1.3: Surface Water Pollutant Loading

Net surface water pollutant loads were quantified for priority watersheds in Collier County. Nutrient loads were higher in older urban areas, golf courses, and agriculture due to fertilizers. Higher biological oxygen demand and metals loads corresponded with low/medium residential areas and urban areas, respectively, and no treatment facilities.

Introduction

Net pollutant loads, i.e., pollutants that are discharged into the primary and secondary drainage network, were calculated for the entire study area. The pollutant loads provide a means of examining the relative contribution of land use types to total pollutant loads as well as a baseline against which to measure the effects of improvement projects. The calculation of pollution loads addressed strictly those resulting from human activities in the watershed given the CCWMP focus on mitigation of those impacts.

Methods

Pollutant loads to the receiving waters were estimated using a Pollutant Loading and Removal Model based on the U.S. Environmental Protection Agency Method. By this method, average annual pollutant loads are calculated by the product of average annual stormwater runoff volume times an event mean concentration (EMC). The EMC represents the estimated concentration of a pollutant in the discharge from a particular land use.

Pollutant loads were estimated for the parameters of concern identified in the Southwest Florida Feasibility Study (SWFFS): total suspended solids, total nitrogen, total phosphorus, biological oxygen demand, copper, zinc, and lead. The MIKE SHE / MIKE 11 hydrologic and hydraulic (H&H) existing conditions model (ECM) was used to estimate runoff volumes. For consistentcy with the SWFFS, the EMCs were also assumed to be the same as those used in that study. However, they were checked with other data available from the literature. No significant differences were noted. A recommendation from the analysis is that additional data be collected through wet weather sampling monitoring to better define the EMCs associated with agricultural discharges given the variations in runoff pollution control practices.

Gross pollutant loads, defined as loads generated in a watershed, were calculated for each cell in the model domain. These loads were then modified to reflect the pollutant removal effect of Best Management Practices (BMPs) for stormwater treatment, such as detention ponds, which are typical treatment systems. The net loads are the those that enter the drainage network, and therefore discharge into the estuary systems.

Results

Table 1-1 provides a summary of predicted nutrient pollutant loads by watershed, which are critical for TMDL impairments analysis. The areas predicted to contribute the largest pollutant load are older developments, golf courses, and agriculture. Further details on areas of concern are provided later in this report and in Volume 4. The nutrient source may be related to excessive use of fertilizers. It must be noted that the largest EMC value for nutrients in the SWFFS analysis is for agricultural land uses. As indicated previously, further wet weather sampling is recommended to better define areas of agricultural nutrient concern.

Table 1-1. Predicted Surface Water Pollutant Loads

Watershed	Total Nitrogen		Total Phosphorus	
	Tons/year	lbs/acre/yr	Tons/year	lbs/acre/yr
Cocohatchee-Corkscrew	168	2.62	31	0.49
Golden Gate - Naples Bay	121	2.74	19	0.42
Rookery Bay	73	1.51	13	0.27
Faka Union, Fakahatchee, Okaloacoochee-SR29	472	2.12	94	0.42

The magnitude of the tabulated loads can be assessed by comparing them to the loads from a single land use category. For example, using the same calculation methodology, the average loads per acre from a medium density residential area with no runoff treatment are 4.39 and 0.73 lbs/acre/year for TN and TP, respectively. Given that the loads represent only those from human activities but distributed over the entire watershed area, results indicate the presence of areas of critical concern.