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SPECIAL FEATURE
THE FIRST HALF-CENTURY
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CHANGES IN VEGETATIVE TYPES IN LOUISIANA COASTAL MARSHES OVER A 10-YEAR PERIOD

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The total area of marshland and associated water bodies of the Louisiana coastal region encompassed 6,581 square miles (mi²) in 1968 (1). That marshland borders the entire coastline of the state and extends inland 15 to 50 miles. Penfound and Hathaway (2) studied marsh plant communities of southeastern Louisiana and identified four vegetative types: saline, brackish, slightly fresh (intermediate) and fresh; they described the plant species composition of each type. The vegetative types occur in bands generally paralleling the shoreline of the Gulf of Mexico (1).

The saline vegetative type lies adjacent to the Gulf, major bays and sounds and is subjected to drastic tidal fluctuations and highly saline water (water salinity: \bar{x} =18.1 ppt). The brackish type is more inland than saline marsh and has slightly lower water salinity (\bar{x} =8.2 ppt) and less tidal fluctuation. The fresh type lies farthest inland than all other marsh types and is in areas relatively free of salt water and tidal action. The intermediate vegetative type is located between brackish and fresh types and is slightly brackish (\bar{x} =3.3 ppt). Intermediate type is comprised of certain plants that also commonly occur in the fresh type and others that commonly occur in the brackish type (1).

Marsh plants become established and grow within a specific range of water salinities (2). Species occupying a particular area will usually persist as long as water salinities remain within the desired range. Whenever water salinities in an area change, plant species in the area unable to tolerate the newly established condition will die. Other plant species, tolerant to the newly established condition, will then persist and/or invade the area.

Each vegetative type is comprised of species having similar water salinity requirements (2). Therefore, a long-term change in water salinity within a particular marsh area is usually followed by a change from one vegetative type to another within the area.

In 1968, a vegetative type map (3) of the Louisiana coastal marshes was prepared showing the boundary of each type. Plant species and associations described by Penfound and Hathaway (2) were used to identify vegetative types. In order to determine changes in vegetative types in the Louisiana coastal marshes over a 10-year period, the vegetative types were again

TABLE 1. Net change in the size of vegetative type in Louisiana coastal marsh from 1968 to 1978.

| Vegetative types | Size of type ¹ (sq. mi) | | Change | |
|------------------|------------------------------------|-------|--------|---------|
| | 1968 ² | 1978 | Sq. mi | Percent |
| Saline | 1,455 | 1,585 | +130 | +8.9 |
| Brackish | 2,023 | 2,060 | +37 | +1.8 |
| Intermediate | 1,072 | 1,044 | -28 | -2.6 |
| Fresh | 2,031 | 1,892 | -139 | -6.8 |

¹ Includes natural marshes and associated water bodies.

² Data from Chabreck (1970) (1).

mapped in 1978 (4) and were compared with the 1968 survey by using a map overlay process. The size of the vegetative types and areas where vegetation types had changed to less saline or more saline conditions was computed using a planimeter.

The comparison of vegetative types disclosed that 1,440 mi² (21.9%) of the coastal marshland had changed in the 10-year period. This included a 13.7% change to more saline vegetative types and an 8.2% change to less saline types for a net increase to more saline conditions on 5.6% of the total marsh area or 367 mi². The greatest net change in area was in the fresh vegetative type, which decreased 139 mi² (6.8%) in size (Table 1). In contrast, the saline vegetative type increased 130 mi² (8.9%) in size, and the brackish type increased 37 mi² (1.8%). The intermediate type decreased 28 mi² (2.6%) in size. In 1968, the fresh vegetative type contained 2,031 mi² and was the largest type. The brackish vegetative type was only slightly smaller and contained 2,023 mi². However, in 1978 the brackish vegetative type contained 2,060 mi² and the fresh type occupied 1,892 mi².

The brackish and intermediate vegetative types are actually transitional zones between the saline and fresh vegetative types. As salt water moved farther inland during the 10-year interval, the saline type expanded in size and caused the transitional zones (brackish and intermediate types) to move farther inland with very little alteration in size. Consequently, the inland advancement of the saline vegetative type was done mostly at the expense of the fresh vegetative type.

The coastal region of Louisiana was previously subdivided into 9 hydrologic units for descriptive purposes with each unit generally encompassing a major drainage basin (5; Fig. 1).

Only a small net change in vegetative types was noted in marshes east of the Mississippi River (Hydrologic Units I and II; Table 2). Although the total change in Unit I was 113.9 mi² and in Unit II was 71.6 mi², the net change in area in each unit accounted for only 1.2% of the total marsh. Both hydrologic units combined moved toward less saline conditions on 102.1 mi² over the 10-year period. A major factor in reducing water salinities was the opening of the Bonnet Carree Spillway in 1973, which moved vast quantities of the Mississippi River flood waters through the area. Neverthe-

