Post Hurricane Ivan Damage Assessment of Seagrass Resources of Coastal Alabama

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Table of Contents:

Abstract …………………………………………………………………… 1

Introduction ……………………………………………………………….. 1

Study Area and Methods ………………………………………………….. 2

Results and Discussion …………………………………………………… 2-3

Literature Cited …………………………………………………………… 3-4

Figure 1a …………………………………………………………………… 5

Figure 1b …………………………………………………………………… 6

Figure 1c …………………………………………………………………… 7

Figure 2a …………………………………………………………………… 8

Figure 2b …………………………………………………………………… 9

Figure 3a …………………………………………………………………… 10

Figure 3b …………………………………………………………………… 11

Figure 3c …………………………………………………………………… 12

Figure 4a …………………………………………………………………… 13

Figure 4b …………………………………………………………………… 14

**Appendices can be found in file "ADCNR_appendix.xls"

Abstract

To evaluate the effects of Hurricane Ivan on seagrass meadows, in November 2004 we surveyed all Alabama coastal locations that were known to support seagrass prior to Hurricane Ivan's landfall in Baldwin County. We found that 82% of the coastal sites surveyed by Vittor and Associates in 2002 and recorded as containing seagrass still contained seagrass. Therefore, there was no major loss of Alabama's seagrass resources due to Hurricane Ivan.

Introduction

Seagrasses are important, productive components of nearshore environments, which provide food and shelter for many economically important species (Heck & Orth, 1980; Zieman, 1982; Williams and Heck 2001). Since the early 1970's there have been worldwide declines in the distribution and abundance of seagrass habitats (Cambridge *et al*., 1986; Dennison *et al*., 1993), and drastic losses of seagrasses have occurred throughout the Gulf of Mexico (Dawes et al. 2004). In most instances, declining water quality has been blamed for seagrass die-off.

Seagrasses are resilient to many hurricanes; however, very strong storms like Ivan can produce severe seagrass loss, as was observed in Santa Rosa Sound, FL after the passage of another major storm, Hurricane Opal (Heck et al. 1996). Thus, recent landfall of Hurricane Ivan in Baldwin County may have negatively impacted the abundance of seagrasses in Alabama coastal waters by uprooting or burying them.

Fortunately, the Mobile Bay NEP funded a survey of submerged aquatic vegetation (SAV) in coastal Alabama in Summer and Fall 2002, and this work included photointerpreted aerial imagery of SAV that was groundtruthed. (Vittor and Associates 2003). Thus, we have a very good idea of where seagrasses existed in 2002, and there is little reason to believe that the distribution of seagrasses should have changed substantially in the intervening two years before the arrival of Hurricane Ivan. To evaluate how the landfall of Hurricane Ivan may have affected the distribution of seagrasses in coastal Alabama, we carried out a rapid field assessment of the seagrass resources identified by Vittor and Associates (2003).

Study Area and Methods

On November 8 and November 10, 2004, we resampled the vegetated coastal locations visited by Vittor and Associates in 2002 to assess changes in seagrass distribution that may have occurred as a result of the effects of Hurricane Ivan. We divided the Alabama Coast into three zones—Grand Bay, Mobile Bay (including Mississippi Sound east of Grand Bay), and Perdido Bay—and resurveyed all coastal locations found to support SAV (either shoalgrass or turtlegrass) by Vittor and Associates (2003). In addition, we selected two areas that were found to contain newly discovered occurrences or species of SAV for more intensive study. These sites included several locations on the west end of Dauphin Island found to support seagrass for the first time, and a location in Little Lagoon, where turtlegrass was reported for the first time in Alabama by Vittor and Associates (2003).

Using a Garmin GPS that can provide position accuracy to less than three meters when receiving WAAS corrections, we located the stations reported in the Vittor and Associates (2003) report. At each of these locations, we recorded data on SAV species composition and abundance as measured by a quick visual assessment (presence/ absence; sparse/ dense) and collected a core sample of seagrass from each location where it is present to obtain an accurate seagrass shoot density. At stations where it appeared that there was a loss, we examined the surrounding area to verify complete bed loss of the area. If seagrass was present nearby (within a few meters), we collected a core sample and recorded the GPS coordinates. These samples were then archived at DISL for future reference as voucher specimens.

Results and Discussion

The Vittor and Associates (2003) survey found seagrass at 44 marine coastal stations that were used to ground-truth aerial photography within our three zones (Grand Bay, Mobile Bay (including Mississippi Sound east of Grand Bay), and Perdido Bay). We re-surveyed these 44 stations (Figure 1) after Hurricane Ivan passed over the area and found that 36 stations were still populated with seagrass (Figures 2-4). Vittor and Associates reported that *Halodule wrightii* (shoal grass) was the species most often found at these stations. Our results agreed that *H. wrightii* was the dominant species; however, we found that at 47% of the stations (17 stations), another species of seagrass, *Ruppia maritima* (widgeon grass), was also present (Figures 2-4).

Two areas of interest in this re-survey were the northwestern end of Dauphin Island and Little Lagoon. *Halodule wrightii* was reportedly found in small, isolated patches along the northwestern end of Dauphin Island by reported by Vittor and Associates (2003). We did not find any evidence of *H. wrightii* in this area. In 2002, Vittor and Associates reported *Thalassia testudinum* (turtle grass) for the first time in Little Lagoon, Alabama. Our re-survey of the area confirmed the presence of this bed.

The west end of Dauphin Island, Little Lagoon and Perdido Bay were heavily impacted by Hurricane Ivan and were considered likely to have experienced seagrass damage or loss. We did not see a large loss of seagrass at Little Lagoon or Perdido Bay; however, due to the shifting sediment conditions at the west end of Dauphin Island, we were not surprised at the loss of seagrass in this area. The absence of shoal grass at five sites in the Perdido Bay area was of slight concern. We cannot say with 100% accuracy that there was a loss, due to the limitations of the GPS. It is quite possible that the sites had small patches of seagrass that were not seen because the position of the GPS was as much as 3 meters away from the intended location. This concern could be resolved by looking at more current aerial photography of the area.

Recovery of seagrass and recolonization after losses are rare, and destruction of seagrass habitat may have long-term consequences for sediment stability and production of economically important finfish and shellfish (Williams and Heck 2001). For this reason, many coastal states with substantial seagrass resources assess the distribution and abundance of seagrass meadows every few years. Given the well recognized importance of seagrasses as nursery habitats for shrimp, crabs and finfish (Heck et al. 2003), we recommend that a survey of seagrass resources in coastal Alabama be conducted at least every three years.

Literature Cited

Cambridge, M.A., A.W. Chiffings, C. Brittan, L. Moore, and A.J. McComb, 1986. The loss of seagrass in Cockburn Sound, Western Australia. II. Possible causes of seagrass decline. Aquat. Bot., Vol. 24, pp. 137-148.

Dawes, C.J., R.C. Phillips, and G. Morrison. 2004. Seagrass Communities of the Gulf Coast of Florida: Status and Ecology. Florida Fish and Wildlife Conservation Commission Fish and Wildlife Research Institute and the Tampa Bay Estuary Program. St. Petersburg, FL. iv + 74 pp.

Dennison, W.C., R.J. Orth, K.A. Moore, J.C. Stevenson, V. Carter, S. Kollar, P.W. Bergstrom, and R.A. Batiuk, 1993. Assessing water quality with submerged aquatic vegetation. BioScience, Vol. 161, pp. 311-312.

Heck, K.L. Jr. and R.J. Orth. 1980. Seagrass habitats: The roles of habitat complexity, competition and predation in structuring associated fish and motile macroinvertebrate assemblages. Pp. 449-464 *In:* V. S. Kennedy, (Ed.). Estuarine perspectives. Academic Press, NY.

Heck, K. L. Jr., M.J. Sullivan, J.M. Zande and C.A. Moncreiff. 1996. An ecological analysis of Seagrass meadows of the Gulf Islands National Seashore. Final Report to the National Park Service, Gulf Islands National Seashore. 378 p.

Heck, K.L. Jr., R.J. Orth and C.G. Hays. 2003. Critical evaluation of the nursery role hypothesis for seagrass meadows. Marine Ecology Progress Series. 253: 123-136.

Vittor and Associates, Inc. 2003. Mobile Bay Submerged Aquatic Vegetation. Final Report to Mobile Bay National Estuary Program.

Williams, S.L., Heck Jr., K.L., 2001. Seagrass community ecology. In: M.D., Bertness, S.D., Gaines, M.E. Hay (Eds.), Marine community ecology. Sinauer Associates, Inc. Sunderland, Massachusetts, pp. 317-337.

Zieman, J.C. 1982. The ecology of seagrasses of south Florida: a community profile. US Fish and Wildlife Services, Office of Biological Services, Washingotn, DC. FWS/OBS-82/25. 158 p.

Figure 1a: Area surveyed in Grand Bay and Mississippi Sound. Stars indicate station locations

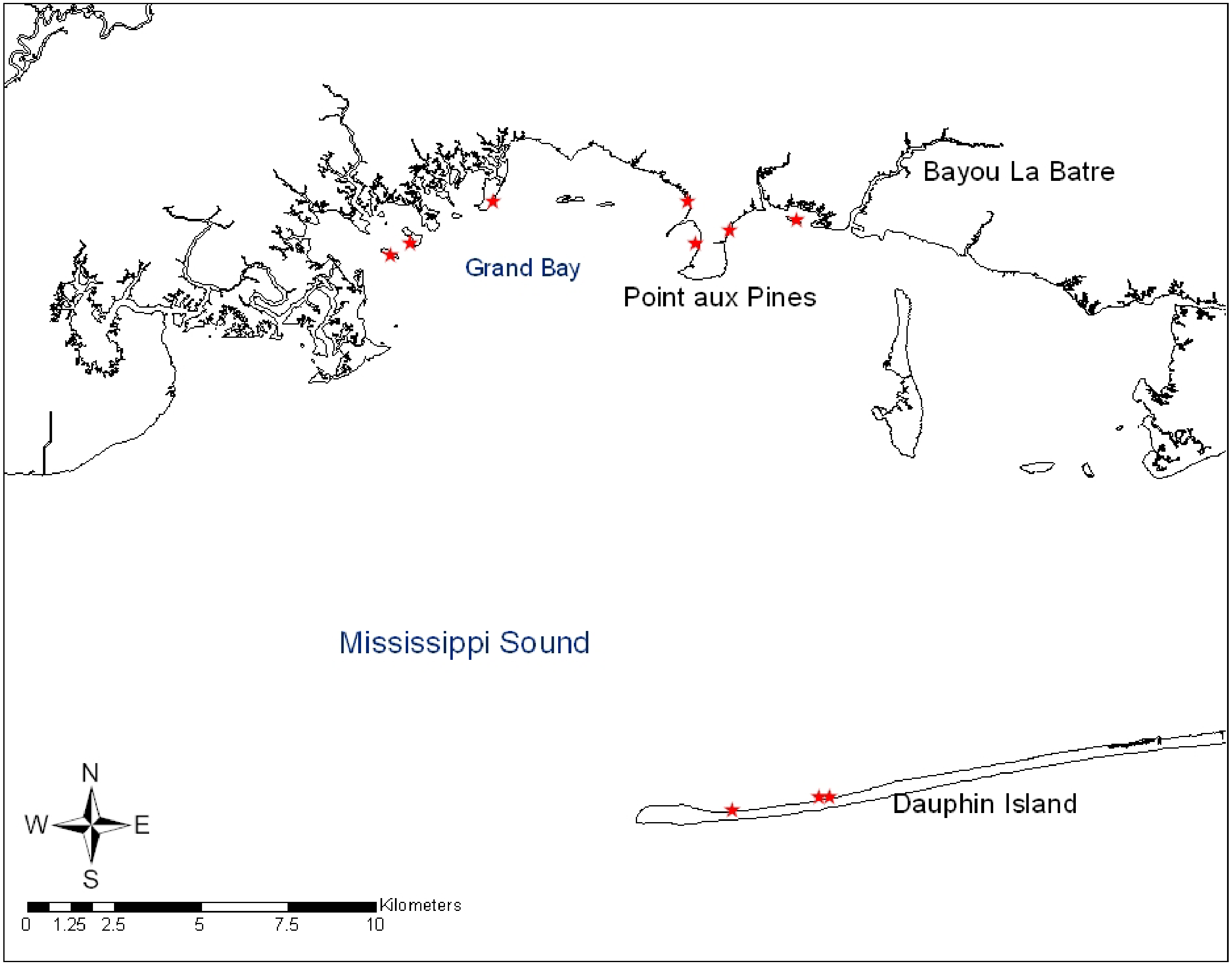

Figure 1b: Area surveyed in Little Lagoon. Stars indicate station locations.

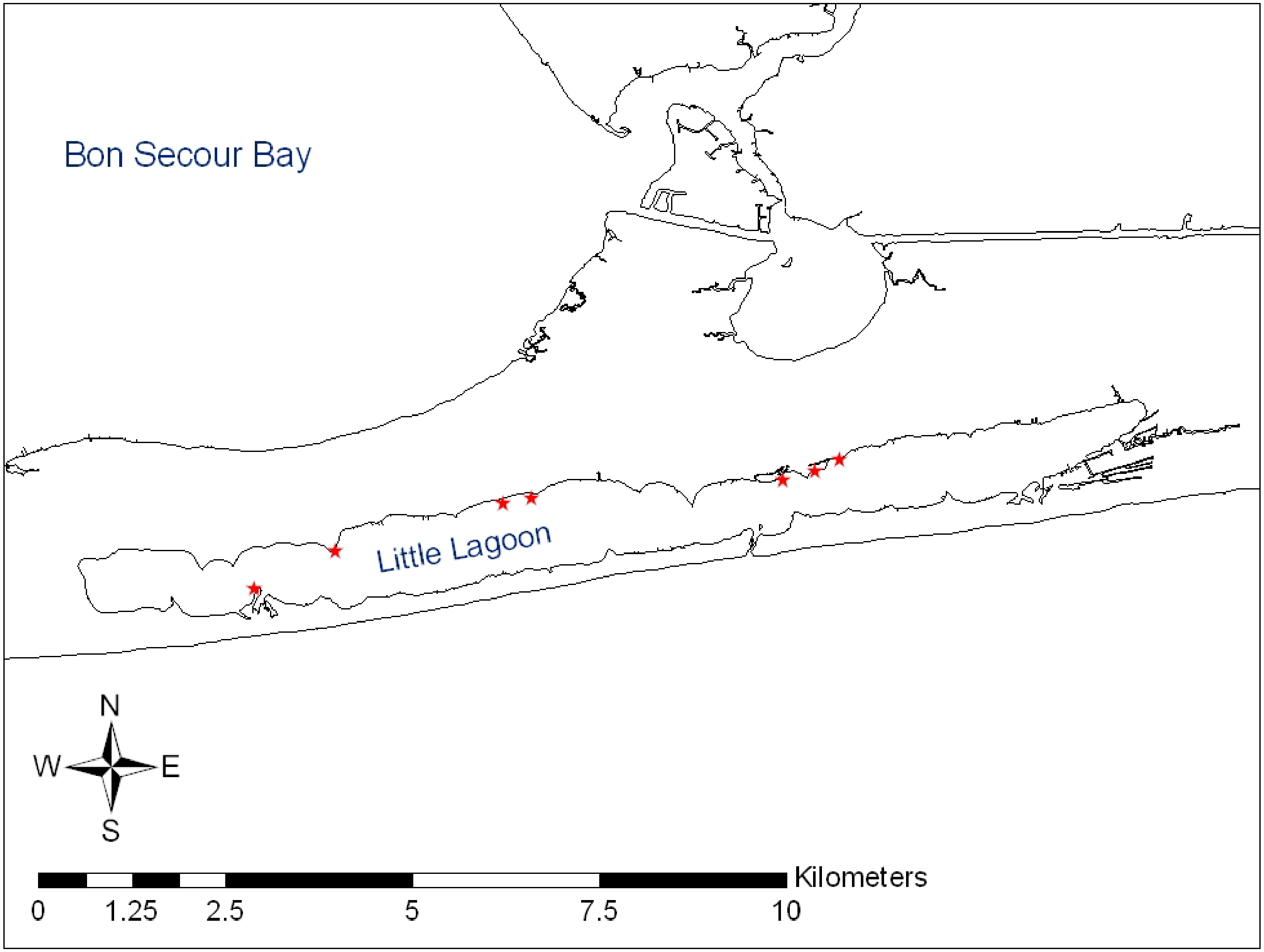

Figure 1c: Area surveyed in Perdido Bay. Stars indicate station locations.

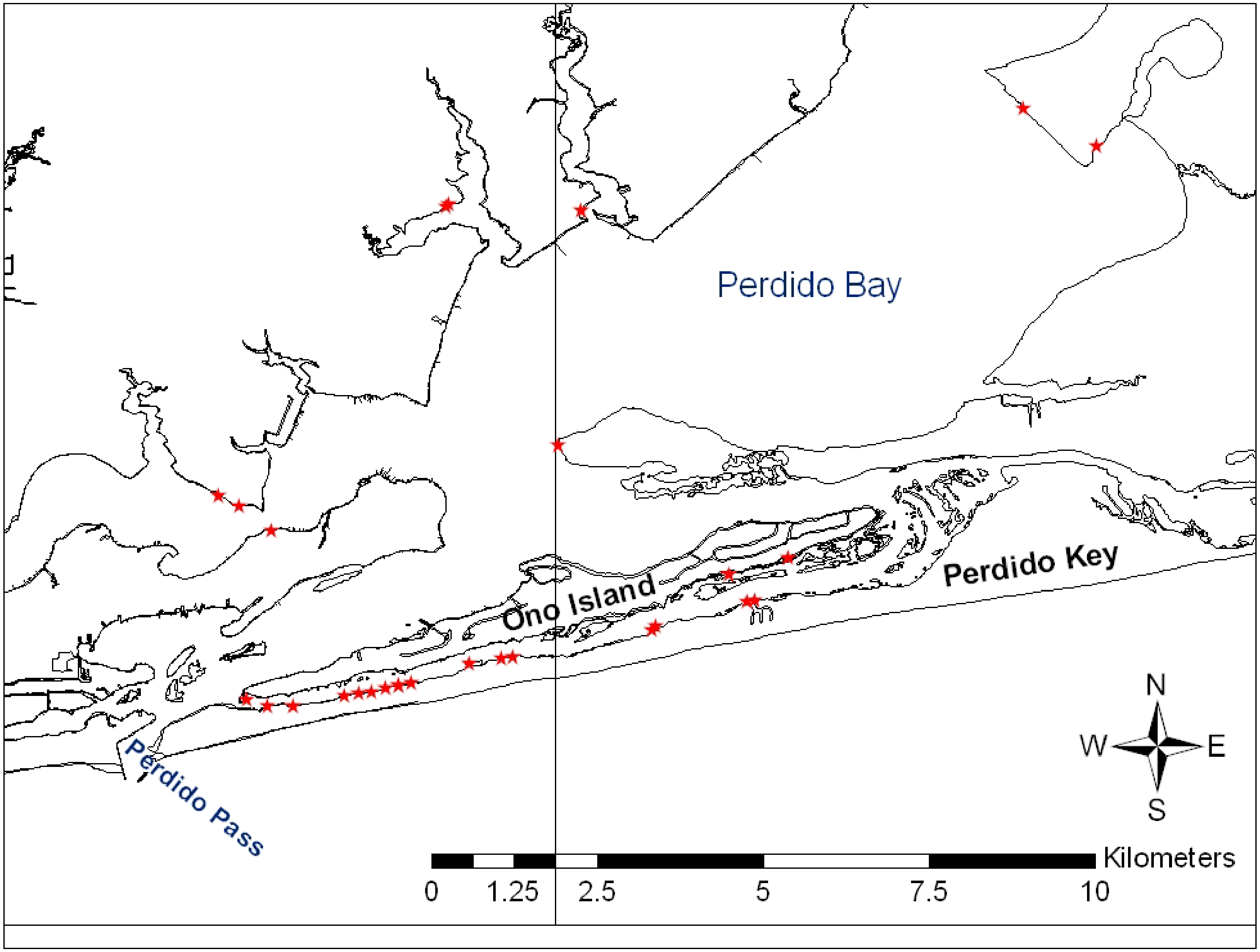

Figure 2a: *Halodule wrightii* shoot density/m^2 at stations in Grand Bay.

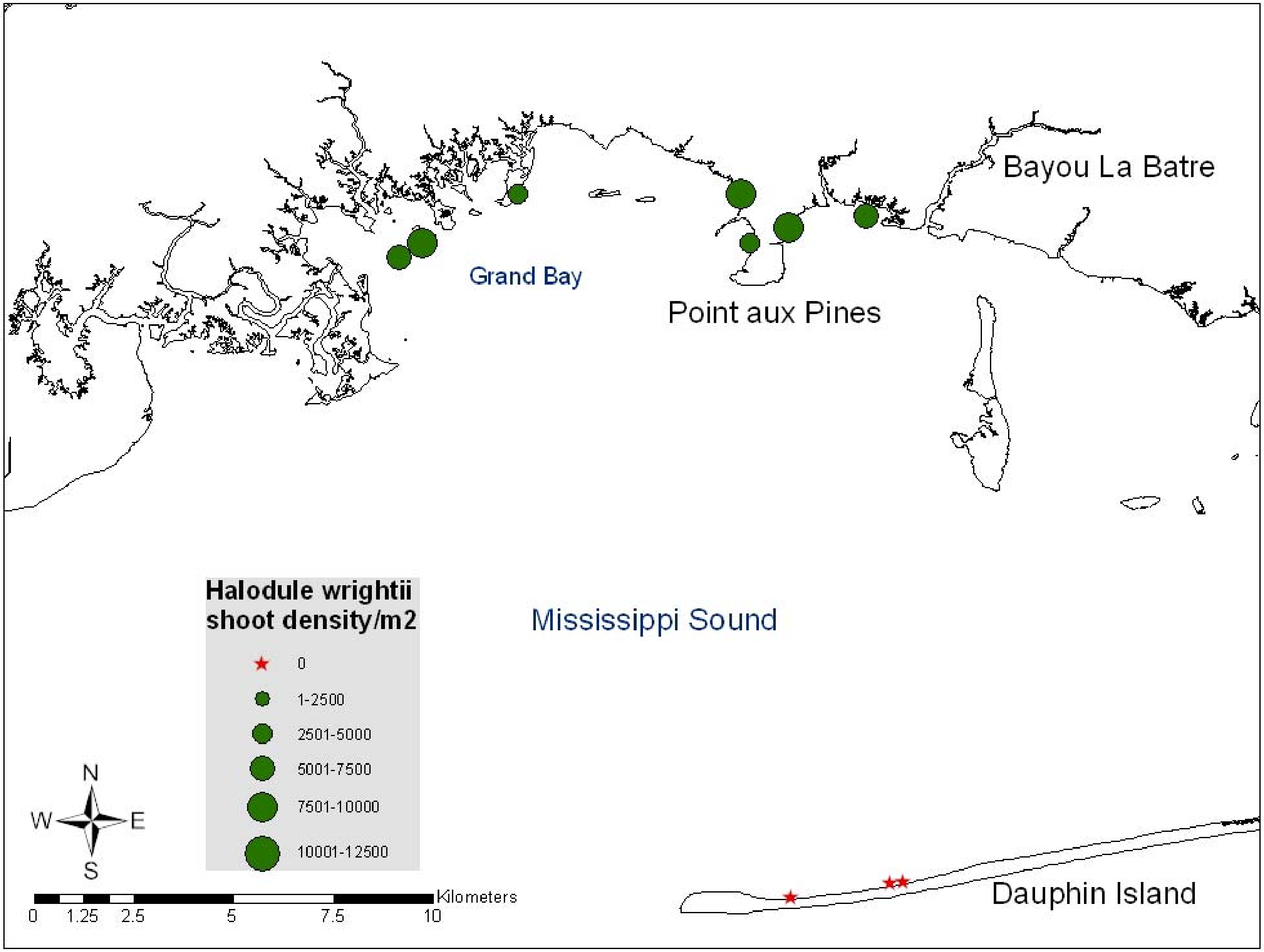

Figure 2b: *Ruppia maritima* shoot density/m^2 at stations in Grand Bay.

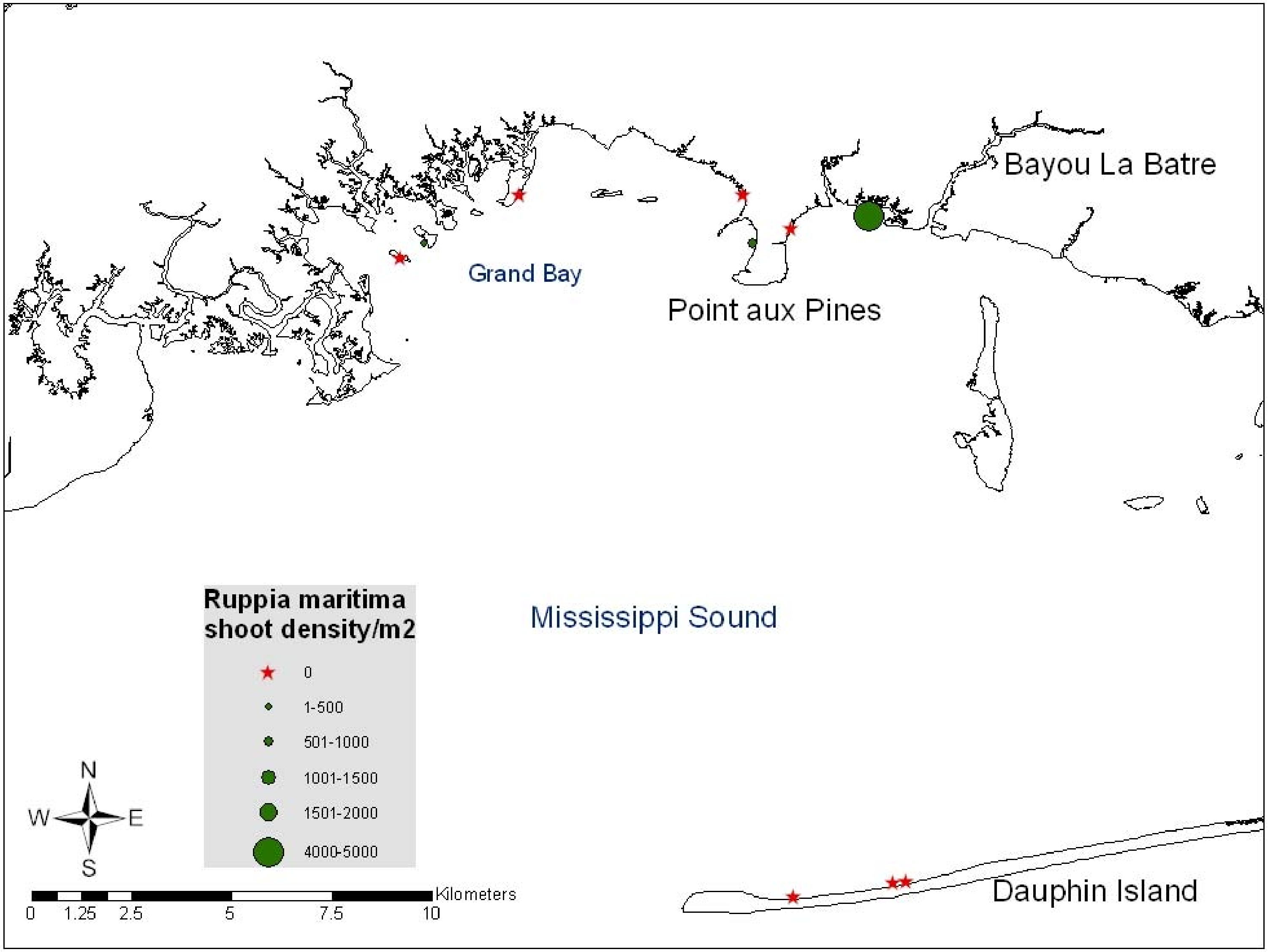

Figure 3a: *Halodule wrightii* shoot density/m^2 at stations in Little Lagoon.

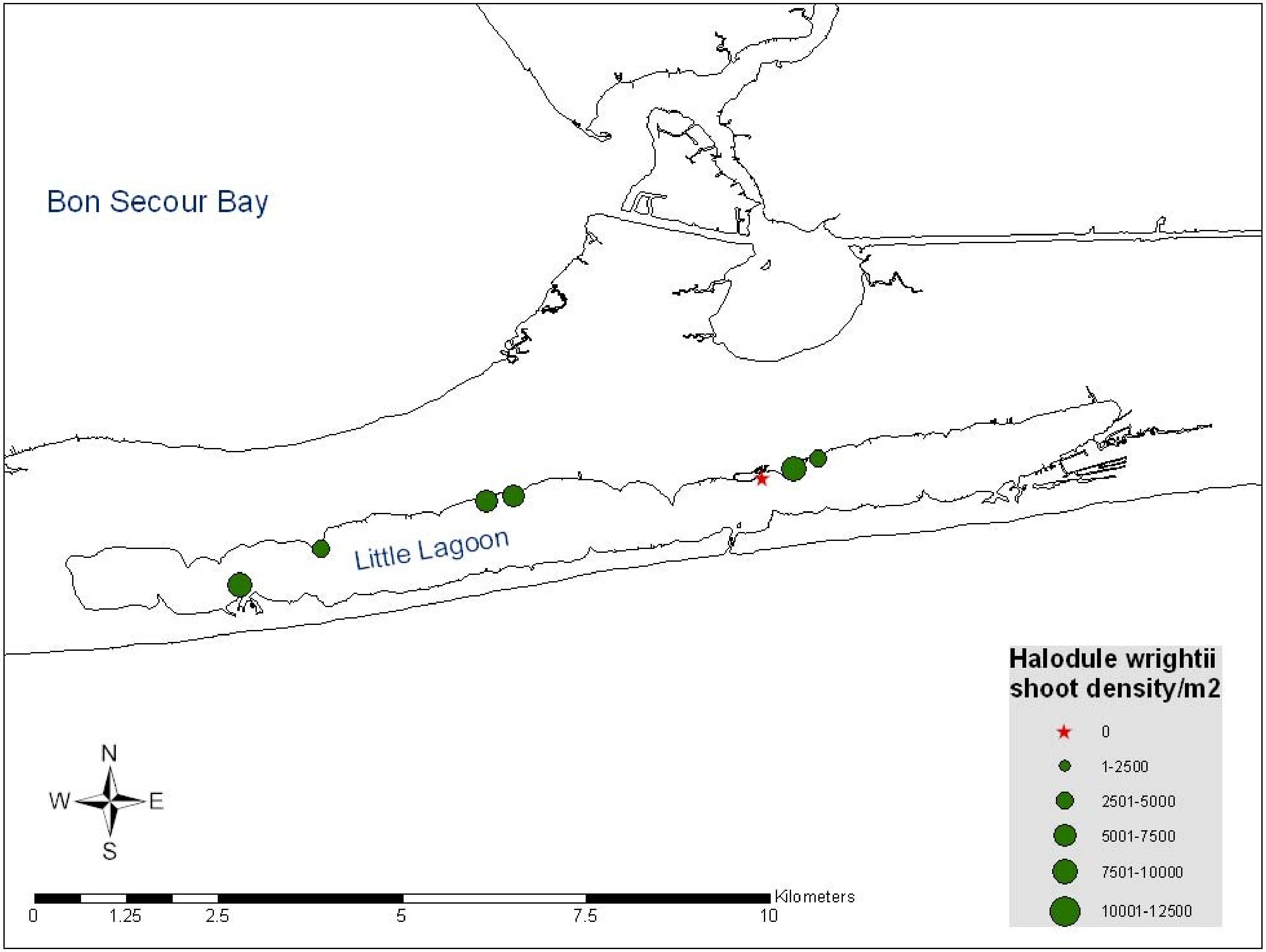

Figure 3b: *Ruppia maritima* shoot density/m^2 at stations in Little Lagoon.

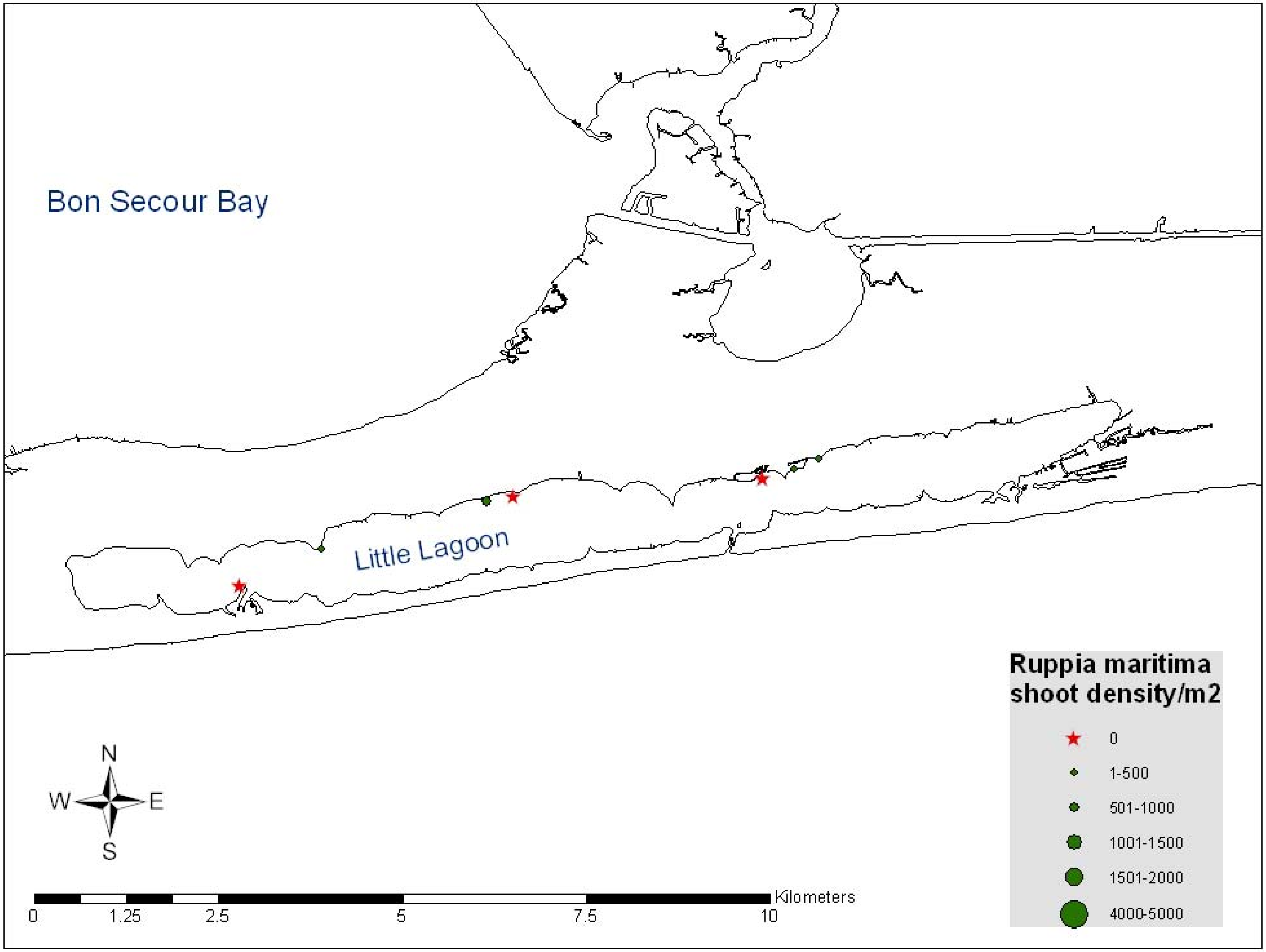

Figure 3c: *Thalassia testudinum* shoot density/m^2 at stations in Little Lagoon.

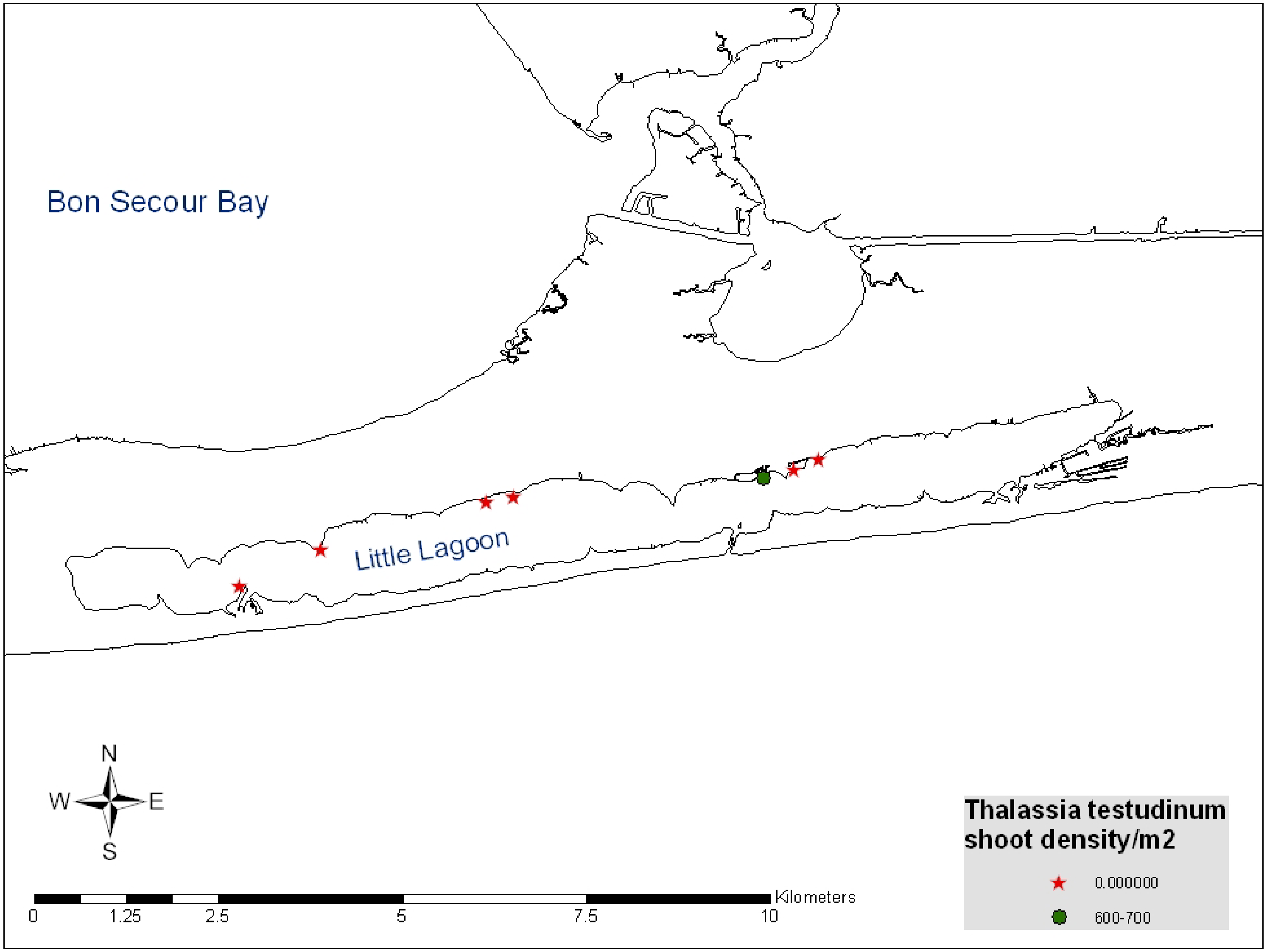

Figure 4a: *Halodule wrightii* shoot density/m^2 at stations in Perdido Bay.

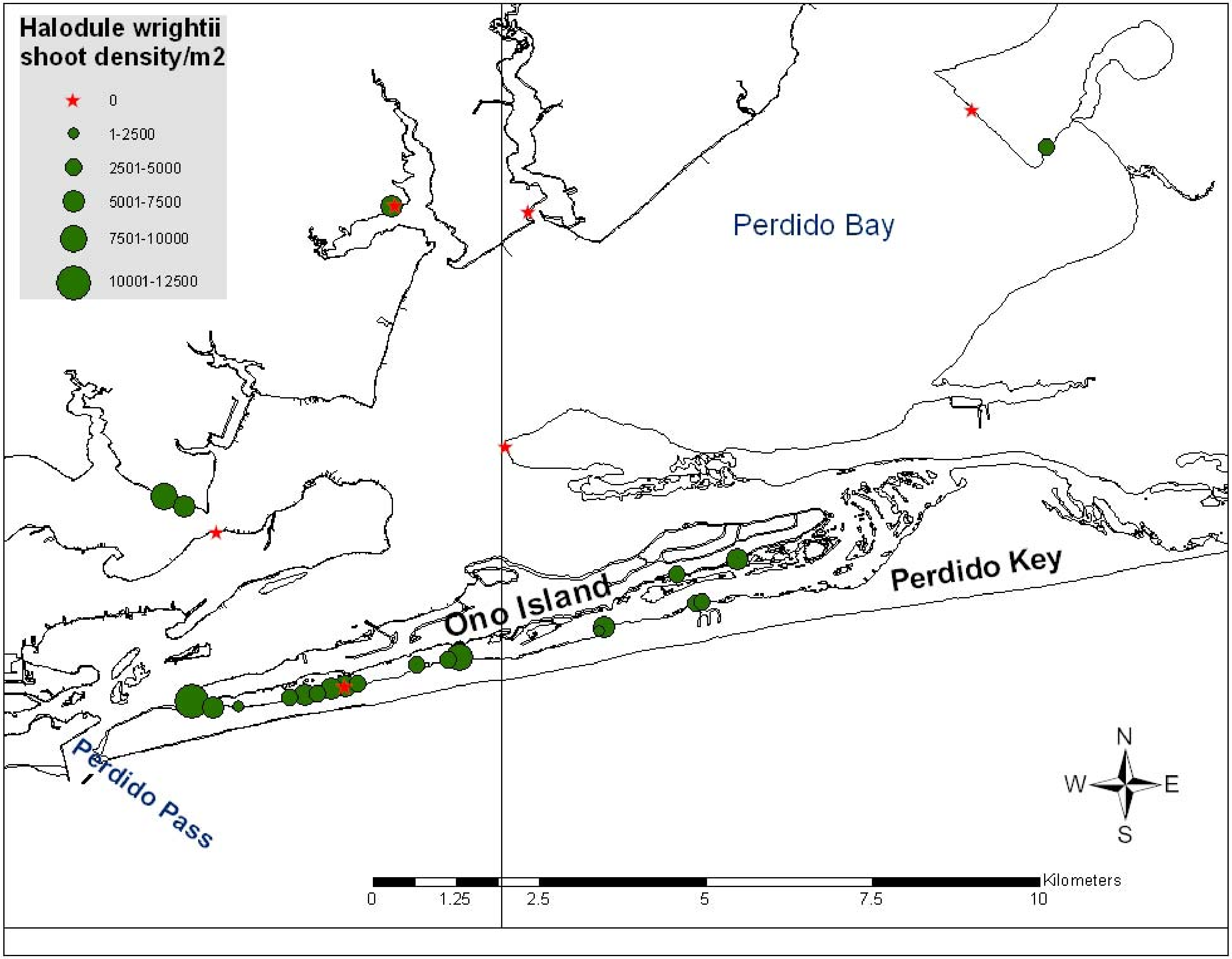

Figure 4b: *Ruppia maritima* shoot density/m^2 at stations in Perdido Bay.