5.4.1 ASSESSMENT OF RIPARIAN FUNCTIONS AND CONDITIONS

The proper functioning condition (PFC) method for assessing the condition of riparian-wetland areas is a qualitative approach developed by the U.S. Bureau of Land Management and U.S. Forest Service for use by land managers. The method uses observations of hydrologic, vegetative, and erosional/depositional (soils) attributes to evaluate the health of a stream. A total of 17 "yes/no" questions are posed about the characteristics of a stream reach, resulting in one of three ratings that reflect stream resiliency: (1) proper functioning condition; (2) functional-at-risk; or (3) non-functional.

A rating of "proper functioning condition" means that a stream is resilient, i.e., the riparian-wetland area is stable during most high-flow events. A resilient stream produces desired values such as high quality fish and bird habitat. "Functional-at-risk" means the stream reach is currently functional, but is at risk of becoming non-functional due to an observed condition that could impact the reach in the future. "Non-functional" indicates that there is a condition in the reach or watershed interfering with the natural functions of the stream.

Individual assessments were performed at 37 sites along the main stem by two Monterey Peninsula Water Management District interdisciplinary teams with local, on-the-ground experience in the quantitative sampling techniques that support the PFC checklist. The Carmel River Watershed Conservancy performed 95 assessments in tributary drainages.

Included in this section is a map of the watershed showing reach ID number and the rating assigned to each reach. Appendix 5.4.1 contains the PFC checklist and photographs taken at each site. In addition, a geographic information system (GIS) layer was created with ARCGIS that links each labeled reach on the watershed map to the respective assessment. The GIS layer is included on a data disc supplied with this assessment.

Discussion of Main Stem Riparian Areas

Prior to the mid-1980's, several reaches between the Narrows and Robles del Rio in Carmel Valley Village periodically went dry due to water diversions. In the mid-1980s, tighter regulation of water extraction from Carmel Valley and improvements in the management of surface and groundwater supplies increased summer river flows down to the Narrows. The reach between the Narrows and Robles del Rio has benefited greatly from the additional flow, which has encouraged vegetation growth and greater diversity of wetland and riparian species. Beginning in 1996, summer and fall diversions at San Clemente Dam were halted and in the late 1990's, municipal well water diversions were concentrated in the furthest downstream wells. It is unclear whether these latter incremental increases in flow have benefited riparian vegetation downstream of Schulte Road Bridge.

Between Schulte Road Bridge and the Rancho Cañada golf course, the increase in municipal groundwater extraction during the summer and fall may have exacerbated plant stress along the streambanks and led to a weakening of the vegetative cover. An episode of bank erosion occurred in this reach between 1993 and 1998 – just a few years after groundwater extraction in this area was increased. A similar episode of erosion occurred in the reach between Schulte

Bridge and Robles del Rio between 1978 and 1983 as a result of a significant increase in groundwater extraction in that area that began in the mid-1960's.

Between 1986 and 2001, riparian wooded areas within the streamside corridor downstream of San Clemente Dam have increased from an estimated 299 acres (*McNeish, 1986*) to an estimated 438 acres (*Christensen, 2003*). This increase is due both to natural recovery after an episode of bank erosion between 1978 and 1986 and to restoration work by a variety of groups including: 1.) CALTRANS (1996) in the vicinity of the lagoon; 2.) MPWMD (1984 to the present) at multiple projects in the main stem between Via Mallorca and the deDampierre ball fields; and 3.) privately sponsored projects. Riparian forest areas, especially in floodplains adjacent to the river, have also become more diverse due to public and private revegetation efforts. In addition, at the time this report was developed, California State Parks had started work on a project to convert 100 acres of agricultural land west of Highway 1 to open water, wetland, and riparian habitats.

The riparian corridor remains very thin in some areas (as little as one or two trees wide along the streambank) due to urbanization. In these locations, wildlife mobility is limited by the poor quality and quantity of the riparian corridor. Some streamside areas continue to come under development pressure as real estate values in Carmel Valley escalate and property owners carve out niches for additional urban living space or seek to stop the natural meanderings of the river. Examples of poor landowner practices include thinning and removing streamside vegetation for view corridors, placing structures adjacent to the stream, dumping of deleterious material, and constructing illegal bank protection works.

Recent gains in riparian vegetation growth and diversity, especially between Robles del Rio and Schulte Road Bridge, may be short-lived as the ability to augment dry season flows with releases from storage at Los Padres Reservoir will decrease due to sedimentation. Should the overall level of water diversions in Carmel Valley remain unchanged, decreased dry season flows downstream of San Clemente Dam would likely have significant effects on water quality, habitat value, and streambank stability.

Shifting the points of water diversion into the lower river (downstream of the Narrows) has benefited aquatic species upstream of the Narrows. But this shift has also increased vegetation stress in the lowest reaches of the river, resulting in loss of vegetation and increased bank instability, as seen during the floods of the 1990's. The relatively poor groundwater quality of the aquifers in the lower 10 miles of the river makes irrigation of the riparian corridor with raw water difficult and expensive. In addition, high concentrations of iron and manganese in these aquifers has led to failures and/or poor performance in several of Cal-Am's domestic supply wells. Because well failures in the lower river normally must be made up by pumping water from further upstream in the system, surface flow conditions immediately downstream of the Narrows can change drastically in a matter of a few days during the summer low flow season.

An inventory of large wood (LW), which is defined as pieces greater than six inches in diameter and five feet in length, was conducted in the channel bottom in 2002 and 2003 between the Stonepine Resort and the Lagoon (*Smith and Huntington, 2004*). The frequency of single pieces and accumulations found in each reach ranged from 16/mile (Via Mallorca to the Lagoon) to

68/mile (Stonepine Resort to Robles del Rio). The trend shows that frequency decreases in the downstream direction. In general, higher frequencies of LW were associated with higher densities of steelhead, although there were notable unexplained exceptions in a few reaches. One explanation for this is that LW may not be a limiting factor for steelhead in these reaches. LW in the lower river tended to have a lower frequency of occurrence, but was larger and more stable, a condition that is to be expected as winter stream flows normally increase in the downstream direction and sweep smaller pieces out to the ocean. A majority of LW appears to have no effect on bed or bank stability, while a small percentage (less than 4%) were found to negatively affect bank stability.

Because the management of LW in the channel bottom has changed recently and data on LW is limited, it is not clear what an appropriate density is for the Carmel River. Past management practices included extensive removal and modification of large wood after floods and episodes of erosion. This is no longer the practice in the main stem, so it is reasonable to assume that the volume of wood in the channel bottom will increase in the future.