

County of Maui
Department of Environmental Management
Community Working Group

Nitrogen Removal at Maui WWRFs

Wastewater reclamation facilities (WWRFs) can be designed to remove nitrogen from wastewater prior to disposal or reuse. All three of the County of Maui’s WWRFs are based on a treatment process called “activated sludge”. There are three levels of nitrogen removal for activated sludge processes, as summarized in Table 1.

Table 1. Nitrogen Removal Definitions			
Level	Name	Description	Typical Nitrogen Concentration (mg/L) ^a
--	Raw wastewater	Before treatment of any kind	20 - 85 ^b
1	Secondary treatment	Process not specifically configured to remove nitrogen, although some reduction occurs	15 - 30
2	Biological nutrient removal (BNR)	Anoxic (low dissolved oxygen) zones and recycle streams established within the biological process tanks to promote nitrogen removal.	7 - 10
3	Advanced nutrient removal (ANR)	Anoxic post-treatment (following BNR) using a supplemental carbon source (typically methanol).	3 - 5

^a mg/L = milligrams per liter (parts per million)

^b Maui County raw wastewater typically contains around 35 mg/L

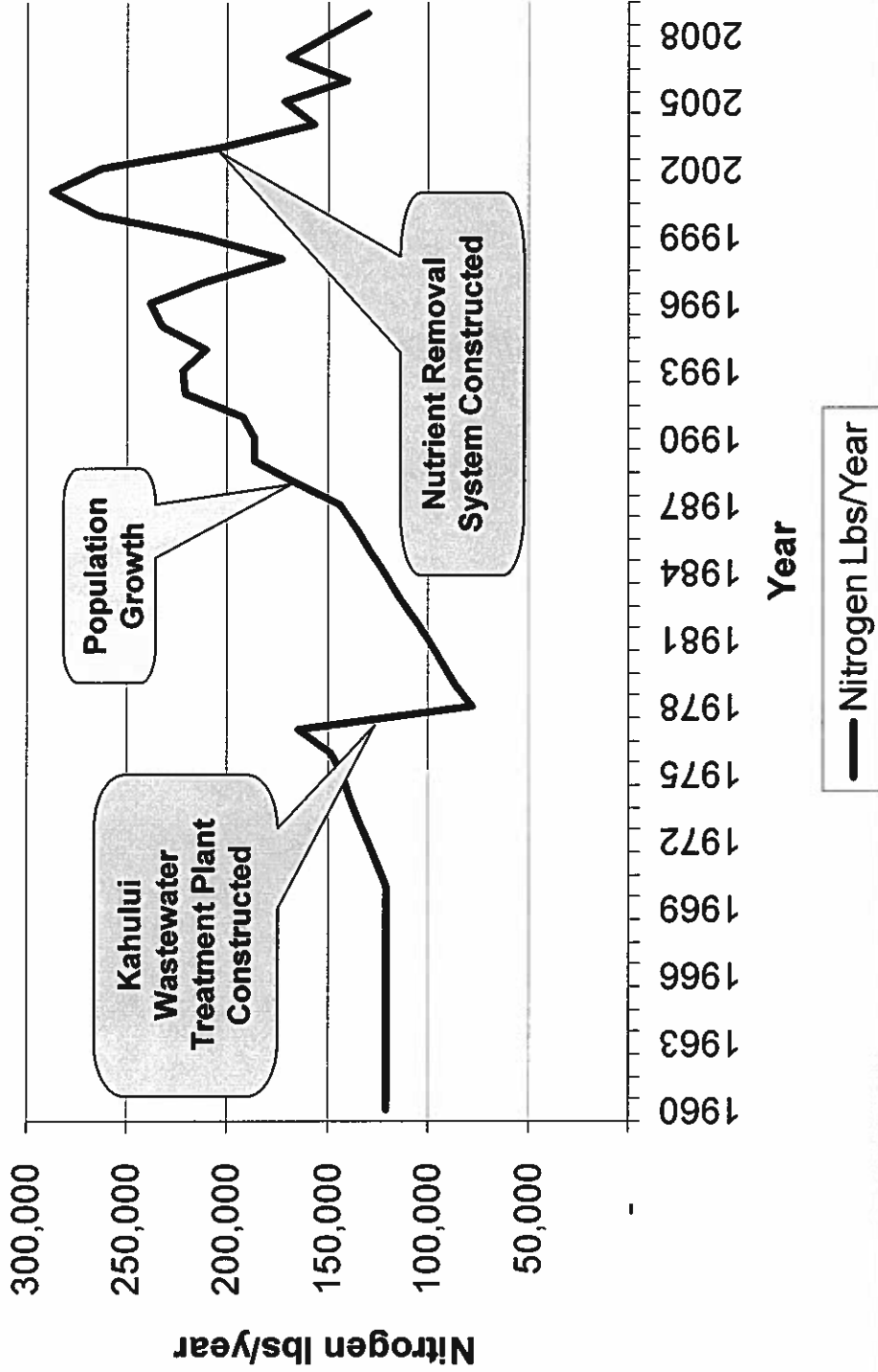
Table 2 summarizes what would be required to implement nitrogen removal at the County of Maui WWRFs.

Table 2. Nitrogen Removal Implementation on Maui		
Level	Name	Implementation Requirements at Maui WWRFs
1	Secondary treatment	None - WWRFs were originally constructed this way in the 1980s
2	BNR	None - County upgraded to this level of treatment in the 1990s
3	ANR	Construction of denitrification filters, supplemental carbon storage and feed systems, pumping systems, instrumentation and control systems, and electrical system improvements

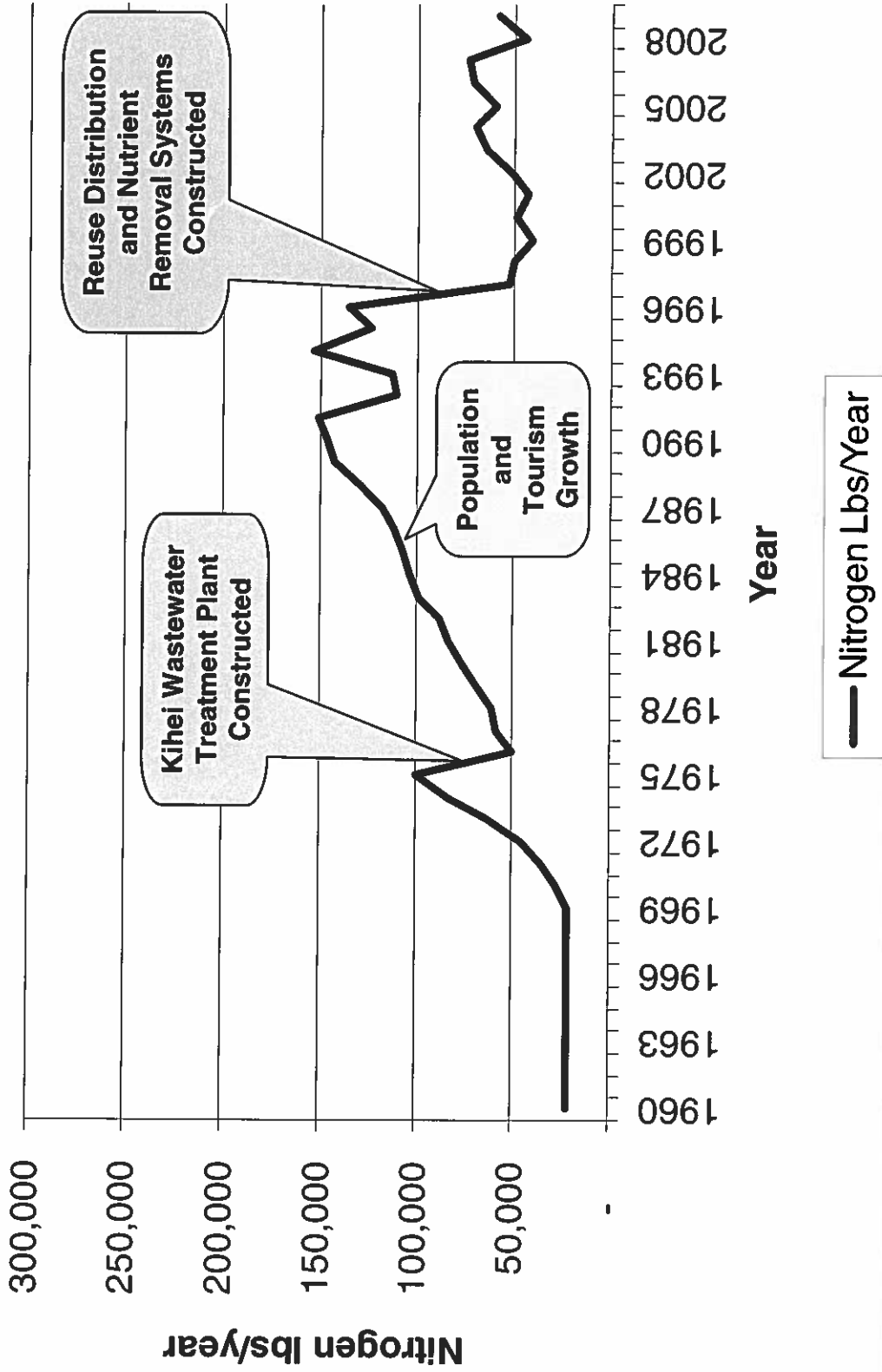
As shown in Table 2, the County is already at Level 2 with regards to nitrogen removal. Table 3 summarizes the additional costs to implement Level 3 nitrogen removal (ANR) at the three Maui WWRFs.

Table 3. Estimated Costs to Implement Level 3 Nitrogen Removal (ANR) at Maui WWRFs		
WWRF	Capital Cost	Additional Operating Cost
Walluku Kahului	\$23 million	\$910,000/year
Kihel	\$16 million	\$740,000/year
Lahaina	\$18 million	\$860,000/year
Totals	\$57 million	\$2,510,000/year

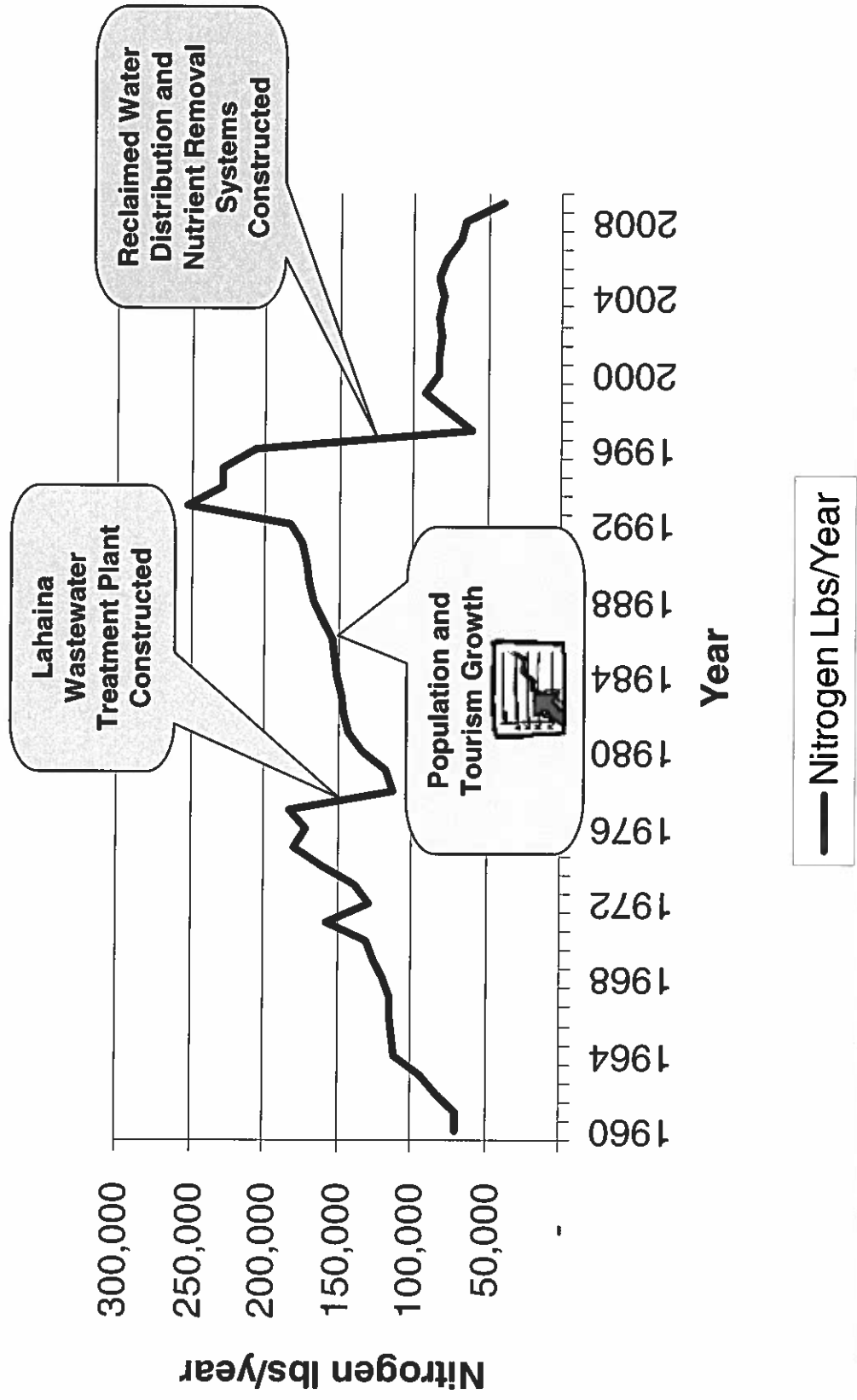
Nitrogen Discharge - Wailuku-Kahului



Nitrogen Discharge - Kihei-Wailea



Nitrogen Discharge - West Maui



— Nitrogen Lbs/Year