

# SEASONAL DISTRIBUTION OF MANATEES IN THE EVERGLADES ESTUARY

James A. Kushlan

Department of Biological Sciences, East Texas State University,  
Commerce, TX 75428

*Abstract: Manatees occur in the Everglades estuaries of extreme southern Florida year-round. More were observed in winter than summer, but the winter increase was less than expected suggesting the Everglades estuaries may be less important as a wintering ground to northern Florida manatees than previously thought. The monthly consistence of census results, however, suggest that the estuaries provide a winter refugium for the local southern Florida population. Manatees use the available habitat differentially, avoiding Florida Bay and, in winter, the open Gulf of Mexico.*

The West Indian manatee (*Trichechus manatus*) occurs throughout much of the riverine and coastal areas of the Florida peninsula (Moore, 1951; Layne, 1965; Hartman, 1974; Irvine and Campbell, 1978). Their winter status and biology have become fairly well understood because they concentrate in sites of warm water during the winter months, especially in the thermally stable streams and springs in northern Florida. The Everglades estuaries of the Gulf Coast and Florida Bay represent the southernmost potential wintering ground for Gulf Coast manatees. Southerly shifts of manatees in winter from northern Florida were predicted by Moore (1951) and Hartman (1974). Three decades ago, Moore (1951a, b) suggested these coastal areas were a principal winter habitat. Irvine and Campbell (1978) called the Everglades estuary a non-focused warm water refuge area. However, based on observer reports, Moore (1951 a) was unable to detect a decrease in manatee numbers in the Everglades estuaries during spring in what should have been the period of return migration. Thus the actual role of the Everglades estuaries as a winter refugium for Florida manatees remains to be clarified.

Several surveys for manatees have been undertaken in southern Florida that included the Everglades estuary. Hartman (1974) conducted a summer survey, and Irvine and Campbell (1978) flew a winter survey. The first repetitive aerial surveys were conducted by Odell (1976) over nearly a three year period in 1973-76, an effort that provided information on distribution and herd size. Because the surveys were added on to surveys for other purposes, in only one year was it possible to fly transects designed for marine mammal observation. Irvine et al. (1981, 1982) flew four surveys from July through November 1979 involving observation of all shorelines and rivers. Because of the importance of obtaining comparable information on the seasonal abundance and distribution of manatees over a full year in this potentially critical area, I undertook censuses for an annual cycle in 1979-1980. In this note I report on seasonal changes in the distribution of manatee in the estuaries of the Everglades.

**METHODS** - For consistency we followed the protocol initiated by Irvine et al. (1981). We flew at an elevation of 150 m and a flight speed of 160 km/h. Our flight route covered all of the shoreline, bays, and rivers of the southwest Florida coast from the inland reaches of headwaters streams to one km into the Gulf of Mexico. It ranged from Everglades City to Flamingo, essentially the "Collier County" portion of the Irvine et al. survey. In addition to Irvine's coverage, we also completely surveyed Florida Bay. Error for Irvine et al.'s methodology is unknown; but consistency of method was attempted. Data should be considered a relative index not a population estimate.

**RESULTS** - An average of 44.8 (sd=19.31) manatees was counted each month. The most were observed in December and the fewest in April (Table 1). As a result more manatees were observed in winter (Sep- Feb) than in summer ( $X^2 = 46.9, p < 0.005$ ), and the monthly observations were not uniformly distributed across months, particularly owing to the high count in December ( $X^2 = p < 0.05$ ). Even so, excepting December the numbers observed in winter and summer were generally similar, especially considering uncertainty inherent in aerial counts.

TABLE 1.-- Total number of manatees and number of calves (in parentheses) observed in the Everglades estuary, 1979- 1980.

Area	1979					1980						
	Jul	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Jun	Jul	Aug
Whitewater Bay				93(7)	45(1)	22(4)	20(6)	30(2)	9	14(2)	24(5)	
Inland bays and rivers				0	0	8(1)	3	0	16(2)	14(5)	13(1)	
Gulf of Mexico				0	0	0	0	0	11(1)	10		
Total	41	51(2)	64(1)	49	93(7)	45(1)	30(5)	23(6)	30(2)	25(2)	39(8)	47(6)

Manatees used the several areas of the Everglades estuary differentially. During the surveys, 257 observations were made in Whitewater Bay, contrasted with 55 in the inland waters of the Gulf of Mexico coast, and only 21 in the Gulf of Mexico itself. No manatees were observed in Florida Bay. These results confirm that Whitewater Bay constitutes a principal manatee habitat in the Everglades estuary. We found manatees in the offshore Gulf of Mexico only in summer. Manatees seem to be less abundant in the northern part of the census area in winter than in summer, suggesting that local population shifts toward Whitewater Bay in winter, especially in December.

Joseph C. Moore was the first to attempt to document manatee sightings in the Everglades estuary. Based on the files he began accumulating at the then new Everglades National Park, I was able to evaluate the recorded distribution of manatees over the past several decades. Manatees have been observed throughout the area since the 1930s. However, the general distribution of manatees was similar throughout the historical record, at least within the resolution of these available data. It is also possible to compare manatee sightings over the two historical periods with the census period. There seems to be no demonstrable difference in the historic and recent use of the estuary by manatees.

Discussion- My initial hypothesis in initiating a census of the Everglades estuary for manatees was that the southward migration would result in a substantial increase in manatees in winter; and, if so, they might play a role in the overall conservation of the Florida population. While there was some month-to-month variation owing no doubt to responses to water and air temperatures, it appears that the Everglades estuary provides a year-round habitat for manatees. Odell's (1976) earlier data showed a more substantial seasonal change than I observed but found more manatees in summer than in winter. Whether there is year-to-year variability based on differences in the timing or extent of migration timing is not addressed by this one year census.

The results in December reflect a shift from the Gulf of Mexico to protected, and likely warmer, inland waters in the cold of winter, especially into Whitewater Bay. In December, the manatees were crowded into a few inland sites, similar to their use of streams further north. So use of the Everglades estuaries is not always "non-focused" (Irvine and Campbell (1978)). The results show that the Everglades estuaries do provide a winter refugium for manatees from cold sea conditions. Despite such shifts, mortality from cold does occur in some years, as evidenced by the death of several animals associated with cold weather in 1980-81 (O'Shea et al. 1985). However, the overall month to month consistency of these data do not suggest extensive winter immigration into the estuary by manatees from further north in Florida so it is likely that the estuary serves as a refugium for the local population.

Manatees use the coastal environment differentially, a pattern that occurs year-round. Florida Bay is lightly used. Moore (1951 b) noting that Florida Bay was fished intensively and implied that previous killing of manatees might have reduced numbers there, but that remains unlikely today after decades of national park protection. Hartman (1974) concluded that a lack of fresh water limited manatee occurrence in Florida Bay. However there is freshwater available in coastal streams and inland lakes that they connect. An eastern embayment is named Manatee Bay and was a fresh water source before drainage. Fresh water flows into Florida Bay have been reduced by water management and development. One further difference with the Gulf Coast is that the stream passages are short and the lakes shallow.

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