

Modeling managed monkey populations: sustainable harvest of longtailed macaques on a natural habitat island

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Abstract

Computer simulation of population dynamics can be useful in managing harvested populations of monkeys on islands. Between 1988 and 1991, 420 adult female and 58 adult male simian retrovirus-free *Macaca fascicularis* were released onto Tinjil Island, Indonesia, to provide the nucleus for a free-ranging breeding colony. Natural habitat breeding facilities are excellent alternatives to wild trapping and compound breeding, maximizing the health and well-being of animals destined for essential biomedical research. To avoid a population crash, the number of offspring that can be harvested annually must be based on life table characteristics such as age-specific natality and mortality. We used a modified Leslie matrix to model changes in female population size over 26 years. First, we assumed that all 420 females were released simultaneously and varied the annual birth rate (50%, 60%, 70%), survival rate, and number of offspring harvested per year.

Assuming high survival and birth rates vs. low rates, about four times as many female offspring could be harvested annually from a stable population (87 vs. 20 offspring). Terminal population size after 26 years did not differ much across rates modeled (568-696 females). Second, we modeled the number of females actually released (including the recent addition of 42 new female breeders) and harvested (averaging 49 annually 1991-1994), and projected the population through 2014. This indicated that threshold harvest rates and terminal population sizes increased considerably over the first model, assuming intermediate (78 harvested, 952 females) and high (152 harvested, 1,331 females) rates of survivorship and natality, but were unchanged assuming low rates (20 harvested, 559 females). A review of the literature and field observations on Tinjil suggest that actual birth and survival rates resemble the intermediate values modeled.

If so, the present density on the island, projected to be ~215 males and females per square kilometer, is approaching carrying capacity. The high values are realistic upper limits. If

actual survivorship and birth rates are at the high end of those modeled, the island's population may be on the verge of rapid expansion, requiring increased harvest and provisioning. © 1996 Wiley-Liss, Inc.

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Keywords

Macaca fascicularis, • demography • conservation • island breeding