South Wales (NSW) and Queensland that retain a drought-declared designation as of March 1, 1993. These enclosures are presented as evidence that drought continues to devastate Australia and kangaroo populations. A February 5, 1993, letter from John Eveleigh, Assistant Regional Manager, Western Region, New South Wales, to the Director, Australian National Parks and Wildlife Service (ANPWS), clearly indicates that economic factors as well as rainfall totals determine the declaration of drought status by the Department of Agriculture.

Ån El Niño-related drought occurred in parts of Australia during 1991-2 and affected some populations of the three kangaroo species. Rainfall deficiencies from March through October 1991 occurred throughout nearly all of Queensland, in northcentral and northeastern New South Wales, some portions of the Northern Territory and in extreme northeastern Western Australia. Rains during November 1991 through January 1992 essentially reduced the rainfall-deficient area to the eastern two-thirds of Queensland, the northern portion of the Northern Territory and northern Western Australia. Additional rains during February 1992 further reduced the rainfall-deficient areas to southcentral Queensland and the northeastern coastal areas of Queensland, the northern portion of the Northern Territory and northern Western Australia. The rainfall-deficient area, by May 1992, was further reduced to southcentral Queensland, northcentral New South Wales, and the central and northern coasts of Queensland. The rainfall-deficient area for the 17-month period from March 1, 1991 to July 31, 1992, occurred in southcentral Queensland and extreme northcentral New South Wales. Much of this southcentral Queensland and northcentral New South Wales area experienced severe rainfall deficiencies and two small localized portions of this area recorded record rainfall deficiencies during this 17-month period. These portions of Queensland and New South Wales constitute important kangaroo habitat.

The 1991–1992 drought event ended in these kangaroo habitats because rainfall totals listed as highest on record were recorded throughout the southern portion of South Australia, southwestern New South Wales and much of Victoria from November 1, 1992 to January 31, 1993. Rainfall totals recorded as very much above average were recorded for much of the remainder of South Australia and western and central New South Wales

during this same three month period. At least average rainfall fell over most of Queensland, including the most important kangaroo habitats, in the November 1, 1992 to January 31, 1993 period. Drought areas in New South Wales received reasonable rains in the first half of 1993 and even better rains in the second half of the year. Drought declarations in Queensland, by early 1994, occurred in about 46 percent of the State's land area. No rangelands are drought declared in Western Australia in early 1994, and South Australia has experienced good rainfall years from 1989-1993 in most parts of the State. The 1991-2 drought, at one time or another, affected northern New South Wales, most of Queensland, eastern and northern portions of the Northern Territory and northern Western Australia. The 1991–2 drought was not experienced in the other 60 percent of the continent.

About 70 percent of Australia is classified as arid or semi-arid and is characterized by high variability in rainfall. Drought periodically occurs to these landscapes, and its severity and duration can clearly affect pasture quality and kangaroo well-being and numbers. At least 47 major drought events have been recorded somewhere on the continent during the 100 year period from 1888 to 1988 (data provided by ANPWS and excerpted from "Water 2000: Consultants Report No 13—Water Resources Aspects of Drought in Australia" Dept. Resources and Energy (1983) and Bureau of Meteorology). Areas of deficient rainfall are to be expected on the Australian continent. Wildlife management specialists accept drought as a "normal" event and manage their resources accordingly by reducing kill during years when kangaroo populations are diminished and increasing harvest when populations are increased (see below). The 1991–1992 drought impacted kangaroos, especially in northern New South Wales and southern Queensland, but did not and does not threaten the continental population of these three species.

Drought areas were declared in most of New South Wales and some southern and eastern areas of Queensland in Australia's winter of 1994. The effect of this drought on kangaroo populations is not yet known, but as noted earlier, kangaroo populations have recovered from the previous severe drought of 1982–83 (longer in some areas). Furthermore, while 1995 kangaroo harvest quotas are not yet known, the Service has reviewed and discussed the State and Commonwealth management program and believes that appropriate

quotas will be established to maintain kangaroo populations.

An additional comment expressed by several persons concerned the capability and willingness of wildlife managers to reduce the kangaroo kill when populations are diminished. They claimed that Australia's management plans do not reduce the kill quotas during droughts and the present drought has sharply reduced kangaroo populations and clearly placed the

species in jeopardy.

The Service responds with a summary description of the management actions that one state, New South Wales (NSW), has undertaken to manage kangaroos during drought declared conditions in the 1980s and 1990s. NSW has about a third of the continent's population of red and gray kangaroos. This summary is excerpted from a letter from John Eveleigh, Assistant Regional Manager, Western Region, New South Wales National Parks and Wildlife Service, to the Director, Australian National Parks and Wildlife Service, dated February 5, 1993. A significant area of NSW was declared to be within a drought declared zone in 1982. A total harvest quota of 843,000 animals had previously been established for 1982, which was 12 percent of the 1981 estimated NSW population of 7 million kangaroos. A fixed quota was allocated for the first six months of 1982 and a notional quota was allocated for the second half of the year to be modified if climatic conditions dictated. The 1982 midwinter (June-August) population survey estimated a total NSW kangaroo population of about 9.4 million animals with the population of red kangaroos still increasing but that of gray kangaroos being diminished by about 29 percent.

Because of the drought conditions the harvest quota for calendar year 1983 was maintained at 843,000, about 9 percent of the 1982 estimated population. Drought conditions prevailed throughout far western and eastern portions of NSW during 1983, but relieving rains fell throughout the central portion of the state. Quotas were allocated as in 1982. The mid-winter 1983 population estimate indicated a total NSW kangaroo population of 5.5 million, with some decline in red kangaroos and a significant decline in the number of gray kangaroos. A total harvest quota of 500,000 was established for 1984, which represented about 9 percent of the total 1983 population. The harvest quota for red kangaroos was set at 12 percent, but no culling was authorized in selected onedegree blocks within management zones. Culling of gray kangaroos was