navarro River	1	0	60%	80%	marginal	50%	90%
Navarro River	Middle Navarro River	4	1	0%	0%	deficient	75%	90%
Navarro River	Middle S. Branch Navarro River	4	1	25%	25%	deficient	75%	90%
Navarro River	Mouth of Navarro River	5	3	25%	50%	deficient	80%	90%
Navarro River	North Fork Indian Creek	1	0	0%	0%	deficient	50%	90%
Navarro River	North Fork Navarro River	2	2	0%	0%	deficient	50%	90%
Navarro River	Ray Gulch	5	4	80%	80%	marginal	80%	90%
Navarro River	Upper Navarro River	3	1	33%	67%	deficient	67%	90%
Navarro River	Upper S. Branch Navarro River	5	0	0%	40%	deficient	80%	90%
Northern Russian River	Jack Smith Creek	2	0	0%	50%	deficient	50%	90%

Future Effective Shade Targets within the Plan Area by Planning Watershed

MRC Watershed Analysis Unit	Planning Watershed	Number of Segments		% Segments Currently On Target		Current Rating (as of 2005)	% Segments	
		Surveyed	MWAT < 15°C and/or Average Canopy > Target	MWAT < 15°C and/or Average Canopy > Target (col. 4/col. 3) ^a	>70% Average Canopy		On Target for Effective Shade by Year 40 col. 3-1)/col.3 ^b	On Target for Effective Shade by Year 80
Northern Russian River	Lower Ackerman Creek	1	0	0%	0%	deficient	50%	90%
Northern Russian River	Upper Ackerman Creek	5	0	0%	0%	deficient	80%	90%
Noyo River	Hayworth Creek	5	2	40%	60%	deficient	80%	90%
Noyo River	McMullen Creek	1	1	100%	100%	on-target	90%	90%
Noyo River	Middle Fork N. Fork Noyo River	8	2	25%	100%	marginal	88%	90%
Noyo River	North Fork Noyo River	4	2	50%	100%	marginal	75%	90%
Noyo River	Olds Creek	4	2	50%	100%	marginal	75%	90%
Noyo River	Redwood Creek	2	2	100%	100%	on-target	90%	90%
Point Arena Streams	Point Arena Creek			To be completed 2012				90%
Rockport Small Coastal Streams	Hardy Creek			To be completed 2012				90%
Rockport Small Coastal Streams	Howard Creek			To be completed 2012				90%
Rockport Small Coastal Streams	Juan Creek			To be completed 2012				90%

TABLE NOTES

^a The number in this column is derived by dividing the number in column 4 (e.g., 6) by the number in column 3 (e.g., 8).

^b The number in this column is derived by subtracting 1 from the number in column 3 and dividing it by itself, e.g., (8-1)/8.

MRC set the target for Year 40 at 50% in the event we only survey 1 segment. The maximum target for Year 80 of the HCP/NCCP is 90% due to sampling error