MANAGEMENT OF FRUIT BATS ON YAP, CAROLINE ISLANDS: PAST AND FUTURE CHALLENGES

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Abstract: Increased hunting pressure for export, commencing about 1975, resulted in a serious decline in the populations of the Yap fruit bat (*Pteropus mariannus yapensis*). Factors causing this pressure included an export market in the U.S. Territory of Guam and in Saipan, Commonwealth of the Northern Mariana Islands and increased use of firearms. Research on Yap fruit bat populations generated legislative support for hunting regulations and gun control. As a result, bat populations have increased two to five-fold between 1981 and 1986. Biological, social, and economic considerations pose a challenge for sustainable management of Yap State's fruit bats in the future.

Yap State lies in the Western Pacific and includes a group of high islands with a maximum elevation of 174 m and totaling about 100.8 km2, and 15 low outer islands totaling about 19.2 km2. It is one of the four Federated States of Micronesia, an emerging Pacific nation associated with the United States. Yap State's only indigenous mammals are fruit bats found on the high islands of Yap (*Pteropus mariannus yapensis*), and Ulithi atoll (*Pteropus mariannus ulithiensis*) (Falanruw, in press).

PAST USE OF FRUIT BATS

In the past, when Yap's human population was high, use of natural resources was culturally regulated (Falanruw 1982). Groups of people living more inland and having limited or no access to marine resources hunted and ate fruit bats (maga'lau). Harvesting of fruit bats was largely done with nets (Fig. 1). Flight patterns of fruit bats were observed and platforms erected near feeding trees. Bats were then netted in the evening when they came to feed. Bats were not netted from their roosts (tamabu), for fear of disturbing the colony. In this way, the colony remained in the area so that flight paths could be observed and netting locations determined.

Yap's human population declined considerably from the time that outsiders first settled on the island in about 1869, through the period of Japanese occupation (Useem 1946), reducing the number of people using the fruit bat resource. The availability of imported foods reduced the pressure further. By 1965, fruit bat populations were high and bats were a common sight at dusk and dawn even in open savanna areas where they fed on the ripe fruit of *Pandanus tectorius*.

THE FRUIT BAT TRADE

Yap's Fruit Bat

Although consumption on Yap is limited, fruit bats are sought as a specialty of the Chamorro cuisine on Guam and Saipan. After the decline of fruit bat populations and imposition of hunting restrictions on Guam, Chamorros living on Yap began to export bats from Yap to Guam, initially for home consumption, and then for sale in small stores.

The numbers of bats estimated, on the basis of import permit requests, to have been exported from Yap to Guam increased from a few in 1974 to over 7,288 in 1980 (Wiles and Payne 1986), and large numbers in the first five months of 1981 (Falanruw, in press). Initially, the export market was filled by shooting bats where their flight paths crossed roads, and in savannas. By 1979, bats were becoming wary and more difficult to harvest. When business became more commercialized and prices increased, a shift to shooting fruit bats at roost sites occurred. Exports increased and included many female bats and their young.

In 1975 the Yap legislature passed a law limiting the hunting of bats to October through December. This hunting season was ignored, and export records show more bats were exported during the closed season than during the open season (Falanruw, in press). A number of factors caused a departure from the traditional pattern of use of fruit bats. A resource traditionally utilized by a less powerful class of Yap's society acquired a high monetary value. Simultaneously, the public road system was expanded, increasing access to private lands. This resulted in the use of fruit bats by a broader group including individuals who were not the traditional users of fruit bats, and non-Yapese. The resulting unlimited exploitation was a new cultural phenomenon and rapidly reduced the fruit bat population, which had been increasing prior to 1965.

In May 1981, fruit bats became protected by law throughout the year, and accompanying legislation outlawed the possession and use of firearms on Yap. The decrease in firearms and enforcement of Yap's law by Guam Customs officials brought an end to the major trade in fruit bats from Yap.

Between June 1979 and June 1981, 21 roosting sites were located most of which were small, frequently disturbed and difficult to count. Roost counts ranged from 7 animals to 62 and 72 bats in the two largest roosts found. The latter colony was the largest found in 1984 when some 600 bats were counted as they returned to roost at dawn (Engbring 1985). Surveys in 1984 and 1986 located some 26 roosting areas and by 1986 the fruit bat population of

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