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ENERGY FLOW IN THE SALT MARSH ECOSYSTEM OF GEORGIA[1]

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INTRODUCTION

Along the coast of the United States from northern Florida to North Carolina runs a band of salt marsh bordered on the east by a series of sea islands and on the west by the mainland. The Marine Institute of the University of Georgia was established on one of these islands, Sapelo, and has tended to focus attention on the marsh. Several studies have provided data from which it is now possible to construct a picture of the energy flow through the organisms of this marsh.

Reasonably detailed studies of the energy flow, or trophic level production have been limited to a few natural ecosystems. These include Cedar Bog Lake, reported in the pioneer work of Lindeman (1942), and 2 fresh-water springs (Odum 1957, Teal 1958). There have been a number of studies of the energetics of laboratory populations (Richman 1958, Slobodkin 1959), and some theoretical comments upon energetics of populations and ecosystems (e.g. Patten 1959, Slobodkin 1960), but work on even the broad details of energy flow in natural ecosystems has lagged.

The present paper draws heavily upon the work of others. The authors are cited in the appropriate places but I wish here to express my appreciation for their cooperation.

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The physical and chemical features of the marsh have been described (Teal 1958, Teal & Kanwisher 1961) but I will briefly define 5 regions into which the marsh was divided in many of these studies (Figure 1).

Creek bank: muddy and/or sandy banks of tidal creeks between low water and the beginning of *Spartina* growth.

Streamside marsh: an area 1-3 m wide of closely spaced, tall *Spartina* located just above the bare creekbank.

Levee marsh: *Spartina* of intermediate height spacing atop the natural levees bordering the creeks.

Short-*Spartina* marsh: flat areas behind the levees with short, widely spaced *Spartina*.

Salicornia marsh: sandy areas near land where plants other than *Spartina* occur, among which *Salicornia* is conspicuous.

The relative areas of these various marsh types were measured on aerial photographs (Table V) to enable calculation of averages for the marsh as a whole.

The marsh fauna

Animals living in the marsh must be able to survive or avoid the great changes in salinity, temperature and exposure. Salinity of water flooding the marshes varies from 20 to 30 o/oo with values as low as 12 o/oo recorded in heads of creeks just after heavy rains. Salinity of water