

Rhode Island Sea Grant South Shore Collaborative

Lagoon/Estuary Matrix---AREA & DEPTH

	Little Narragansett Bay	Pawcatuck River Estuary	Maschaug	Winnapaug	Quonochontaug	Ninigret	Green Hill	Trustum	Cards	Potter	Point Judith
Water Surface Area ^[23]											
square meters	9.7 x 10 ⁶ (¹)	2.7 x 10 ⁶ (¹)	1.9 x 10 ⁵	1.9 x 10 ⁶	3.0 x 10 ⁶	6.4 x 10 ⁶	1.7 x 10 ⁶	7.3 x 10 ⁵	1.7 x 10 ⁵	1.5 x 10 ⁶	6.3 x 10 ⁶
Average Depth ^[3]											
meters	2.01 ⁽¹³⁾	-	2.1	1.5	1.8	1.3	0.8	0.4	0.4	0.6	1.8
Watershed Area ^[6]											
square meters	3.55 x 10 ⁷ (^{15,17})	1.97 x 10 ⁷ (¹⁵)	1,375,921	1.11 x 10 ⁷	1.19 x 10 ⁷	3.09 x 10 ⁷	1.39 x 10 ⁷	3,387,193	8,008,667	1.47 x 10 ⁷	6.64 x 10 ⁷
Year Permanently Breached ^[9]	na	na	No	1950s	1950s	1952	1962	No	No	1910	1910
Tidal Range ^[10]											
centimeters	-	-	-	-	-	13.7	3.7	-	-	20	44.5
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 10⁸ m³/day

Record low flow (1981) = 2.24 x 10⁸ 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