

5.7.4. CONSTRAINTS TO POPULATION OF BENTHIC POPULATIONS AND FUNCTIONAL GROUPS

Based on the findings of MPWMD's bioassessment program (2000 – 2003), the primary five functional feeding groups (FFG) were ranked by abundance at the five sampling sites (**Figure 5.7.2a-A**). The most numerous species in each of these groups are listed. Probable constraints to the population size of each group and some potential restoration projects to overcome these constraints are discussed.

(1) Collector-Gatherer FFG (collect fine particulate organic matter [FPOM] from the stream bottom):

Most numerous species: High numbers of individual *Baetis* mayflies, and the midges Orthocladiinae and Tanytarsini contributed to the numerical dominance of this group. This feeding group typically comprised 35 to 55 percent of the BMI in all samples.

Probable constraints: This group does not appear to be constrained in the Carmel River, but according to Petersen and Cummins (1974) and Short and Maslin (1977), about 30% of the conversion of coarse particulate organic matter (CPOM) leaf litter to FPOM has been attributed to shredder feeding and this can affect the growth of FPOM feeding collectors. So by increasing the abundance of shredders to help break down CPOM (leaves and LWD), the collector-gatherers would also benefit.

Abundant interstitial spaces are also important for this group. The release of large amounts of sand from San Clemente Reservoir or from bank failure along the river that cause interstitial space filling would be detrimental.

Potential restoration projects to overcome constraints: Any project that contributes to the overall health of the river with improved water quality, stable banks, and abundant gravel will help this group. Planting more native riparian trees would help by increasing the abundance of shredders.

(2) Collector-Filterer FFG (collect FPOM from the water column using a variety of filters):

Most numerous species: Black flies (*Simulium*), and hydropsychid caddisflies. This feeding group typically comprised 20 to 45 percent of the BMI in all samples.

Probable constraints: This group relies on remaining stable and attached to the substrate to facilitate their filtering behavior. They need a constant flow of fresh water that contains FPOM. High flushing flows that cause scour and bedload movement could result in a reduction of this group.

Potential restoration projects to overcome constraints: While important to the overall health of the stream, this group is less important as a food source to steelhead since they are infrequent

drifters. They thrive in many stream conditions, including those that may be less favorable to other groups, such as downstream of a dam.

(3) Scraper FFG (consumes algae and associated material):

Most numerous species: The hydroptilid *Leucotrichia pictipes* was the primary contributor to the scraper FFG but other BMI taxa such as the water penny *Psephenus falli*, the heptageniid mayfly *Ironodes*, and the riffle beetle *Optioservus*, also contributed to the representation of the scraper FFG. There was a trend of higher percentages of scrapers in the fall season when compared to the percentage of scrapers in the spring season. This feeding group typically comprised 2 to 15 percent of the BMI in all samples.

Probable constraints: This group is dependant on a rocky substrate that supports algal growth. Dense overhead growth of trees and shrubs that shade the stream may reduce the abundance of this FFG as would turbid water that prevents sunlight from penetrating the water column. The presence of moving sand or silt that scours the cobble surfaces would also be detrimental. Water that is high in organic nutrients, such as from septic drain-fields or agricultural runoff, may be beneficial for this group since algal production would be increased.

Potential restoration projects to overcome constraints: This group is also an important component of drift food for steelhead. Individuals BMI crawl on the surface of the rocks and may get swept away by the current. Projects that stabilize the stream banks to prevent siltation and turbidity of the river would benefit this group.

(4) Predator FFG (feed on other consumers):

Most numerous species: The damselfly *Argia*, water mites comprising several genera (mostly *Sperchon*), flatworms, and at some sites dance flies (several genera within the family Empididae) were the main contributors to this FFG. This feeding group typically comprised 5 to 10 percent of the BMI in all samples.

Probable constraints: This group depends on vigorous populations of the other feeding groups.

Potential restoration projects to overcome constraints: Any restoration project that provides for a healthy stream would benefit this group. Excellent water quality, including cool water temperatures, abundant cobble and gravel substrate, stable stream banks, and a natural flow regime would promote an increased population of all BMI taxa.

(5) Shredder FFG (consume leaf litter or other CPOM, including wood):

Most numerous species: The shredding caddisfly, *Lepidostoma*, was the most abundant shredder in the samples but was not numerically dominant at any of the sites. This rare group comprised less than 2 percent of the BMI in most samples.

Probable constraints: The lack of LWD and the somewhat limited riparian cover in some sections of the river likely contribute to the lack of CPOM and the near absence of shredders on the Carmel River. Ironically, the CRCA and CRSH sites had the fewest shredders of any of the sites even though there is abundant leaf litter in the fall in these locations.

Potential restoration projects to overcome constraints: Continue with stream bank restoration projects that include vegetation planting and irrigation. Strive to complete more LWD installment projects.