WESTERN AUSTRALIAN WILDLIFE MANAGEMENT PROGRAM NO. 2 (DRAFT)

THE NOISY SCRUB-BIRD

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FOREWORD

Early in 1984 the Western Australian Department of Fisheries and Wildlife established a new series of publications, "Western Australian Wildlife Management Programs", with the publication of "Kangaroo Management in Western Australia 1984". This, the second in the series, is the first to be released as a draft for public comment before the production of a definitive program to cover the next 10 years.

Male Noisy Scrub-bird (Photo B.A. & A.G. Wells FRPS)

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We thank L.A. Moore and M.C. Ellis for assistance during the course of the Noisy Scrub-bird research program. Previous reserves officers at Two Peoples Bay, R.J. Grayson and R.E.S. Sokolowski, also contributed to both our understanding of the Scrub-bird and to the management of the Nature Reserve.

Special thanks go to the New Zealand Wildlife Service for donating the services of D.V. Merton to direct the translocation experiment and to Dr I.G. Crook for coordinating that experiment.

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PART 1 - BACKGROUND

1. TAXONOMY AND RELATIONSHIPS

The Noisy Scrub-bird was described and named Atrichia clamosa by John Gould in 1844, from a specimen collected by John Gilbert at Drakesbrook, east of Waroona.

Stejneger (1885), when considering the Rufous Scrub-bird (A. rufescens), found that Atrichia had been used for another species in 1802. He proposed that the generic name be changed to Atrichornis. Later, Sharpe (1901) transferred clamosus to Atrichornis. In 1916, Mathews proposed a new genus Rahcinta for clamosus, believing it to be sufficiently different from rufescens to warrant generic differentiation. Also in 1916 Mathews described a subspecies, Atrichornis clamosus campbelli, from King George Sound, believing that birds from this area differed from those at the type locality. Neither of these last two taxonomic changes is accepted today.

Thus the correct scientific name of the Noisy Scrub-bird is Atrichornis clamosus (Gould 1844). Atrichornis refers to the absence of bristles around the gape, while clamosus means noisy.

The Noisy Scrub-bird, together with the closely related Rufous Scrub-bird of north-eastern New South Wales and south-eastern Queensland, form a small endemic Australian family, the Atrichornithidae. This is believed to be an ancient Australian family, whose closest relatives, on the basis of the similarities of their voice boxes (syrinxes), are the lyrebirds (Menuridae). The two families are placed in a sub-order (Menurae) of the Song-birds (Passeriformes). Sibley (1974) considered the Menurae to be most closely related to the bower-birds (Ptilonorhynchidae) and birds of paradise (Paradiseidae), while Feduccia and Olsen (1982) considered it to be most closely related to the tapaculos (Rhinocryptidae) of South America, and close to the base of one of the two evolutionary radiations in the song-birds.

Recently Bock and Clench (in press) have presented a detailed historical resumé of the systematic relationships of the Atrichornithidae and Menuridae as an introduction to their summary of the results of a series of anatomical studies based on a single female A. clamosus collected from Two

Peoples Bay by special permit in 1976. They consider that Atrichornis and Menura are each other's closest relatives but are sufficiently distinct to be placed in monogeneric families. They further consider that both families should be placed in a superfamily, the Menuroidea, which has unknown affinities within the sub-order Oscines. They conclude that "it seems reasonable to suggest that Atrichornis and Menura are relict members of an earlier more diverse radiation of oscine birds."

2. HISTORY AND STATUS

Although the Noisy Scrub-bird with its loud call would have been well known to Aboriginal people for many thousands of years, only one Aboriginal name has been recorded: Tjimuluk, from the King George Sound area (Serventy and Whittell 1976). The first European to report the species was John Gilbert who found it at Drakesbrook, near Waroona, in November 1842. Later, on the same journey, he found it near Augusta. In 1843 Gilbert travelled from York to Albany and noted that he first heard the Scrub-bird around Mount Barker, the numbers increasing as he approached Albany. George Masters collected seven specimens from near Albany in 1866, 1868 and 1869, and William Webb collected about eight specimens in the same area about the same time. The final 19th century specimen was collected by A.J. Campbell at Torbay in October 1889, and he reported having heard the Noisy Scrub-bird at Boojidup Creek, about 25 km north of Karridale, in November of the same year (Whittell 1943, Serventy and Whittell 1976) (see Fig. 1 for localities).

Despite a number of searches no further records of the Noisy Scrub-bird were confirmed until the species was rediscovered at Two Peoples Bay in

Table 1. Numbers of singing male Noisy Scrub-birds at Two Peoples Bay Nature Reserve.

1962-66	ca 40-45	1975	69
1968	ca 50	1976	74
1970	45	1977	74
1971	44	1979	107
1972	50	1980	111
1973	59	1982	130
1974	66	1983	138

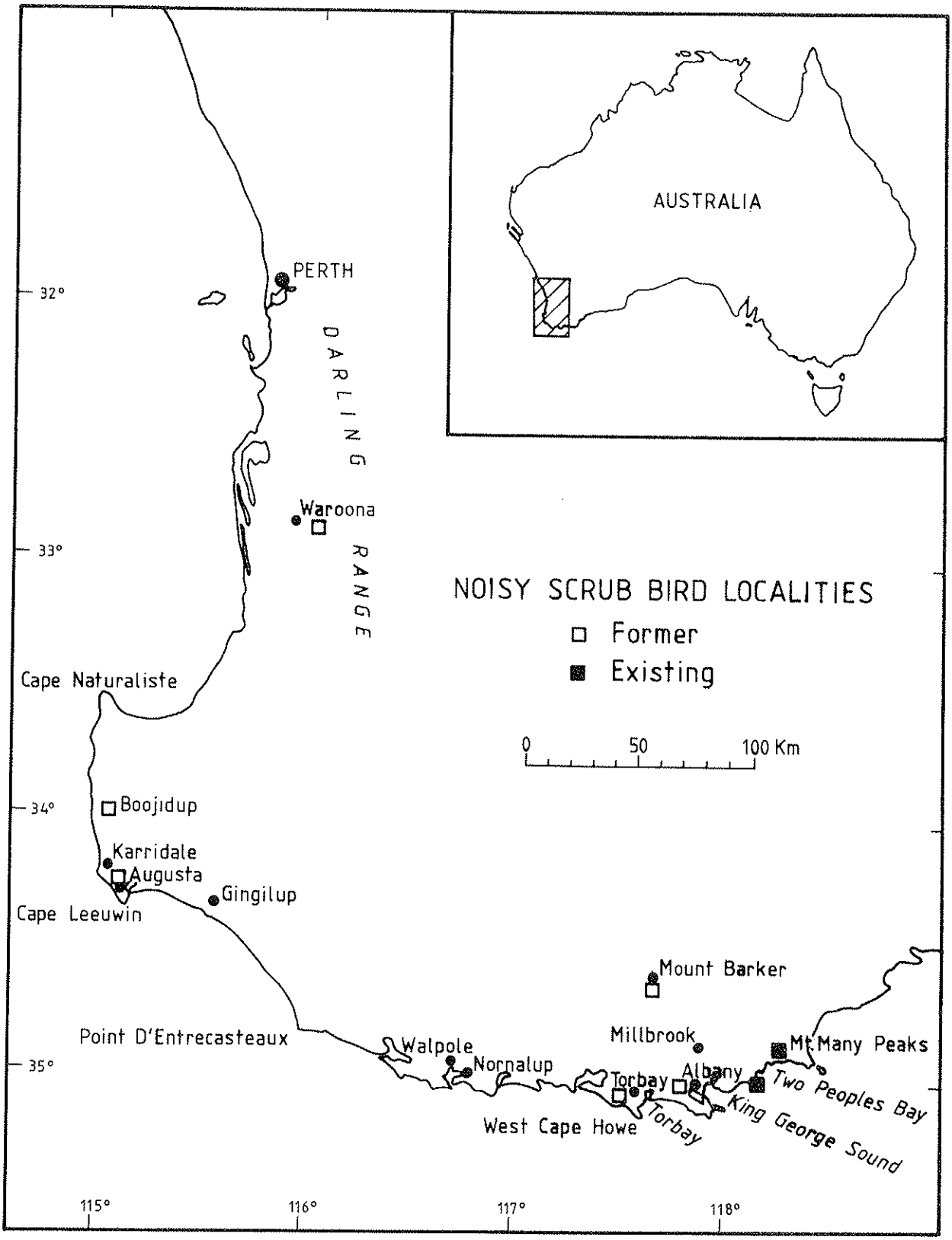

Fig 1. Former and existing Noisy Scrub-bird distribution

1961 (Webster 1962, Chatfield in prep.). Recent searches elsewhere in its former range have failed to locate additional populations.

The only practical method of taking a census of the species is to count the number of singing males. Census methods have been described by Smith and Forrester (1981). The number of singing males recorded since 1962 (Smith and Forrester loc. cit., Smith in prep. a) are given in Table 1. Data from 1962 to 1969 are not as accurate as those from 1970 onwards but are probably within two or three of the number present during that period. In the period 1962 to 1966 there were 40 to 45 males increasing to 50 in 1968. The numbers then decreased to 44 in 1971 after which there was a steady increase to 138 in 1983.

Since the mid-1970s non-singing adult males have been observed in a number of territories (Smith, in prep. a) and their presence in some territories was confirmed when such birds were captured during the translocation experiment. While the number of singing males is less than the number of adult males it is unlikely that the subordinate males affect the breeding potential of the population. Breeding females are the most important component of the population. Unfortunately they cannot be counted and it is not known if there are more or less than the number of singing males.

In 1973 a male was noted along Gardner Creek to the west of the low-fuel fire buffer strip, and since then Scrub-birds have become established along the Creek and around Lake Gardner, where the first record was made in 1979 (Fig. 2). Effectively this means that there are now two sub-populations - one on the Mt Gardner headland and one around Lake Gardner and its creek - separated by the low-fuel fire buffer between King George Sound and Two Peoples Bay. There appears to be further suitable habitat between Lake Gardner and Moates Lake and it is expected that the lakes population (18 in 1983) will expand.

3. BIOLOGY AND HABITAT REQUIREMENTS

Various aspects of the biology of the Noisy Scrub-bird have been described by Smith (1976), Smith and Robinson (1976), Robinson and Smith (1976), Smith (1977), Smith (1978), Smith and Forrester (1981), Smith and Calver (1984) and Smith (in prep. a and b).

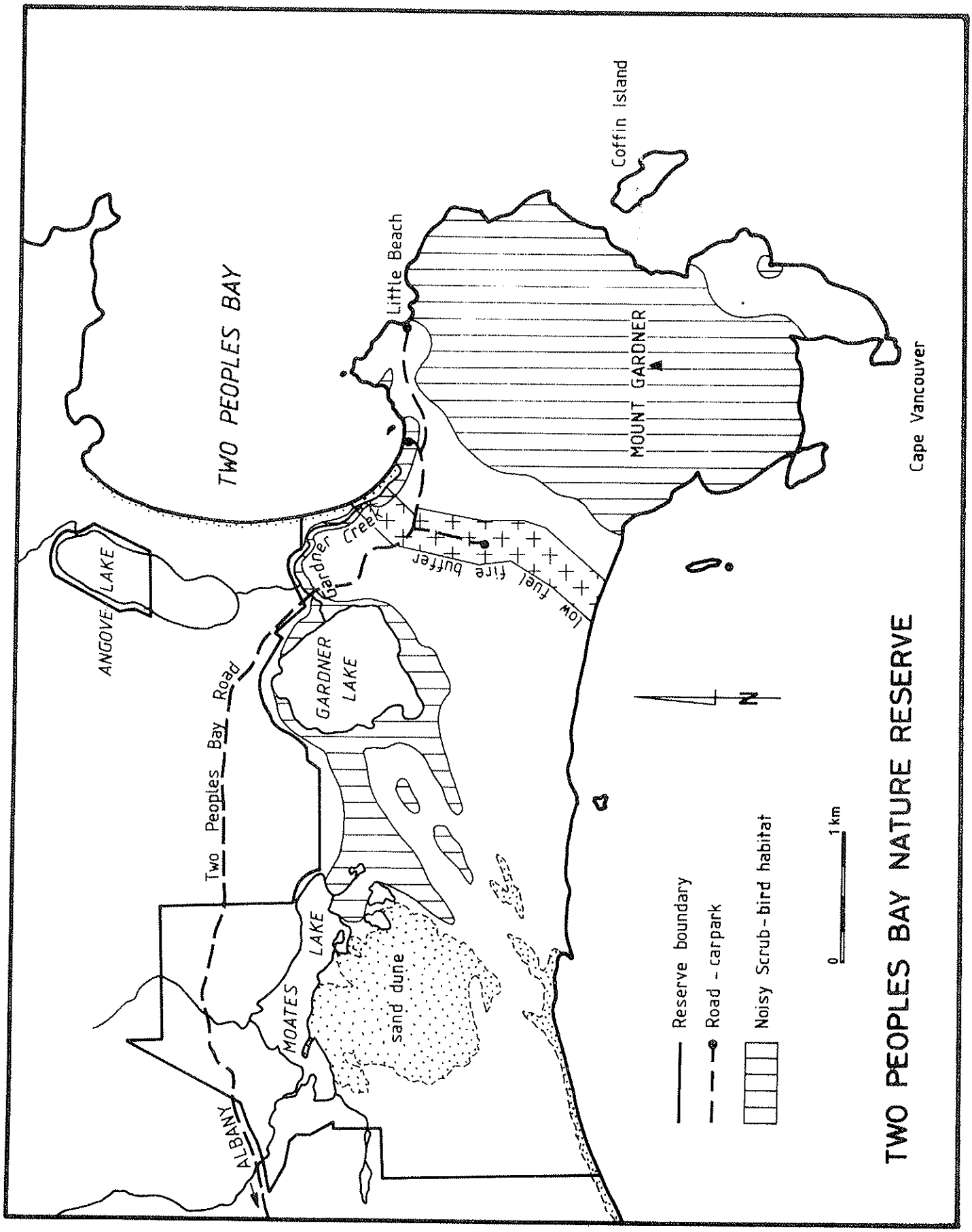

Fig 2. Two Peoples Bay Nature Reserve showing areas of Noisy Scrub-bird habitat

Noisy Scrub-birds are small (female 35 g, male 50 g) and solidly built with strong pointed bills, long powerful legs, long graduated tails, short round wings and brown plumage, ideal attributes for birds that live close to the ground in dense vegetation. They are fast and agile runners, using their limited flying ability to move from shrub to shrub without having to move to the ground. Cryptic colour and ground-hugging behaviour combine with their dense habitat to make them difficult subjects to observe. However, they are not as secretive as casual observations would suggest; in fact they are inquisitive birds, moving quickly to investigate the cause of some disturbance, then moving off, often unheard and unseen.

Examination of the habitat at Two Peoples Bay, and at other locations where Noisy Scrub-birds are known to have occurred, indicates that they were confined to the wetter areas within the distribution of the Jarrah/Marri (Eucalyptus marginata/E. calophylla) forest, in particular to the ecotone between forest and swamp vegetation. The dense layer of sedges and shrubs at the edge of the swamp provides cover as well as sites and material for nests. The reduced moisture regime uphill from the swamp allows the development of vegetation in the middle and upper storeys, which filters light at ground level, reducing the density of the ground cover. This enables the development of a thick layer of litter. Broadly, the swamp can be thought of as providing the breeding habitat while the forest provides the feeding habitat.

At Two Peoples Bay such a stiuation is uncommon. In wetter creeks on Mt Gardner the breeding habitat is confined to a narrow zone, some two to five metres either side of the creek bed, while the feeding habitat is above this zone. In the drier drainage lines, without a well-defined creek bed, suitable habitat is found in a small-scale mosaic of breeding and feeding habitat. The habitat around Lake Gardner is similar to that in the drier drainage lines, but the eucalypts are replaced by Agonis juniperina and there are dense areas of sedge in wetter ground.

The males are territorial, defending their territories with a loud, directional song, which they sing throughout the year. The location, size and use of the 14 territories studied by Smith during the period 1973 to 1976 were determined by plotting the location of singing males. The average size of the territories was 6 ha (range: 4 to 9 ha), and within this area 80% of the observations were made within a core area that

averaged 1.25 ha (range: 0.75 to 2.25 ha). Detailed observation of 10 territories from 1971 to 1976 showed that the core areas remained constant throughout the year and from year to year. Less detailed observations from 1977 to 1983 showed that these same core areas were still being used. The core areas are characterised by having a dense understorey, low light intensity and thick layer of litter with abundant invertebrates; that is, they are high-quality feeding areas. Marked changes in the area used by a male were only observed when a neighbouring male stopped singing; the remaining male then spent some time during most days of the breeding season in his former neighbour's territory, until it was reoccupied.

Territories may be divided into two classes. Firstly, there are long-term territories, in which the male sings throughout the year, and in which there is adequate feeding and breeding habitat. Evidence of breeding was found in most territories of this type, but the difficulty of finding nests made it impossible to verify breeding in all. Secondly, there are short-term territories, in which the male sings infrequently during the breeding season, and in which the feeding and/or breeding habitat is inadequate. No evidence of breeding has been found in these territories and they are probably occupied by immature males. The increasing population since 1976 has tended to blur these distinctions; there is now an increasing number of males that sing throughout the year in localities with poor and/or small areas of breeding and feeding habitat. It is possible that breeding may occur in these territories, for a nest has been found in similar habitat adjacent to two long term territories, where at least one of the breeding attempts was successful. In addition there are more males occupying heath and thicket, vegetation formations that can best be described as "survival" habitat. In 1970, three males (6.6%) were located in such areas, whereas, in 1983, 28 (20.3%) males were found in these vegetation formations.

During the breeding season the male moves slowly around his territory each day, the pattern of movement changing from day to day. The only predictable movements are those to and from the roosting areas, which are usually outside the core area. The roost sites are at the top of shrubs or small trees and may be used continuously for up to at least three months. Little is known of the daily movements of the female. However, a limited number of observations suggests that, like the male, the female spends most of her time in a small area around the nest. This area is usually on the

periphery of or outside the core area of the male's territory, but some breeding females have been located in areas away from male territories.

The period from the start of nest-building to the last chick leaving its nest may extend from May to November, although it more commonly lasts from June to October. Males, who defend their territories with song all year, begin to sing more frequently in April, reaching a peak in May and June. A high but variable level of singing is maintained until October, after which it declines (Smith and Robinson 1976). From April to June males in short-term territories begin singing, and this may lead to boundary disputes with adjacent breeding males. Such confrontations between males with long-term territories and those with short-term territories may occur as often as two to three times a week, compared with a maximum of one or two disputes per breeding season between males with long-term territories (Smith 1976).

Egg-laying begins in late May, with the peak in late June, and ends in early October. Little is known of the factors controlling the breeding season. Decreasing photoperiod is probably the main factor, while the interaction of rainfall and temperature on the production and decay of litter and its invertebrate fauna may greatly influence the timing of events.

Males do not build nests, incubate eggs or feed the chicks. The nest is globular (approximate diameter 18 cm) with a small side entrance. The bottom half of the cavity is lined with a papier-maché-like substance. The nest is constructed of a variety of sedges with some leaves and twigs and usually sited about 20 cm above the ground in a dense sedge clump or shrub. Building takes two to three weeks and the single egg is laid 10 to 16 days later. Second nests may be built in a week, presumably because the female spends more time building per day, and also because these nests have fewer pieces of sedge and the lining is not as extensive.

There is no direct evidence for polygamy in the field. However, observations of two males in the study area showed that they regularly visited areas with breeding females outside their territories. In one case these visits ceased after the area was reoccupied by a male. Only one active nest has ever been found outside a male's territory, although breeding females have occasionally been found in suitable areas outside the territories; the

extent of this extra-territorial breeding is unknown. Females start breeding in their first year and males in their third year (Smith 1978) and it is likely that males are opportunistically polygamous, mating with the female in their territory as well as females on the periphery of or outside their territory. This conclusion is supported by the fact that in captivity a single male successfully mated with three females, one in each of three consecutive years (Smith et al. 1983).

Incubation lasts 36 to 38 days, and the chick fledges three to four weeks after hatching. The chick stays with its mother for some time after fledging, probably until it has finished its post-fledging moult at about three months old (Smith et al. 1983). The female tends to build her nest in the same area year after year, often within 5 m of the previous nest. If the egg is lost the female will build another nest, usually some distance (20 to 50 m) away from the first nest, and re-lay; a second clutch is not attempted if the chick is lost (Smith 1976).

Noisy Scrub-birds spend most of their time feeding on or near the ground, foraging in litter, the bases of sedge clumps, dense shrubs and decaying wood. The diet of adults has not been documented in detail, but it appears to consist mainly of insects. Data on the food fed to nestlings were obtained from nest observations and analyses of the contents of faecal sacs. Seventeen orders of invertebrates and vertebrates were identified; the most common items were Araneida (spiders), Orthoptera (grasshoppers, crickets), Blattodea (cockroaches), Lumbricidae (earthworms), Myriapoda (centipedes and millipedes), and various insect larvae (Smith and Calver 1984).

4. THE NEED FOR MANAGEMENT

The total world population of the Noisy Scrub-bird is only about 300 birds, and, apart from a small group at Mount Manypeaks (see Translocation, below), is contained within the Two Peoples Bay Nature Reserve. The dangers of such a situation are clear : a catastrophe (extensive fire, disease, etc) could conceivably drastically reduce or even wipe out the population and cause the extinction of the species.

The loss of any species is to be regretted. The loss of the Noisy Scrub-bird would be particularly unfortunate because of the great

scientific importance of the species and its special place in the history of nature conservation in Western Australia.

During the first few years after the Noisy Scrub-bird was rediscovered the population was small (about 40 to 45 singing males), nothing was known about its biology or habitat requirements, and no techniques were available for artificially enlarging or extending the population.

Since that time detailed research programs have been carried out on the bird by the Commonwealth Scientific and Industrial Research Organisation's Division of Wildlife Research (now Division of Wildlife and Rangelands Research) including an experiment on captive breeding. Further, the Department of Fisheries and Wildlife, which is responsible for wildlife conservation in Western Australia and which manages the Two Peoples Bay Nature Reserve, has instituted a management plan for the Reserve and has developed the necessary expertise to establish Scrub-bird populations at new locations.

Therefore it is now appropriate that a management program should be developed for the Noisy Scrub-bird.

PART 2 - THE MANAGEMENT PROGRAM

1. AIM

The aim of the management program for the Noisy Scrub-bird is to ensure that the species persists.

2. POSSIBLE STRATEGIES

There are three broad strategies that might be used to promote the Noisy Scrub-bird's survival.

Habitat Management at Two Peoples Bay Nature Reserve

It is clear that appropriate management of the Two Peoples Bay Nature Reserve is vital to ensure that the species continues to survive. The rapid expansion of the Scrub-bird population at Two Peoples Bay followed a successful policy of fire exclusion contained in the 1971 Nature Reserve Management Plan (Anon. 1971). A new management plan for Two Peoples Bay Nature Reserve currently under preparation by the Department of Fisheries and Wildlife will discuss this strategy in detail and, accordingly, it is not intended to discuss habitat management at Two Peoples Bay further in this Program.

Captive Breeding

Captive breeding of an endangered species is often thought to be the last resort and only to be considered if all other methods fail. Nevertheless because of the extremely low total world population of the Noisy Scrub-bird, captive breeding should not be dismissed as a possible conservation strategy for the species.

During the CSIRO research program captive breeding was attempted from 1975 to 1981 using three females and one male hand-reared from chicks collected in the wild (Smith et al. 1983). Twenty eggs were laid, at least six being fertile. Of the four chicks hatched only one, a female, reached maturity and she did not breed. The program clearly showed that scrub-birds could be maintained and bred in captivity, using the appropriate aviary management techniques. The major problem

was a calcium, phosphorus and Vitamin D3 deficiency that resulted in some thin egg shells and a high chick mortality. The main inhibition to promoting captive breeding at present is its extremely high cost. Maintaining the aviaries, the food supply, and the constant supervision by expert staff is expensive in manpower and money. Smith (in prep. a) has shown that the captive breeding program required approximately nine man-years of labour and $40 000 for equipment and maintenance.

A successful program of captive breeding could result in the establishment of the species in zoos, perhaps including some overseas, to ensure that the species survived even if it became extinct in the wild. It could also provide birds for release in places that are suitable for the species but that do not currently support populations.

Translocation

Translocation involves capturing birds at Two Peoples Bay and transporting them to and releasing them at a suitable location, followed by monitoring to see if the birds survive and breed. Translocation of the Noisy Scrub-bird was first attempted, as an experiment, in 1983 by D.V. Merton of the New Zealand Wildlife Service and G.L. Folley of the Department of Fisheries and Wildlife (Young 1983). The New Zealand Wildlife Service generously donated the services of D.V. Merton, who is a world-renowned expert in translocating endangered birds, so he could train Western Australians in the techniques he has developed.

During May and June 1983 techniques were developed for capturing, housing, transporting and releasing Noisy Scrub-birds, the site of release being at Mount Manypeaks, about 12 km north-west of the Mt Gardner peninsula. At this time ten males and four females were released in two valleys on the north side of Mt Manypeaks. Four males quickly established territories and there were still four singing males during the winter of 1984. It is not known whether the other males or the females survived but there is no reason to believe they did not. In November 1983 a further attempt was made to trap female Scrub-birds: two further females were captured and released at Mt Manypeaks, bringing the total to 16 (10 male, 6 female).

This work has demonstrated that it is possible to trap, keep, transport and release Noisy Scrub-birds and that males will quickly establish new territories. Some further time will be necessary, however, before it can be determined whether the new population will breed and expand in numbers, but we are confident that it will. Noisy Scrub-birds are difficult to capture.

Both sexes have been captured in modified Elliott mammal traps, but the method is very labour-intensive and unreliable. Males are most easily captured in special mist-nets to which they are lured by tape-recordings of male song. The only reliable method of capturing females is to trap them at the nest. Both methods are labour-intensive, the time spent searching for nests especially long.

The birds settle down readily in aviaries, where they are held for a short time before being moved to the new locality. They do not suffer trauma while being moved in vehicles provided that transmission of noise and vibration to the carry boxes is minimised.

Translocation is expensive only in terms of manpower. During the November 1983 work four volunteers helped with the project and, given current low staffing in the Department of Fisheries and Wildlife, it is thought that the availability of volunteers will be crucial to the success of any future translocations.

3. PREFERRED STRATEGIES

Two of the preceding three strategies are proposed during the term of this program: habitat management at Two Peoples Bay Nature Reserve and translocation to establish new populations. Captive breeding is considered to be too costly to be warranted at this time, especially given the rapidly increasing size of the population at Two Peoples Bay, allowing birds to be removed without major effects on population numbers.

Habitat management will be discussed in detail in the new Two Peoples Bay Nature Reserve Management Plan, now in preparation, and this publication will be restricted to describing future translocation programs.

The aim of the translocation program is to establish additional populations

of the Noisy Scrub-bird, so that there are at least four reproducing populations at any one time. It is thought that the major reason for the decline of the bird was the change in fire regimes following European settlement (Smith 1977). Noisy Scrub-birds are unable to colonise areas of suitable habitat until four to ten years after a fire. Given this situation it is likely that some of the scrub-bird populations established by translocation will be wiped out or be seriously depleted by fire and will need re-establishment after the habitat has regenerated. At Mount Manypeaks, for example, major fires have occurred every ten to twenty years and the terrain makes fire prevention or control very difficult. The last major fire, during the summer of 1978/79, burnt out all suitable scrub-bird habitat except that in the two major valleys where the birds were released in 1983.

It is likely that some other sites proposed for release in the future will also be destroyed or extensively damaged by fire from time to time. Accordingly it will be necessary to establish perhaps six to eight populations in order to ensure that there are at least four viable populations at any one time.

4. DEVELOPMENT OF LIST OF RELEASE SITES

The first step in the translocation program will be to develop a list of sites suitable for the release of Noisy Scrub-birds taken from the Two Peoples Bay population. Criteria for site selection will be as follows.

Habitat

The habitat must be suitable for Noisy Scrub-birds to feed and breed. Habitat is described in Part 1, Section 3. There must be extensive habitat, sufficient for at least 20 pairs. Areas capable of holding many more than this number will be preferred.

Land Tenure

Preference will be given to land contained in National Parks, Nature Reserves or State Forest, but other types of Crown land will be considered. Private land will not be investigated unless long-term security of the habitat is ensured.

Fire Management

Preference will be given to land that can be protected from frequent or extensive fires.

A list of sites for possible release will be developed during the period 1984 to 1986 and will be updated and amended thereafter as new information becomes available. Initial selection of sites will take place using available topographic, cadastral and vegetation maps, as well as satellite imagery. Liaison will be maintained with the Forests Department and the National Parks Authority. Following the preparation of an initial list further work will include inspection of aerial photography, examination from aircraft, and ground traverse. Sites will then be placed in order of priority. At present there is no objective method of assessing scrub-bird habitat. The best method is for a trained observer to visit potential areas and determine the number of suitable sites, taking into account the need for a core area of up to 2 ha and a minimum separation of about 300 m.

Places to be examined will include West Cape Howe, Millbrook Nature Reserve, Walpole-Nornalup National Park, D'Entrecasteaux National Park, Owingup Swamp, Gingilup Swamps Nature Reserve, the Donnybrook Sunklands (State Forest), the Leeuwin-Naturaliste National Park and sites in the Darling Range. Further releases at Mt Manypeaks will be considered.

5. TRANSLOCATION PROGRAM

It is proposed that there be at least one translocation each year, starting in 1985. Each annual program will be designed to run for approximately eight weeks from mid-June to mid-August. The aim will be to capture and release a minimum of ten pairs to each site, although the opportunistically polygamous behaviour of the males means that fewer of that sex need to be released provided the release points are carefully planned. In capturing males, preference will be given to sub-optimal habitat since this will minimise the effect on the breeding population.

Annual counts of singing males at Two Peoples Bay Nature Reserve will continue and if the numbers decline drastically due to translocation or some other cause the program will be suspended or modified.

6. MANPOWER AND FINANCE

The key person in this program is the Reserves Officer at Two Peoples Bay Nature Reserve (currently G.L. Folley). Responsibilities associated with the management of the Reserve preclude his having enough time available to carry out this program and it is vital that a relieving person be provided each year to allow him to concentrate on the translocation.

Volunteers will be sought to help with the more labour-intensive parts of the program, especially searching for nests at Two Peoples Bay, collection of food for captive birds, and monitoring the release sites. A minimum of four, but preferably six, volunteers will be required each year. It is desirable that the same volunteers work right through a a year's program but, noting that many people will not be available for six to eight weeks, a larger number of volunteers working for shorter periods will be acceptable.

A register of volunteers will be developed by the Department for this and other wildlife conservation projects. The Department will meet travel and food costs of volunteers for this program. Accommodation will be provided at the Two Peoples Bay Research Station. Volunteers from the Albany region will be given preference in order to minimise costs and encourage local interest in and commitment to Noisy Scrub-bird conservation.

All major items of equipment necessary for translocation are already available, although modifications may be needed as further experience is gained. The translocation team will need at least one four-wheel drive vehicle in addition to the one stationed permanently at Two Peoples Bay Nature Reserve.

An annual budget item will be needed for the program. An estimate of costs is (1984 costs):

Relieving reserves officer (8 weeks)	$ 2 200
Vehicle hire	2 000
Travelling and food for volunteers	800
Equipment maintenance	500
Total	$ 5 500

Sponsorship will be sought to meet part or all of the costs.

Long-term programs such as this require a stable management and funding commitment. Until such time as the Department can establish its planned Endangered Species Unit, the Chief Research Officer, Wildlife (currently A.A. Burbidge), will act as coordinator.

7. GENERAL

Term of the Management Program

Unless superseded earlier the term of this program shall be ten years.

Other Provisions

During the term of this program the Department of Fisheries and Wildlife may undertake any other work or research or institute any other provisions for the management of the Noisy Scrub-bird as are necessary to properly promote the aim stated in Part 2, Section 1, of this program.

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