

5.5.1.1 DISTRIBUTION MAPS FOR SPAWNING AND REARING HABITATS BETWEEN LAGOON AND HEADWATERS

Extent of Spawning Habitat in the Carmel River Basin – Barriers keep adult steelhead from migrating upstream and ultimately limit the amount of spawning habitat utilized annually in the Carmel River Basin. **Table 5.5.1.1-A** lists the known upper barriers to adult steelhead migration and the location and the extent of spawning habitat is shown on **Figure 5.5.1.1-A**. In normal and above water years, when no temporary barriers limit upstream migration, adult steelhead spawn in a total of 60.5 miles of stream, including 24.5 miles of the Carmel River mainstem, 30 miles of primary tributaries, and 6 miles of secondary tributaries. In dry and some below normal water years, adults probably do not ascend to the uppermost permanent barriers on the primary and secondary tributaries, but utilize the entire 24.5 of the mainstem. Those unable to migrate past barriers are forced to spawn below smaller falls and chutes or in the mainstem.

Quantity and Quality of Spawning Habitat in the Mainstem Carmel River – Based on 1989 surveys, the amount of spawning habitat in the mainstem upstream of the Narrows totals ~120,000 square feet, including 50,000 square feet in the reach from the Narrows to San Clemente Dam (41% of total), 11,000 square feet from San Clemente Reservoir to Los Padres Dam (9% of total), and 60,000 square feet upstream of Los Padres Reservoir (50% of total) (**Table 5.5.1.1-B**). Based on these estimates, the spawning habitat in the mainstem can support approximately 2,400 nests, equivalent to a run of 4,800 adults or about 193 spawners per mile of stream. The large amount of habitat upstream of Los Padres Dam, but disproportionately low returns of adults to Los Padres Dam, indicates that spawning habitat upstream of Los Padres Dam has not been fully utilized for many years and that spawning habitat is most likely not the primary limiting factor upstream of Los Padres Dam.

Spawning Habitat between San Clemente Reservoir and Los Padres Dam and below San Clemente Dam – The amount and quality of spawning habitat in these reaches is limited by the inadequate supply of gravel from the upper Watershed, caused by entrapment of bedload in Los Padres and San Clemente Reservoirs. No natural gravel recruitment has occurred in the reach immediately below San Clemente Dam since 1920. Similarly, no recruitment from upstream of Los Padres Reservoir has occurred since 1948, when Los Padres Dam was constructed. The historical loss of spawning gravel is indexed by the trend in **Figure 5.5.1.3-B**, illustrating that habitat between the dams and immediately below San Clemente Dam contains only one-quarter as much habitat per mile, as compared to upstream of Los Padres Reservoir. Habitat is most limited in the reach between Cachagua Creek and Los Padres Dam where in 1990 there was only enough area to support 14 nests, or about 24 spawners per mile (**Table 5.5.1.1-B**). To address this situation, the MPWMD has partially restored spawning habitats in the reach between the dams and immediately below San Clemente Dam with two grants from the California Department of Fish and Game and another from the federal government. As a result, the quality of spawning habitat has been improved at key locations and the increased amount has partially offset historical losses.

Spawning Habitat in Selected Tributaries – As part of studies evaluating impacts of water supply alternatives on steelhead populations, the MPWMD assessed the quantity of spawning habitat in three primary tributaries to the mainstem, including Danish Creek, Cachagua Creek

and San Clemente Creek. Following is a brief account of spawning habitats in each of these tributaries.

Danish Creek – This basin contains about 5,100 square feet of available spawning habitat and could support about 100 steelhead nests (**Table 5.5.1.1-B**). The extent of habitat is limited by a bedrock chute and waterfall 1.7 miles upstream from the confluence with the Carmel River. Substantial habitats are probably available upstream of this barrier, but no surveys have been done to quantify the amount.

Cachagua Creek – Spawning habitat in Cachagua Creek and its tributaries, Finch and James Creeks, totals 4,416 square feet, or enough for 88 nests (**Table 5.5.1.1-B**). Although over 8 miles of stream is available to steelhead in Cachagua Creek Basin, the narrow stream widths and low flow limits the amount of spawning habitat and yields a spawners index of only 22 fish per mile. Although the value of spawning habitat in Cachagua Basin is marginal, the stream performs the important function of replenishing spawning sized gravels to the mainstem Carmel River below Los Padres Dam.

San Clemente Creek – Spawning habitat in the San Clemente Basin totals 10,250 square feet, equivalent to 205 nest sites (**Table 5.5.1.1-B**). Despite narrower stream widths and lower flows, San Clemente Creek supports about the same number of nest sites as the mainstem Carmel between San Clemente Reservoir and Los Padres Dam.

Juvenile Rearing Habitat in selected portions the Carmel River Basin – Figure 5.5.1.1-B illustrates the extent of known juvenile rearing habitat in the Carmel River Basin. In most years, 49 miles of rearing habitat are available with ~20 miles in the mainstem, 24 miles in primary tributaries, and 5 miles in second tributaries. Juvenile rearing habitat in the mainstem can be divided into three reaches based on the physical character of the channel and summer flow regimes:

Upper Mainstem – Most rearing habitat upstream of Los Padres Dam is within the Ventana Wilderness area, where river flow is unregulated, roads and trails have not caused erosion, the gradient is steep (~320 feet per mile), and bedrock outcrops control the course of the channel. Typically, deep pools separated by short, shallow glides and long, cobble/boulder riffles and runs predominate throughout the reach.

Middle Mainstem – The configuration of the reach between the dams is controlled by bedrock outcrops and large boulders. The substrate is a mixture of cobbles and boulders and lacks a natural source of gravel because most of it is trapped behind Los Padres Dam. During summer, water stored in Los Padres Dam is released into the channel and diverted or released at San Clemente Dam. By agreement with DFG, Cal-Am maintains a minimum flow of 5 cubic feet per second (cfs) below Los Padres Dam. Because of variation in natural accretion, the augmented dry-season flows range from 5 cfs in critical years to 15 cfs in wet years.

Lower Mainstem – Below San Clemente Dam, the river is controlled primarily by bedrock outcrops downstream to near Paso Hondo Road (Powell's Hole). Below that point, the

interaction of alluvial deposits and storm flows periodically rearrange, scour, and deposit bedload along the river. Beginning in 1984, MPWMD, DFG, and Cal-Am negotiated an agreement to release water during the low-flow season. Under the annual agreements, releases have varied from 2.5 cfs to 10 cfs and have improved aquatic habitat in the reaches downstream of San Clemente Dam, particularly upstream of Robinson Canyon, where the State Water Resources Control Board and NOAA-Fisheries limit Cal-Am pumping from the alluvium.

Table 5.5.1.1-A

Estimates of the linear extent of stream accessible to adult steelhead in the Carmel River Basin³

PORTION OF BASIN, Stream	Length Accessible (ft) (miles)		Type of Permanent Barrier	Permanent Barrier Field Checked	Type of Temporary Barriers
DOWNSTREAM OF SAN CLEMENTE DAM					
- Carmel River mainstem	64,750	12.26	none	yes	shallow riffles, flow barrier at Old Carmel Dam, reservoir drawdown at San Clemente Dam
-- Robinson Canyon Cr. ¹	5,850	1.11	unknown	no	boulder piles
--- Las Gazas Creek ¹	13,150	2.49	unknown	no	unknown
--- Tularcitos Cr. ²	22,750	4.31	concrete ford	yes	Bedrock chutes, culverts
FROM SAN CLEMENTE RESERVOIR TO LOSPADRES DAM					
- Carmel River mainstem	28,550	5.41	none	yes	Shallow riffles, bedrock chutes, concrete fords, & summer dams
-- San Clemente Creek	22,200	4.20	unknown	no	boulder piles, recreation dams
--- Black Rock Cr.	15,800	2.99	recreation dam & waterfall	no	recreation dams, boulder piles, & bedrock chutes
-- Pine Creek ¹	29,050	5.50	unknown	no	boulder piles, bedrock chutes
	7,750	1.47			
-- Cachagua Creek	25,250	4.78	none	yes	shallow riffles
--- Finch Cr. ²	10,900	2.06	unknown	no	shallow riffles, bedrock chutes, boulder piles
--- James Cr. ²	5,600	1.06	unknown	no	boulder piles
UPSTREAM OF LOS PADRES RESERVOIR					
- Carmel River mainstem	35,800	6.78	waterfall	yes	shallow riffles, boulder piles
-- Miller Fork ¹	31,000	5.87	unknown	no	shallow riffles, bedrock chutes
-- Danish Creek	9,000	1.70	bedrock chute & waterfall	yes	bedrock chute
Subtotals:					
- Carmel River mainstem	129,100	24.45			
-- Primary Tributaries	158,250	29.97			
--- Secondary Tribs.	32,300	6.12			
TOTAL IN CARMEL RIVER BASIN:	319,650	60.54			

¹ Limit of spawning habitat assumed at elevation where average slope of stream exceeds 13 percent

² Limit of spawning habitat assumed at elevation where streamflows were judged inadequate for successful spawning.

Summary of steelhead spawning habitat measured in 26 reaches of the Carmel River Basin upstream of the Narrows and estimates of spawning habitat in the Carmel River and selected tributaries upstream of the Narrows ¹

STREAM	REACH	Length of Reach (ft)	Portion of Reach Surveyed (ft)	Spawning Habitat Measured in Portion of Stream Surveyed (sqft)	Estimate of Total Spawning Habitat in Reach (sqft)	Potential Number of Steelhead Nests (nos.)	Spawner Index (nos./mi)	
Mainstem Carmel River	Narrows to Sleepy Hollow	57,750	57,750	45,445	45,445	909	166	
	Sleepy Hollow to San Clemente Dam	7,000	5,350	1,864	2,439	49	74	
		subtotal	64,750			47,884	958	156
	San Clemente Res. to Pine Creek	10,600	8,122	3,369	4,397	88	88	
	Pine Creek to Syndicate Camp	5,350	5,478	2,482	2,482	50	98	
	Syndicate Camp to Cachagua Creek	6,300	3,594	1,797	3,150	63	106	
	Cachagua Creek to Los Padres Dam	6,300	6,503	722	722	14	24	
		subtotal	28,550			10,751	215	80
	Danish Creek to Bluff Camp	7,200	5,171	7,480	10,415	208	306	
	Bluff Camp to Bruce Fork	5,900	1,785	1,573	5,199	104	186	
	Bruce Fk to trib. above Sulphur Sprgs.	3,850	1,828	2,987	6,291	126	345	
	Trib. above Sulphur Spr to trib below Buckskin Camp	5,650	2,733	2,254	4,660	93	174	
	Trib. below Buckskin Camp to rightbank trib. above Buckskin	4,350	1,811	6,826	16,396	328	796	
	Rightbank trib above Buckskin Camp to trib below Benchmark 1743	4,750	3,234	10,557	15,506	310	689	
	Tributary below Benchmark 1743 to Barrier above Ventana Mesa Creek	4,200	489	119	1,022	20	51	
		subtotal	35,900			59,489	1,190	350
		Total Mainstem Carmel River (miles)	129,200 24.47	103,848 19.67	87,475	118,124	2,362	193

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MILLER FORK	Confluence with Carmel River to meadow ~ 1 mile upstream	5,150	1,117	137	632	13	26
	Meadow to Clover Basin Camp	5,750	1,908	1,659	5,000	100	184
	Clover Basin Camp to Miller Canyon	2,850	1,503	698	1,324	26	98
	Miller Canyon Camp to probable migration barrier	17,300	1,201	50	720	14	9
	Subtotal Miller Fork Basin (miles)	31,050 5.88	5,729 1.09	2,544	7,675	154	52
DANISH CREEK	Confluence with Carmel River to migration barrier (miles)	9,000 1.70	2,442 0.46	1,386	5,108	102	120
CACHAGUA CREEK	From Carmel River to Conejo Creek	24,500	14,011	841	1,471	29	13
	Conejo Creek to Finch Creek	750	680	56	62	1	17
	-Finch Creek From James Creek to Big Creek	10,900	2,405	543	2,461	49	48
	-James Creek From Finch Creek to Lambert Ranch	5,600	451	34	422	8	16
	Subtotal Cachagua Creek Basin (miles)	41,750 7.91	17,547 3.32	1,474	4,416	88	22
SAN CLEMENTE CREEK	San Clemente Reservoir to Trout Pond Dam	9,000	?	?	3,906	78	92
	Trout Pond Reservoir to Black Rock Creek	3,450	2,315	1,005	1,498	30	92
	Confluence with Blk Rk Crk to end of permanent flow	9,750	669	161	2,346	47	51
	-Black Rock Creek Confluence with San Clemente Creek to confluence of North and South Forks	3,450	1,460	410	969	19	59
	--No.Fork Black Rock Cr Confluence with South Fork to permanent barrier at White Rock Dam	12,350	1,494	184	1,522	30	26

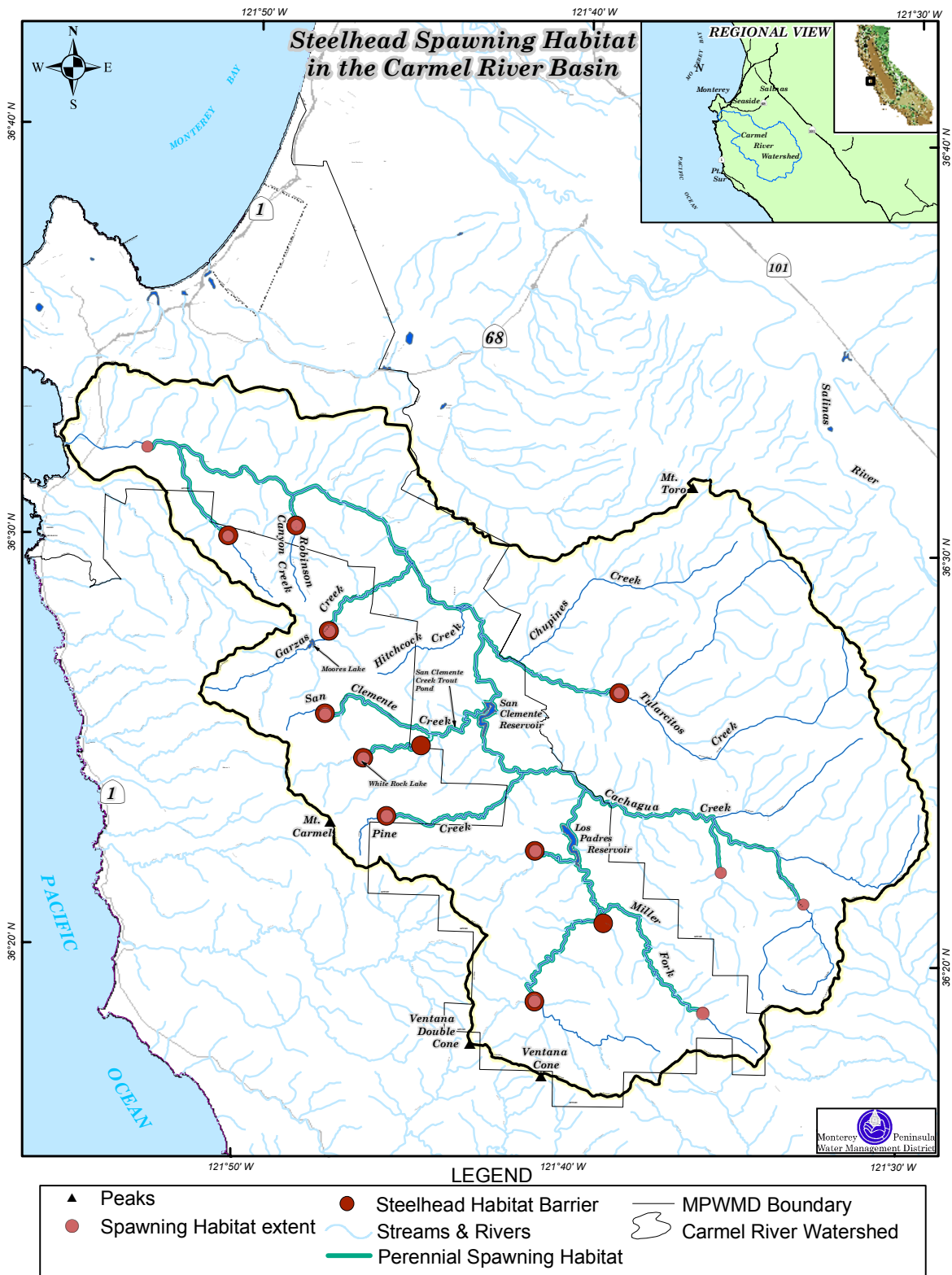
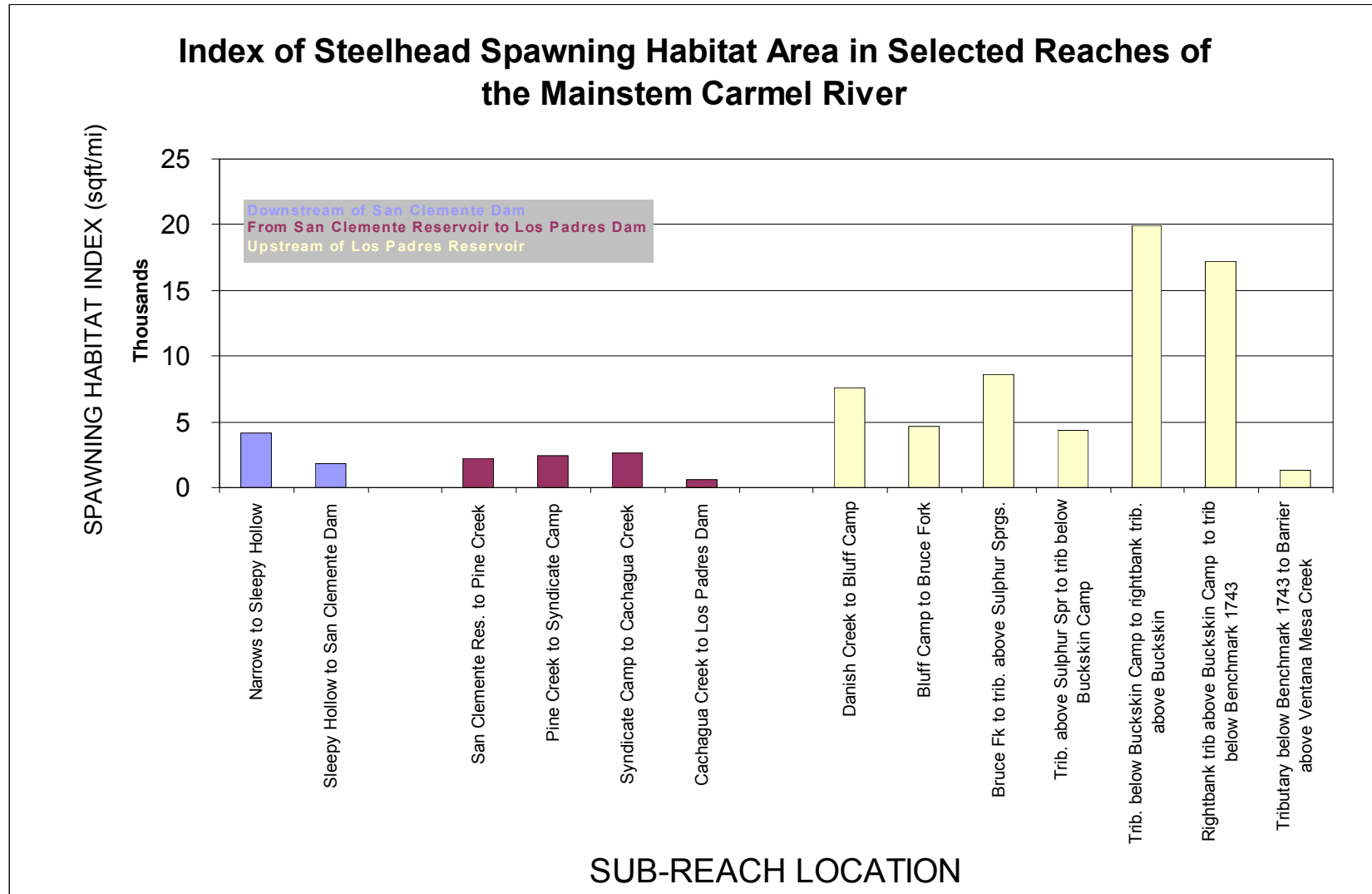


Figure 5.5.1.1-A

Figure 5.5.1.1-B



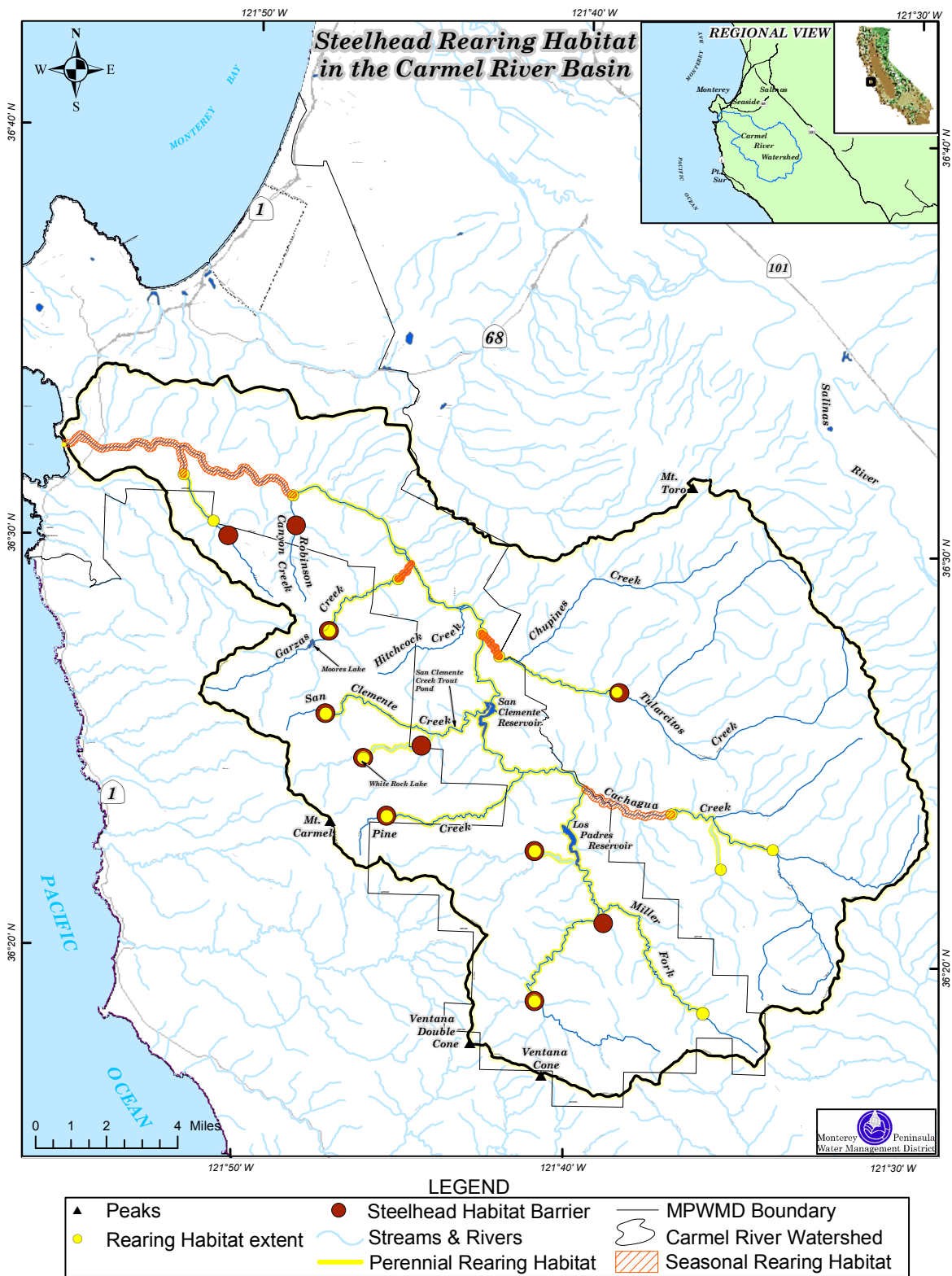


Figure 5.5.1.1-C