

## Chapter 20

# Trends in numbers of three cormorants *Phalacrocorax* spp. breeding in South Africa's Western Cape Province

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Numbers of three cormorants breeding at ten islands in South Africa's Western Cape Province were monitored from 1978–2007. Numbers of Bank Cormorants *Phalacrocorax neglectus* halved in this period, whereas numbers of Crowned *P. coronatus* and White-breasted *P. lucidus* Cormorants remained stable or increased slightly. The decrease of Bank Cormorants was attributable to decreases at the two largest colonies where food may have become limiting after the production of rock lobster, the most important prey in the region, decreased in the late 1980s. The colony at Lambert's Bay became extinct after

displacement of birds from nesting sites by seals. In the late 1990s, there may have been movement of Crowned Cormorants from Robben Island, where there was a high population of feral cats, to Dassen Island. Similarly, White-breasted Cormorants probably moved between breeding localities. In the 1980s, breeding stopped at Jutten and Marcus islands and was initiated at nearby Schaapen, Meeuw and Vondeling islands. In the 1990s, birds displaced from Geyser Rock by seals moved to adjacent Dyer Island.

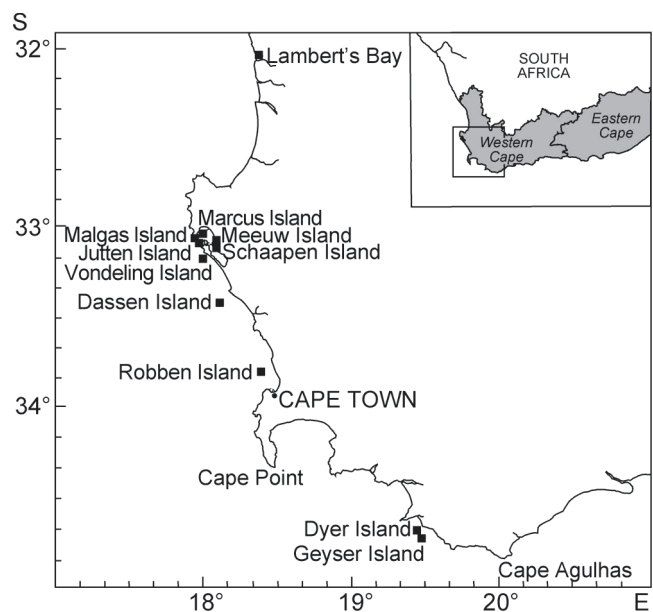
**Keywords:** Bank Cormorant, Crowned Cormorant, *Phalacrocorax* spp., population trend, South Africa, White-breasted Cormorant

### Introduction

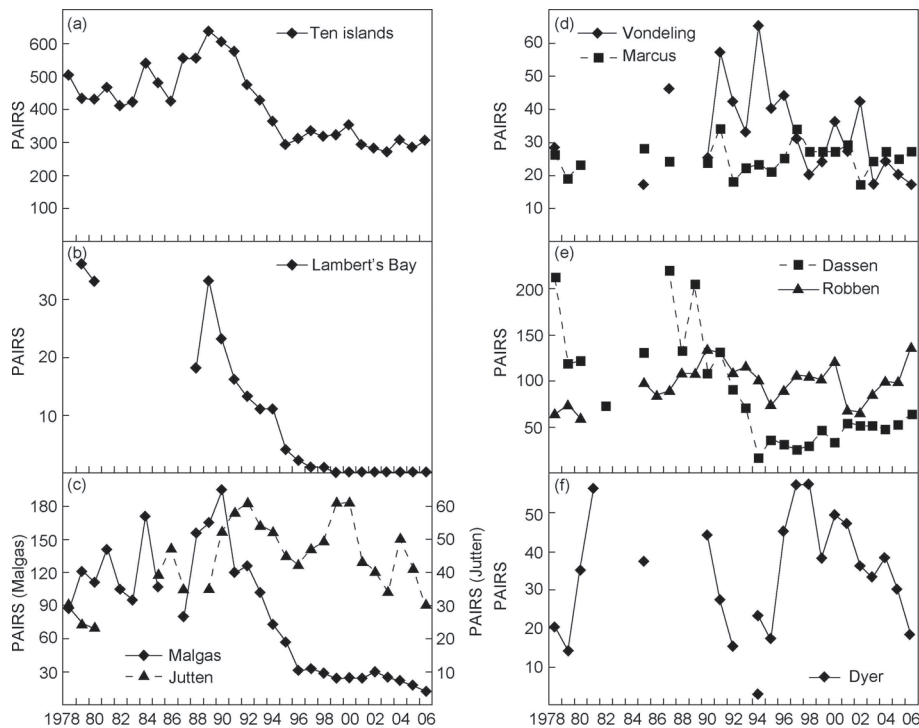
Four species of cormorant breed in the marine environment of southern Africa: the Cape *Phalacrocorax capensis*, Bank *P. neglectus*, Crowned *P. coronatus* and White-breasted *P. lucidus* Cormorants. The former three are endemic as breeding birds to the sub-continent and nest only around its coastline. White-breasted Cormorants also breed at inland water bodies in southern Africa and farther north in sub-Saharan Africa (Hockey *et al.* 2005). The Cape Cormorant is an abundant bird that feeds, often in large flocks, mainly on two shoaling pelagic fishes that are plentiful in the Benguela upwelling ecosystem, anchovy *Engraulis capensis* and sardine *Sardinops sagax* (Hockey *et al.* 2005). The other three cormorants are considerably less numerous in southern Africa's marine environment and do not eat large quantities of anchovy and sardine. In the Western Cape, Bank Cormorants feed mainly on benthic fish and crustaceans (Rand 1960). In Namibia, the mesopelagic goby *Sufflogobius bibarbatus* contributes most of its diet (Crawford *et al.* 1985). Crowned Cormorants feed primarily on bottom-dwelling fish that occur inter- and infra-tidally on rocky shores (Williams and Cooper 1983). The White-breasted Cormorant feeds on bottom-living, mid-water and surface-dwelling prey (Whitfield 1986), including Clinidae and Mugillidae in the Western Cape (Rand 1960). Coastal birds also forage in adjacent fresh water environments (Randall *et al.* 2002).

This paper reviews trends in the abundance, during 1978–2007, of the three less numerous cormorants at ten seabird-breeding islands in South Africa's Western Cape Province: Lambert's Bay, Malgas, Marcus, Jutten, Meeuw,

Schaapen, Vondeling, Dassen, Robben and Dyer islands (Fig. 1). In 1978–80, the overall population of Bank Cormorants was 8 672 pairs, of which 7 166 were in Namibia, 1 506 in South Africa and 552 (6%) at the ten islands considered



**Figure 1:** The Western Cape of South Africa, showing the ten islands where numbers of cormorants were monitored from 1978–2007



**Figure 2:** Trends in the counts of Bank Cormorants breeding at eight islands in the Western Cape, and in the overall number estimated to breed at the ten islands that were monitored, 1978–2006. The overall number may have been underestimated in the earlier part of this period, when fewer counts were undertaken (see text). At individual localities, gaps for any given season indicate that no counts were undertaken

here. By 1995–1997, this had fallen to 4 888 pairs: 3 735 in Namibia, 1 153 in South Africa and 371 (8%) at the ten islands (Cooper 1981, Crawford *et al.* 1999a). By 1995–2002, the overall population numbered 3 132 pairs, of which 971 were in South Africa (Du Toit *et al.* 2003). In 1977–81, the overall population of Crowned Cormorants was 2 665 pairs, of which 977 were in Namibia, 1 688 in South Africa and 968 (26%) at the ten islands (Crawford *et al.* 1982). In the same period (1977–81), the population of White-breasted Cormorants breeding along the southern African coast was 2 524 pairs, of which 1 422 were in Namibia, 1 102 in South Africa and 324 (13%) at the ten islands (Brooke *et al.* 1982). About 3 700 pairs breed in southern Africa, including inland localities (Hockey *et al.* 2005). More recent estimates of the population sizes of Crowned and White-breasted Cormorants by Du Toit *et al.* (2003) are incorrect because, for example, they attribute a population of 238 pairs of Crowned Cormorants to Geyser Island in 1978, whereas no pairs bred at that locality in that year (Crawford *et al.* 1982), and they take no account of movements of White-breasted Cormorants between breeding localities (Crawford *et al.* 1994).

## Methods

During the period 1978–2007, surveys were made of each of the 10 major seabird-breeding islands in the Western Cape. From 1990–2007, surveys were conducted monthly at Lambert's Bay and Malgas islands, and at the other islands, at least thrice each year. In earlier years, the islands were often surveyed less frequently. On each survey of an island, the numbers of active nest sites of each of the three cormorant species were counted. A nest site was defined as being active if an adult was present, or if it contained fresh eggs or live chicks. Territory that contained no nesting material but that was defended by a pair of birds was also considered to be an active site. Older chicks may leave nests and group

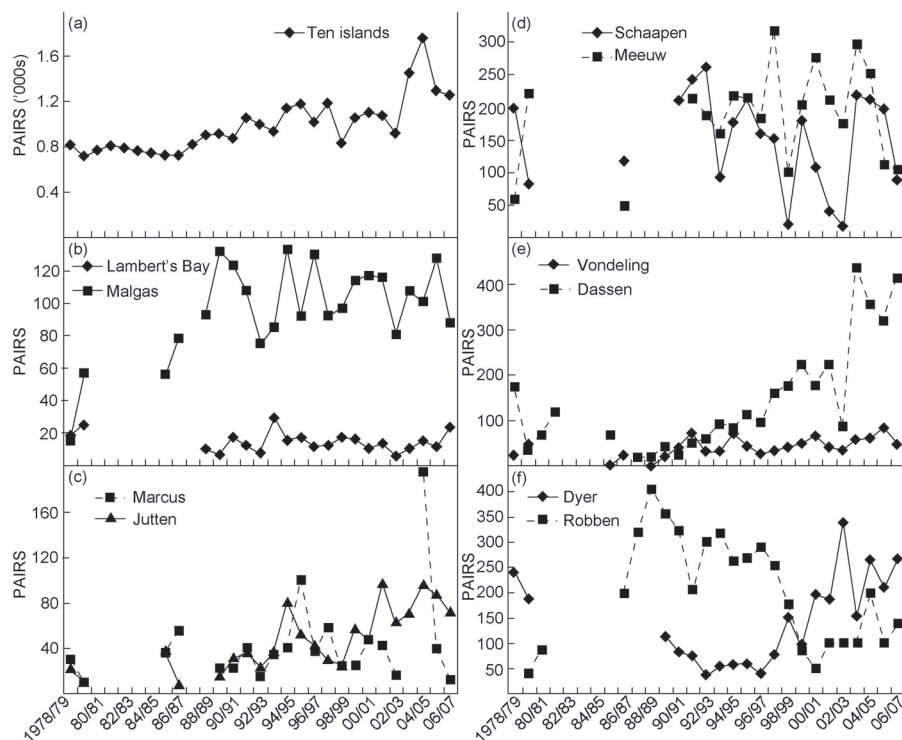
into crèches. Because the nests at which they hatched would not then have been counted, the numbers of chicks in crèches were counted and divided by two (Bank Cormorants) or three (Crowned and White-breasted Cormorants) to estimate the number of nests they represented. Remainders were taken to represent additional sites; e.g. for Crowned Cormorants six chicks in a crèche would represent two nests and seven chicks would represent three nests. The mean clutch size of Bank Cormorants is 2.02 (Cooper 1987), of Crowned Cormorants 2.7 (Williams and Cooper 1983) and of White-breasted Cormorants 3.1 (Olver and Kuyper 1978).

In the Western Cape, the main breeding season for Bank Cormorants is from March–November (Crawford *et al.* 1999a), of Crowned Cormorants from December–March (Crawford *et al.* 1999b) and of White-breasted Cormorants from May–October (Ward and Williams in press). Therefore, the seasons of breeding were taken to be January–December for Bank and White-breasted Cormorants and July–June for Crowned Cormorants. Counts for each of the three species over the period of observations were grouped annually into breeding seasons following the above. The highest count obtained at an island for a species during a given breeding season, was taken to represent the local breeding population of the species in that season. Estimates were not available at all localities in every season. Missing information is indicated on Figs 2–4. In order to estimate the overall trend for the ten islands, gaps for species at localities were filled by linear interpolation between adjacent counts.

## Results

### Bank Cormorants

Bank Cormorants bred at nine of the ten islands. The exception was Meeuw Island, though at Schaapen Island breeding was only recorded in 1998, when a single nest was



**Figure 3:** Trends in the counts of Crowned Cormorants breeding at ten islands in the Western Cape, and in the overall number estimated to breed at these islands, 1978/79–2006/07. The overall number may have been underestimated in the earlier part of this period, when fewer counts were undertaken (see text). At individual localities, gaps for any given season indicate that no counts were undertaken

recorded there (Crawford *et al.* 1999a). The number estimated for the nine islands fluctuated around 450 pairs from 1978–1986, increased to more than 600 pairs in 1989 and 1990 and then fell to an average of about 300 pairs from 1995–2006 (Fig. 2).

Estimates for individual localities are shown in Fig. 2. At Lambert's Bay, the colony numbered 30–40 pairs from 1979–1989 (the 1988 count will have been an underestimate), then decreased rapidly and became extinct in 1999. At Malgas Island, counts fluctuated around 120 pairs up until 1992 and then decreased rapidly, to just 11 pairs in 2006. At Jutten Island, counts increased from about 25 pairs in the late 1970s to around 50 from 1990–2000, and then fell to 30 in 2006. At Marcus Island, counts were stable over the period of observations, averaging 25 pairs. At Vondeling Island, counts were around 25 pairs at the start and end of the period of observations, with a peak in between. At Dassen Island, there were probably more than 200 pairs from 1978–1989 (some counts in this period were lower but likely to have underestimated numbers), but this fell rapidly to about 50 pairs from 1994–2006. At Robben Island, numbers fluctuated around 100 pairs throughout the period of observations. At Dyer Island, numbers fluctuated around an average of 35 pairs with no long-term trend but suggestion of a decrease after 1998.

### Crowned Cormorant

Crowned Cormorants bred at all of the ten islands investigated. The number estimated for these islands was relatively stable at about 800 pairs from 1978/79–1990/91, fluctuated between 800 and 1 200 pairs until 2002/03 and then increased sharply. It increased to more than 1 750 pairs in 2004/05 and was above 1 250 pairs in the following two seasons (Fig. 3).

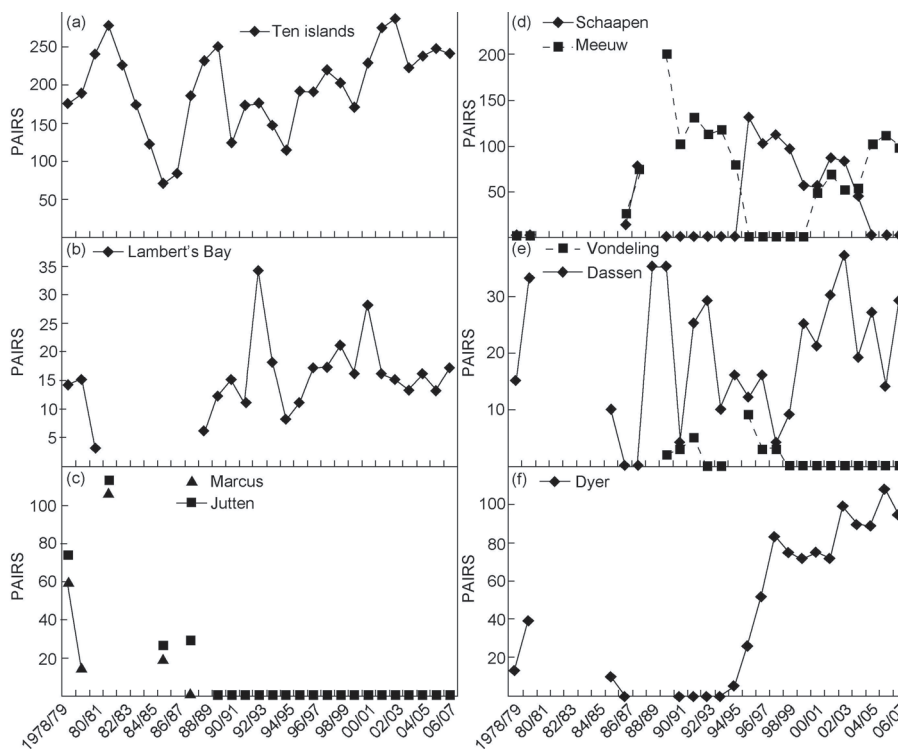
Estimates for individual localities are shown in Fig. 3. At Lambert's Bay, numbers breeding were stable at a low level.

At Malgas and Jutten islands, numbers increased in the 1980s and early 1990s, respectively, and then fluctuated around the higher levels. At Marcus, Schaapen and Meeuw islands, there were large fluctuations in the numbers counted, with no trends apparent. Numbers were stable at Vondeling Island, but at Dassen Island there was a large increase from 100 pairs in 1996/97 to more than 400 in 2003/04. Conversely, at Robben Island the colony decreased from more than 400 pairs in 1988/89 to 100–200 pairs from 2001/02–2006/07. At Dyer Island, the number decreased from about 200 pairs in the late 1970s to about 50 pairs in the mid 1990s, and then increased again. It varied around 200 pairs from 2000/01 onwards.

### White-breasted Cormorant

White-breasted Cormorants bred at nine of the ten islands during the period of observations. The exception was Malgas Island, where 1–2 pairs had bred in the 1920s (Brooke *et al.* 1982). However, at Robben Island breeding was only recorded in 2004, when two nests were found at a platform erected adjacent to the island as alternative habitat for cormorants while the breakwater was being repaired and extended. The number estimated for the nine islands fluctuated around 200 pairs throughout the period of observations, but there was a noticeable trough in 1985 and 1986, when fewer than 100 pairs were estimated to breed at the ten islands (Fig. 4).

Estimates for individual localities are shown in Fig. 4. The colony at Lambert's Bay had considerable fluctuations in the numbers breeding but long-term stability. Breeding stopped at both Jutten and Marcus islands between 1987 and 1990. In the early 1980s, each of these localities had supported more than 100 pairs. Breeding was first recorded at Schaapen and Meeuw islands in 1986 and at Vondeling Island in 1989. Substantial numbers (>100 pairs in some seasons) subsequently bred at Schaapen and Meeuw islands,



**Figure 4:** Trends in the counts of White-breasted Cormorants breeding at eight islands in the Western Cape, and in the overall number estimated to breed at the ten islands that were monitored, 1978–2006. The overall number may have been underestimated in the earlier part of this period, when fewer counts were undertaken (see text). At individual localities, gaps for any given season indicate that no counts were undertaken

where the counts had large fluctuations that were often out of phase with each other. The maximum number recorded at Vondeling Island was nine pairs. Counts at Dassen Island had long-term stability with large fluctuations. There was a large increase in the number breeding at Dyer Island between 1994 and 1998, after which the number fluctuated above 70 pairs.

## Discussion

Counts of the three species at all the islands were less regularly conducted during the period 1978–1989 than subsequently. This may mean that numbers breeding at some islands were underestimated in the earlier period, for example Bank Cormorants at Lambert's Bay in 1988 and at Dassen Island in 1979, 1980, 1985 and 1988 (Figure 2). Hence the overall populations at the ten islands also may have been underestimated. At Lambert's Bay from 1997–2002, counts of pairs of White-breasted Cormorants were made at approximately weekly intervals by Ward and Williams (in press). Their highest single count was of 29 pairs in 2000. Over the same period, the highest count obtained during monthly surveys for this study was similar: 28 pairs in 2000 (Fig. 4). This suggests that monthly counts are adequate to gauge population trends. However, Ward and Williams (in press) believed that because seven pairs had completed breeding earlier in 2000, the actual population at Lambert's Bay in 2000 was 37 pairs. Therefore, even in the period of more frequent counting the actual population may be underestimated. For birds that move between breeding sites, as all three species may (Crawford *et al.* 1994, 1999a), there is the possibility that the same birds may be counted at two localities in any given season, which would overestimate abundance.

For Bank Cormorants, the number breeding at the ten islands was probably stable at 550–650 pairs from 1978–

1991 (Crawford *et al.* 1999a), thereafter halving to about 300 pairs. This was as a result of decreases at Lambert's Bay, Malgas and Dassen islands. Numbers were little changed from 1978–2006 at the other localities. The extinction of the colony at Lambert's Bay was partly attributable to the displacement of birds from breeding sites by Cape Fur Seals *Arctocephalus pusillus pusillus* (Crawford *et al.* 1999a), which earlier caused a decrease in the colony at Mercury Island (Crawford *et al.* 1989). The reasons for the declines at Malgas and Dassen islands are not well understood, especially since the numbers breeding at three islands (Marcus, Jutten and Vondeling) between these localities remained stable over the period investigated. Some birds from Malgas Island may have moved to nearby Jutten Island, where numbers increased as those at Malgas Island began to decrease.

Prior to their demises, the colonies at Malgas and Dassen islands were the largest at the ten islands that were investigated. It is possible that food resources became limiting in their vicinity, a scenario that is supported by a halving in the catch of rock lobsters *Jasus lalandii* off South Africa between the 1980s and the 1990s (Van der Lingen *et al.* 2006). There was a large decrease in the growth rate of rock lobsters off South Africa between 1985 and 1991, after which growth rate remained low (Cruywagen 1997) suggesting reduced productivity of rock lobsters. At Dassen Island, the annual growth increment of rock lobsters of size 70–80 mm averaged 5.1 mm from 1969–1971 and 3 mm from 1992–1995, whereas for lobsters of size 80–90 mm it was 4.4 mm from 1969–1988 and 2.1 mm from 1989–1995 (Pollock *et al.* 1997). Rock lobsters are a major component of the diet of Bank Cormorants in South Africa (Rand 1960, Avery 1983) and in the 1990s were their most important prey item between Saldanha and Table Bay (Hockey *et al.* 2005), where both Malgas and Dassen islands are located. The decreased commercial harvest of rock lobsters was not alleviated by a

reduced minimum size limit for catches of lobsters, from 89 to 75 mm carapace length in 1993 (Pollock *et al.* 1997), but the exploitation of smaller lobsters probably further reduced their availability to Bank Cormorants.

It is thought that in the late 1970s and early 1980s, about 1 000 pairs of Crowned Cormorants bred at the 10 islands investigated (Crawford *et al.* 1982), and this remained the case until 2002/03. A subsequent increase was driven by a large increase at Dassen Island. Opposite trends at Dassen and Robben islands after 1996/97 (Fig. 3) indicate there may have been movement of birds between these localities. Crowned Cormorants are known to shift their nest sites around islands (Crawford *et al.* 1994, Crawford and Dyer 1996, Underhill *et al.* in press), and may do so between adjacent breeding localities. Crowned Cormorants have moved distances up to 560 km from the site at which they were banded (Underhill *et al.* 1999). There were substantial numbers of feral cats *Felis catus* at Robben Island in the late 1990s (Crawford and Dyer 2000), when the number of Crowned Cormorants there decreased.

There was no discernible long-term trend in the population of White-breasted Cormorants breeding at the islands, but large fluctuations were apparent (Fig. 4). White-breasted Cormorants stopped breeding at Jutten and Marcus islands in the 1980s, when they colonised Schaapen, Meeuw and Vondeling islands (Crawford *et al.* 1994). The reason for this shift in their location is unknown, although it is believed that disturbance at breeding colonies may cause birds to move to other localities (Ward and Williams in press). Two pairs of White-breasted Cormorants commenced breeding at Robben Island, when a platform was provided offshore, at which they could not be disturbed. The trough in the overall number of pairs breeding in the mid 1980s suggests that some birds may skip breeding seasons when looking for a new locality at which to breed. In the 1990s and 2000s, it appears that some birds alternated their breeding sites between Schaapen and Meeuw islands (Fig. 4), which are in close proximity to each other. Again, troughs in the overall counts (1994, 1999, 2003) precede years at which the alternation took place (Fig. 4). The increase in the number breeding at Dyer Island followed a decrease in the number breeding at adjacent Geyser Rock, which supported some 50–60 pairs from 1979 until 1993 (Brooke *et al.* 1982, unpublished information). The birds at Geyser Rock were displaced from their breeding sites by Cape Fur Seals (pers. obs.).

In summary, the populations of Crowned and White-breasted Cormorants have remained more or less stable, or even increased, over the 29 years that they have been monitored at the ten islands in the Western Cape, although there have been marked shifts in numbers breeding at different localities. By contrast, the numbers of Bank Cormorants breeding at these islands have halved. It seems probable that food has not been limiting for Crowned and White-breasted Cormorants, but it may have been for Bank Cormorants. Factors such as disturbance by humans, displacement from breeding sites by seals and introduced predators have influenced trends at particular localities (e.g. Crawford *et al.* 1999a).

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