

POPULATION CHANGES OF THE APPLE SNAIL, *POMACEA PALUDOSA*,  
IN THE SOUTHERN EVERGLADES

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## ABSTRACT

A six-year program of monthly sampling of aquatic animals in the southern Everglades, Florida, provided information on population changes of *Pomacea paludosa* in relation to two water regimes — fluctuating water levels with seasonal drought and continuously high water levels. Higher population levels were attained under more permanent water conditions. However the average size of snails was smaller indicating increased juvenile recruitment. Larger snails apparently survived drought better than did smaller snails.

The apple snail, *Pomacea paludosa* (Say), occurs in the extreme southeastern United States in southern Alabama, southern Georgia and throughout the Florida peninsula. It is especially common in the freshwater wetlands of southern Florida where it forms an important intermediate link in the aquatic food chain. The endangered Everglade kite (*Rostrhamus sociabilis*) is almost completely dependent on the snail for food (Strieglitz and Thomson 1967). The limpkin (*Aramus guarauna*) feeds heavily on *Pomacea* (Harper 1936, 1941; Cottam 1941), and the snail forms an important part of the diet of more euryphagous avian predators such as the boat-tailed grackle (*Cassidix mexicanus*) (Snyder and Snyder 1969) and the white ibis (*Eudocimus albus*) (Kushlan in prep.). Young alligators (*Alligator mississippiensis*), snapping turtles (*Chelydra serpentina*) and other aquatic predators also consume this snail.

Despite its ecological importance and recent reduction in numbers due to habitat alteration (Heard 1970, U.S. Department Interior 1973:120), little is known about the ecology of this species. It is most active at night and is capable of aestivation by burrowing in the mud when marshes begin to dry. Survival during such periods is evidenced by the appearance of egg clusters soon after water levels rise. Survival through drought is of critical importance in the marshes of the southern Everglades which typically experience a seasonal fluctuation

of water level and are usually without surface water during the latter part of the dry season. In some years which do not follow the typical pattern, water remains above ground level throughout the year.

A program of quantitative sampling of aquatic organisms from 1966 through 1972 provided information on the abundance and size distribution of *Pomacea* in the southern Everglades of Everglades National Park. The purpose of this paper is to describe changes in the population of *Pomacea paludosa* over the 6-year study period especially in relation to population differences between years of typically fluctuating water conditions and years of extended high water levels. In as far as seasonal fluctuation or stable high water conditions are representative of snail habitats in other areas of southern Florida, implications can be drawn concerning the role of water levels in other parts of the snail's range.

## METHODS

Data discussed in this paper were collected as part of a more extensive program to monitor populations of aquatic organisms in the southern Everglades conducted by the U.S. Geological Survey for the U.S. National Park Service. Samples were taken with ten 4.5-m<sup>2</sup> pull-up traps described by Higer and Kolipinski (1967). Traps were located in sawgrass marsh (*Cladium jamaicense*) and mixed-marsh prairie composed of several species of herbaceous plants (*Eleocharis cellulosa*, *Rynchospora tracyi*). Traps

were generally used on two consecutive nights each month. These samples generated monthly averages for the number of snails per square meter, the wet weight biomass (including shell) of snails per square meter, and the average weight per snail. In order to take into consideration any seasonal changes in snail population, an average value of each parameter was calculated for each hydrologic year which runs from the beginning of the rainy season in June to the end of the dry season the following May.

### RESULTS AND DISCUSSION

Fig. 1 shows how water level fluctuated in the southern Everglades from 1966 through 1972. The typical water level pattern characterized by low water levels during the dry season, occurred in the hydrologic years of 1966-67, 1967-68, 1970-71 and 1971-72. From 1968 to 1970 water levels were continuously high. Fig. 1 also shows the average abundance, biomass and size of snails each year. The data from the hydrologic years of 1968-69, 1969-70 and 1970-71 reflect changes in the snail population coincident with prolonged high water. It is apparent that both abundance and biomass increased during the high water and then declined when the typical pattern was re-established after 1971. The average size of snail decreased during the high water period probably due to higher production and survival of young snails. Average size increased during 1971-72 suggesting that larger snails survived the dry period of 1970-71 better than did smaller snails and perhaps that juvenile recruitment declined.

In general, the results suggest that higher population levels are attained under more permanent water conditions in contrast to conditions in which surface water reaches low levels in the dry season. Apparently there is a differential survival of large snails through dry periods, and greater juvenile recruitment in constantly high water. As a result, the average size of snails is greater under conditions of fluctuating water levels.

It is not unlikely that these general relations hold in ecologically similar areas elsewhere in southern Florida. For example canal-edge marsh-

es, water impoundment marshes, and lake-edge marshes may have higher populations than the Everglades. It is not surprising therefore that these are preferred foraging habitats of the Everglade kite, limpkin and grackle. Limpkins and white ibis also feed on snails throughout the Everglades especially when water levels are low. However canal-edge habitats, such as those observed by Snyder and Snyder (1969), probably

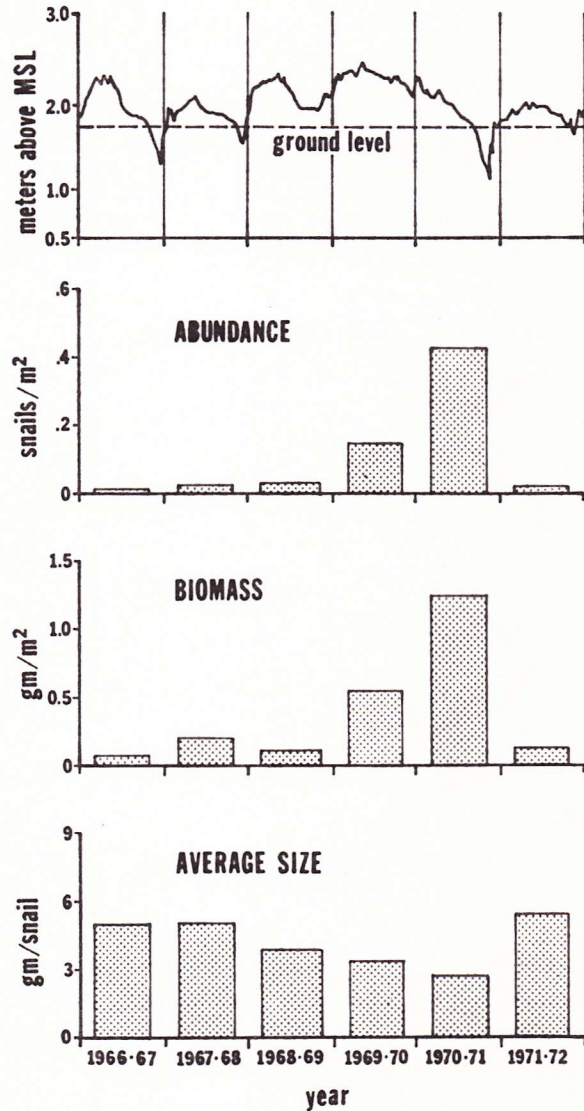


FIG. 1. Changes in water level and in the abundance, biomass and average size of snails in the southern Everglades from 1966 to 1972.

combine high snail densities with ready availability to avian predators.

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