

# Estero River Stream Assessment

## Study Area

Estero River is located in the middle of Estero Bay in Lee County. This system is surrounded by golf courses and residential areas but appears to be relatively hydrologically unaltered. To the west of US41 on the southern bank of the Estero River is Koreshan State Park which provides a natural undeveloped habitat in a relatively developed stream. Where Halfway Creek flows into the Estero River the system becomes surrounded by mangrove swamps and marshes until it reaches Estero Bay. This system’s watershed has a LDI value of 4.1 and the area adjacent to the creek has a buffer LDI value of 3.4.

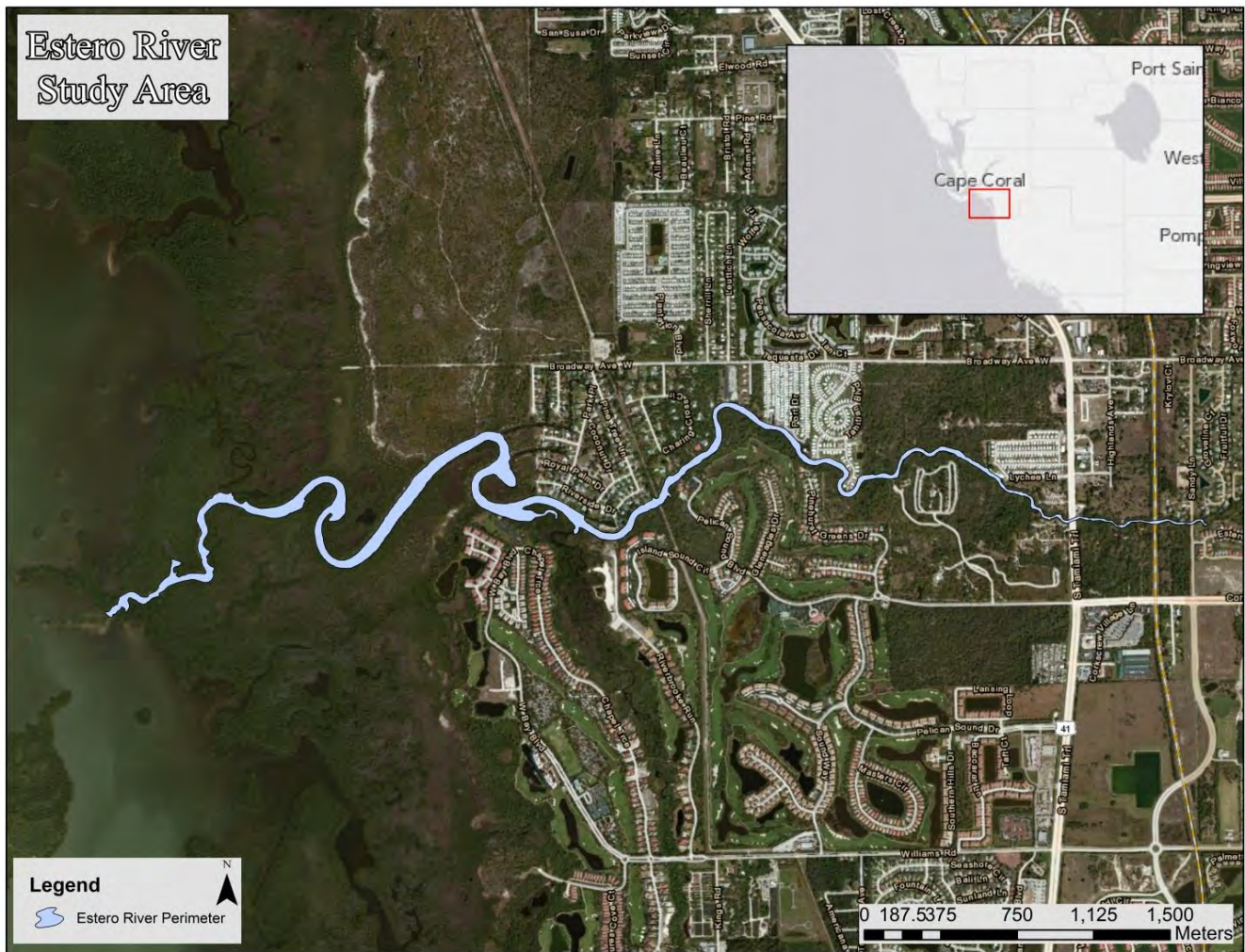


Figure 89. Overview of the Estero River Study Area

### Vegetation Survey

The Estero River vegetation assessment encompassed 40 vegetation regions from the mouth in Estero Bay to above Sandy Lane as shown in Figure 90 through Figure 92. In these regions, 66 species of vegetation were identified. Regions 1 through 27 were dominated by mangroves (*Rhizophora mangle*, *Laguncularia racemosa* and *Avicennia germinans*) with few other salt tolerant species present. Mangroves were present throughout the study area. The first occurrence of Leather Fern (*Acrostichum danaeifolium*) was in Region 15. Needle Rush (*Juncus roemerianus*) was first observed in Region 16 with the last occurrence in Region 30. Above Region 38 the vegetation communities are populated by many species indicative of dominating freshwater influence.

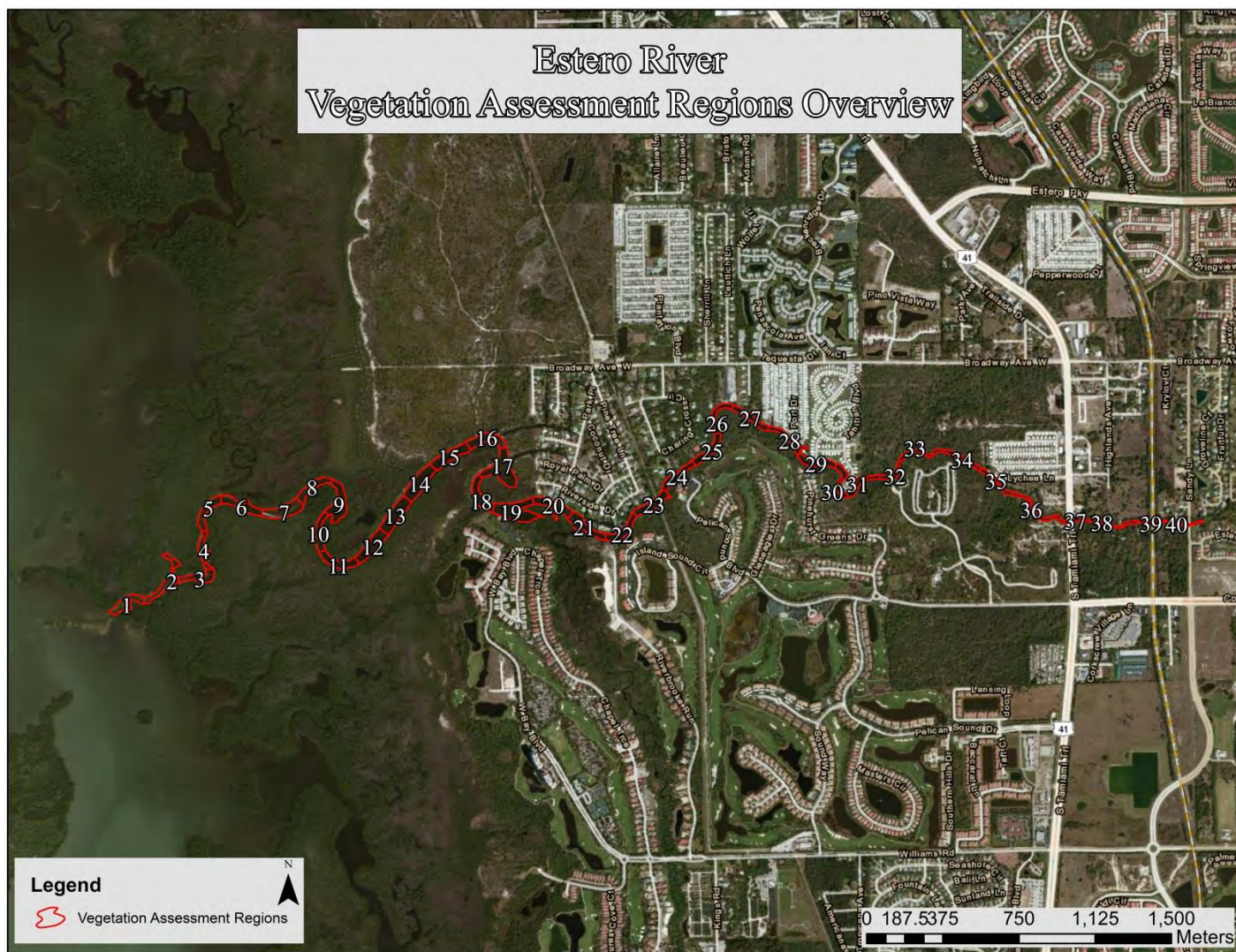


Figure 90. Overview of Estero River Vegetation Assessment Regions



Figure 91. Estero River Vegetation Assessment Regions 1-20



Figure 92. Estero River Vegetation Assessment Regions 21-40



Figure 93. Estero River Vegetation Waypoints

Figure 93 shows the vegetation transition zones of Estero River indicating the most upstream *Juncus* as well as the most downstream Leather Fern, *Juncus* and *Crinum*. Based on the vegetation assessment data for Estero River, regions 1 through 15 would comprise the highest salinity and tidal influence zone, regions 16 through 30 would comprise the “mixing” zone and regions 30 through 40 would comprise the freshwater dominant zone. The vegetation assessment species lists are shown in Table 21 through Table 22.

Table 21. Estero River Vegetation Assessment List Regions 1-20 (Part 1)

Plant Species	Common Name	Sample Region																				Regions Found
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
<i>Rhizophora mangle</i>	Red Mangrove	D	D	D	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	39
<i>Laguncularia racemosa</i>	White Mangrove	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	38
<i>Conocarpus erecta</i>	Buttonwood	1	1	1	C	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	35
<i>Schinus terebinthifolius</i>	Brazilian Pepper		1	1	1									1	1	1	1	1	1	1	1	31
<i>Dalbergia ecastaphyllum</i>	Coin Vine				1			1							1	1	1	1	1	1	1	27
<i>Quercus virginiana</i>	Virginia Live Oak															1	1	1	1	1		25
<i>Avicennia germinans</i>	Black Mangrove	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	24
<i>Acrostichum danaeifolium</i>	Leather Fern															1	1	1	1	1	1	23
<i>Sabal palmetto</i>	Sabal Palm														1	1	1	1	1	1	1	23
<i>Vitis rotundifolia</i>	Muscadine Grape																1	1				21
<i>Eustachys glauca</i>	Saltmarsh Finger Grass		1	1	1	1	1							1	1	1	1	1		1		18
<i>Crinum americanum</i>	Swamp lily																					11
<i>Quercus geminata</i>	Sand Live Oak																					10
<i>Batis maritima</i>	Saltwort			1	1	1	1		1	1	1	1	1									9
<i>Borrchia frutescens</i>	Sea Oxeye			1							1		1	1	1	1		1	1			8
<i>Sansevieria hyacinthoides</i>	Bowstring Hemp																		1			8
<i>Serenoa repens</i>	Saw palmetto																1	1		1		8
<i>Cupaniopsis anacardioides</i>	Carrotwood																1	1	1	1		7
<i>Ficus aurea</i>	Strangler Fig																					7
<i>Myrica cerifera</i>	Wax Myrtle																		1			7
<i>Ximenia americana</i>	Tallow Wood, Hog Plum																	1				7
<i>Coccoloba uvifera</i>	Seagrape																			1	1	6
<i>Juncus roemerianus</i>	Needle Rush, Black Rush																1	1				6
<i>Leucaena leucocephala</i>	White leadtree																1					6
<i>Rhabdadenia biflora</i>	Mangrove Rubber Vine												1				1	1	1		1	6
<i>Baccharis halimifolia</i>	Eastern False Willow, Saltbush		1	1													1		1	1		5
<i>Casuarina equisetifolia</i>	Australian Pine															1	1	1				5
<i>Cyperus ligularis</i>	Flat Sedge			1		1		1											1			5
<i>Sphagneticola (Wedelia) trilobata</i>	Creeping Oxeye																1					5
<i>Acacia auriculiformis</i>	Earleaf Acacia																	1				4
<i>Distichlis spicata</i>	Salt Grass										1				1	1	1					4
<i>Bacopa monnieri</i>	Common Bacopa, Herb-Of-Grace																					3
<i>Boehmeria cylindrica</i>	Bog Hemp, False Nettle																					3
<i>Cyperus involucratus</i>	Umbrella flat sedge																					3
<i>Erythrina herbacea</i>	Coral Bean																					3
<i>Solidago sempervirens</i>	Goldenrod																					3
<i>Thespesia populnea</i>	Seaside Mahoe															1		1	1			3
<i>Typha spp.</i>	Cattails																					3

Table 22. Estero River Vegetation Assessment List Regions 1-20 (Part 2)

Plant Species	Common Name	Sample Region																				Regions Found
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
<i>Abrus precatorius</i>	Rosary Pea														1							2
<i>Andropogon virginicus var. glaucus</i>	Broom grass																					2
<i>Bauhinia variegata</i>	Orchid Tree																					2
<i>Blechnum serrulatum</i>	Swamp Fern																					2
<i>Blutaparon vermiculare</i>	Silverhead, Saltweed				1											1						2
<i>Cyperus odoratus</i>	Fragrant Flatsedge																					2
<i>Dioscorea bulbifera</i>	Air Potato																					2
<i>Eupatorium capillifolium</i>	Dog Fennel															1						2
<i>Iva frutescens</i>	Marsh Elder											1	1									2
<i>Panicum repens</i>	Torpedo Grass																					2
<i>Albizia lebbek</i>	Woman's Tounge																					1
<i>Antigonon leptopus</i>	Coral Vine																					1
<i>Ardisia escallonioides</i>	Marlberry																					1
<i>Eclipta alba (prostrata)</i>	False Daisy, Yerba De Tajo																					1
<i>Ilex cassine</i>	Dahoon Holly																					1
<i>Ipomoea pes-caprae</i>	Railroad Vine																1					1
<i>Ludwigia repens</i>	Creeping Primrosewillow, Red Ludwigia																					1
<i>Melaleuca quinquenervia</i>	Punk Tree, Melaleuca																				1	1
<i>Pluchea rosea</i>	Rosy Camphorweed																					1
<i>Quercus nigra</i>	Water Oak																			1		1
<i>Sagittaria lancifolia</i>	Bulltongue Arrowhead, Duck Potato																					1
<i>Smilax bona-nox</i>	Saw Greenbrier Cat Briar																					1
<i>Spartina alterniflora</i>	Salt Marsh Grass																					1
<i>Spartina bakerii</i>	Cordgrass																					1
<i>Syngonium podophyllum</i>	Nephtis, American Evergreen																					1
<i>Ulmus americana</i>	American Elm																					1
<i>Urena lobata</i>	Caesar's Weed																					1
<i>Urochloa mutica</i>	Para Grass																					1

Table 23. Estero River Vegetation Assessment List Regions 21-40 (Part 1)

Plant Species	Common Name	Sample Region																			Regions Found
		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	
<i>Rhizophora mangle</i>	Red Mangrove	D	D	D	D	D	D	D	C	C	C	C	C	C	C	C	C	1	1		39
<i>Laguncularia racemosa</i>	White Mangrove	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			1	38
<i>Conocarpus erecta</i>	Buttonwood	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					35
<i>Schinus terebinthifolius</i>	Brazilian Pepper	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	D	D	1	31
<i>Dalbergia ecastaphyllum</i>	Coin Vine	1	1	1	1	1	1	C	C	C	C	1	1	1	C	C					27
<i>Quercus virginiana</i>	Virginia Live Oak	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	25
<i>Avicennia germinans</i>	Black Mangrove	1	1			1		1		1											24
<i>Acrostichum danaeifolium</i>	Leather Fern		1		1		1	1	1	1	1	C	C	C	1	1	1	1	1	1	23
<i>Sabal palmetto</i>	Sabal Palm	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					23
<i>Vitis rotundifolia</i>	Muscadine Grape		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
<i>Eustachys glauca</i>	Saltmarsh Finger Grass	1	1									1	1	1	1						18
<i>Crinum americanum</i>	Swamp lily							1			1	1	1	1	1	1	1	1	1		11
<i>Quercus geminata</i>	Sand Live Oak	1	1	1	1	1	1	1	1	1	1										10
<i>Batis maritima</i>	Saltwort																				9
<i>Borrchia frutescens</i>	Sea Oxeye																				8
<i>Sansevieria hyacinthoides</i>	Bowstring Hemp		1					1		1							1	1	1	1	8
<i>Serenoa repens</i>	Saw palmetto				1	1	1	1	1												8
<i>Cupaniopsis anacardioides</i>	Carrotwood	1	1	1																	7
<i>Ficus aurea</i>	Strangler Fig	1								1						1	1		1	1	7
<i>Myrica cerifera</i>	Wax Myrtle				1				1	1	1	1								1	7
<i>Ximenia americana</i>	Tallow Wood, Hog Plum													1	1	1	1			1	7
<i>Coccoloba uvifera</i>	Seagrape	1		1					1											1	6
<i>Juncus roemerianus</i>	Needle Rush, Black Rush			1	1	1				1											6
<i>Leucaena leucocephala</i>	White leadtree		1	1	1											1	1				6
<i>Rhabdadenia biflora</i>	Mangrove Rubber Vine	1																			6
<i>Baccharis halimifolia</i>	Eastern False Willow, Saltbush																				5
<i>Casuarina equisetifolia</i>	Australian Pine													1	1						5
<i>Cyperus ligularis</i>	Flat Sedge				1																5
<i>Sphagneticola (Wedelia) trilobata</i>	Creeping Oxeye					1										1	1			1	5
<i>Acacia auriculiformis</i>	Earleaf Acacia			1			1	1													4
<i>Distichlis spicata</i>	Salt Grass																				4
<i>Bacopa monnieri</i>	Common Bacopa, Herb-Of-Grace		1							1										1	3
<i>Boehmeria cylindrica</i>	Bog Hemp, False Nettle						1	1										1	1		3
<i>Cyperus involucratus</i>	Umbrella flat sedge																1			1	3
<i>Erythrina herbacea</i>	Coral Bean														1	1				1	3
<i>Solidago sempervirens</i>	Goldenrod				1					1	1										3
<i>Thespesia populnea</i>	Seaside Mahoe																				3
<i>Typha spp.</i>	Cattails					1	1				1										3

Table 24. Estero River Vegetation Assessment List Regions 21-40 (Part 2)

Plant Species	Common Name	Sample Region																			Regions Found	
		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39		40
<i>Abrus precatorius</i>	Rosary Pea												1									2
<i>Andropogon virginicus var. glaucus</i>	Broom grass				1										1							2
<i>Bauhinia variegata</i>	Orchid Tree																		1	1		2
<i>Blechnum serrulatum</i>	Swamp Fern											1			1							2
<i>Blutaparon vermiculare</i>	Silverhead, Saltweed																					2
<i>Cyperus odoratus</i>	Fragrant Flatsedge						1	1														2
<i>Dioscorea bulbifera</i>	Air Potato																			1	1	2
<i>Eupatorium capillifolium</i>	Dog Fennel	1																				2
<i>Iva frutescens</i>	Marsh Elder																					2
<i>Panicum repens</i>	Torpedo Grass											1									1	2
<i>Albizia lebeck</i>	Woman's Tounge																	1				1
<i>Antigonon leptopus</i>	Coral Vine														1							1
<i>Ardisia escallonioides</i>	Marlberry		1																			1
<i>Eclipta alba (prostrata)</i>	False Daisy, Yerba De Tajo																				1	1
<i>Ilex cassine</i>	Dahoon Holly			1																		1
<i>Ipomoea pes-caprae</i>	Railroad Vine																					1
<i>Ludwigia repens</i>	Creeping Primrosewillow, Red Ludwigia																1					1
<i>Melaleuca quinquenervia</i>	Punk Tree, Melaleuca																					1
<i>Pluchea rosea</i>	Rosy Camphorweed																				1	1
<i>Quercus nigra</i>	Water Oak																					1
<i>Sagittaria lancifolia</i>	Bulltongue Arrowhead, Duck Potato							1														1
<i>Smilax bona-nox</i>	Saw Greenbrier Cat Briar																				1	1
<i>Spartina alterniflora</i>	Salt Marsh Grass				1																	1
<i>Spartina bakerii</i>	Cordgrass														1							1
<i>Syngonium podophyllum</i>	Nephtis, American Evergreen																				1	1
<i>Ulmus americana</i>	American Elm																				1	1
<i>Urena lobata</i>	Caesar's Weed																				1	1
<i>Urochloa mutica</i>	Para Grass																				1	1

## Habitat Assessment

Collected sonar data was processed through Dr. Depth software to analyze the strength of the return signal from the bottom to get an estimate of the relative bottom hardness for Estero River. Figure 94 shows the bottom hardness raster for Estero River. In this raster, the higher the hardness value, the harder the bottom substrate. This map is meant to help identify locations of harder and softer bottoms for benthic invertebrate sampling, fish sampling and benthic chlorophyll sampling.



Figure 94. Estero River Relative Bottom Hardness Map

### Bathymetry Mapping

In the study area, Estero River had a mean depth of 3.99 feet and a maximum depth of 12.06 feet. A total of 73.78 acres of creek was mapped during the assessment. At the time of assessment, Estero River contained an estimated 69,288,066 gallons of water in the study area. Figure 95 and Figure 96 detail the bathymetric mapping for Estero River showing the three depth stratum.

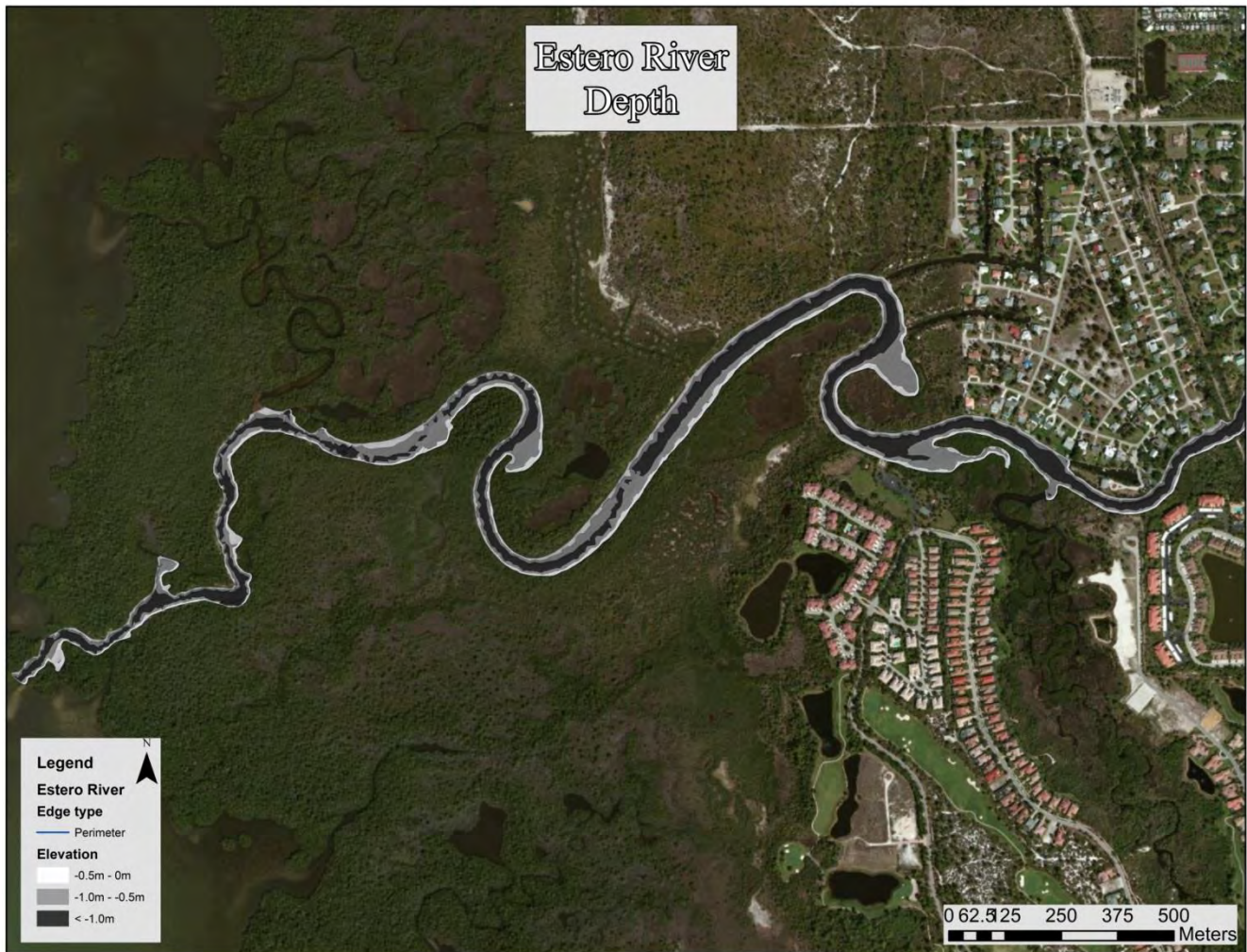


Figure 95. Estero River Bathymetric Stratum Map (1 of 2)



Figure 96. Estero River Bathymetric Stratum Map (2 of 2)