

Chapter 5.5

The Bearded Pig

(*Sus barbatus*)

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Status and Action Plan Summary

Status categories 2-3 - the nominate subspecies from Borneo, *S. b. barbatus*, is still widespread but declining in numbers; the western subspecies from Peninsular Malaysia and Sumatra, *S. b. oi*, and the eastern subspecies from Palawan and neighboring islands, *S. b. ahoenobarbus*, are both rare.

In Borneo, the dipterocarp forests should be deliberately managed for a variety of non-wood as well as wood outputs, which will benefit bearded pigs if wild meat is one of the outputs required. This action requires a fundamental rethinking of forestry management strategy. Conservation areas need to be maintained, and the communal forest system expanded, thereby retaining intact forest areas for the benefit of rural communities and with them, local bearded pig populations. Detailed, long-term investigation of the behaviour of identified pigs is necessary to resolve outstanding questions of social structure and home range use.

In Peninsular or West Malaysia, (northern) Sumatra, Bangka and the Riau Islands, field surveys are needed to correct a lack of information on the distribution and status of *S. b. oi* and the habitats where they can be expected to survive, which is hampering measures to conserve bearded pigs in these regions. Unlike either of the other two subspecies, these animals are everywhere sympatric with *S. scrofa*, which may be competitively advantaged by human induced changes in its environment and whose relative abundance may have a negative influence on local attitudes to the management requirements of the rarer form.

There is similar lack of recent information on the distribution and status of the Philippine endemic, *S. b. ahoenobarbus*, which has by far the most restricted range of the three, currently recognized subspecies. The present status of these animals on Balabac is unknown, but they remain quite widely, if patchily, distributed on the Calamian Islands (Busuanga, Culion and Coron) despite intense hunting pressure. Bearded pigs are also reported to be intensively hunted on Palawan, though precise data is lacking on their range there and any future fieldwork on this island is likely to be seriously compromised by the presence of armed rebels. All of these and other related problems are addressed in the proposed action plan for this species, which also recognizes the need to resolve the now rather confused systematic relationships between the three (Sundaic) forms of bearded pigs the closely allied wild pigs of the

neighboring Wallacean subregion, i.e. the eastern Philippines' '*philippensis*' and '*cebifrons*', and the Sulawesi warty pig, *S. celebensis*.

Introduction

Adult bearded pigs are characterized by their relatively large body size, a degree of sexual dimorphism, an elongated skull, long legs, a 'bearded' jaw (gonial tuft) and sparse body hair (Pfeffer, 1959). In addition, they are well known for their most spectacular collective attribute - lemming-like population eruptions - which have been recorded in different parts of Borneo since early this century (Shelford, 1916). Equally interesting migratory behaviour was described from Malaya in the 1940's and 1950's, but by the 1960's the camphor wood forests whose fruiting seemed to stimulate this behaviour had been felled (Caldecott, 1991). The result was a long period when eruptions and migrations were known to be a feature of the species, but they could not be described in the context of a broad appreciation of the bearded pig's ecology.

Following Groves (1981) and Groves and Grubb (this vol.), three subspecies are currently recognized. The type race, *S. b. barbatus*, is confined to Borneo (Kalimantan, West Malaysia and Brunei), though recent reports indicate that it may also occur on some neighboring islands, including Sibutu and Tawi-Tawi in the Sulu Archipelago, Philippines (Oliver *et al.*, Chapter 5.6, this vol.). The closely related race from West Malaysia, Sumatra, Bangka and the Riau Islands, was separated as a distinct subspecies, *S. b. oi*, by Groves (1981), though this was questioned by Mudar (1986), who proposed it should be lumped with the nominate race. In either event, ecological and behavioral, as well as morphometric, similarities suggest that these 'Sundaic' forms are the most closely related. This name refers to Sundaland, the continental shelf, which was exposed at times during the Pleistocene and which thereby, linked Malaya with Sumatra and Borneo and, at its periphery, with Java and Palawan (Whitmore, 1981, 1987, 1988). On Java *S. barbatus* is replaced by *S. verrucosus*, but there is a third subspecies, *S. b. ahoenobarbus*, on Balabac, Palawan and the Calamians Group. Groves (1981) also tentatively recognized two additional subspecies of bearded pigs from the central and easternmost islands of the Philippines (i.e. *S. b. cebifrons* and *S. b. philippensis*, respectively), but recently acquired evidence suggests that these forms should be treated as separate, though closely allied, species (Grubb and Groves, this vol.; Oliver *et al.*, *op cit.*).

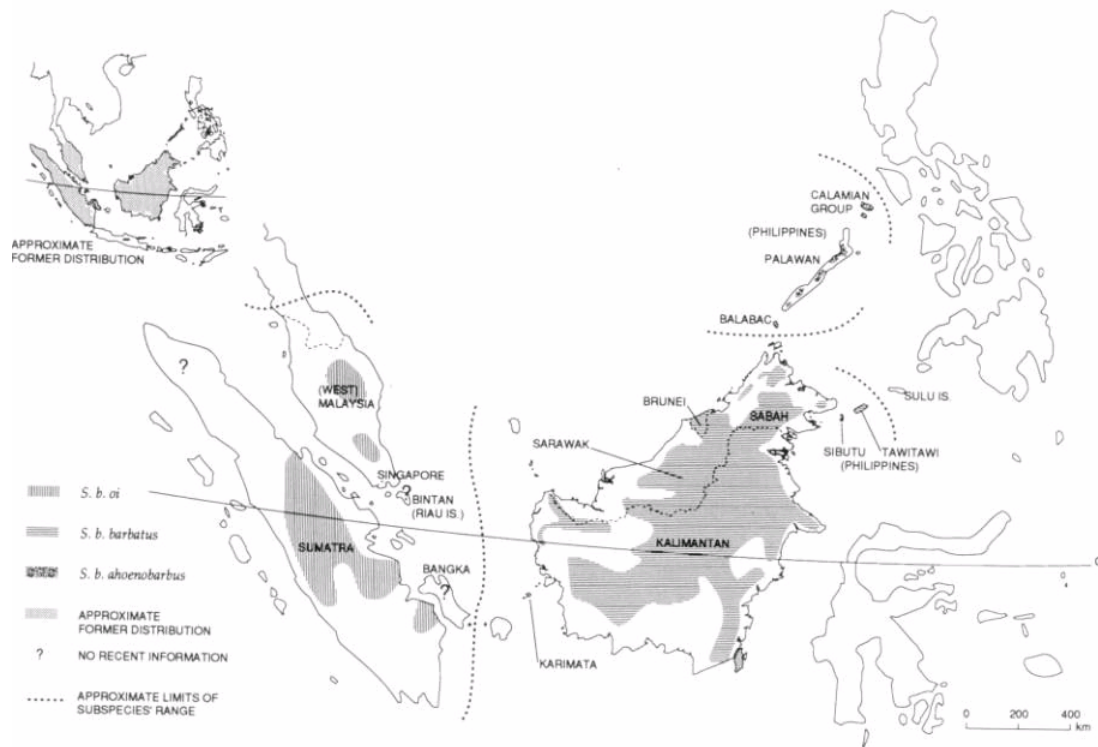


Fig. 13: Approximate former and present distribution of the bearded pig, *Sus barbatus* ssp.

Former and Present Distribution

The bearded pig occurs in archipelagic South-east Asia, extending from the large landmasses of the Sunda shelf (Peninsular Malaya, Sumatra and Borneo) to Palawan and neighboring islands in the west Philippines. In Malaya and Sumatra, it is sympatric (though not necessarily syntopic) with the Eurasian wild boar, *S. scrofa*. The archeological evidence suggests that the bearded pig was fairly plentiful and widespread in the Malayan Peninsula about 1500 to 2000 years ago (Gibson-Hill, 1950).

Herds of *S. b. oi* have been seen in the vicinity of the Taman Negara National Park in central north-east Malaya as recently as 1981 (Johns, 1983), and this extensive forest block presumably represents an important refuge for the subspecies. On the other hand, annual movements of bearded pig populations in Malaya appear to have been associated with the regular fruiting of camphor wood forests, which once occupied several thousands of square kilometers in the south-east and north-east of the Peninsula.

Formerly, bearded pigs of this subspecies were also found in northern (Medan), central (Indragiri) and southern (Lampung) Sumatra (Groves, 1981). However, a field survey of the larger mammals revealed that they had all but disappeared from the southern quarter of the island, where they are now reported to survive only in the Lebung Hitam forest across the straits from Bangka Island (Blouch, 1984). Not coincidentally, deforestation in Sumatra during the past 30 years has been heaviest in the south, and the relatively small amount of remaining forest there is now highly

fragmented. In central Sumatra bearded pigs were nowhere abundant in 1984, although local people in several areas reported occasional large traveling herds (Blouch, unpubl.). There is no recent information on the status of these animals in the northern end of the island, north-west of Medan. Recent information on their status on Bangka Island and in the Riau Archipelago (Bintang Island), where they are known to have occurred (Groves, 1981), is also lacking.

Archaeological studies in Sarawak indicate the human hunting of bearded pigs was undertaken since before the Palaeolithic (Medway, 1958, 1977). This (type) subspecies remains widely distributed in Borneo and is still relatively abundant in some areas. It also occurs on some offshore islands, including Karimata (off west Kalimantan), where it was recently reported to be common (Bekti *et al.*, 1991). *S. b. barbatus* is not, therefore, particularly threatened at the present time. However, the continued ability of the bearded pig to provide an abundant source of meat to the tribal inhabitants of the interior is now threatened by deforestation and selective logging. Since bearded pig productivity is so dependent on ecological events (see below), this can be regarded as only one among many consequences of a broader abuse of the Bornean forest estate by the timber industry.

From reports obtained recently (W. Oliver pers. comm.; Oliver *et al.*, Chapter 5.6, this vol.), it appears that bearded pigs periodically cross the strait between the north-easternmost tip of Borneo (Sabah) to the Sibutu and Tawi-Tawi, the southernmost islands of the Sulu Archipelago, in south-west Philippines. This implies genetic continuity between these locations and also another (though non-endemic) pig taxon to the Philippines' list. However, it is not known if there is any correlation between the (as yet poorly documented) incidences of pigs crossing this strait and the periodic eruptions and migrations of these animals on the Bornean mainland (see below).

The third subspecies, *S. b. ahoenobarbus*, is endemic to the Philippines, where it is confined to Balabac, Palawan and the Calamian Islands (Groves, 1981; Rabor, 1986), which collectively comprise the 'Palawan Faunal Region' (Heaney, 1986), the westernmost edge of the Sunda Shelf. There is relatively little information on the status of these animals on Balabac, though it is reported to survive in most still-forested areas on Palawan (McGowan, 1987) and on the three principal islands, Busuanga, Culion and Coron, in the Calamian Group (Oliver, 1992; Oliver and Villamor, 1993).

Habitat, Ecology and Behavior

The natural vegetation in all areas where bearded pigs are found is dominated by tropical evergreen rainforest, but within this broad category the animals utilize a wide variety of habitat types, ranging from beaches to upper montane cloud forests. The carrying capacity for bearded pigs no doubt varies greatly from habitat to habitat within the rainforest, depending on soil, drainage, elevation and floristic and phytochemical composition of the vegetation. Population density is also radically variable over time, so it is hard to determine consistent differences between habitats in this respect.

Bearded pigs consume roots, fungi, invertebrates in soil and rotting wood, small vertebrates, turtle eggs, carrion, and items from at least 50 genera and 29 families of plants. Fruit supply is believed to have particular influence in determining growth rate, fat deposition and reproduction, with the oil-rich seeds of members of the tree families Fagaceae (oaks and chestnuts) and Dipterocarpaceae (dipterocarps) being especially important in this regard. Of these, the oaks are significant because of their relatively continuous or regular fruiting behaviour, and also because they can come to dominate submontane habitats. The dipterocarps are often dominant in lowland and hill forests, and strongly influence food availability for terrestrial seed-eaters by characteristically synchronized flowering and mast-fruiting behaviour (Caldecott, 1988; Pfeffer, 1959; Pfeffer and Caldecott, 1986; Davies and Payne, 1982; Janzen, 1974; Jessup *et al.*, 1982; Leighton and Leighton, 1983).

Large-scale population movements by bearded pigs have often been reported in Malaya (Allen, 1948; Kempe, 1948; Hislop, 1949, 1952, 1955) and Borneo (Shelford, 1916; Banks, 1931, 1949; Banks in Hislop, 1955; Pfeffer, 1959; Davies and Payne, 1982; Caldecott and Caldecott, 1985; Caldecott, 1988a, 1991). Pigs are described as moving consistently in one direction, in scattered or condensed herds, over a broad or narrow front, and over a period of several days, weeks or months. The animals are variously described as being in good, poor or very poor physical condition, sometimes accompanied by piglets and sometimes not, and regularly swimming across rivers, sometimes coastal bays and even out to sea. In some cases, the population is said to retrace its route later, or to follow a circular course to return whence it originally came. The distances traveled appear to vary greatly. Pfeffer (1959) described annual, apparently unidirectional, population movements in Kalimantan involving distances of 250-650 km, while Davies and Payne (1982) refer to annual reversible movements over tens of kilometers in Sabah. The approximate population tracks given by Caldecott (1988a) suggest rates of travel of 8-22 km/month sustained over at least 4-8 months as part of larger cyclical movements in interior Sarawak. Some reports indicate that such population migrations begin or end in particular locations where abundant food may be found. Thus, Davies and Payne (1982) linked movements to seasonally-fruiting *Dinochloa* bamboo groves, while Caldecott (unpubl.) reinterpreted historical accounts so as to link Malayan bearded pig movements with predictable fruiting in camphor wood (*Dryobalanops aromatica*) forests. Caldecott (1988a) also described what appeared to be regular use of fruiting montane oak (*Lithocarpus*) forests in the upper Baram area of Sarawak.

In Sumatra bearded pigs also exhibit large scale population movements, but reports are anecdotal and often contradictory. Groups of up to 300 individuals are said to embark on long migrations, arriving at a given location at irregular intervals, sometimes as often as once a year but more frequently once every two to four years. In the highlands these movements do not seem to have any relation to the seasons, but in the lowlands the pigs tend to move out of the inundated forests to higher ground in the rainy season and back again in the dry season (Blouch, 1984). The relationship between these movements and the cycles of mast production has not been investigated.

The primary ecological adaptation of the western races of bearded pigs, to the pursuit of fruiting peaks within the large-scale phenological mosaic of dipterocarp forests, may not be a feature of the Philippine subspecies, since 'eruptions' and 'migrations' of

the kind seen in Borneo and Malaya have not been reported there. However, bearded pig populations exhibit a range of different states, which can be summarized as follows:

- Dispersed, static populations exploiting small, dispersed, unpredictable and discontinuous 'background' food sources. Low breeding and growth rates possible. Local movements only. (E.g.: typical mixed dipterocarp forest in Borneo between generalized fruiting episodes).
- Small to medium populations exploiting concentrated, predictable and continuous 'target' food sources. High breeding and growth rates possible. Local movements only. (E.g.: *Koompassia-Burseraceae* forest in Malaya).
- Small to medium populations, with members aggregating to exploit large, dispersed, unpredictable food sources. Breeding and birth rates depend on success of matching movements to fruiting within a dynamic phenological mosaic. Short to medium-range movements. (E.g.: typical mixed dipterocarp forest in Borneo between generalized fruiting episodes).
- Small to large populations moving regularly to exploit concentrated, predictable and discontinuous target food sources. Breeding and growth linked to activity of food sources. Short-range to long-range movements. Size of population varies from year to year depending on background food supply. (E.g.: *Dinochloa* association in Sabah, or *Dryobalanops aromatica* association in Malaya).
- Large and expanding population exploiting an exceptional supply of background food available over a period sufficient for several litters to be raised to sexual maturity. High breeding and growth rates characteristic. Long range movements. (E.g.: interior of Sarawak in 1954, 1959, 1983 and 1987).
- Very large and collapsing population having exceeded background food supply. Low breeding and high death rates. Increasingly desperate long-range movements. (E.g.: starving herds reported from Malaya and Borneo).

The basic social structure is that of the major social unit being the mother family, a female and her litter. These units often join up, and much larger aggregations are formed occasionally, with scores or even hundreds of pigs traveling together. Fully adult males seldom associate with the natal groups. Age at first pregnancy presumably varies in the wild from about 10-20 months. In any one area, the rut coincides with synchronized flowering in the forest, with the timing being centered on the transition between late flowering and early fruit formation. Falling petals therefore offer a potential visual cue. A certain nutritional status may have to have been attained by females before they become responsive to whatever stimulus acts to trigger mating. Pregnant females had a median fatness index (finger-widths of fat depth at the shoulder) of 1.5, while rutting males scored zero by this measure (n = 19, 32).

Gestation length is not known but is estimated at 90-120 days, based on the interval between rut and the ensuing birth-peak. Birth occurs within a nest, which is constructed of vegetation by the mother, and which is occupied by her and the new piglets for a week or so. Data from hunter interviews indicated that the median

number of piglets accompanying an adult female ($n = 53$) was 7, which was the same as the median number of fetuses counted in dead females ($n = 8$). Abbot in Davies (1962) reported a slightly higher median of 9 fetuses per female ($n = 5$). Litter size is very variable in part because of the influence of female size: small mothers typically have 3-4 piglets in a litter, while large ones have 10-12. Elsewhere, the range in litter size has been given as 3-11 piglets (National Research Council, 1983).

Fat reserves in the mother are used up quickly during lactation, and females accompanied by small piglets are almost invariably thin or very thin. Those with large piglets are fatter, and have presumably gained weight after weaning. This fattening process seems to depend on what fruit is available, with dipterocarp seeds and acorns having most impact. If these are abundant, it seems likely that two litters can be raised by a female within a year.

Threats to Survival

The unsustainable logging of dipterocarps in Bornean forests will change the underlying ecology of the island, probably in such a way as to prevent bearded pigs from exhibiting in future the mass population eruptions and movements of the kind observed during the 1950's and 1980's. These phenomena are no longer seen in areas where extensive logging has already occurred. The Sundaic bearded pig may be said to be consummately adapted to life in almost limitless dipterocarp forests. It is possible that the demise and fragmentation of Borneo's forests will allow wholesale invasion of the island by *S. scrofa*, which could then displace *S. b. barbatus* from much of its former range. The same may be said for Malaya where several thousands of square kilometers of camphor wood forest have now been virtually destroyed, and the integrity of forest cover throughout the Peninsula is so disrupted that long-distance movement by forest-dwelling mammals is no longer possible in many areas.

Meanwhile, a more sedentary population of bearded pigs, apparently associated with continuously-fruiting, *Koompassia-Burseraceae* forests in western Malaya, is probably endangered by hunting and habitat destruction. The habitat changes experienced by the Peninsula since the Second World War have almost certainly favored *S. scrofa* over *S. barbatus*, and the latter species is believed to be in serious jeopardy as a result. The same can also be said of Sumatra, where habitat disturbance has been at least as extensive as in Malaya and where a comparison between the current distribution of bearded pigs and that of the remaining native forest supports the contention that the species cannot long survive the reduction and fragmentation of these habitats. The same situation probably applies to Bangka and the Riau Archipelago where habitat disturbance has been at least as extensive as in Sumatra.

Wildlife protection measures are so limited, and hunting so rife, that there is increasing concern about the status of all wild pig populations in the Philippines. McGowan (1987) concluded that the future prospects for largest population of *S. b. ahoenobarbus* on Palawan were poor if the species were limited to relatively undisturbed lowland forest. Palawan still supports the highest percentage (59%) of forest cover of any of the larger islands in the Philippines, although almost all of the island's forests are subject to logging operations, despite their low commercial value (Quinnell and Bamford, 1988). Palawan is being rapidly deforested for timber extraction and agricultural expansion. The construction of logging roads has also

facilitated access to formerly remote areas, which, together with the depressed economy and relative high price of meat, has exacerbated hunting pressure and the increased use of such (non-traditional) hunting methods as pig bombs (McGowan, 1987). There is no information on the current status of these animals on Balabac, but a recent (February 1992) survey has revealed that they remain patchily distributed on each of the three principal islands of Busuanga, Culion and Coron in the Calamian Group (W. Oliver pers. comm.; Oliver and Villamor, 1993).

Conservation Action Taken

As far as is known, little or no action has been taken with the specific intention of conserving these animals anywhere within their range. In Sumatra and Peninsular Malaysia this is at least partly due to predominantly Moslem populations, which consider all pigs to be unclean and pay little attention to them. In addition, the distinction between *S. scrofa* and *S. barbatus* is seldom appreciated, and the relative abundance of the former has probably tended to obscure any declines in the populations of the latter.

In Peninsular Malaysia, the species survives in the Taman Negara National Park (4,343 sq. km), the only protected area that is likely to be large enough to support a viable population. In Sumatra, bearded pigs are known to occur in the large Kerinci-Seblat National Park (14,000 sq. km.) and in Berbak Game Reserve (175,000 ha), and they are likely to survive in some other protected areas, though surveys are needed to confirm this.

As previously stated, the Bornean *S. b. barbatus* remains widely distributed and it occurs in numerous protected areas in Kalimantan, Sarawak, Sabah and Brunei. In direct contrast, it remains uncertain whether the eastern subspecies, *S. b. ahoenobarbus*, even occurs in the only existing protected area within the core area of its range on Palawan, i.e. the relatively tiny St. Paul's Subterranean River National Park (3,590 ha) (Cox, 1988), though a small population (c. 150 individuals; J. Gapuz pers. comm. to W. Oliver) is protected in the Calauit Island Game Preserve and Wildlife Sanctuary (3,400 ha), off N. Busuanga in the Calamian Islands.

Captive Breeding

Bearded pigs have been exhibited only rarely in captivity, and few captive births have been recorded. In recent years, a trio of *S. b. oi* was kept in the Singapore Zoological Gardens, but these have since died without breeding. During the population eruption of 1983, many villagers in Sarawak obtained *S. b. barbatus* piglets by catching them from boats while they were swimming across rivers with their families. The main feature reported was how difficult it was to prevent the escape of these piglets, since they were easily able to climb out of pens designed to hold domestic pigs. A majority of the captives therefore escaped within a few days. A small numbers of *S. b. ahoenobarbus* are maintained in small zoos and private collections in the Philippines, though no attempts have yet been made to start a properly structured breeding program with any of these animals.

Conservation Measures Proposed: An Action Plan

Given the relatively wide, but highly fragmented distribution of this species in four countries, the varying conservation status of the currently recognized subspecies and various conservation problems confronted, any Action Plan for the species as a whole must address an array of socio-economic and ecological issues, as well as the more immediate research and management priorities, where these are known. In Borneo, for example, overall conservation priorities should be directed towards the deliberate management of dipterocarp forests for a variety of non-wood outputs (including game meat species, of which the bearded pig is probably the most important) as well as for wood production, rather than the promulgation of activities designed to benefit the wild pigs in particular.

The situation for the western subspecies, *S. b. oi*, in Sumatra and Peninsular Malaysia, and the eastern subspecies, *S. b. ahoenobarbus*, in the Palawan region, are more problematic than in Borneo. Both of these subspecies are already far less numerous than *S. b. barbatus* and their habitats are greatly reduced and increasingly fragmented. *S. b. ahoenobarbus* is probably the most sedentary of the three, but it also has by far the smallest range. In common with the Bornean race, it is also intensively hunted throughout its restricted distribution. By comparison, *S. b. oi* is not an important resource to local people (except perhaps to a few scattered aboriginal tribals) owing to the local predominance of Islam in Sumatra and Peninsular Malaysia, and there is therefore little perceived economic incentive to conserve it. However, this subspecies also differs from *ahoenobarbus* and *barbatus* in that it is naturally sympatric with wild *S. scrofa*, which is probably competitively advantaged by human-induced changes in the environment.

Nonetheless, the available information on these rarer forms is insufficient to enable intelligent recommendations at the present time, or even to identify the most important populations with a view to the development of management plans for their enhanced future protection. The foremost priorities for these taxa must, therefore, be directed towards field surveys and other basic research to determine, amongst other things, where they still occur, how far they move and why, which habitats are most critical, and whether or not they are able to survive in logged over forests.

The principal objectives and priority projects for this species can therefore be summarized as follows:

Objectives:

1. To initiate, or otherwise promote, further field status surveys and other studies on topics relevant to the future management needs of these animals.
2. To promote the enhanced future protection of the most threatened subspecies/populations by increasing the number and size of existing reserves, and/or the effectiveness of protective measures, in those key areas where the protected areas network is inadequate to ensure the survival of representative taxa/populations.

3. To design and implement particular, practical conservation management initiatives, including captive breeding, directed towards the most threatened forms, etc.
4. The promotion of conservation management policies designed to ensure the sustainable utilisation of wood and non-wood products, which would be of both direct and indirect benefit to game meat species, including the wild pigs.

Priority Projects:

1. Conduct field status surveys on Balabac, Palawan and associated smaller islands.

These surveys should be designed to complete the distribution and status survey recently initiated in the Calamian Islands, in order to determine the nature and magnitude of threats to the smallest subspecies, *S. b. ahoenobarbus*, which also has by far the most restricted range. These surveys should also be conducted with a view to the development of recommendations for the enhanced future protection of selected populations and, if necessary, the formulation of management strategies to enable the continued harvesting of these animals in non-protected areas on a sustainable basis. Particular priority should be given to the survey of Balabac, where any remnant populations are likely to be seriously threatened. This is not to understate the importance of main stronghold for this taxon on Palawan, where surveys are also urgently required, though field investigations are likely to be precluded by the presence of insurgents in some areas.

2. Field status surveys in selected parts of West (Peninsular) Malaysia, (northern) Sumatra, Bangka and the Riau Islands.

These surveys are required to determine the distribution and status of the western subspecies, *S. b. oi*, and the habitats in which they may be expected to survive in competition with the sympatric, *S. scrofa*. Further research on basic biological questions relevant to the future management of this subspecies should also be supported, particularly those relating to its habitat requirements, population movements, response to commercial logging activities, etc.

3. Assist the development of deliberate management policies in the remaining dipterocarp forests of Borneo for a variety of non-wood (e.g. game meat, of which *S. barbatus* is a predominate source) as well as wood outputs.

This is proposed as one feature of an 'Extended Variable Management System' for these forests (Caldecott, 1988b). Placing Bornean forestry on a sustainable basis, however, would demand fundamental reforestation at unprecedented cost to local economies. Failing a forestry investment program sufficiently intense to achieve an adequate rate of change, priorities for bearded pigs in Borneo revolve around maintaining protection in certain conservation areas, and expanding the communal forest system whereby intact forest areas are retained for the benefit of rural communities and, with them, local bearded pig populations.

4. Promote detailed, long-term investigations of the behaviour of known individual pigs in circumscribed study areas.

Such studies are necessary to resolve outstanding questions of social structure and home range use and are of direct relevance to the development of any management plans intended to ensure the maintenance of viable populations of this species over the longer-term and, hopefully, the perpetuation of their phenomenal population cycles and associated migratory behaviour.

5. Assist development of local conservation-education and applied research initiatives in selected, priority areas.

The historical, and in some places continued, significance of these pigs as a basic economic and cultural resource to many ethnic groups, and their potential value as classic 'indicator' species for forest management policy, is widely unappreciated or even countered by religious prejudice. These factors should be addressed by the production and distribution of conservation-education materials and the dissemination of information to relevant decision and policy making bodies. This process would be greatly facilitated by the promotion of more localized research into aspects of the biology, ecology and human utilisation of these animals, particularly in those areas where the species (for whatever reason) remains poorly known and/or where sympatry with *S. scrofa* occurs.

6. Promote development of properly structured captive breeding programmes for the rarest subspecies, *S. b. ahoenobarbus* and *S. b. oi*.

Although captive breeding is not thought likely to materially influence the survival prospects of these taxa in the near future, it may well constitute an important contribution over the longer-term, as well as providing a potentially invaluable resource for further research into various aspects of the species' biology and behaviour.

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