

Rhode Island Sea Grant South Shore Collaborative

Lagoon/Estuary Matrix---NUTRIENT LOADING

	Little Narragansett Bay	Pawcatuck River Estuary	Maschaug	Winnapaug	Quonochontaug	Ninigret	Green Hill	Trustom	Cards	Potter	Point Judith
(kg/N/yr) ^[4,5,6]											
Groundwater	-	-	3,924 ⁽⁷⁾	20,821 ⁽⁷⁾	13,400 ⁽⁷⁾	29,595	25,635	3,600	10,415	16,999	28,333
Precipitation	* ⁽¹⁶⁾	* ⁽¹⁶⁾	232	2,385	3,743	8,238	2,106	922	205	1,817	7,758
Stormwater Runoff	57,060 ⁽¹⁷⁾	134,797 ⁽¹⁷⁾	-	-	-	227	104	32	68	64	367
Septic Systems	18,002 ⁽¹⁷⁾	54,340 ⁽¹⁷⁾	-	-	-	-	-	-	-	-	-
Sewage Treatment Facilities	0	63,614 ⁽¹⁷⁾	-	-	-	-	-	-	-	-	-
Stream/River Flow	-	239,620 ⁽¹⁷⁾	0	0	-	1,149	3,345	0	-	0	27,322
Oceanic Waters	-	-	0	-	-	2,722	1,361	0	0	-	-
TOTAL DIN	75,062	492,371	4,156	23,206	17,143	41,931	32,551	4,554	10,688	18,880	63,780
Average Well NO3 in watershed (mg/l) ^[6]	-	-	-	-	-	1.44	2.75	1.57	3.71	2.07	2.29
Nitrate N Loading to Surface Area Ratio ^[8]											
(kg/m2/day)	-	-	0.001	0.001	0.001	0.006	0.02	0.007	0.06	0.01	0.01
(kg/yr)	-	-	4,156	2,385	3,743	41,931	32,551	4,554	10,688	18,880	63,780
Flushing Time (days) ^[1,19]	-	* ⁽¹⁸⁾	-	-	-	4.64	10.81	0	0	1.5	2.02

References:

- ¹ Desbonnet and Lee, 1996
- ² Grace & Kelly, 1981
- ³ Lee, 1980
- ⁴ Nixon et al., 1982
- ⁵ Ernst & Lee, 1995
- ⁶ Ernst 1996
- ⁷ CRMC, 1996. Table 3-4
- ⁸ CRMC, 1996. Table 3-5
- ⁹ CRMC, 1996. Chapter 5, Section C
- ¹⁰ Lee & Olsen, 1985
- ¹¹ Thorne-Miller et al., 1983
- ¹² Not including Saugatucket watershed area
- ¹³ Ehinger et al., 1978
- ¹⁴ US Geological Survey, 1977-1989, 1997
 Record high flow (1973)= 7.78 x 10⁶ m³/day
 Record low flow (1981)= 2.24 x 10⁶ m³/day
 Aquatic Base Flow (ABF) = 127 cfs
 7Q10 Flow = 47 cfs
 248 cfs estimated by Desbonnet & Banister (1994) to be critical flow below which bottom hypoxia becomes routine at head of estuary in Westerly
- ¹⁵ For the direct estuarine drainage basin only. Entire Pawcatuck watershed area is 188 mi² (120,320 acres)
- ¹⁶ DIN loading to the entire bay/estuary complex is 4,536 kg/yr⁽¹⁷⁾
- ¹⁷ Desbonnet, 1991
- ¹⁸ Doering, Pers. Comm. (in Desbonnet, 1991). 1-3 days in the freshwater lens; 2-8 days in the salt water lens.
- ¹⁹ Determined by Tidal Prism model where T=(V + P)/P
 T= flushing rate in tidal cycles (days=T/2 tidal cycles/day)
 V= low tide volume (surface area x depth) - (surface area x tidal range)
 P= tidal volume (surface area x tidal range)
- ²⁰ Scott & Moran 2000
- ²¹ Gonthier et al 1974 estimate this subterranean flow to occur between Little Narragansett Bay and Ninigret Pond. No further refinement is provided.
 Both Moran and Grace/Kelly estimates for Ninigret alone exceed the USGS estimates
- ²² RIGIS 2001---Does not include salt pond/lagoon/estuary water surface area
- ²³ RIGIS 2001---Is salt pond/lagoon/estuary water surface area only
- ²⁴ McKenna 1996 (PhD thesis)
- ²⁵ URI Botany Dept. precipitation records