TABLE 9.—POPULATION ESTIMATES AND DATA FOR THE COMMERCIAL HARVEST OF EASTERN GRAY KANGAROOS FROM QUEENSLAND—Continued

	Population estimate (mean +/- SE)	Commercial harvest quota	Commercial kill	Percent males in kill
1994		1,250,000		

<sup>1</sup> Fixed Wing estimates have been corrected using Caughley Correction Factors for Habitat but have not been corrected for temperature. Caughley correction factors for gray kangaroos are known to give very conservative estimates of total population numbers. They are maintained in the publicly published figures to enable comparisons in population trends with the earlier published data for gray kangaroos until an agreed revised set of correction factors is published for the species.

The total national commercial quota in 1992 for red and gray kangaroos in the commercial utilization areas was 4.942.000, which was about 19 percent of the estimated 1992 red and gray kangaroo population of 26.2 million (using the estimates developed for Queensland from 1992 helicopter counts, for New South Wales and South Australia from 1992 FW surveys, and for Western Australia from 1990 FW surveys). The 1992 commercial kill was 2,676,000, which was 54 percent of the commercial quota and about 10 percent of the presumed 1992 population estimate. The total national commercial quota in 1993 for red and gray kangaroos was 4,517,600 which was about 21 percent of the estimated 1993 red and gray kangaroo population of 21.4 million in the CUAs (data from 1993 helicopter counts in Queensland. and 1993 FW counts in South Australia, New South Wales, and Western Australia). The 1993 commercial kill was 2.8 million which was 62 percent of the 1993 commercial quota and 13 percent of the 1993 population estimate. The 1994 national commercial quota is set at 3.88 million, which is about 18 percent of the 1993 population estimate. An additional 153,000 red and gray kangaroos were reported killed during 1993 for damage mitigation purposes outside the commercial harvest quotas. This damage mitigation kill was an unknown small percent of the continental population of red and gray kangaroos (153,000 equals about 0.7 percent of the 1993 presumed population of red and gray kangaroos within the CUAs which comprise a fraction of the continental land area).

Queensland has received criticism in past years for its harvest management system. That system has been substantially modified in recent years (QNPWS 1992). Queensland now establishes its kangaroo harvest quota in the following manner. Survey data from aerial and ground surveys are utilized to provide population estimates. A

conservative possible harvest quota is formulated from this mid-winter survey information. This statewide potential quota for the state, by management areas, is reviewed by the Area Director, Regional Director, and the Manager-Wildlife Management, Queensland. The potential quota is then passed before the Macropod Management Committee (a State Ministerial committee) to receive public input from the rural community, pastoralists, graziers, shooters, dealers, the Department of Primary Industries, conservation groups, and politicians whose constituents are impacted by kangaroos. The committee advises on the acceptability of the proposed quota and may make recommendations about the quota. The proposed quota and the comments are passed to the Queensland Minister, who determines the final quota to be submitted to the Commonwealth for approval. Commonwealth approval may be gained after the proposal has been reviewed by ANCA and the Commonwealth Minister's Scientific Advisory Committee on Kangaroos.

The CUA in South Australia occurs on about 282,000 sq km of pastoral landscape, which comprises about 28 percent of the State's land area. The harvest quota in South Australia is based on the winter aerial survey of the CUA and is developed for each of 10 kangaroo management zones within the CUA. The commercial quota is set as a best estimate of the maximum number of each species that may need to be killed to contain deleterious effects on stock, crops, or property without jeopardizing the viability of kangaroo populations (SANPWS 1991). The proposed quota has to be approved by the appropriate South Australian Minister before its submission to the Commonwealth. The Commonwealth Minister subjects the proposed quota to review by ANCA and the Minister's Scientific Advisory Committee on Kangaroos before any implementation of the kangaroo management program can occur.

The CUA covers the western twothirds of New South Wales. The harvest quota in the State is based on population estimates from the most recent annual surveys, recent trends in population numbers and distribution, harvest monitoring data, information about nonharvest mortality and noncommercial harvest mortality, climatic conditions over at least the past year, current land use, the proportion of the population not subject to damage mitigation culling, and the demand for agricultural damage mitigation culling (NSWNPWS 1991a). The proposed quota is subject to peer review by the NSW Kangaroo Management Review Committee and must be approved by the appropriate New South Wales Minister before its submission to the Commonwealth. The quota must be approved by the Commonwealth Minister, after its review by ANCA and the Minister's Scientific Advisory Committee on Kangaroos, before the harvest program can be implemented.

The CUA may total about one-half of Western Australia. Parks, reserves, and State forest lands occupied by and providing protective status to western gray and/or red kangaroos may total 100,000 sq km within this vast state. The harvest quota in Western Australia is conservatively established on the basis of current population trends. seasonal conditions, the review of previous annual harvests, the proportion of the habitat and population not subject to harvesting, current land use practices, and the significance of the take outside the commercial quota (WADCLM 1991a and 1991b). The proposed quota is subject to peer review by the Kangaroo Management Advisory Committee and must be approved by the appropriate Western Australian Minister before being forwarded to the Commonwealth Government. The Commonwealth Minister (after review by ANCA and the Minister's Scientific

<sup>&</sup>lt;sup>2</sup> ANCA does not have this data for 1991. <sup>3</sup> Estimate received from the 1992 Quota application.

<sup>&</sup>lt;sup>4</sup> Estimate received from the 1993 Quota application.

<sup>&</sup>lt;sup>5</sup> Estimate received from the 1994 Quota application.