

Chapter 6.2

Development of a seagrass habitat suitability index for the Maryland Coastal Bays

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Abstract

The SAV Index by region appears to be less representative than the water quality index. Although both used “seagrass habitat criteria,” there was a significant difference between seagrass habitat criteria achievement for total nutrients vs. dissolved nutrients. Future evaluation of habitat criteria should include total nutrients, since more stations met the inorganic nutrient criteria (Table 6.2.3), but demonstrated relatively poor status when analyzed for total nutrients

Introduction

A seagrass habitat suitability index was developed in an attempt to summarize habitat criteria attainment for all five parameters on a bay segment scale, which could be compared to the status of seagrasses in each segment.

Data Sets

Same data sets used in Chapter 6.1.

Indicator: Submerged Aquatic Vegetation Index (SAVI) = 1.0 (100% attainment)

Data Analysis

To summarize seagrass (SAV) habitat criteria attainment, standard water quality indicators measured from 2001 through 2003 were compiled into a Submersed Aquatic Vegetation suitability Index (SAVI). The index was calculated for each station (Figure 6.2.1) and also for each bay segment (Table 6.2.2). This index was based on compliance of measured water quality indicators (Chlorophyll *a*, dissolved inorganic nitrogen, dissolved inorganic phosphorus, total suspended solids, and Secchi depth) to established habitat criteria for survival of seagrasses (Table 6.2.1). Index values range from zero (no habitat criteria for seagrass survival attained) to one (all habitat criteria for SAV survival met). This approach of summarizing compliance of water quality indicators with habitat

criteria values has previously been carried out to compare U.S. mid-Atlantic estuaries as well as tributaries within the Chesapeake Bay (Kiddon *et al.*, 2003; Jones *et al.*, 2003).

Table 6.2.1: Indicators and habitat criteria values used in the calculation of an SAV index for Maryland Coastal Bays (1: Dennison *et al.*, 1993; 2: Stevenson *et al.*, 1993, 3: Chapter 6.1 of this report).

Indicator	Habitat criteria value	Reference
Chl a	< 15 $\mu\text{g L}^{-1}$	1, 2
Dissolved inorganic nitrogen	< 0.15 mg L^{-1} (11 μM)	1, 2
Dissolved inorganic phosphorus	< 0.02 mg L^{-1} (0.64 μM)	1, 2
Total suspended solids	< 15 mg L^{-1}	1, 2
Secchi depth	> 0.96M >40% of the time	1, 3

For each station with greater than ten records for each indicator, medians were calculated for each indicator. Only sampling occasions in March through November during 2001 to 2003 were included to represent the growth season of *Zostera marina* and *Ruppia maritima* the dominant seagrass species. Median values for each indicator were compared to habitat criteria values and scored as one (meets criteria) or zero (fails to meet criteria). These scores were summed for all indicators and divided by the number of indicators to result in a unitless index value ranging from zero to one for each sampling location. An index value of zero indicated that a site met none of the criteria, while a score of one indicated a site that met all habitat criteria. Once index values were calculated for each site, means were calculated for all sites within several reporting regions and presented by measured indicator and index values in Tables 6.2.2 and 6.2.3. Error associated with mean index values in these cases represents variation between sites, within a reporting region (and does not account for temporal variation).

SAV Index Status

Sinepuxent Bay showed the best habitat health with Chincoteague Bay, followed by Isle of Wight Bay and Assawoman Bay respectively (Table 6.2.2). Assawoman Bay failed Secchi and chlorophyll parameters while Chincoteague Bay more often failed due to Secchi and TSS parameters (Table 6.2.3).

Table 6.2.2: SAV suitability Index by reporting region calculated from median values (March – November; 2001-2003)

Region	n (sites)	SAVI	Health
Assawoman	6	0.63 _(0.06)	Good
St Martin	11	0.41 _(0.05)	Poor
Isle of Wight	9	0.77 _(0.06)	Good
Sinepuxent	5	1.00 _(0.00)	Excellent
Newport	12	0.48 _(0.05)	Poor
Nth Chincoteague	6	0.77 _(0.06)	Good
Sth Chincoteague	11	0.80 _(0.05)	Good

Table 6.2.3: SAV suitability Index scores, by measured indicator, based on median values (March – November; 2001-2003). Standard error is presented in parentheses.

	Secchi	TSS	CHL	DIP	DIN
Assawoman	0.00 (0.00)	0.83 (0.17)	0.33 (0.21)	1.00 (0.00)	0.83 (0.17)
StMartin	0.00 (0.00)	0.45 (0.16)	0.36 (0.15)	0.73 (0.14)	0.36 (0.15)
Isle of Wight	0.50 (0.19)	0.67 (0.17)	0.89 (0.11)	0.89 (0.11)	0.89 (0.11)
Sinepuxent	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)
Newport	0.11 (0.11)	0.67 (0.14)	0.50 (0.15)	0.58 (0.15)	0.42 (0.15)
North Chincoteague South	0.17 (0.17)	0.67 (0.21)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)
Chincoteague	0.73 (0.14)	0.64 (0.15)	1.00 (0.00)	0.64 (0.15)	1.00 (0.00)

Summary

The SAV Index by region appears to be less representative than the WQ Index (Figures 6.2.1 and 4.4.2). Although both used “seagrass habitat criteria,” there was a significant difference between seagrass habitat criteria achievement for total nutrients (see Chapter 4.4, specifically Table 4.4.2) and dissolved nutrients (Table 6.2.3). Future evaluation of habitat criteria should include total nutrients, since more stations met the inorganic nutrient criteria (Table 6.2.3), but demonstrated relatively poor status when analyzed for total nutrients (see Chapter 4.1, specifically Figures 4.1.1 and 4.1.2).

Since data on light availability were flawed (due to many secchi reading of ‘on bottom’), this parameter was not weighted heavier than the other indicators. However, as a general first iteration of SAV habitat testing, these results tend to follow the spatial pattern of SAV distribution (see Chapter 6.1 of this report).

References

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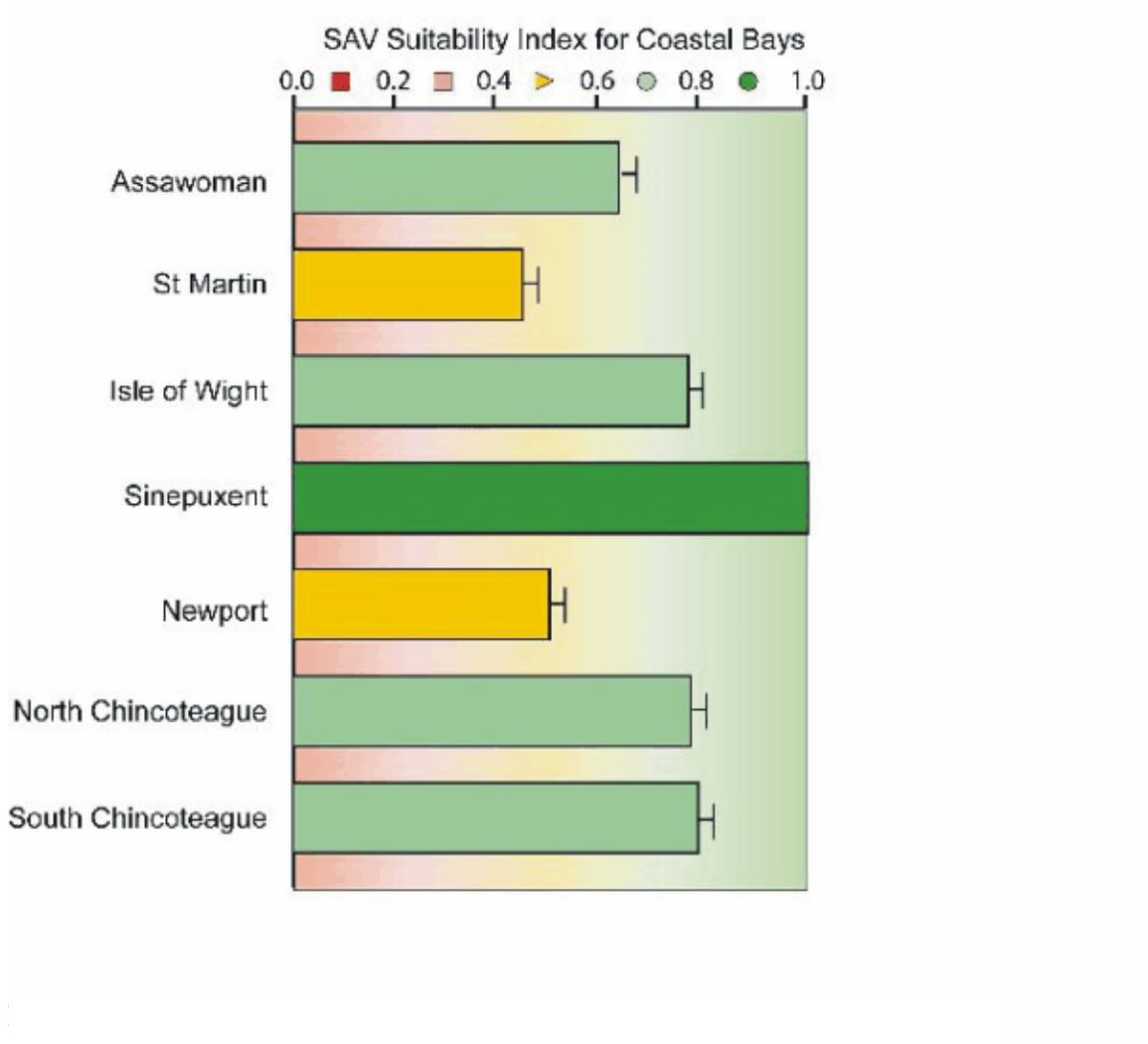


Figure 6.2.1: Seagrass index (SAVI) results for each Coastal Bays segment.