Tampa Bay Estuary Program
Technical Report # 09-02

Data Summary from the Tampa Bay Interagency Seagrass Monitoring Program Through the Year 2001

Submitted to the Tampa Bay Estuary Program

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by
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City of Tampa
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Introduction

The state of Tampa Bay's seagrass meadows have become an important issue in the past three decades as scientist and environmental managers have worked to reverse the detrimental effect of eutrophication upon this important habitat within the estuarine ecosystem. Seagrass coverage in Tampa Bay declined from about 16,000ha in 1950 to near 8800ha in 1982. This decline was a result of anthropogenic impacts such as dredge and fill operations and excessive nutrient discharge to the bay. However, nutrient load reductions began to ameliorate eutrophic conditions during the 1980s and as water clarity improved, seagrass began to recolonize several areas of the bay.

The Tampa Bay National Estuary Program (now named Tampa Bay Estuary Program or TBEP) established restoration goals for Tampa Bay by advocating control of nutrients discharged to Tampa Bay thus controlling conditions that potentially could allow Tampa Bay to digress back into a more eutrophic system. Seagrass was chosen as the "biological barometer" to gauge the effectiveness of the nutrient reduction strategy. It was postulated that improved water clarity resulting from reduced phytoplankton biomass would allow restoration of seagrass coverage. Using the nutrient reduction paradigm, the TBEP set a restoration goal of similar seagrass acreage to that found in 1950.

In 1997, the TBEP coordinated the creation of a bay-wide fixed transect seagrass monitoring program. The primary goal of the program is to document temporal and spatial changes in seagrass species composition, abundance, and distribution along a depth gradient. Several bay area agencies committed personnel and equipment to the program. Data collection began along sixty transects in 1998.

Program Overview

In 1997, 30 fixed seagrass monitoring transects were selected from randomly selected Tampa Bay transects that had previously been used by SWIM to groundtruth the every other year aerial photographic surveys. An additional 27 fixed transects were placed in a nonrandom manner in other areas of interest within Tampa Bay. In 2000, two transects in Middle Tampa Bay and three transects in Lower Tampa Bay were added. Also, in 2000, transect S4T1 in Lower Tampa Bay was not monitored due to the impending expansion at Port Manatee. Several transects that were being monitored in Old Tampa Bay did not appear to provide sufficient information to characterize seagrass distribution in several sections of this bay segment. Therefore, monitoring was terminated at transects S1T2, S1T7, S1T10, S1T11, and S1T12 after 2000. Instead, transects S1T13, S1T14, S1T15, S1T16, and S1T17 were established and monitored in 2001 (see Figure 1 for the location of terminated and newly established transects in Old Tampa Bay). In total there were 62 seagrass transects monitored in Tampa Bay during 2001 (Figure 1). The agency responsible for monitoring each transect and the initial monitoring year for that transect is presented in Table 1. These agencies include Hillsborough County Environmental Protection Commission (HCEPC), City of Tampa, Bay Study Group (BSG), Pinellas County Department of Environmental Management (PC), Hillsborough County Cockroach Bay Aquatic Preserve (CB), Florida Fish & Wildlife Conservation

Commission, Florida Marine Research Institute (FMRI), Manatee County Environmental Management Department (MC), and Tampa Baywatch, Inc. (TBI).

Report Summary

This paper presents a general overview of the Tampa Bay Interagency Seagrass Monitoring Program and results concerning seagrass distribution within Tampa Bay. Further, a summary of trends in areal coverage and major changes in species composition observed during the course of the monitoring program are also included. Data collected during the course of the program pertaining to water quality, sediment composition, and epiphytes are not discussed within this report. All information collected during the monitoring program may be obtained through the TBEP.

Results regarding seagrass species abundance, distribution, and zonation over time are presented for the 1997-2001 period in Hillsborough Bay (HB, Figures 15-26) and the 1998-2001 period for Old Tampa Bay (OTB, Figures 3-14), Middle Tampa Bay (MTB, Figures 28-40), Lower Tampa Bay, including Terra Ceia Bay (LTB, Figures 42-55), and Boca Ciega Bay (BCB, Figures 57-67). For each transect, results are presented in a graphic format illustrating annual species composition, abundance, and distribution. Seagrass abundance is presented as percent coverage within a square meter using the Braun Blanquet coverage class system. The coverage classes are as follows: 1) solitary = one short shoot; 2) few = more than one short shoot, but less than 1% seagrass coverage within a meter square; 3) 1 = 1-5% seagrass coverage within a meter square; 4) 2 = 6-25% seagrass coverage within a meter square; 5) 3 = 26-50% seagrass coverage within a meter square; 6) 4 = 51-75% seagrass coverage within a meter square; 7) 5 = 76-100% seagrass coverage within a meter square; 8) 6 = reported seagrass coverage not occurring within a meter square. The "reported" category, though not a Braun Blanquet coverage class, is useful in following recolonization patterns or delineating areas with changes in species composition.

Additional 2001 transect information for each bay segment is presented in Figures 2 (OTB), 15 (HB), 27 (MTB), 41 (LTB), and 56 (BCB). These data include the length of each transect, the number of meter square placements (N) along each transect, and the percent of N which each seagrass species was found.

Training of Participating Agency Personnel:

During the initial development of the seagrass transect monitoring program, concerns were raised about the need to collect comparable data between the participating agencies. To address this concern, a training class is scheduled several weeks prior to the start of each annual monitoring effort to train personnel in field sampling procedures and protocols.

Results and Discussion

Old Tampa Bay:

Of the twelve transects monitored in Old Tampa Bay during 2001 (Figure 2), only S1T1, S1T3, S1T5, S1T6, S1T8, and S1T9 have data that encompass the four year data set generated from the onset of the program. Transect S1T4 was established in 1999, while monitoring of transects S1T13, S1T14, S1T15, S1T16, and S1T17 commenced in 2001. Braun Blanquet data from transects monitored during 2001 are presented in Figures 3-14.

All five seagrass species found in Tampa Bay were found in Old Tampa Bay during 2001. Generally, *Halodule wrightii* (Shoal grass) has been the dominant species found along each transect. However, *Thalassia testudinum* (Turtle grass) and *Syringodium filiforme* (Manatee grass) have comprised a substantial portion of the seagrass composition along the eastern shoreline and the western shoreline south of Gandy Bridge. Sparse *Ruppia maritima* (Widgeon grass) and *Halophila engelmanni* (Star grass) have been documented in northeast and northwest Old Tampa Bay, respectively.

Only minor changes in species composition and distribution have been noted in Old Tampa Bay during the course of the study. In contrast, SWIM reported large losses of Old Tampa Bay seagrass coverage between 1996-1999 (Dave Tomasko, Personal communication). This dichotomy may serve to illustrate the ineffectiveness of the five transects deleted in 2001. In a 2001 meeting of the Tampa Bay Seagrass Working Group to discuss transect relocation in Old Tampa Bay, it was agreed that data from the new transect selections would have reflected this loss of coverage.

Hillsborough Bay:

Eleven transects have been monitored in Hillsborough Bay since 1997 (Figure 15). *H. wrightii* has been the dominant species where seagrass coverage was present. Also, *R. maritima* has persisted along the northeastern shoreline and has been noted periodically in most areas of Hillsborough Bay. Braun Blanquet data from the Hillsborough Bay transects are presented in Figures 16-26.

Hillsborough Bay seagrass coverage increased over 50 percent from about 56ha in 1997 to nearly 86ha in 2001, largely due to rapid *H. wrightii* recolonization around southeastern Interbay Peninsula (Figure 3). However, there has been little coverage change in other areas of Hillsborough Bay since 1997.

Middle Tampa Bay:

Thirteen transects have been established in Middle Tampa Bay (Figure 27). Two transects, S3T12 and S3T14, have been monitored since 1997. Two additional transects, S3T10 and S3T11, were established in 2000. Braun Blanquet data from transects monitored during 2001 are presented in Figures 28-40.

Four seagrass species, *H. wrightii*, *R. maritima*, *S. filiforme*, and *T. testudinum* were documented in Middle Tampa Bay during 2001. *H. wrightii* has been the dominant species in the northeast quadrant of Middle Tampa Bay. Typically, seagrass composition south of the Little Manatee River and along the western side of Middle Tampa Bay has been comprised of *H. wrightii*, *S. filiforme*, and *T. testudinum*.

In general, there has been little variation in seagrass species composition and abundance in Middle Tampa Bay. During the course of the monitoring, the only notable change has been the apparent thinning and loss of the seaward edge of *H. wrightii* coverage near Wolf Branch (transect S3T13). The edge of this meadow has retreated nearly 40m since 1998.

Lower Tampa Bay:

Fourteen transects were assessed for seagrass coverage in 2001 (Figure 41). *H. wrightii*, *S. filiforme*, and *T. testudinum* were the only species reported in Lower Tampa Bay (including Terra Ceia Bay) during 2001, although *H. engelmanni* and *R. maritima* have been documented in the Manatee River in previous monitoring years. Braun Blanquet data from transects monitored during 2001 are presented in Figures 42-55.

Generally, seagrass composition in Lower Tampa Bay has been dominated by *T. testudinum*. *S. filiforme* has not been documented along the transects within the Manatee River, however, this species is common in the proximity of Terra Ceia Bay and Egmont Key. The ubiquitous *H. wrightii* was present on most transects.

There has been little change in species composition during the course of the study. However, there appears to be a slight decrease in *T. testudinum* abundance in southeastern Lower Tampa Bay. This trend has been most evident along transect S4T2 located just south of Bishop Harbor.

Boca Ciega Bay:

Eleven transects have been assessed for seagrass coverage in Boca Ciega Bay (Figure 56). *H. wrightii*, *S. filiforme*, and *T. testudinum* have been documented within this bay segment. Braun Blanquet data from transects monitored during 2001 are presented in Figures 57-67.

Generally, *H. wrightii* has been the dominant species in the northern portion of Boca Ciega Bay and coverage transitions to a *T. testudinum* dominated community further south. Only minor fluctuations have been noted within the Boca Ciega Bay seagrass community since the start of the monitoring program. The major change has been an apparent shift from a *T. testudinum* dominated community present along transect S5T8 in 1998 to a *S. filiforme* meadow.

Conclusion

We now have four years or more of data from most of the Tampa Bay seagrass monitoring transects. The collected information suggests that most seagrass meadows in Old Tampa Bay, Middle Tampa Bay, and Lower Tampa Bay have been relatively stable in terms of species composition and abundance. The only major change detected has been the rapid development of *H. wrightii* meadows along southeastern Interbay Peninsula in Hillsborough Bay.

Nitrogen management has been the keystone to the recovery of Tampa Bay to date. The need to reduce nitrogen to the bay was identified in the 1960s and work began to control point source loading. As nitrogen sources were reduced in the late 1970s and early 1980s, there were soon improvements noted such as reductions in macroalgae and phytoplankton biomass. Following these improvements, minor seagrass recolonization began to occur in some areas of Tampa Bay. With the advent of the Tampa Bay National Estuary Program in the early 1990s, work began on establishing acceptable levels of phytoplankton biomass needed to maintain adequate water clarity to promote seagrass recolonization.

Phytoplankton biomass between 1999-2001 has been near or below target levels set for all bay segments (City of Tampa; unpublished data). Information collected to date from the Tampa Bay Interagency Seagrass Monitoring Program suggests that seagrass coverage in most areas of Tampa Bay has changed little since 1998, though SWIM reported a large loss in seagrass coverage in Old Tampa Bay between 1996-1999. In 2001, an eighteen month study of Old Tampa Bay was initiated with a goal to discern additional factors that may affect seagrass health.

Acknowledgements

This project has been made possible through the auspices of the Tampa Bay Estuary Program. Special thanks are extended to Holly Greening who has facilitated the coordination and implementation of the seagrass monitoring program. Also, Dave Tomasko (Southwest Florida Water Management District-Surface Water Improvement Management Program), Ray Kurz (Post, Buckley, Shue, and Jernigan), and Tom Reis (Scheda Ecological Associates, Inc.) provided guidance in the initial design of the monitoring protocols. Field collections were conducted by personnel from Florida Fish & Wildlife Conservation Commission - Florida Marine Research Institute, Hillsborough County Cockroach Bay Aquatic Preserve, Hillsborough County Environmental Protection Commission, Manatee County Environmental Management Department, Pinellas County Department of Environmental Management, Tampa BayWatch, Inc., and City of Tampa Bay Study Group. The generous contributions from these agencies and the hard work by their personnel have ensured the success of this project. Finally, Robin Lewis (Lewis Environmental Services, Inc.) is acknowledged for early on advocating the need to establish permanent seagrass transects in Tampa Bay and for his continued support of this program.

Table 1. Transect monitoring in Tampa Bay by agency and initial monitoring date.

		HCEPC	BSG	PC	CB	FMRI	MC	TBI
Old Tampa Bay	S1T1	1999						
	S1T3	1998						
	S1T4	1999						
	S1T5	1998						
	S1T6	1998						
	S1T8	1998						
	S1T9	1998						
	S1T13	2001						
	S1T14	2001						
	S1T15	2001						
	S1T16			2001				
	S1T17		2001					
Hillsborough Bay	S2T2		1997					
	S2T3		1997					
	S2T4		1997					
	S2T5		1997					
	S2T6		1997					
	S2T8		1997					
	S2T9		1997					
	S2T10		1997					
	S2T111		1997					
	S2T112		1997					
	S2T12		1997					
Middle Tampa Bay	S3T1					1998		
	S3T2					1998		
	S3T3				1998			
	S3T4				1998			
	S3T5				1998			
	S3T6				1998			
	S3T7					1998		
	S3T8					1998		
	S3T9				1998			
	S3T10							2000
	S3T11							2000
	S3T12		1997					
	S3T13		1997					
Lower Tampa Bay	S4T2						1998	
	S4T3						1999	
	S4T4						1998	
	S4T5						1998	
	S4T6						1998	
	S4T7						1998	
	S4T8						1999	
	S4T9						1998	
	S4T10						1998	
	S4T11						1998	
	S4T12		1998					
	S4T13							2000
	S4T14							2000
	S4T15							2000
Boca Ciega Bay	S5T1			1998				
	S5T2			1999				
	S5T3			1998				
	S5T4			1998				
	S5T5			1998				
	S5T6			1998				
	S5T7			1998				
	S5T8			1998				
	S5T9			1998				
	S5T10			1998				
	S5T11			1998				

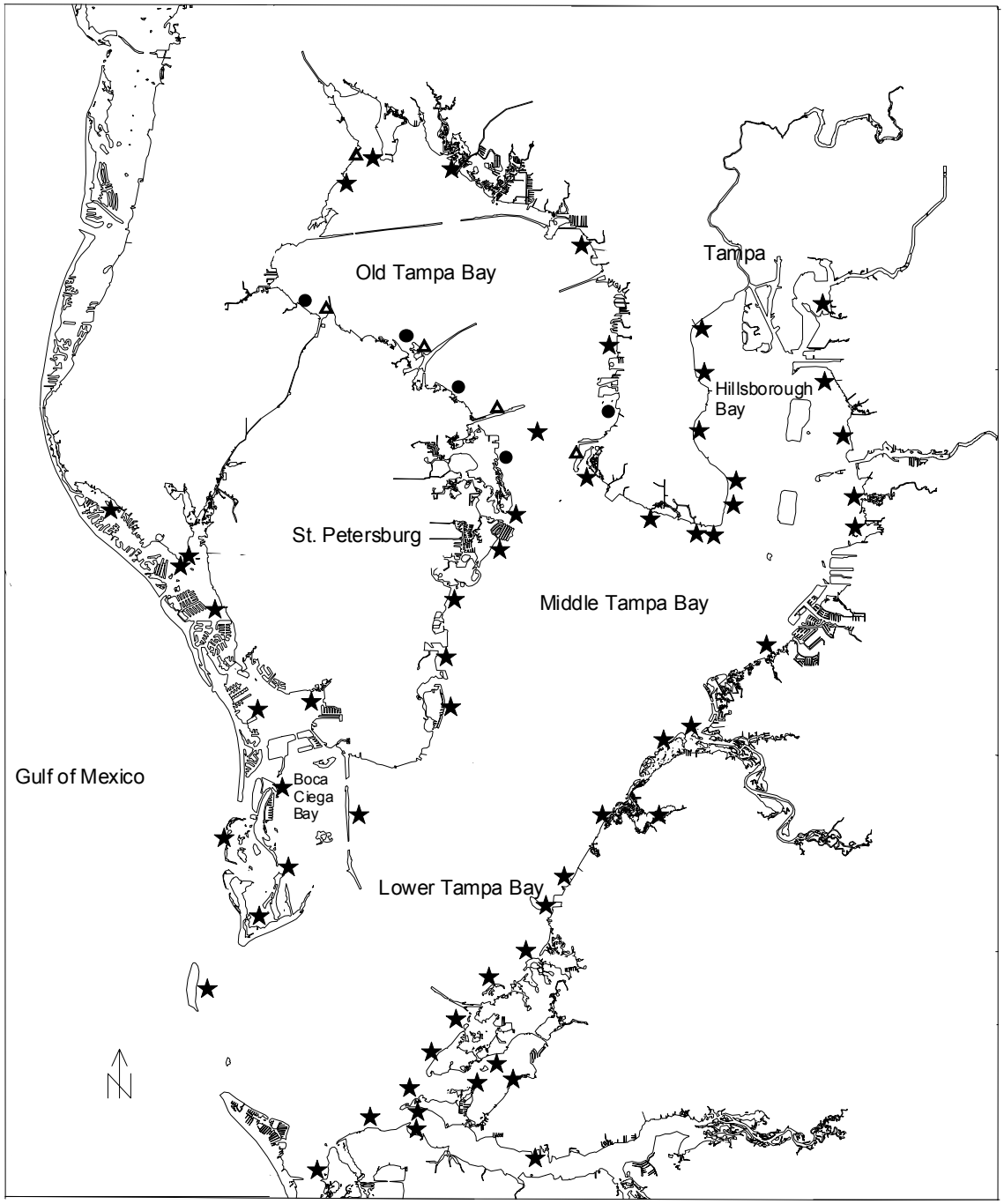

Figure 1. Location of the 62 seagrass monitoring transects in Tampa Bay. Filled circles (●) are new Old Tampa Bay transects. Triangles (▲) are discontinued Old Tampa Bay transects.

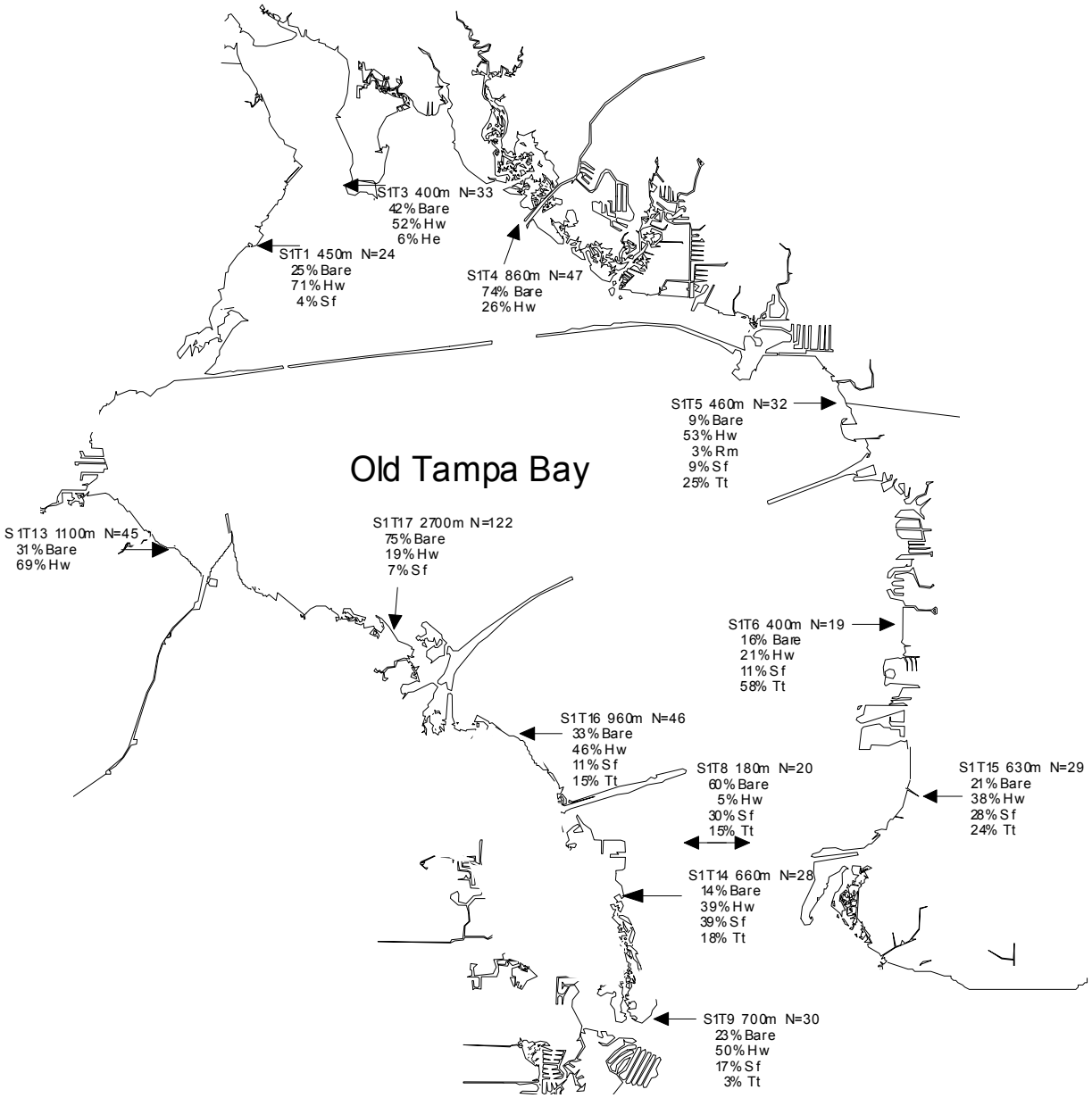

Figure 2. Name, location, length and percent of meter square placements containing each seagrass species along the 12 Old Tampa Bay seagrass monitoring transects in 2001. N=number of meter square placements; He=*Halophila engelmanni*; Hw=*Halodule wrightii*; Rm=*Ruppia maritima*; Sf=*Syringodium filiforme*; Tt=*Thalassia testudinum*.

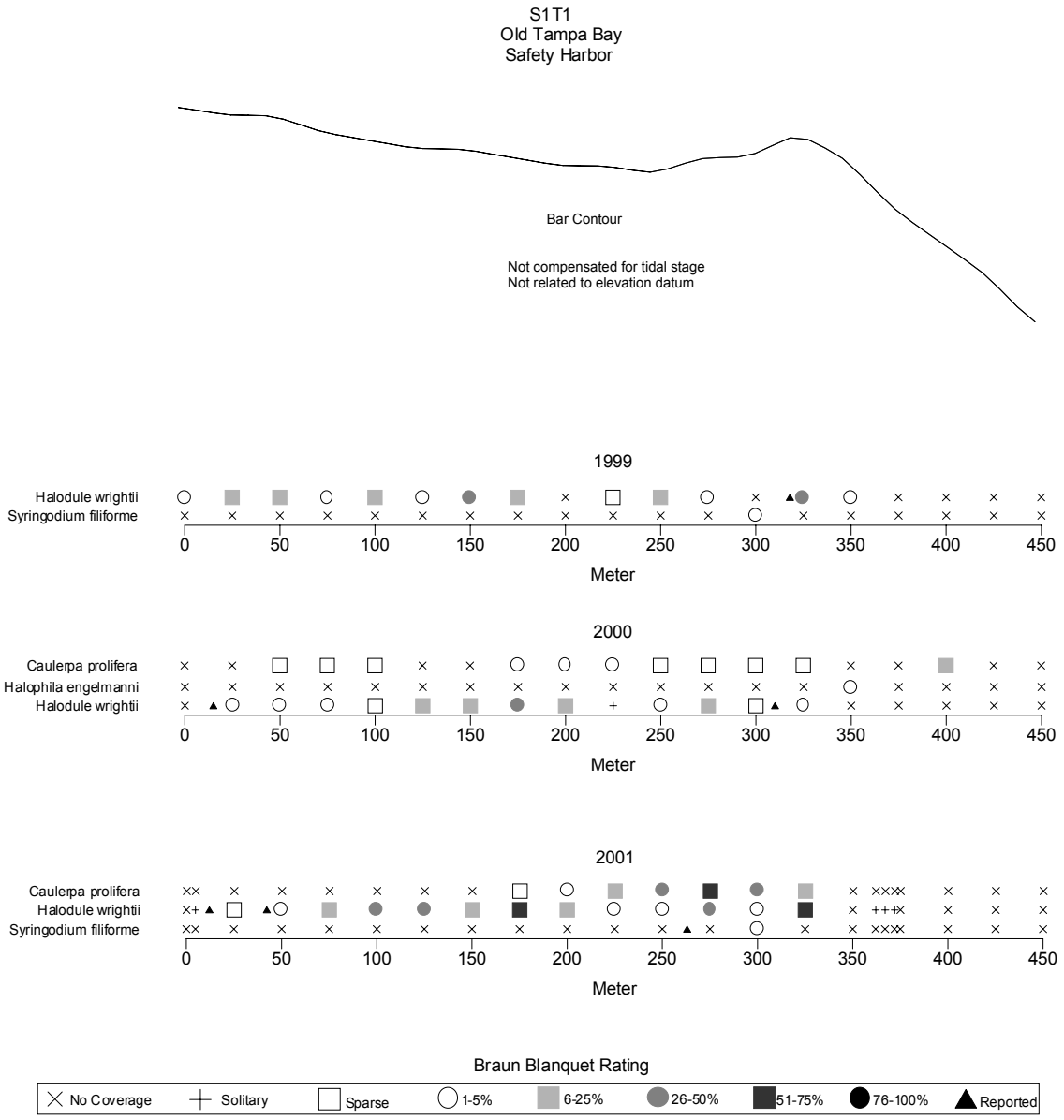

Figure 3. Seagrass species, abundance, and zonation at S1T1 from 1998-2001.

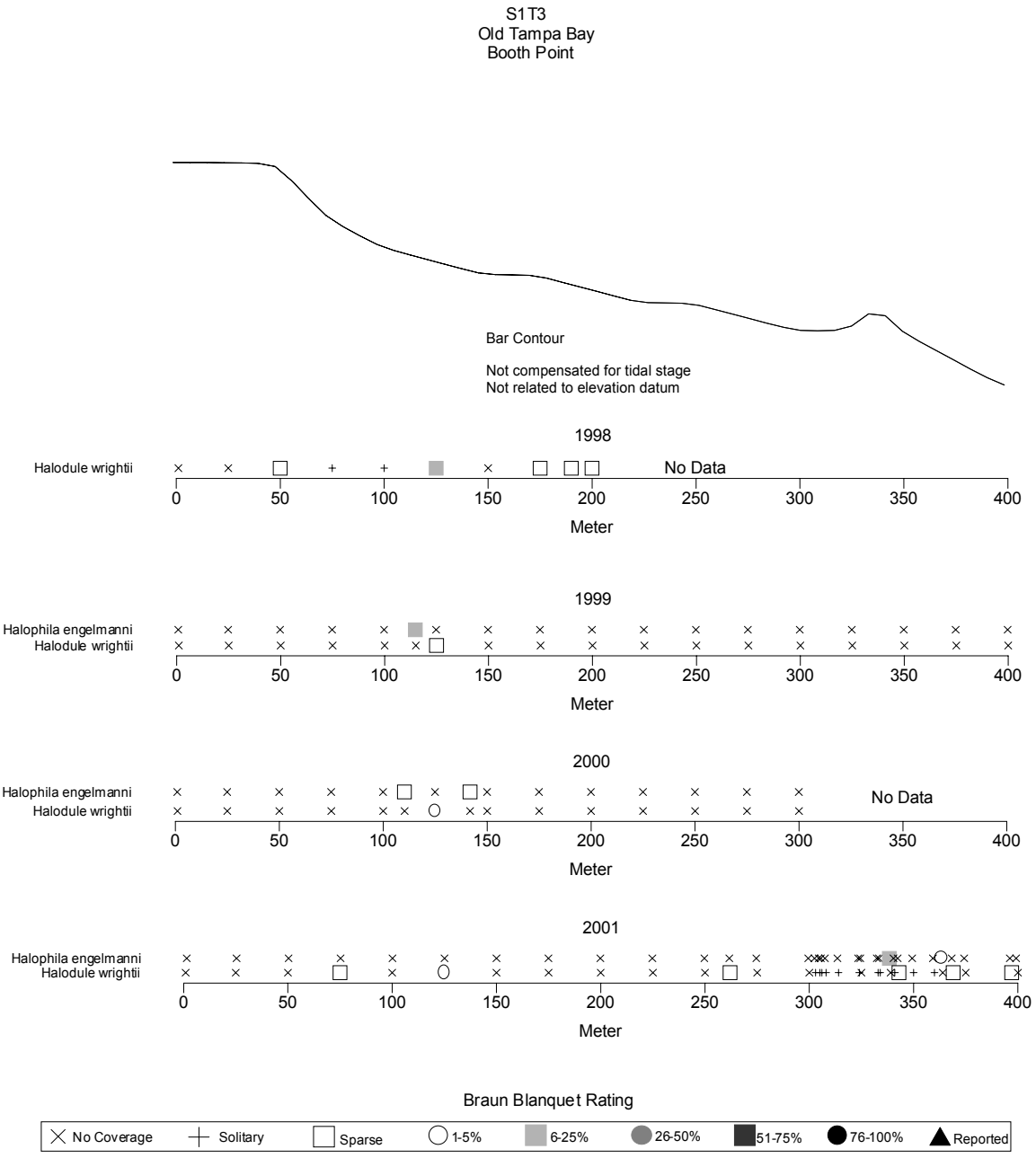

Figure 4. Seagrass species, abundance, and zonation at S1T3 from 1998-2001.

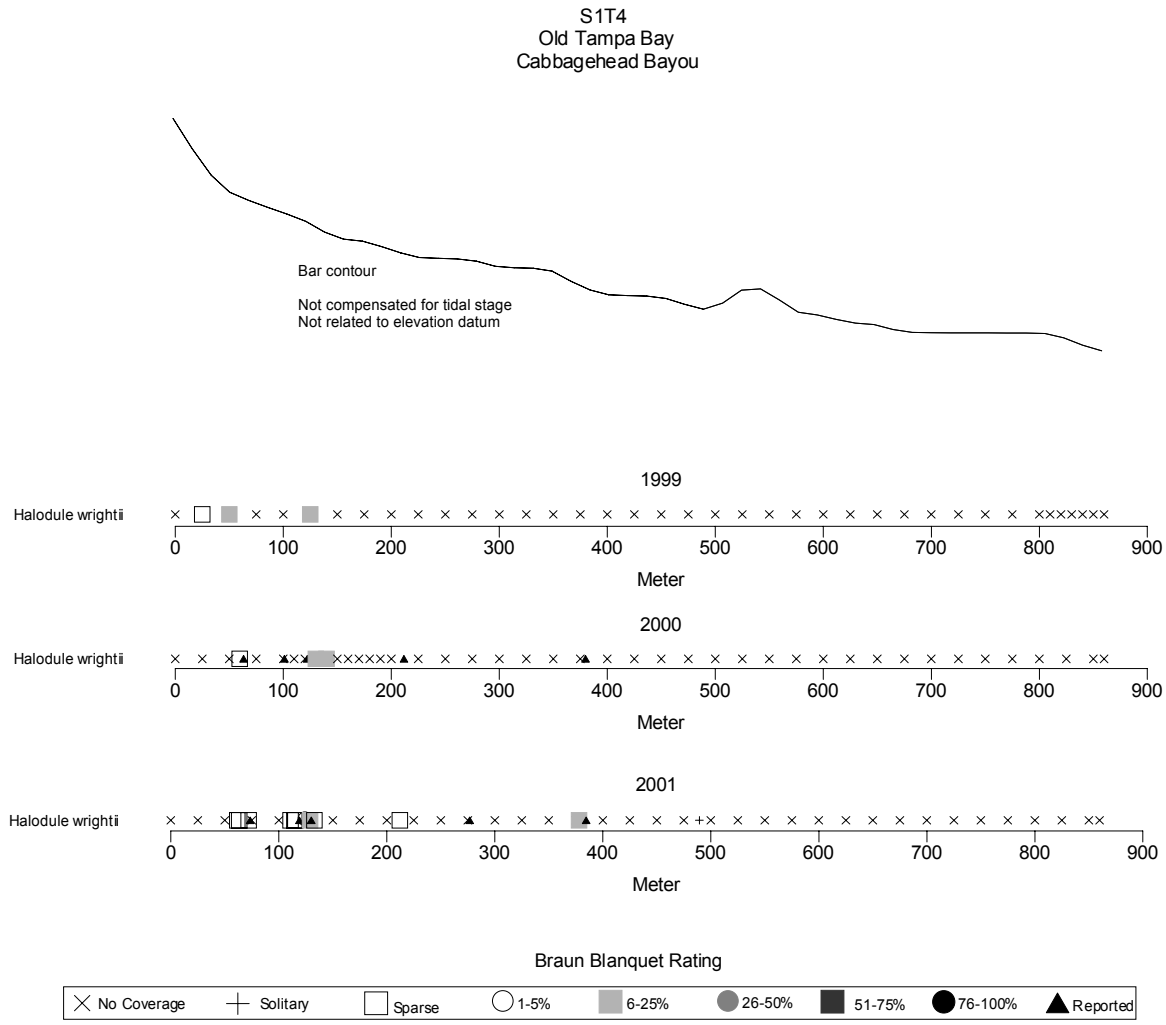

Figure 5. Seagrass species, abundance, and zonation at S1T4 from 1999-2001.

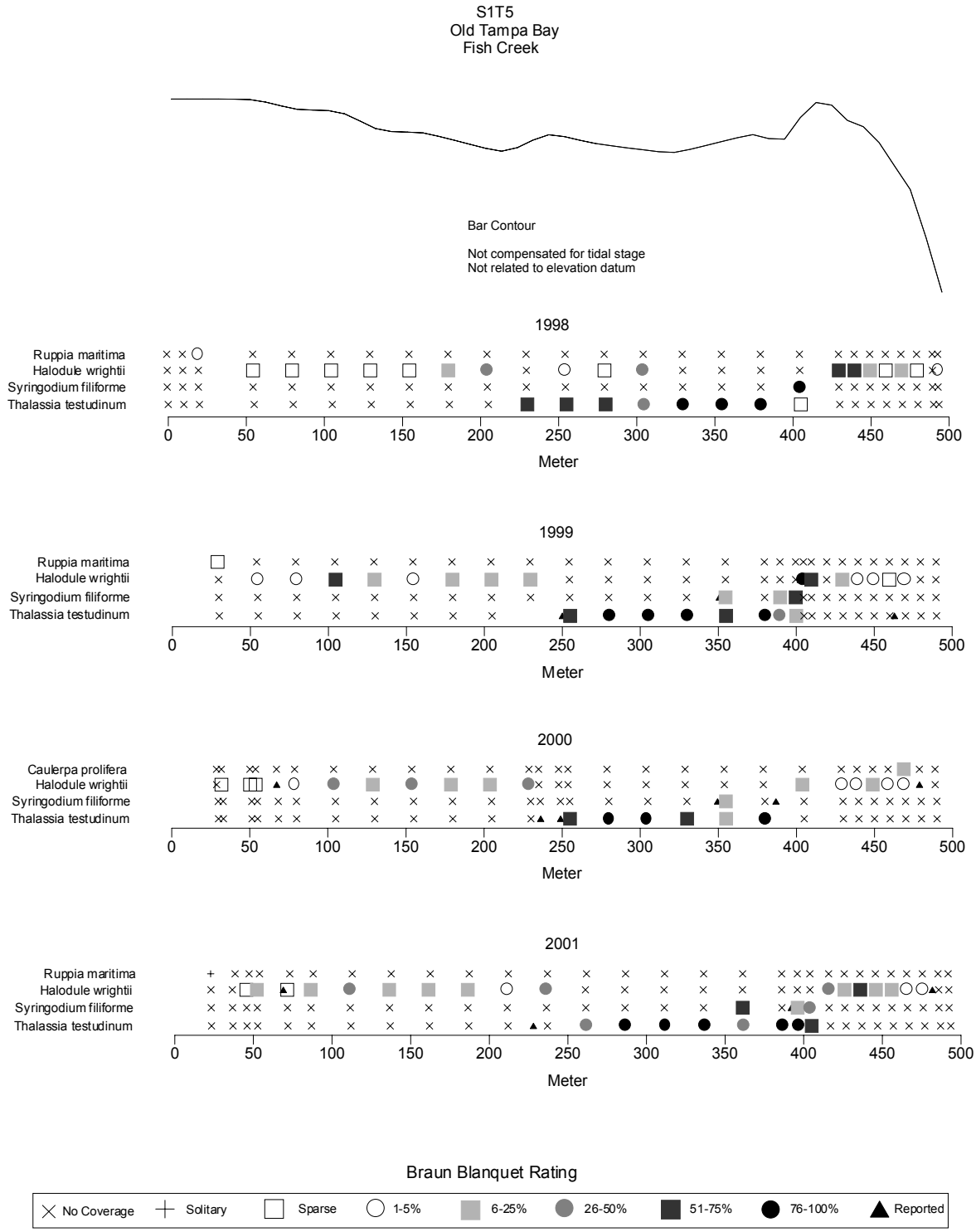

Figure 6. Seagrass species, abundance, and zonation at S1T5 from 1998-2001.

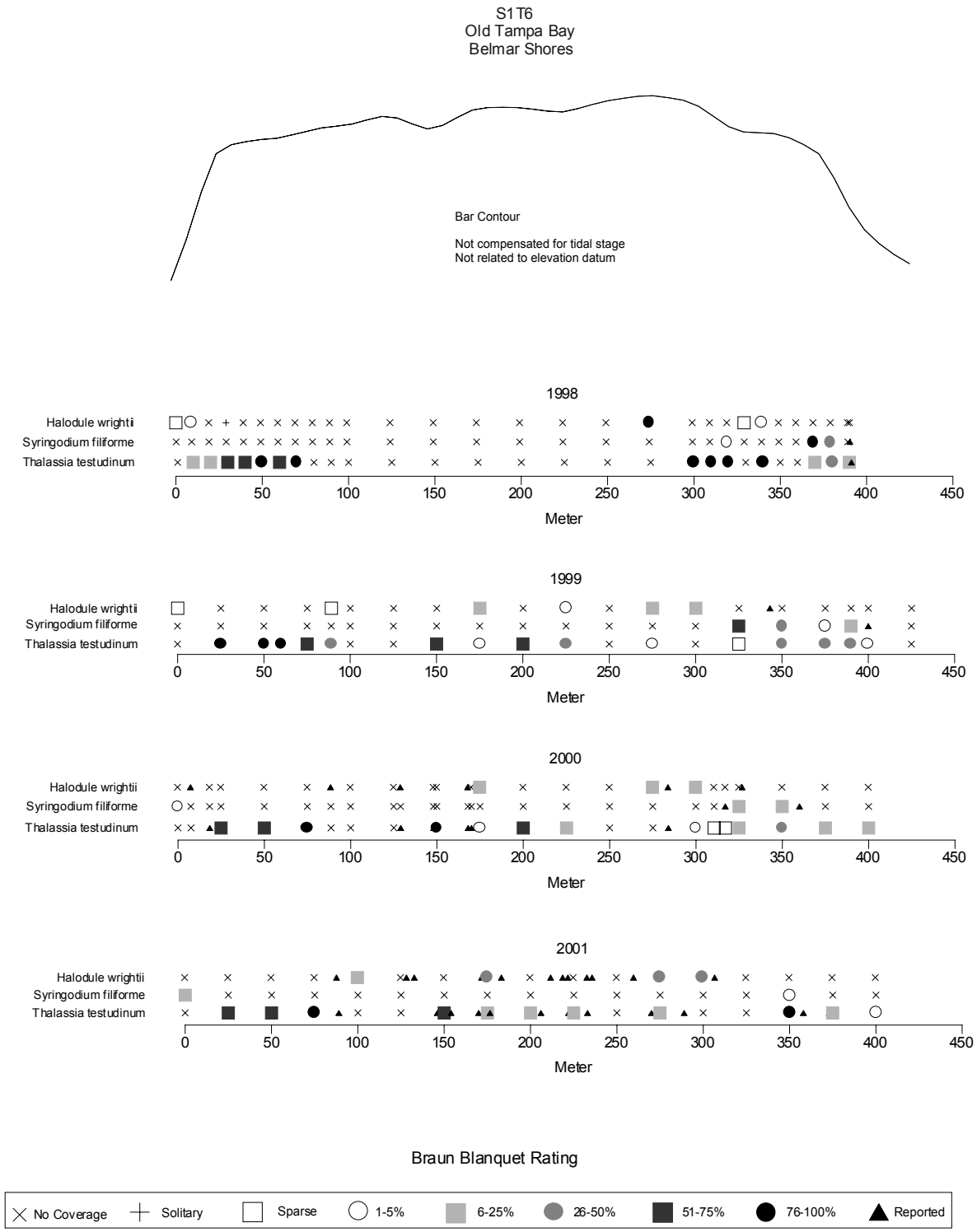

Figure 7. Seagrass species, abundance, and zonation at S1T6 from 1998-2001.

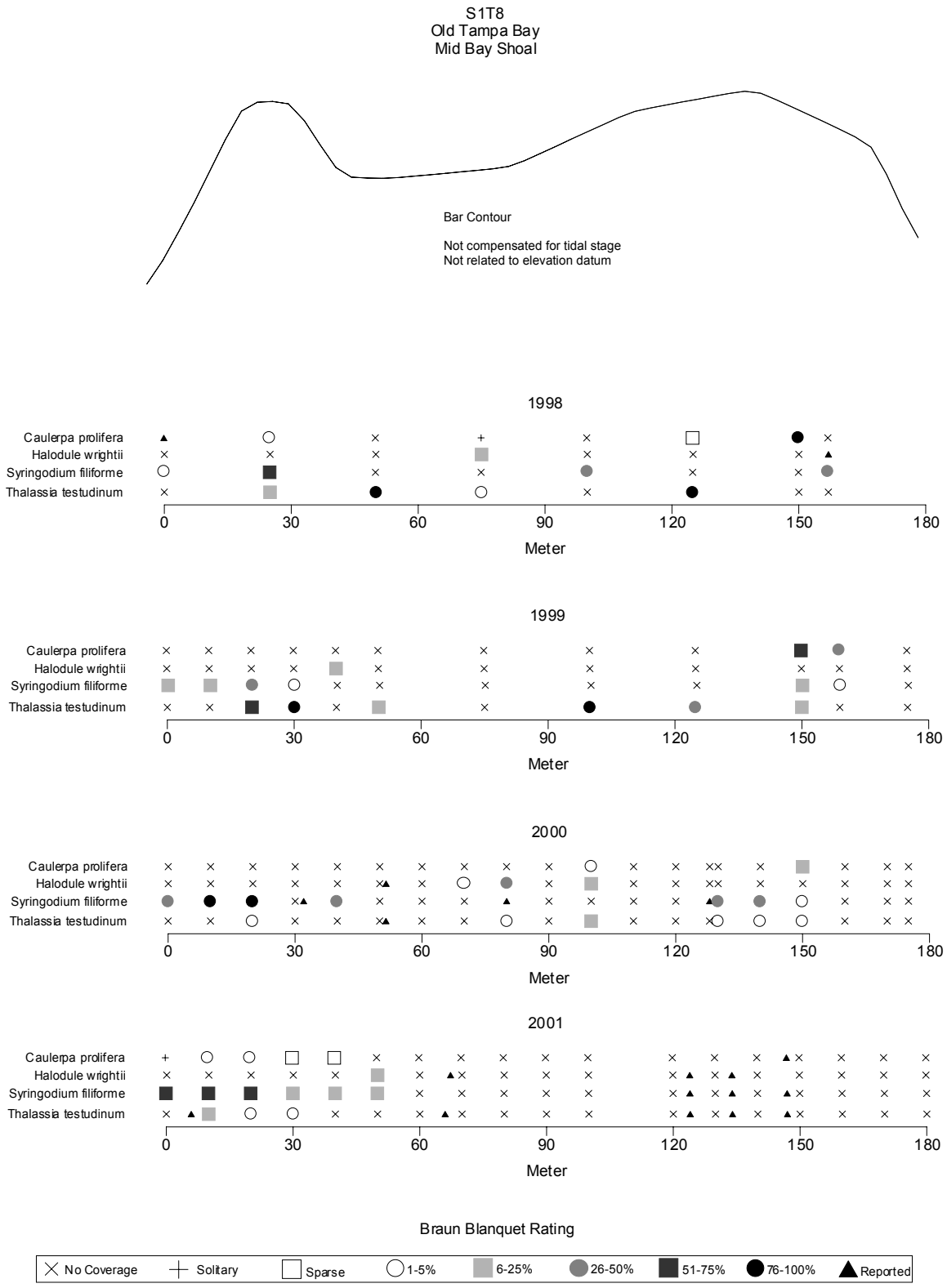

Figure 8. Seagrass species, abundance, and zonation at S1T8 from 1998-2001.

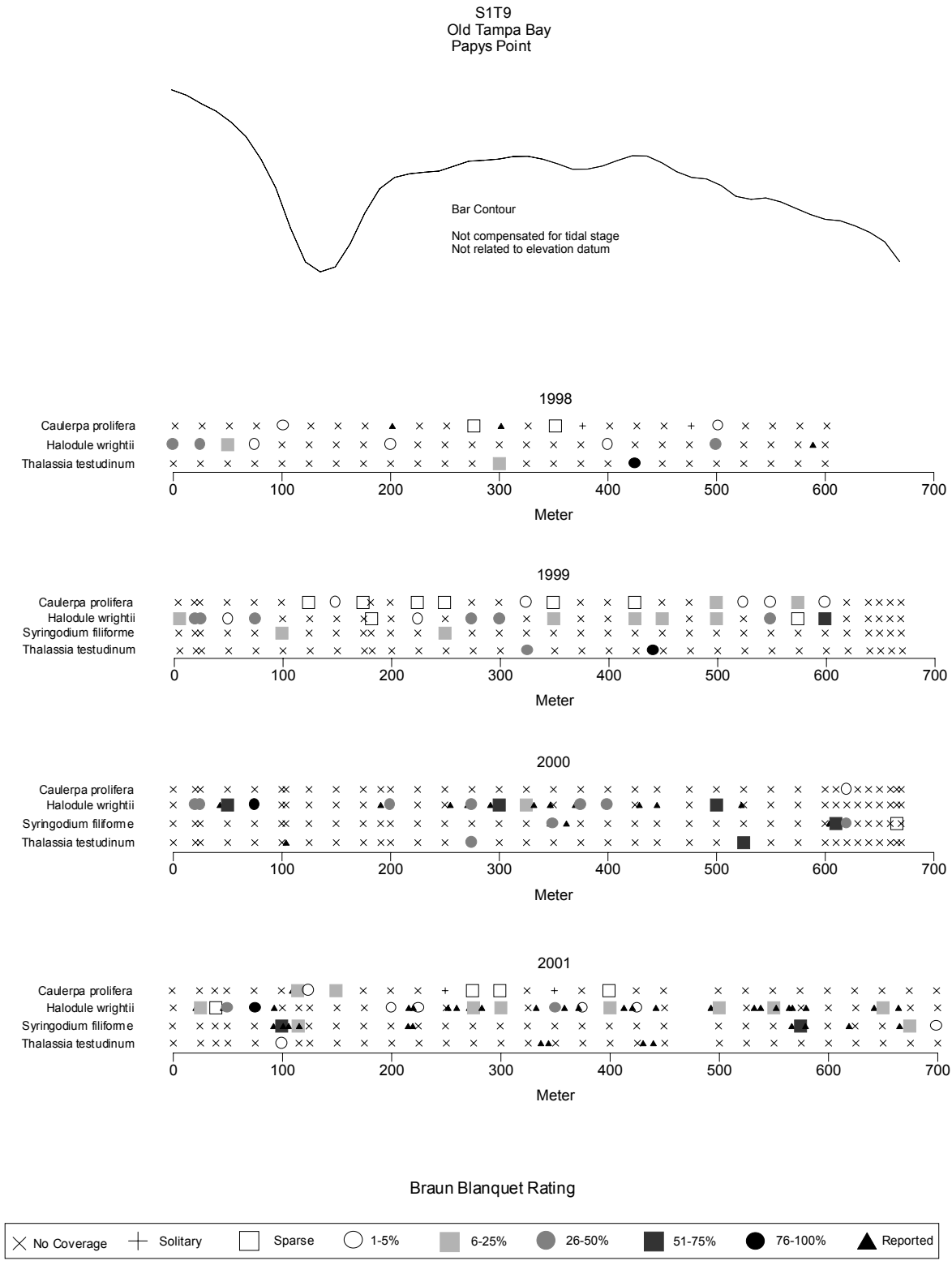

Figure 9. Seagrass species, abundance, and zonation at S1T9 from 1998-2001.

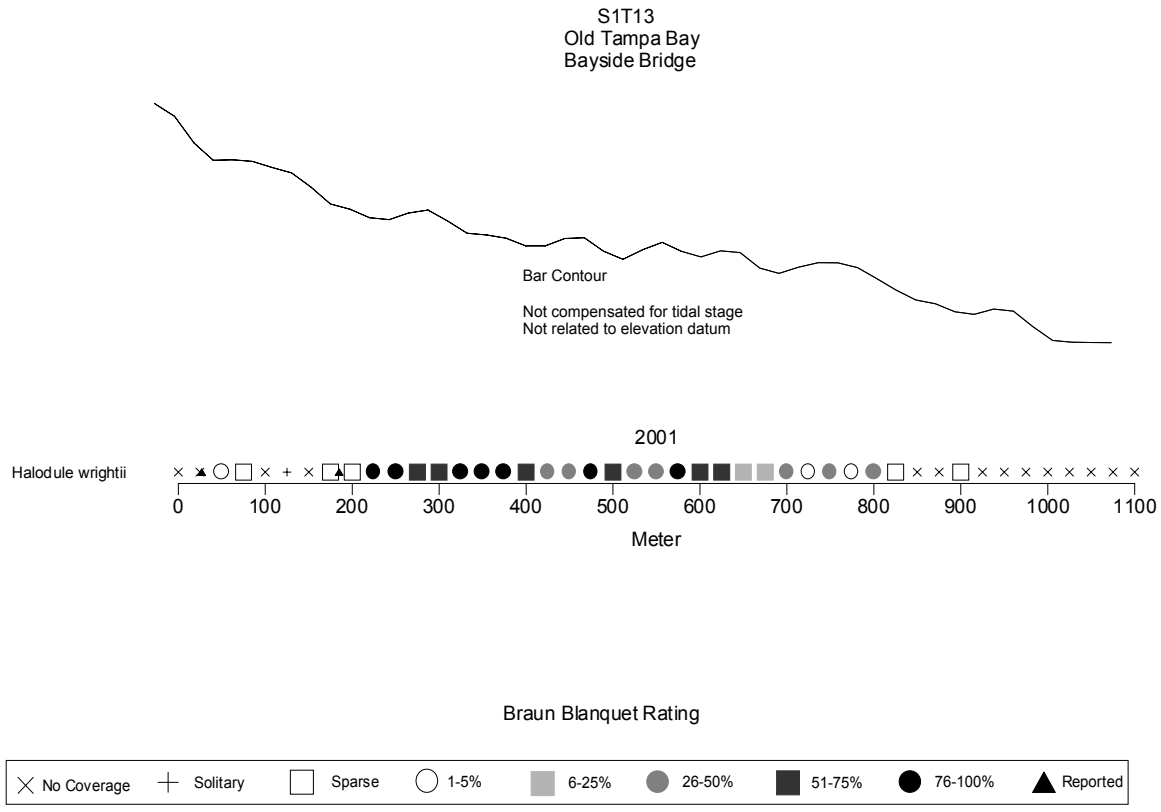

Figure 10. Seagrass species, abundance, and zonation at S1T13 from 2001.

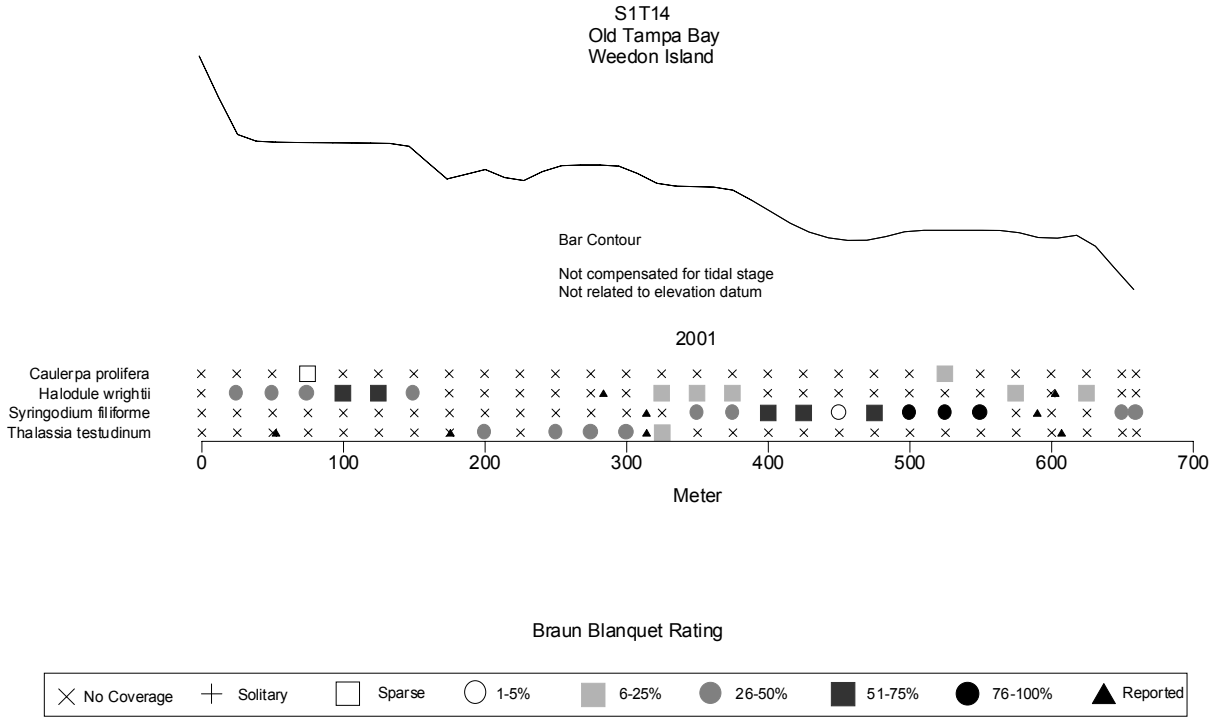

Figure 11. Seagrass species, abundance, and zonation at S1T14 from 2001.

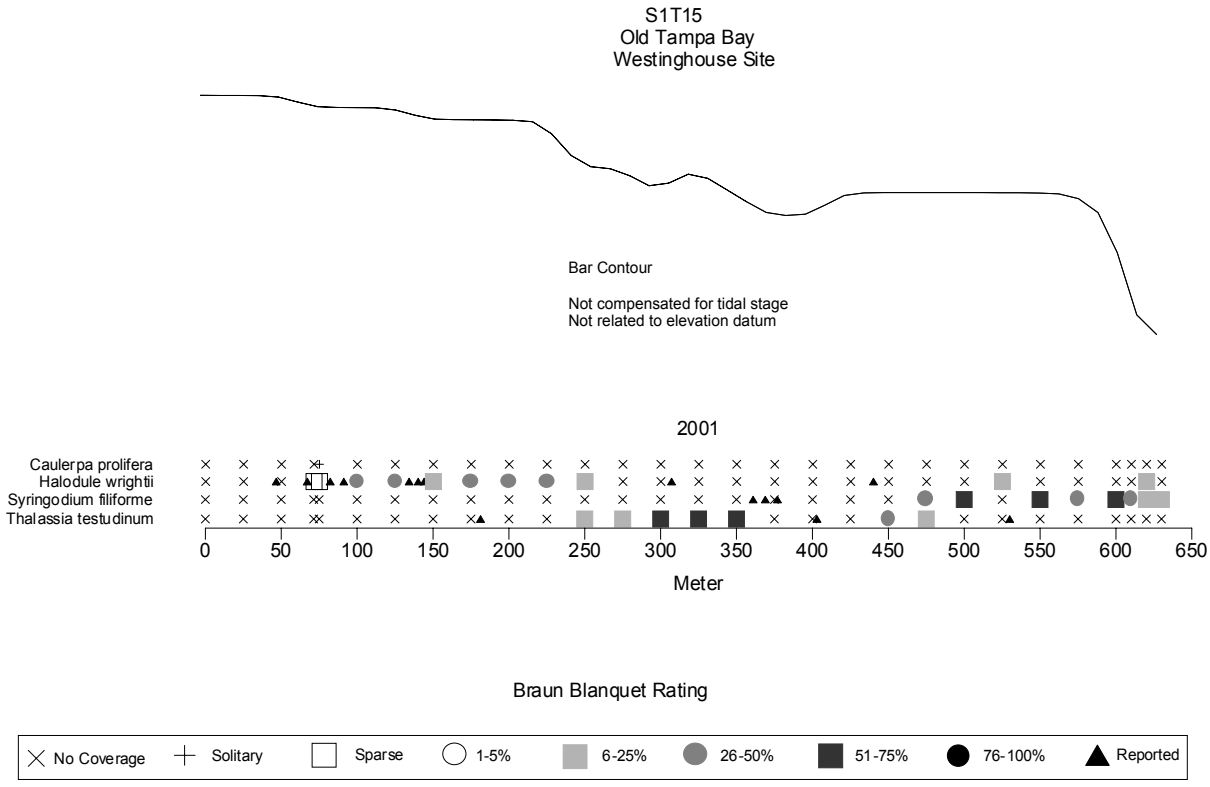

Figure 12. Seagrass species, abundance, and zonation at S1T15 from 2001.

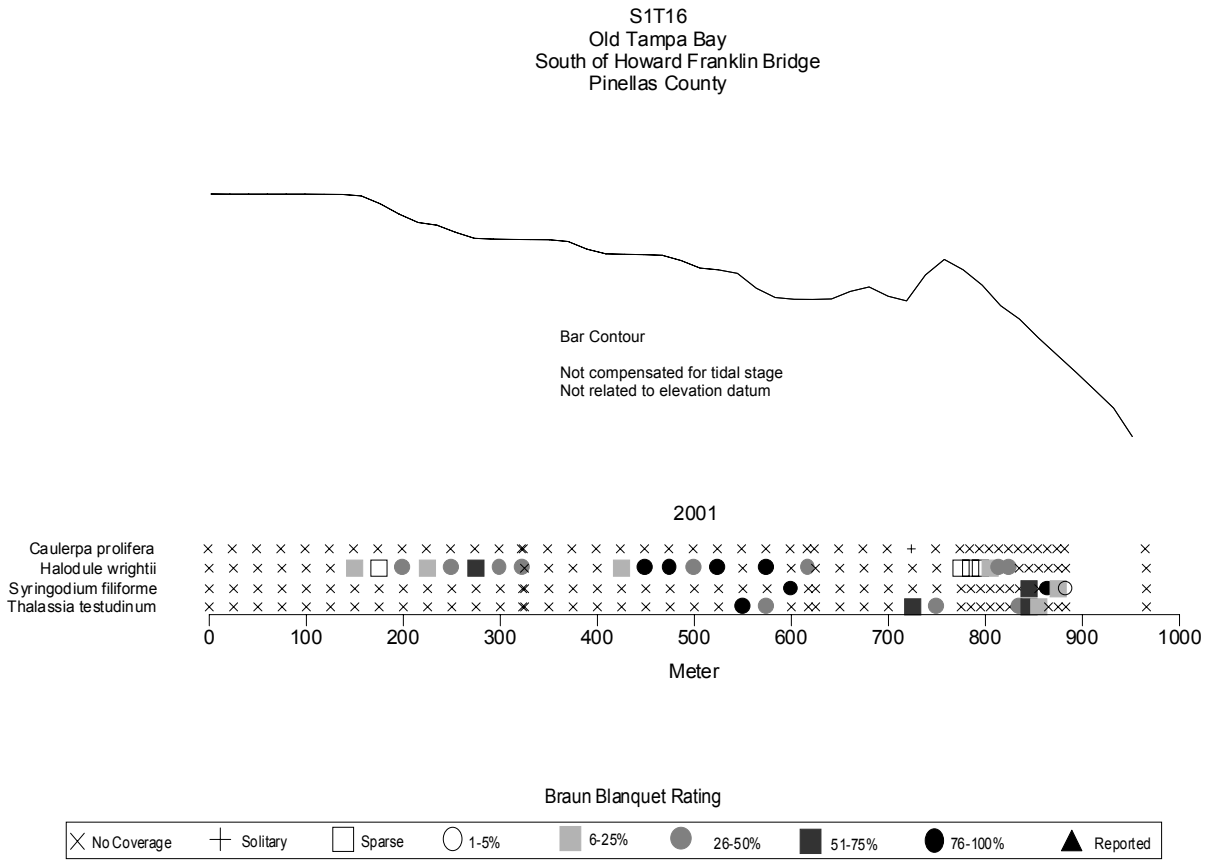

Figure 13. Seagrass species, abundance, and zonation at S1T16 from 2001.

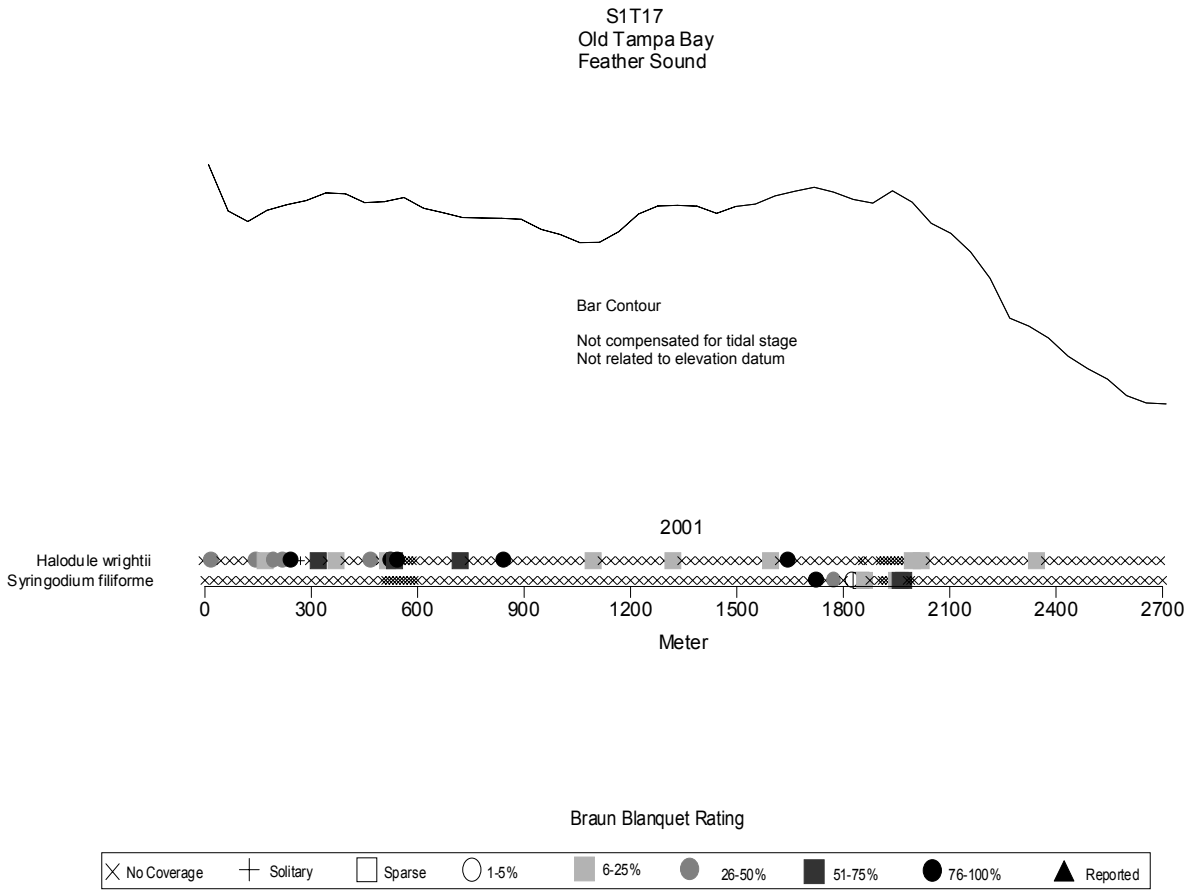

Figure 14. Seagrass species, abundance, and zonation at S1T17 from 2001.

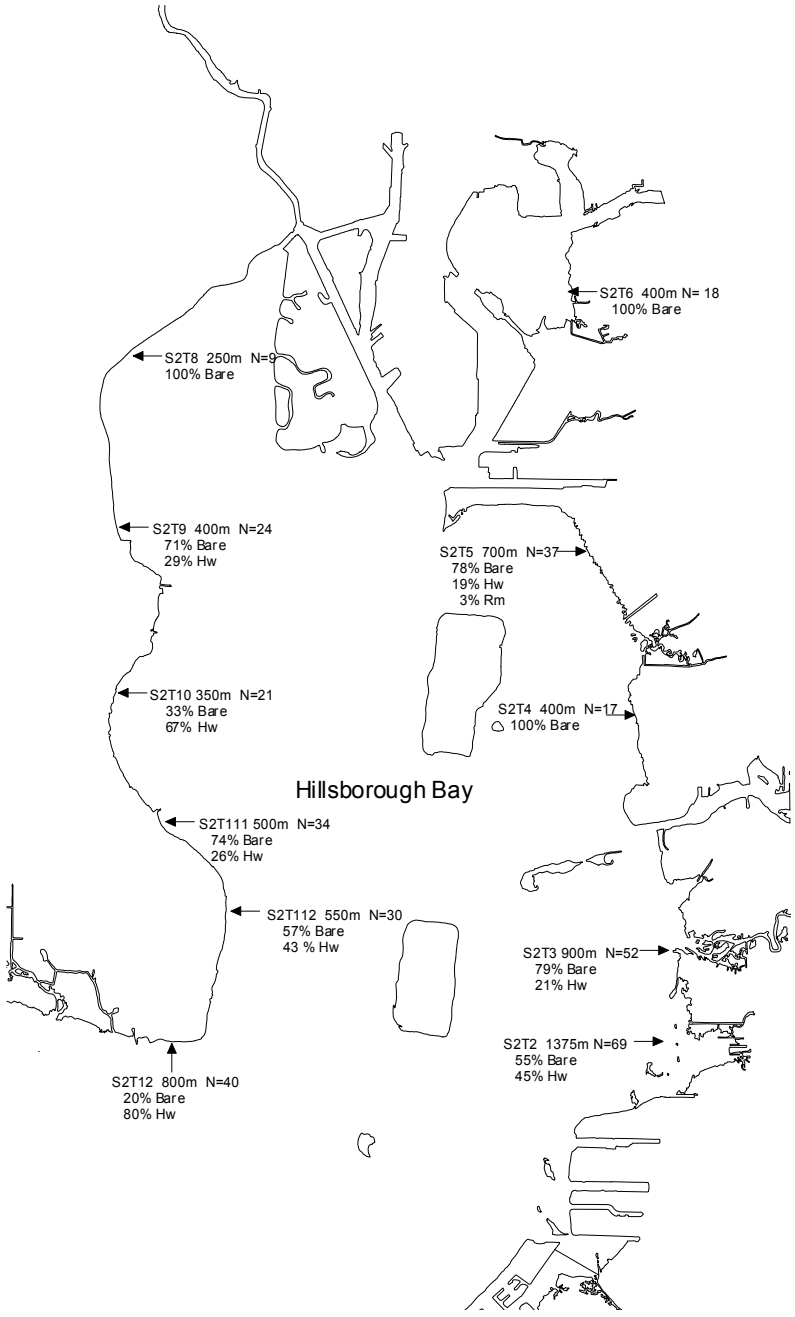

Figure 15. Name, location, length and percent of meter square placements containing each seagrass species along the 11 Hillsborough Bay seagrass monitoring transects in 2001. N=number of meter square placements; He=*Halophila engelmanni*; Hw=*Halodule wrightii*; Rm=*Ruppia maritima*; Sf=*Syringodium filiforme*; Tt=*Thalassia testudinum*.

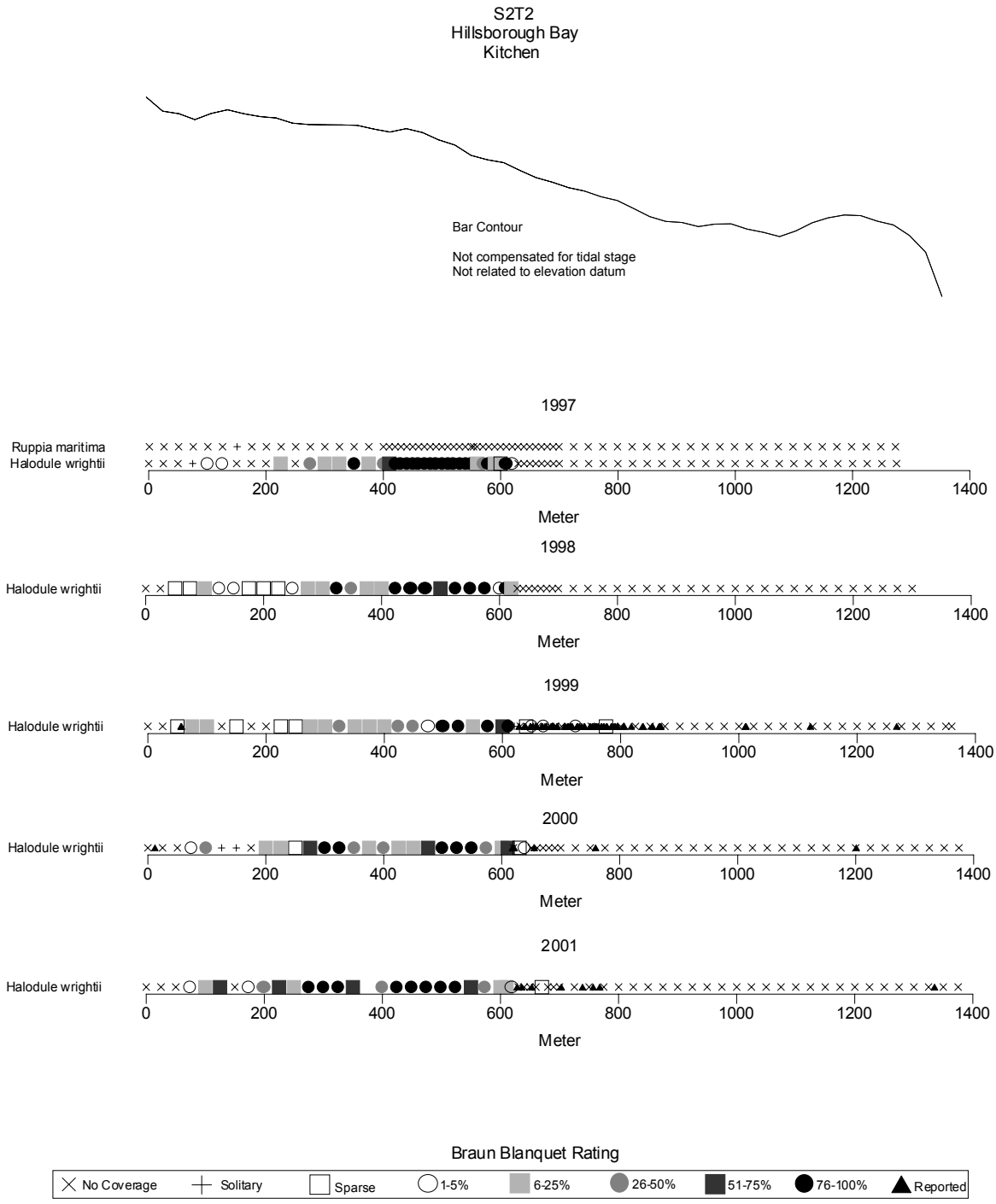

Figure 16. Seagrass species, abundance, and zonation at S2T2 from 1997-2001.

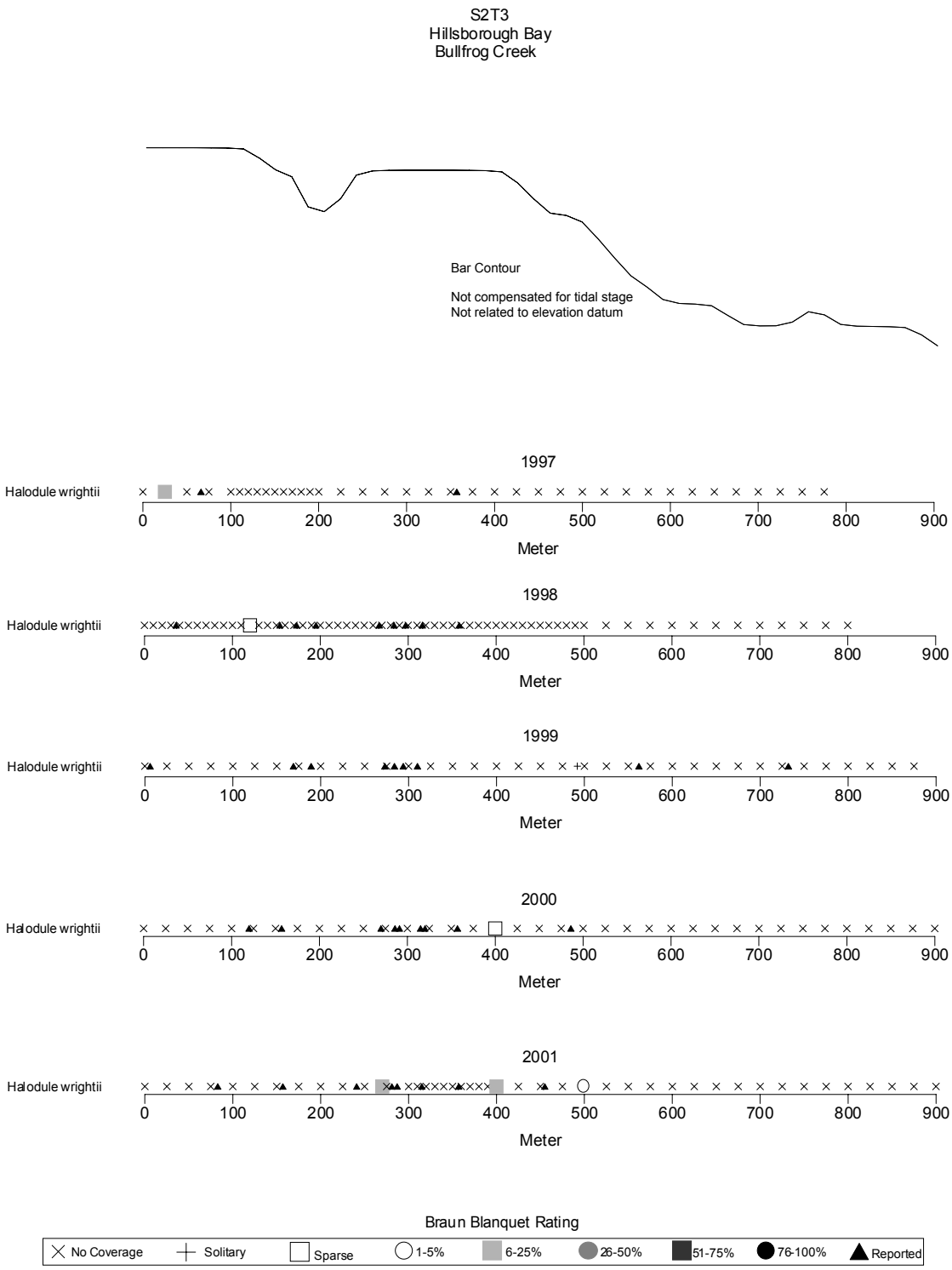

Figure 17. Seagrass species, abundance, and zonation at S2T3 from 1997-2001.

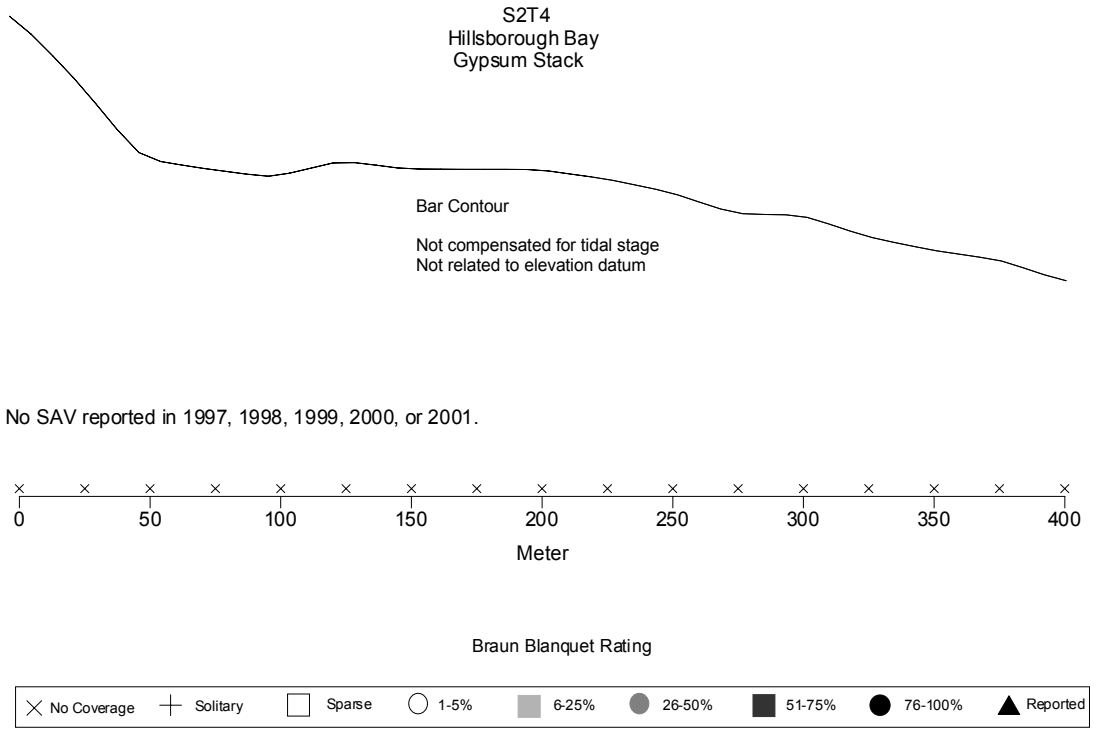

Figure 18. Seagrass species, abundance, and zonation at S2T4 from 1997-2001.

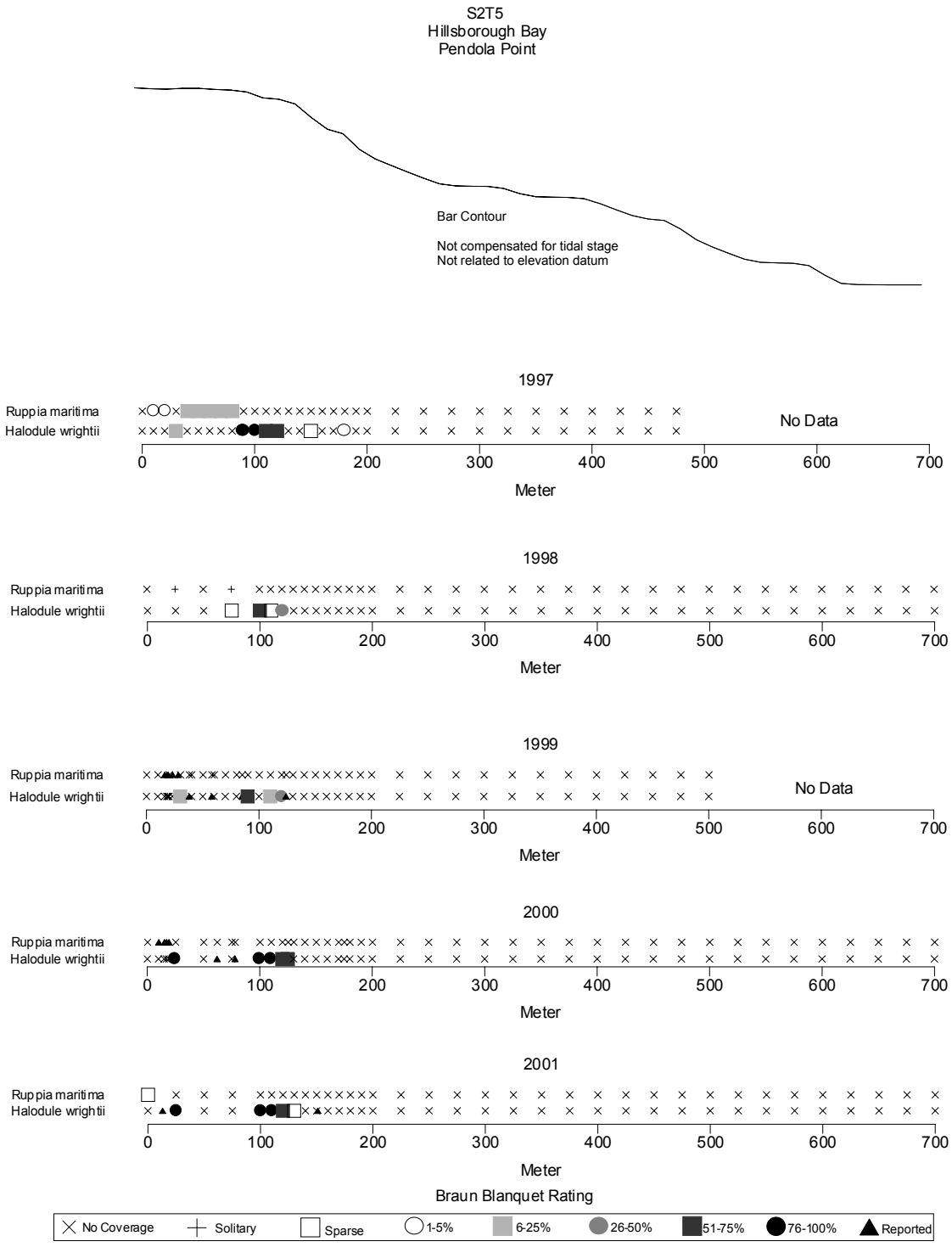

Figure 19. Seagrass species, abundance, and zonation at S2T5 from 1997-2001.

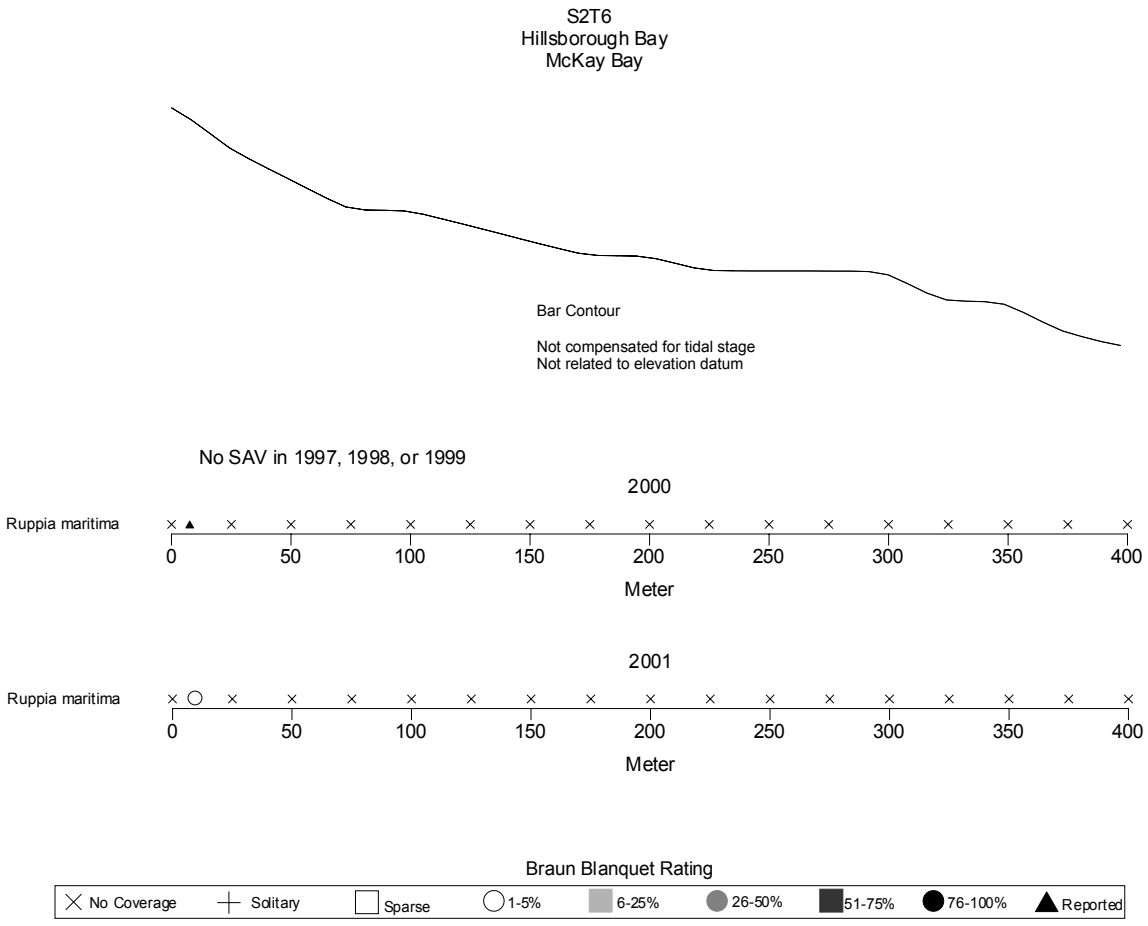

Figure 20. Seagrass species, abundance, and zonation at S2T6 from 1997-2001.

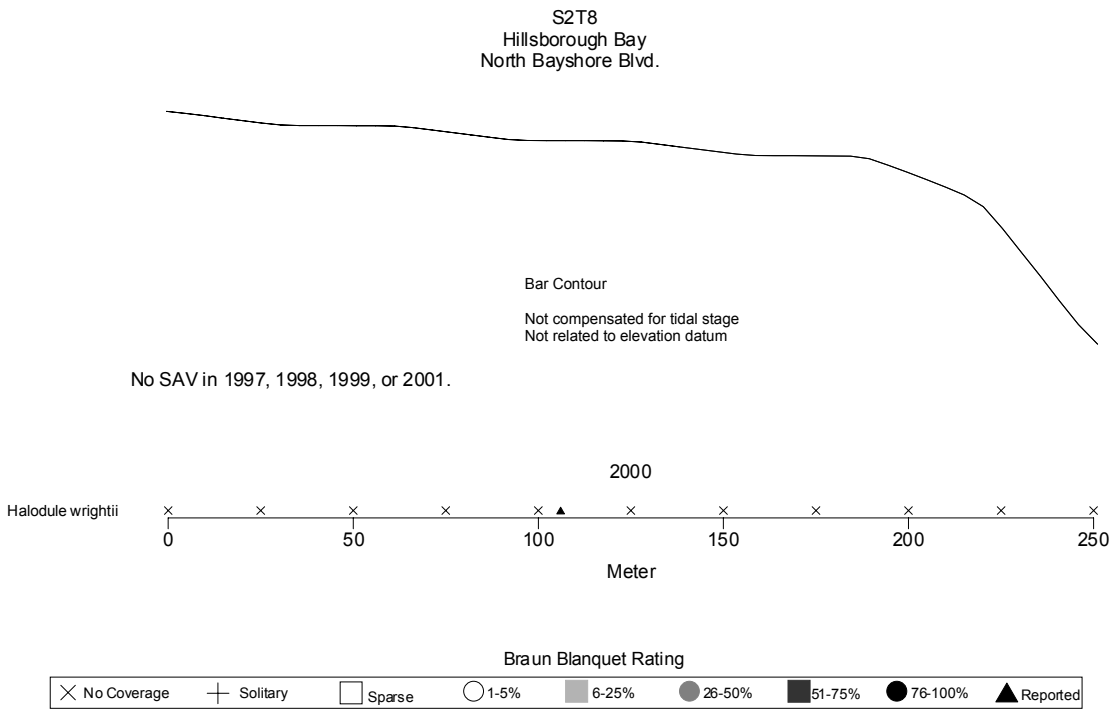

Figure 21. Seagrass species, abundance, and zonation at S2T8 from 1997-2001.

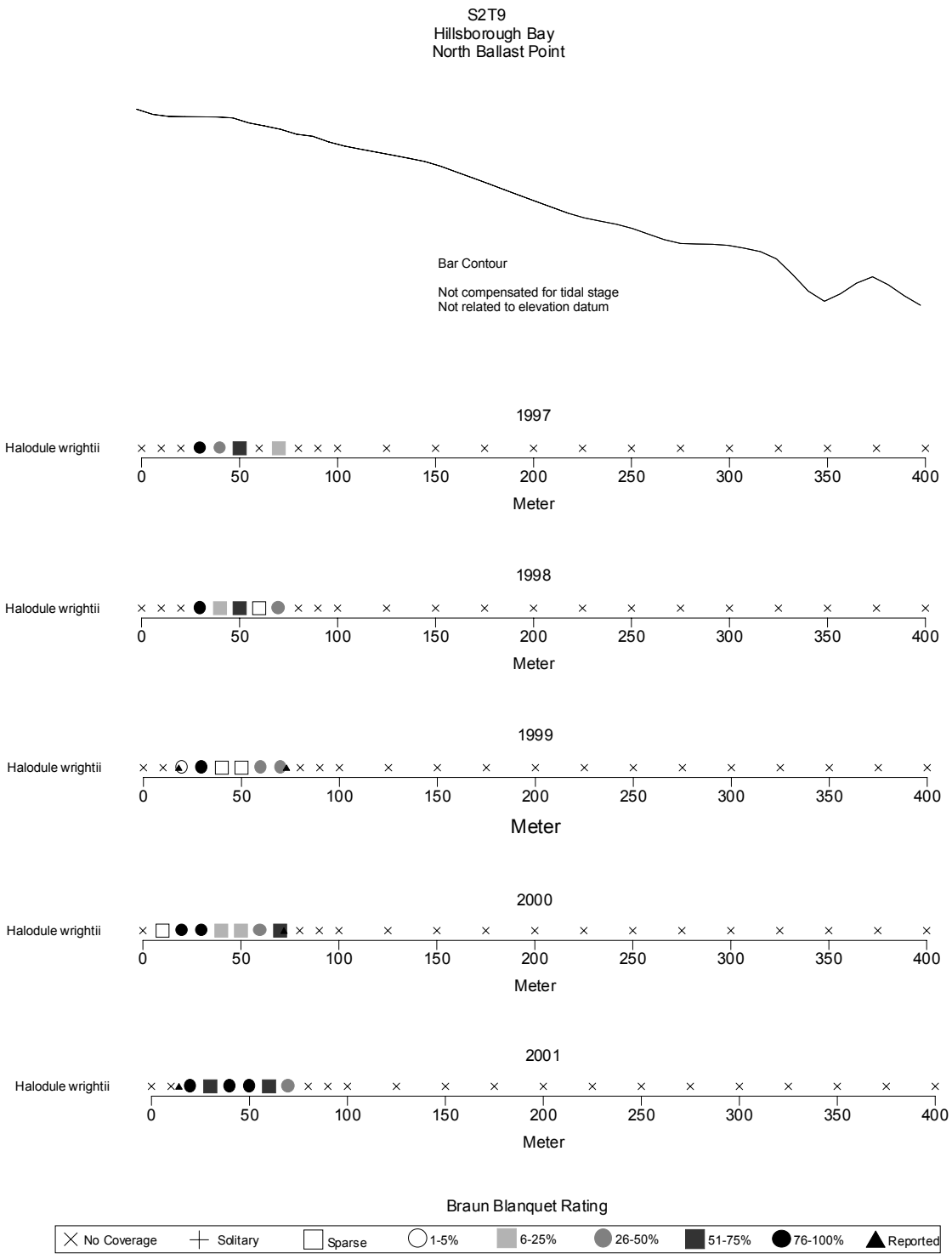

Figure 22. Seagrass species, abundance, and zonation at S2T9 from 1997-2001.

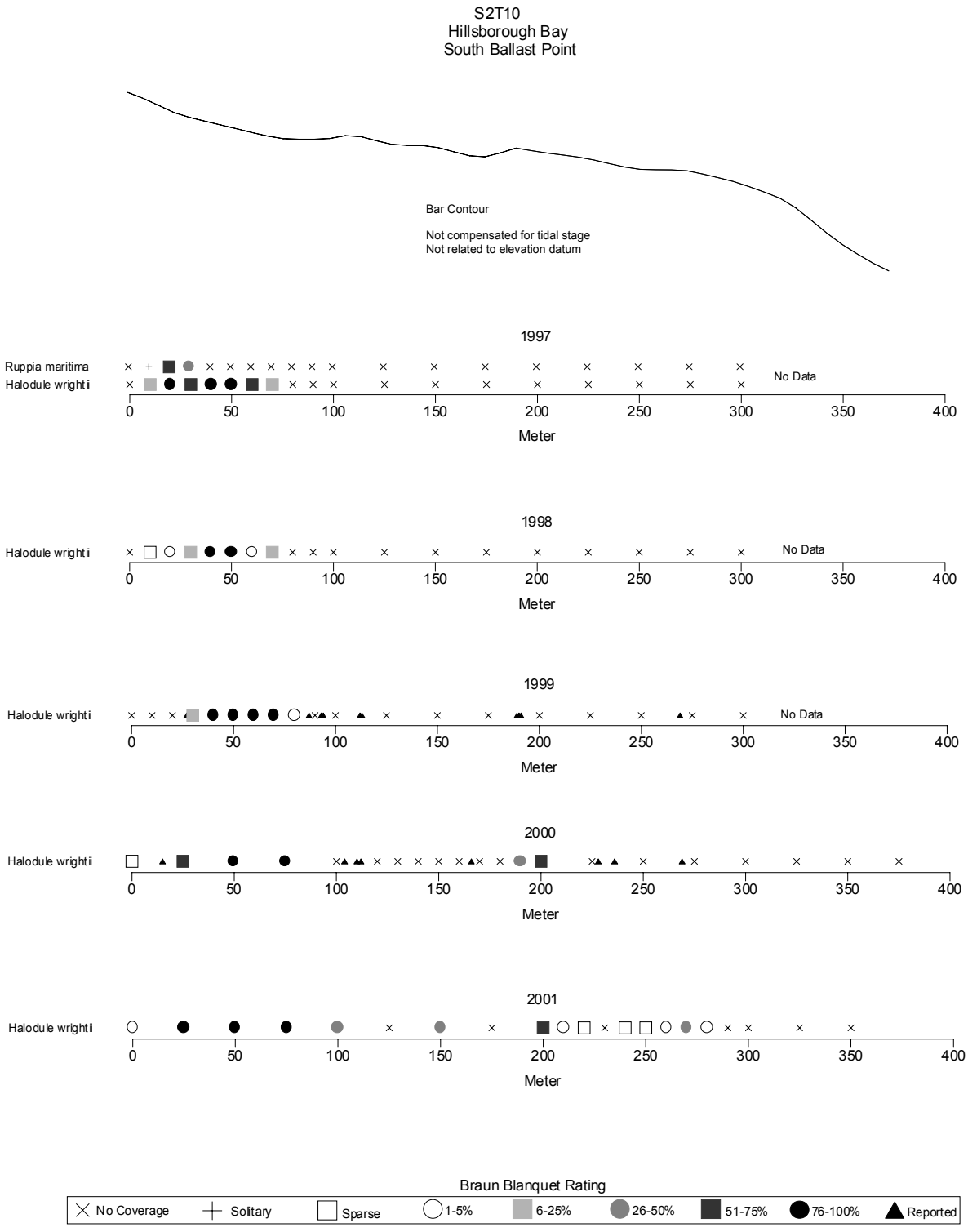

Figure 23. Seagrass species, abundance, and zonation at S2T10 from 1997-2001.

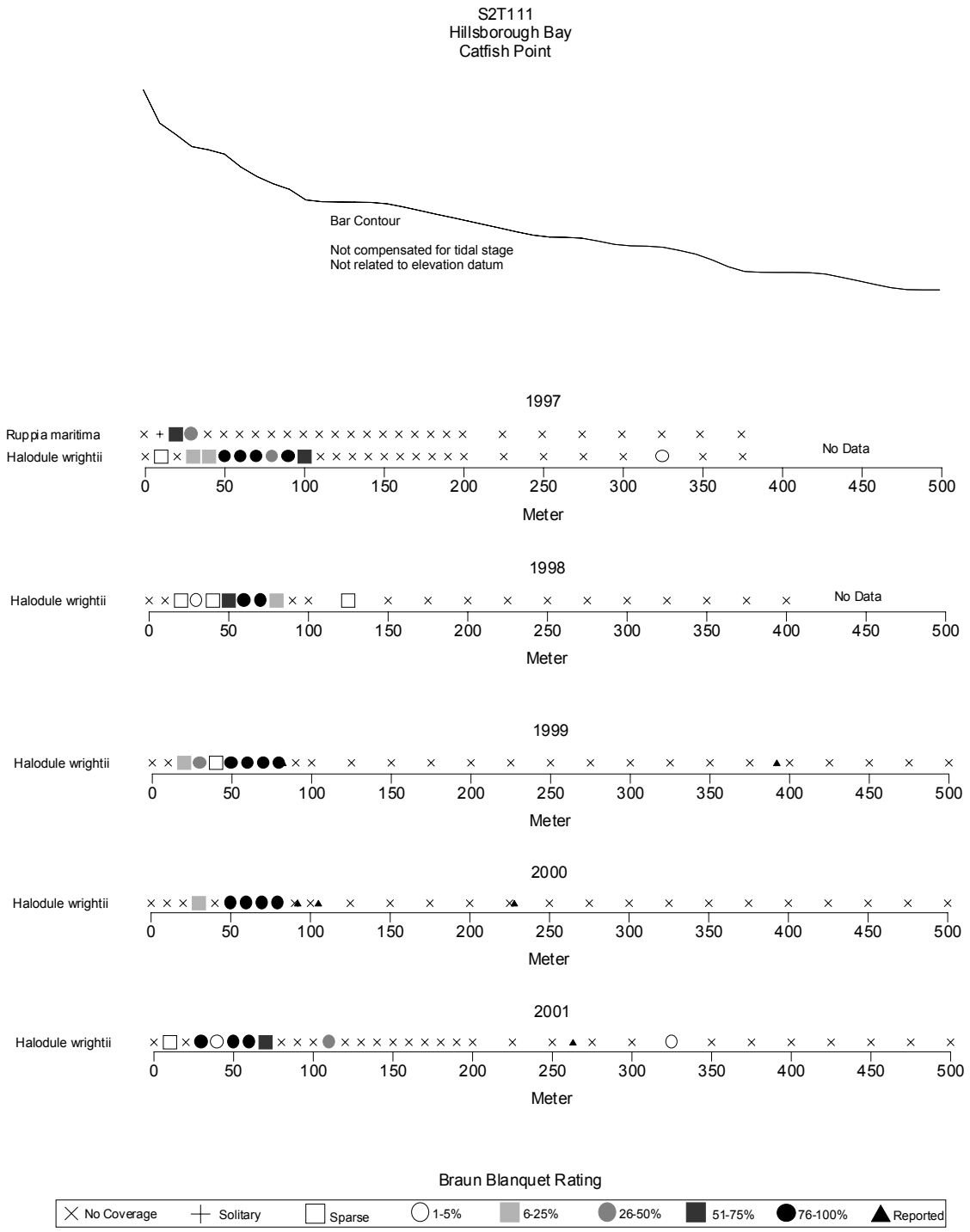

Figure 24. Seagrass species, abundance, and zonation at S2T111 from 1997-2001.

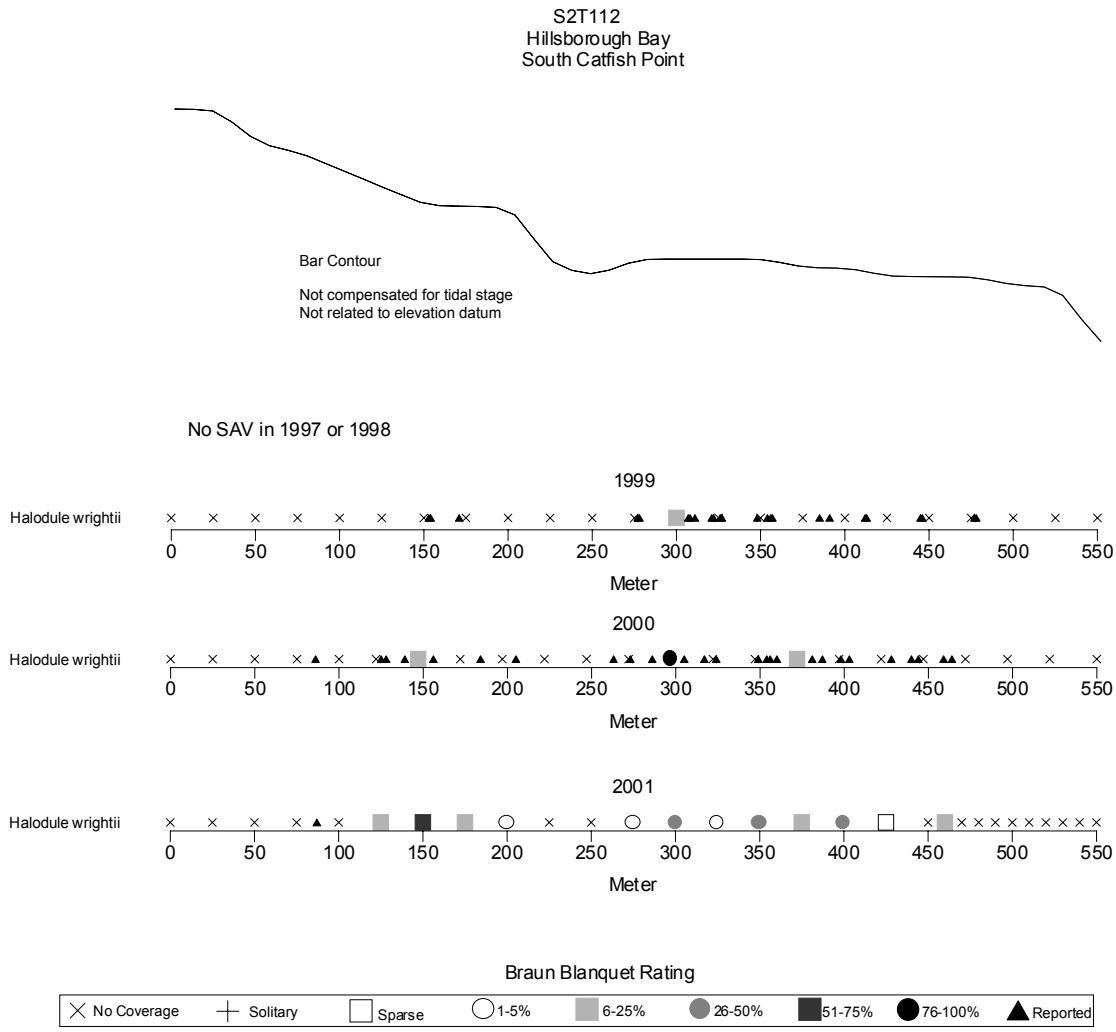

Figure 25. Seagrass species, abundance, and zonation at S2T112 from 1997-2001.

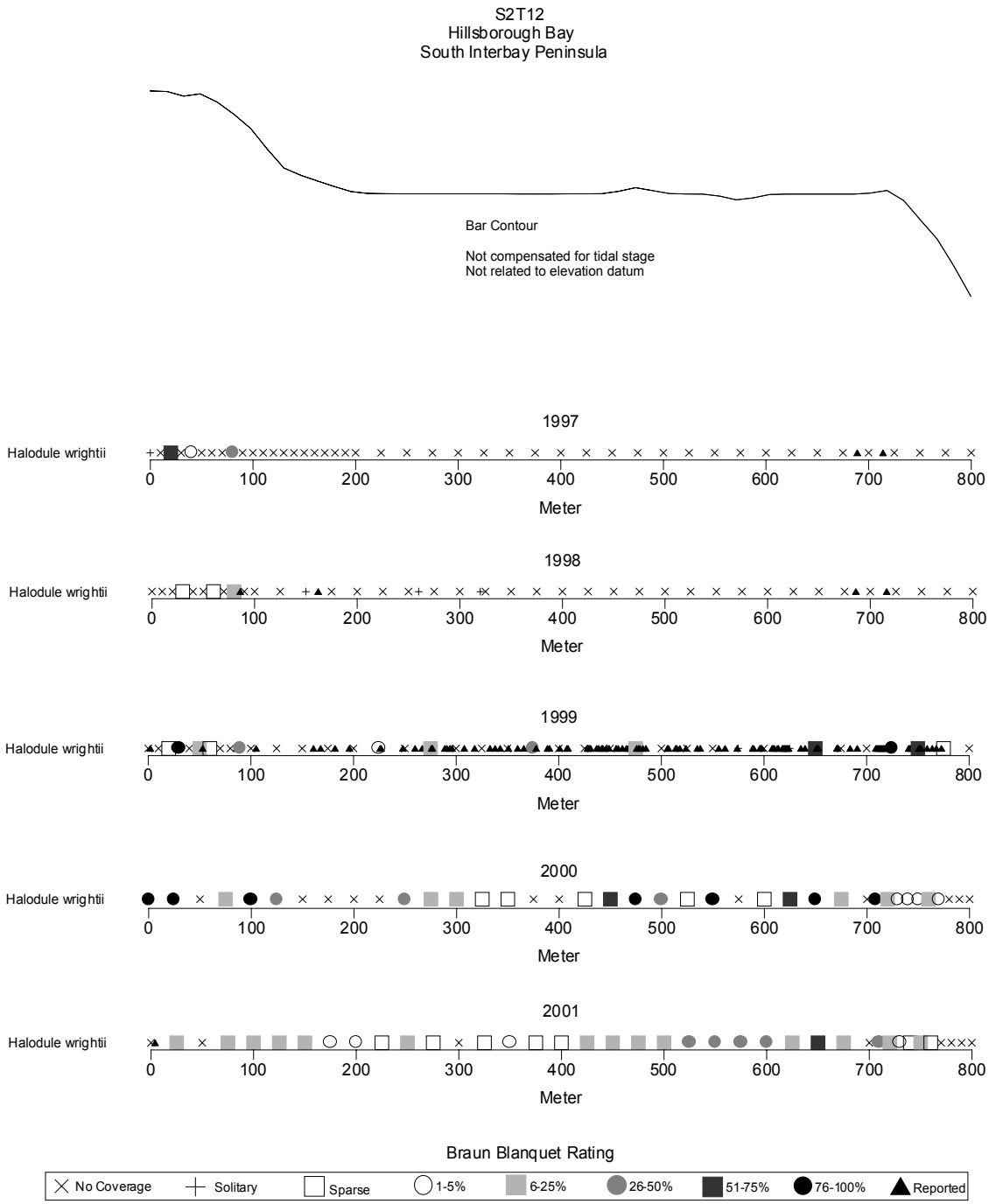

Figure 26. Seagrass species, abundance, and zonation at S2T12 from 1997-2001.

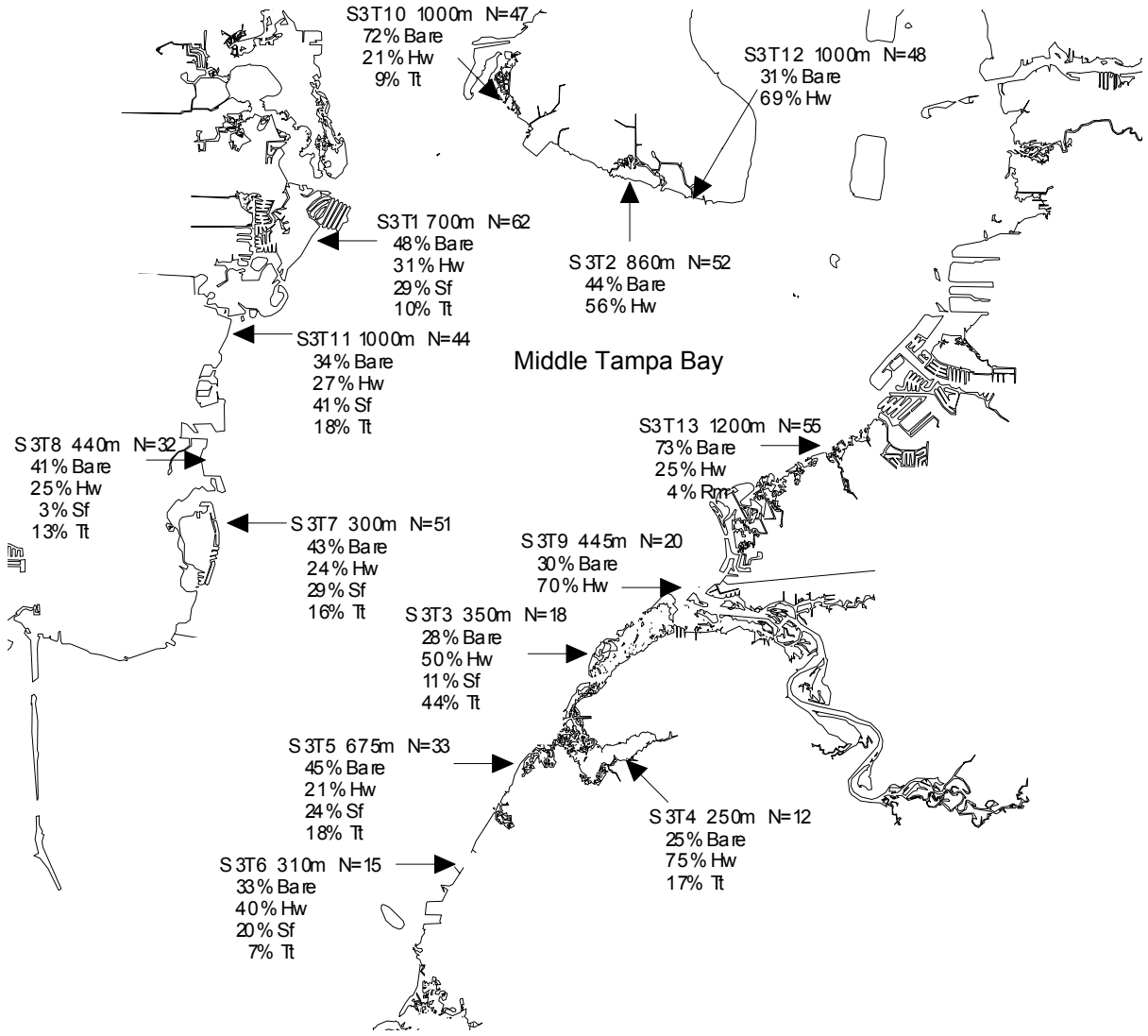

Figure 27. Name, location, length and percent of meter square placements containing each seagrass species along the 13 Middle Tampa Bay seagrass monitoring transects in 2001. N=number of meter square placements; Hw=*Halodule wrightii*; Rm=*Ruppia maritima*; Sf=*Syringodium filiforme*; Tt=*Thalassia testudinum*.

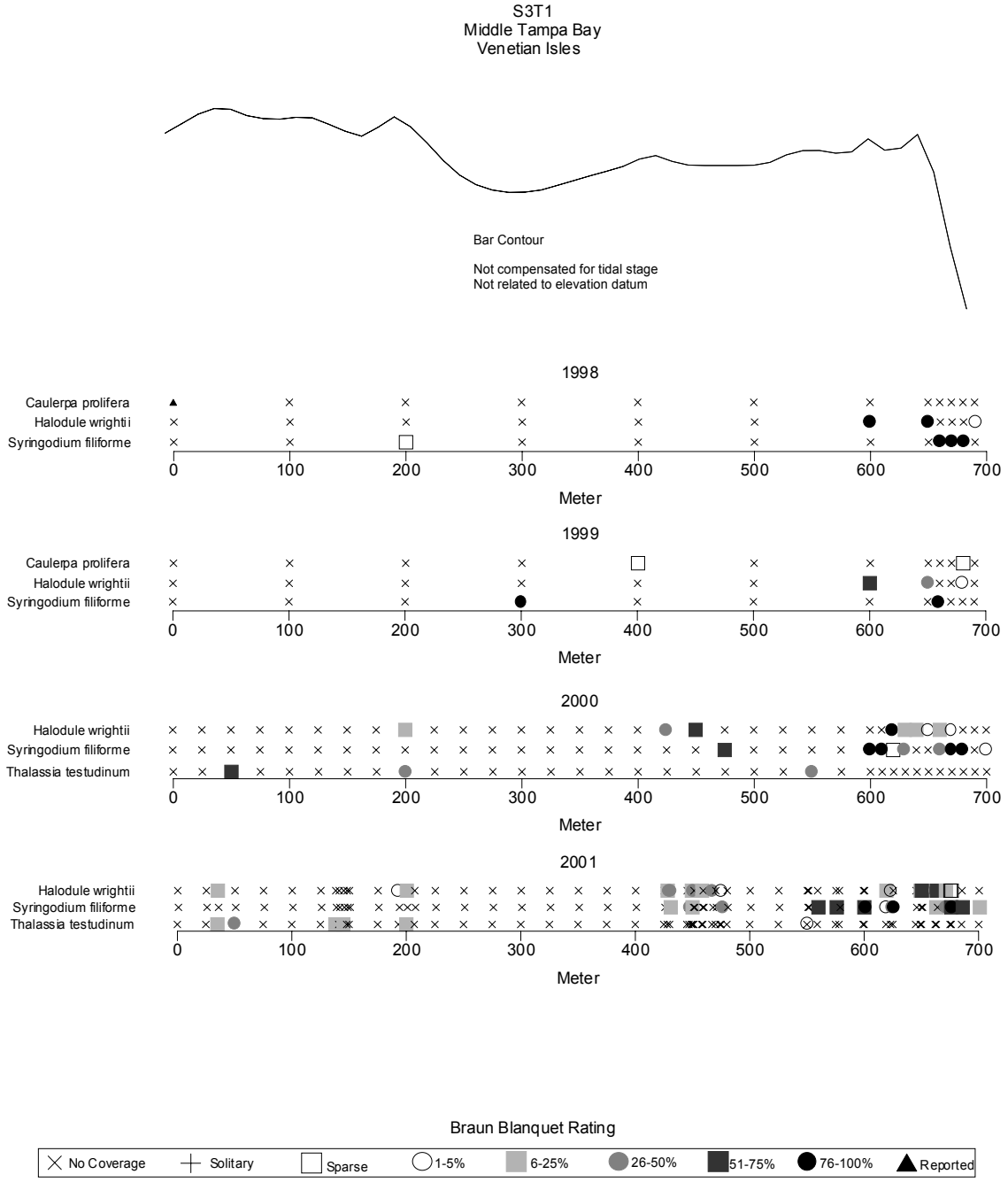

Figure 28. Seagrass species, abundance, and zonation at S3T1 from 1998-2001.

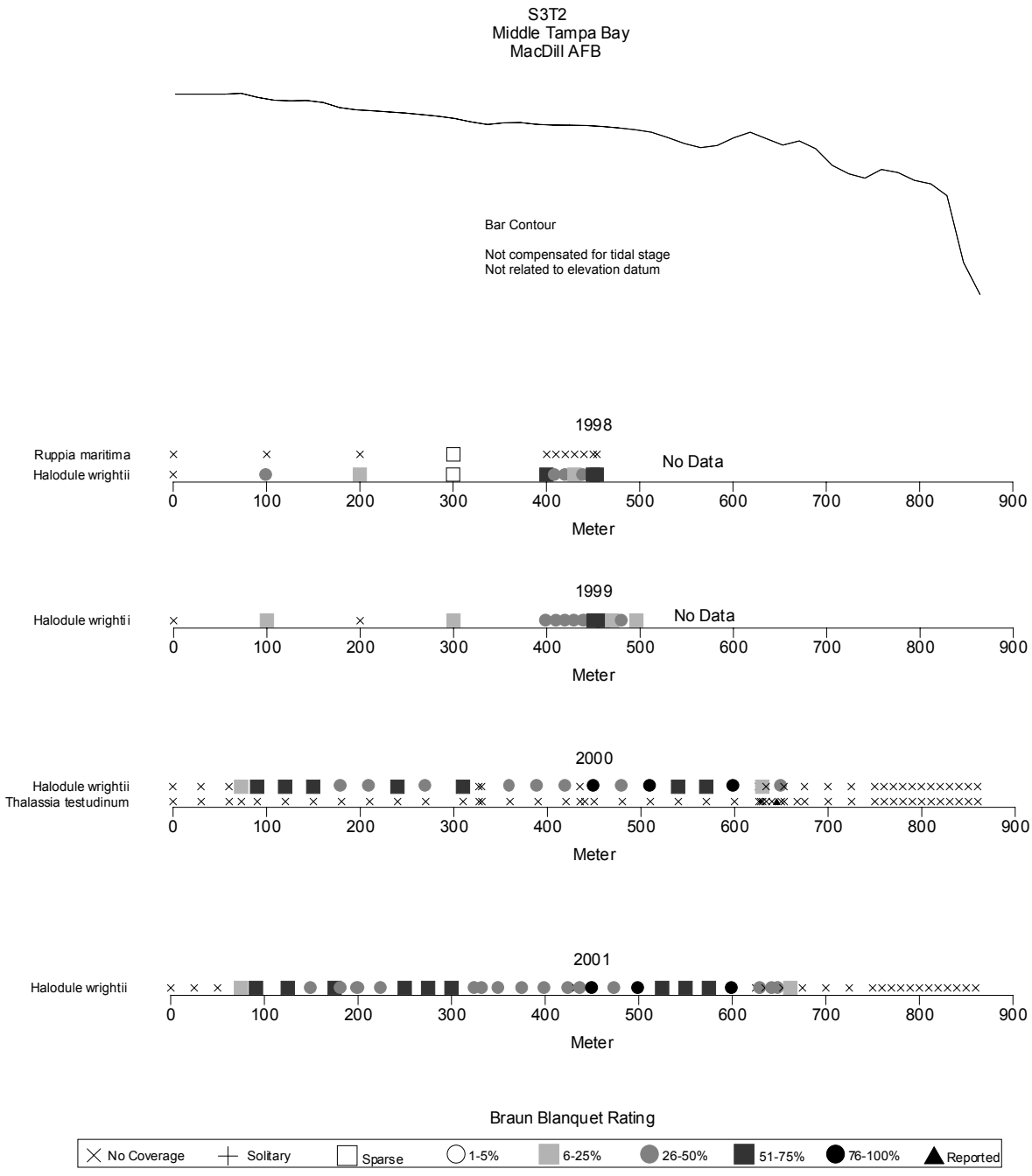

Figure 29. Seagrass species, abundance, and zonation at S3T2 from 1998-2001.

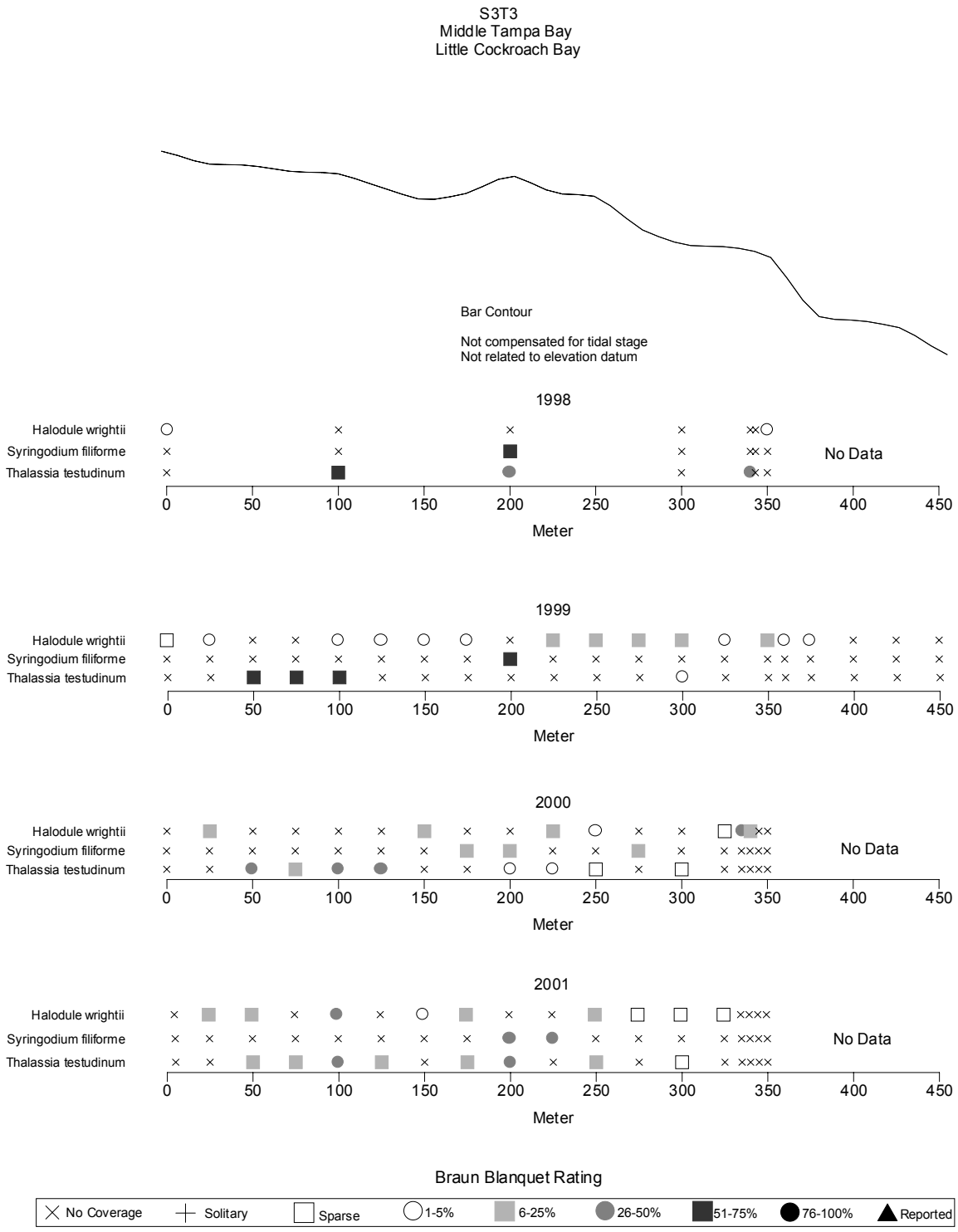

Figure 30. Seagrass species, abundance, and zonation at S3T3 from 1998-2001.

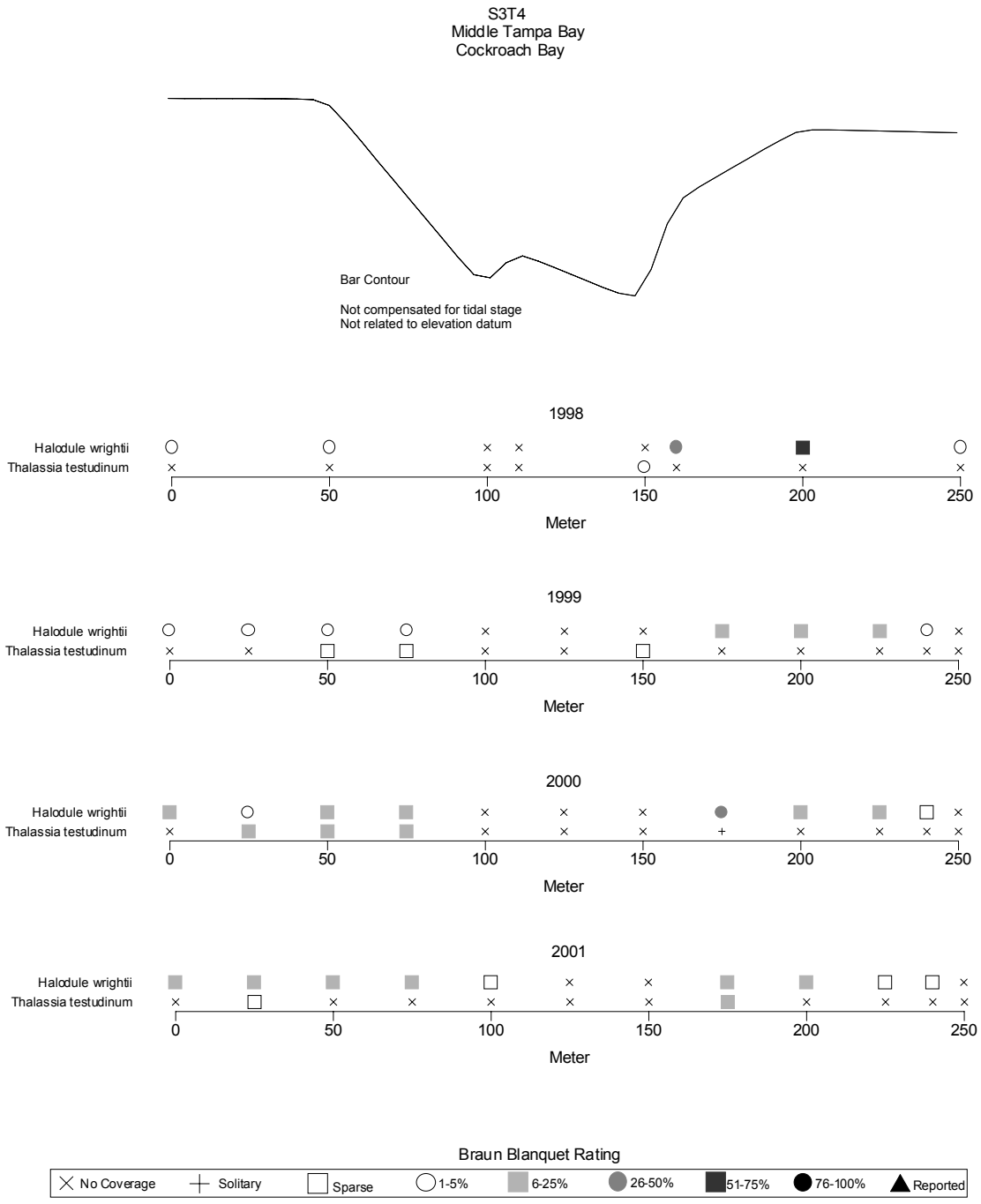

Figure 31. Seagrass species, abundance, and zonation at S3T4 from 1998-2001.

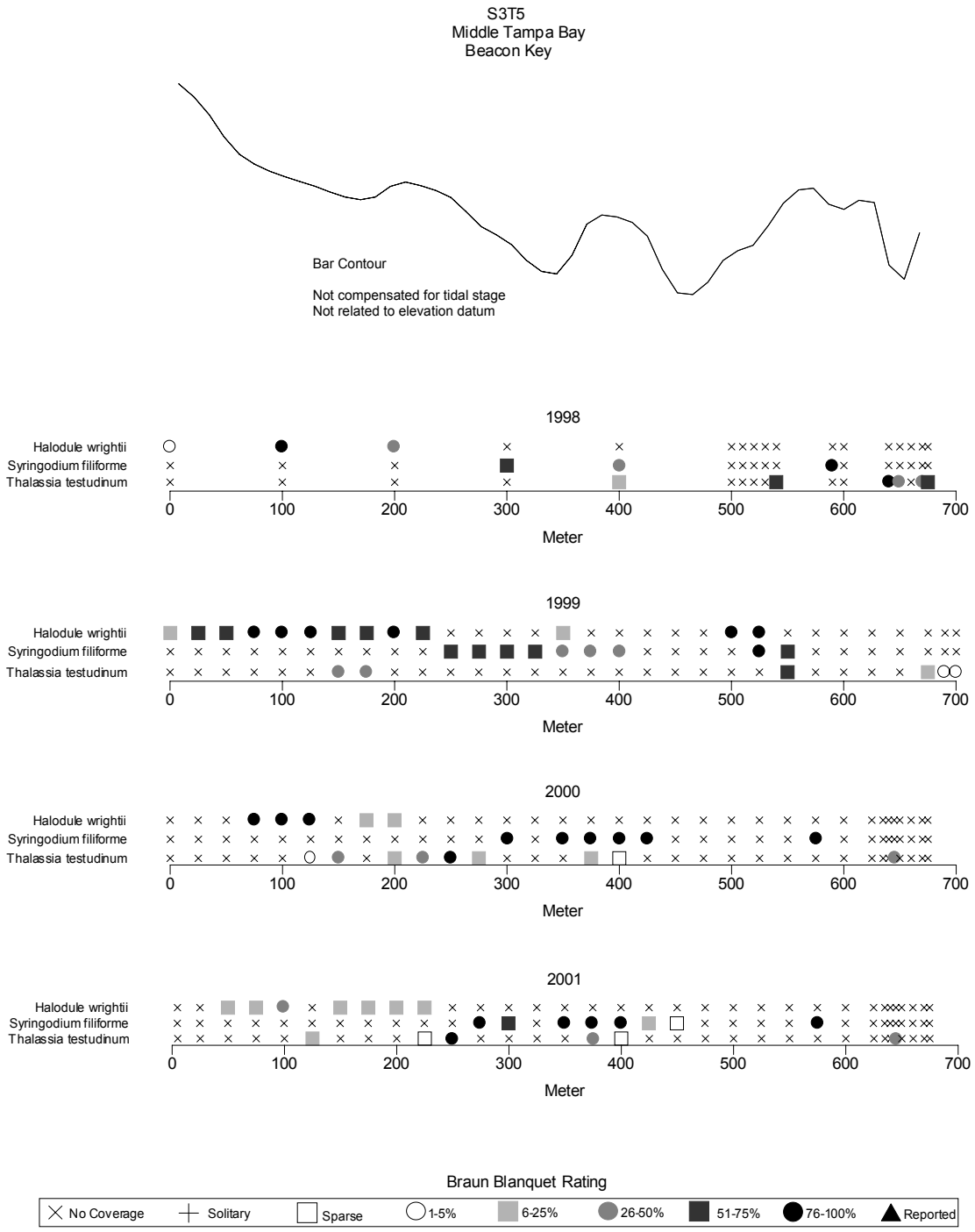

Figure 32. Seagrass species, abundance, and zonation at S3T5 from 1998-2001.

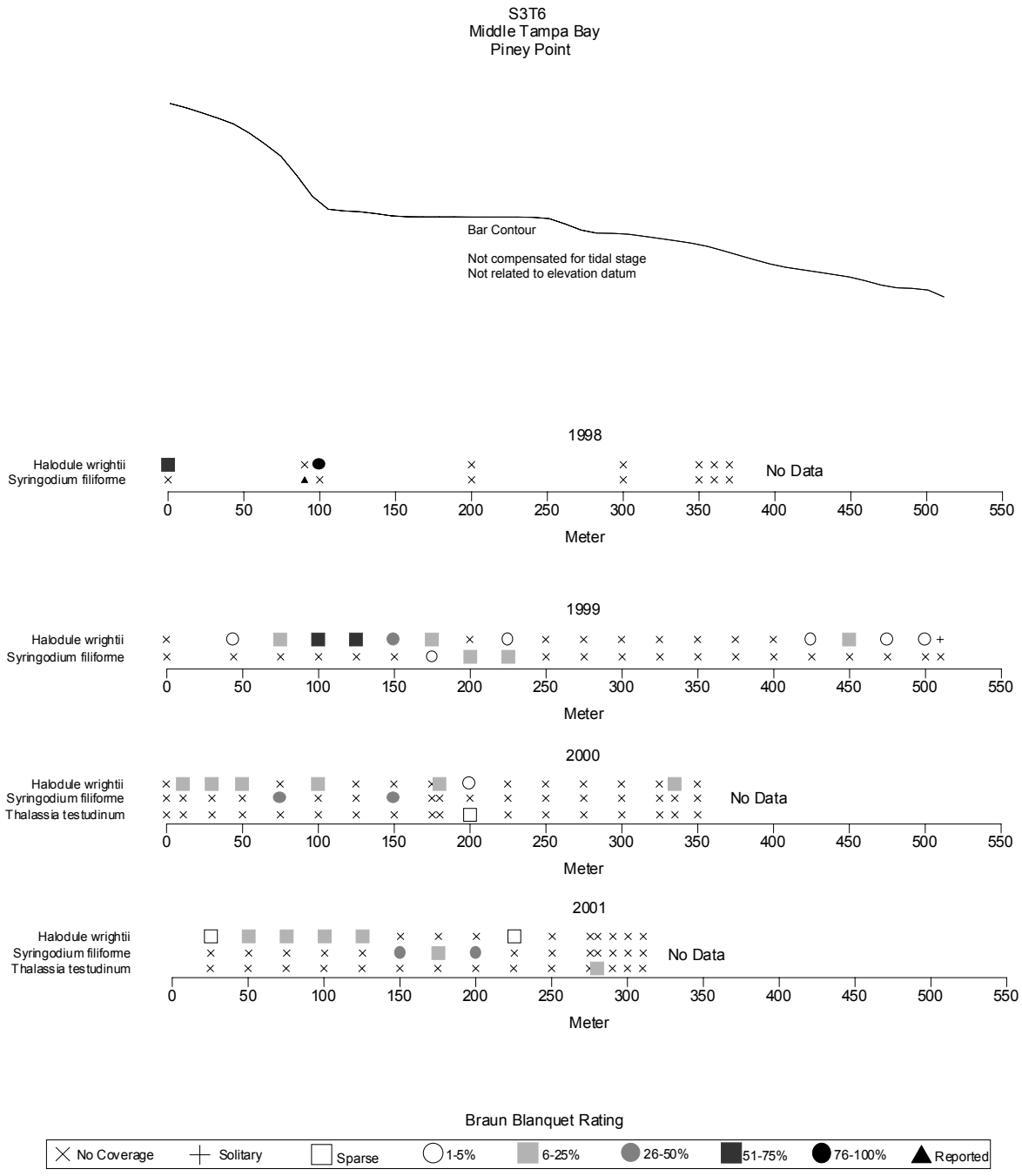

Figure 33. Seagrass species, abundance, and zonation at S3T6 from 1998-2001.

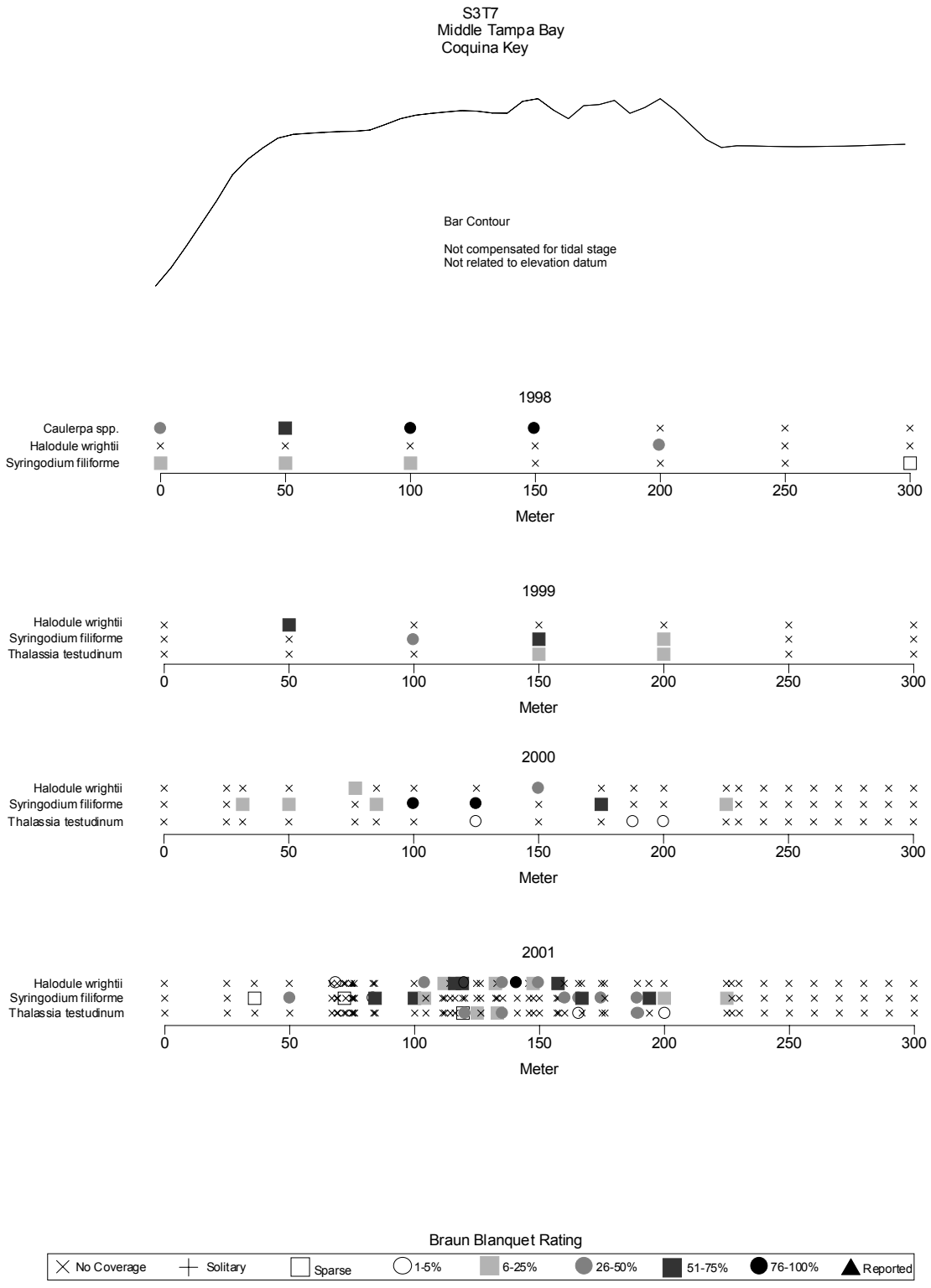

Figure 34. Seagrass species, abundance, and zonation at S3T7 from 1998-2001.

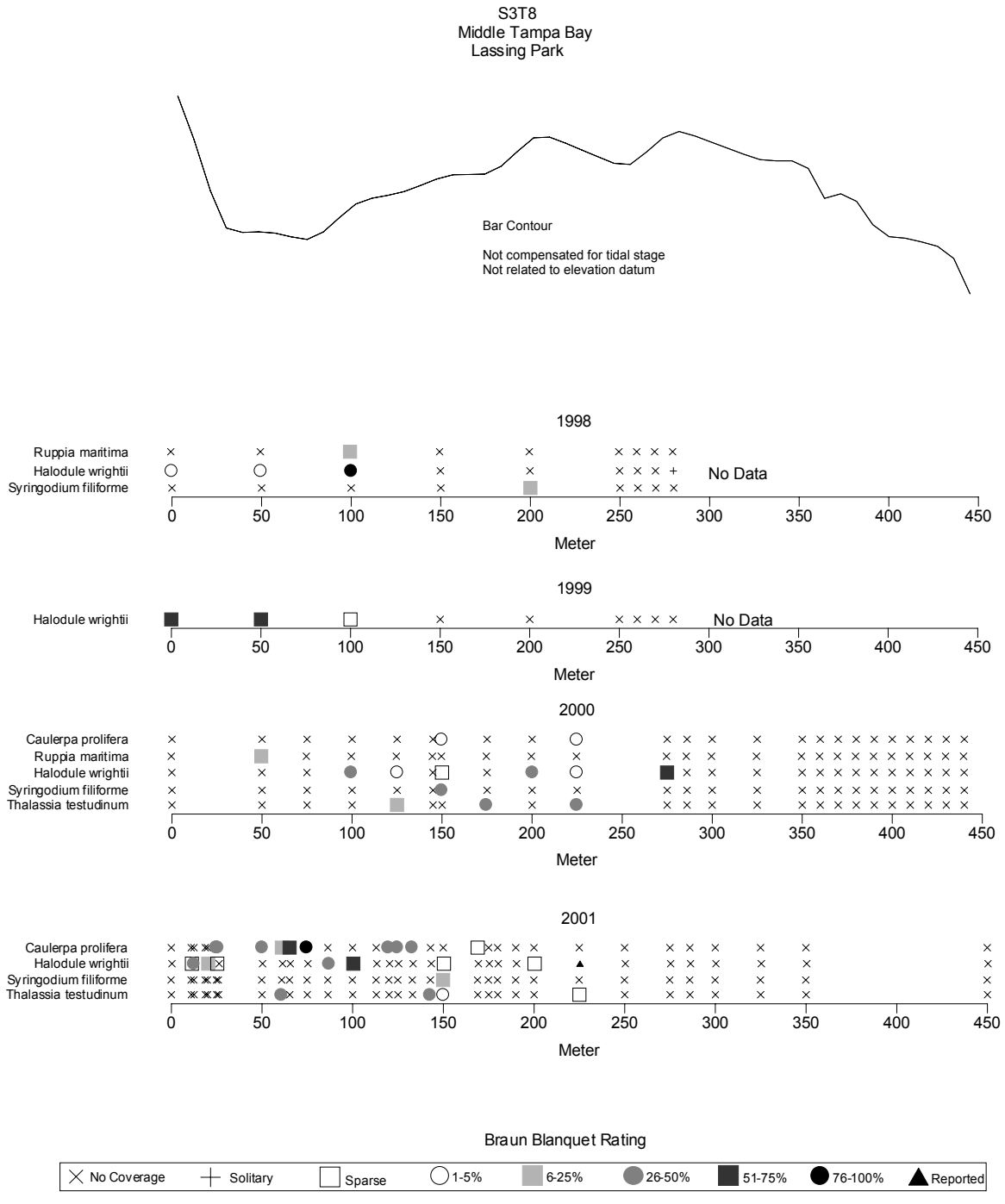

Figure 35. Seagrass species, abundance, and zonation at S3T8 from 1998-2001.

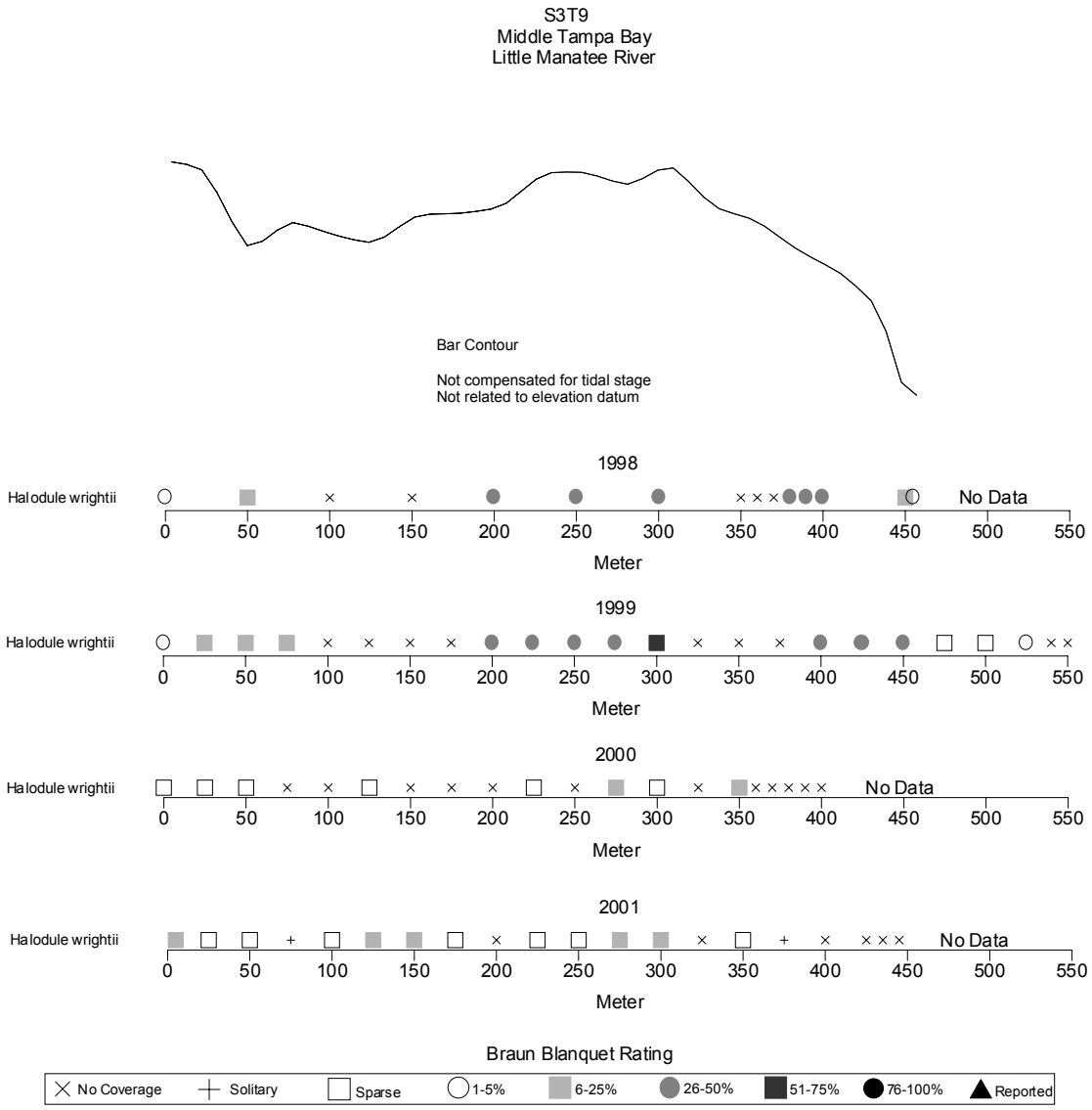

Figure 36. Seagrass species, abundance, and zonation at S3T9 from 1998-2001.

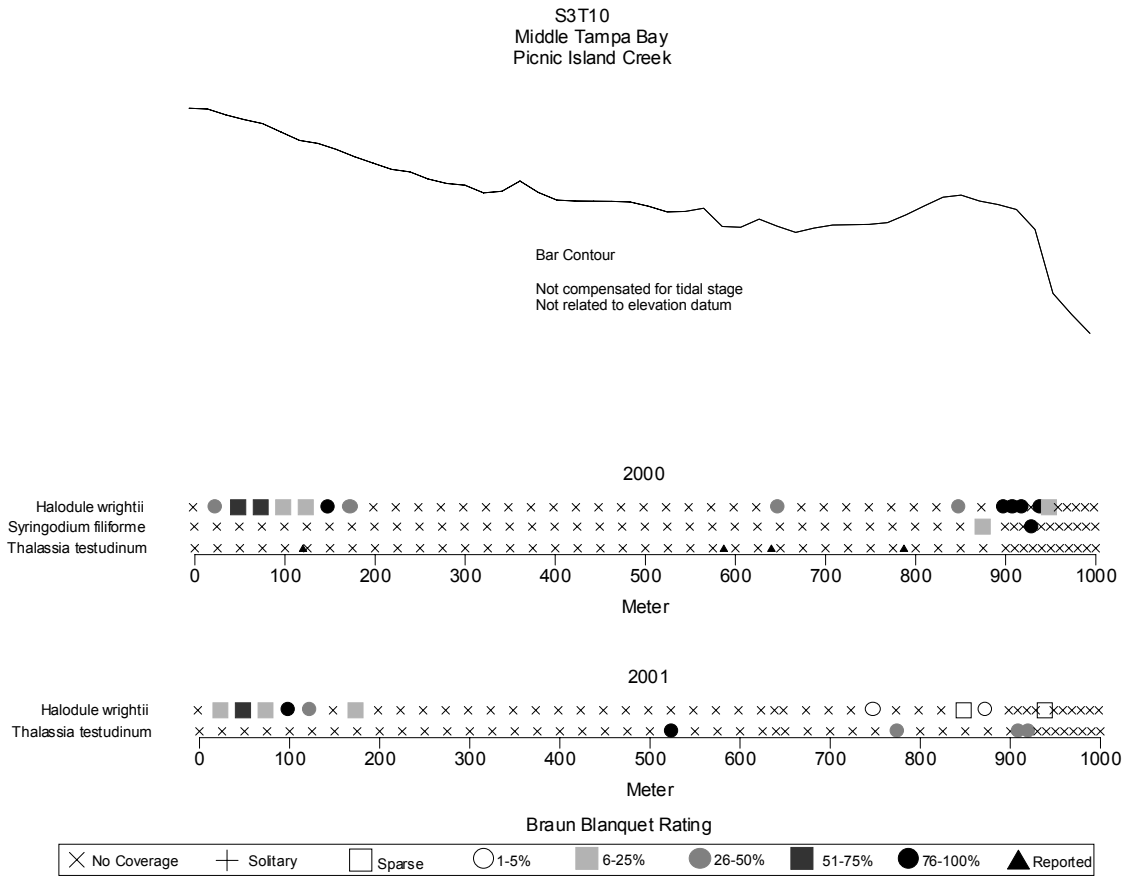

Figure 37. Seagrass species, abundance, and zonation at S3T10 from 2000-2001.

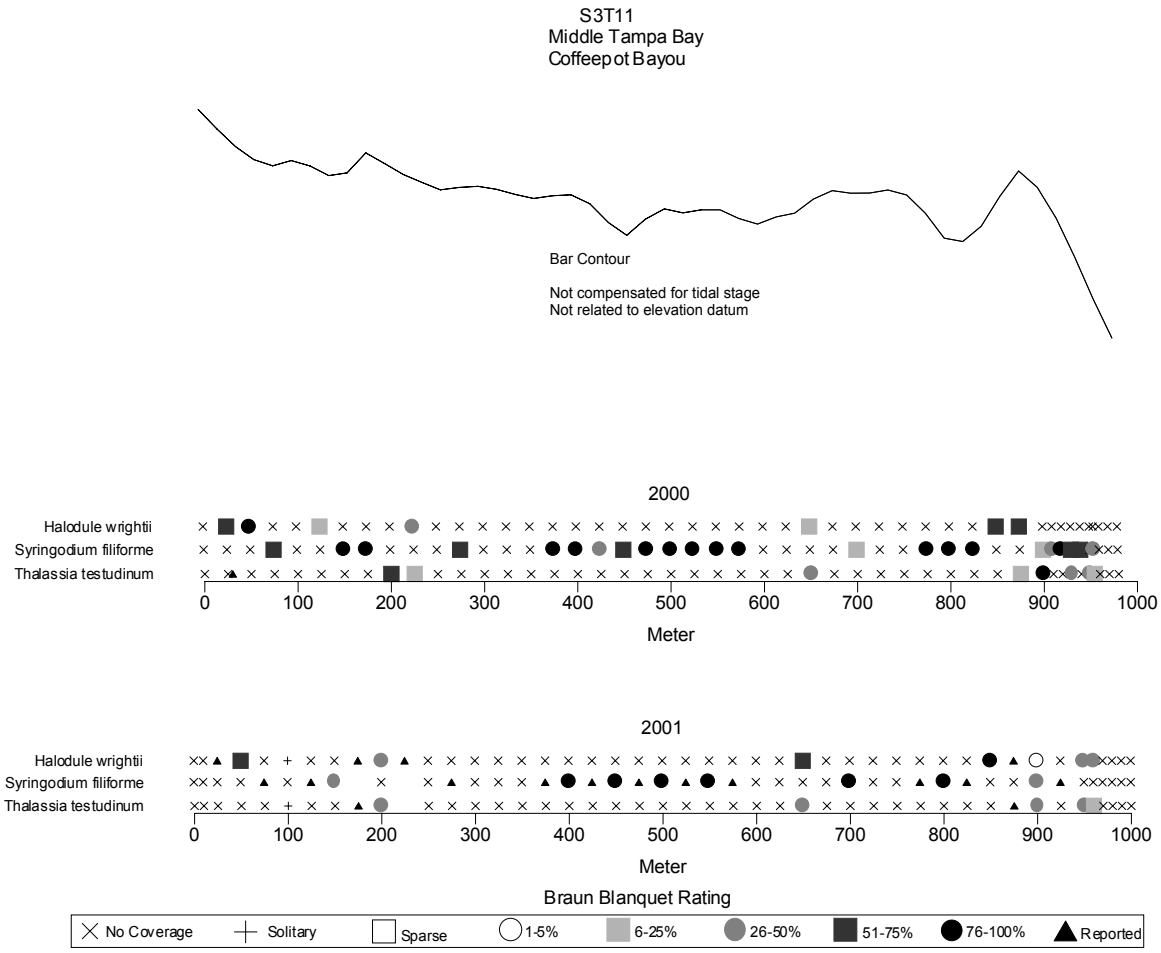

Figure 38. Seagrass species, abundance, and zonation at S3T11 from 2000-2001.

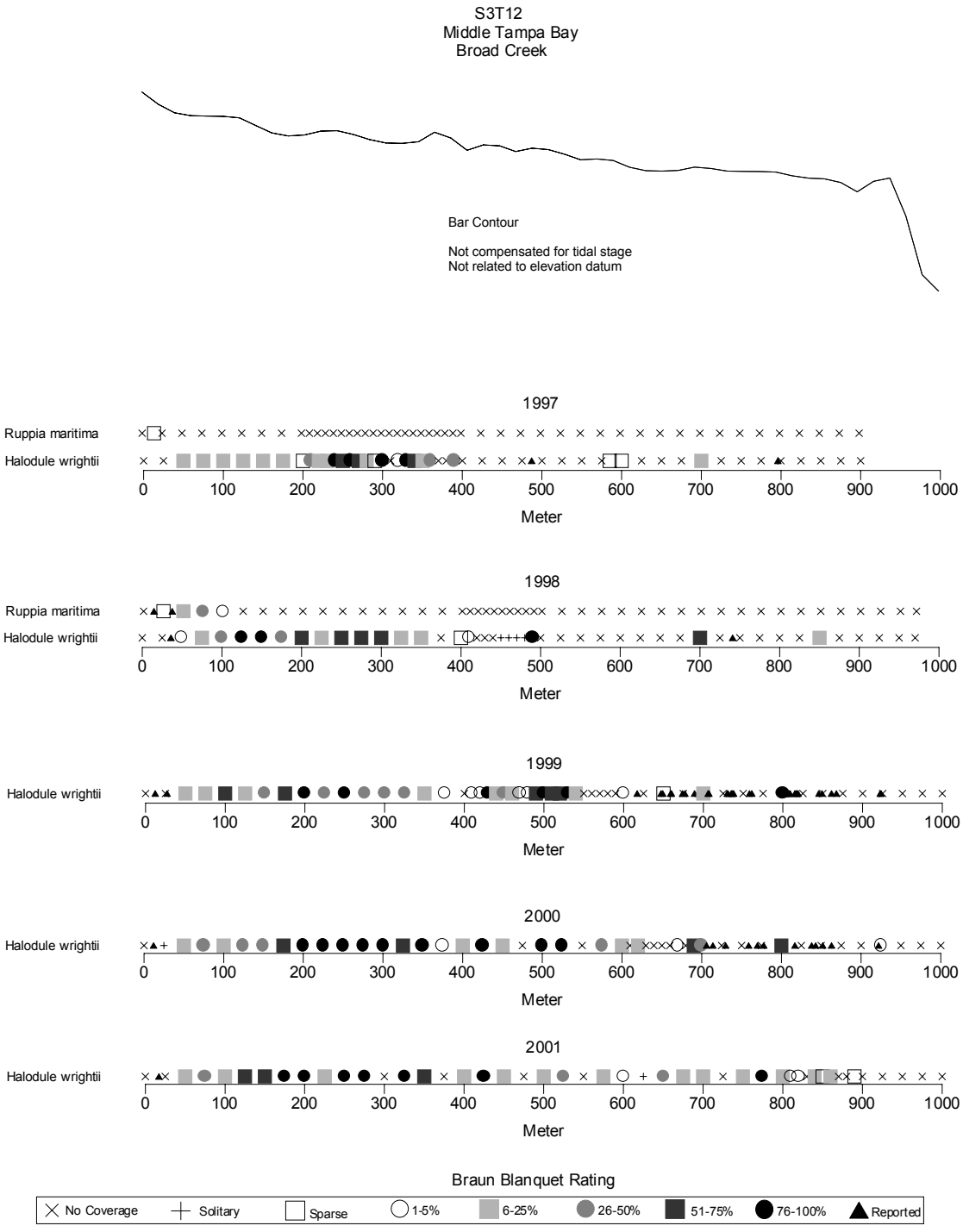

Figure 39. Seagrass species, abundance, and zonation at S3T12 from 1997-2001.

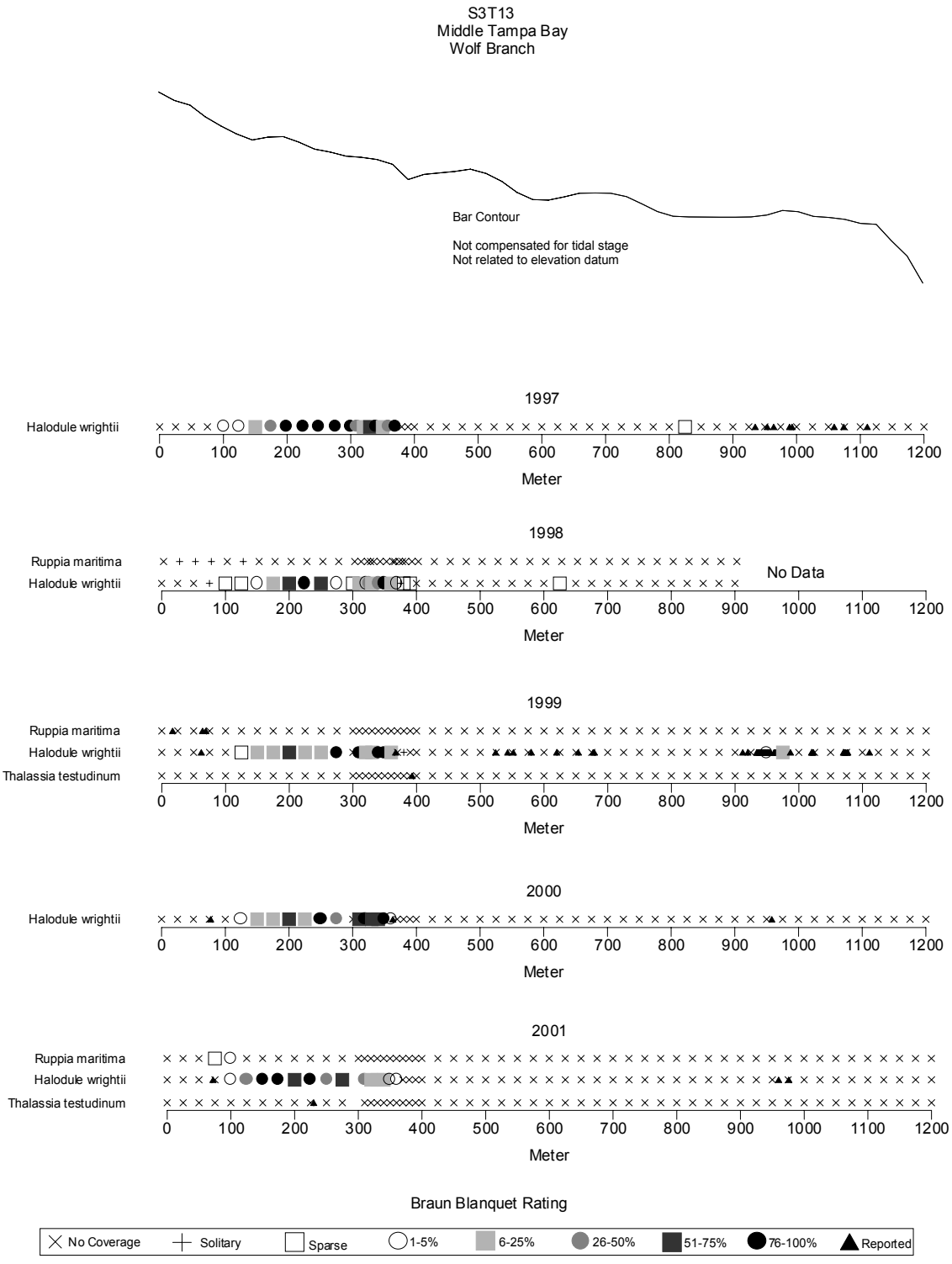

Figure 40. Seagrass species, abundance, and zonation at S3T13 from 1997-2001.

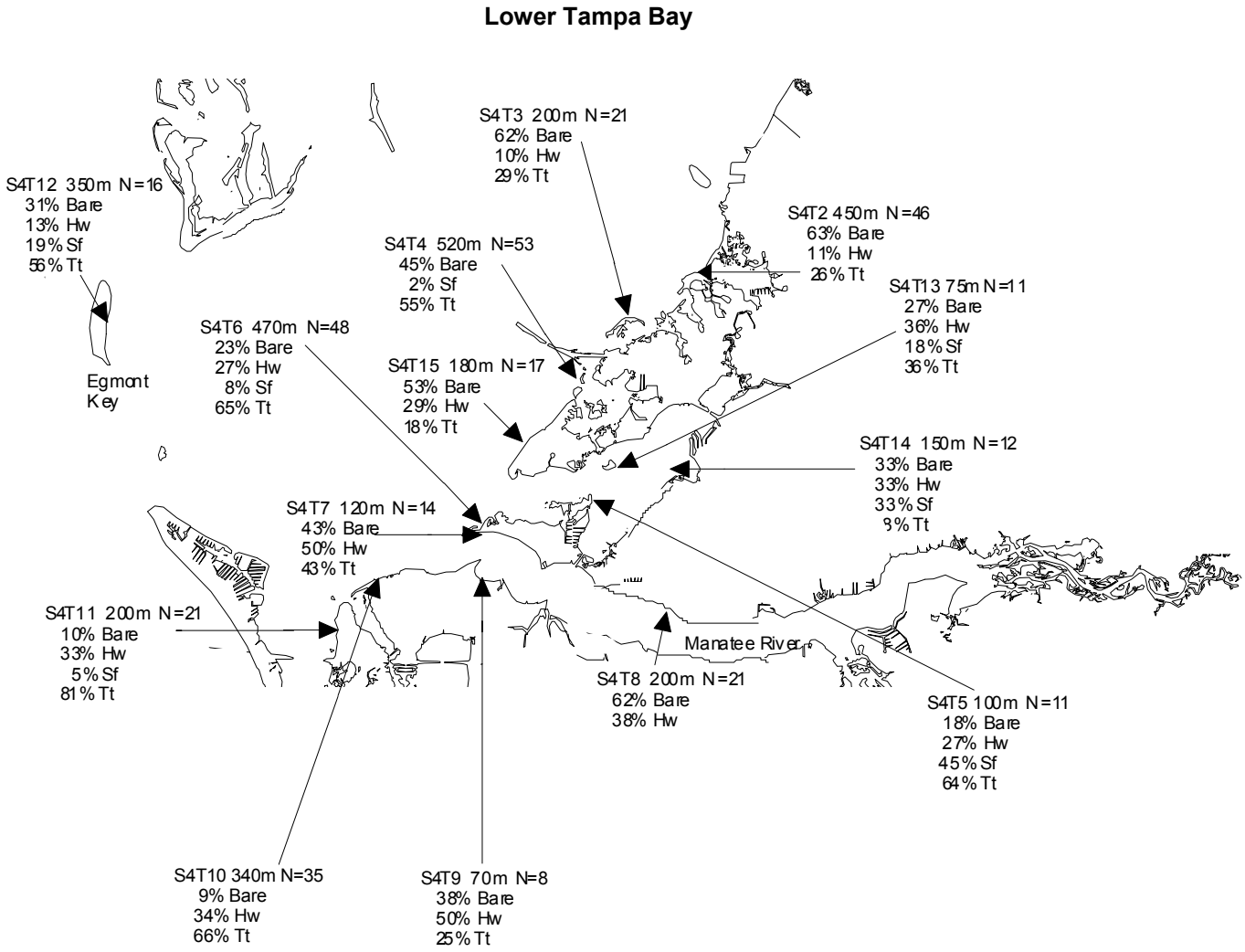

Figure 41. Name, location, length and percent of meter square placements containing each seagrass species along the 14 Lower Tampa Bay seagrass monitoring transects in 2001. N=number of meter square placements; Hw=*Halodule wrightii*; Rm=*Ruppia maritima*; Sf=*Syringodium filiforme*; Tt=*Thalassia testudinum*.

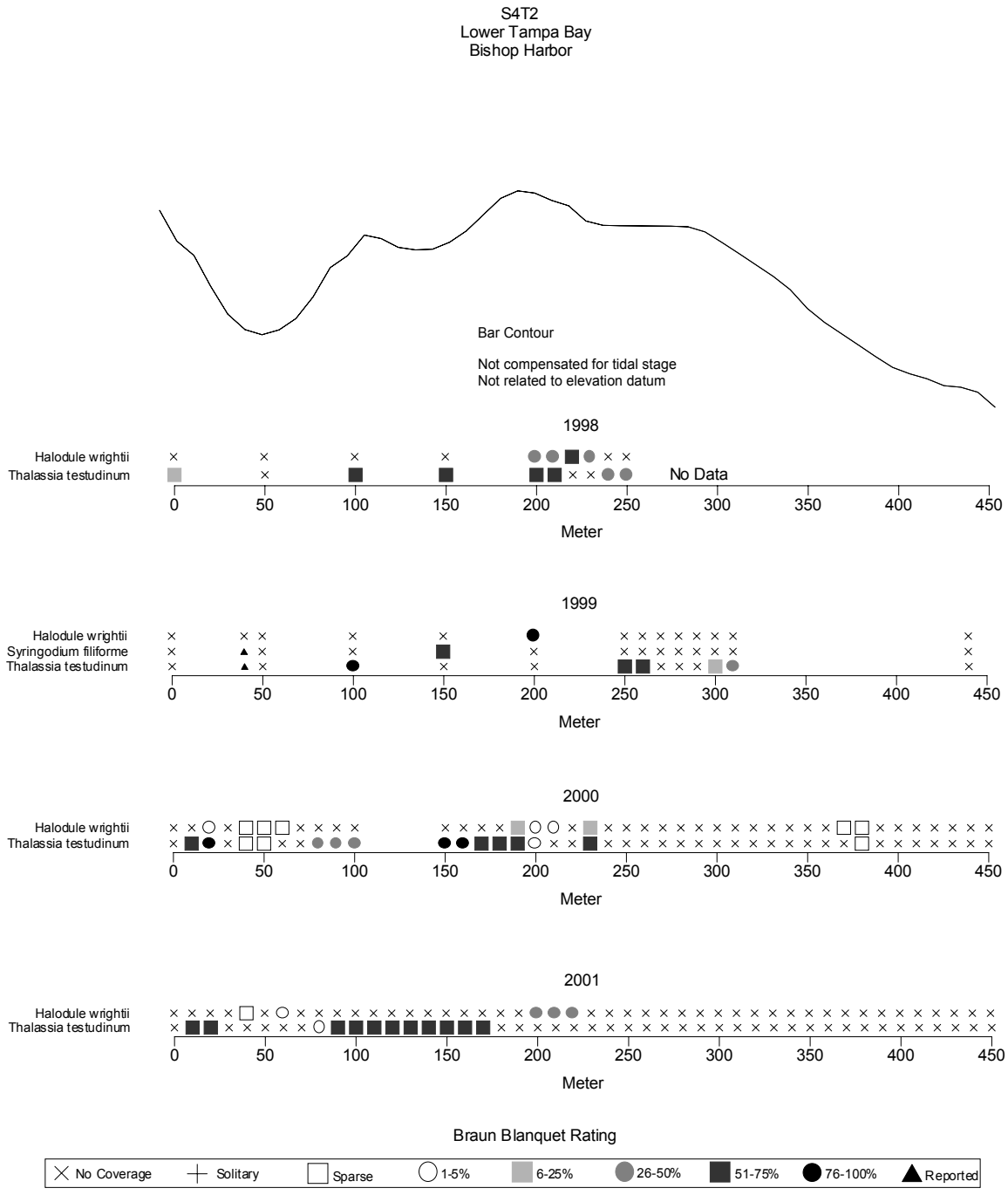

Figure 42. Seagrass species, abundance, and zonation at S4T2 from 1998-2001.

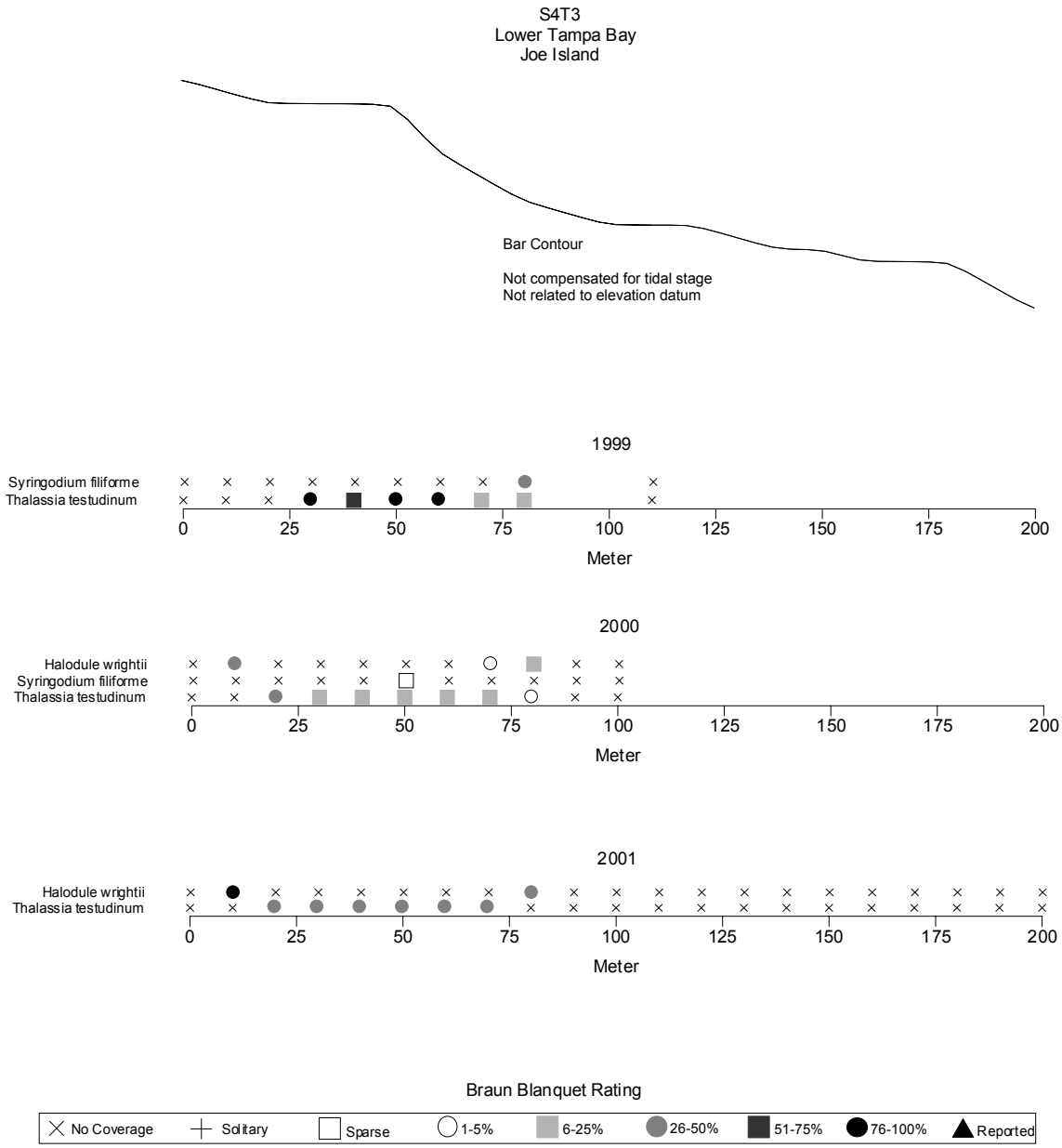

Figure 43. Seagrass species, abundance, and zonation at S4T3 from 1999-2001.

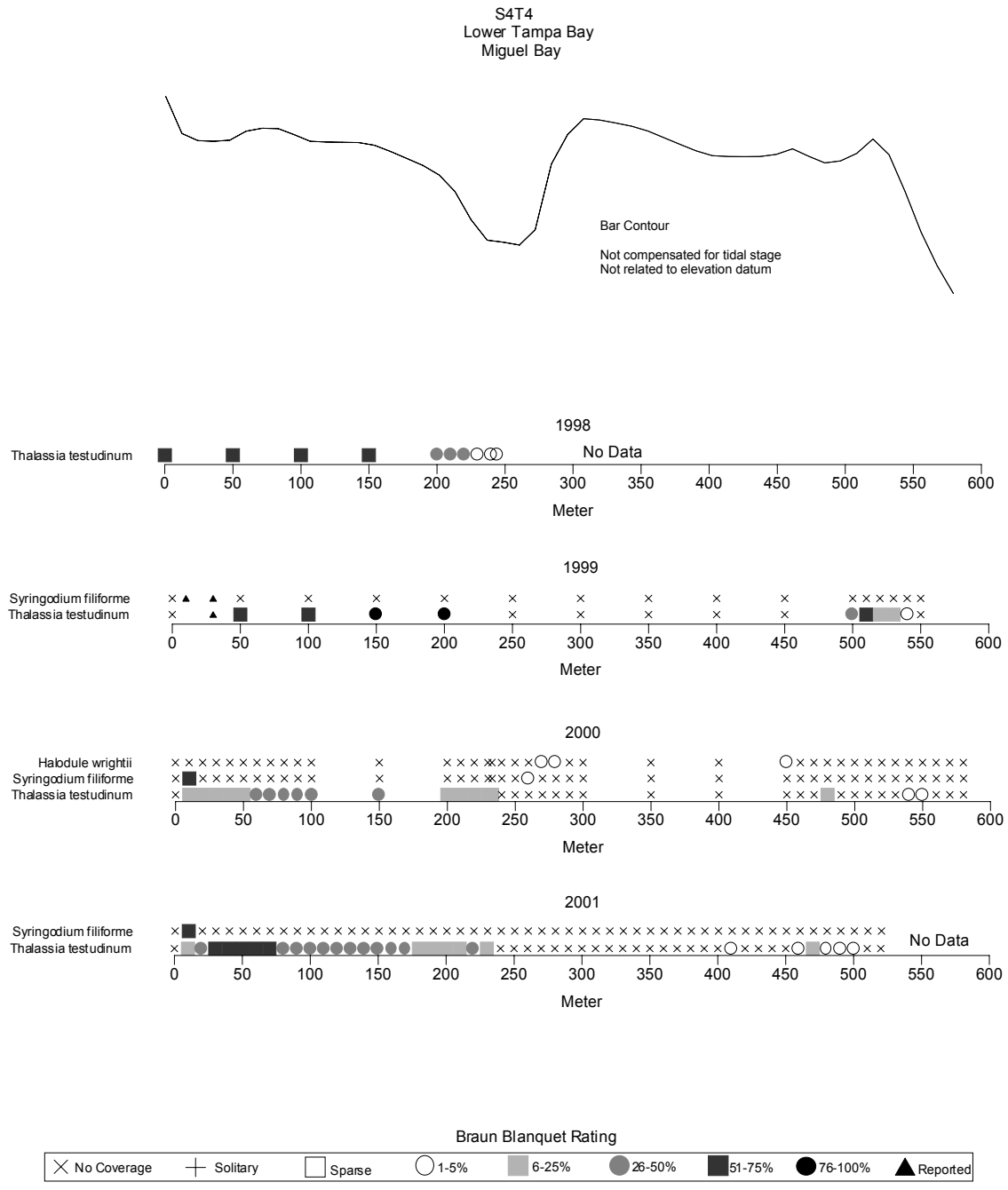

Figure 44. Seagrass species, abundance, and zonation at S4T4 from 1998-2001.

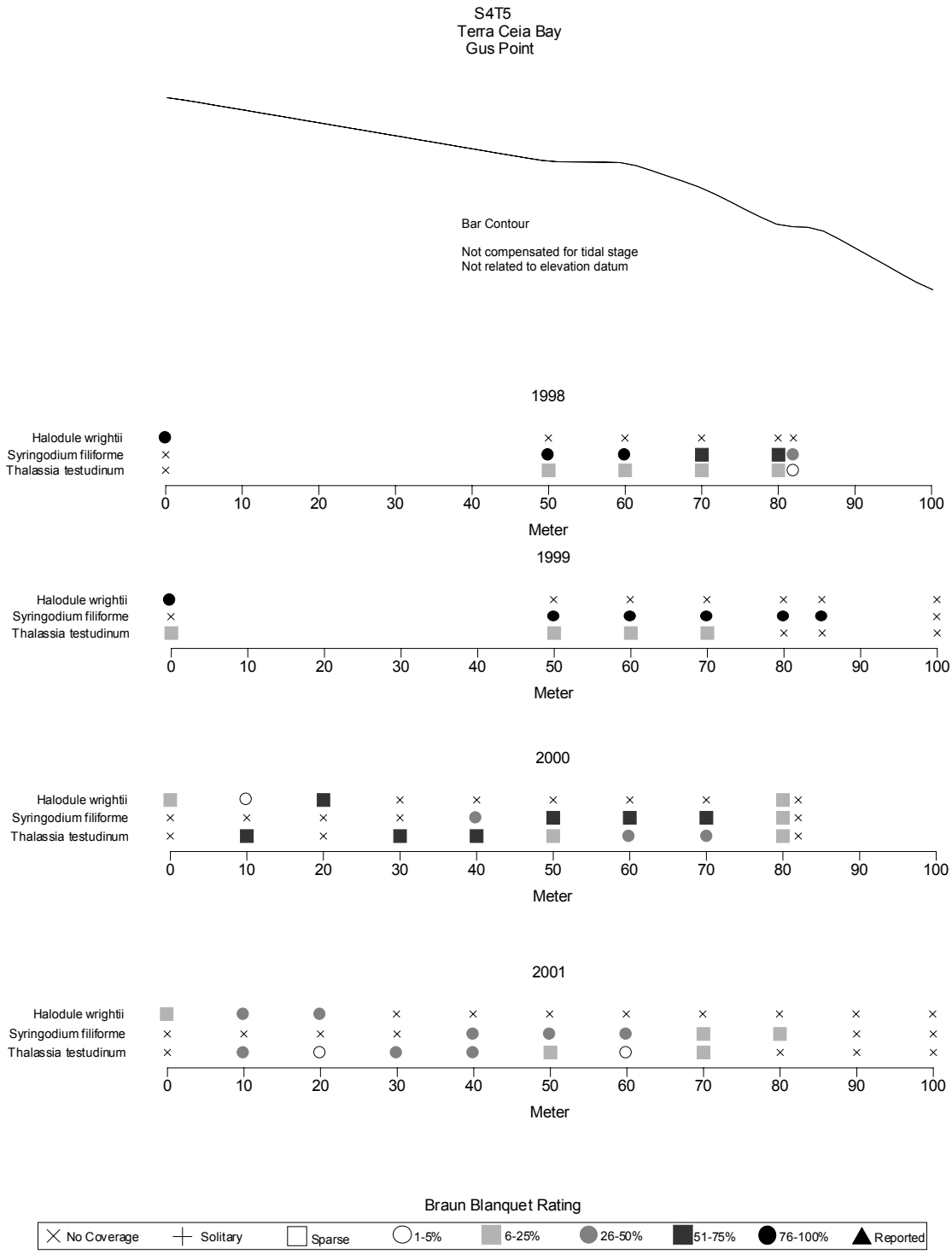

Figure 45. Seagrass species, abundance, and zonation at S4T5 from 1998-2001.

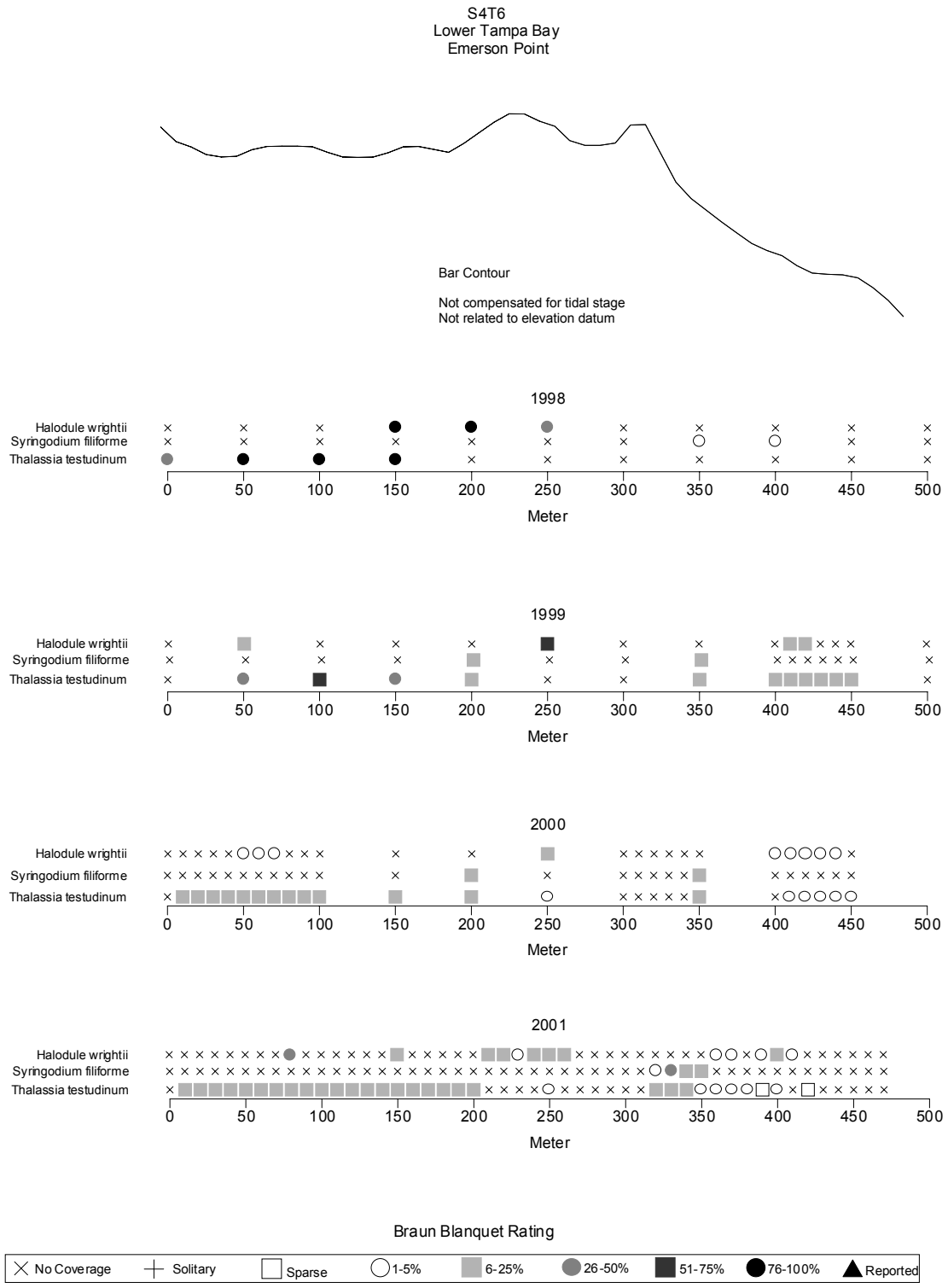

Figure 46. Seagrass species, abundance, and zonation at S4T6 from 1998-2001.

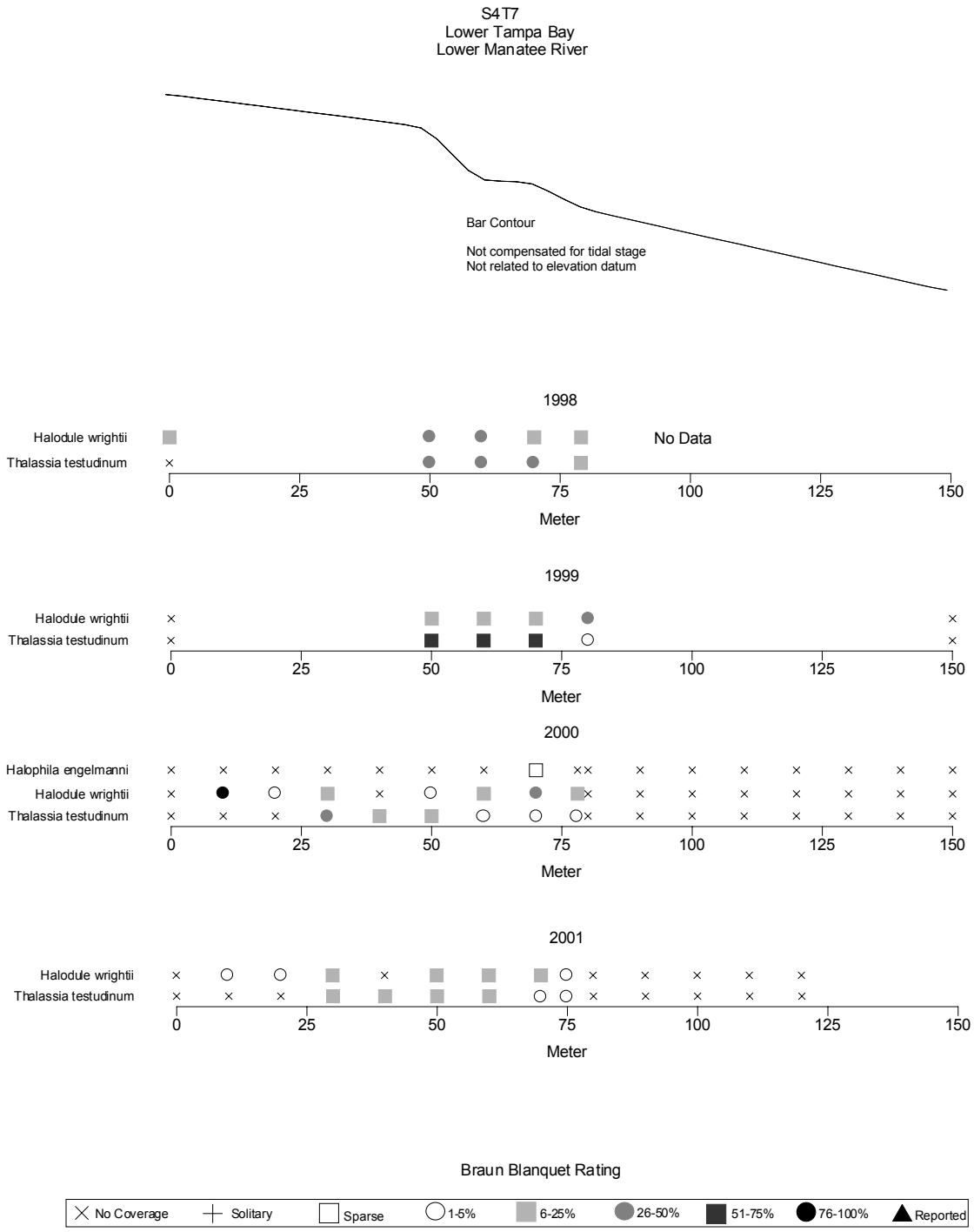

Figure 47. Seagrass species, abundance, and zonation at S4T7 from 1998-2001.

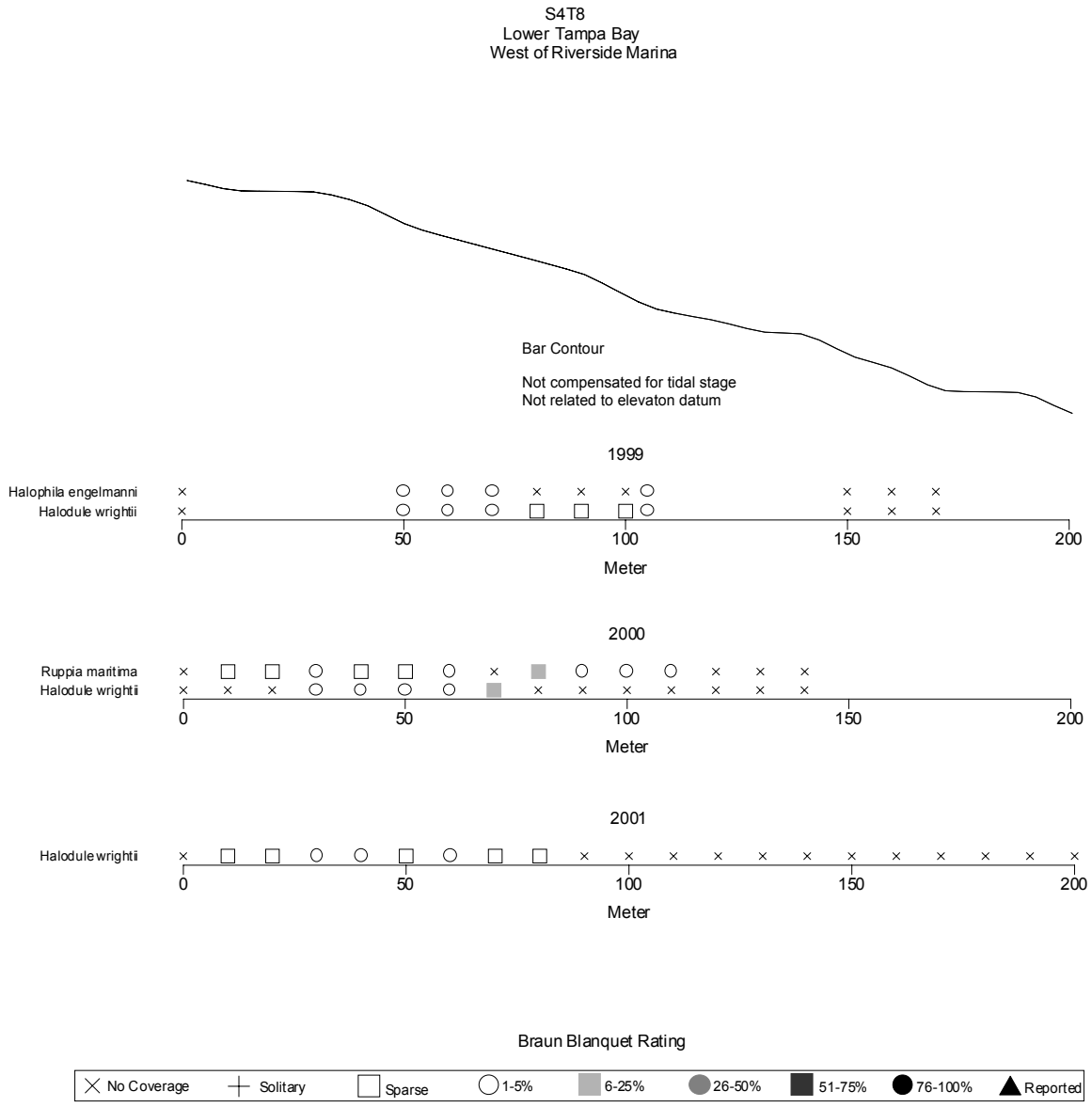

Figure 48. Seagrass species, abundance, and zonation at S4T8 from 1999-2001.

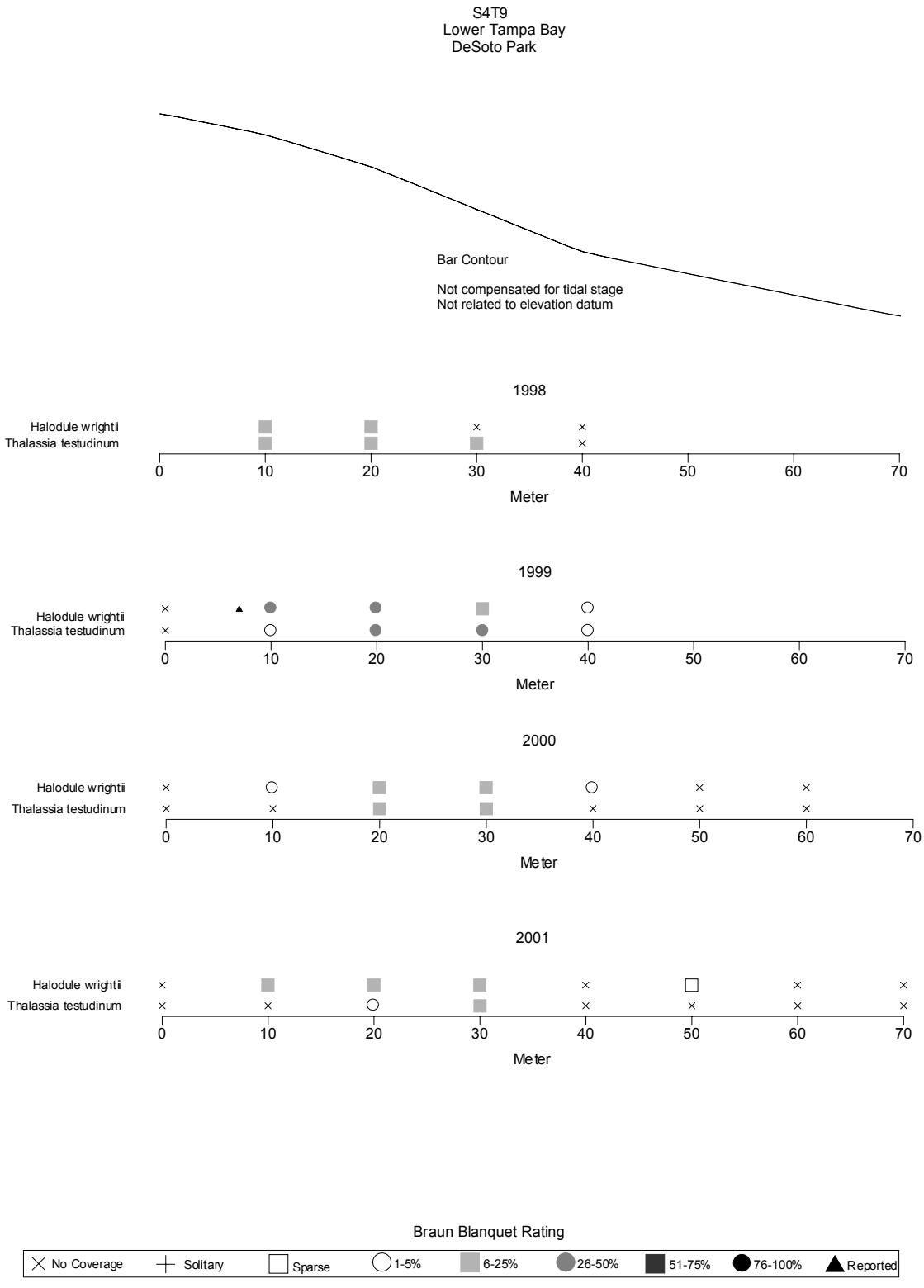

Figure 49. Seagrass species, abundance, and zonation at S4T9 from 1998-2001.

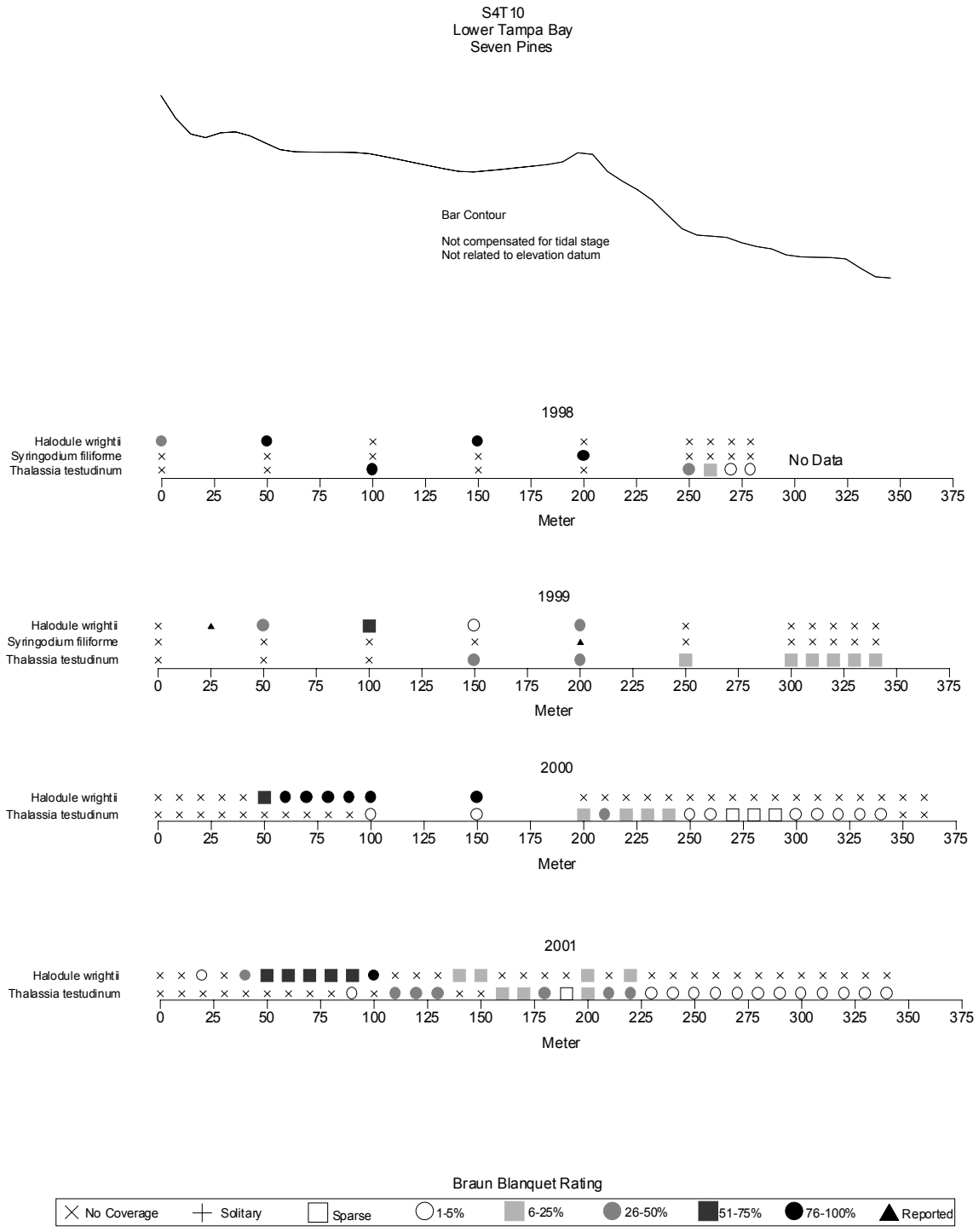

Figure 50. Seagrass species, abundance, and zonation at S4T10 from 1998-2001.

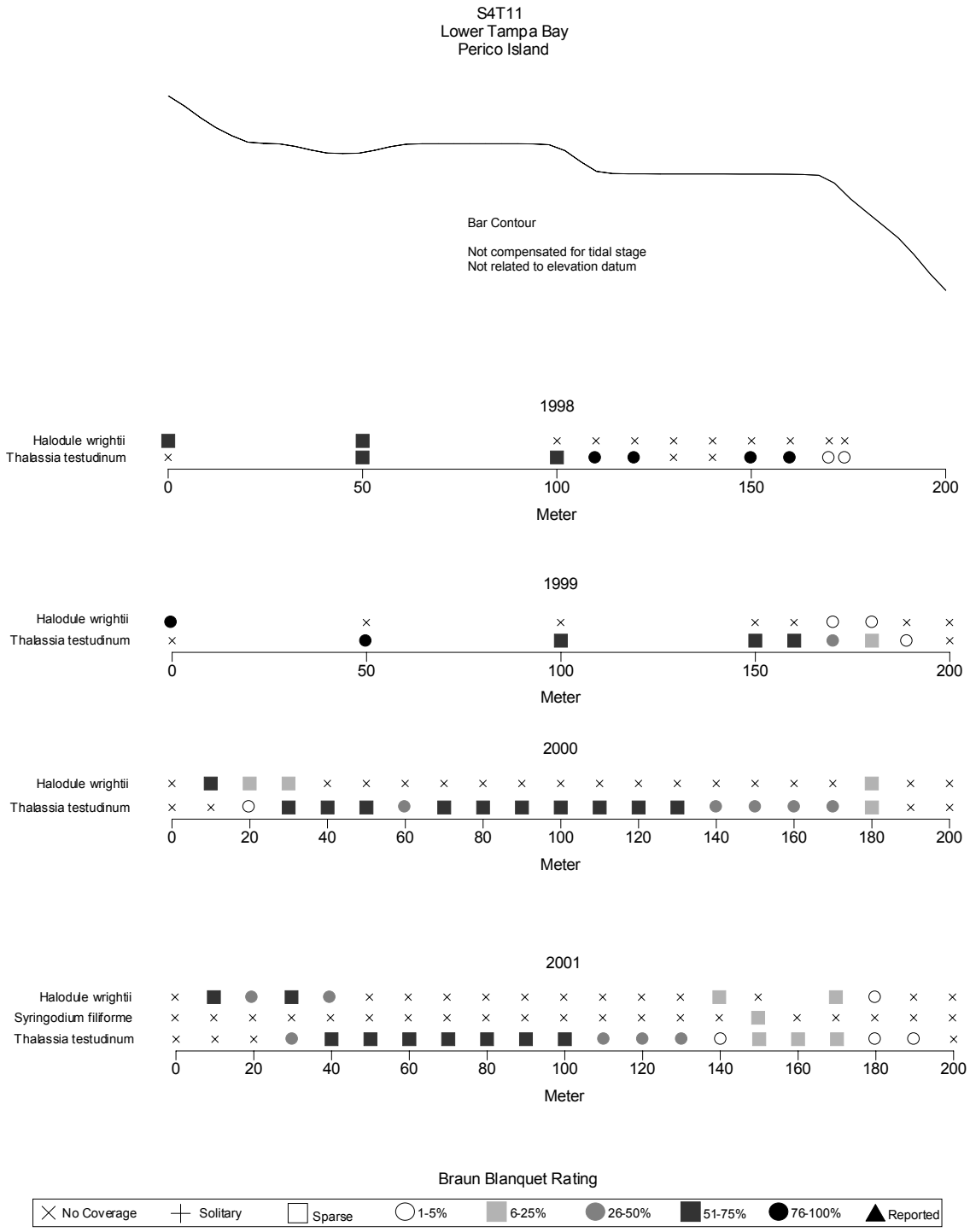

Figure 51. Seagrass species, abundance, and zonation at S4T11 from 1998-2001.

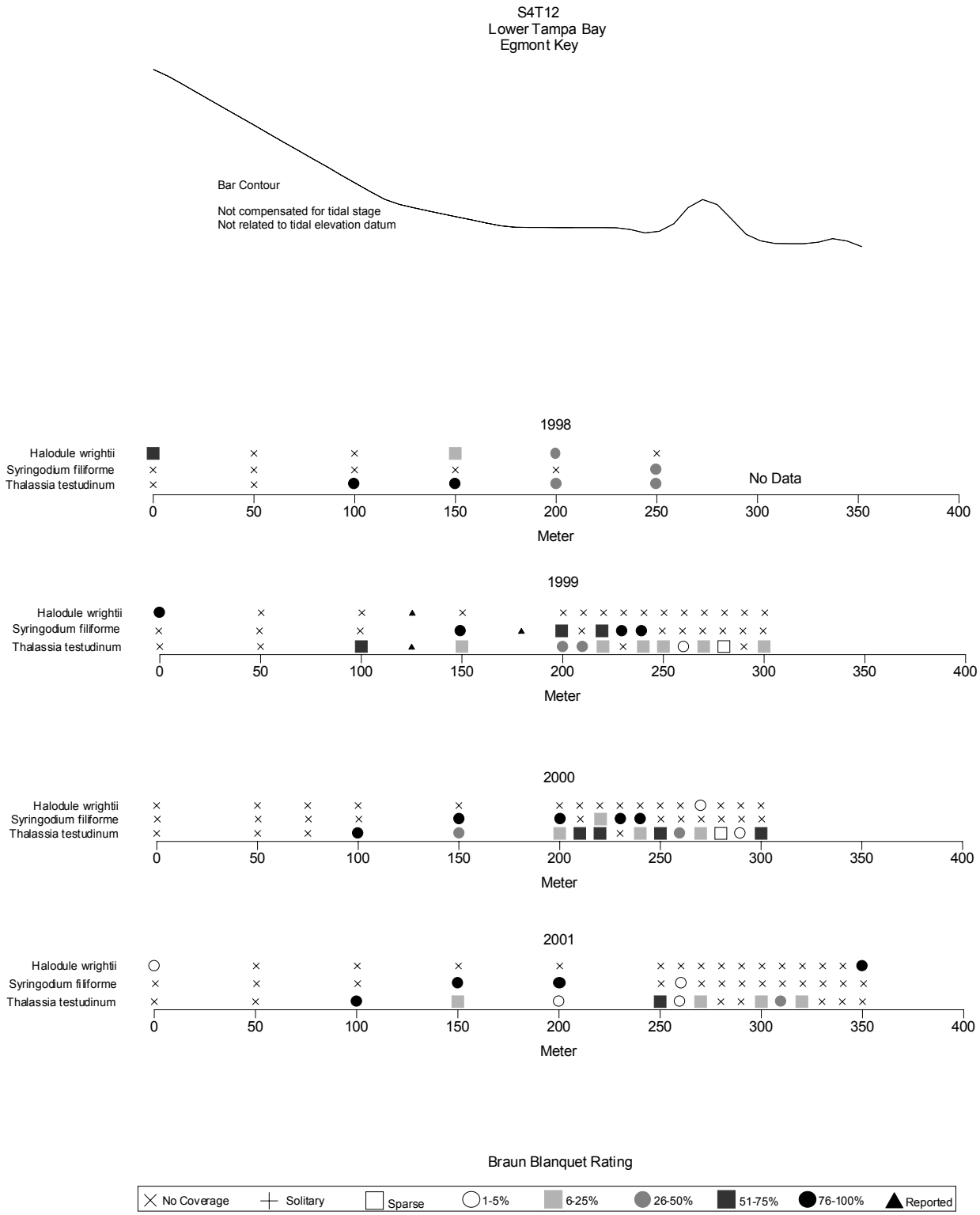

Figure 52. Seagrass species, abundance, and zonation at S4T12 from 1998-2001.

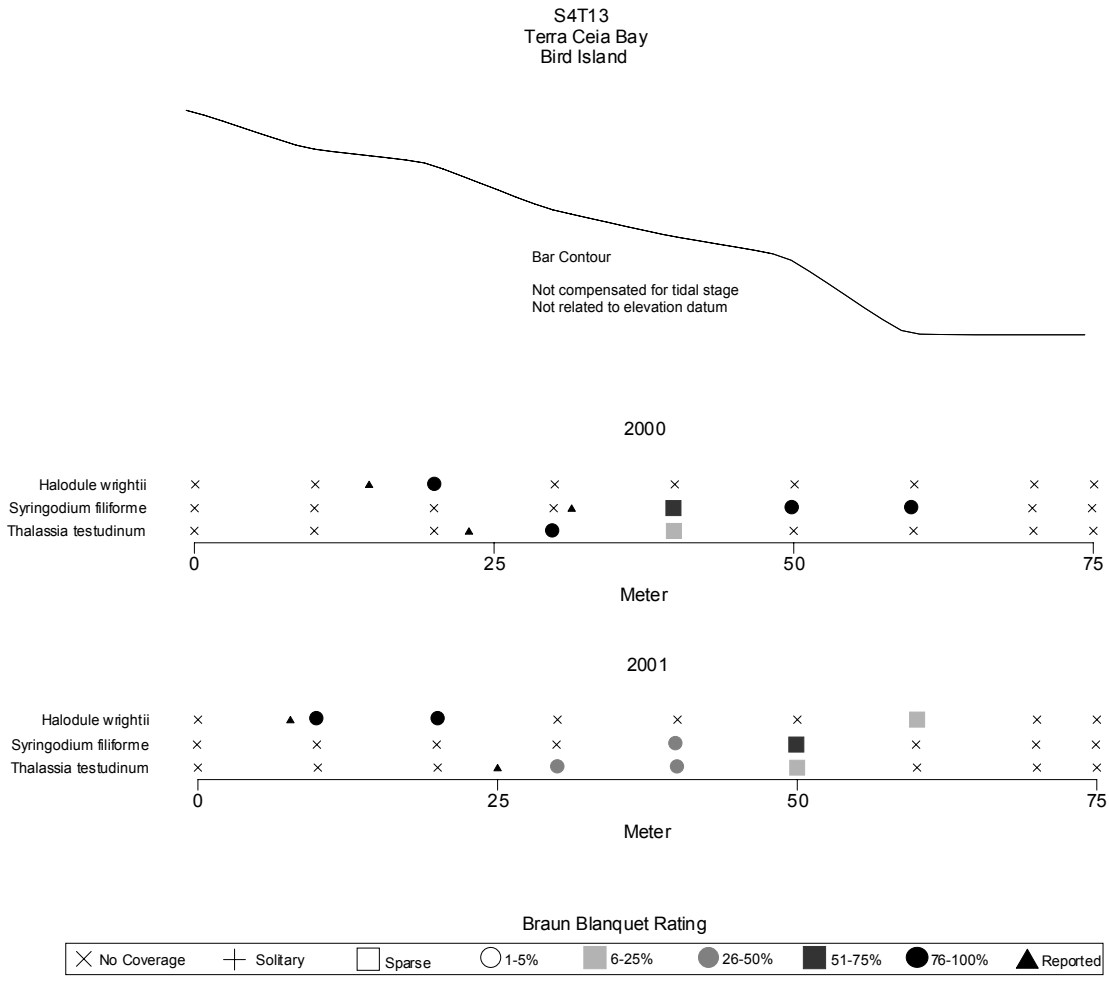

Figure 53. Seagrass species, abundance and zonation at S4T13 from 2000 - 2001.

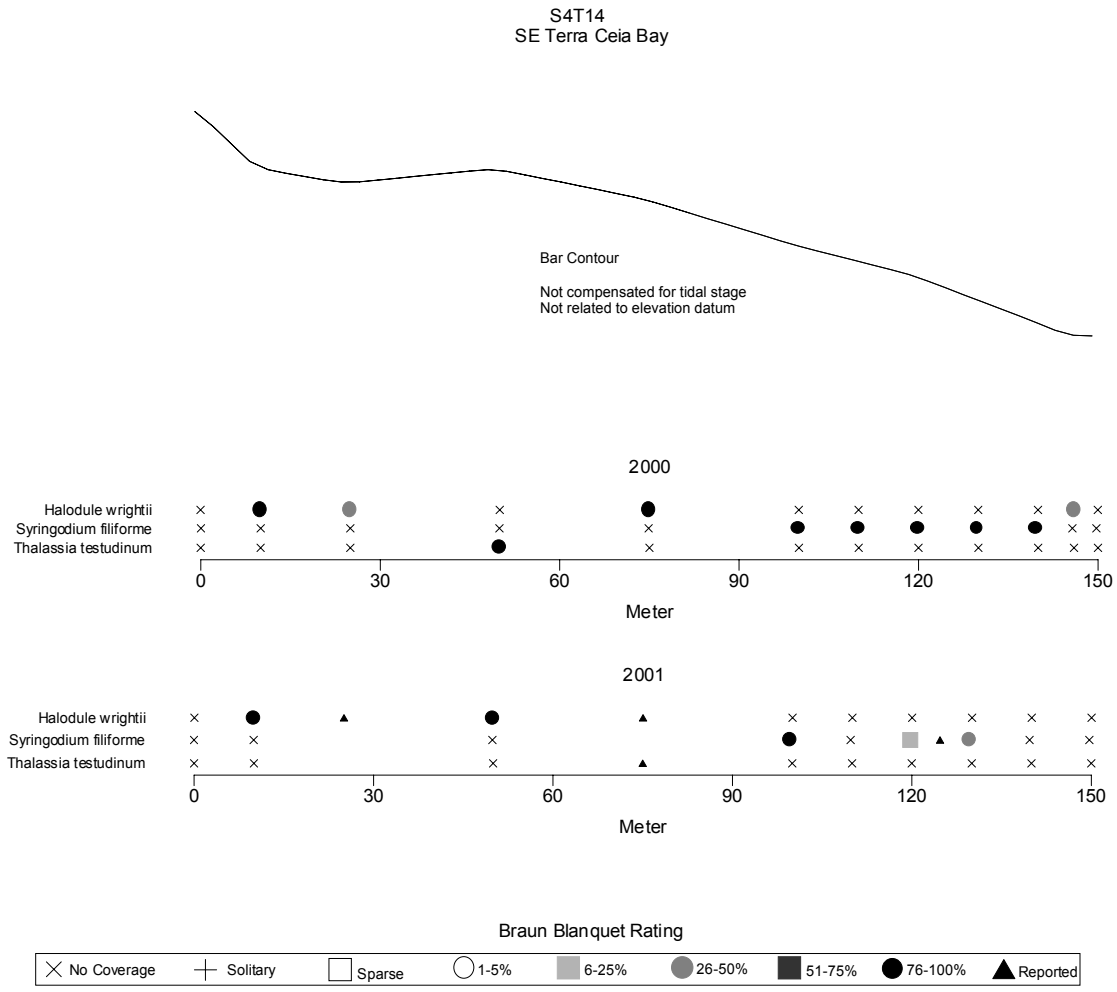

Figure 54. Seagrass species, abundance, and zonation at S4T14 from 2000-2001.

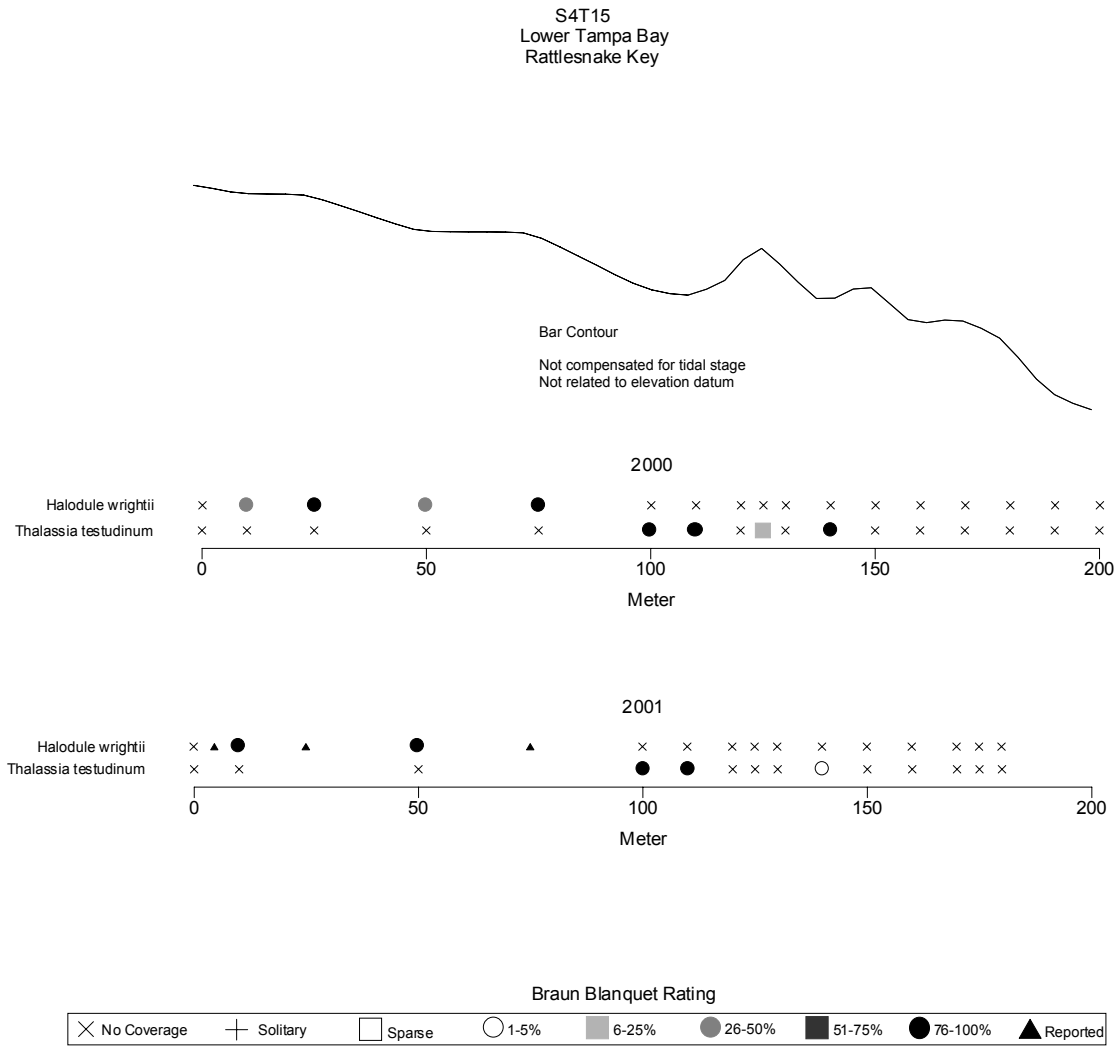

Figure 55. Seagrass species, abundance, and zonation at S4T15 from 2000-2001.

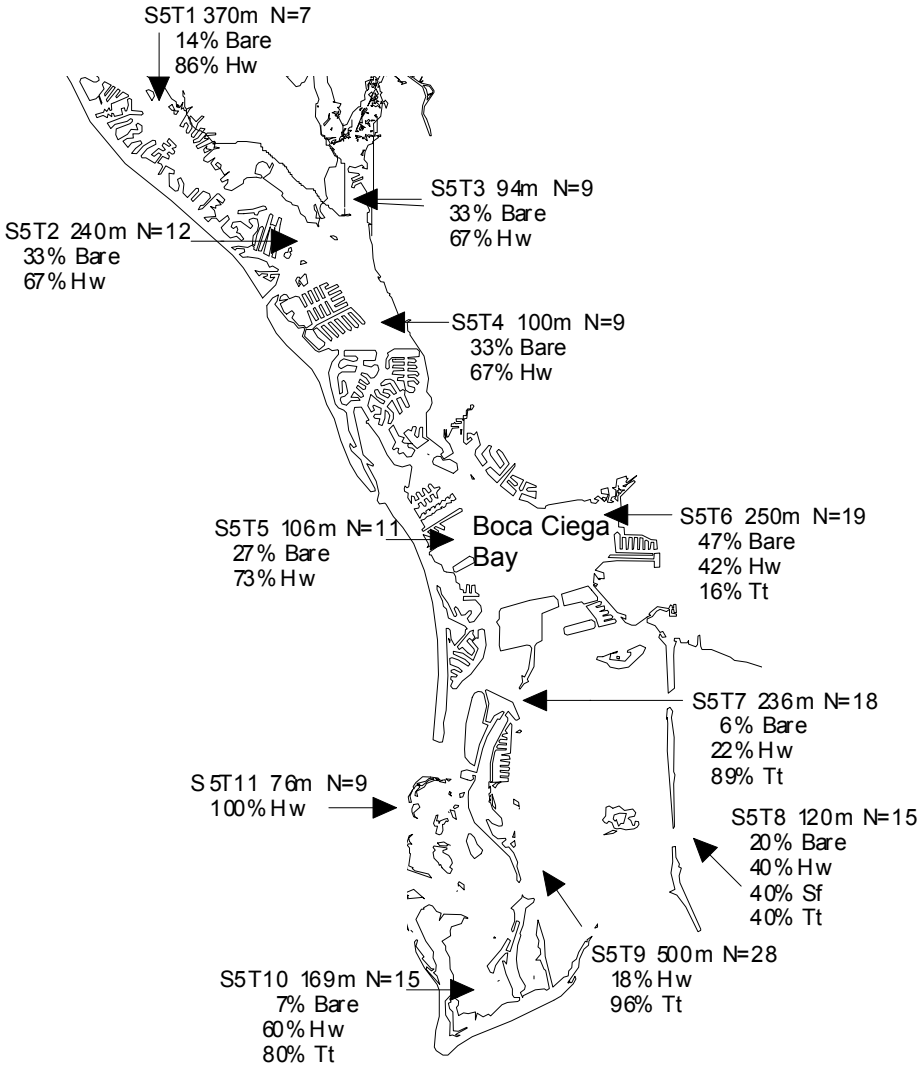

Figure 56. Name, location, length and percent of meter square placements containing each seagrass species along the 11 Boca Ciega Bay seagrass monitoring transects in 2001. N=number of meter square placements; Hw=*Halodule wrightii*; Rm=*Ruppia maritima*; Sf=*Syringodium filiforme*; Tt=*Thalassia testudinum*.

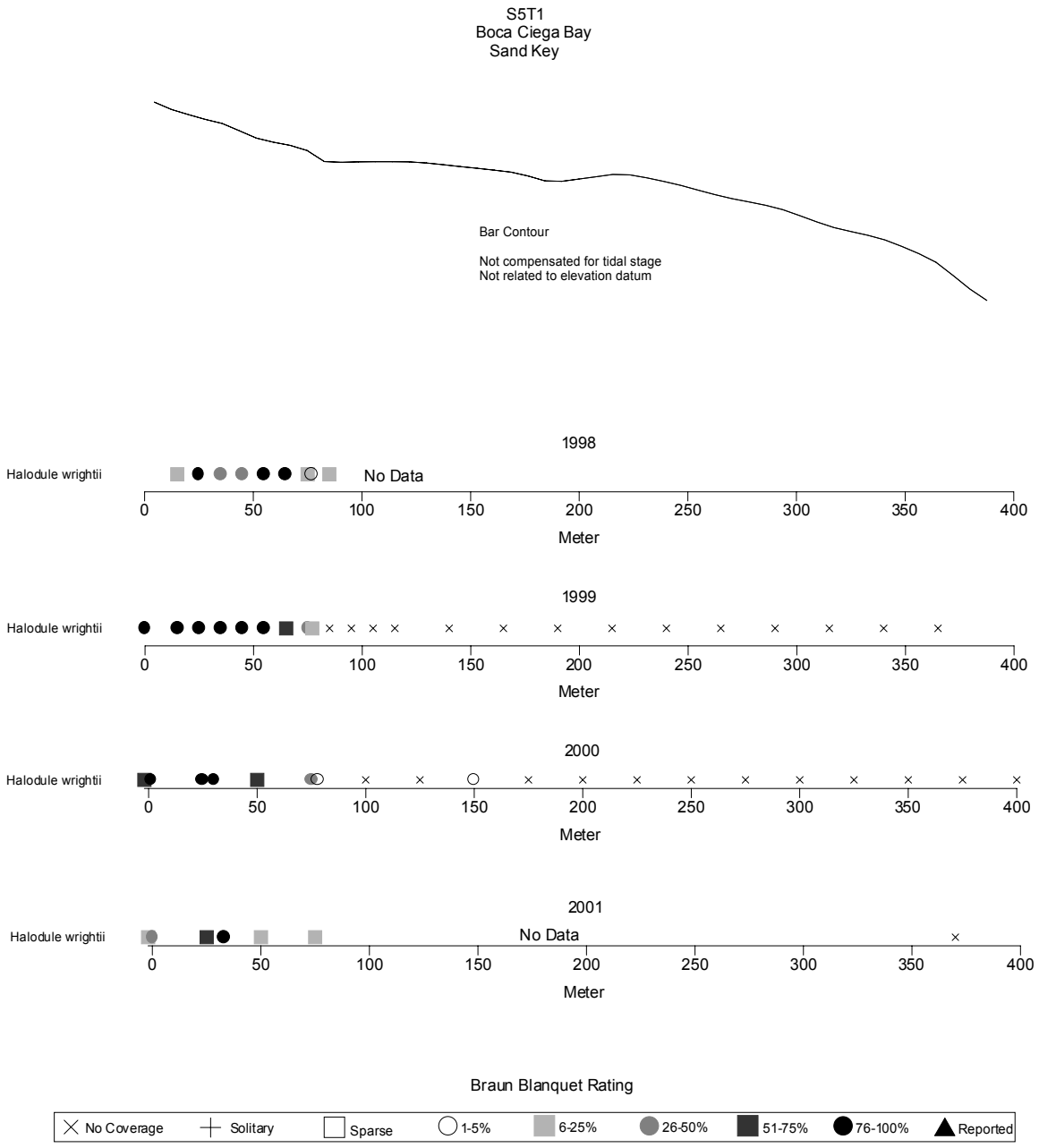

Figure 57. Seagrass species, abundance, and zonation at S5T1 from 1998-2001.

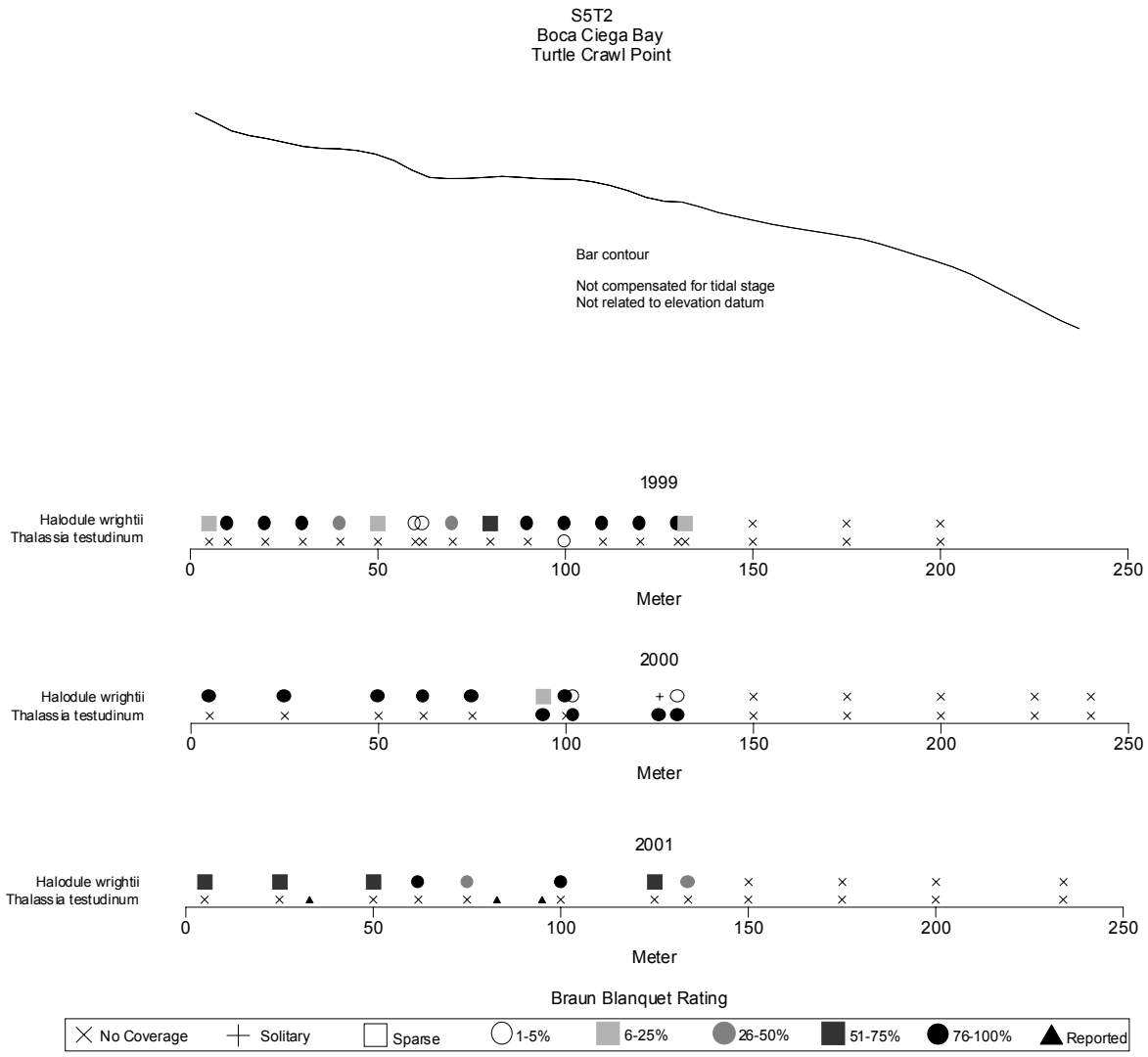

Figure 58. Seagrass species, abundance, and zonation at S5T2 from 1999-2001.

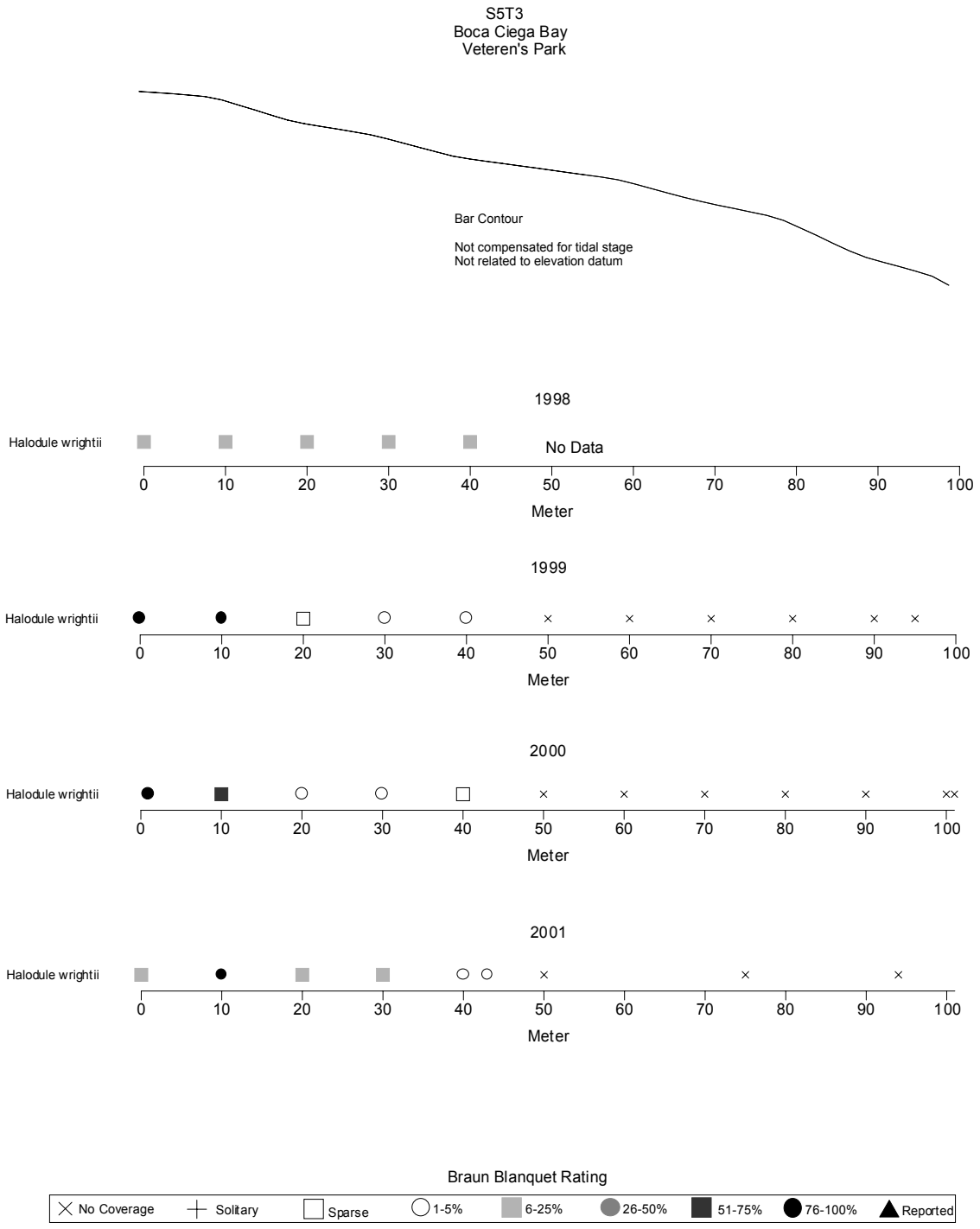

Figure 59. Seagrass species, abundance, and zonation at S5T3 from 1998-2001.

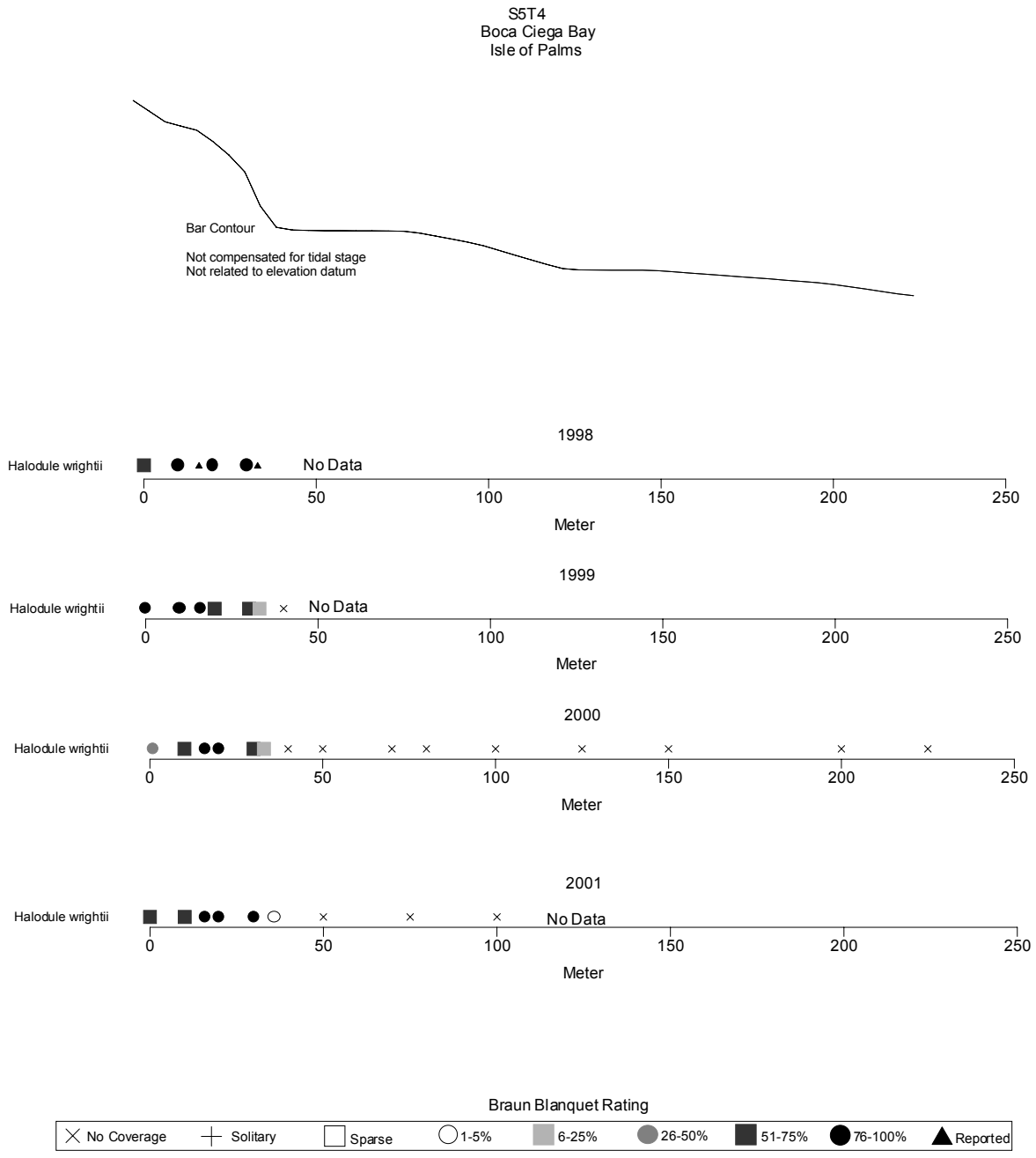

Figure 60. Seagrass species, abundance, and zonation at S5T4 from 1998-2001.

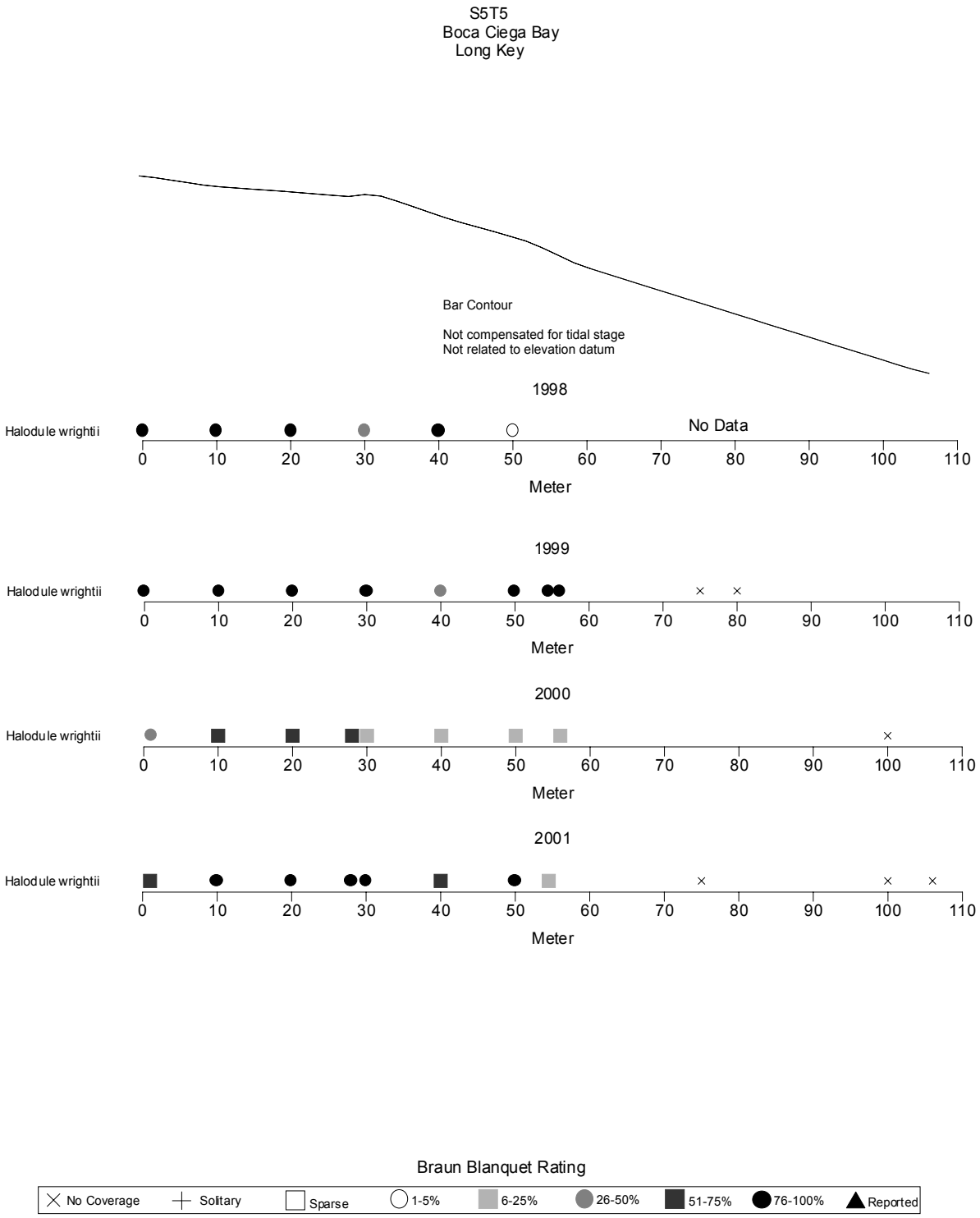

Figure 61. Seagrass species, abundance, and zonation at S5T5 from 1998-2001.

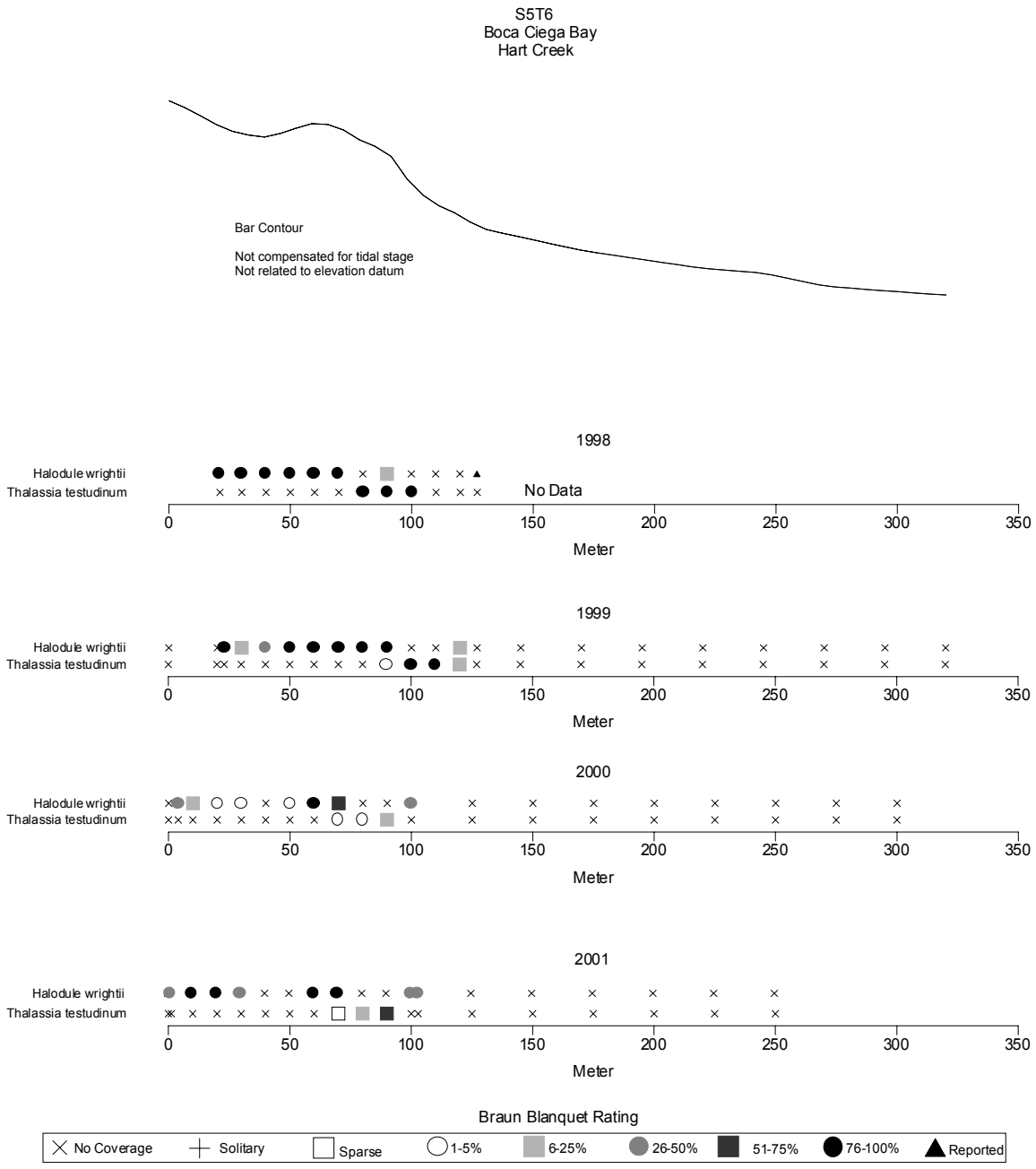

Figure 62. Seagrass species, abundance, and zonation at S5T6 from 1998-2001.

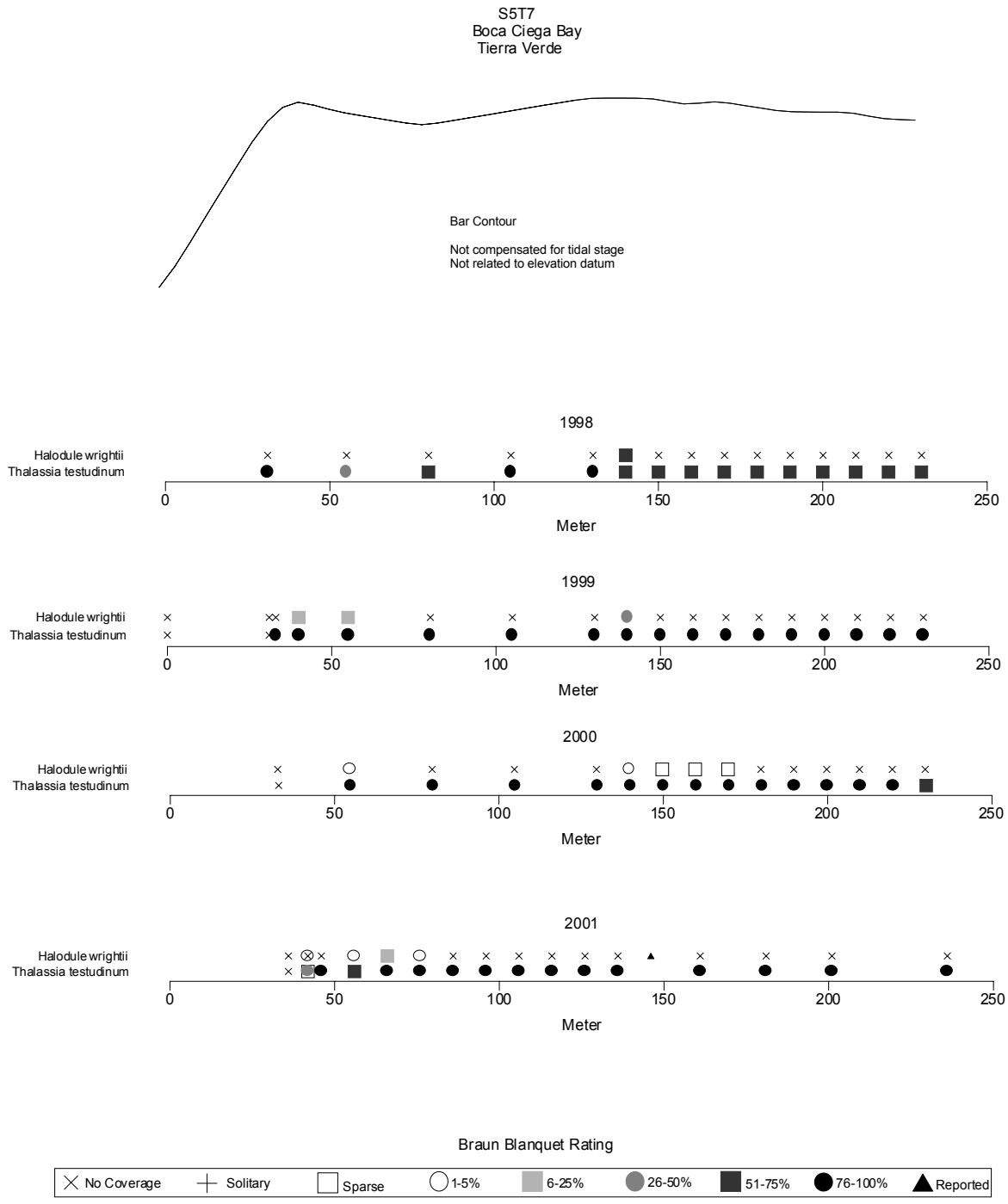

Figure 63. Seagrass species, abundance, and zonation at S5T7 from 1998-2001.

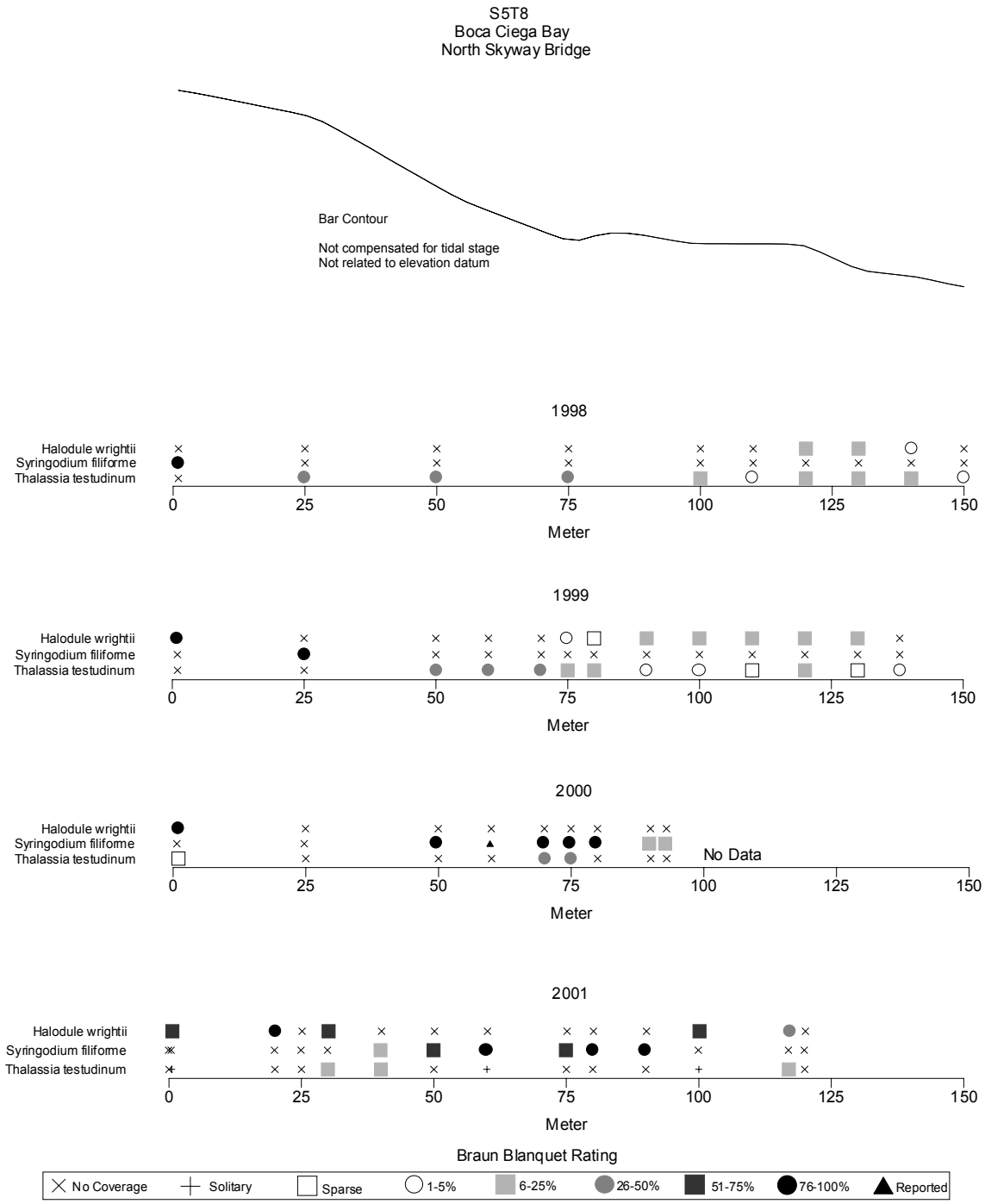

Figure 64. Seagrass species, abundance, and zonation at S5T8 from 1998-2001.

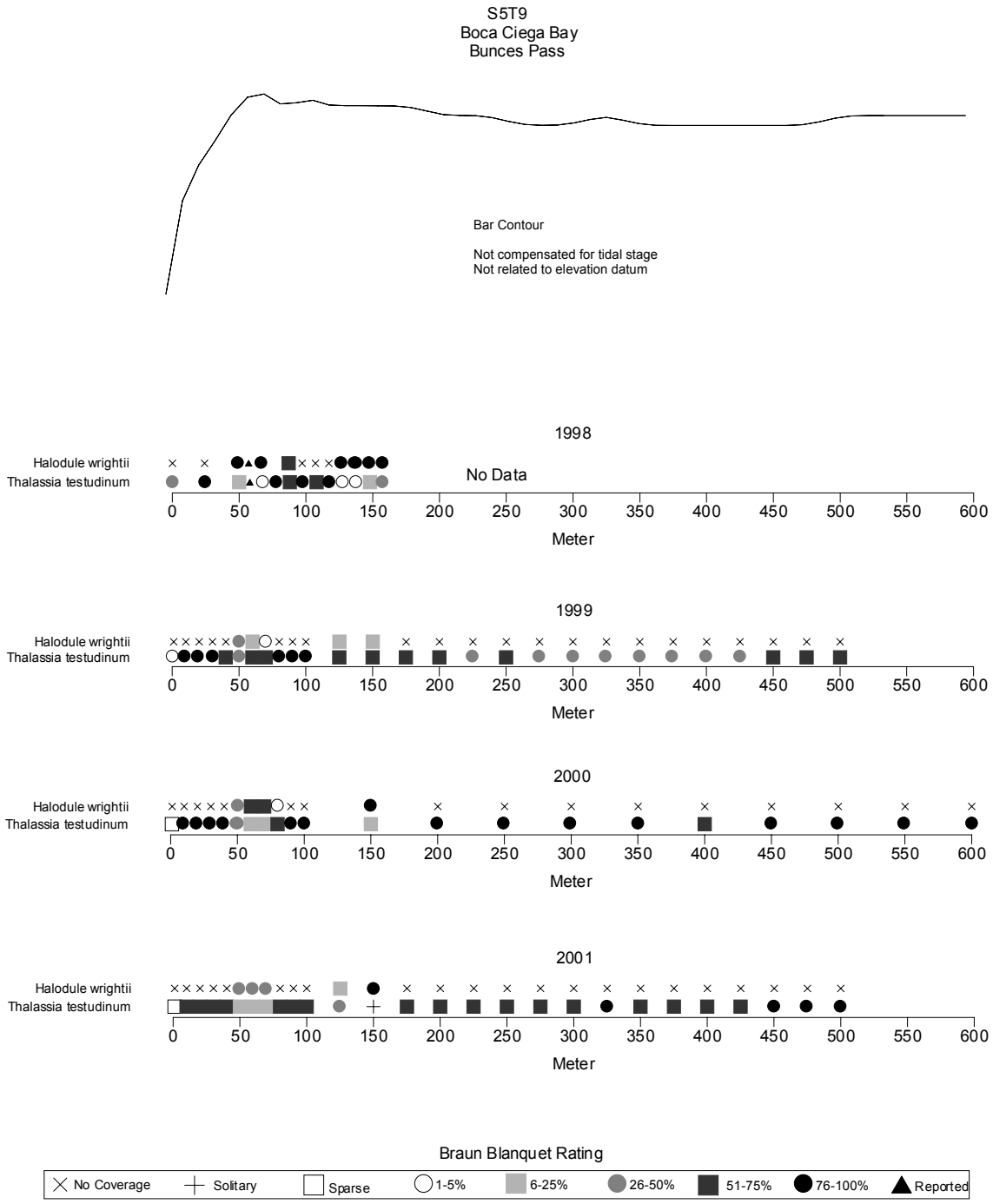

Figure 65. Seagrass species, abundance, and zonation at S5T9 from 1998-2001.

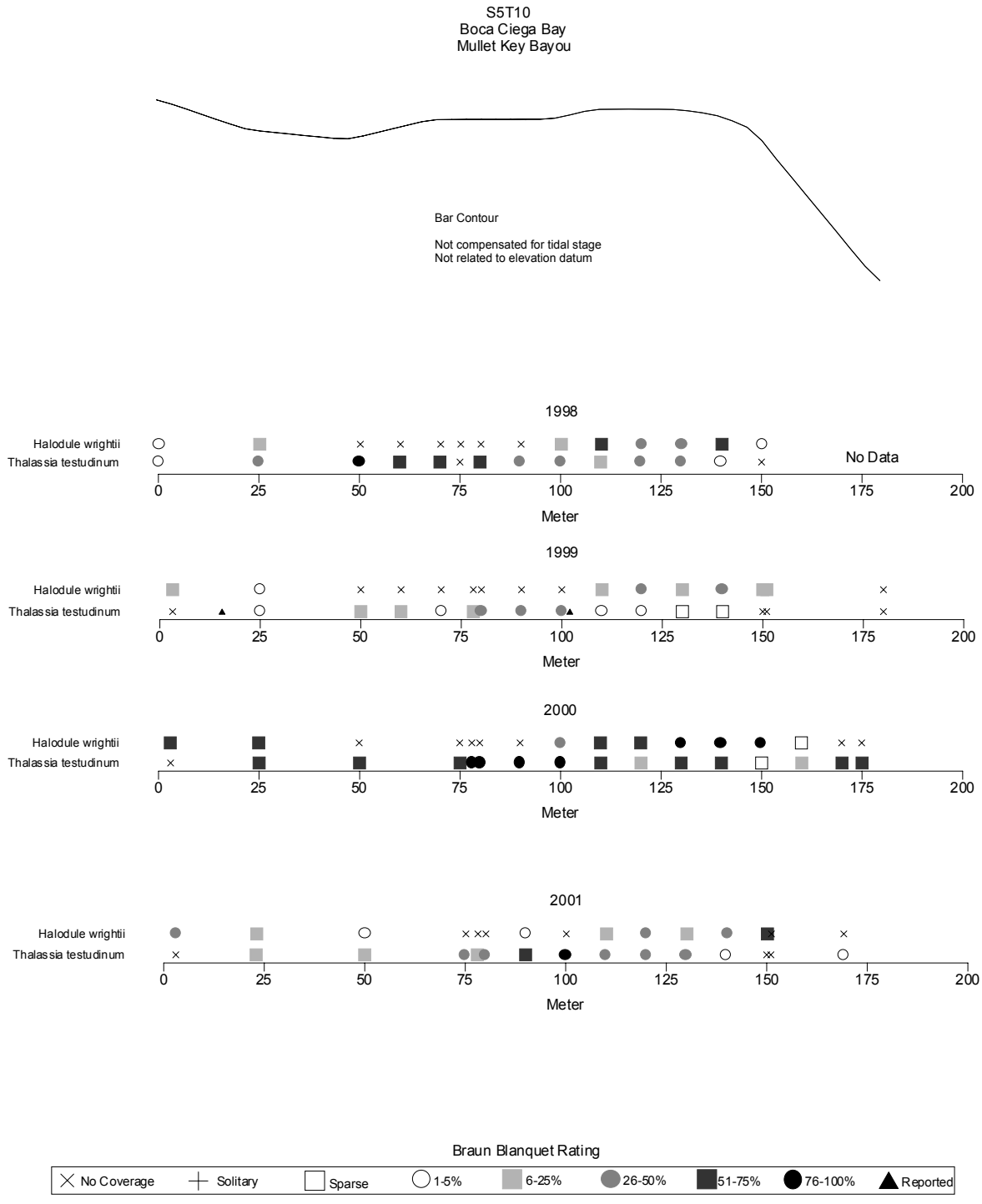

Figure 66. Seagrass species, abundance, and zonation at S5T10 from 1998-2001.

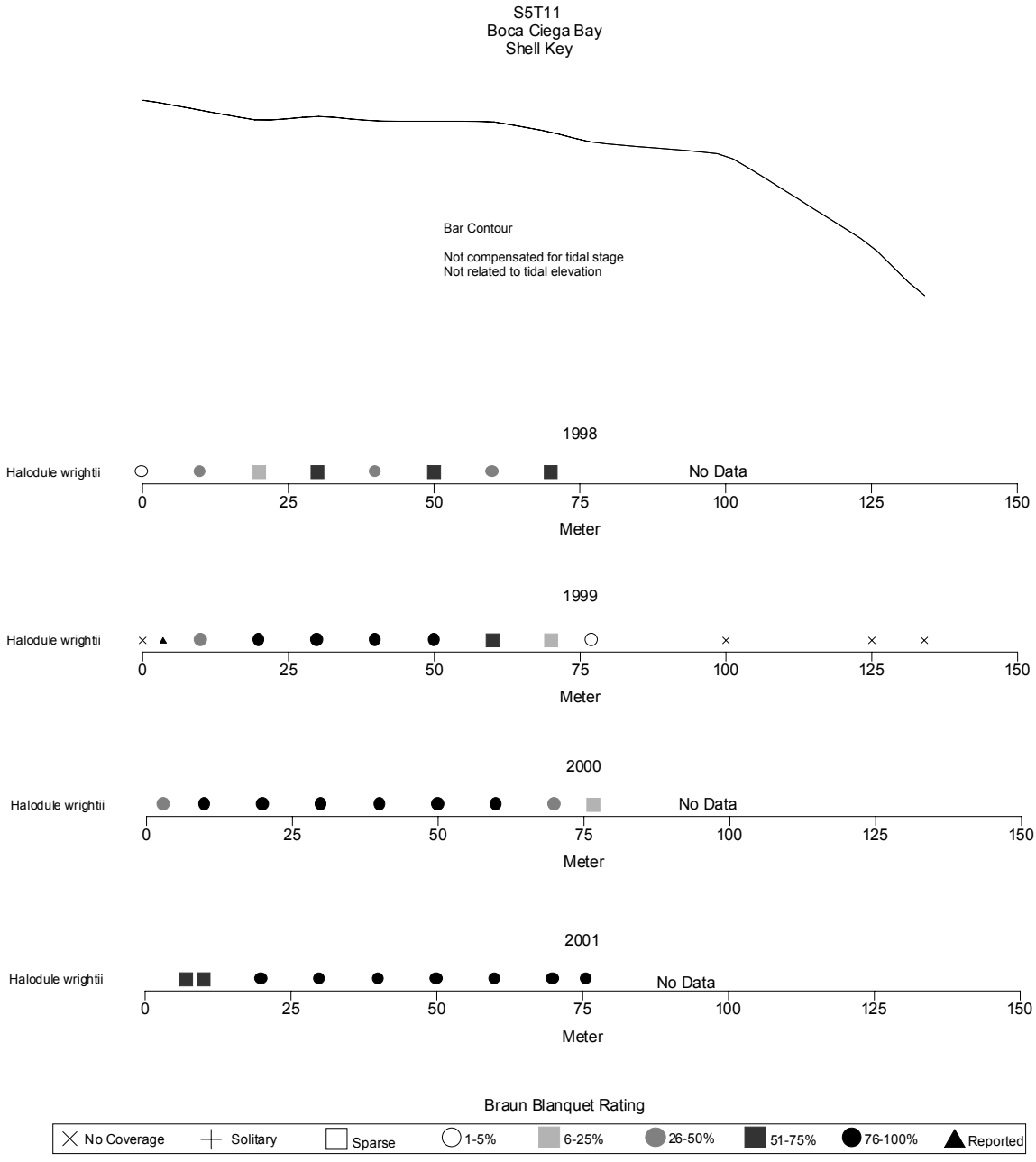

Figure 67. Seagrass species, abundance, and zonation at S5T11 from 1998-2001.