An Inventory of South Carolina's Coastal Marshes

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INTRODUCTION

Coastal marshes are recognized as one of the most productive natural habitats in the world (Odum 1961). They annually produce tons of organic matter per acre, thereby supporting the estuarine detritus-based food web (Odum 1961; Schelske and Odum 1961). Once considered wastelands and used as sites for municipal dumps and landfill operations, it is now realized that these wetlands with their attendant tidal creeks serve as primary nursery grounds for the majority of the commercial and sport fishes and invertebrates along the Atlantic and Gulf coasts (Pearse and Gunter 1957; Gunter 1961; Kutkuhn 1966; McHugh 1967; Turner and Johnson 1974; Herke 1976). Southeastern coastal marshes also produce food for overwintering waterfowl and other wildlife, and are utilized as resting areas for migratory wading birds (Shaw and Fredine 1956; Lynch 1968; Sprunt 1968). In addition, tidal wetlands provide critical habitat for numerous specialized forms of wildlife; these animals have adapted to the environmental conditions and now depend on such areas for survival, i.e. muskrats, minks, otters, clapper rails, killifishes, marsh periwinkles, salt marsh snails and fiddler crabs (Teal and Teal 1969). Thus, the ecological importance of these areas is now realized and proper steps must be taken to conserve this precious natural resource.

Accelerated coastal development and the continued influx of people into South Carolina's coastal zone have placed increased pressure on the state's coastal resources. These changes threaten the tidal marshes which are highly vulnerable to such activities as dredging and filling. In view of this situation, the need for coastal resource planning and management is evident. Since tidal marshes represent perhaps the most important coastal resource, an up-to-date inventory of these intertidal areas is an obvious first step toward rational planning.

The principle objective of this work is to delineate and quantify the different types of coastal marshes in South Carolina. In addition, other prominent features in the coastal zone, namely beaches and diked disposal areas are included in this inventory. A second objective is to describe the plant communities characteristic of each wetland type. It is also within the scope of this study to establish a priority classification of marsh types based on their relative importance to marine resources as well as their value to wildlife and waterfowl. Such a classification could be used as guidelines for future zoning activities in coastal wetlands.

METHODS

The coast of South Carolina was divided into seventeen estuarine systems to facilitate the description of the plant composition of tidal marshes. Estuarine boundaries used in this study are indicated on a map of the coastal zone of the State (Figure 1). These boundaries are not based on hydrographic data, since much of this is unknown; instead, these lines generally follow prominent features, such as state and federal highways, and are intended for discussion purposes only.

By streamlining some of the more sophisticated classifications and inventory methods, a simple and precise assessment of the current status of South Carolina's coastal resources was accomplished. Seven categories were established for inventory: 1) Beach zone, 2) Low salt marsh, 3) High salt marsh, 4) Brackish-water marsh, 5) Fresh-water marsh, 6) Impoundments and 7) Diked disposal areas. Inventory data were compiled from aerial photography and ground truth surveys. Through aerial photo-interpretation, it was possible to identify and delineate the seven inventory categories. Ground truthing was then conducted to verify these results.

ASCS black and white photography provided essential data for updating USGS 7-1/2 minute topographic quadrangles and mapping coastal features. Low altitude color-infrared photography, when available, proved invaluable in identifying wetlands. Marshlands were initially recorded on USGS topographic maps and later transferred onto mylar overlays to be digitized for computer use and stored as data for the coastal zone baseline map.

Acreage statistics were compiled for each coastal county (Horry, Georgetown, Charleston, Berkeley, Dorchester, Colleton, Beaufort and Jasper) and for each estuarine system. Individual areas were circumscribed by planimeter at least two times to provide reliable results. The minimum mapping unit for this inventory was five acres. Acreage figures were considered accurate within $\pm$ 5.0%. The primary factor responsible for this error was the data transfer operation where data from other sources, such as black and white or color-infrared photography, were transcribed onto baseline maps used in this study.

Field investigations were conducted from August 1975 to May 1977 in each estuarine system to obtain descriptive information about the plant ecology of the various marsh types. Observations of dominant vegetation and associated plant species were recorded in a field notebook. Most of the plant identifications were made by sight, however, specimens of undetermined species were collected and returned to the laboratory for identification. Scientific nomenclature used in this report is according to Radford, et al. (1964).

Available published literature concerning plant composition of South Carolina's coastal marshes and waterfowl impoundments was reviewed to supplement data derived from field surveys. In addition, a form letter requesting information on managed waterfowl impoundments was sent to several knowledgeable individuals, including

state and federal refuge managers. The following questions were asked:

1. At present, how many acres of impoundments do you have available to waterfowl?

2. What type of plant community are you attempting to grow in these impoundments?

3. Please list the more common plants growing in these impoundments.

RESULTS

General Remarks on Coastal Wetlands of South Carolina

The tidal marshes of South Carolina may be divided into three major types based upon predominant vegetation and integrity of the creek systems: 1) salt marshes; 2) brackish-water marshes; and 3) fresh-water marshes. Differences between types 1 and 3 are readily apparent; type 2 shares several characteristics with both types 1 and 3 and thus represents a transitional zone between these distinctive wetlands.

In South Carolina's coastal wetlands, plant diversity progressively increases as one moves towards the head of an estuary from salt marshes to tidal fresh-water marshes. A host of physical, chemical and biological factors interact to limit the distribution of vascular plants in these estuarine marshes. This subject will be discussed in more detail later in this report.

The floral dissimilarity between salt marshes and fresh-water marshes is evident (Tables 1-3), yet a relatively subtle variation in plant composition exists between the brackish-water marshes and the other two types. Brackish-water marshes are influenced by salinity and the vegetative composition of these wetlands reflects this effect. For example, the more seaward and higher salinity marshes of the brackish zone may be dominated by black needlerush (Juncus roemerianus) with smooth cordgrass (Spartina alterniflora) occurring as the primary associate. However, the more landward and lower salinity segments of this brackish zone may contain a diverse assemblage of plants, including cattails (Typha spp.), giant cordgrass (Spartina cynosuroides), soft-stem bulrush (Scirpus validus), sawgrass (Cladium jamaicense), pickerel-weed (Pontedaria cordata), spider-lily (Hymenocallis crassifolia), arrow-arum (Peltandra virginica), alligator-weed (Alternanthera philoxeroides), water parsnip (Sium suave), wild rice (Zizania aquatica), and giant cutgrass (Zizaniopsis miliacea), which are representative of tidal fresh-water marshes, as well.

The integrity of creek systems in the three wetland types varied substantially. Creek systems of salt marshes generally remain in their natural condition, while the integrity of the brackish marsh creeks and fresh-water marsh creeks, which were previously altered by man in the 1800's for the cultivation of rice, is largely broken. The typical salt marsh creek system consists of a rather elaborate network of interconnecting small creeks and channels which produces a somewhat dendritic appearance (Figure 2). Conversely, the natural creek pattern of the majority of the fresh-water marshes was drastically changed by the construction of dikes and excavation of canals within these wetlands. Two previously altered marshes, one presently managed for waterfowl hunting, and the other an abandoned rice field, are shown in Figure 3. Where the dike has not been maintained and the former rice field is no longer managed, the dike has eroded at certain locations, allowing tidal waters to enter the former impoundment. Within these abandoned rice fields, a more natural appearing creek system is beginning to re-establish itself between each of the man-made canals and the adjacent tidal river or creek. The more seaward brackish-water marshes usually exhibit a more natural pattern with sinuous creeks and channels (Figure 4); those marshes influenced predominantly by fresh-water reveal a previously altered creek system with dikes and canals evident (Figure 3).

Description of Marsh Types

Salt Marsh

The overwhelming influence of the marine environment is apparent on the species composition of the salt marsh. Responsible factors will be discussed later in this report. A list of plants observed in this survey, as well as others published elsewhere, is given in Table 1.

In general, salt marshes may be divided into two major zones based on tidal elevation and vegetative composition: low marsh and high marsh. The regularly flooded low marsh extends from about mean sea-level to the approximate mean high water (MHW) level. The high marsh occurs above this zone in an area which is flooded only at irregular intervals by higher than average tides (i.e. spring and storm tides). Differences in tidal elevation and related physical conditions, such as submergence, exposure and soil salinity, are accompanied by a distinct change in plant community composition between these two zones. Figure 5-7 are examples of plant zonation within the salt marsh.

An extensive pure stand of smooth cordgrass (Spartina alterniflora) represents the low marsh. Along creek banks, this plant typically attains heights of two meters or more, while in the interior of the low marsh, plant height may vary from one to two meters. Smooth cordgrass is generally regarded as the most valuable and productive salt marsh plant along the Atlantic coast from an ecological standpoint (Odum 1961).

In contrast to the monospecific low marsh, plant composition of the high marsh is quite varied. Several halophytes occur in abundance: glasswort (Salicornia spp.), salt wort (Batis maritima), sea lavender (Limonium spp.), salt marsh aster (Aster tenuifolius), salt grass (Distichlis spicata), sea ox-eye (Borrichia frutescens), black needlerush (Juncus roemerianus), marsh-hay cordgrass (Spartina patens),

coastal dropseed (Sporobolus virginicus), salt-marsh fimbristylis (Fimbristylis spadicea), marsh elder (Iva frutescens), and a short form (less than 0.5m high) of smooth cordgrass.

The lowest elevations of the high marsh near the MHW mark are typically dominated by smooth cordgrass generally one meter or less in height, with perennial glasswort (Salicornia virginica) frequently intermixed. Above this level, sand barrens devoid of vascular plants and/or vegetated sandflats commonly occur. These flats are colonized by either pure stands of glasswort (Salicornia spp.) or mixed communities of glasswort, saltwort, short smooth cordgrass, coastal dropseed, salt grass and sea lavender. Other plants, such as sea-blite (Suaeda linearis), sea ox-eye and needlerush, may be present in these sandflats.

The plant community assumes a different appearance in the upper high marsh, which is flooded only by spring and storm tides. In general, black needlerush dominates this zone commonly forming a conspicious marginal band along the adjacent upland. Other plants may also abound in this region, namely sea ox-eye, marsh elder, salt grass marsh-hay cordgrass and fimbristylis. At the transitional marsh-upland border, a number of different species may enter the community, including sea myrtle (Baccharis spp.), marsh orach (Atriplex patula), switchgrass (Panicum virgatum), wax myrtle (Myrica cerifera), broomsedge (Andropogon spp.) and seaside goldenrod (Solidago sempervirens).

Marsh plants, such as saltmarsh bulrush (Scirpus robustus), common three-square (Scirpus americanus), cattails (Typha spp.), sea purslane (Sesuvium spp.), marsh fleabane (Pluchea purpurascens), spikerush (Eleocharis spp.) and giant cordgrass (Spartina cyrosuroides), may be locally abundant in certain areas. Also, widgeon-grass (Ruppia maritima), which is commonly managed in brackish-water impoundments, may be present in salt marsh ponds.

Brackish-water Marsh

Located along the estuaries between salt marshes and the tidal fresh-water marshes, the brackish marshes represent an apparent transitional zone, sharing vegetative characteristics with each of these diverse wetland types. Brackish marsh plants observed during field trips, as well as those that appeared in the published literature, are listed in Table 2. This list contains plant species representative of both salt marshes and fresh-water marshes; thus revealing both the marine and riverine influences upon this region.

The more seaward brackish marshes bear a striking resemblance to the upper high marsh zone of the salt marsh. Black needlerush (Juncus roemerianus) forms vast pure stands within these marshes. As the primary associate, smooth cordgrass generally occurs along the water's edge, although in certain localities needlerush extends down to the creek. Other typically high marsh plants may also be present, including salt marsh bulrush, aster, marsh elder, sea myrtle, panic grass, fimbristylis, salt grass, marsh-hay cordgrass, sea ox-eye, broomsedge and golden rod. In certain areas, salt marsh bulrush (Scirpus robustus) may be the co-dominant species or primary associate. Giant cordgrass (Spartina cynosuroides) occasionally appears along the upland border.

Proceeding toward the head of the estuary, giant cordgrass generally replaces needlerush as the dominant plant, while salt marsh bulrush, marsh elder, sea myrtle, aster, goldenrod, broomsedge, three-square, marsh-hay cordgrass, smooth cordgrass and panic grass (all common to salt marshes) may still remain in the community. Typically fresh-water marsh plants quickly enter the plant community, giving the marsh a heterogeneous appearance, including cattails (Typha spp.), sedges (Carex spp. and Cyperus spp.), smartweeds (Polygonum spp.), wild rice (Zizania aquatica), giant cutgrass (Zizaniopsis miliacea), soft-stem bulrush (Scirpus validus), pickerel-weed (Pontedaria cordata), arrow-arum (Peltandra virginica), arrowhead (Sagittaria spp.), water parsnip (Sium suave), spider-lily (Hymenocallis crassifolia), sawgrass (Cladium jamaicense), rose mallow (Hibiscus moscheutos), and alligator-weed (Alternanthera philoxeroides). Olynei's three-square (Scirpus olynei) also occurs in these situations. Cattails, soft-stem bulrush, wild rice, common three-square, pickerel-weed, salt marsh bulrush, sawgrass and Olynei's three-square may be locally abundant in these brackish marshes. Smooth cordgrass may occur along the water's edge in these marshes, but is generally supplanted by other species like pickerel-weed in fresher regions.

Tidal Fresh-water Marsh

Tidal fresh-water marshes border coastal rivers where water is either fresh or relatively low in salinity and where a comparatively small change in tidal amplitude exists relative to the lower estuary. Although the more seaward fresh-water marshes may be subjected periodically to brackish water, the predominant force governing plant distribution appears to be the river which floods vast marsh areas during the spring freshets and after severe storms.

Plant diversity is greater in the fresh-water marshes than in either the salt or brackish marshes, as can be seen in the species list (Table 3). Interestingly, the boundary between fresh and brackish marshes is not well defined, but rather a subtle transition. Many of the marsh plants observed in the upper region of the brackish marsh gradually become more prominent in fresh-water marsh, especially giant cutgrass (Zizaniopsis miliacea), wild rice (Zizania aquatica), water parsnip (Sium suave),

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Pages 3 & 4 are reversed

alligator-weed (Alternanthera philoxeroides), cattails (Typha spp.) and sawgrass (Cladium jamaicense).

Although giant cutgrass appears to dominate many of these fresh-water areas, the general composition of these marshes is heterogeneous with other species, such as sawgrass, giant cordgrass, soft-stem bulrush, arrowhead, pickerel-weed, common three-square, wild rice and cattails being equally important. Additional species, particularly members of the floating aquatic group, enter the wetland community: frog's-bit (Limnobium spongia), yellow pond-lily (Nuphar luteum), white water-lily (Nymphaea odorata), parrots-feather (Myriophyllum sp.), pondweeds (Potamogeton spp.), bladderworts (Utricularia spp.), mosquito-fern (Azolla caroliniana), pennyworts (Hydrocotyle spp.), duckweeds (Lemna spp. and Spirodela polyrhiza), water-weeds (Elodea spp.), golden-club (Orontium aquaticum), beggar's-ticks (Bidens spp.), sedges (Carex spp. and Cyperus spp.), jewel-weed (Impatiens capensis), rushes (Juncus spp.), water-primroses (Ludwigia spp.), royal fern (Osmunda regalis), smartweeds (Polygonum spp.), mock-bishopweed (Ptilimnium capillaceum), Sacciolepis striata, lizard's-tail (Saururus cernuus), bulrush (Scirpus cyperinus), dock (Rumex verticillatus), and butterweed (Senecio sp.). At the highest elevations in these marshes, including old rice field dikes, woody plants characteristic of riverine swamps are present, such as bald cypress (Taxodium distichum), gums (Nyssa sylvatica and N. aquatica), ironwood (Carpinus caroliniana), button-bush (Cephalanthus occidentalis), water locust (Gleditsia aquatica), Viburnum dentatum, elderberry (Sambucus canadensis) and tag alder (Alnus serralata). Others (wax myrtle and sea myrtle) that were present at higher elevations within salt marshes and brackish marshes comprise part of the fresh-water marsh community as well. Conspiciously absent from this community is smooth cordgrass, the dominant salt marsh plant and common brackish marsh plant, which is apparently eliminated through competition by fresh-water marsh species. Also, needlerush is generally absent, except in the Cooper River, where relict populations continue to endure after water conditions (salinity and average water level) were changed by the Santee-Cooper Diversion Project.

Coastal Impoundments

Species lists of the common wetland plants present in both brackish and fresh-water coastal impoundments appear in Tables 4 and 5, respectively. These lists include plants observed during field investigations, those reported from the questionnaire survey, and those found in the published literature.

The majority of coastal impoundments represent former rice fields that are currently managed to attract waterfowl for hunting. Other uses of these impoundments have been identified, including cattle pasturage, water reserves, snipe hunting, planted cypress, wildlife sanctuary, aesthetics and beautification and mariculture (Morgan 1974). These types of impoundments are chiefly found in the freshwater zones of coastal rivers, although they occur in brackish-water situations as well. Impoundments have also been constructed in salt marshes where tidal sloughs have been cut off from adjacent waters by dikes. Like other coastal impoundments, the main objective of these impoundments is to attract waterfowl for hunting, yet some may be utilized for mariculture or other purposes.

Waterfowl impoundments may be managed in several ways to encourage growth of desired duck food plants by manipulation of water levels, marsh burning or a combination of these two practices. Depending on their location within the estuarine system, impoundments may be flooded with either brackish or fresh-water, resulting in an obvious difference in plant community structure.

Brackish impoundments are principally managed for widgeon-grass (Ruppia maritima), salt marsh bulrush (Scirpus robustus) and dwarf spike-rush (Eleocharis parvula), which are excellent duck food species (Wilkinson 1970). Other duck food plants, such as sago pondweed (Potamogeton pectinatus), soft-stem bulrush (Scirpus validus), muskgrass (Chara hornemannii) and duckweeds (Lemna and Spirodela), may also be present. Less desirable plants from a waterfowl management standpoint may persist in these diked wetlands, including smooth cordgrass, needlerush, glassworts, salt grass, marsh-hay cordgrass, marsh elder, giant cordgrass, sawgrass, cattails, panic grass, marsh fleabane, sedges and green algae (Cladophora).

Under fresh-water conditions, a host of other marsh plants, which are desirable duck food, are encouraged to grow within waterfowl impoundments: smartweeds (Polygonum spp.), panic grasses (Panicum spp.), wild millet (Echinochloa spp.), red root (Lachnanthes caroliniana), water shield (Brasenia schreberi), spikerushes (Eleocharis spp.), pondweeds (Potamogeton spp.), arrow-arum (Peltandra virginica), white water lily (Nymphaea odorata), southern naid (Najas guadalupensis), asiatic dayflower (Aneilema keisak), soft-stem bulrush (Scirpus validus), wild rice (Zizania aquatica) and water grass (Hydrochloa carolinensis) (Conrad 1965; Morgan 1974). Cultivated crops, such as corn (Zea mays), brown top millet (Panicum ramosum), Japanese millet (Echinochloa crus-galli), wheat (Triticum aestivum), barley (Hordeum sp.), rye (Secale cereale), Italian rye grass (Lolium sp.), clover (Trifolium sp.), soybeans (Glycine max) and grain sorghum (Sorghum sp.), are planted in conjunction with summer drawdown in some fresh-water impoundments (Wilkinson, pers. comm.). Undesirable marsh plants found within fresh-water impoundments include alligator-weed, cattails, giant cordgrass, giant cutgrass, pickerel-weed, soft rush, sea myrtle, marsh fleabane, American frogbit, bladderwort, pennywort, coontail (Ceratophyllum spp.), water-weed, green algae (Cladophora spp.) and fanwort (Cabomba caroliniana) (Conrad 1965; Morgan 1974).

Preparation of Wetlands Maps

Seventy-six maps and corresponding inventory overlays were produced to delineate the boundaries of coastal marshes in South Carolina. These data were bound into a working atlas.* Future natural and cultural changes occurring within the inventoried region may be easily recorded on this atlas for management purposes.

Statistical Results of the Inventory

State Totals

A total of 504, 445 acres of coastal marshlands, including 70,451 acres of impoundments, was delineated in our inventory (Table 6). Over 77% (334,501 acres) of the tidal marshes in the state was classified as salt marsh, with about 82% of this marsh designated as low salt marsh (Table 7). Only 8% (34,962 acres) was considered brackish marsh, whereas fresh-water marsh comprised nearly twice this amount (15% or 64,531 acres).

Diked disposal areas identified in this survey amounted to 10,790 acres (Table 6). Considering that the vast majority of these areas was constructed in tidal marshes, we estimate that their construction has destroyed less than 2% of South Carolina's coastal marshlands.

In addition, our inventory charted 10, 701 acres of beach zone. This figure includes both sand dunes and intertidal beaches.

County Totals

Statistical results of our inventory on a county-basis are presented in Tables 6 (acreage figures) and 7 (percentage ratios). Each inventory category is defined for the eight coastal counties.

Both Charleston and Beaufort Counties possess over one hundred thousand acres of tidal marshes, with Charleston ranking first in abundance. In addition, Charleston has more beach acreage (5,272) and more impoundments (22,999 acres) than any other county, although Colleton County ranks a close second in impoundment acreage (20,596). Georgetown County has the highest acreage of tidal fresh-water marsh in the state with 23,764 acres, while Berkeley County closely follows with 17,511 acres. Charleston, Colleton and Georgetown Counties contain almost equal amounts of brackish-water marsh (10,843 a., 10,170 a., and 8,262 a., respectively). The acreages of diked spoil areas is also fairly evenly divided among three counties - Berkeley, Jasper and Charleston.

Discussion of Estuarine Marshes

In this section, discussion will be limited to marsh acreages and dominant vegetation of each estuarine systems. General descriptions of the major marsh types were presented earlier in this report. Statistical results of our inventory were broken down for each of the seventeen estuarine systems. Table 8 outlines the acreage of seven inventory categories associated with each estuary, while Table 9 shows comparative percentage ratios between marsh types, impoundments and spoil areas on an estuary-basis.

System 1. Little River

The marshes of the Little River system encompass slightly more than 2,000 acres, with the majority (73% or 1527 acres) of this acreage classified as low salt marsh. Smooth cordgrass dominates this low marsh, while several plants thrive in the 217 acres of high marsh identified in this system, including needlerush, sea lavender, sea ox-eye, glasswort, marsh-hay cordgrass, salt grass, marsh elder and fimbristylis. More than 300 acres of brackish marsh also occur within this system and the dominant vegetation includes needlerush, cattails, salt marsh bulrush and giant cordgrass.

System 2. Myrtle Beach

The Myrtle Beach system, the smallest estuarine system inventoried in this study, is composed mainly of the marshes of two tidal swashes, Singleton Swash and White Point Swash. These swashes are connected to the Atlantic Ocean by small tidal creeks. There is very little fresh-water inflow into these areas and the dominant influence of the marine environment is evident in the species composition of these marshes. These marshes are considered salt marshes, since the predominant vegetation is composed of halophytes, mainly smooth cordgrass. Sixty-one acres of low salt marsh and 14 acres of high salt marsh comprise the Myrtle Beach wetland system, while 43 acres of impoundments are also present. The vegetation of the high salt marsh is varied with several common plants observed: needlerush, sea ox-eye, marsh-hay cordgrass, salt grass, glasswort, sea lavender and marsh elder. The low marsh is dominated by a single species, smooth cordgrass. In certain localities fringing the upland, cattails flourish, apparently associated with fresh-water runoff from adjacent highland areas.

System 3. Murrells Inlet

Murrells Inlet is a comparatively small (1,760 acres of coastal marsh), high salinity estuarine system which contains 64 acres of impoundments. Plant composition of these marshes reflects the overwhelming marine influence on the system, in which fresh-water inflow is negligible. The low marsh occupies 1,561 acres (or 89% of the system's coastal marshland), while high marsh plants abound in 135 acres (or 8%) of this system's wetlands. A single species, smooth cordgrass, dominates the low marsh, whereas several plants are common in the high marsh, including needlerush, sea ox-eye, saltgrass, fimbristylis, marsh-hay cordgrass, glassworts, marsh elder and sea lavender. Cattails and yellow-pond lily flourish in the large impoundment bordering the entrance road to Huntington

* Blueprint copies of these maps are available upon request from the Office of Conservation and Management of the S.C. Wildlife and Marine Resources Department.

Beach State Park.

System 4. Pawleys Island

Similar to Murrells Inlet, the Pawleys Island system is a rather small, (1,268 acres of coastal marsh) highly saline estuary in which the marine influence predominates. Plant composition of these marshes also resembles that of Murrells Inlet. Over 80% (or 721 acres) of these salt marshes is designated as low marsh, dominated by a single plant, smooth cordgrass. Less than 200 acres of high marsh are present within this system. These areas are characterized by a diverse plant community, including needlerush, sea ox-eye, marsh-hay cordgrass, fimbristylis, glassworts, marsh elder, and others.

System 5. North Inlet

Like systems 3 and 4, North Inlet is a relatively small (5,688 acres of coastal marsh), high salinity estuary with little freshwater inflow. This system contains 5,640 acres of salt marsh, of which 4,906 acres (or 86%) are classified as low marsh and 734 acres (or 13%) are designated high marsh. Low marsh areas are characterized by extensive stands of smooth cordgrass, while the plant community of the high marsh is relatively diverse with needlerush, sea ox-eye, salt grass, marsh-hay cordgrass, fimbristylis, glassworts, marsh elder, and others.

System 6. Winyah Bay

The Winyah Bay system is large (31,867 acres of coastal marshlands), and the strong fresh-water influence arising from four major rivers (Sampit, Black, Pee Dee and Waccamaw) results in an extremely diverse plant community, particularly in the fresh-water areas. Consequently, fresh-water marshes dominate the region, totaling 22,649 acres (81% of the Winyah Bay marshes), while brackish marshes cover about 18% (or 4,915 acres) of the wetlands. Salt marshes occupy only 204 acres and comprise less than one per cent of the Winyah Bay marshes.

Smooth cordgrass dominates the salt marshes, particularly the low marsh, while a number of plants, including sea ox-eye, needlerush, marsh-hay cordgrass, salt grass, fimbristylis, sea lavender, glassworts and marsh elder, abound at higher elevations. Several species flourish in the brackish marshes including giant cordgrass, black needlerush, salt marsh bulrush, common three-square, soft-stem bulrush, cattails, pickerel-weed, arrowhead, spider-lily and arrow-arum. Giant cutgrass, which occurs less abundantly in slightly brackish marshes, is a common plant of the fresh-water marshes, along with others which include pickerel-weed, sawgrass, jewel-weed, water parsnip, smartweeds, yellow pond-lily, water hemlock, arrowhead, rose mallow, soft-stem bulrush, giant cordgrass, cattails, loosestrife, white water lily and alligator-weed. Tree species, such as tag alder, bald cypress, ironwood, water locust, tupelo and black gums, buttonbush and viburnum, also appear in these marshes along natural levees and abandoned ricefield dikes.

System 7. Santee River

The coastal marshes of the Santee River occupy 48,172 acres, including 19,837 acres of managed impoundments which represent 41% of this system's wetlands. A significant amount (3,964 acres or 8%) of fresh-water marsh occurs in this region. Fresh-water inflow was reduced by the Santee-Cooper Diversion Project, which diverted most of the flow of the Santee River to the Cooper River to fulfill hydroelectric power needs. In turn, this has increased saltwater intrusion in this system. Most of the unmanaged marshes (37% or 17,847 acres) are classified as salt marshes, whereas brackish marshes encompass 6,524 acres or 14% of the Santee's coastal marshlands.

Smooth cordgrass dominates the low areas of the salt marshes and a mixed plant community of needlerush, salt marsh bulrush, marsh-hay cordgrass, sea ox-eye, saltgrass and other typical high marsh species occupies high marsh areas. Brackish and fresh-water marshes of the Santee Delta may be subjected to controlled burning during the fall or winter for waterfowl management. This practice effectively controls plant succession and encourages the growth of important duck food plants, such as bulrushes and spikerushes. The brackish marshes are comprised of five major plants: giant cordgrass, smooth cordgrass, salt marsh bulrush, narrow-leaved cattail and needlerush. Other plants occurring in these wetlands include common three-square, salt marsh aster, goldenrod, marsh elder, sea myrtle and occasionally pickerel-weed, giant cutgrass and wild rice.

Mixed plant communities characterize the transitional fresh-water marshes adjoining the brackish wetlands, while giant cutgrass tends to predominate further upriver. The mixed community marshes are mainly represented by three species: giant cordgrass, common three-square and soft-stem bulrush. Salt marsh bulrush, cattails, spikerush, wild rice and other plants are also present. In addition to the three dominants of the mixed marshes, numerous species are associated with the giant cutgrass marshes: wild rice, sawgrass, cattails, sedges, alligator-weed, water primrose, beggar's-ticks, water parsnip, arrow-arum, dock, aster, foxtail grass, pickerel-weed, smartweeds, rose mallow and others.

System 8. Bulls Bay

The Bulls Bay wetland system is composed mainly of salt marshes located between the mainland and barrier islands, such as Cape Island, Bull Island, Dewees Island, Isle of Palms and Sullivans Island, yet also includes brackish marshes associated with large tidal creeks (Awendaw, Tibwin and Jeremy) that drain mainland areas. Over 45,000 acres (or 94%) of the tidal marshes are dominated by smooth cordgrass, and therefore, classified as low salt marsh. A host of plants characterize the system's 2,742 acres of high

marsh, which represents about 5% of the system's coastal wetlands. These plants include needlerush, marsh-hay cordgrass, saltgrass, fimbristylis, sea lavender, glasswort, sea ox-eye and marsh elder. Needlerush forms vast stands in the 164 acres of brackish marshes bordering Awendaw Creek and other large tidal creeks. Giant cordgrass, sawgrass, smartweeds, and rushes are among the other plants which occupy marginal positions along the upland edges of these marshes, particularly in Awendaw Creek.

System 9. Charleston Harbor

The Charleston Harbor system consists primarily of tidal marshes associated with three major rivers, the Cooper, Wando and Ashley. The Wando and Ashley Rivers are tidal rivers with a moderate to small amount of fresh-water influence, whereas the Cooper River is characterized by a large volume of fresh-water diverted from the Santee River basin through Lake Moultrie into the river. The marshes associated with the Cooper River reflect this strong freshwater influence as flooded rice fields are observed in the East and West Branches, yet plant composition of the Ashley and Wando marshes reflects the strong marine influence upon these regions.

Over 50,000 acres of coastal marshes are present in the Charleston Harbor system. Of this total, 5,111 acres (or 10%) are impoundment areas. Salt marshes comprise roughly 48% (24,710 acres) of these wetlands, while fresh-water marshes cover approximately 36% (18,425 acres) and brackish marshes make up 6% (3,329 acres).

Smooth cordgrass dominates the 20,103 acres of low salt marsh in this system, whereas a variety of plants thrive in the system's 4,607 acres of high marsh, including needlerush, sea ox-eye, fimbristylis, marsh-hay cordgrass, salt grass, glassworts, marsh elder and other typical high marsh species. Needlerush also dominates the system's brackish marshes, while smooth cordgrass occurs here as the primary associate. Other plants, such as salt marsh bulrush, soft-stem bulrush, cattails, giant cordgrass, common three-square and pickerel-weed are present as well, and may be locally abundant. The vegetation of the fresh-water marshes is more diverse, with many common species, including cattails, giant cordgrass, soft-stem bulrush, Olynei's three-square, sawgrass, wild rice, giant cutgrass, pickerel-weed, arrowhead, spiderlily, arrow arum, water parsnip, sedges, rushes, alligator-weed, water hemlock, marsh fleabane, mock bishop-weed, jewelweed, rose mallow, dock, bald cypress, button bush, elderberry, sea myrtle butterweed, common three-square, and bladderwort. Giant cordgrass, giant cutgrass, pickerel-weed, soft-stem bulrush, sawgrass, cattails, and common three-square are locally dominant in these marshes. Remnant stands of needlerush are present in the fresh marshes of the Cooper River, giving testimony of previous (pre-Santee Diversion) brackish-water conditions.

System 10. Stono-Kiawah

The Stono-Kiawah system is chiefly composed of the coastal marshes bordering the Stono and Kiawah Rivers. The marine influence on this region is evident in the plant composition of the attendant wetlands. Over 18,000 acres of salt marsh were inventoried, with nearly 80% of this total designated as low salt marsh and dominated by smooth cordgrass. The remaining salt marsh acreage (3,228 acres or 20%) was classified as high marsh, characterized by a mixed plant community of needlerush, aster, glassworts, sea ox-eye, salt grass, marsh-hay cordgrass, marsh elder and others. Brackish marshes cover 2,665 acres (or 11% of the system's coastal wetlands) with needlerush predominating. Other plants such as giant cordgrass, smooth cordgrass, salt marsh bulrush, marsh elder, aster, and smartweeds are commonly associated with those needlerush dominated wetlands. Fresh-water marshes within this area are rather limited (21 acres) and are dominated by cattails.

System 11. North Edisto

The North Edisto System, like System 10, is under strong marine influence, as only a small amount of freshwater enter the system, principally the result of upland runoff. Over 23,000 acres of salt marshes and only 385 acres of brackish marshes comprise 94% of this system's coastal wetlands. The remaining 6% (or 1,132 acres) is classified as coastal impoundments.

Smooth cordgrass dominates the low salt marsh, which occupies about 84% of this region's tidal marshes, while the high marsh and brackish-water marsh make up only 14% and 2%, respectively. Both the high marsh and brackish-water marsh are largely dominated by black needlerush, while common associates in the high marsh include sea ox-eye, sea lavender, salt grass, smooth cordgrass, marsh-hay cordgrass, fimbristylis and marsh elder. Common brackish marsh associates include giant cordgrass, smooth cordgrass, aster and cattails.

System 12. St. Helena Sound

The St. Helena Sound estuarine system contains tidal marshes primarily associated with South Edisto, Ashepoo, Combahee, Morgan and Coosaw Rivers, as well as with the Sound itself. Over 117,000 acres of coastal marshes, including 25,843 acres of impoundments, were inventoried. Most (72%) of the tidal marshes are classified as salt marshes, with 60,434 acres designated as low marsh and 5,148 acres of high marsh. Brackish water and fresh-water marshes occur in nearly equal amounts (13,596 acres and 12,148 acres, respectively) and comprise roughly thirty per cent of the system's tidal marshes.

which dominate the low marsh areas, while the high marsh is characterized by a mixed plant community which includes needlerush, sea ox-eye, glassworts, marsh-hay cordgrass, fimbristylis, salt grass, aster, marsh elder and sea lavender. Brackish marshes of this system may either be dominated by needlerush or represented by a mixed community of marsh plants. In the needlerush-dominated marshes, smooth cordgrass occurs as the primary associate species, while other plants frequently observed include salt marsh bulrush, giant cordgrass, marsh elder, sea ox-eye and sea myrtle. Dominant plants of the mixed brackish marshes are giant cordgrass, salt marsh bulrush, and soft-stem bulrush, with pickerel-weed and arrowhead also prevalent. The fresh-water marsh community is extremely diverse and contains a host of wetland plants: giant cordgrass, giant cutgrass, cattails, pickerel-weed, alligator-weed, water primrose, mock bishop-weed, swamp rose, tag alder, smartweeds, marsh fleabane, buttonbush, wild rice, arrowheads sedges, iris, rushes, pennyworts, parrots-feather, beggar's-ticks, spikerushes, butter-weed, swamp dock, frog's-bit, rose mallow, royal fern, golden-club, bladderworts, mosquito-fern, asters, goldenrod, bald cypress, common three-square and others.

System 13. Fripp-Trenchards

The Fripp-Trenchards estuarine system is a high salinity area similar to Systems 3, 4 and 5, where little fresh-water inflow occurs. The marsh vegetation is dominated by halophytes which reflects the strong marine influence on the region. Almost all of this system's 21,842 wetland acres were classified as salt marshes. Only 72 acres of coastal impoundments were identified.

Smooth cordgrass dominates the major portion (17,890 acres or 82%) of these coastal marshes, while a diverse plant community exists in this system's 3,880 acres of high marsh. Plants such as needlerush, sea ox-eye, saltgrass, glasswort, marsh-hay cordgrass, fimbristylis and marsh elder are common in these high marshes.

System 14. Port Royal Sound

The Port Royal Sound estuarine system encompasses the tidal marshes bordering the Broad, Beaufort, Chechessee River, Colleton River as well as other smaller rivers and creeks such as Euhaw Creek, Pocataligo River, and Whale Branch. A total of 70,953 acres of coastal marsh, including 1,329 acres of impoundments, is present within this system. All of these marshes, with the exception of impounded wetlands, were classified as salt marshes. Seventy-four per cent (or 51,406 acres) of these tidal marshes was designated as low salt marsh, while the remaining 26% (or 18,218 acres) was high marsh.

The low marsh is characterized by extensive monospecific stands of smooth cordgrass, whereas the high marsh vegetation is relatively diverse with several common species, including needlerush, sea ox-eye, salt grass, marsh-hay cordgrass, fimbristylis, glasswort, sea lavender and marsh elder. Under brackish conditions, needlerush commonly dominates large areas of high marsh in this system. In these marshes, associate species include smooth cordgrass, marsh elder, giant cordgrass, sea myrtle, panic grass and broomsedge.

System 15. Calibogue Sound

The Calibogue Sound estuarine system includes the tidal marshes of Broad Creek, May River, Bull Creek, Cooper River and part of Mackay Creek. The marine environment dominates this area where little fresh-water inflow exists. Characteristic marsh plants of this region are halophytes typical of salt and brackish marshes. More than 16,000 acres of salt marsh were inventoried (13,437 acres of low marsh and 3,064 acres of high marsh). Impoundments in this system total 113 acres. Smooth cordgrass forms monospecific stands in the low marsh, whereas the high marsh plant community is relatively varied with several common species: needlerush, sea ox-eye, salt grass, marsh-hay cordgrass, fimbristylis, glasswort, marsh elder, sea lavender, and salt marsh aster.

System 16. New-Wright

The New-Wright system is composed of the marshes bordering two rivers, New and Wright Rivers. There is a moderate amount of fresh-water flowing into this system as evidenced by the 1,786 acres of fresh-water marsh inventoried. Most of the marshes, however, are salt marshes (15,988 acres). Smooth cordgrass dominates 13,917 acres of low marsh, while several plants are common in the 2,071 acres of high marsh: needlerush, sea ox-eye, glasswort, salt grass, marsh-hay cordgrass, fimbristylis, sea lavender, aster, marsh elder, salt marsh bulrush and others. Brackish marshes total 3,072 acres and are represented by several common species: giant cordgrass, needlerush, pickerel-weed, soft-stem bulrush and arrowhead. Plant composition of fresh-water marshes is extremely diverse with cattails, sawgrass, water parsnip, pickerel-weed, iris, arrowhead, rose mallow, arrow-arum, alligator-weed, rushes, spikerushes, mock bishop-weed, swamp rose, dodder, Olynei's three-square and royal fern, as well as woody species: button-bush, sweet gum and sea myrtle.

System 17. Savannah

The Savannah system is composed of 7,651 acres of tidal marshes which occur along the South Carolina portion of the Savannah River. The effect of the Savannah River upon the associated marshes is apparent, since the majority (72% or 5,538 acres) of these wetlands was classified as fresh-water marsh. Much of the system's wetlands have been previously altered or manipulated by man, such as 4,321 acres of managed impoundments and 3,102 acres of spoil areas (former marshlands). As a result, only a small amount (113 acres) of low salt marsh remains, while 2,000 acres of high marsh are present. The majority of high marsh acreage is the work of former open marsh disposal practices in low marsh areas.

No brackish marsh was inventoried, since all of this marsh type is currently used for disposal of dredged material.

Smooth cordgrass dominates the surviving low marshes, whereas the following plants commonly comprise the high salt marsh community: needlerush, sea ox-eye, salt grass, marsh-hay cordgrass, glasswort, marsh elder and sea lavender. Freshwater marshes are characterized by a mixed plant community of giant cordgrass, giant cutgrass, cattails, wild rice, sawgrass, water parsnip, arrowhead, pickerel-weed, rose mallow, soft-stem bulrush, beggar's-ticks, alligator-weed and others.

PRIORITY CLASSIFICATION OF TIDAL MARSHES

A series of priorities based on overall value would be of great benefit as guidelines for future coastal zone planning and management activities. Since all marshes generally play important roles in erosion control, flood control and water storage, water quality control and aesthetics, these factors were not regarded to be of prime importance in formulating a priority classification. Instead, emphasis was placed upon ecological values which may vary considerably between tidal marshes. Three general ecological values were considered: 1) marsh production and detritus availability; 2) fish and invertebrate utilization; 3) waterfowl and wildlife utilization.

The following classification was devised using systems proposed by the South Carolina Marine Resources Division (1972) and Silberhorn, et al. (1974) as models:

Class I. Class I marshes are most important to fisheries, waterfowl and wildlife resources and exhibit the highest productivity values. These marshes, with their tidal streams and channels, serve as principle nursery and spawning grounds for many fishes and invertebrates. They may also be important as shellfish-growing areas. In addition, these marshes may have a high value to waterfowl. Class I marshes should be preserved based on their ecological importance. These marshes include: 1) low salt marsh, 2) mixed community brackish-water marsh and 3) fresh-water marsh.

Class II. Class II marshes are less important to fisheries, waterfowl, and wildlife resources than Class I marshes. These marshes are generally less productive than the Class I marshes. Since they are usually located above the mean high water mark, less tidal flushing results, and therefore, the organic matter (detritus) that is produced is not readily available to the estuarine environment. Class II marshes should also be preserved, but if development in wetlands can be justified based on public need, it would be preferable to alter Class II marshes rather than Class I marshes. These marshes include: 1) high salt marsh and 2) brackish-water marsh (needlerush-dominated community).

Class III. Class III marshes have little value to fisheries, waterfowl, and wildlife when compared with the previous classes. These marshes, however, serve important value in erosion control, flood control and water storage, and water quality control. These marshes may appear less aesthetically-pleasing than Class I and Class II marshes. While Class III marshes should not be unreasonably disturbed, development in these marshes is preferred to altering any of the marshes of the preceding classes. Class III marshes include: sand barrens or sand-flats of the high salt marsh and areas significantly altered by development (outer margins of diked spoil areas, undiked spoil areas and areas fouled by industrial, municipal or other wastes).

Unfortunately, at the present time, we do not have sufficient data to quantify the above priority classes within each estuary. Current work, however, is underway to accomplish this objective and these results should be available before the end of 1978.

DISCUSSION

Realizing the importance of wetlands to wildlife and especially to waterfowl, the U. S. Bureau of Sport Fisheries and Wildlife carried out a national wetlands inventory in 1953-54 (Shaw and Fredine 1956). The location and extent of wetlands in South Carolina were determined during this survey. Spinner (1969) presented these results in a report entitled "A Plan for the Marine Resources of the Atlantic Coastal Zone." He recorded a total of 516,400 acres of coastal wetlands for South Carolina. Of this, 345,000 acres were classified as type 18 (regularly-flooded salt marsh), while 91,000 acres were designated as type 17 (irregularly-flooded salt marsh). In addition, 80,400 acres of types 12 and 13 (coastal shallow fresh marsh and coastal deep fresh marsh, respectively) were inventoried. Spinner also estimated that 2,000 acres (.4%) of coastal wetlands were destroyed from 1954-1968.

In response to potential conflicts associated with future Corps of Engineers navigation projects, the Marine Resources Division of the South Carolina Wildlife and Marine Resources Department has conducted several inventories of coastal marshes in certain South Carolina estuaries. Wetland acreages have been determined for three estuaries for this purpose: Charleston Harbor (SCMRD 1972); Murrells Inlet (SCMRD 1975b, Calder et al. 1976); and Little River (SCMRD 1976, Calder et al. 1977). Also, before state acquisition of Capers Island, the Marine Resources Division surveyed the tidal marshes of Capers and Dewees Island (SCMRD 1975a) for preparation of an environmental assessment.

Three additional coastal wetland inventories have been performed in South Carolina. Morgan (1974) determined the extent of coastal marshes

in the South Edisto-Ashepoo-Combahee Area, while studying wetland management. Duncan (1975) reported the results of a photo-interpretative survey of the Wando River marshes. Hook (1976) conducted a partial inventory of former ricefields in coastal South Carolina. This work included the Waccamaw, Pee Dee, Black, North Santee, South Santee, Cooper, Ashley and Wando Rivers.

Richard Stalter has worked extensively in the coastal wetlands of South Carolina, initially studying in detail the North Inlet salt marshes (1968). In addition, he reported on the distribution of marsh vegetation in the Cooper River (1973b). He has also prepared species lists of specific coastal areas, such as Huntington Beach State Park (1971), Otter Island (1972), Turtle Island (1973b) and Isle of Palms (1975).

A number of scientists have studied the coastal marshes of Georgetown County, including Stalter (1968). Conrad (1965) conducted a plant survey of the Pee Dee Management Area and adjacent marshes along the lower Pee Dee and Waccamaw Rivers. Barry (1968) inventoried the native vascular plants at the Baruch Plantation which included salt and tidal freshwater marshes. Vegetative succession in newly-controlled marshes was studied by Wilkinson (1970). Baden, et al. (1975) investigated the distribution of vegetation in abandoned ricefields of the Winyah Bay estuary. Recently, a vascular plant survey of the lower Santee River floodplain was accomplished (Havel 1976).

Plant zonation within South Carolina salt marshes has received considerable attention. Kurz and Wagner (1957) explained vegetational changes correlated with elevation in Charleston County marshes. Stalter (1968) ran numerous marsh transects in the North Inlet estuary, while Shriner (1971, 1972) conducted similar studies in Port Royal Sound and North Edisto River. Plant zonation was also examined in the marshes of Kiawah Island (Hosier 1975), Little River (SCMRD 1976, Calder et al. 1977) and in Murrells Inlet (Tiner - unpublished data).

Much attention has focused on the factors affecting plant distribution in estuarine marshes. Penfound (1952) listed the following parameters as important in this respect: water content, water table, fluctuation of water levels, soil types, aeration, nutrients, acidity, salinity, temperature, light, molar agents, plant competition, animal actions and human activities (i.e. canalizing, cutting, burning, draining, and grazing). After studying Connecticut salt marshes, Miller and Egler (1950) concluded that a complex of factors is responsible for affecting plant composition: tides, salinity, water table, soil, mowing, ditching, surface level changes, precipitation and temperature. Adams (1963) reported that tide-elevation influences are the primary factors controlling the distribution of species in North Carolina salt marshes. Kurz and Wagner (1957) found that a number of factors besides chlorinity enter into the survival of plants in the marshes, namely amount of soil water, aeration, soil nutrients, competition, salt spray and duration of critical conditions. A recent study by Baden, et al. (1975) in the Winyah Bay (S.C.) tidal marshes indicated that chlorinity does appear to limit species distribution, while texture, organic content and pH do not seem to be important edaphic factors influencing zonation. Although most studies recognize several limiting factors, there is some disagreement on which factor is the most important. Johnson and York (1915), Wells (1928), Chapman (1938) and Hinde (1954) believed that tidal inundation is most critical. On the other hand, salinity was thought to be the principle factor by several workers (Penfound 1952, Bourdeau and Adams 1956, Kerwin 1966).

SUMMARY

An inventory of the coastal marshes of South Carolina, including impoundments, beaches and diked disposal areas, has been accomplished by the Marine Resources Division of the South Carolina Wildlife and Marine Resources Department. This survey, based on aerial photo-interpretation and field surveys, revealed a total of 504,445 acres of coastal marshlands for South Carolina. This figure includes salt marshes, brackish-water marsh, tidal fresh-water marshes and coastal impoundments. Also delineated in the inventory were 10,790 acres of diked disposal areas and 10,701 acres of beaches and sand dunes.

The majority (66% or 334,501 acres) of the coastal marshlands in South Carolina was classified as salt marsh. Low salt marsh dominated these areas, totaling 284,252 acres, while high salt marsh comprised 50,249 acres. Brackish marshes and fresh-water marshes made up only 7% and 13% of the coastal wetland in the state, while impoundments represented the remaining 14%.

Plant composition of the four major wetland types was described. In addition, species composition of the tidal marshes in each of the seventeen estuarine systems in South Carolina was generally discussed.

Three priority classes of coastal marshes were established by appraising the overall value of these wetlands to marine resources, waterfowl and other wildlife. The low salt marsh, mixed plant community brackish-water marsh and tidal fresh-water marsh were regarded as the highest priority (Class I) wetlands, while the needle-rush-dominated brackish marsh and high salt marsh were rated as Class II marshes. Sand barrens in the high salt marsh and areas significantly altered by development (outer margins of diked disposal areas, undiked spoil areas and marshlands fouled by industrial, municipal or other wastes) represented the lowest priority (Class III) marshes.

FIGURE 2. AERIAL PHOTOGRAPH SHOWING DENDRITIC DRAINAGE PATTERN IN THE SALT MARSH BEHIND ISLE OF PALMS, CHARLESTON COUNTY.

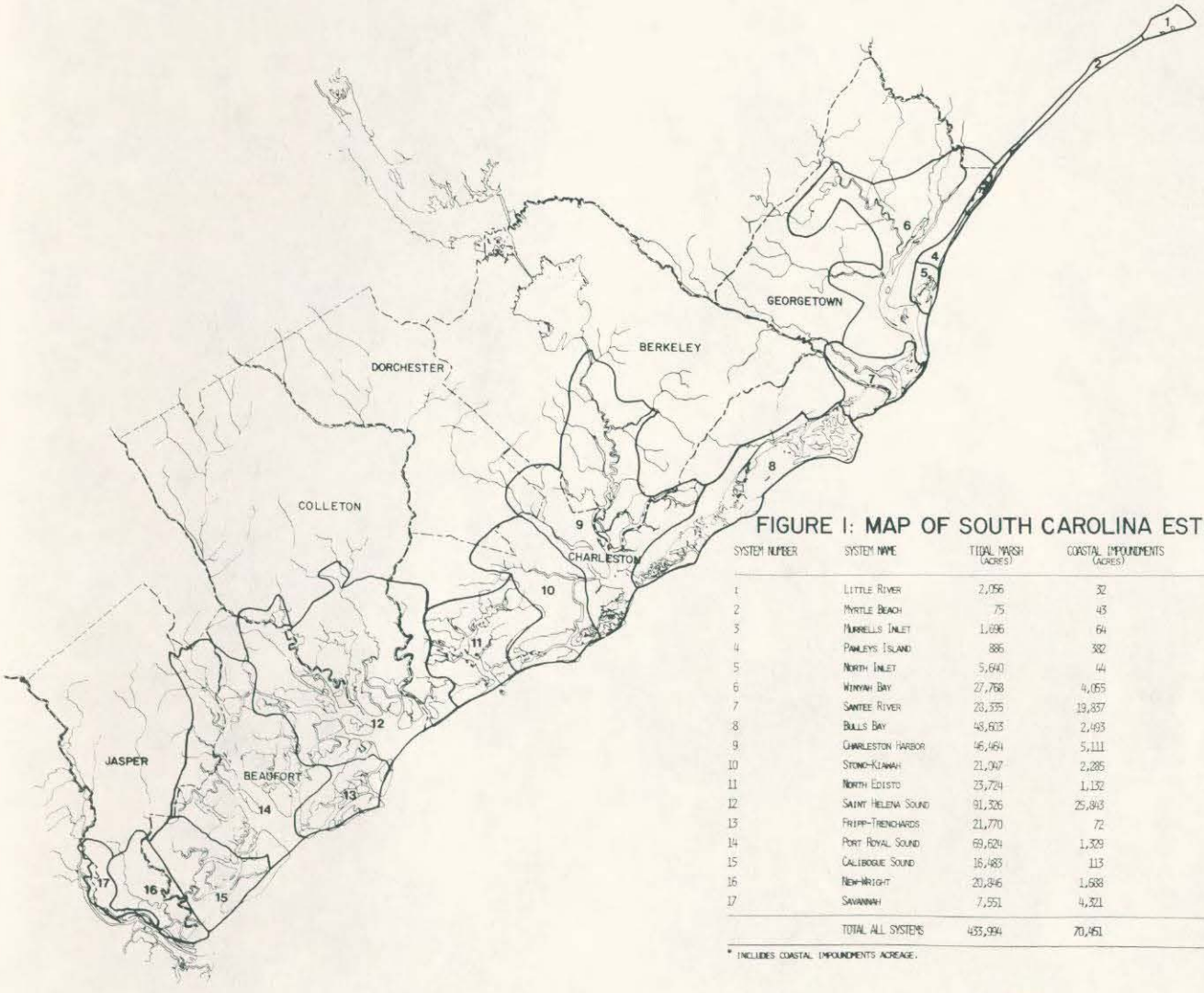

FIGURE I: MAP OF SOUTH CAROLINA ESTUARIES

SYSTEM NUMBER	SYSTEM NAME	TIDAL MARSH (ACRES)	COASTAL IMPOUNDMENTS (ACRES)	TOTAL COASTAL MARSH* (ACRES)
1	Little River	2,056	32	2,088
2	Myrtle Beach	75	43	118
3	Murrells Inlet	1,696	64	1,760
4	Pawleys Island	886	382	1,268
5	North Inlet	5,640	44	5,688
6	Winyah Bay	27,768	4,055	31,823
7	Santee River	28,335	19,837	48,172
8	Bulls Bay	48,603	2,493	51,096
9	Charleston Harbor	46,464	5,111	51,575
10	Stono-Kiawah	21,047	2,285	23,332
11	North Edisto	23,724	1,132	24,856
12	Saint Helena Sound	91,326	25,843	117,169
13	Fripp-Trenchards	21,770	72	21,842
14	Port Royal Sound	69,624	1,329	70,953
15	Calibogue Sound	16,483	113	16,596
16	New-Wright	20,846	1,688	22,534
17	Savannah	7,551	4,321	11,972
	TOTAL ALL SYSTEMS	433,994	70,451	509,445

* INCLUDES COASTAL IMPOUNDMENTS ACREAGE.

Scale 1:500,000

10 0 10 20 30 40 Miles

FIGURE 3. AERIAL PHOTOGRAPH OF COMBAHEE RIVER COASTAL MARSHES (COLLETON COUNTY), SHOWING OLD RICE FIELDS - A) MANAGED IMPOUNDMENT, AND B) ABANDONED RICE FIELD.

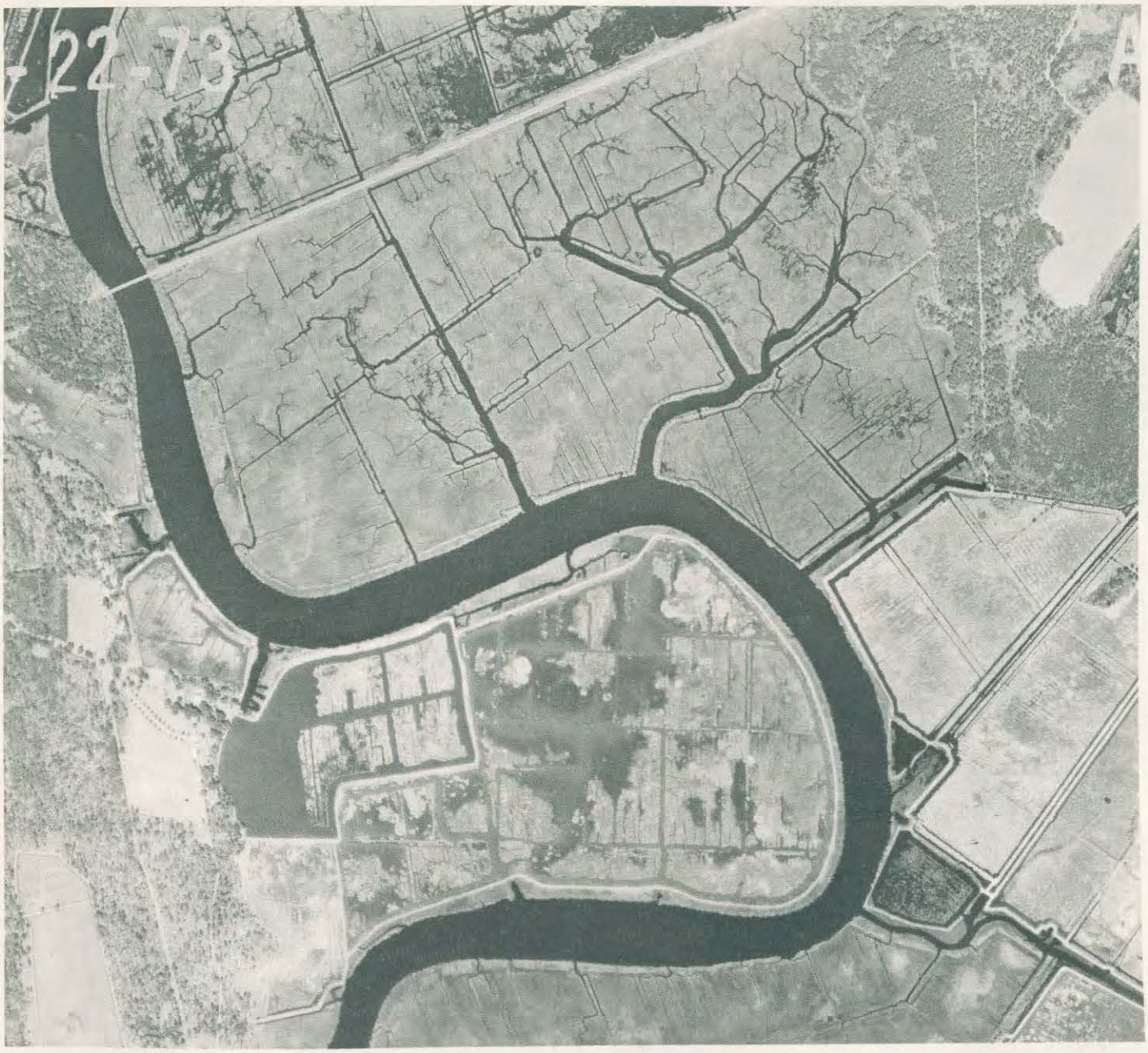

FIGURE 4. AERIAL PHOTOGRAPH SHOWING SINUOUS DRAINAGE PATTERN OF A BRACKISH-WATER MARSH (CHURCH CREEK) NEAR PIERPONT, CHARLESTON COUNTY.

FIGURE 5. SALT MARSH TRANSECT No.1 FROM MURRELLS INLET ESTUARY. THE HEIGHT OF THE HISTOGRAM BAR REPRESENTS THE RELATIVE ABUNDANCE OF SPECIES ON A SCALE FROM 1 TO 2. THE LOWEST LEVELS OF THE MARSH ARE DOMINATED BY SMOOTH CORDGRASS (SPARTINA ALTERNIFLORA), WHILE A DIVERSE ASSEMBLAGE OF PLANTS ABOUNDS AT THE HIGHEST ELEVATIONS. BETWEEN THESE TWO ZONES, A BARREN ZONE, DEVOID OF VASCULAR PLANTS, EXISTS.

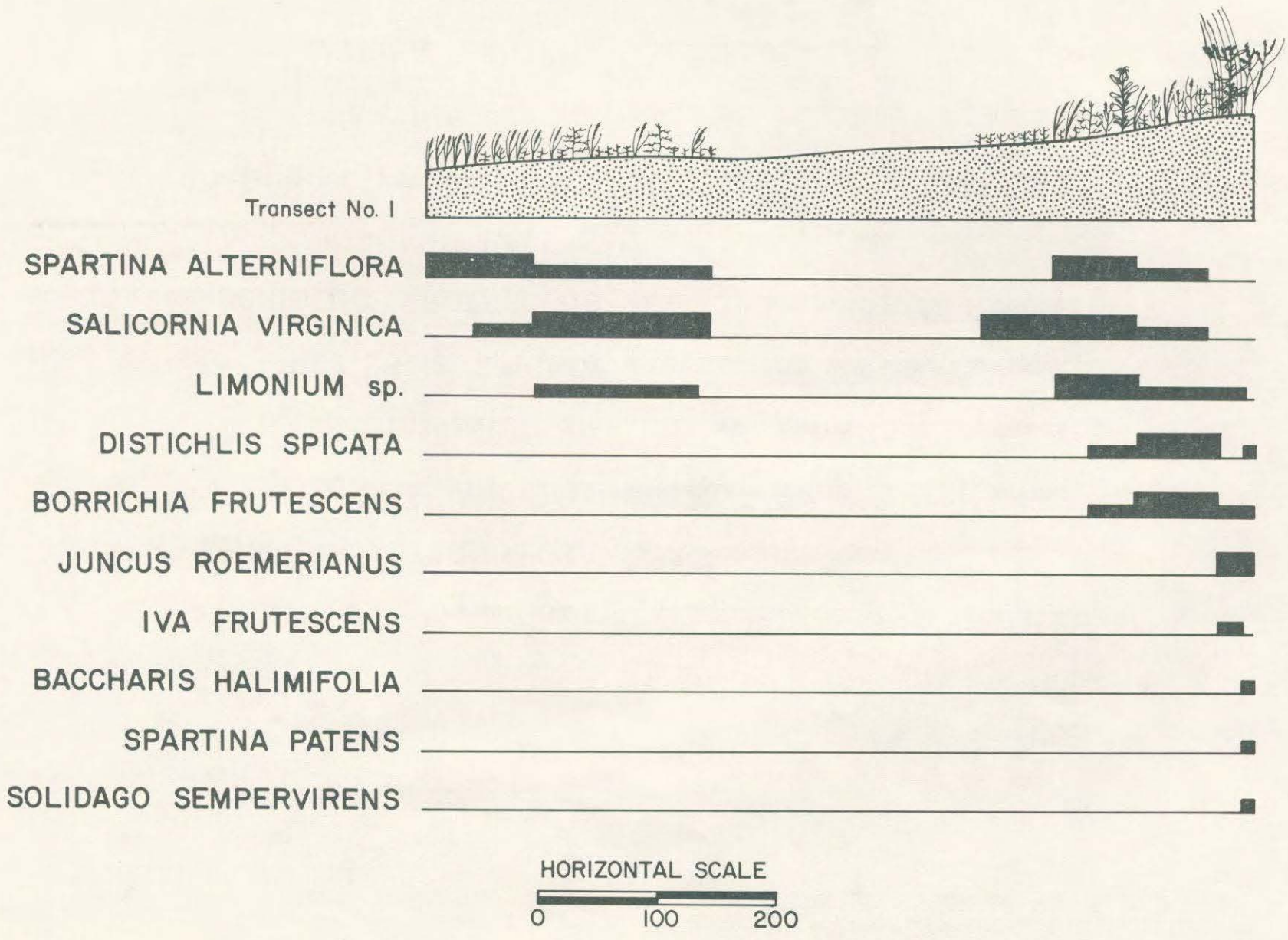

FIGURE 6. TRANSECT NO.2 IN HIGH MARSH OF MURRELLS INLET ESTUARY, REVEALING A SLIGHTLY DIFFERENT COMMUNITY STRUCTURE. NOTE THE ABUNDANCE OF SALT GRASS (DISTICHLIS SPICATA) AND SEA OX-EYE (BORRICHIA FRUTESCENS), AND THE ABSENCE OF NEEDLERUSH (JUNCUS ROEMERIANUS).

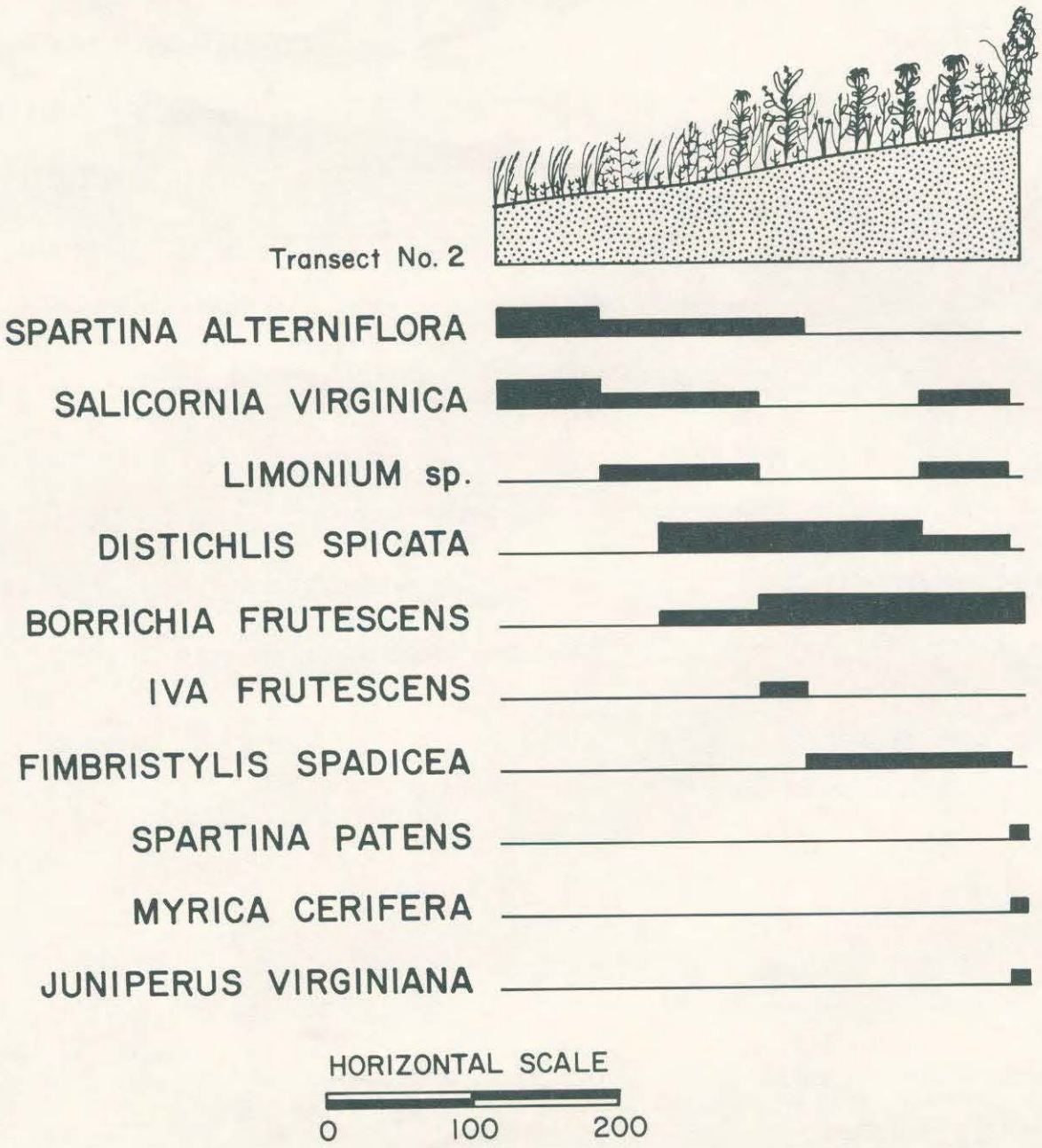

FIGURE 7. HIGH MARSH TRANSECT NO.3 IN MURRELLS INLET ESTUARY. NOTE DOMINANCE OF GLASSWORT (SALICORNIA VIRGINICA) IN LOWER HIGH MARSH AND ABUNDANCE OF SALT MARSH FIMBRISTYLIS (FIMBRISTYLIS SPADICEA) AND MARSH ELDER (IVA FRUTESCENS) AT HIGHEST ELEVATIONS.

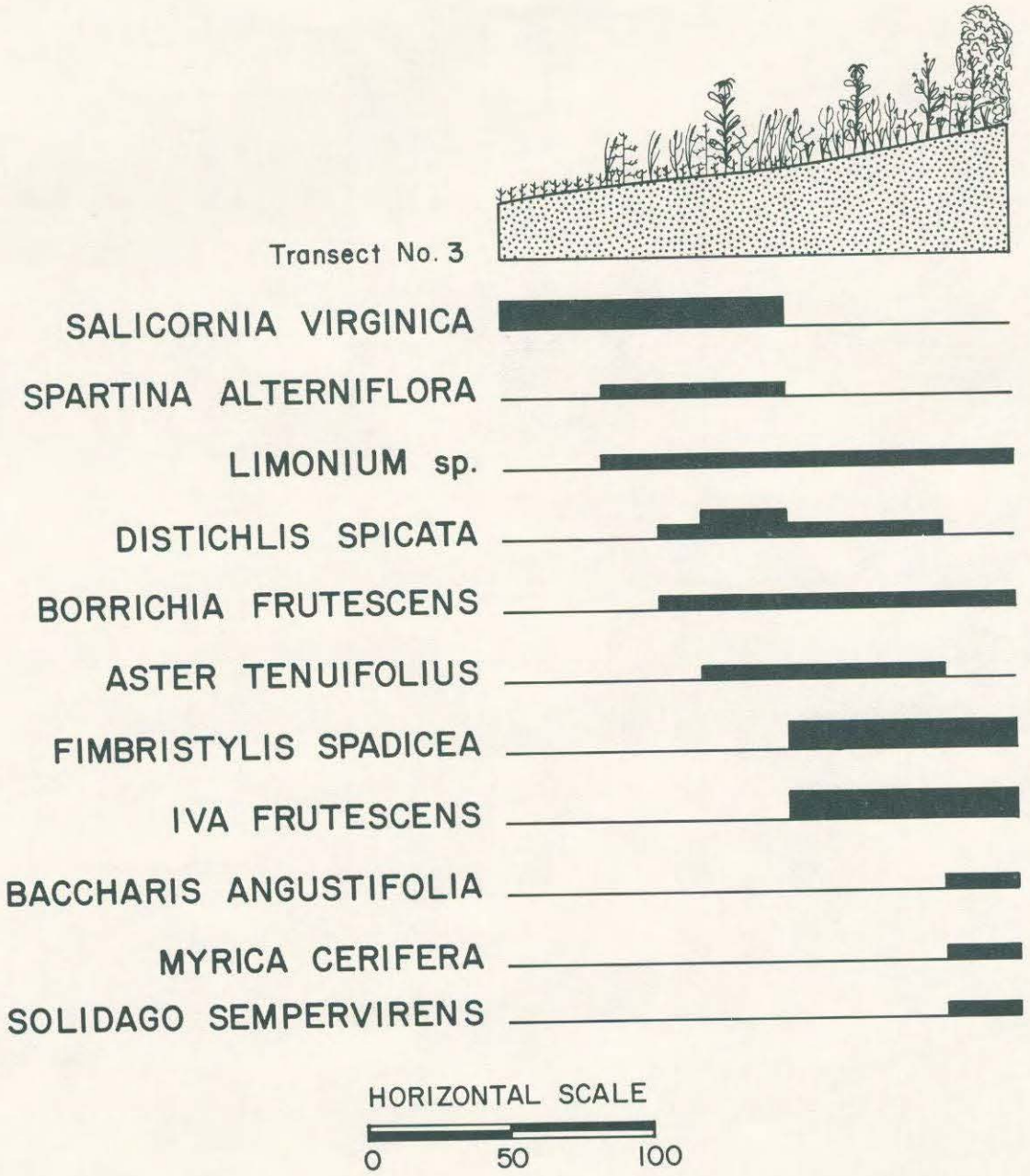

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Table 1. Species list of plants occurring in the salt marshes of South Carolina. Plants observed during the present survey are marked with an asterisk (*). This list also includes wetland flora reported in other studies (see footnotes).

	Scientific Name	Common Name	Location within Salt Marsh
*	*Ampelopsis arborea*	Peppervine	Marsh-upland border
*	*Andropogon sp.*	Broom-straw	Marsh-upland border
	Andropogon scoparius 1	Little Bluestem	Marsh-upland border
	Andropogon virginicus 1,2	Broom Sedge	Marsh-upland border
	Aster subulatus 3	Annual Salt Marsh Aster	High Marsh
*	*Aster tenuifolius*	Perennial Salt Marsh Aster	High Marsh
*	*Atriplex patula*	Marsh Orach	High Marsh
*	*Baccharis angustifolia*	False Willow	Marsh-upland border
*	*Baccharis halimifolia*	Sea Myrtle	Marsh-upland border
*	*Bacopa monnieri*	Water-hyssop	High Marsh
*	*Batis maritima*	Saltwort	High Marsh
*	*Borrichia frutescens*	Sea Ox-eye	High Marsh
*	*Chenopodium album*	Lamb's Quarters	Marsh-upland border
*	*Chloris petraea*	Finger Grass	Marsh-upland border
	Cladium jamaicense 2	Sawgrass	High Marsh
*	*Distichlis spicata*	Salt Grass	High Marsh
*	*Eleocharis sp.*	Spikerush	High Marsh
*	*Fimbristylis spadicea*	Salt Marsh Fimbristylis	High Marsh
	Hibiscus moscheutos 1,3	Rose Mallow	High Marsh
*	*Iva frutescens*	Marsh Elder	High Marsh
*	*Juncus roemerianus*	Black Needlerush	High Marsh
	Kosteletskya virginica 1,3,4	Seashore Mallow	High Marsh
	Liliaeopsis chinensis 5		High Marsh
*	*Limonium carolinianum*	Sea Lavender	High Marsh
*	*Limonium nashii*	Sea Lavender	High Marsh
	Lythrum lineare 1,4,5	Loosestrife	High Marsh
*	*Myrica cerifera*	Wax Myrtle	Marsh-upland border
*	*Panicum virgatum*	Panic Grass	Marsh-upland border
*	*Pluchea purpurascens*	Marsh Fleabane	High Marsh
	Rumex verticillatus 5	Swamp Dock	High Marsh
*	*Ruppia maritima*	Widgeon-grass	Marsh ponds and potholes
*	*Sabal palmetto*	Cabbage Palmetto	Marsh-upland border
	Sabatia dodecandra 1	Sea Pink	Marsh-upland border
*	*Sabatia stellaris*	Sea Pink	High Marsh
*	*Salicornia bigelovii*	Glasswort	High Marsh

Table 1. (Continued)

	Scientific Name	Common Name	Location within Salt Marsh
	Salicornia europaea 4,6	Glasswort	High Marsh
*	*Salicornia virginica*	Perennial Glasswort	High Marsh
*	*Scirpus americanus*	Common Threesquare	High Marsh
*	*Scirpus robustus*	Salt Marsh Bulrush	High Marsh
*	*Sesuvium maritimum*	Sea Purslane	High Marsh
*	*Sesuvium portulacastrum*	Sea Purslane	High Marsh
*	*Solidago sempervirens*	Seaside Goldenrod	High Marsh
*	*Spartina alterniflora*	Smooth Cordgrass	Low Marsh and High Marsh
*	*Spartina cynosuroides*	Giant Cordgrass	High Marsh
*	*Spartina patens*	Marsh-hay Cordgrass	High Marsh
*	*Spergularia marina*	Sand Spurrey	High Marsh
*	*Sporobolus virginicus*	Coastal Dropseed	High Marsh
*	*Suaeda linearis*	Sea-blite	High Marsh
*	*Typha angustifolia*	Narrow-leaved Cattail	High Marsh
	Typha domingensis 3,4	Southern Cattail	High Marsh

1 Stalter (1971)

2 Stalter (1972, 1973b, 1975)

3 Stalter (1975)

4 Stalter (1972)

5 Stalter (1973a)

6 Stalter (1973b)

Table 2. Species list of plants characteristic of brackish-water marshes in South Carolina. Plants observed during the present inventory are marked with an asterisk (*). This table also includes wetland flora listed in other studies (see footnotes).

	Scientific Name	Common Name
*	*Alternanthera philoxeroides*	Alligator-weed
*	*Amaranthus cannabinus*	Water Hemp
	Ammanea teres 1	
*	*Andropogon sp.*	Broom-Straw
	Apios americana 2	
*	*Aster tenuifolius*	Salt Marsh Aster
*	*Baccharis angustifolia*	False Willow
*	*Baccharis halimifolia*	Sea Myrtle
*	*Borrichia frutescens*	Sea Ox-eye
*	*Carex sp.*	Sedge
	Cicuta maculata 2	Water Hemlock
*	*Cladium jamaicense*	Sawgrass
*	*Cyperus spp.*	Sedges
*	*Dichromena colorata*	
*	*Distichlis spicata*	Salt Grass
*	*Eleocharis spp.*	Spikerushes
*	*Fimbristylis spadicea*	Salt Marsh Fimbristylis
	Hibiscus militaris 2	Halberd-leaved Marsh Mallow
	Hibiscus moscheutos 3	Rose Mallow
*	*Hymenocallis crassifolia*	Spider-lily
*	*Iris virginica*	Blue Flag
*	*Iva frutescens*	Marsh Elder
*	*Juncus effusus*	Soft Rush
*	*Juncus roemerianus*	Black Needlerush
*	*Juncus spp.*	Rushes
*	*Kosteletskya virginica*	Seashore Mallow
*	*Limonium carolinianum*	Sea Lavender
	Liliaeopsis chinensis 1,2	
*	*Lythrum lineare*	Loosestrife
*	*Panicum virgatum*	Panic Grass
*	*Peltandra virginica*	Arrow-arum
*	*Pluchea purpurascens*	Marsh Fleabane
*	*Polygonum spp.*	Smartweeds
*	*Pontedaria cordata*	Pickerel-weed
	Ptilimnium capillaceum 2	Mock-bishopweed

Table 2. (Continued)

	Scientific Name	Common Name
*	*Rosa palustris*	Swamp Rose
*	*Rumex verticillatus*	Swamp Dock
	Ruppia maritima 3	Widgeon-grass
*	*Sagittaria spp.*	Arrowheads
*	*Scirpus americanus*	Common Threesquare
*	*Scirpus olynei*	Olynei's Threesquare
*	*Scirpus robustus*	Salt Marsh Bulrush
*	*Scirpus validus*	Soft-stem Bulrush
*	*Sesbania exaltata*	Coffee-weed
	Setaria geniculata 1	Foxtail Grass
*	*Setaria magna*	Foxtail Grass
*	*Solidago sempervirens*	Seaside Goldenrod
*	*Spartina alterniflora*	Smooth Cordgrass
*	*Spartina cynosuroides*	Giant Cordgrass
*	*Spartina patens*	Marsh-hay Cordgrass
*	*Sium suave*	Water Parsnip
*	*Typha angustifolia*	Narrow-leaved Cattail
	Typha domingensis 4	Southern Cattail
*	*Zizania aquatica*	Wild Rice
*	*Zizaniopsis miliacea*	Giant Cutgrass

1 Batson (1974)

2 Stalter (1973a)

3 Radford, et al. (1964)

4 Morgan (1974)

Table 3. Species list of characteristic plants in tidal freshwater marshes of South Carolina. Plants observed during the present study are marked with an asterisk (*). This table also includes marsh flora listed in other works (see footnotes).

	Scientific Name	Common Name
*	*Alnus serrulata*	Tag Alder
*	*Alternanthera philoxeroides*	Alligator-weed
*	*Amaranthus cannabinus*	Water Hemp
*	*Amorpha fruticosa*	False Indigo
*	*Aneilema keisak*	Asiatic Dayflower
	Arundo donax 1	Giant Reed
*	*Aster spp.*	Asters
*	*Azolla caroliniana*	Mosquito-fern
*	*Baccharis halimifolia*	Sea Myrtle
*	*Bidens spp.*	Beggar's-ticks
	Brasenia schreberi 2	Water-shield
*	*Carex spp.*	Sedges
*	*Carpinus caroliniana*	Ironwood
	Cassia fasciculata 1	Partridge Pea
*	*Cephalanthus occidentalis*	Button-bush
	Chenopodium album 1	Lamb's Quarters
	Cicuta maculata 3,4	Water Hemlock
	Cinna arundinacea 1,5	Wood Reed
*	*Cladium jamaicense*	Sawgrass
	Clematis crispa 3	Leather-flower
*	*Clethra alnifolia*	Sweet Pepperbush
*	*Cuscuta sp.*	Dodder
*	*Cyperus spp.*	Sedges
	Dichromena colorata 1,6	
	Echinochloa crusgalli 1	Millet
*	*Eleocharis spp.*	Spikerushes
	Elymus virginicus 5	Wildrye
*	*Eupatorium capillifolium*	Dog-fennel
*	*Egeria densa*	Water-weed
	Elodea spp. 2	Water-weeds
*	*Erianthus giganteus*	Plume Grass
*	*Eryngium aquaticum*	Marsh Eryngo
*	*Gleditsia aquatica*	Water Locust
	Hibiscus militaris 2	Halberd-leaved Marsh Mallow
*	*Hibiscus moscheutos*	Rose Mallow
*	*Hydrocotyle ranunculoides*	Pennywort
	Hydrocotyle spp. 2	Pennyworts
*	*Hymenocallis crassifolia*	Spider-lily
*	*Impatiens capensis*	Jewel-weed
*	*Iris virginica*	Blue Flag
*	*Juncus effusus*	Soft Rush
*	*Juncus spp.*	Rushes

Table 3. (Continued)

	Scientific Name	Common Name
*	*Lemna spp.*	Duckweeds
	Lilaeopsis chinensis 1,6	
*	*Limnobium spongia*	Frog's-bit
*	*Liquidambar styraciflua*	Sweet Gum
*	*Lobelia cardenalis*	Cardinal-flower
*	*Ludwigia spp.*	Water-primroses
	Lythrum lineare 1	Loosestrife
*	*Mikania scandens*	Climbing Hempweed
*	*Myrica cerifera*	Wax Myrtle
*	*Myriophyllum sp.*	Parrots-feather
*	*Nuphar luteum*	Yellow Pond-lily
*	*Nymphaea odorata*	White Water-lily
*	*Nyssa aquatica*	Tupelo Gum
*	*Nyssa sylvatica*	Black Gum
*	*Orontium aquaticum*	Golden-club
*	*Osmunda regalis*	Royal Fern
*	*Panicum spp.*	Panic Grasses
	Paspalum distichum 1	
*	*Peltandra virginica*	Arrow-arum
*	*Phragmites communis*	Reed
*	*Pluchea spp.*	Marsh Fleabanes
*	*Polygonum spp.*	Smartweeds
*	*Pontedaria cordata*	Pickerel-weed
*	*Potamogeton spp.*	Pondweeds
*	*Ptilimnium capillaceum*	Mock-bishopweed
	Rhynchospora sp. 1,5	Beakrush
*	*Rosa palustris*	Swamp Rose
*	*Rumex verticillatus*	Swamp Dock
*	*Sacciolepis striata*	
*	*Sagittaria spp.*	Arrowheads
*	*Salix caroliniana*	Swamp Willow
*	*Sambucus canadensis*	Elderberry
	Saururus cernuus 1,3	Lizard's-tail
*	*Scirpus americanus*	Common Threesquare
*	*Scirpus cyperinus*	Bulrush
*	*Scirpus olynei*	Olynei's Threesquare
*	*Scirpus robustus*	Salt Marsh Bulrush
*	*Scirpus validus*	Soft-stem Bulrush
*	*Scutellaria sp.*	Skullcap
*	*Senecio sp.*	Butterweed
	Setaria magna 1	Foxtail Grass
*	*Sium suave*	Water Parsnip
*	*Solidago sempervirens*	Seaside Goldenrod
*	*Spartina cynosuroides*	Giant Cordgrass
	Spirodela polyrrhiza 7	Duckweed

Table 3. (Continued)

	Scientific Name	Common Name
*	*Taxodium distichum*	Bald Cypress
	Tripsacum dactyloides 1	Gamma Grass
*	*Typha angustifolia*	Narrow-leaved Cattail
	Typha domingensis 2	Southern Cattail
	Typha glauca 2	Blue Cattail
*	*Typha latifolia*	Broadleaf Cattail
	Uniola latifolia 1	
	Uniola laxa 1	
*	*Utricularia sp.*	Bladderwort
	Verbesina occidentalis 1	
*	*Vernonia sp.*	Ironweed
*	*Viburnum dentatum*	
*	*Zizania aquatica*	Wild Rice
*	*Zizaniopsis miliacea*	Giant Cutgrass

1 Baden, et al. (1975)

2 Morgan (1974)

3 Stalter (1973a)

4 Conrad (1965)

5 Havel (1976)

6 Barry (1968)

7 Radford, et al.(1964)

Table 4. List of vascular plants common to South Carolina's brackish-water impoundments. Information obtained from field observations and questionnaire survey are indicated by an asterisk (*), while data from published literature are appropriately footnoted.

	Scientific Name	Common Name
*	*Alternanthera philoxeroides* 1	Alligator-weed
	Aster subulatus 1	Salt Marsh Aster
*	*Baccharis halimifolia* 1	Sea Myrtle
	Bacopa monnieri 1	Water-hyssop
*	*Borrichia frutescens*	Sea Ox-eye
*	*Ceratophyllum demersum* 1	Coontail
	Cladium jamaicense 1,2	Sawgrass
	Cyperus strigosus 3	Sedge
*	*Distichlis spicata* 1,3	Salt-grass
*	*Echinochloa walteri* 1	Salt Marsh Millet
*	*Eleocharis parvula* 1,2,3	Dwarf Spikerush
*	*Eupatorium capillifolium*	Dog-fennel
*	*Iva frutescens* 1,2	Marsh Elder
*	*Juncus roemerianus* 1,2	Black Needlerush
*	*Lemna spp.* 1	Duckweeds
*	*Leptochloa sp.*	Sprangletop
	Myrica cerifera 1	Wax Myrtle
	Najas guadalupensis 1	Bushy Pondweed
*	*Nymphaea mexicana* 1	Banana Water-lily
	Nymphaea odorata 1	White Water-lily
*	*Panicum spp.* 3	Panic Grasses
	Pluchea purpurascens 1,3	Marsh Fleabane
	Polygonum punctatum 1	Dotted Smartweed
*	*Polygonum sp.*	Smartweed
	Potamogeton berchtoldii 1	Narrow-leaved Pondweed
*	*Potamogeton pectinatus* 1	Sago Pondweed
*	*Ruppia maritima* 1,2,3	Widgeon-grass
	Salicornia europaea 3	Glasswort
	Scirpus americanus 1	Common Threesquare
	Scirpus olynei 2	Olynei's Threesquare
*	*Scirpus robustus* 1,2,3	Salt Marsh Bulrush
	Scirpus validus 1,3	Soft-stem Bulrush
*	*Sesbania exaltata*	Coffee-weed
*	*Setaria magna*	Giant Foxtail
*	*Spartina alterniflora* 1,2,3	Smooth Cordgrass
*	*Spartina cynosuroides* 2,3	Giant Cordgrass
*	*Spartina patens* 1,2,3	Marsh-hay Cordgrass
	Spirodela polyrhiza 1	Duckweed
*	*Typha angustifolia* 1,2,3	Narrow-leaved Cattail
*	*Typha domingensis* 1,2	Southern Cattail
	Typha glauca 1	Blue Cattail
*	*Typha latifolia* 1	Broadleaf Cattail

1 Baldwin (1956)

2 Morgan (1974)

3 Wilkinson (1970)

Table 5. List of vascular plants associated with freshwater impoundments in South Carolina. Information obtained from field investigations and questionnaire survey are marked with an asterisk (*), while plants appearing in available literature are properly footnoted.

	Scientific Name	Common Name
*	*Alternanthera philoxeroides* 1,2	Alligator-weed
*	*Aneilema keisak* 1,2,3,	Asiatic Dayflower
*	*Baccharis spp.* 2	Sea Myrtle
	Brasenia schreberi 1,2	Water-shield
	Cabomba caroliniana 1,2	Fanwort
	Cephalanthus occidentalis 1	Button-bush
	Ceratophyllum spp. 1,2,	Coontail
	Cyperus erythrorhizos 1	Redrooted Nutgrass
	Cyperus odoratus 2	Sedge
	Cyperus polystachos 2	Sedge
	Cyperus spp. 2	Sedges
*	*Echinochloa crusgalli* 1	Wild Millet
	Echinochloa spp. 2	Millets
	Egeria densa 1	Water-weed
	Eichhornia crassipes 1,2	Water-hyacinth
	Eleocharis baldwinii 1,2	Proliferating Spikerush
	Eleocharis equisetoides 1	Jointed Spikerush
	Eleocharis quadrangulata 1,2,3	Square-stem Spikerush
	Elodea spp. 1,2	Water-weeds
	Erianthus spp. 1	Plume Grasses
	Hydrochloa caroliniensis 3	Water Grass
	Hydrocotyle spp. 1,2	Pennyworts
	Juncus effusus 1,2	Soft Rush
	Lachnanthes caroliniana 1,2	Redroot
	Leersia oryzoides 1	Rice Cutgrass
	Leersia hexandra 1	Rice Cutgrass
	Lemna spp.	Duckweeds
	Limnobium spongia 2	Frog's-bit
	Ludwigia peploides 1	Water-primrose
	Melochia corchorifolia 1	Chocolateweed
	Myriophyllum heterophyllum 1	Watermilfoil
*	*Najas quadalupensis* 1	Bushy Pondweed
*	*Nelumbo lutea*	Lotus
	Nelumbo pentapetela 1	Lotus
	Nuphar advena 1	Spatterdock
*	*Nymphaea odorata* 1,2,3	White Water-lily

Table 5. (Continued)

	Scientific Name	Common Name
	Panicum bisulcatum 1	Asiatic Panic Grass
*	*Panicum dichotomiflorum* 1	Fall Panic Grass
	Panicum hemitomon 1	Maidencane
	Paspalum boscianum 1	Bullgrass
	Peltandra virginica 1,3	Arrow-arum
	Pluchea spp. 2	Marsh Fleabanes
*	*Polygonum arifolium* 3	Tearthumb
	Polygonum densiflorum 3	Southern Smartweed
*	*Polygonum hydropiperoides* 1,3	Swamp Smartweed
*	*Polygonum pensylvanicum* 1,3	Large-seed Smartweed
	Polygonum portoricense 1	Southern Smartweed
*	*Polygonum punctatum* 1	Dotted Smartweed
*	*Polygonum sagittatum*	Tearthumb
	Polygonum setaceum 1	Swamp Smartweed
*	*Polygonum spp.* 1,2,3	Smartweeds
	Pontedaria cordata 1,2	Pickerel-weed
	Potamogeton berchtoldii 2	Narrow-leaved Pondweed
	Potamogeton diversifolius 1	Variable-leaved Pondweed
	Potamogeton pectinatus 2	Sago Pondweed
	Sagittaria graminea 1	Delta Duck Potato
	Sagittaria latifolia 1	Duck Potato
	Sagittaria spp. 2	Arrowheads
	Salix spp. 1	Willows
	Scirpus validus 1,2,3	Soft-stem Bulrush
*	*Sesbania macrocarpa* 1	Seban
*	*Spartina cynosuroides*	Giant Cordgrass
	Spirodela polyrhiza 1	Duckweed
	Typha latifolia 1,2	Broadleaf Cattail
	Typha glauca 1,1	Blue Cattail
	Utricularia spp. 1,2	Bladderworts
	Zizania aquatica 1,2,3	Wild Rice
*	*Zizaniopsis miliacea* 1,2,3	Giant Cutgrass

1 Baldwin (1956)

2 Morgan (1974)

3 Conrad (1965)

Table 6. Acreage of each habitat type associated with South Carolina's eight coastal counties; state-wide totals are also designated.

COUNTY	LOW SALT MARSH (acres)	HIGH SALT MARSH (acres)	TOTAL SALT MARSH (acres)	BRACKISH WATER MARSH (acres)	FRESH WATER MARSH (acres)	COASTAL IMPOUND-MENTS (acres)	DIKED DISPOSAL AREAS (acres)	BEACHES (acres)	TOTAL TIDAL MARSH (acres)	TOTAL COASTAL MARSH* (acres)
Horry	1,697	152	1,849	312	727	75	51	1,567	2,888	2,963
Georgetown	11,100	1,178	12,278	8,262	23,764	11,940	775	1,959	44,304	56,244
Charleston	117,989	13,569	131,558	10,843	5,000	22,999	3,058	5,272	147,401	170,400
Berkeley	4,260	1,714	5,974	1,278	17,511	4,294	3,588	0	24,763	29,057
Dorchester	0	0	0	439	862	45	0	0	1,301	1,346
Colleton	19,285	1,186	20,471	10,170	8,608	20,596	216	321	39,249	59,845
Beaufort	109,694	18,964	128,658	1,357	1,523	4,278	0	1,582	131,538	135,816
Jasper	20,227	13,486	33,713	2,301	6,536	6,224	3,102	0	42,550	48,774
STATE TOTAL	284,252	50,249	334,501	34,962	64,531	70,451	10,790	10,701	433,994	504,445

*Includes coastal impoundment acreage.

Table 7. Percentages of inventoried categories in South Carolina's coastal counties; state percentages are also indicated. Figures enclosed by parentheses indicate percentages of different marsh types vs. each county's total coastal marshland acreage.

COUNTY	LOW SALT MARSH VS. TIDAL MARSH (%)	HIGH SALT MARSH VS. TIDAL MARSH (%)	SALT MARSH VS. TIDAL MARSH (%)	BRACKISH MARSH VS. TIDAL MARSH (%)	FRESH MARSH VS. TIDAL MARSH (%)	HIGH SALT MARSH VS. LOW SALT MARSH (%)	IMPOUNDMENTS VS. COASTAL MARSH (%)	DISPOSAL AREAS VS. COASTAL MARSH (%)
Horry	58.76 (57.27)	5.26 (5.13)	64.02 (62.40)	10.80 (10.53)	25.17 (24.54)	8.96	2.53	1.72
Georgetown	25.06 (19.74)	2.49 (2.09)	27.56 (21.83)	18.69 (14.69)	53.76 (42.25)	9.92	21.23	1.38
Charleston	80.05 (69.24)	9.21 (7.96)	89.25 (77.21)	7.36 (6.36)	3.39 (2.93)	11.50	13.50	1.79
Berkeley	17.20 (14.66)	6.92 (5.90)	24.12 (20.56)	5.16 (4.40)	70.71 (60.26)	40.23	14.78	12.35
Dorchester	0	0	0	33.74 (32.62)	66.26 (64.04)	0	3.34	0
Colleton	49.14 (32.22)	3.02 (1.98)	52.16 (34.21)	25.91 (16.99)	21.93 (14.38)	6.15	34.42	0.36
Beaufort	83.39 (80.77)	14.42 (13.96)	97.81 (94.73)	1.03 (1.00)	1.16 (1.12)	17.29	3.15	0
Jasper	47.54 (41.47)	31.69 (27.65)	79.23 (69.12)	5.41 (4.72)	15.36 (13.40)	66.67	12.76	6.36
TOTAL	65.50 (56.35)	11.58 (9.96)	77.08 (66.31)	8.06 (6.93)	14.87 (12.79)	17.68	13.97	2.14

Table 8. Acreage figures of each inventoried category for South Carolina's seventeen estuarine systems; also included are state-wide totals for each category.

SYSTEM NO.	SYSTEM NAME	LOW SALT MARSH (acres)	HIGH SALT MARSH (acres)	TOTAL SALT MARSH (acres)	BRACKISH WATER MARSH (acres)	FRESH WATER MARSH (acres)	COASTAL IMPOUND-MENTS (acres)	DIKED DISPOSAL AREAS (acres)	BEACH ZONE (acres)	TOTAL TIDAL MARSH (acres)	TOTAL COASTAL MARSH* (acres)
1	Little River	1,527	217	1,744	312	0	32	51	643	2,056	2,088
2	Myrtle Beach	61	14	75	0	0	43	0	859	75	118
3	Murrells Inlet	1,561	135	1,696	0	0	64	0	330	1,696	1,760
4	Pawleys Island	721	165	886	0	0	382	0	363	886	1,268
5	North Inlet	4,906	734	5,640	0	0	44	0	378	5,640	5,688
6	Winyah Bay	204	0	204	4,915	22,649	4,055	898	582	27,768	31,823
7	Santee River	17,174	673	17,847	6,524	3,964	19,837	224	577	28,335	48,172
8	Bulls Bay	45,697	2,742	48,439	164	0	2,493	1,005	2,336	48,603	51,096
9	Charleston Harbor	20,103	4,607	24,710	3,329	18,425	5,111	5,066	415	46,464	51,575
10	Stono-Kiawah	15,133	3,228	18,361	2,665	21	2,285	52	950	21,047	23,332
11	North Edisto	19,968	3,371	23,339	385	0	1,132	38	1,201	23,724	24,856
12	Saint Helena Sound	60,434	5,148	65,582	13,596	12,148	25,843	354	614	91,326	117,169
13	Fripp-Trenchards	17,890	3,880	21,770	0	0	72	0	650	21,770	21,842
14	Port Royal Sound	51,406	18,218	69,624	0	0	1,329	0	103	69,624	70,953
15	Calibogue Sound	13,437	3,046	16,483	0	0	113	0	693	16,483	16,596
16	New-Wright	13,917	2,071	15,988	3,072	1,786	1,688	0	7	20,846	22,534
17	Savannah	113	2,000	2,133	0	5,538	4,321	3,102	0	7,551	11,972
	TOTAL ALL SYSTEMS	284,252	50,249	334,501	34,962	64,531	70,451	10,790	10,701	433,994	504,445

*Includes coastal impoundment acreage.

Table 9. Percentages of inventoried categories in South Carolina's estuaries. Figures enclosed by parentheses indicate percentages of different marsh types vs. each system's total coastal marshland acreage.

SYSTEM NUMBER	SYSTEM NAME	LOW SALT MARSH VS. TIDAL MARSH (%)	HIGH SALT MARSH VS. TIDAL MARSH (%)	SALT MARSH VS. TIDAL MARSH (%)	BRACKISH MARSH VS. TIDAL MARSH (%)	FRESH MARSH VS. TIDAL MARSH (%)	HIGH SALT MARSH VS. LOW SALT MARSH (%)	IMPOUNDMENTS VS. COASTAL MARSH* (%)	DISPOSAL AREAS VS. COASTAL MARSH* (%)
1	Little River	74.27 (73.13)	10.55 (10.39)	84.82 (83.52)	15.18 (14.94)	0 (0)	14.21	1.53	2.44
2	Myrtle Beach	81.33 (51.69)	18.67 (11.86)	100.00 (63.56)	0 (0)	0 (0)	22.95	35.60	0
3	Murrells Inlet	92.04 (88.69)	7.96 (7.67)	100.00 (96.36)	0 (0)	0 (0)	8.65	3.64	0
4	Pawleys Island	81.38 (56.86)	18.62 (13.01)	100.00 (69.87)	0 (0)	0 (0)	22.88	30.13	0
5	North Inlet	86.99 (86.25)	13.01 (12.90)	100.00 (99.16)	0 (0)	0 (0)	14.96	0.77	0
6	Winyah Bay	0.73 (0.64)	0 (0)	0.73 (0.64)	17.70 (15.44)	81.57 (71.17)	0	12.74	2.82
7	Santee River	60.61 (35.65)	2.38 (1.40)	62.99 (37.05)	23.02 (13.54)	13.99 (8.23)	3.92	41.18	0.47
8	Bulls Bay	94.02 (89.43)	5.64 (5.37)	99.66 (94.80)	0.34 (0.32)	0 (0)	6.00	4.88	1.97
9	Charleston Harbor	43.27 (38.98)	9.92 (8.93)	53.18 (47.91)	7.16 (6.45)	39.65 (35.72)	22.92	9.91	9.82
10	Stono-Kiawah	71.90 (64.86)	15.34 (13.84)	87.24 (78.69)	12.66 (11.42)	1.00 (0.09)	21.33	9.79	0.22
11	North Edisto	84.17 (80.33)	14.21 (13.56)	98.38 (93.90)	1.62 (1.55)	0 (0)	16.88	4.55	0.15
12	Saint Helena Sound	66.17 (51.58)	5.64 (4.39)	71.81 (55.97)	14.89 (11.60)	13.30 (10.37)	8.52	22.06	0.30
13	Fripp-Trenchard	82.18 (81.91)	17.82 (17.76)	100.00 (99.67)	0 (0)	0 (0)	21.69	0.33	0
14	Port Royal Sound	73.83 (72.45)	26.17 (25.68)	100.00 (98.13)	0 (0)	0 (0)	35.44	18.73	0
15	Calibogue Sound	81.52 (80.97)	18.48 (18.35)	100.00 (99.32)	0 (0)	0 (0)	22.67	0.68	0
16	New-Wright Rivers	66.76 (61.76)	9.93 (9.19)	76.70 (70.95)	14.74 (13.63)	8.57 (7.93)	14.88	7.49	0
17	Savannah River	1.48 (0.94)	26.14 (16.71)	27.62 (17.82)	0 (0)	72.38 (46.26)		36.09	25.91
	TOTAL ALL SYSTEMS	65.50 (56.35)	11.58 (9.96)	77.08 (66.31)	8.06 (6.93)	14.87 (12.79)	17.68	13.97	2.15