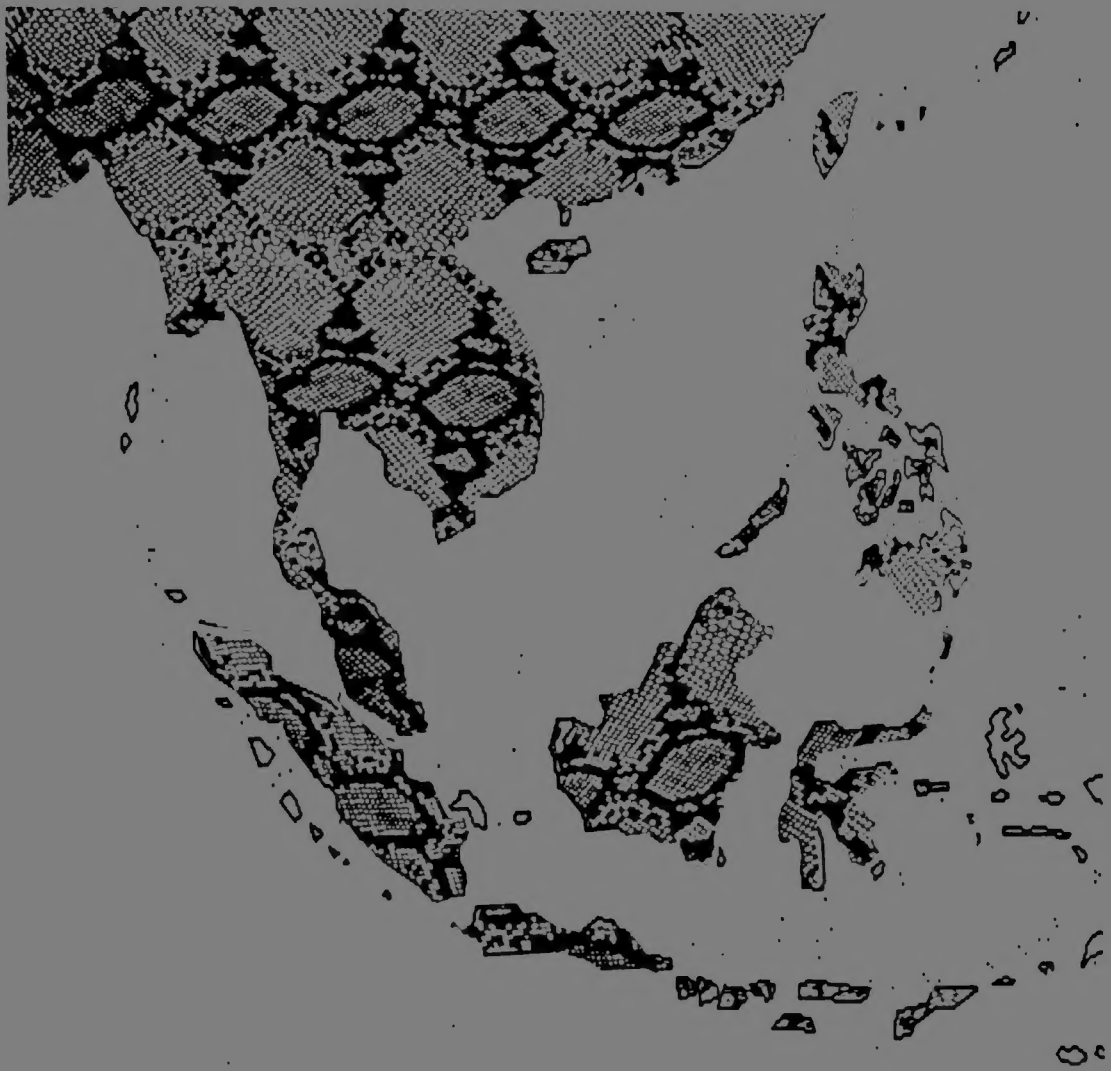
Pythons in South-East Asia

A review of distribution, status and trade in three selected species



B. Groombridge and R. Luxmoore

United Nations Environment Programme

Pythons in South-East Asia

A review of distribution, status and trade in three selected species

A report to the CITES Secretariat
August 1990

B. Groombridge and R. Luxmoore

World Conservation Monitoring Centre
219c Huntingdon Road, Cambridge CB3 0DL
United Kingdom

1991

Secretariat of the Convention on International Trade
in Endangered Species of Wild Fauna and Flora

A publication of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, Lausanne, Switzerland. 1991.

The publishers acknowledge the financial support of the Government of Japan.

This report was prepared under contract to the Convention on International Trade in Endangered Species of Wild Fauna and Flora by the World Conservation Monitoring Centre.

Cover design: Doris Aeberli

CONTENTS

1. *Python curtus*

The Blood Python occurs in extreme south-east Thailand, Malaysia (West Malaysia, Sabah, Sarawak) and Indonesia (Bangka, Sumatra, Kalimantan). The species is listed in Appendix II of CITES but does not appear in the 1988 IUCN Red List of Threatened Animals.

There is no recent adequately documented information on population status or trends in any part of the range. The species is said to be rare in Thailand, infrequently seen although not necessarily uncommon in West Malaysia, and relatively rare in Sabah and Sarawak. It can be inferred that *Python* populations in Indonesia have locally been adversely affected by intensification of the snakeskin trade, but there is no specific information on *P. curtus*.

Virtually all *P. curtus* skins in trade derive from Indonesia, primarily from northern Sumatra with much smaller numbers from south Sumatra and Kalimantan. Indonesia's annual CITES reports indicate export of around 38 000 skins in 1986, 25 000 in 1987, and 150 000 in 1988. An increase in the price fetched by skins appears to have caused the recent increase in volume. Dealers reported that prices and exports had fallen in 1989, the latter to 75% of the 1988 volume. These trends parallel those apparent in *P. reticulatus* (see below). No capture quota was allocated prior to 1986 and no export was recorded although an unknown quantity of skins was probably traded as '*P. reticulatus*'. Exports appear to have been underestimated in CITES reports.

The species is relatively short (rarely exceeding 2 m) and stout-bodied, ground-dwelling, and has a much smaller clutch size (rarely more than 12) than congeneric species.

2. *Python molurus bivittatus*

The species ranges from parts of eastern Pakistan through the remainder of the Indian sub-continent, including Sri Lanka, eastward through much of South-east Asia to southern China; to the south, there are isolated populations on Java, Sumbawa and Sulawesi. The species appears to be absent from the Malay Peninsula and Sumatra, but there are unconfirmed reports of its occurrence on Borneo. Two subspecies are usually recognised: the nominate form *P. m. molurus* (or Indian Python), centred on the Indian sub-continent, and *P. m. bivitattus* (or Burmese Python), from south-east Bangladesh and Myanmar (Burma) eastward. *Python m. molurus* is categorised 'Vulnerable' in the 1988 IUCN Red List and is in CITES Appendix I; *P. m. bivitattus* is not currently in the Red List and is in CITES Appendix II. There is good evidence that populations of *P. m. molurus* in India and Bangladesh have declined significantly, and reasonable evidence for some degree of decline in Pakistan, Sri Lanka and Nepal. There is little recent documented information on population status or trends in any part of the range of *P. m. bivitattus*; undocumented reports indicate local decline in Laos, Myanmar (Burma) and Thailand, and, although there is no specific

information on *P. molurus*, it can be inferred that other *Python* populations in Indonesia have locally been depleted by intensification of the snakeskin trade.

Estimates derived from CITES annual reports for 1980-1987 of minimum net imports of *P. molurus bivittatus* skins range from a low of 22 000 in 1980 to a high of 189 000 in 1985; these figures do not include shipments reported in terms of length, area or weight, and so will underestimate the true volume.

Most *P. molurus* skins in reported international trade are exported from Thailand, with significant amounts from Viet Nam in recent years. A substantial proportion of skins exported from Thailand (perhaps more than 50% of those sold in Bangkok), are said to originate from Cambodia and Laos. Few skins are reported to have come from Indonesia since 1984; the species is protected and export permits have not been issued. Thailand's annual CITES reports indicate export of around 73 000 *P. m. bivitattus* skins in 1984, rising to around 188 000 in 1985 and falling to 35 000 and 57 000 in 1986 and 1987. The species has been protected in Thailand since 1985 and this appears to have caused the decline in exports. Exports from Malaysia have shown a corresponding increase and this is believed to indicate illegal trading skins originating in Thailand.

This is a large and heavily-built python, occasionally up to 6 m in length; maturity is attained at around 2.5 years, at a length of 2.5-3 m; typical clutch size is around 35, but can rise to around 100 in older females.

3. ***Python reticulatus***

The Reticulated Python ranges from western Bangladesh (and possibly adjacent parts of north-east India) south and east through most of mainland South-east Asia, almost throughout Indonesia (absent from New Guinea), also Sarawak, Sabah, and the Philippines. The species is listed in Appendix II of CITES but does not appear in the 1988 IUCN Red List of Threatened Animals.

There is reasonable evidence for significant decline in Bangladesh, and the species is reported to be depleted locally over much of the remainder of the range, including Indonesia, Laos, Malaysia, Myanmar and the Philippines. In Indonesia, traders generally report little decrease in the availability of *P. reticulatus* skins, but to some extent this is because the area in which snakes are captured is continually expanding, and more people are involved in collecting.

By far the greatest proportion of skins in trade originate from Indonesia. Thailand is second in importance as a source of skins, and Malaysia third, followed by the Philippines. Singapore re-exports a very large number of skins originating in nearby countries and most of these appear also to derive from Indonesian populations. Snake skins are exported mainly from Sumatra, Java and Kalimantan and this to some extent reflects the source of

skins; an increase in the proportion of the total that is exported from Java is a consequence of the increasing importance of large exporters based in Jakarta and a decrease in exports direct from the provinces.

Estimates of minimum net imports of *P. reticulatus* skins derived from CITES annual reports indicate an overall increase in volume from around 118 000 in 1980 to around 460 000 in 1987; these figures do not include shipments reported in terms of length, area or weight, and so will underestimate the true volume. A significantly larger number of skins is specified on export permits issued to traders by PHPA; some 200 000 in 1986, rising to around 300 000 and 700 000 in the following two years, and falling to 550 000 in 1989. It is probable that the export permit data are a more accurate indication of export volumes than the CITES annual report data. The very recent decrease in export volume appears to reflect a fall in demand caused by high prices.

4. *Python reticulatus* provides the great majority of Asian python skins in international trade. The mean live length of the snakes involved is around 2.5 m; maturity appears to be attained at a length approaching 3 m (although available data relate to captive specimens). The skin trade is thus having an impact primarily on immature animals close to maturity. It may be that these animals comprise the most abundant size class, or are the most susceptible to collecting, but their value in reproductive terms to the population is not known and the impact of harvesting thus cannot be assessed.

5. Field techniques for routine monitoring of the status of snake populations have not yet been developed, with the exception of those applied to a small number of temperate zone species with strongly seasonal patterns of activity. Assertions concerning the status of Asian pythons are thus often based upon unquantified and unverifiable evidence, and current data on *Python* population dynamics and status do not provide an adequate basis for scientific management.

6. Available evidence indicates that many populations of the three *Python* species discussed herein have been adversely affected by a combination of habitat loss and collection for international trade. None of the species appears to be threatened with extinction in the immediate or near future. Appropriate management is required in order to help ensure that populations of target species are maintained as elements of the biological diversity of the region, and that harvesting is carried out in a sustainable manner. The opinions of those with considerable experience in the field or in the trade have the potential to give a valid indication of population trends. It is thus strongly recommended that an extended examination of collecting areas and practices, and of the volume of skins entering trade in relation to the intensity of collecting effort, be carried out in order to allow reasonable management regimes to be developed.

OBJECTIVES, METHODS, BACKGROUND

This study was undertaken by the World Conservation Monitoring Centre, under contract to the Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Work commenced in the latter part of 1989 and was largely completed by February 1990 with final text produced in July 1990.

Project title

Survey of the population and trade status of the Blood Python *Python curtus*, the Indian Python subspecies *P. molurus bivittatus* and the Reticulated Python *P. reticulatus* in South-east Asia, with emphasis on Indonesia.

Objectives

(i) To collect and collate the best available data relating to the status and distribution of the above named taxa, with emphasis on Indonesia.

(ii) To collect local, internal, and external trade data in Indonesia, and, so far as possible, in Malaysia, Singapore, and Thailand, and other countries within the range.

For the sake of completeness, we have also provided below a selection of available data concerning distribution and population status of *Python molurus molurus*, although this taxon is not one of the primary subjects of the present report.

Methods

A wide variety of published and unpublished literature has been reviewed, along with personal communications from relevant sources. Visits were made to government authorities and other organisations, including major reptile skin traders, in Indonesia, Singapore and Thailand.

Background

The family Boidae has been listed in the Appendices to CITES since 1975, when the Convention first came into effect; all boid species were considered to be threatened significantly by international trade, either directly or indirectly (as 'look alike' species). A small number of taxa, regarded as threatened with extinction and hence requiring the strictest possible protection from the pressures of international trade, currently appear on Appendix I; the remainder are listed on Appendix II.

A few boid taxa appear in the 1988 IUCN Red List of Threatened Animals; in each case, however, this is a direct and uncritical continuation of listings made in earlier editions of the IUCN Red Data Book, sometimes dating back to 1975. The conservation status of the family as a whole has not been subject to more

recent and more comprehensive analysis, and the existing Red List designations should not be regarded as in any sense definitive.

A recent review of status and trade trends in selected species listed on CITES Appendix II (Luxmoore *et al.*, 1988) found cause for concern over recent international trade levels and trends in the Asian species *Python curtus*, *P. molurus*, and *P. reticulatus*, and the African *P. sebae* (also the Neotropical boids *Boa constrictor*, *Eunectes murinus* and *E. notaeus*). This assessment led to recognition of a need for the present more detailed study.

The CITES and Red List designations accorded to species of the family Boidae are summarised in Table 1.

Table 1. Summary of current position of boid snakes on the Appendices of CITES and in the IUCN Red List. Taxa above the dotted line are the main subjects of the present report.

Taxon	CITES Appendix	IUCN Red List status
Python curtus	II	-
Python molurus bivittatus	II	V
Python reticulatus	II	-
.....		
Acrantophis spp.	I	K
Boa constrictor occidentalis	I	-
Bolyeria multocarinata	I	E
Casarea dussumieri	I	E
Epicrates angulifer	II	I
Epicrates inornatus	I	E
Epicrates monensis	I	E/R
Epicrates striatus fosteri	II	R
Epicrates subflavus	I	V
Python molurus molurus	I	V
Sanzinia madagascariensis	I	K
all remaining Boidae	II	-

THE FAMILY BOIDAE: GENERAL REMARKS

Systematics and distribution

Although the taxonomic position of several species and species-groups remains uncertain, approximately 85 extant species are traditionally regarded as members of the family Boidae (*sensu lato*); some 26 of these are included in the subfamily Pythoninae ('pythons') (see Underwood and Stimson, 1990). The world distribution of pythons, on one hand, and remaining boids (loosely termed 'boas'), on the other, is largely complementary. Boas occur in South and Central America, the islands of the Caribbean, on Madagascar, on New Guinea and other west Pacific islands, and there is a group of burrowing forms in arid parts of the Old World. True pythons occur in sub-Saharan Africa, South and South-east Asia and Australasia. The curious distribution of the boas is paralleled in part by the lizard family Iguanidae (Americas, Madagascar, west Pacific).

Morphology

Extant boas and pythons retain a number of features considered primitive among snakes. These include (among others): a robust cranial structure (including coronoid and postfrontal bones), a relatively large left lung, and vestiges of a pelvic girdle. All these features are lost in higher snakes. Fossil boids of Cretaceous age are known, confirming the antiquity of the group. The living species range in length from under half a metre, in the case of some of the dwarf boas (from the Greater Antilles and parts of mainland Central and South America), to, exceptionally, around 10 m, in the case of the Anaconda *Eunectes murinus* (South America) and the Reticulated Python *Python reticulatus* (South-east Asia).

Habitat

Some are truly fossorial species, many are surface dwelling forms; some are strictly arboreal, some are highly aquatic. The burrowing species mainly occupy warm desert areas; the remainder are more or less tropical in distribution, and variously inhabit tall grassland, open scrub woodland, seasonal forest, rain forest, and swampland. Many species appear to favour the vicinity of waterways and wetland margins. Where not unduly persecuted, some species occur around human habitations, where associated rodents or domestic animals are preyed upon.

Diet

Small to medium sized mammals are generally a mainstay of the diet, while some species, mainly arboreal in habit, take a high proportion of birds (or even bats), the teeth of these species tend to be longer and with a double curvature, in order to increase their chances of maintaining a firm grip on such elusive prey. Many species possess sensory pits, either within (pythons) or between (boas) the scales bordering the upper lip; these pits

are sensitive to changes in infra-red radiation, and assist with orientation during prey location and capture. Uniquely, the Central American species *Loxocemus bicolor* has been recorded to consume eggs of Olive Ridley *Lepidochelys olivacea* sea turtles during a mass nesting emergence in Costa Rica (Mora and Robinson, 1984).

Movements and feeding

All use well-developed powers of constriction to immobilise prey; all can be active searching predators, although many often use 'sit-and-wait' tactics to ambush prey animals. Quantitative field studies of feeding habits are few. In the Australian python species *Morelia spilota*, adult snakes tend to move by day into ambush sites used at night (Slip and Shine, 1988a). In the similarly-sized Neotropical boa species *Boa constrictor*, one radio-tracked individual was found to be mostly inactive and to move from hole to hole every three days or so; this snake moved only 135 m over 12 days (Montgomery and Rand, 1978). The inference was made that prey would be captured either when the mammalian occupant of the burrow returned, or when animals could be seized while passing the mouth of the burrow (Montgomery and Rand, 1978). As Greene (1983) put it, it seems that boas actively search for good places to sit and wait; this generalisation may apply to many pythons also.

In the only published quantitative study of habitat use and movement patterns in a python, Slip and Shine (1988b) showed that individual snakes occupy a relatively large home range; home ranges are variable between the sexes and the seasons, and overlap significantly. The largest recorded range comprised an area of 124 ha in one male, with mean values of 52 ha for males and 27 ha for females (minimum polygon method). Males move relatively long distances during the springtime mating period. During summer and autumn, snakes were most frequently found in disturbed habitats, including the vicinity of houses, apparently because of increased availability of rodent prey animals.

Information on feeding habits of the three python species covered in the present report derives mostly from anecdotal observations, reviewed in the appropriate section below. There is no information available, quantitative or anecdotal, on movement patterns and home range occupancy in these python species; these parameters require investigation.

Reproduction

Boas are typically viviparous; pythons oviparous. In certain python species, the breeding female broods her eggs, perhaps partly to aid concealment and deter predators, and partly to help maintain suitable temperature levels in the developing eggs.

PYTHONS IN ASIA

The true pythons comprise the Australian genus *Aspidites* (two species), the Australasian genus *Morelia* (17 species, including several forms previously referred to *Chondropython, Liasis* and *Python*), and seven species of python. An additional two secretive species of uncertain taxonomic position, one in Central America, one in West Africa, may have affinities with true pythons.

The seven species currently referred to the genus *Python* are distributed as follows:

Africa	*P. anchietae, P. regius, P. sebae*
South and South-east Asia	*P. curtus, P. molurus, P. reticulatus, P. timoriensis.*

The world distribution of the three Asian *Python* species is shown in generalised form in Maps 1-3. The fourth species, *P. timoriensis*, is localised (limited to Flores and Timor), extremely poorly-known, and is not a subject of this report. It is important to note that these maps are based solely on published sources, and no attempt has been made to verify literature records or to gather new locality data from museum specimens. The boundaries of the distribution areas indicated are in places somewhat conjectural; furthermore, distribution is certain to be uneven within these areas, and species may be absent from significant portions of the overall suggested range because of lack of suitable habitat or anthropogenic changes to preferred habitats. The distribution of these three species is listed in Table 2.

Australasian Pythons in Indonesia

Although one or more of the above three Asian species of python (*P. curtus, P. molurus, P. reticulatus*) may be present in countries of mainland South and South-east Asia, and over the greater part of Indonesia, several additional Australasian python species, mostly assigned to genera other than *Python*, occur on the island of New Guinea and adjacent areas. These species are enumerated in Table 3.

Table 2. World distribution of three Asian species of python: *Python curtus*, *P. molurus* and *P. reticulatus*. See text for further details and sources.

	P. curtus	*P. molurus*	*P. reticulatus*
Bangladesh	-	+ (b/m)	+
Bhutan	-	? (m)	-
Brunei	? (t)	(?)	+
Cambodia	-	+ (b)	?
China	-	+ (b)	-
Hong Kong	-	+ (b)	-
India			
mainland	-	+ (m/b?)	(?)
Nicobar Is.	-	-	+
Indonesia			
Sumatra	+ (c/g)	(?)	+
Java	-	+ (b)	+
Kalimantan	+ (t)	(?)	+
Sulawesi	-	-	+
'Lesser Sundas'	-	-	+
'Moluccas'	-	-	+
Laos	-	+ (b)	+
Malaysia			
West Malaysia	+ (g)	(?)	+
Sabah	+ (t)	(?)	+
Sarawak	+ (t)	(?)	+
Myanmar (Burma)	-	+ (b)	+
Nepal	-	+ (m)	-
Pakistan	-	+ (m)	-
Philippines	-	-	+
Singapore	(?)	-	+
Sri Lanka	-	+ (m)	-
Thailand	+ (g?)	+ (b)	+
Viet Nam	(?)	+ (b)	+

Key: + = present, - = absent; ? = probably present, but unconfirmed; (?) = possibly present, reports old or suspect; in *curtus* column (c) = subspecies *curtus*, (g) = subspecies *brongersmai*, (t) = subspecies *breitensteini*; in *molurus* column (b) = subspecies *bivittatus*, (m) = subspecies *molurus*.

Table 3. Australasian boas and pythons present in Indonesia (excluding *P. curtus*, *P. molurus* and *P. reticulatus*, treated above), noting distribution in Indonesia and occurrence in adjacent countries. Taxonomy follows Underwood and Stimson (1990) (and see Smith, 1985, and Storr *et al.*, 1986).

Candoia aspera (syn. *Enygrus asper*) Papuan Ground Boa
Indonesia: Moluccas, Irian Jaya
Papua New Guinea

Candoia carinata (syn. *Enygrus carinatus*)
Indonesia: Moluccas, Kep. Sangihe, Kep. Talaud, Irian Jaya
Palau, Papua New Guinea, Solomon Is.

Morelia albertisii (syn. *Liasis albertisii*) D'Albertis' Python
Indonesia: Irian Jaya
Australia (Torres Straits Is.), Papua New Guinea

Morelia amethistina (syn. *Liasis* or *Python amethistinus*) Amethystine Python
Indonesia: Timor, Moluccas, Irian Jaya
Australia (Torres Straits Is., Cape York Peninsula), Papua New Guinea

Morelia boeleni (syn. *Liasis* or *Python boeleni*) Boelen's Python
Indonesia: Irian Jaya
Papua New Guinea

Morelia fuscus (syn. *Liasis fuscus*) Water Python
Indonesia: Timor ?, Moluccas, Irian Jaya
Australia, Papua New Guinea

Morelia mackloti (syn. *Liasis mackloti*)
Indonesia: Timor (and adjacent islands), Irian Jaya ?
Australia, Papua New Guinea

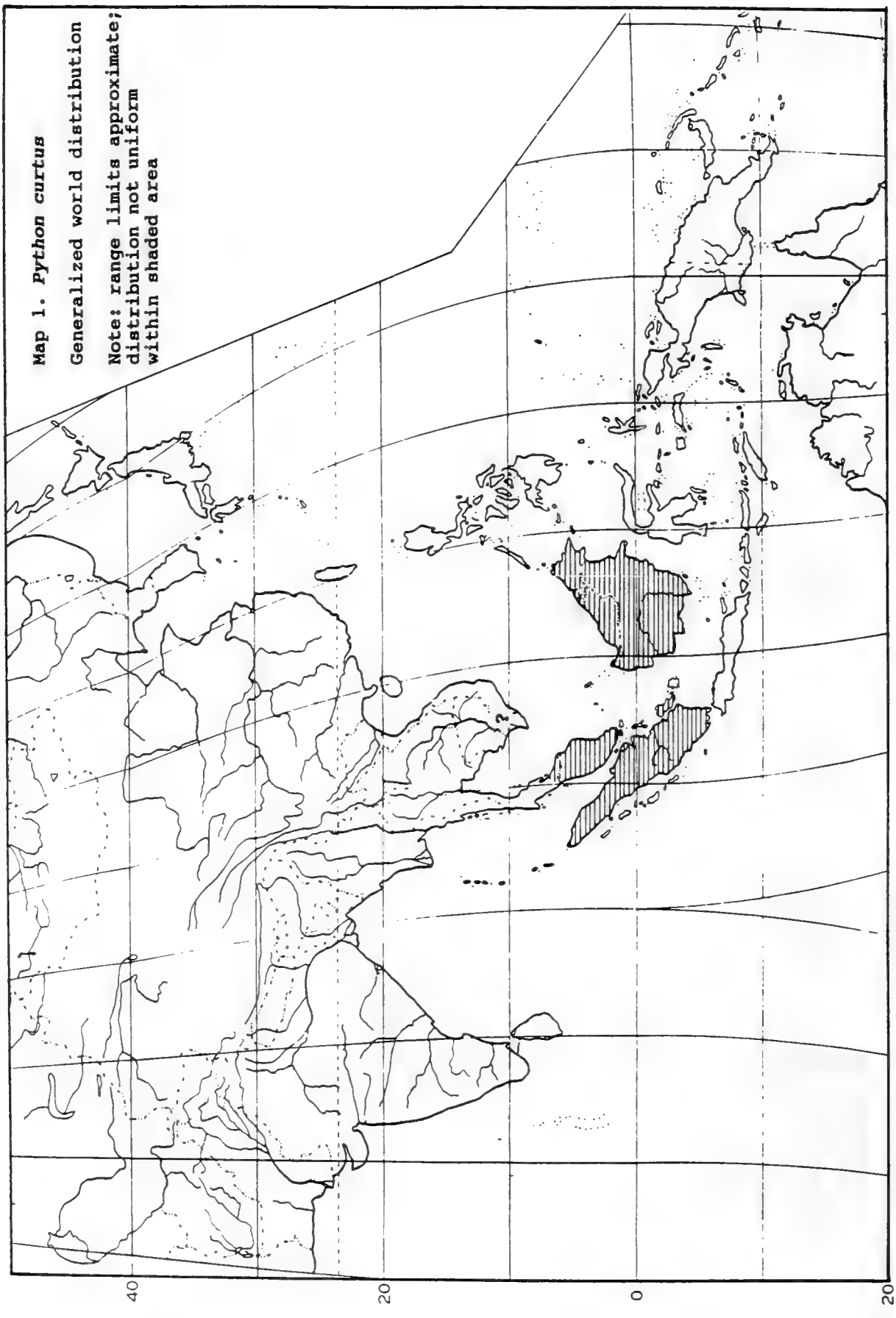
Morelia papuana (syn. *Liasis papuanus*) Papuan Python
Indonesia: Irian Jaya
Papua New Guinea

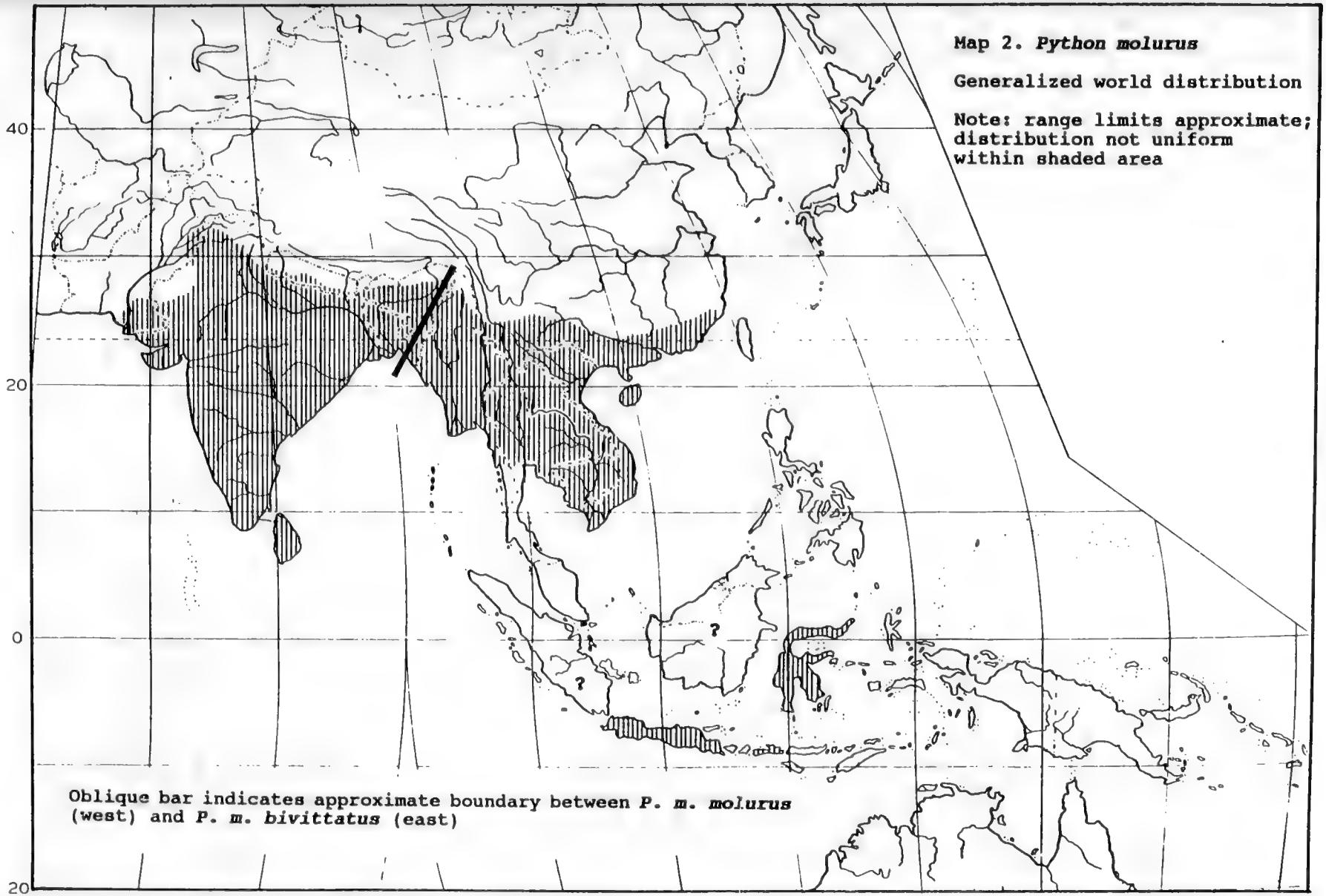
Morelia spilota (syn. *Python spilotes*) Carpet or Diamond Python
Indonesia: Irian Jaya
Australia, Papua New Guinea

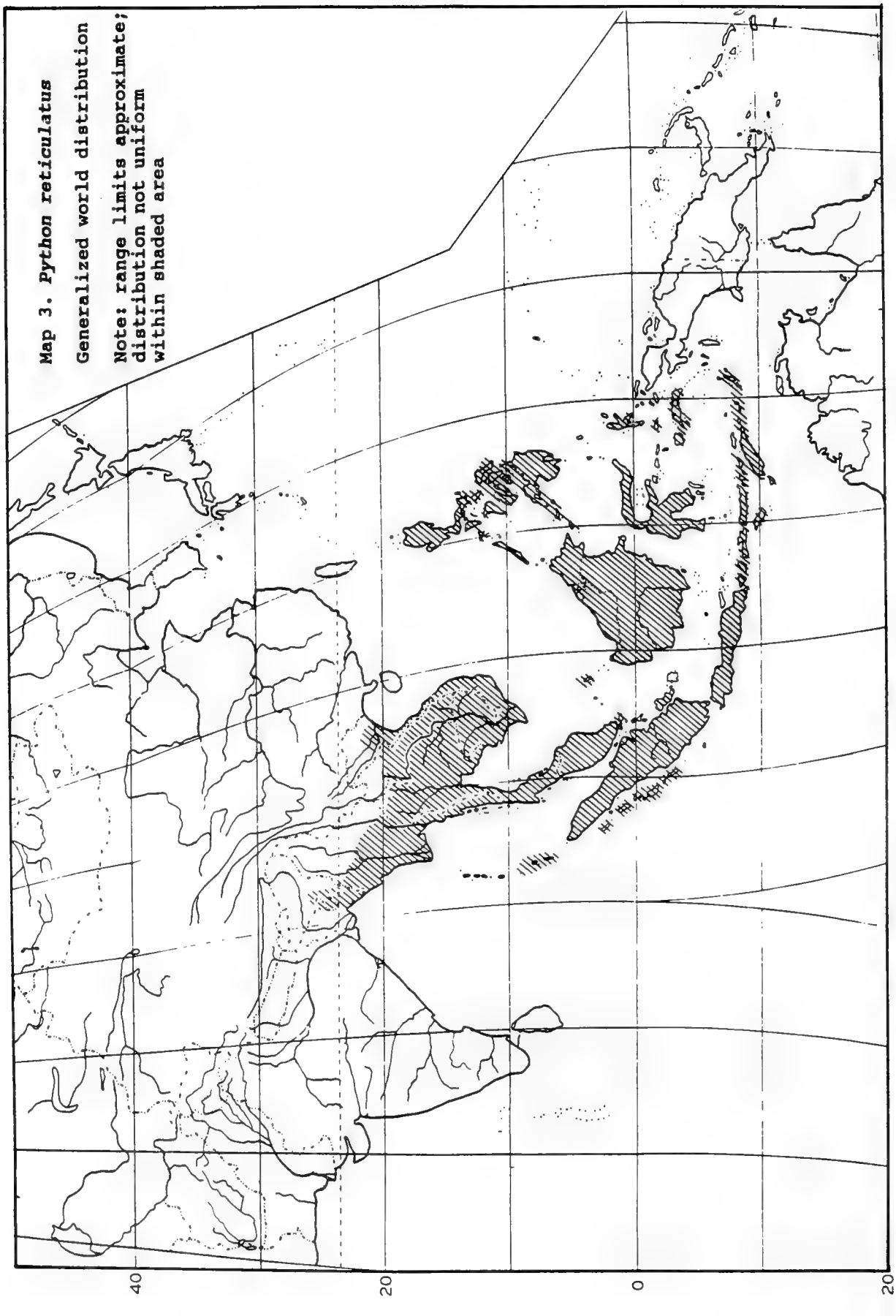
Morelia viridis (syn. *Chondropython viridis*) Green Tree Python
Indonesia: Irian Jaya
Australia, Papua New Guinea

Python timoriensis (syn. *P. timorensis*) Timor Python
Indonesia: Flores, Timor (endemic species)

Several of these are present in Irian Jaya and a very few extend to other parts of eastern Indonesia; such species are at times involved in international trade as live animals and perhaps as skins. According to Mattison (1988) there is currently a good deal of interest among pet-keepers in the less familiar pythons of Indonesia and the South Pacific; he notes that species such as *Python timoriensis* and *Morelia boeleni* (*Python boeleni*) are highly sought after.


Map 1. *Python curtus*
Generalized world distribution
Note: range limits approximate; distribution not uniform within shaded area
40
20
0
20


Map 2. Python molurus
Generalized world distribution
Note: range limits approximate; distribution not uniform within shaded area
40
20
0
20
?
?
Oblique bar indicates approximate boundary between P. m. molurus (west) and P. m. bivittatus (east)


Map 3. Python reticulatus
Generalized world distribution
Note: range limits approximate; distribution not uniform within shaded area
40
20
0
20

TAXONOMIC COMMENTS

Python curtus Schlegel, 1872

Stull (1938, and see Stull, 1935) recognised three subspecies of *P. curtus*. These comprise: the nominate form *P. c. curtus* on Sumatra, *P. c. breitensteini* Steindachner 1880 on Borneo, and *P. c. brongersmai* Stull 1938 in the Malay Peninsula.

Subsequently, Brongersma (1947) pointed out that one of the three scalation characters supposedly differentiating *P. c. curtus* from *P. c. brongersmai* (number of supraocular scales) was not reliable, and that specimens fitting the description of mainland *P. c. brongersmai* were to be found on Sumatra and Banka. Two seemingly distinct populations thus occur on Sumatra. Regional differences in colour pattern were not apparent from the material at hand. Two characters still provided a valid distinction between the two forms: *P. c. curtus* has a lower ventral count (152-156) and subocular scales separating the orbit from the supralabial scales; *P. c. brongersmai* has a higher ventral count (168-174) and no subocular scales (two supralabials usually enter the margin of the orbit).

Brongersma (1947) concluded: "it is as yet impossible to indicate sharply defined areas in Sumatra for each of these two subspecies ... future collecting will have to show whether ... some overlapping occurs". No such investigation has since been carried out. Sumatran specimens discussed by Brongersma were from the following localities: *P. c. curtus* (1) the type, apparently from the Padang Highlands, (2) Mt Kabor in the Padang Highlands, (3) Kaba Wetan, an estate near Kelobak, Kepahiang, in Benkulu; *P. c. brongersmai* (1) Medan, (2) several from 'Deli', (3) one from 'north-east Sumatra', (4) Tinjoang estate, Sungei Bedjangkar, Assahan, north-east Sumatra, (5) Kuala Simpang, south-east Atchin, north-east Sumatra, (6) Siolak Daras, Korinchi valley, west coast. Non-Sumatran specimens came from Bangka (Indonesia) and from Port Dickson, Negeri Sembilan (West Malaysia).

Although only few locality data are available, the apparent ranges of the taxa *P. c. curtus* and *P. c. brongersmai* do not overlap. The published Sumatran localities for *P. c. curtus* appear to be restricted to hill areas along the western coast, while records of *P. c. brongersmai* seem to be mainly from the lowland eastern side of the island.

Reptile skin dealers in Sumatra generally recognise two distinct colour pattern variants of *P. curtus*, and it is possible that these correspond to the two named subspecies, the trunk patterns of which have not yet been analysed systematically. See the Indonesia account, below, for further discussion. The brown colour variety is generally more prevalent in the south of Sumatra while the red form is found mostly in the north. The species is known by skin traders in Sumatra as 'Rock Python'; this stands in contrast to the Malay name for the species, which translates as 'Blood Python', an allusion to the rich brown or

reddish colour of Malay specimens. On the other hand, Mattison (1988) noted that the specimens most attractive to pet-keepers, those suffused entirely with brick-red or carmine, appear to originate from Sumatra. The red form is apparently absent from Kalimantan, where the colour is described by traders as brown or yellowish. Further investigation into the systematics of *P. curtus* would be of value.

Python molurus (Linnaeus, 1758)

Populations of *P. molurus* centred on the Indian subcontinent are assigned to *Python molurus molurus* (Indian Python, CITES Appendix I); populations from Myanmar (Burma) eastwards are assigned to *P. m. bivittatus* Kuhl 1820 (Burmese Python, CITES Appendix II). Some authorities working around the turn of the century treated each of these two populations as distinct species. The population on Sri Lanka has on occasion been regarded as sufficiently distinct to warrant subspecific status, as *P. m. pimbura*. This is not the consensus view, and the population is generally assigned to *P. m. molurus*, although some Sri Lankan *molurus* tend to resemble *P. m. bivittatus* in certain aspects of trunk pattern and coloration, whilst sharing scalation features with *P. m. molurus*. Constable (1949) regarded the observed differences as within the expected bounds of individual variation, not indicative of inter-population differentiation.

Several characters supposedly distinguish *Python molurus molurus* and *P. m. bivittatus*. The former lacks subocular scales (thus the labial scales border the orbit), the lance-shaped mark on the dorsal surface of the head is distinct only posteriorly, and the ventral scale count ranges from 253 to 270; the latter possesses labial scales, has the head markings distinct throughout, and a slightly wider ventral scale range (245-270) (Smith, 1943). Individuals from the Indian subcontinent (*P. m. molurus*) are typically lighter in overall coloration than those from South-east Asia (*P. m. bivittatus*); the former are sometimes referred to as 'light phase', the latter as 'dark phase'.

Smith (1943) stated that *P. m. molurus* ranges east to Bengal (i.e. including present-day Bangladesh) and that *P. m. bivittatus* occurs throughout the 'Indo-Chinese subregion'. Smith included Nepal and north-east India in his 'Indo-Chinese subregion', but it is not clear if he intended explicitly to include these areas within the range of *P. m. bivittatus*; on the contrary, animals from throughout the sub-continent, including Nepal, are typically regarded as belonging to the nominate form (Stimson, 1969).

However, de Rooij (1917) had earlier examined numerous living and preserved specimens of *P. molurus*, and noted that, whilst the distinction between lighter and darker groups held true, a number of specimens were to some extent intermediate in respect of scalation features. For example, one specimen from Assam (north-east India), although light coloured as in *P. m. molurus*, had the dark head marking distinct throughout and a series of suboculars, both features of *P. m. bivitattus*. This suggests some difficulty

in distinguishing one subspecies from the other in the zone of contact, or intergradation, between them. Although many authorities support the use of trinomials, very few specimens from the supposed contact area of *molurus* and *bivittatus*, in north-eastern parts of the Indian subcontinent, have been examined, and the boundary between the two forms cannot at present be precisely delineated.

The south-west Bangladesh population has been referred to *P. m. bivittatus* (Kock and Schröder, 1981), and Bangladesh would thus appear to hold populations assignable to both subspecies of *P. molurus*.

Python reticulatus (Schneider, 1801)

No subspecific taxa are currently recognised.

POPULATION STATUS

Limitations of available data

No detailed published information on numbers, density or trends, nor on the effects of exploitation, is available for python populations anywhere in South-east Asia. Such published information as is available is frequently old and generally anecdotal in nature, although not without value.

The general lack of published data of this kind is not surprising. Typically, it is difficult or impossible routinely to observe significant numbers of individuals of a given snake species, and more so to capture them for measurement, or assessment of reproductive condition, for example. Most snakes are both secretive and elusive; their appearance is often highly seasonal and often highly correlated with particular weather conditions. With few exceptions, it is thus very difficult to assess the status of snake populations, and exceedingly so to monitor changes in status over time.

In the case of snake species that are regularly utilised by man, it is probably reasonable to place some credence in the opinions of those whose way of life brings them into close contact with snakes; the tribal who eats python meat on occasion and lives permanently in python habitat, or the reptile collector whose livelihood depends on finding reptiles, might be expected to have an insight into the long-term local status of his prey species that cannot be attained directly by the short term academic researcher. Such insights generally remain unrecorded.

The opinions given below, on python abundance and alleged population trends, are at best based on observations which, whilst sometimes casual or accidental, were at least accumulated over long periods spent in appropriate habitats. Some statements were recorded 50 or 100 years ago, and are of mainly historical interest, but are included here because they present the possibility of cautiously estimating long-term changes in

abundance. Some statements clearly rely heavily on reports received from others rather than on the personal experience of the writer cited. Informal terms used to describe relative abundance, such as "common" or "rare", may be used in different senses by different people. The fact that more specimens of one species than of another were received at a given research institute means simply that the former species is more frequently encountered by people, presumably because of differences in habitat type or activity patterns.

These data limitations combine to ensure that it is as yet impossible to propose detailed management strategies for particular python species. We recommend that longer term projects be undertaken, with emphasis on developing appropriate quantitative field survey techniques, and on intensive gathering of local knowledge from reptile collectors and traders. By far the majority of Asian python skins in trade originate from Indonesia, where python species constitute a natural resource of marked economic significance, and priority should thus be given to further work in that country.

Population trends: a summary

Table 4, which attempts to summarise information presented in the country accounts, highlights the virtual absence of detailed and reliable population data.

Whilst detailed information on population trends is typically unavailable, probable changes in distribution area, which in turn implies loss and fragmentation of local populations, can sometimes be estimated. In some countries, India for example, wild habitats have been very substantially modified over centuries of human occupation, and the overall area used by pythons will presumably have been contracting during this period. In other cases, Bangladesh for example, evergreen hill rain forest appears to have remained largely unmodified until the present century, and contraction in the range of *Python reticulatus*, which inhabits this forest type, will have been correspondingly recent.

Although python populations in several countries appear to have suffered some degree of decline in recent decades, it is rarely clear to what extent this can be attributed mainly to habitat changes, on one hand, or to direct exploitation of pythons, on the other. Even in countries such as Malaysia and Indonesia, where pythons have been exploited for the skin trade since the 1920s, or utilised for food or medicinal purposes for centuries, it appears that pythons can flourish locally although seemingly depleted elsewhere.

It can reasonably be inferred that collecting for the skin trade has adversely affected the status of python populations in parts of Indonesia. Whilst the supply of skins has in general remained steady, this appears to have been possible only because many more people are now collecting snakes and their activities are

geographically far more widespread. On the other hand, it seems that pythons remain reasonably abundant in more remote areas not subject to intense collection pressure.

An additional factor, the importance of which cannot yet be evaluated, is that skins entering international trade routes sometimes originate in countries adjacent to the declared country of origin; for example, a significant proportion of skins exported from Thailand is said to enter undeclared from neighbouring Cambodia and Laos. The implication of this is that python populations in all accessible parts of South-east Asia are likely to be affected by the skin trade to some extent.

The number of skins in international trade in recent years does give cause for serious concern, even though the long-term impact on python populations cannot be quantified. Although it is most unlikely that python populations in the region could be extirpated so long as extensive tracts of suitable habitat persist, it remains entirely possible that populations could decline to the point where they no longer constitute a resource of any significance. For this reason, and in the more general interest of maintaining regional biodiversity, it is considered necessary to undertake more intensive local investigations into the status of python populations in countries supplying skins to the international trade.

Table 4. Estimated recent population trends in three Asian species of python: *Python curtus*, *P. molurus* and *P. reticulatus*. See text for further details and sources.

	P. curtus	*P. molurus*	*P. reticulatus*
Bangladesh	-	<<	<<
Bhutan	-	?	-
Brunei	?	(-)	?
Cambodia	-	?	?
China	-	?	-
Hong Kong	-	?	-
India	-	<<	?
Indonesia	?	?	<
Laos	-	<	<
Malaysia	?	(-)	<
Myanmar (Burma)	-	<	<
Nepal	-	<	-
Pakistan	-	<	-
Philippines	-	-	<
Singapore	(-)	-	?
Sri Lanka	-	<	-
Thailand	?	<	?
Viet Nam	(-)	?	?

Key: - = species absent; (-) = species probably absent; ? = no significant information suggesting population decline; < = local or poorly-substantiated wider decline; << = significant decline, reasonably well-substantiated.

HABITAT

Python curtus

The preferred habitat is variously cited as swampy country (De Rooij, 1917), swamp forest (Bain and Humphrey, 1982), and heavy jungle along watercourses (Reitinger, 1978). Mattison (1988) stressed that this species requires high humidity and high temperature in order to thrive in captivity, which is consistent with reported wild habitats. In West Malaysia *P. curtus* has been found in the same kinds of habitat as *P. reticulatus*: along streams, on the forest floor, and in secondary growth. On the other hand, traders in Sumatra assert that at least one colour variant of the species occurs mainly in rocky hills giving it the local name of "Rock Python" (Luxmoore, pers. obs.). The species is also associated with palm plantations in Sumatra.

Python molurus

May be found in a variety of habitats, but appears to prefer wooded areas, ranging from evergreen forest to more open deciduous woodland; occurs "in the interior of the densest forest tracts, or in sparser forest growth such as that which clothes the rocky slopes of many low hills" (Wall, 1912). Known localities often include rock outcrops or hollow trees used for shelter and nesting, and typically will include still or flowing permanent water. The species may also be found in the vicinity of rivers, lakes or marshy areas, most especially where woodland is absent (Wall, 1912), and in reed beds and mangrove stands. Dhungel (1983) reported the species to be common in the subtropical tall grasslands of Chitwan National Park (Nepal), where individuals often occupy holes excavated by Sloth Bear *Melursus ursinus* in search of food. In Thailand, the species occurs mainly in the relatively drier hill country (Jarujin, pers. comm.).

An able swimmer, capable of remaining submerged for many minutes, and an able climber, often ascending trees to seek prey or to ambush prey while concealed among branches. Wall (1912) noted the frequency with which specimens may be found partially or wholly submerged near the bank of a river or pool, and regarded the species as virtually semi-aquatic. There tends to be a phase of hibernation where a distinct cold weather period exists.

Python reticulatus

The species is said to favour dense forest (Lim, 1981) or 'jungle growth' (Soderberg, 1965), it also occurs in plantations or secondary growth (B.H. Kiew *in litt.*, 25 February 1986). Three of seven specimens brought to the Institute for Medical Research in Kuala Lumpur were found in forest habitats; four were found in habitat classed by Lim (1955) as 'scrub' (this included gardens, plantations, and non-forest vegetation generally). Wall (1926a) contrasted the situation in Burma, where *P. reticulatus* was said to occur only in the most dense and least frequented

jungle, with that in Thailand and West Malaysia ("Malay States and Siam"), where it was a fairly frequent intruder around human habitations. Flower (1899) stressed that it was once common in Bangkok city and appeared to prefer the busiest parts of the riverside. It is still found in the city, often in association with warehouses, where it is presumed to be feeding on rats (Wirot, pers. comm., 1989).

Said to be fond of water, and rarely to be found far from it (Smith, 1943; Tweedie, 1983). One medium-sized specimen was captured at sea about three miles from shore off Singapore (Cantor, 1847), and this species was one of the earlier animal colonists of the newly-formed island of Krakatau, presumably after having made a sea crossing from adjacent Sumatra or Java. The species often occurs in the vicinity of forest rivers and streams, but may also be found around rice fields, and sometimes in water-less rocky hills (Bourret, 1936). Bourret (1939) recorded that in 'Indo China' the species is especially associated with marshy areas. In southern Viet Nam the species is reportedly "always" found near water, and around Bien Hoa, for example, often found under bridges over rapidly flowing streams (Campden Main, 1970). The large Brunei specimen reported by Ussher (1979) was found on a grassy ledge alongside a small shallow steep-banked river in the forest. Similarly, in Thailand the species occurs mainly in the vicinity of water in low-lying parts of the country (Jarujin, pers. comm.).

FOOD

Python curtus

Said to feed on small vertebrates, and reportedly fond of rats (Ridley, 1899; Reitinger, 1978). This preference seems confirmed by the fact that 10 out of 11 specimens collected near Kuala Lumpur between 1948 and 1954 were found in rat traps at an experimental trapping area at Sungei Buloh (Lim, 1955).

Python molurus

Prey includes a wide variety of mammals, birds and reptiles. Although mammals as large as deer, gazelle and leopard have been taken, small mammals, rats in particular, appear to comprise the bulk of the diet (there is growing awareness of the importance of *P. molurus* as rodent control agents in agricultural areas). Singh (1983) asserts that pythons around Sarapduli, in Corbett National Park (India) were responsible for removing two of three local family groups of Jackal *Canis aureus*. The species is a very able climber, and Wall (1912) noted that individuals appear to ascend fruiting trees, such as Banyan, in order to ambush animals, such as deer, attracted to fallen fruit. The same authority noted reports that pythons sometimes frequent hollow trees in which egrets and herons roost, and ascend at night to take birds from the branches.

Python reticulatus

Said to spend much of the day in hiding, often climbing trees for the purpose, and to seek prey at night, often small or medium sized mammals such as mice, rats, monkeys, civet cats, pangolins, small deer and pigs, but also birds (Lim, 1981; Wall, 1912). Domestic livestock, especially chickens, are also taken; for this reason pythons are often found close to human habitation and persecuted as a result. Kopstein (1926) reported that in the Maluku group, *P. reticulatus* was generally encountered around villages, where goats were among recorded prey, and that individuals tended to remain in a given area for around a month before being chased away or killed by villagers.

Snakes as rodent control agents

Cantor (1847) reported that Reticulated Pythons in Malaysia tended frequently to occupy outhouses in human settlements, where they were "useful in destroying vermin, although plunder is occasionally committed in poultry yards". He recorded a colleague's observation in George Town (Penang) of a young Reticulated Python "which the inhabitants suffered to retain unmolested possession of the rice stores in order to secure them against the ravages of rats". Such observations as these appear to validate the more recent reawakening of interest in snakes, including pythons, as effective agents of rodent control (Whitaker and Dattatri, 1986), although any control exerted may be achieved through deterrence - perhaps restricting the location of rodent activity and reducing the availability of burrows - rather than by direct predation pressure. Legislation was introduced in Thailand in 1985 to prohibit the export of pythons and other selected snake species as they were considered to be important predators of rodents.

SIZE AND GROWTH

General morphology

Python curtus

Relatively small and very stout-bodied, the Blood Python can attain some 2.75 m in total length; according to Mehrtens (1987) the average adult size is 1.5-1.75 m (5-6 ft).

Python molurus

A large and lethargic, heavy-bodied snake; specimens of 3 m (10 ft) length "are not very uncommon", and there is little doubt that it can exceed 6 m (20 ft) (Wall, 1912). Smith (1943) suggested an average length of around 3.7 m (12 ft), after five or six years' growth. The most heavily-built of the Asian python species, *P. molurus*, tends to be correspondingly slow-moving (Smith, 1943).

Python reticulatus

A potentially very large boid snake; reasonably well substantiated records indicate that *Python reticulatus* can attain around 10 m (33 ft) in length, and was perhaps the only snake which regularly exceeded 6 m in length (Wood, 1982). A more typical length would be perhaps 3-4 m, although Smith (1943) suggested an average adult length of 5.5-6 m (18-20 ft) after five or six years' growth. The average length of snakes whose skins are traded can be calculated to be around 2.65 m (see Trade section). A recent report (Anon., 1988) of the finding of a specimen 33 ft in length on Great Nicobar Island (India) does not appear to be accompanied by quantitative evidence. This species is relatively more slender than *P. molurus*, and can move with considerable speed at times, including through trees (Smith, 1943).

Growth rates

Among reptiles generally, growth is most rapid during the embryonic phase, intermediate after birth or hatching, and continues at a slow and decreasing rate after maturity is attained (Bellairs, 1969). Among larger reptile species, growth potentially may continue long after the age of maturity; this contrasts with the typical situation in mammals, where growth stops relatively soon thereafter. In mammals, skeletal growth occurs mainly by means of the ossification of cartilage cells in growth zones and it comes to an end when all cartilage growth zones themselves become fully ossified, making further bony growth impossible; in many reptiles, including varanid lizards and snakes generally, areas of growth cartilage, and thus the capacity for skeletal growth, persist throughout life (Bellairs, 1969).

The lack of a determinate growth pattern in reptiles that attain a large body size means that it impossible to define with complete accuracy both the mean and maximum size for any given species.

The exceptionally large pythons sometimes recorded appear to be those that have escaped the everyday hazards of existence for an exceptionally long period (Bellairs, 1969); with the increased spread of human settlements in the tropics, such individuals will be increasingly rare, and none may now be expected to be able to attain the sizes that were possible a century ago.

Limitations of available growth data

The data available on size and growth rates are mainly of two kinds: single measurements of wild-caught snakes, and measurements, single or series, of captive specimens. The former typically concern killed large-sized individuals. The latter will be of uncertain relevance to wild populations because of differences induced by variations in feeding and maintenance in captivity; virtually all time series data derive from captive

individuals. In both cases, sample sizes range from small to very small, and do not provide a firm basis for statistical investigations. The issue is further complicated by the observation that individuals from a single clutch or litter can vary significantly in size, and after a year of growth there will be further differences according to the prey that has been consumed, and other environmental conditions.

Ambient temperature, food intake and parasite load all affect growth rate in captivity and, although rigorous quantitative observations are lacking, experience suggests that individuals of similar age can show very different rates of growth under different maintenance regimes (see, for example, Hingley, 1987). Given optimum conditions, including ready prey availability and minimal stress, growth seems likely to be potentially more rapid in captivity than in the wild, and maturity might thus be attained at younger ages in captivity. This does not appear to have been demonstrated experimentally.

Growth rates: some examples

Probably the most extensive published data set concerns 'Sylvia', a pet Indian Python *Python molurus bivitattus* (Pope, 1962). This snake was captured in north-east Burma in October 1945, when of a size suggesting it was only a few weeks old. It was transported to USA and measured at fairly regular intervals between February 1946 and January 1960; this animal was extremely docile and allowed itself to be straightened out for relatively accurate measurement. Data presented by Pope (1962:160) are graphed in Figure 1. Lederer (1944) provided less complete data on the growth in captivity of three *Python reticulatus*; see Figure 2. There are several more recent but less comprehensive figures in minor journals concerned with reptile keeping as a hobby.

The long-term data sets published by Pope and by Lederer demonstrate that rapid growth occurred during the first three (*P. molurus*) to six (*P. reticulatus*) years of life, followed by a period of very slow growth. The transition between rapid and slow growth phases appears to take place during early maturity.

REPRODUCTION

Maturity

The onset of sexual maturity in reptiles appears to be related more directly to size than to age (Bellairs, 1969). As in the case of size and growth rates, it is generally feasible to record the onset of maturity only in captive individuals, and extrapolation to wild conditions is likely to be misleading to an unknown extent (see *Limitations of available data* in Growth section above).

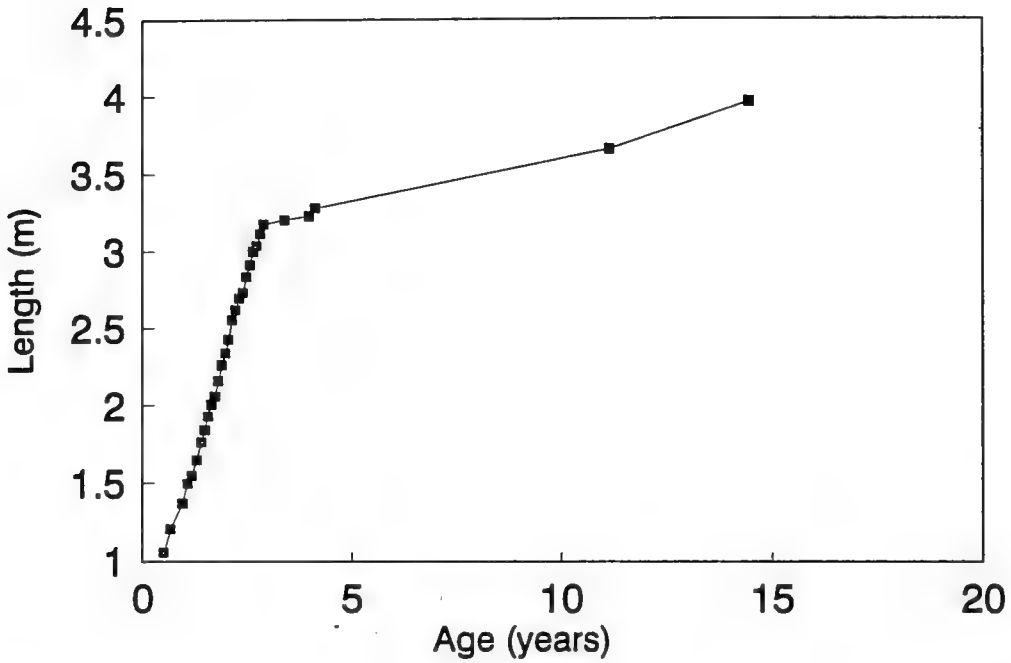


Figure 1 Graph to show length/age relationship in 'Sylvia', a captive *Python molurus bivitattus*.

Python curtus

Little information is available; the breeding female reported by Noble (1935) was 1.67 m in length, but size at first breeding appears to be unrecorded, despite the fact that the species is now being bred by a significant number of pet keepers.

Python molurus

Pope (1962) summarised a good deal of published information. The smallest male then recorded to have bred successfully (at Nagpur Zoo, India) was 1.7 m (5'8") in length; the female of the pair was 2.59 m (8'6"). Male maturity at this relatively small size appears to be exceptional, and has not been recorded since; the next smallest male was 2.64 m (8'8"). Female maturity at around 2.6 m appears to be not unusual; other females to have bred in captivity have ranged between 3 and 3.6 m. A pair recorded by de Clercq (1988) comprised a male 2.5 m in length and four and a half years old, and a female 3.5 m long and six and a half years old (it is not entirely clear whether this was the first breeding for both snakes). A female *P. m. bivittatus* described by Martin and Martin (1987) was born in July 1976, started to

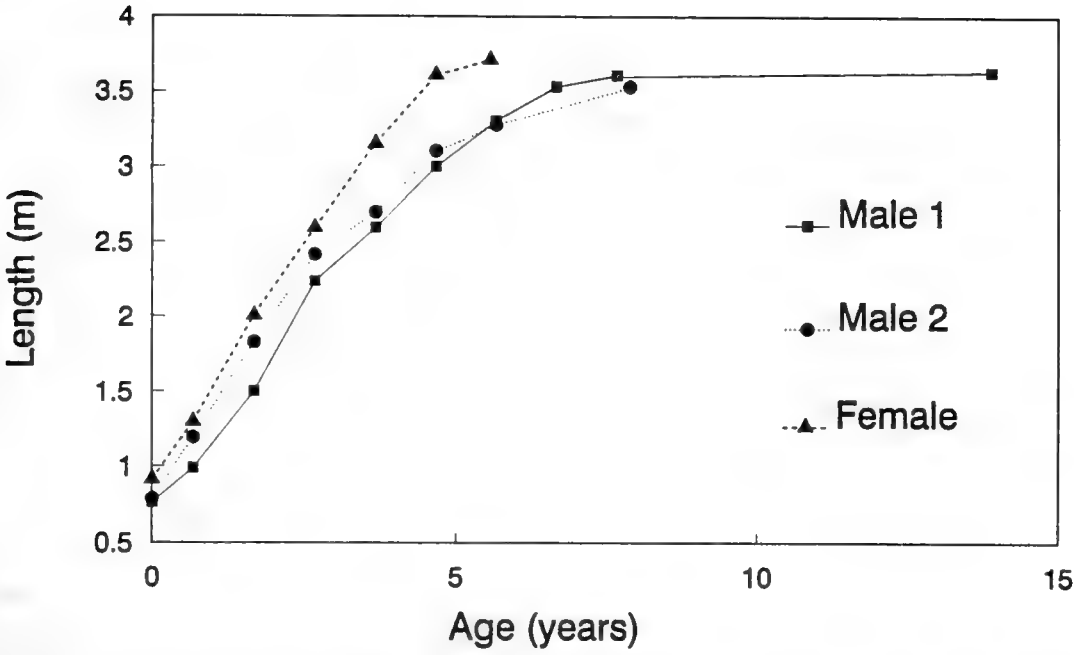


Figure 2 Graph to show length/age relationship in three captive *Python reticulatus* (see text for source).

breed in 1981 (in her fifth year) when the female was 3.65 m in length, and continued to breed annually until at least 1987, when a length of 4.57 m had been attained. Leigh, cited by Pope (1962) stated that a female in captivity laid fertile eggs when one month short of three years in age, and the male of this pair was less than two years old.

Smith (1943) recorded that sexual maturity is reached in *Python molurus* and *P. reticulatus* at two and a half to three years. According to Mattison (1988) females in captivity typically mature at around 4 m length, males at around 3 m, and these sizes can be attained in captivity in under three years. According to Hingley (1987) an 'average' large python (*P. molurus* or *P. reticulatus*) would be around 1.25-1.75 m long after its first year, 2.5-3 m after the second year, and 3-4.25 m after the third.

Python reticulatus

Maturity in captivity tends to be attained at a length of around 3.5 m (Mattison, 1988). Smith (1943) recorded that sexual maturity is reached in *Python molurus* and *P. reticulatus* at two

and a half to three years. Pope (1962) cited examples of a female sexually active at around 9'-10' (3 m) in length and probably five or six years of age, and further females apparently mature at minimum sizes of 3-3.5 m.

Breeding

Virtually all pythons, including *P. curtus*, *P. molurus* and *P. reticulatus*, are oviparous species.

Python curtus

Clutch size is relatively small, and ranges from 10 to 16 eggs (Stafford, 1986; Mattison, 1988), although rarely above 12 (Mehrtens, 1987). Eggs average around 6 x 4 cm (Noble, 1935). The eggs are brooded by the mother for two and a half to three months, hatchlings average around 30.5 cm (12") in length (Mehrtens, 1987). Mattison (1988) stated that hatchling length is in the range 30-45 cm. Captive specimens have lived for at least 22 years.

Python molurus

In India, mating occurs during December-February (the colder season); the clutch of 8-100 eggs, about 6 x 12 cm in size, is laid three to four months later, in the hot weather months of March-June (Wall, 1912). In captivity, clutch size has ranged from 18 to 55, with 35.9 as the mean of one sample of 29 clutches recorded (Mattison, 1988). According to Mattison, clutch sizes in the Burmese subspecies tend to be smaller than in the nominate form. The female may deposit her eggs in a tree hole, under fallen branches, in a termite nest, or in a cavity in rocky ground, and typically incubates the eggs, which hatch around two months later. Hatchlings vary in size, according to Mattison (1988) typical length is around 55 cm. Captive specimens have lived for at least 22 years (Shaw, 1959).

Python reticulatus

In captive animals, mating occurs around the turn of the year, with egg laying usually between April and October (Wall, 1926a), about two months after the last mating. Clutch size tends to be greater with increasing size and age of the female; extremes of 8 and 103 have been recorded (Lim, 1981; Reitinger, 1978). Females 4 m in length typically lay 30-40 eggs, about 6 x 12 cm in size. Pope (1962:139) presented a table showing a positive correlation between female size and clutch size; the mean of ten clutches was 48. Clutch sizes recorded in captivity are most often in the range 30-50 (Mattison, 1988). Pope (1962) cited a report of two nests in Sumatra, one in a hollow log, the other in a hole under bamboo roots. The female coils around the eggs and broods them for the entire incubation period of 2.5-3 months, although she may leave them to drink and slough. Hatchlings are typically between 75-80 cm (Mattison, 1988). Captive specimens have a maximum recorded age of 21 years.

Table 5. Summary of selected reproduction data for three Asian python species. Note: all entries are approximate representative values only and refer almost exclusively to captive animals; see text for sources and further details. Column 1: age at maturity refers to captive snakes and shows marked individual variation. Column 3: the first figure is an approximate mean, published ranges appear in parentheses. Column 5: a representative figure for the upper size range, not maximum recorded or suggested values.

	1 Age at maturity (yrs)	2 Size at maturity (m)	3 Clutch size	4 Hatchling size (cms)	5 Adult size (cms)	6 Adult age (yrs)
Python curtus	?	?	12 (10-16)	30-45	to 250	>22
P. molurus	2.5-3	3-3.5	35 (8-107)	55-75	to 650	>22
P. reticulatus	2.5-3	3-3.5	48 (8-103)	75-80	to 900	>21

DISTRIBUTION

Python molurus molurus Formerly widespread through all 21 districts, but now restricted in distribution and largely confined to the Sunderbans and evergreen forests of the south-east (Khan, 1982), although the latter may refer to populations of *P. m. bivittatus* (Kock and Schröder, 1981).

Python molurus bivittatus Reported from the Chittagong region (Kock and Schröder, 1981).

Python reticulatus Restricted to the Chittagong and Sylhet areas (Khan, 1982).

POPULATION

Python molurus molurus Uncommon generally but common in the Sunderbans (Khan, 1982; Bangladesh CITES MA, 1986). Widely distributed and present in all 21 districts about three decades ago, but due to habitat changes there have been only two records of sightings outside government controlled forests in the past decade (Khan, 1982). Small populations survive in evergreen forest in the east (**N.B.**: some of these may be populations of *P. m. bivittatus*) and adequate populations remain in the Sunderbans; the moist deciduous (Sal) forest in central Bangladesh is almost devoid of pythons (Khan, 1982). According to Sarker and Sarker (1983), and Sarker (1990), *P. molurus* was once fairly common but populations are now decreasing rapidly because of habitat loss and exploitation for skins.

Python reticulatus While always confined to rain forests in the east and south-east, habitat destruction has reduced and fragmented the range and only two small populations remain, in Sylhet and Chittagong (Khan, 1982). The species was apparently always restricted to semi-evergreen and evergreen forests and was nowhere common (Khan, 1982). Khan considers the species to be rare, in part because of persecution for skins and food; another authority considers it common within its restricted range (Bangladesh CITES MA, 1986).

EXPLOITATION

CITES annual reports from 1980 to 1987 contain no reference to trade in live pythons or their skins originating in Bangladesh. Japanese Customs statistics (Table 27) record a small quantity of snake skins but there is no indication of what species was involved.

DISTRIBUTION

Python molurus molurus Probably present in southern Bhutan; no specific records are available.

POPULATION

Python molurus molurus No information.

EXPLOITATION

There is no indication of any trade in pythons or their skins from Bhutan.

BRUNEI

DISTRIBUTION

Python curtus Present in other parts of Borneo, and so probably present in Brunei also; no specific records are available.

Python molurus bivittatus No records are available; possibly absent from the island of Borneo (see under Indonesia).

Python reticulatus A very large specimen, a little over 6.5 m (21'6") in length, was recorded by Ussher (1979); no further details of range in Brunei are available.

POPULATION

Python curtus No information.

Python reticulatus No information.

EXPLOITATION

There is no indication of any trade in pythons or their skins from Brunei.

DISTRIBUTION

Python molurus bivittatus Widely distributed over most of the country (Saint Girons, 1972).

Python reticulatus According to Bourret (1939), the species occurred throughout the former 'Indochine Française' (which included present Cambodia), particularly in marshy areas. There appear to be no recent records (Saint Girons, 1972).

POPULATION

Python molurus bivittatus Although not rare, not really abundant, perhaps because of hunting for food or commerce (Saint Girons, 1972).

Python reticulatus No data

EXPLOITATION

Japanese Customs statistics (Table 27) recorded the import of 312 kg of snake skins from Cambodia in the early 1970s, but none since. CITES annual reports have not recorded any trade in pythons from Cambodia. However traders in Thailand report that substantial quantities of skins are obtained from Cambodia and exported from Thailand (see p. 87).

CHINA

DISTRIBUTION

Python molurus bivittatus Occurs in mountain forests in Fujian, Guangdong (including Hainan island), Guangxi, Guizhou and Yunnan (Anon., 1980a).

POPULATION

Python molurus bivittatus Said to be rare, except, perhaps, on Hainan (Pope, 1962). Schmidt (1927) cited a report by Swinhoe dating from the latter part of the nineteenth century, to the effect that people on Hainan often brought pythons into the market for the sake of their heart and liver (used, dried and ground, as a stimulant), and the skin (used chiefly in musical instruments). Pope, also cited in Schmidt (1927), collected reptiles in the vicinity of Nodoa in 1923 and reported that pythons appeared "fairly common ... and apparently were not confined to any special habitat". Anon. (1980a) confirmed that pythons are valued for their flesh, eggs and skins (used in musical instruments and tanned for various handicraft articles). Wall (1912) noted that python meat was regarded as a great delicacy in southern China.

EXPLOITATION

CITES annual reports record trade in a total of 1369 *P. molurus* skins from China from 1980 to 1987 (Table 48) and Japanese Customs statistics similarly record a small volume of trade (Table 27). There was also a report of 160 *P. reticulatus* skins from China in 1984 (Table 47) but this probably represents misidentification. Traders in Singapore report that *P. molurus* skins that have been imported from China are notable for their poor preparation, having been inexpertly pegged out.

HONG KONG

DISTRIBUTION

Python molurus bivittatus Reported from many parts of the country, most frequently from widely distributed sites on Hong Kong island (Romer, 1979). According to Karsen *et al.* (1986), the species is very widely distributed in Hong Kong, occurring on all major islands and in the New Territories, in lowland, hill and mountain areas.

POPULATION

Python molurus bivittatus Not common anywhere in the country (Romer, 1979). Karsen *et al.* (1986) consider the species uncommon and sporadic in occurrence, generally frequenting wooded country and sometimes very close to human habitations; regarded as endangered in Hong Kong. One source (Hong Kong CITES MA *in litt.*, 1985) estimates a population of between 50 and 200 individuals.

EXPLOITATION

Hong Kong features principally as an importer of python skins. There is one large company, Steven Law, Kaiser Tannery, to whom traders in Thailand report having exported substantial quantities of skin.

DISTRIBUTION

Python molurus molurus Ranges virtually throughout, although reportedly extirpated from many former localities (Whitaker, 1978). With reference to subspecific assignment of *P. molurus* in north-east India, see Taxonomic Comments section.

Python reticulatus Confirmed records appear to be restricted to the Nicobar islands in the Union Territory of the Andamans and Nicobars; recorded from Car Nicobar, Teressa, Trinkat, Nancowry, Great Nicobar and Little Nicobar (Whitaker and Whitaker, 1983). Other sources (Daniel, 1984; Tikader, 1983) state that the species also occurs in mainland India, in the extreme north-east, but these reports seem to be unconfirmed.

POPULATION

Python molurus molurus Widely distributed but heavily exploited and locally extirpated from many areas (Whitaker, 1978), possibly in most of its former range, although the species remains common in certain locations in Rajasthan, Andhra Pradesh and Uttar Pradesh (and perhaps elsewhere) (Whitaker and Whitaker, 1983). Also said to be in severe decline, extremely rare outside protected areas, and considered a threatened species (Tikader, 1983). Wall (1912) thought the species far commoner in the plains than the hills.

Python reticulatus Restricted distribution, numbers unknown (Whitaker and Whitaker, 1983); officially considered threatened (Tikader, 1983).

EXPLOITATION

Python molurus was formerly exploited extensively in India, and Customs statistics in 1974 recorded the export of 15 000 skins (Inskipp, 1981). However, exports have been prohibited since 1977, and recent statistics show evidence of much lower levels of trade. The nominate subspecies of *P. molurus*, which is the only one to occur in India, has been listed in Appendix I since 1975, and so it is likely that any continuing trade would have been concealed. Numerous tribes in the plains and hills use the snake and its eggs for food; the fat is applied externally to alleviate bruising, sprains, fractures and rheumatics, and taken internally for leprosy (Wall, 1912). The species is still hunted to some extent; e.g. one forest dweller in Kerala had skins 3.4 and 4.5 m long in store along with other wildlife products (pers. obs.). CITES annual reports record significant quantities of *P. reticulatus* skins from India from 1980 to 1985 (Table 47). This may have been an error in the statistics (for instance a confusion of the ISO code for Indonesia, ID, with that for India, IN) or it may represent skins of *P. molurus*. It is most unlikely that the skins were truly *P. reticulatus* from the Nicobar Islands.

DISTRIBUTION

Python curtus Restricted to Bangka, Sumatra and Kalimantan (de Haas, 1950; de Rooij, 1917).

Python molurus bivittatus Present on Java, Sumbawa and Sulawesi (de Haas, 1950). Although reported from Borneo (de Haas, 1950), the species' occurrence is doubted by at least one authority (R.F. Inger *in litt.*, 5 March 1986), and no confirmed records from the island appear to be known. On the other hand, Gusti *et al.*, 1990) report seeing a few skins of *P. m. vittatus* (sic) during a survey of traders in Kalimantan (no documentation of this identification is provided). De Rooij (1917) cited a questionable record from Sumatra.

Python reticulatus Widespread, extending in the west to Sumatra and adjacent islands including the Mentawai group, and in the east to Halmahera, Seram and Tanimbar (but not to Irian Jaya) (de Rooij, 1917; de Haas, 1950). Recorded from Sumatra, Natuna, Kalimantan, Sulawesi, Java, Lombok, Sumbawa, Sumba, Flores, Timor, and Tanimbar (Stimson, 1969). Probably present on numerous smaller islands. In the Maluku group, recorded from Saparua, Haruku, Ambon and Buru in addition to Seram (Kopstein, 1926).

In South Kalimantan pythons are caught in the swamps around Cindai Alus, the Martapura area and the Sungei Negara wetlands. In Central Kalimantan most skins originate from swamp forests and forests in the upper reaches of the Barito, Kahayan and Kapuas Rivers (Gusti *et al.*, 1990); these areas are also important sources of *Varanus* skins. Pythons are also collected from forests in the Meratus Mountains in Hulu Sungai District, and large numbers come from Pulau Laut (Gusti *et al.*, 1990).

POPULATION

Python curtus No information.

Python molurus bivittatus Little information is available. A skin dealer in Jakarta reported that *P. molurus* is very much less common than *P. reticulatus* in Java; he could purchase some 600 skins of the former annually, compared with 14 000 of the latter (pers. comm. to Luxmoore).

Python reticulatus One early twentieth century source cites this species as very common (de Rooij, 1917). More recently, McNeely (*in litt.* to R. Honegger, 15 January 1979) considered the species uncommon throughout its range, and becoming depleted in Indonesia because of hunting for skin and meat.

It was considered rare in West Java by de Haas (1941). Over a period of a few years, he paid many hundreds of workers on two tea estates to collect snakes; both estates were several hundred hectares in extent (and included primary forest, secondary forest

and tea plantation). On one estate, only one *P. reticulatus* was collected in two years, and four in two years on the other.

According to Anon. (1980b), this species is the major predator on Siberut, feeding on monkeys, small mammals, and village pigs and chickens. Individuals are killed whenever encountered and "specimens exceeding 4 m in length are quite commonly killed"; on Siberut, python meat is eaten only in the Simatulu region (Anon., 1980b). Silvius *et al.* (1984) reported *P. reticulatus* to be common in both agricultural and forest areas within Berbak Game Reserve, Sumatra (and found one track 40 cm in width). Whitten *et al.* (1987) noted that the species is now hunted for food by Balinese transmigrants in the Aopa Swamp region of Sulawesi. In Lore Lindu National Park on Sulawesi, Watling (1981) found *P. reticulatus* common only below 1000 m; large sized animals, up to 6 m, had been recorded (Watling also reported that in 1978 an adult man had been killed and consumed by a python 40 km north of Lore Lindu). MacKinnon (1979) noted that the species remains common in most forests in northern Sulawesi, despite being killed for meat or skin whenever encountered (he attributed its persistence to the unusual abundance of rats in the region).

Informants cited by Gusti *et al.* (1990) suggested that pythons are now less common than formerly in many parts of South and Central Kalimantan, and traders were concerned that the declining supply of skins is a threat to their livelihood. Traders who visit villages to buy skins reported that between 10 and 50 useable skins might be obtained from a given locality each month; Gusti *et al.* interpret this to suggest that python populations are at fairly low levels. An average catch for a four- or five-man collecting expedition lasting seven to 20 days would comprise between two and eight snakes in the 3- to 6-m size range; this is equivalent to between four and 12 man-days per snake.

The following five paragraphs summarise the views of skin dealers interviewed in Indonesia by Luxmoore. In so far as dealers might have their own business reasons for giving incomplete or misleading information, although we have no evidence that this is the case, some caution is advised in interpreting their comments.

The consensus was that pythons in general remain readily available to the skin trade, although decline is apparent in some areas (e.g. Sumatra) and some difficulty in obtaining skins can in part be attributed to increased competition in the trade. The term 'python' here will usually refer to *P. reticulatus*, as the most widespread and abundant species. Most dealers confirmed that whilst skin supplies had in general remained level, many more people were involved at all levels of the trade, including collectors, middlemen and main dealers, and vast new areas of land (e.g. transmigration areas) had been opened up. These observations can most readily be interpreted to indicate a significant decline in the occurrence and density of python populations in some regions.

Java (Jakarta)

One dealer in Jakarta reported that large skins formerly available from Kalimantan had become more difficult to obtain, perhaps since the extensive 1987 fires in the country; another reported no difference in the supply of python skin during the seven years he had been trading, and the same applied to another who had been trading for 20 years. However, a fourth trader reported some decline in turnover, which he attributed to much increased competition.

South Sumatra (Palembang)

An exporter reported no difference in the supply of skins during the 20 years he had been in business. Two buyers agreed that it was easy to obtain skins 10 or 20 years ago when few trappers were active and the market was more restricted; most snake skins now come from transmigration areas, where many of the immigrants collect snakes for part of their income, and where snake populations would be expected to have a relatively high density initially. Reportedly, a group of five or six men could catch 20-30 pythons during a two-week expedition.

North Sumatra (Medan)

Of two dealers interviewed, one reported buying 50 000 m of python skin in 1979 but twice this amount in 1989 (the significance of this is uncertain); the second reported that there were 30% fewer pythons than a decade ago because of forest loss and increasing human populations, on the other hand, he asserted that one man could collect 20-30 pythons in one week (which is a large catch).

Kalimantan

One buyer in West Kalimantan reported that more skins are available now compared with a decade ago because there are now more collectors; another in East Kalimantan asserted that there are still plenty of pythons in the forest and collectors do not have to travel far from the rivers in order to catch them.

EXPLOITATION

There is a large export trade in reptile skins from Indonesia, the most valuable of the snake skins being pythons, the great majority of which are *P. reticulatus*. *P. curtus* is traded in smaller quantities, but is of much lower value. *P. molurus* is protected but, although some skins are collected, no export permits are issued for this species. It is probable that skins are exported amongst shipments of *P. reticulatus* skins; little evidence of this was found, except that in 1988 the USA reported seizing 49 skins on import from Indonesia. A number of other large boids occur in Irian Jaya and the Moluccas (see Table 3), but their skins are considered to be of low value and are apparently not traded.

There are a few companies, mostly in Jakarta, specialising in the export of live animals, which export all three species of python. They also trade in the rarer boids, especially *Morelia albertisii*, *M. amethistina*, *M. timoriensis* and *M. viridis*.

Snake meat is not widely consumed in Indonesia as most of the people are Muslims, but some ethnic groups, notably in North Sumatra and Kalimantan, may occasionally eat the meat. Gall bladders are in great demand for Chinese medicine, and when snakes are killed for their skins the gall bladder is usually extracted and dried.

Hunting methods

Pythons are usually caught in nets set in rivers or streams at right angles to the bank. Occasionally, baited hooks are used, and snakes are also caught on an opportunistic basis by agricultural workers. The skins of such animals are often damaged by knives or other implements. Larger snakes may be skinned in the field, but the smaller animals are often brought into the towns to be skinned by the dealers, who are generally more skilled. The skins are nailed out on boards and air-dried.

The majority of pythons are caught in the wet season; dealers in Palembang and Medan reporting that up to twice as many may be caught a month as in the dry season.

Legislation

The legal system by which capture and trade in wildlife is controlled in Indonesia was described in detail in Luxmoore and Groombridge (in press), a shortened summary will therefore be given here. Capture permits are issued to allow the capture of all wildlife. Permits are issued by the provincial Forest Department office (Kantor Wilayah) up to a maximum provincial quota which is set by the Directorate General of Forest Protection and Nature Conservation (PHPA). The quotas, which are reviewed annually, are shown in Tables 6 and 7. Permits are usually issued to the main traders rather than to the local trappers. In some provinces, responsibility for issuing permits has been delegated to the local PHPA office.

Domestic transport permits are required to transport wildlife products within Indonesia. These permits are also issued by the Kantor Wilayah and should not exceed the total quantity of specimens for which capture permits have been issued. Domestic transport permits are not widely used, and checks are seldom, if ever, made.

Permits to export all wildlife are granted by the Directorate General of PHPA in Bogor, theoretically on confirmation from the local PHPA offices that the trader in question has obtained the

Table 6. Capture quotas for *Python reticulatus* allocated to the different provinces in Indonesia. 1989a refers to the quotas set at the start of 1989 by the previous Director General, Rubini. Revised quotas (1989b) were allocated by the new Director General, Sutisna, by a Decree dated 2 May 1989.

	1984	1985	1986	1987	1988	1989a	1989b
Aceh	1783	2050	4959	6900	6900	5590	10000
N Sumatra	20709	6000	10974	11500	11500	73124	95000
Riau	1500	4000	7926	8000	8000	4051	7500
W Sumatra	1500	3000	4574	4100	4100	3646	7500
Bengkulu	1500	3500	7164	7000	7000	6076	10000
Jambi	1500	3500	7164	6000	6000	6076	10000
S Sumatra	7770	5000	9450	12000	12000	20256	30000
Lampung	689	1500	4114	4500	4500	3241	7500
W Java	700	500	2590	1000	1000	810	5000
W Kalimantan	2500	1000	3352	0	0	8102	15000
DKI Jakarta	8750	2000	4876	2400	2400	1944	5000
C Java	4000	250	2210	100	100	81	1500
E Java	939	250	2210	1000	1000	810	5000
S Kalimantan	41000	30000	7518	7000	7000	16204	27500
C Kalimantan	1000	10000	17072	17000	17000	48614	63000
E Kalimantan	2700	20000	35000	30000	30000	68870	90000
S Sulawesi	4000	2500	5440	10000	10000	10128	17500
C Sulawesi	972	500	2590	1000	1000	1215	5000
SW Sulawesi	1368	1500	4114	1500	1500	1215	5000
N Sulawesi	2200	500	2590	2500	2500	1620	5000
NTB	1000	0	0	0	0	0	0
NTT	700	500	2590	500	500	405	3500
E Timor	1000	500	2590	500	500	405	3500
Moluccas	1000	500	2590	2500	2500	6076	10000
Irian Jaya	1700	950	3276	3000	3000	2430	6000
Total	112480	100000	156933	140000	140000	290989	445000

wildlife legally in the first place. In practice, such checks appear not to be made, and the number of specimens permitted to be exported routinely exceeds the total capture quota for the whole country by a large margin. Export permits for *P. reticulatus* were issued to a total of 18 traders over the period 1986-1989 (Table 8) and ten for *P. curtus* (Table 9).

A further decree, issued by the Ministry of Trade, to prohibit the export of raw skins in an attempt to bolster the tanning industry was extended to apply to the export of reptile skins in 1986. On instruction from PHPA, the CITES Secretariat issued a Notification (no. 426, 13 March 1987) that the export of raw skins was prohibited. At that time, few tanners had the expertise to process reptile skins to an internationally acceptable standard, and none had modern technology. Over the next few years, tanneries were built by Kaltim Indah Raya, Makmur

Table 7. Capture quotas for *Python curtus* allocated to the different provinces in Indonesia. No quotas were allocated for this species from 1984-1985. 1989a refers to the quotas set at the start of 1989 by the previous Director General, Rubini. Revised quotas (1989b) were allocated by the new Director General, Sutisna, by a Decree dated 2 May 1989.

	1987	1988	1989a	1989b
Aceh	8000	8000	1753	8000
N Sumatra	13000	13000	17370	75000
Riau	2000	2000	438	2000
W Sumatra	2000	2000	438	2000
Total	25000	25000	19999	87000

Table 8. Total number of skins of *Python reticulatus* specified on export permits issued to Indonesian traders

		1986	1987	1988	1989
1	PT Padi Mas Jaya	29500	43500	84000	88000
2	PT Makmur Abadi Permai	32000	48750	158240	112500
3	PT Reptindo Utama	71660	43300	33653	34211
4	PT Kaltim Indah Raya	-	42500	81135	43900
5	CV Ramlie	1200	4378	2785	1092
6	CV Alona Jaya	7650	18603	24678	38751
7	CV Leo Jaya	3500	19000	41200	66654
8	CV Insam Alam Indonesia	-	6102	-	-
9	CV Sumber Murni	-	17375	41000	22500
10	CV Reco	23500	10000	42500	30000
11	CV Perintis Tani/Yasanda	16000	6000	32750	41000
12	CV Bintang Sakti	10500	7500	15000	7000
13	CV Stock Borsuma	21404	16500	22500	17500
14	CV Ika Guna	6450	8250	6250	27774
15	CV Sasmerau Jaya	-	500	84000	-
16	CV Sumber Karya	-	-	25000	-
17	CV Tri Santosa	-	-	-	25000
18	PT Ganofa Raya	-	-	300	-
	Total	223364	292258	694991	555882

Table 9. Total number of skins of *Python curtus* specified on export permits issued to Indonesian traders

		1986	1987	1988	1989
1	PT Padi Mas Jaya	2250	0	20000	21000
2	PT Makmur Abadi Permai	3000	0	2500	0
3	PT Reptindo Utama	700	0	21006	0
4	PT Kaltim Indah Raya	-	3000	11500	7000
5	CV Alona Jaya	1200	3000	2500	0
6	CV Leo Jaya	0	0	12000	12000
7	CV Sumber Murni	0	0	10000	6000
8	CV Reco	0	4000	10000	15000
9	CV Perintis Tani	12000	4500	97000	5000
10	CV Bintang Sakti	6000	5000	11000	5000
	Total	25150	19500	197506	71000

Table 10. Total number of raw and tanned skins of *Python reticulatus* specified on export permits issued to Indonesian traders in 1988 and 1989

		1988 Tanned	1988 Raw	1989 Tanned	1989 Raw
1	PT Padi Mas Jaya	50000	34000	28000	60000
2	PT Makmur Abadi Permai	125000	33240	82500	20000
3	PT Reptindo Utama	2503	31000	102	12000
4	PT Kaltim Indah Raya	85125	16000	38250	5650
5	CV Ramlie	2450	0	310	0
6	CV Alona Jaya	8270	10948	23515	15020
7	CV Leo Jaya	2100	39100	0	61654
9	CV Sumber Murni	32500	13000	10000	12500
10	CV Reco	0	42500	0	30000
11	CV Perintis Tani/Yasanda	0	32750	0	41000
12	CV Bintang Sakti	0	15000	0	7000
13	CV Stock Borsuma	10000	12500	10000	7500
14	CV Ika Guna	0	6250	0	19774
15	CV Sasmerau Jaya	-	-	-	-
16	CV Sumber Karya	-	25000	-	-
17	CV Tri Santosa	-	-	0	25000
18	PT Ganofa Raya	300	-	-	-
	Total	318248	311288	192677	317098

Abadi Permai, Alona Jaya, Stock Borsuma and Padi Mas Jaya. Several other companies relied on local back-yard tanning facilities, but it was clearly not possible to process all of the reptile skins. Consequently, special permits were issued by the Department of Trade to allow the export of raw skins. This was viewed as an interim measure, and it was intended that the proportion of skins exported raw would decline (Luxmoore and Groombridge, in press). The relative numbers of permits issued for raw and tanned python skins in 1988 and 1989 are shown in Tables 10 and 11. Although progress has undoubtedly been made towards establishing a reptile skin tanning industry, difficulties have been experienced, and the proportion of raw skins rose in 1989. A further CITES notification (no. 559) was issued in 1990 to cancel notification no. 426 and clarify that export permits continue to be issued for raw skins.

Python molurus was listed as protected in 1978 by Ministry of Agriculture Decree No. 327/Kpts/Um/5/1978. *Morelia viridis* and *Python timoriensis* were protected by Decree No. 716/Kpts/Um/10/1980.

Table 11. Total number of raw and tanned skins of *Python curtus* specified on export permits issued to Indonesian traders in 1988 and 1989

		1988 Tanned	1988 Raw	1989 Tanned	1989 Raw
1	PT Padi Mas Jaya	20000	0	0	21000
2	PT Makmur Abadi Permai	2500	0	0	0
3	PT Reptindo Utama	5006	16000	0	0
4	PT Kaltim Indah Raya	6500	5000	7000	0
5	CV Alona Jaya	1000	1500	0	0
6	CV Leo Jaya	0	12000	0	12000
7	CV Sumber Murni	5000	5000	5000	1000
8	CV Reco	0	10000	0	15000
9	CV Perintis Tani	0	97000	0	5000
10	CV Bintang Sakti	0	11000	0	5000
	Total	40006	157500	12000	59000

Java

Most of the python skin exporters in Indonesia (numbers 1-8 in Table 8) are located in Jakarta, although some have tanneries elsewhere. They buy skins from all around the country and export them from Jakarta airport. The principal exception is Makmur Abadi Permai, which has a tannery in East Kalimantan (see below) and exports tanned skins from Samarinda. It also exports raw skins from Jakarta. Kaltim Indah Raya has a tannery in Surabaya,

but all of the skins are collected in Jakarta and sent by truck to Surabaya for tanning; all export takes place from Jakarta. The director of this company has close family links with Sumber Karya and Sumber Murni, the latter based in Ujung Pandang. Skins from both these companies are processed in the tannery in Surabaya and exported from Jakarta.

The capture quota for the whole of Java for *P. reticulatus* in 1989 was 16 500, of which 5000 was for the capital district of Jakarta (Table 6) in which few, if any, pythons occur. There are five Sub-Balais in Java: West Java, DKI Jakarta, Central Java, and two in East Java. Those in DKI Jakarta, West Java and East Java (Surabaya) were interviewed. None of these offices had any records to indicate that capture or domestic transport permits had been issued in their provinces, and most of the activity seems to relate to the control of exports. The premises of the exporters are inspected up to twice a year and the skins are inventoried. An inventory in December 1988 revealed total stocks of 100 000 *P. reticulatus* skins with nine traders. When consignments are ready for export, the staff of the Sub-Balai in Jakarta inspect the goods in the company of inspectors from Sucofindo (a subsidiary of Société Générale de Surveillance), who are responsible for implementing Customs controls. They check that the goods comply with the description in the export permit, after which the cases are sealed and taken to the airport in bond.

Controls on the capture and trade of pythons in Java are very poor. In spite of the fact that the quota in 1989 was 16 500, and that no capture permits were issued, the traders indicate that they may obtain as many as 90 000 skins a year on the island (see below). Staff at the PHPA Sub-Balai in Surabaya were unaware that pythons were hunted in any quantity in the province. Controls on domestic transport are generally not enforced. Many thousands of skins each year pass between Jakarta and the tannery in Surabaya but this movement is not controlled by transport permits. More importantly, the bulk of the skins exported from Jakarta are brought from Sumatra and Kalimantan without transport permits. In verifying the stocks permitted to be exported, the Sub-Balai apparently makes no attempt to determine whether they were legally obtained.

South Sumatra

There is only one licensed exporter of reptile skins in South Sumatra, Stock Borsuma, which is located in Palembang. A large tannery was built in the city in 1987. The company receives python skins from dealers all over southern Sumatra and exports them directly from Palembang. There are also three other skin dealers in Palembang, P.D. Budiman, Andy Lesmana and Husin Wijaya, which do not have permits to export skins but sell their goods to Stock Borsuma and other exporters in Jakarta.

Capture permits are issued in South Sumatra by the Department of Forestry Kantor Wilayah, and the quantities are shown in

Table 12. It can be seen that the quota was exceeded in 1985, but adhered to strictly in subsequent years. In 1989, the quota (20 256) was that set at the beginning of the year by the previous Director General of PHPA. When new quotas were allocated in May 1989 (see Table 6), no attempt was made to issue more capture permits to fill the increased quota of 30 000. The PHPA Sub-Balai appeared to be unaware of the revised quotas.

Table 12. Capture permits for *P. reticulatus* issued to four dealers in Palembang (Department of Forestry records).

	1985	1986	1987	1988	1989
Stock Borsuma	10000	9450	12000	10500	14256
Andy Lesmana	0	0	0	500	2000
P.D. Budiman	0	0	0	500	2000
Husin Wijaya	0	0	0	500	2000
Total	10000	9450	12000	12000	20256
S Sumatra quota	5000	9450	12000	12000	20256

Domestic transport permits were issued to each of the three smaller traders in 1988 and 1989 to allow them to send their quotas of skins (500 in 1988 and 2000 in 1989) to Jakarta.

The Kantor Wilayah also keeps records of the number of reptile skins exported from South Sumatra, and publishes these in its annual reports. Data from 1979-1988 are given in Table 13. Although the accounting years are slightly different, it is apparent that the quantities in Table 13 are substantially lower than quantities specified in the export permits issued for Stock Borsuma (Table 8). It should also be noted that, until 1987, both sets of figures are higher than the capture quotas for South Sumatra.

Table 13. Export of *P. reticulatus* from South Sumatra. Data were extracted from the Department of Forestry (Kantor Wilayah, Sumatra Selatan) Annual Reports for the years 1979/80-1987/88. The fiscal year runs from April-March.

79/80	80/81	81/82	82/83	83/84	84/85	85/86	86/87	87/88
6800	8050	10050	4950	4057	4959	13355	13051	9183

The skin dealers in Palembang report that most of the python skins come from the transmigration areas in South Sumatra and Jambi. These are characterised by extensive deforestation, and the snakes displaced by these activities are easy prey for the hunters. Good sources were noted as being the Musi River, Mubal,

Makadijaya, Sembilan River, Lumpur, Komering, Telorn, Sugiharn and Bangka Island. The approximate proportions of python skins purchased from the different provinces by three dealers in Palembang are given in Table 14. Very few *P. curtus* skins are traded through the city, and those that are, are said to come from the hills in Bengkulu and the west of South Sumatra.

Table 14. Approximate percentage of *P. reticulatus* skins bought from different provinces by three dealers in Palembang.

Province	Dealer 1	Dealer 2	Dealer 3
S Sumatra	40	55	60
Jambi	10	15	
Lampung	20	10	
Bengkulu	20	10	
Riau	10	10	

North Sumatra

There are three licensed reptile skin exporters in Medan, C.V. Reco, Bintang Sakti and Perintis Tani, which has recently changed its name to Yasanda. None had a tannery in 1989, but all had plans to develop tanning facilities in order to comply with the Department of Trade regulations. Most of the skins collected are exported directly from Medan, although some are sold to other exporters in Jakarta.

Capture permits are issued by the Kantor Wilayah in Medan on the recommendation of the PHPA Balai. The capture permits issued from 1987 to 1989 are shown in Table 15. From 1989 onwards, the permits for both species were the same as the quotas, except that, as in South Sumatra, no account seems to have been taken of the revised quotas issued in May 1989 (see Tables 6 and 7).

In 1987 and 1988, capture permits were issued to named agents of the three exporters, scattered around North Sumatra. Each exporter had between 18 and 39 agents (Luxmoore and Groombridge, in press). This system was changed in 1989, when each of the three exporters was simply issued with a single capture permit, with a list of his agents appended to it.

Domestic transport permits are occasionally issued when one of the dealers requests to send skins to Jakarta. The Kantor Wilayah had no records of any transport permits having been issued in 1988 or 1989 but in 1987 a permit for 2000 *P. reticulatus* skins was issued.

The PHPA Balai in Medan keeps records of the number of skins that have been exported from Medan, and notes these in its annual reports. Data from 1985 onwards are given in Table 16. Before that date, the statistics only specified "snake skins" and so it

was impossible to separate out those referring to pythons. It can be seen that the number of skins exported shown in Table 16 greatly exceeds the number specified on the capture permits (Table 15), but is usually far lower than the quantities of skins specified on the export permits issued to these three companies by PHPA Directorate General in Bogor (Tables 8 and 9).

Table 15. Number of python skins specified on capture permits issued to three companies in Medan.

	1987	1988	1989
Python reticulatus			
CV Reco	4000	4000	25000
Bintang Sakti	3500	3000	25000
Perintis Tani	3000	4500	23124
Total	10500	11500	73124
Quota	11500	11500	73124
Python curtus			
CV Reco	4000	5000	6000
Bintang Sakti	4000	3000	6000
Perintis Tani	3500	5000	5370
Total	11500	13000	17370
Quota	13000	13000	17370

The dealers report that they receive skins from all over northern Sumatra, and occasionally as far south as Lampung. The majority come from North Sumatra and Aceh. Within Indonesia, Medan is the centre of trade in skins of *P. curtus*. Two colour varieties are found, a reddish variety and a brown one. An experienced dealer, who had been in the business for 25 years, reported that the red type came principally from Tapanuli, Tanah Karo, Simalungun, Labuhan Batu, Aceh, Pakanbaru, Padang, Jambi and a few from Lampung. It is particularly associated with the palm plantations, where it is said to eat rats. The brown type was said to come mainly from Tapanuli, Asahan and Lampung, where it favours rockier habitats, although it can be found in the same areas as the red variety.

West Kalimantan

There are no dealers who are permitted to export python skins from Pontianak, but there are several who collect skins and sell them to exporters in Jakarta. The main dealer, Budiyono Widjaya, claims to sell about 40 000 python skins a year. Most are *P. reticulatus*, but up to 20% are said to be *P. curtus*, only the brown variety of which occurs in West Kalimantan. He has been

trading skins for more than ten years, and used to export them directly to Singapore before the stricter export regulations were implemented in 1984. Two other dealers have permits to capture *V. salvator*, Acay and Kim Lin (see Luxmoore and Groombridge, in press), and it is possible that they also sell python skins.

Table 16. Realisation of export of python skins by three companies in Medan. Data from PHPA BKSDA I annual reports for 1985-1989. (Years run from Apr-Mar).

	1985/86	1986/87	1987/88	1988/89
Python reticulatus				
CV Reco			22500	32500
Perintis Tani			6000	32750
Bintang Sakti			7500	25000
Total	28700	21000	36000	90250
Python curtus				
CV Reco			8500	20000
Perintis Tani			4500	48450
Bintang Sakti			5000	11000
Total	0	14000	18000	79450

West Kalimantan theoretically comes under the control of the PHPA Balai in West Java but, as it is so remote, most of the permitting procedures are handled by the local Sub-Balai in Pontianak. It is the Sub-Balai, not the Kantor Wilayah, which issues capture and domestic transport permits. Capture permits are valid for six months, and domestic transport permits, which are issued to send skins to Jakarta, for only two days. The capture quota for West Kalimantan in 1989 was originally only 8102, but this was subsequently increased to 15 000. For some obscure reason, no quotas were granted for the years 1987 and 1988, but it seems most unlikely that this had any inhibitory effect on the capture of pythons in the province.

Most of the pythons are said to come from Manpawa, Sambas, Sinkawang, Sintang, Ketapang, and around Pontianak, mainly in the forests and swamps, although the snakes are said to move into the rice fields in the wet season. Both species of python are said to be found in similar areas.

East Kalimantan

The largest reptile skin tannery in the whole of Indonesia is located near Samarinda, owned by P.T. Makmur Abadi Permai. It was built in 1987 and started operation in 1988. By 1989, it was working at full capacity, around 7500 python skins and 50 000 *Varanus* skins a month, and a new tannery was under construction which was intended to double the capacity. Before 1987, the company had an agent in Samarinda who sent skins for export to Jakarta, but tanned skins are now exported directly from Balikpapan to Singapore. There are two other companies in East Kalimantan (both in Samarinda) which have permits to capture pythons, Toko Bogor and Kaltim Indah Raya.

Table 17. Recommendations by PHPA Sub-Balai for capture and transport permits for *P. reticulatus* numbers issued by the Kantor Wilayah (KanWil) to three traders in East Kalimantan in 1989 (from official records at PHPA and KanWil).

	Sub-Balai recommendation	KanWil issued
Capture permits		
Makmur Abadi Permai	75000	54750
Toko Bogor	3000	2000
Kaltim Indah Raya	2500	4952
Total	80500	61702
Transport permits		
Makmur Abadi Permai	0	1250
Toko Bogor	3000	500

As in most provinces, the PHPA Sub-Balai is responsible for administering the quota and making recommendations for permits to be issued by the Kantor Wilayah. The number of skins recommended by PHPA and those specified in the permits issued for 1989 are shown in Table 17. There was considerable confusion over the capture quotas for 1989, because the Sub-Balai did not have details at the beginning of the year. Towards the end of August, they managed to obtain a copy of the original quotas (i.e. 68 870 for *P. reticulatus*, see Table 6) but, by then, had already recommended issuing permits for 80 500 skins. They were unaware that the quota had subsequently been increased to 90 000. The number of skins specified in domestic transport permits issued is also shown in Table 17. Few were issued, as most of the skins covered by the capture permits were tanned and exported by Makmur Abadi Permai. It is almost certain that any skins purchased by Kaltim Indah Raya will have been sent to Jakarta for export, but no transport permits were issued.

All of the skins bought by Makmur Abadi Permai in Samarinda are said to have come from East Kalimantan, most of the *P. reticulatus* (c. 80%) from along the Mahakan River, with others from Balikpapan, Penagam, Polongan, Tarakan, Bulongan and Sangkulirang. There are also a few *P. curtus* of the brown variety, which are said to come from the Meratus Mountains. The company has about 50-60 regular suppliers, who bring skins to sell in Samarinda. In the dry season, they may come by road, but for the rest of the year they come by boat.

South Kalimantan

There is only one trader licensed to export python skins from South Kalimantan, C.V. Ika Guna, but two others, C.V. Suastika Jaya, and C.V. Kaltim Indah Raya, sell skins to exporters in Java. All three are based in Banjarmasin. Other smaller dealers are based in Sungai Utara, Sungai Tengah, Sungai Selatan and Pulau Laut. There are no facilities for tanning reptile skins for export in South Kalimantan, and all are therefore exported in a raw state.

The capture quota for *P. reticulatus* in South Kalimantan fell from 30 000 in 1985 to 7000 in 1987, before rising to 27 500 in 1989 (Table 18). There is no capture quota for *P. curtus*. The Regional PHPA office (BKSDA V) has compiled statistics for the number of pythons captured in the province, and these are shown in Table 18. Also shown are the number of skins of *P. reticulatus* specified on export permits issued to C.V. Ika Guna by PHPA Directorate General in Bogor. It can be seen that these bear little resemblance to the numbers of snakes captured as recorded by the local PHPA office.

Table 18. Capture quotas for *P. reticulatus* and the number reported in the Annual Reports of PHPA BKSDA V to have been captured in South Kalimantan (Gusti *et al.*, 1990). Export permits refer to the numbers issued to C.V. Ika Guna by PHPA in Bogor.

	1985	1986	1987	1988	1989
Quota	30000	7518	7000	7000	27500
Captured	20000	7500	4671	5500	13000
Export permits		6450	8250	6250	27774

Gusti *et al.* (1990) also quote statistics collected by the Departments of Industry and Trade for the export of reptile skins from the Province. The latter show that although reptile skins were worth from US$34 000-145 000 annually, they accounted for less than 0.03% by value of all of the province's exports in

1988. It is notable that there is close agreement between the monetary values of the export statistics collected by the two departments, but the volumes recorded differ by an order of magnitude (Table 19). Python skins represented 11-16% by weight of the exports in 1985 and 1986 but 25-52% by value. The apparent value of the skins, as calculated from the figures in Table 19, rose from US$9.11/kg to US$35.28/kg in this period. Assuming that the mean length of skins was 3.5 m and the mean weight 250 g, even the higher value would only indicate a price of US$2.52/m. As the true price of python skins was around US$9/m in 1985-86, it would appear that the value of reptile skin exports has been grossly under-estimated by the Government departments.

Dealers in Banjarmasin report that they pay Rp12000-24000/m (US$6-13/m) for python skins, depending on quality. There are at least two companies in Banjarmasin and one in Barabai which manufacture products from python skins. Some of the products are sold locally (c. 10-15%), but most are sent to Bali and Yogyakarta (60-70%), the principal markets for tourist products in Indonesia. This market tends to use the poorer quality, cheaper (Rp5000-7500/m) skins which are not good enough for export. One of the firms, which has 30 employees, claims to buy 20 python skins a month, most of which are used to produce belts and watchstraps. Representative prices are shown in Table 20 (Gusti *et al.*, 1990).

Table 19. Volume and value of reptile skin exports from South Kalimantan compiled by the Department of Industry (columns 1-4) and Department of Industry (columns 5-6) (Gusti *et al.*, 1990).

	Dept of Industry *P. reticulatus*		Dept of Industry All reptiles		Dept of Trade All reptiles	
	Volume kg	Value US$	Volume kg	Value US$	Volume kg	Value US$
1984		36765		122446	231632	122449
1985	1703	15508	15942	62235	183487	62236
1986	1255	44275	8066	84680	92847	84680
1987					23000	34300
1988					81197	144240

Table 20. Prices (Rp) of products manufactured from python skin in Banjarmasin (Gusti *et al.*, 1990).

	Price to craftsman	Price in shop
Belt (10 cm)	12500	17500
Belt (3-4 cm)	5000	7500
Belt (2 cm)	4000	6000
Handbag	20000-40000	25000-50000
Ladies' shoes	100000	125000-150000
Purse	5000	10000
Wallet	4000	7000
Watchstrap	2000-3500	2500-5000

In South Kalimantan, most of the snakes are caught in the swamps around Cindai Alus, the Martapura area and the Sungai Negara wetlands. In Central Kalimantan, the swamp forests of the upper reaches of the Barito, Kahayan and Kapuas rivers are the main sources. Other trapping areas include the Meratus Mountains, Hulu Sungai and Pulau Laut. Some trapping is carried out by specialist trappers, in which case a group of 4-5 men will make expeditions of 7-20 days into the forest, during which time they would expect to catch 2-8 pythons. Other pythons are caught incidentally by villagers and farmers. Skins are sold to local traders and visiting middlemen, who wait until they have accumulated 20-50 skins before taking them to sell in Banjarmasin (Gusti *et al.*, 1990).

Sulawesi

The principal exporter of reptile skins in Sulawesi is PT Sumber Murni. Formerly the company used to export from Ujung Pandang but recently they have exported through Kaltim Indah Raya in Jakarta. Owing to time constraints, it was not possible to visit Sulawesi and so details of the operation of the permitting system are not known. Skins of both *P. reticulatus* and *P. molurus* are obtained from the island. One dealer in Jakarta claimed that the skins of *P. reticulatus* from Sulawesi had a recognisable pigmentation pattern which distinguished them from all other members of the species in Indonesia.

International trade

The numbers of python skins recorded in CITES annual reports as having been exported from Indonesia are shown in Table 21, where they are compared with those reported to have been imported from Indonesia. From 1985 until 1988, only 67 skins of *P. molurus* are said to have been imported from Indonesia. Declared exports of *P. curtus* were relatively low in 1986 and 1987, but rose sharply to 150 270 in 1988. Reported exports of *P. reticulatus* rose from 136 376 in 1985 to 480 207 in 1988. The corresponding imports were much lower, owing principally to the fact that no imports have been reported by Singapore, one of the main destinations of snake skins. In 1985 and 1986, Singapore was not a Party to CITES, but it has submitted annual reports in 1987 and 1988. However, for political reasons unconnected with CITES, Singapore (q.v.) does not report any imports from Indonesia, and so it is impossible to verify the volume of exports by this means.

Table 21. Exports of python skins recorded in Indonesia's CITES annual reports compared with imports reported by the importing countries. - No annual report submitted. 0 No trade recorded.

	1985		1986		1987		1988	
	Exp	Imp	Exp	Imp	Exp	Imp	Exp	Imp
P. curtus								
Italy	0	0	0	0	1000	0	0	-
Spain	0	-	200	0	0	0	0	-
Japan	0	0	100	0	1000	0	1000	-
Singapore	0	-	37750	-	23000	0	149270	0
USA	0	0	200	201	0	0	0	0
Total	0	0	38250	201	25000	0	150270	0
P. molurus								
Spain	0	-	0	0	0	18	0	-
USA	0	-	0	-	0	-	0	49
P. reticulatus								
FR Germany	40	4570	1250	351	102	2100	120	0
France	0	4620	1200	0	4200	2154	35115	32641
Italy	0	0	350	0	3080	180	2850	-
Japan	0	0	1000	1000	3000	1400	8401	-
Netherlands	0	0	0	0	0	0	10	0
Singapore	136301	-	313643	-	283695	0	421708	0
Spain	0	-	1000	4750	5770	3884	5570	-
Switzerland	0	0	0	1	0	0	0	0
UK	0	0	0	0	0	0	300	4000
USA	35	733	7765	874	8052	0	6133	3764
	136376	9923	326208	6976	307899	9718	480207	40405

Table 22. Comparison of the quantities and destinations of python skins recorded in Indonesia's CITES Annual Report for 1988 with those specified in the permits issued.

	Ann Rep	Permits
P. curtus		
Japan	1000	0
Singapore	149270	197500
USA	0	6
Total	150270	197500
P. reticulatus		
FR Germany	120	900
France	35115	41455
Italy	2850	2780
Japan	8401	700
Netherlands	10	0
Singapore	421708	575278
Spain	5570	4170
UK	300	0
USA	6133	4253
Total	480207	629536

Tables 8 and 9 show the numbers of skins specified on export permits issued to traders by PHPA. In 1986 and 1987, the annual reports submitted by Indonesia recorded more skins of *P. curtus* and *P. reticulatus* than were specified in the permits issued. In 1988, permits were issued for 197 500 *P. curtus* and 629 536 *P. reticulatus*, while the annual reports only recorded 150 270 and 480 207 skins of the two species respectively (Table 22). It is difficult to explain this discrepancy except in terms of a serious omission from the annual report. The annual report is based on permits issued, there being no mechanism for incorporating information from permits returned by Customs, but it is possible that if some permits were not used, they may have been returned by the traders and subsequently excluded from the annual report.

Whatever the reason, it appears that the export of *P. reticulatus* skins rose from around 200 000 in 1986 to nearly 700 000 in 1988 before falling again to some 550 000 in 1989 (Table 8). Exports of *P. curtus* skins appear to have followed a similar course, but at a lower level (Table 9). It is probable that *P. curtus* were exported prior to 1986 but that they were identified as "*P. reticulatus*", there being no capture quota for Blood Pythons. The dramatic rise from 1987 to 1988 may have been the result of

improved reporting, but it is probably a real increase, fuelled by the rising price of skins (Figure 3). The Indonesian dealers confirmed that exports had been lower in 1989 as a result of slumping demand and falling prices, most estimating that they had exported in 1989 75% of the numbers of skins that they had exported in 1988. This corresponds closely with the data in Table 8.

Further data on snake skin exports are contained in the Indonesian Customs statistics (Table 25), which do not differentiate species of snakes, but merely "Snakes hide and skin" (category 4101930). Exports have varied from 21 tonnes to a peak, in 1984, of 215 tonnes, the latter corresponding to 5.3 million skins. Exports appeared to fall sharply from 1984 to 1987, but then rose again in 1988 (Figure 3). The average weight of the skins exported has varied from 41 to 176 g, and this may give an indication of the species of snake traded; air-dried *P. reticulatus* skins have an average weight of around 250 g while those of *Cerberus rhynchops*, *Ptyas mucosus*, *Acrochordus* spp. and other commonly traded species are considerably less. Dealers in Singapore reported that trade before 1979 was almost exclusively in python skins, but that the smaller species have only become fashionable since that date. This agrees fairly closely with the data in Table 25, which show that the average weight fell from 176 g in 1977 to 51 g in 1978. The sudden rise in average weight in 1987 is puzzling, but it was accompanied by a ten-fold drop in the number of skins reported. It is possible that this indicates a relative increase in the number of python skins traded at the expense of the smaller species. The Indonesian CITES annual reports also specify the numbers of non-CITES species which have been exported in each year, and the totals for each snake species are given in Table 23. This confirms that the overall number of snake skins did halve in 1987, but that the number of python skins continued to increase.

Indonesian Customs statistics also specify the ports from which the snake skins have been exported (Table 26). These confirm that snake skins come mainly from Sumatra, Java and Kalimantan, with very few from Sulawesi or the eastern provinces. However, in the early 1970s, very few of the skins were exported from Java, the majority coming directly from Sumatra and Kalimantan; whereas by the 1980s, some 70% left from Java. This is not a reflection of the source of the skins, but of changing trade patterns. Formerly the Singaporean importers dealt directly with the small traders and middlemen in the provinces but, now, most of the skins pass through the hands of large Indonesian exporters based in Jakarta. Part of this change may be attributable to the increasing importance of air transport and ease of movement around the Indonesian archipelago, part to the growing economic independence of Indonesian businessmen, and part to the centralisation of permitting facilities in Bogor. However, as the main shift to exporting through Java took place in 1977 and 1978, before Indonesia joined CITES, the centralisation of permitting was probably of lesser importance in this transition.

Table 23. Total numbers of snake skins exported from Indonesia recorded in Indonesian CITES annual reports.

Species	1985	1986	1987	1988
Acrochordus granulatus	194075	267000	-	32500
Acrochordus javanicus	186459	180802	180032	244615
Agkistrodon rhodostoma	3000	3000	-	-
Boiga dendrophyla	8100	3000	5003	-
Cerberus rynchops	81330	129616	596046	774584
Dryophis prasinus	70000	165002	6600	-
Elaphe radiata	49015	45200	35500	24179
Enhydris enhydris	108000	45000	-	75
Homalopsis buccata	387960	1120001	113892	96075
Naja hannah	500	1000	-	-
Naja sputatrix	124000	124707	63177	51418
Natrix piscator	-	10000	730	-
Natrix subminiata	15000	10000	100	-
Ptyas korros	15320	31000	17520	4335
Ptyas mucosus	251000	1597813	488513	763857
Python curtus	-	26150	25000	160176
Python reticulatus	150955	214191	328044	451172
Vipera russelli	-	60000	-	-
Xenopeltis unicolor	109800	21000	50000	75000
Total	1754514	4054482	1910157	2677986

By using a combination of the CITES data and the Customs statistics, it is possible to infer that the numbers of python skins exported increased from low levels in the early 1970s to nearly three-quarters of a million in 1988, before declining slightly in 1989. It is tempting to suggest that this decline might be due to a decreasing supply of snakes, but evidence from the traders in Indonesia and Singapore suggests that a decreasing demand was responsible: the price had risen too high in 1988, causing the consumers to stop buying python skins. Demand in Europe had dropped even more drastically, but this effect had been cushioned throughout the chain of supply to cause only a 25% drop in Indonesia. Dealers in Singapore reported that they had still been buying skins, albeit at lower prices, from the Indonesian traders, but had been stockpiling them anticipating being able to re-export them at a later date. Similarly, some of the Indonesian exporters said that they had continued to buy skins from their suppliers and were stockpiling them, waiting for the price to rise. One exporter in Medan claimed to have a stock of 100 000 python skins obtained in this way. Other traders in Indonesia reported that their purchase of python skins had declined more substantially. The crucial question affecting the wild populations is whether the drop in demand in Europe had been translated into a reduction in the numbers of pythons killed in

Indonesia. In the short term, it would appear that this was not the case, but if the slump in demand continues for a few more years, it is possible that the full effect of the drop in price of skins may work its way back to the snake hunters. However, as the demand fluctuations in Europe are said to be linked to the price of skins rather than simply fashion, it is probable that a drop in the price of skins of some 40% will soon stimulate the demand once more.

Domestic trade

The usual trade route for python skins is to pass from the hunters in the villages, through the hands of one or more middlemen, to the main exporters. It is difficult to ascertain the true price of skins, partially because the traders involved had a variety of reasons for distorting the price when questioned, and partially because there had been very sharp fluctuations over the past year. Prices for standard-sized *P. reticulatus* skins varied from Rp8000/m (US$4.4/m) to US$18/m (Table 24). Undersized *P. reticulatus* ("baby python") skins were cheaper, at around Rp6000-10000 each, as were *P. curtus*, which were said to fetch Rp3000-12000 each.

Table 24. Prices per metre for *P. reticulatus* skins (20-cm, up) in Indonesia obtained by questioning major traders and from Gusti *et al.* (1990). Prices quoted are those paid to middlemen and those obtained on export in 1988 and 1989 (US$1 = Rp1800).

	To middlemen		Export	
	1988	1989	1988	1989
Dealer 1		Rp10-12000		US$10
Dealer 2			US$18	US$10
Dealer 3		Rp14000		US$13
Dealer 4		Rp8000		Rp10000
Dealer 5		Rp13000		
Dealer 6	Rp12000	Rp8000		
Dealer 7	Rp23000	Rp15000		
Dealer 8	Rp17000	Rp10000		
Dealer 9		Rp8-10000	US$14	US$10
Gusti *et al.*		Rp12-24000		

The other major python product in Indonesia is the gall bladder, which is sold for medicinal purposes, and is mainly exported. The value was said to range from Rp300 000 to 600 000 a kg. As dealers estimate that there are 100-400 bladders to a kg, the gall bladder can add Rp750-6000 to the value of each snake. There is a small trade in live pythons from dealers, most of whom are based in Jakarta. The export price for *P. reticulatus* quoted by the main dealer was US$15 each.

Summary

1. The export of wildlife products from Indonesia is controlled by a complex permitting procedure involving the setting of capture quotas for each province, and the issuance of separate capture, domestic transport and export permits. Capture permits are issued in the provinces and do not usually exceed the quotas, but they have little effect in limiting the skin harvest. Domestic transport permits are very rarely issued and their use does not appear to be policed. Export permits are issued centrally in Bogor and probably give the most accurate estimate of the number of skins exported.

2. Permits are only granted for *Python curtus* and *P. reticulatus*, the third Indonesian species, *P. molurus*, being protected. The capture quota for pythons increased very sharply in 1989 to 532 000 skins, 84% of which were for *P. reticulatus*. Export permits are routinely granted for numbers of skins greatly in excess of the capture quotas, and no attempt is made to ensure that the skins destined for export have been legally acquired.

3. Since 1986, the Ministry of Trade has attempted to encourage traders to develop tanning facilities in Indonesia by banning the export of raw skins. However, although several of the major exporters have thereby been encouraged to establish tanneries, it is still possible to obtain permission to export raw skins.

4. Most of the *P. reticulatus* skins come from Sumatra and Kalimantan, with lesser quantities from Java, Sulawesi and Nusa Tenggara.

5. The majority of *P. curtus* skins derive from northern Sumatra, with a few from southern Sumatra and Kalimantan. There are two colour varieties of this species, a reddish variety, confined to Sumatra, where it is most common in the north, and a yellowish form, which is found also in Kalimantan.

6. In the 1960s and 70s, pythons were the principal species of snake skin exported, but a great variety of smaller snake skins were added to the trade in the late 1970s. Throughout most of the 1970s and 80s, exports of *P. reticulatus* were probably relatively constant, but they rose to around three-quarters of a million in 1988, principally in response to rising demand and therefore price.

7. The great majority of snake skins have traditionally been exported to Singapore for re-export to the consumer markets. There has been a growing trend towards direct exports from Indonesia to Europe, North America and Japan, aided by the development of tanning facilities.

8. There is no reliable information on the effects of the trade on wild populations of pythons. The increased trade has been

supplied by an increasing number of trappers operating over a greater range. This has been aided by the transmigration programme, which both opens up large areas of previously inaccessible python habitat and introduces more unskilled labourers keen to obtain a supplementary income from forest products. Some of the older dealers reported decreasing supplies of pythons from the more populated areas, but it is difficult to separate the effects of exploitation from those of habitat disruption.

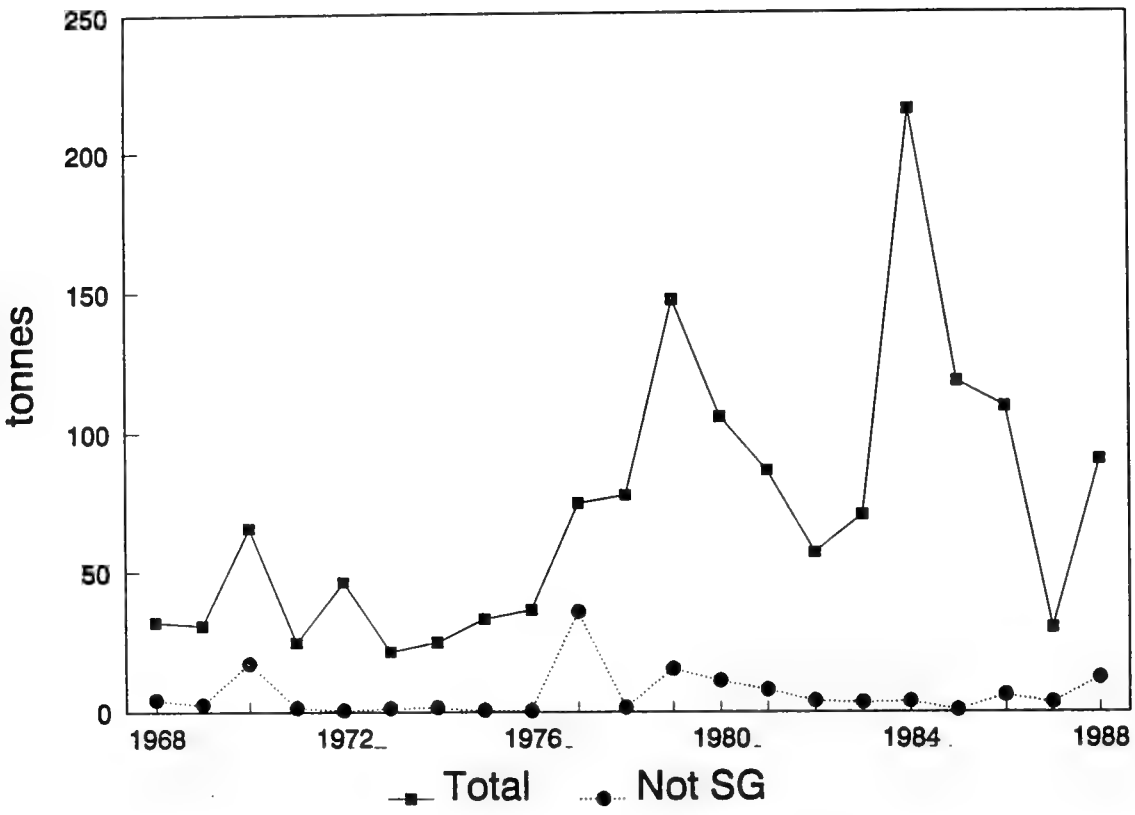
Table 25. Exports of snake skins recorded in Indonesian Customs statistics (kg), with totals also in US$ and pieces.

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Australia																					119
France							78								128				702	917	2130
FRG		286					357	275			24	1452	874	484	310	939	1110	80	680		
Hong Kong		4		10	1							951	591	437					780		67
Hungary								211													
Italy							800					2820	2146	555	505		559			150	2312
Japan	3532	2216	2843	1175	540	1372	284	24		35129	1159	5646	4495	406	2655	490	99	222	277	1146	1820
Korea Rep												63					18				
Netherlands	621	137	518	317	49				272	7		95									
Singapore	27750	27957	48761	23017	45714	19928	23056	32449	35686	39072	75989	131872	94486	78579	53063	67021	211261	117329	103036	26484	78112
Spain																	1830	264	330	813	1652
Switzerland																					150
Taiwan												2665	2783	3392	193	1875			3138	240	
Thailand									170					782							
UK			13680																		75
USA			28				25		14	461	340	1416		1622			92	127	25		3664
Total kg	31903	30600	65830	24519	46304	21300	24600	32959	36142	74669	77512	146980	105375	86257	56854	70325	214969	118022	108968	29750	90101
Total US$	48048	30045	92539	45845	53754	28015	64495	81239	70733	61344	129109	694637	506698	382742	331905	290056	971460	605492	1318895	505498	2596599
Total pc								222245	350070	424702	1524101	2209073	1514244	1041606	460384	1200024	5302812	2359216	2403722	200703	1233915
US$/kg	1.51	0.98	1.41	1.87	1.16	1.32	2.62	2.46	1.96	0.82	1.67	4.73	4.81	4.44	5.84	4.12	4.52	5.13	12.10	16.99	28.82
US$/pc								0.37	0.20	0.14	0.08	0.31	0.33	0.37	0.72	0.24	0.18	0.26	0.55	2.52	2.10
g/pc								148	103	176	51	67	70	83	123	59	41	50	45	148	73

Table 26. Exports of snake skins recorded in Indonesian Customs statistics from different ports of export (kg).

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Ampenan			60						39												
Balikpapan	154																		27		3127
Banjarmasin	3410	3750	3964	1731	3560	1639	1680	3036	3157	3590	8454	5515	5290	1940	6821	5202	15776	11301	8065	2805	6489
Belawan	5001	5638	5850	6728	4958	4529	5340	6095	7775	8125	10487	10151	13101	12760	8231	11166	12000	12495	9086	2013	5549
Fak-Fak								450													
Jambi					30																
Juanda										280	340			20	505		658				
Kemayoran			2791	2944	1386	2793	5544	2919	4989	5943	12299	79587	48840	23893	19070	31356	100043				
Makasar	1323	1150																			
Merauke					720																
Ngurah Rai												97									
Other													1161								
Pakanbaru		65	705	100	815					347	549	959	887	902	323	1084	1099	2956	4089		
Palembang	5994	5014	6834	8837	10783	6615	3293	5748	9429	4797	5648	21081	11160	8804	7320	3035	12293	11770	7335		1650
Panjang	92											10									
Plaju				268																	
Polonia												584	598	2199	4591	1094	1426	3560	2268	3391	5850
Pontianak	417	506	441	100	144	432	110			140	262	340	420	119							
Samarinda	6122	3664	14851	312	22108	2610	5325	12101	3877	2774	1017	399	1385				294				980
Sampit	517	501	140																		
Semarang	352	322																			
Soekarno Hatta																		30525	42251	3655	30977
Sorong			270	2500											229						
Sumbawa	144																				
Surabaya perak	5370	8410	14363		50	740		767	6175	47601	14841	5945								240	
Talang Betutu								544			75	381									
TG Priok	3007	1580	436	469	1595	1870	3135	1224	701	1065	23540	20534	21715	35214	7338	16898	71380	45415	35847	17406	35479
Ujung Pandang			15125	530	155	72	173	75		7		1397	818	406	2426	490				240	
Total kg	31903	30600	65830	24519	46304	21300	24600	32959	36142	74669	77512	146980	105375	86257	56854	70325	214969	118022	108968	29750	90101

Figure 3. Total exports of snake skins recorded in Indonesian Customs statistics, showing the total exported to countries other than Singapore.



No pythons occur in Japan, but the country imports large quantities of skins. Japanese Customs statistics report imports of snake skins, and these are given in Table 27 and Figure 4. Since 1970, total imports have fluctuated roughly between 15 and 50 tonnes with an overall increase over this period. The majority of the skins have come from Indonesia, but the proportion form this source has increased recently. In the 1970s, more skins were said to have come from Singapore but, in 1981, Japan changed its reporting procedure to record in the statistics the country of origin rather than the country of export. It is most likely that the skins from Singapore originated in Indonesia. Malaysia also supplied substantial quantities of skins in the early 1970s but ceased in 1978. The imports in 1988 and 1989 are discussed in the section on Malaysia and possibly indicate skins re-exported from Thailand. Imports from Thailand fell in these two years (Table 27). Imports from the Philippines have been falling since a peak in 1971 (Figure 4). Customs statistics do not indicate the species of snake involved, but some indication may be found in the unit price of the skins (Table 27) which rose to Yen23531/kg in 1982 before falling back slightly. The price in 1988, Yen21254/kg, is equivalent to US$38/skin, assuming a mean weight of 260 g, or Us$12/m, assuming skins of mean length 3.2 m. This is close to the international price for python skins (see Fig. ??) and suggests that a large percentage of the skins recorded in this Customs category were pythons. The fact that the price fell slightly in 1983 may indicate that skins of some other species started to be included around that date. It is notable that no snake skins, apart from 2 kg in 1980, were reported from Africa, very few from Latin America, and the overwhelming majority came from South-east Asia.

Figure 4. Total imports of snakes skins recorded in Japanese Customs statistics, showing quantities reported from major sources.

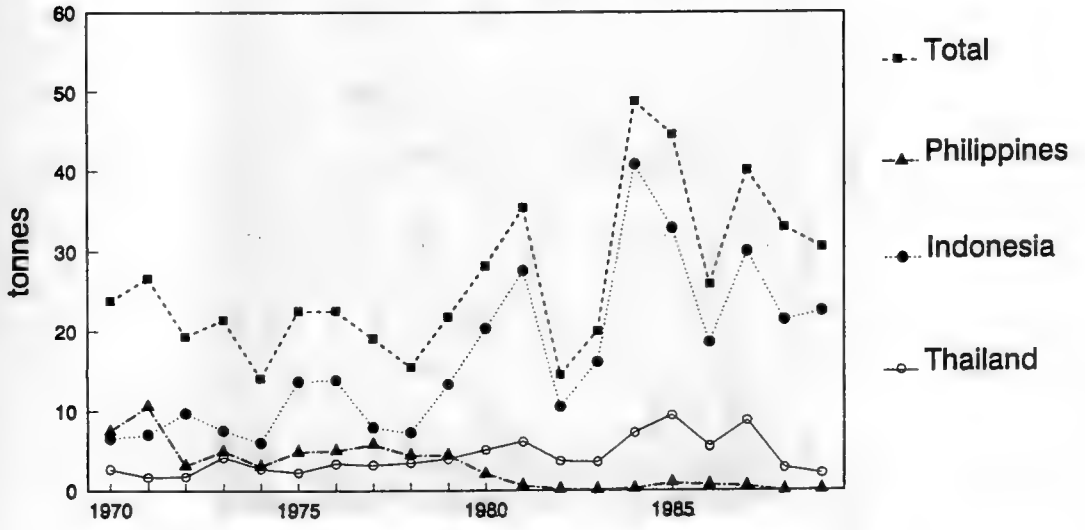


Table 27. Imports of snake skins recorded in Japanese Customs statistics (kg), with totals in Yen.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	*1989
Argentina				34												1176				
Bangladesh				600		721		343							60					
Brazil	801	1492																		
Cambodia	262		50																	
China				523											28			115		218
Hong Kong			184	66		141	36	60	19		40							40		
India	665	214														74				
Indonesia	1947	1154	1997	1601	966	4184	6121	6198	6443	10925	15280	26998	10423	15482	39881	29336	18628	29510	20925	22012
Israel											143									10
Italy																				
Korea Rep								8	30				20							
Malaysia	4574	5223	3897	3394	2139	214	145	640										328	6749	4048
Panama								320												
Paraguay								814	252		409	200		255	320					
Philippines	7497	10637	3156	4970	3094	4893	5059	5838	4467	4492	2099	613	166	104	243	959	691	533	0	104
Ryukyu	417		546																	
S Leone											2									
Singapore	4596	5941	7738	5938	5071	9541	7814	1758	885	2466	5112	645	117	659	950	3559		488	532	568
Taiwan			65		9	230										108				
Thailand	2711	1691	1746	4170	2751	2286	3362	3189	3476	3990	5131	6119	3700	3558	7243	9405	5537	8803	2836	2125
UK				145	18															
USA	372	250			113										65		1024			
Vietnam		47				347	27					864	157					338	1977	1483
Total kg	23842	26649	19379	21441	14161	22557	22564	19168	15572	21873	28216	35439	14583	20058	48790	44617	25880	40155	33019	30568
Total Yen	197077	180285	150722	147922	154779	279411	312187	244703	205132	370715	528185	723794	343156	387352	1088380	980156	440980	696657	701780	602111
Yen/kg	8266	6765	7778	6899	10930	12387	13836	12766	13173	16949	18719	20424	23531	19312	22307	21968	17039	17349	21254	19697

DISTRIBUTION

Python molurus bivittatus Reportedly found in all provinces, although more rare than *P. reticulatus* (Deuve, 1970), and more common in the south (Lao P.D.R. Forest Department *in litt.*, 31 January 1986).

Python reticulatus Found in all provinces, although more common in the centre and south (Deuve, 1970). Bourret (1939) noted that the species occurred throughout the former 'Indochine Française' (which included present Laos), especially in marshy areas.

POPULATION

Python molurus bivittatus According to Bourret (1939), this species was common throughout the former 'Indochine Française', which includes the present country of Laos. More recently, said to be more rare than *P. reticulatus* (Deuve, 1970). Both this species and *P. reticulatus* are said to have declined significantly due to local utilisation and the export trade (Lao P.D.R. Forest Department *in litt.*, 31 January 1986).

Python reticulatus Reportedly not uncommon in Laos (Deuve, 1970). Both this species and *P. molurus* are said to have declined markedly in Laos due to local utilisation and the export trade (Lao P.D.R. Forest Department *in litt.*, 14 February 1986).

EXPLOITATION

CITES annual reports indicate little trade in python skins from Laos, but an import of 2445 live *P. molurus* to the USA in 1986 (Table 51). If verified, this would prove a new trade route which might deserve further investigation. Traders in Thailand report receiving python skins from Laos on a regular basis for re-export (see Thailand section).

DISTRIBUTION

Python curtus Recorded from Peninsular Malaysia, Sabah, and Sarawak; seemingly widely distributed but local (Tweedie, 1983; Malaysia, Sabah CITES MA, 1985).

Python molurus bivittatus There appears to be no confirmed record of the species from any part of Malaysia. The occasional old report exists for West (Peninsular) Malaysia, but any such individuals are likely to have escaped from snake charmers (Flower, 1899; Smith, 1930; Tweedie, 1983). Although the species has been reported to occur in Borneo (Smith, 1943; de Haas, 1950), and would thus be expected in Sabah or Sarawak, there are no specific records for these areas and its occurrence in Borneo is doubted by one authority (R.F. Inger *in litt.*, 5 March 1986).

Python reticulatus No details available for Malaysia, but apparently occurs in suitable habitat throughout the peninsula (B.H. Kiew in litt., 25 February 1986); also present in Sabah, where recorded in forested areas throughout (Malaysia, Sabah CITES MA, 1985), and in Sarawak.

POPULATION

Python curtus Reported not rare in the peninsula at the turn of the century (Ridley, 1899), and not uncommon in Peninsular Malaysia in the 1950s (Tweedie, 1983). In general, not commonly encountered in Peninsular Malaysia, but widespread and not heavily exploited (S. Ambu *in litt.*, 17 February 1986). Here, also said to be not frequently seen, but not markedly uncommon either; the relative frequency of *curtus* to *reticulatus* is about 1:100 (B. Kiew *in litt.*, 25 February 1986).

At Asahan in Malacca, only one *P. curtus* was seen during a period of three and a half years, while *P. reticulatus* was said to be very common (Batchelor, 1958). Among the snakes regularly brought to the University at Bangi, Selangor, there is perhaps one *curtus* to every eight to ten *reticulatus* (G. Davison *in litt.*, 22 February 1986). Eleven *P. curtus* were among snakes brought to the Institute for Medical Research in Kuala Lumpur between 1948 and 1954 (Lim, 1955).

Said to be much rarer than *Python reticulatus* (common) in Borneo in the early years of this century; this report apparently refers to Sarawak in particular (Shelford, 1916). No *curtus* were found during long-term herpetological sampling at three primary rainforest sites in Sarawak in 1962-64 and 1984 (R.F. Inger *in litt.*, 5 March 1985), and none were seen by another fieldworker (working on rainforest lizards) (H. Watson *in litt.*, 17 March 1986). Similarly, reported less common and less widespread than *P. reticulatus* in Sabah, but suitable habitat is found through most of the country (Malaysia, Sabah CITES MA, 1985).

Python molurus bivittatus No data; possibly absent (see Distribution section above).

Python reticulatus Cantor (1847) reported that the species was "very numerous in the Malayan hills and valleys" in the mid-nineteenth century. At the end of the nineteenth century said to be one of the commonest snakes, pythons of 6 m (20 ft) then being "by no means uncommon" (Ridley, 1899). Reported very common in the 1950s at Asahan, Malacca, where "because of its depredations of fowls, it is viewed with considerable disfavour"; on one rubber estate, often seen in streams from which they sometimes took ducks (Batchelor, 1958). Seven *P. reticulatus* were among snakes brought to the Institute for Medical Research in Kuala Lumpur between 1948 and 1954 (Lim, 1955). A recent popular source (Lim, 1981) noted that young pythons are often found close to human habitations (probably attracted by the presence of rodents) and, after stating that the species is "still quite common", questions how long this situation will persist. Similarly, said to be still quite common despite exploitation, and still readily to be seen (B.H. Kiew *in litt.*, 25 February 1986). Still abundant in Perlis, within the security area of northern Peninsular Malaysia (S. Ambu *in litt.*, 17 February 1986), but disturbance, habitat loss, persecution and exploitation for food reportedly causes appreciable mortality in other parts of the peninsula, where, by implication, the species may often be less than abundant.

Cantor (1847) reported in the mid-nineteenth century that Chinese communities attributed great medicinal properties to the heart and gall bladder, and used the skin in musical instruments. Lim (1958) noted that python meat is regarded as a delicacy among Chinese communities, and that any snakes caught soon find their way into market, a point confirmed by Lim (1981), who reported a small but steady market for python meat and skin. The skin is used for ornamental leather, meat is eaten as a tonic, and various organs, notably the gall bladder, are valued for reputed medicinal properties (Lim, 1981).

Reported common in Sarawak at one time (Shelford, 1916), and said to be still widespread and common (H. Watson *in litt.*, 17 March 1986). However, during intensive herpetological fieldwork at three primary rainforest sites in Sarawak (Nanga Tekalit, 366 days; Labang, 128 days; Sengai Pesu, 160 days), the *P. reticulatus* seen numbered only 8, 10 and 4, respectively (R.F. Inger *in litt.*, 5 March 1986).

Population levels are unknown in Sabah, although *P. reticulatus* is reportedly more common then *P. curtus* (Malaysia, Sabah CITES MA, 1985).

EXPLOITATION

Both *Python reticulatus* and *Python curtus* are hunted for skins in Peninsular Malaysia, the hunters typically working at night when the snakes are foraging (Jasmi, 1987). A system of licensing is operated (see under legislation) and the numbers of permits issued in the different provinces is shown in Table 29. Each permit is valid for 50 skins, and so the maximum number of

animals permitted can be calculated. Since 1978, this has generally been in the region of 13 000-25 000, having been slightly lower in recent years. The provinces where most hunting has been permitted are Perak, Selangor, Kedah and P. Pinang.

International trade

Official records of the number of python skins exported from Peninsular Malaya are shown in Table 30. This has been considerably lower than the number of skins permitted for hunting. Most exports have taken place through P. Pinang, Perak, Selangor and Johor. Minimum net imports of live pythons and skins from Malaysia recorded in CITES annual reports is shown in Table 32. In several years, notably 1980, these have been appreciably higher than the quantities recorded in Table 30, though it must be remembered that the latter are only for the peninsula. Table 32 indicates that skin exports may have increased sharply in 1987.

The destinations of the skin exports are examined in greater detail in Table 28 for the years 1985-88. Most of the exports are said to have gone to Singapore. The quantities reported by Singapore in 1987 were slightly higher than those reported by Malaysia. Malaysia's annual report for 1988 was not available for this analysis, but Singapore reported even greater imports in 1988. Of particular interest are the imports from Peninsular Malaysia of *P. molurus*, which is not known to occur there.

The exports of live pythons also showed a dramatic increase in 1986 and 1987, in which *P. molurus* again featured prominently. The destinations of exports of live pythons are shown in Table 33, where it can be seen that the great majority went to the USA.

The increase in python exports from Malaysia coincided with the introduction of legal protection in Thailand (q.v.) and the decrease in exports from there. Export of live pythons from Malaysia increased in 1986, slightly before those of skins. This may be correlated with the fact that exports of live pythons from Thailand were banned in 1985, while skin dealers were given a three-year period in which they could export their old stocks. It is possible that the traders simply switched to Malaysian suppliers of skins, but the appearance of large quantities of *P. molurus* suggests that skins were actually imported from Thailand and then re-exported.

Malaysian Customs statistics (Table 31) record the export of "raw hides and skins of snakes" (21199300), which may include species other than pythons. These confirm that exports increased suddenly in 1987 and that the major destination was Singapore.

Japan has not imported large quantities of snake skins from Malaysia in recent years, but Japanese Customs statistics (q.v.) indicate that in the early 1970s it was the third most important

source after the Philippines and Singapore. No explanation has been found of why this trade declined so rapidly.

Legislation

Malaysia is a Party to CITES; the Convention entered into force on 18 January 1978. The wildlife legislation differs in Sabah and Sarawak, but in West Malaysia the principal act is the Protection of Wild Life Act, 1972. No. 76. (1 January 1973), under which:

> Licences are required to shoot, take or kill any protected wild animal or its nest or eggs; to carry on the business of a dealer or taxidermist; to house, confine or breed any protected wild animal, keep its trophy or import or export the animal.
> The Minister may declare open or close seasons, quotas for the number of protected animals to be taken or kept, and methods and localities of hunting.
> The Minister must maintain a list of all licensees. Hunters, dealers and taxidermists must maintain records of the numbers of protected wild animals obtained. Dealers and taxidermists must maintain a list of buyers and sellers and prices paid.
> Dealers and taxidermists may only acquire protected animals from authorised people (i.e. licensed hunters, dealers or Game Wardens).
> Dealers may only purchase protected wild animals during the open season or first 30 days of the close season.
> Aboriginal people (defined in the Aboriginal Peoples Ordinance, 1954) do not require a licence to kill partially protected wild animals (those in Schedule II) for the purpose of providing food for their families. Protected animals may be killed in the protection of crops or livestock, but they remain the property of the state.
> Immature animals may not be shot, killed or taken.

Schedule II, Part III "Other protected wild animals" includes: "Python - *Python reticulatus*". It would appear that *P. curtus* may not be protected.

The capture licences are valid for a period of three months and have a bag limit of 50 animals. Each licence costs M$15. Since 1985 it has been a requirement that trappers record on the back of the licence the number of animals killed. Separate permits are required for the export of skins. The fee for export permits has recently been increased from M$0.25 to M$1.00 per skin (Jasmi, 1988).

Table 28. Exports of python skins recorded in Malaysia's CITES annual reports compared with imports reported by the importing countries. - No annual report received. 0 No trade recorded.

	1985		1986		1987		1988	
	Exp	Imp	Exp	Imp	Exp	Imp	Exp	Imp
P. curtus								
Singapore	0	-	0	-	0	0	203	209
USA	0	0	0	0	0	0	6	0
P. molurus								
Singapore	0	-	0	-	1508	1005	-	13200
USA	0	0	0	0	0	0	0	68
P. reticulatus								
FR Germany	0	0	0	0	300	0	0	0
Italy	0	0	0	0	0	0	1962	-
Japan	0	0	0	0	0	0	12258	-
Singapore	0	-	0	-	16985	20361	30593	43061
Taiwan	0	-	0	-	60	-	30	-
UK	0	0	0	0	0	614	20523	36910
USA	0	3919	0	0	80	0	3631	2096
Total	0	3919	0	0	17425	20975	68997	82067

Table 29. Number of trapping permits issued for pythons in Peninsular Malaysia (Jasmi, 1987)

	1978	1979	1980	1981	1982	1983	1984	1985	1986
Perak	437	206	327	363	247	117	120	135	146
Selangor	9	-	36	18	34	41	50	55	67
Kedah	45	34	41	68	64	26	37	24	36
P. Pinang	2	41	34	41	30	47	43	46	29
Pahang	6	3	7	3	8	5	15	10	6
Johor	-	-	-	2	3	8	5	6	14
Ng. Sembilan	-	-	-	-	-	-	3	5	12
Melaka	-	-	1	-	3	7	7	5	5
Perlis	5	3	2	5	-	2	3	-	5
Kelantan	-	-	1	1	-	-	-	3	7
Total	504	287	449	502	389	253	283	289	325
Equiv. Snakes	25200	14350	22450	25100	19450	12650	14150	14450	16250

Table 30. Number of python skins exported from Peninsular Malaysia (Jasmi, 1987).

	1978	1979	1980	1981	1982	1983	1984	1985	1986
Perak	3022	877	930	906	609	1414	964	1085	791
Selangor	399	-	137	107	156	175	184	330	1195
P. Pinang	2116	3077	2377	1588	692	1160	1819	2431	6568
Johor	-	-	-	-	36	100	114	964	60
Melaka	-	-	-	60	-	-	-	-	-
Perlis	-	-	1	-	-	-	-	-	-
Total	5537	3954	3445	2661	1493	2849	3081	4810	8614

Table 31. Destinations of raw snake skins exported reported in Malaysian Customs statistics (kg). SP Sarawak and Peninsula only; S Sarawak only; P Peninsula only. na Not available

	1978	1979 SP	1980 SP	1981 P	1982	1983	1984 na	1985	1986 S	1987
France	-	-	-	-	12	-	-	-	-	-
Italy	660	433	-	-	-	-	-	-	-	30
Japan	-	-	-	-	-	-	-	-	1500	-
Singapore	2353	83	176	810	1081	253	-	310	1100	9603
UK	-	-	-	-	-	-	-	-	-	3655
Total kg	3013	516	176	810	1093	253	na	310	2600	13288
Total M$	32369	8759	3386	4050	8162	2540	na	1650	85918	185229
M$/kg	10.74	16.97	19.24	5.00	7.47	10.04	na	5.48	33.04	13.94

Table 32. Minimum net trade in live pythons and skins said to have originated in Malaysia reported in CITES annual reports.

	1980	1981	1982	1983	1984	1985	1986	1987
Live								
P. curtus	7	2	2	5	96	43	513	892
P. molurus	-	-	-	2	113	94	15006	17343
P. reticulatus	513	161	37	101	449	114	4551	9382
Skins								
P. curtus	-	715	-	-	-	-	-	-
P. molurus	104	770	-	-	-	-	1508	-
P. reticulatus	19069	2771	14	2751	4642	3775	-	21415
	-	150 m	-	-	-	-	-	-
	-	29 kg	213 kg	-	221 kg	271 kg	-	-

Table 33. Destinations of exports of live *P. curtus* (C), *P. molurus* (M) and *P. reticulatus* (R) from Malaysia.

	1985 C	1985 M	1985 R	1986 C	1986 M	1986 R	1987 C	1987 M	1987 R
Canada	-	-	-	-	-	-	2	-	10
China	-	-	-	-	-	-	10	100	55
Denmark	-	-	-	-	-	-	51	127	32
FR Germany	11	-	-	206	2225	823	169	1560	893
France	-	-	-	10	60	60	-	-	100
Hong Kong	6	2	-	-	-	-	-	-	-
Italy	-	-	-	-	-	-	10	-	50
Japan	-	-	-	-	20	17	18	15	12
Korea, Rep.	-	2	-	-	-	-	-	-	-
Netherlands	-	-	-	76	100	93	14	20	55
Singapore	-	-	-	-	-	-	-	1	205
Taiwan	-	-	-	-	-	-	12	10	-
UK	2	-	20	39	961	264	64	1895	760
USA	24	110	100	182	11140	2285	525	13615	7242

DISTRIBUTION

Python molurus bivittatus Records extend south to the Tavoy district (Smith, 1943); northern limit of distribution is uncertain. Wall (1926b) reported specimens from near Maymyo, near Mandalay, and Zimba Chaung in Tavoy District.

Python reticulatus According to Wall (1926a) the species is restricted to 'Lower Burma' and Tenasserim; the range here may be contiguous with that in south-east Bangladesh. All specimens available to Wall (1926b) were from Tenasserim. Salter (1983) suggested that pythons, without differentiating between *reticulatus* and *molurus*, are widespread in the country.

POPULATION

Python molurus bivittatus According to Salter (1983) pythons in general (sources do not distinguish between *molurus* and *reticulatus*) appear to be widespread and reasonably common, although were becoming rare in some areas even by the early 1900s. Wall (1912) noted that the species occurred "plentifully" in Burma; both the Burmese and Karens regarded the species as excellent food, and all specimens found were likely to be consumed; the gall bladder is prized for medicinal properties.

Python reticulatus Records available to Wall (1926a) suggested that *P. reticulatus* was a rare species in 'Lower Burma', although he cited an earlier authority that it was relatively common around Pegu; Wall considered the species not uncommon in Tenasserim. Pythons in general are reportedly widespread and reasonable common, although with local declines already noted after the turn of the century (Salter, 1983).

EXPLOITATION

CITES annual reports record the import to the USA of 912 skins of *P. reticulatus* from Myanmar (Table 47). Prior to this there was little evidence of any trade.

DISTRIBUTION

Python molurus molurus The species appears to be restricted to central areas; no records are available from west or east Nepal (Swan and Leviton, 1962).

POPULATION

Python molurus molurus Regarded as an endangered species in the Kingdom, but, because of lack of persecution, common in the tall grasslands of Chitwan National Park (Dhungel, 1985).

EXPLOITATION

The only record in CITES annual reports of trade in python skins from Nepal is of 1265 *P. reticulatus* skins in 1983 (Table 47). As the species does not occur in Nepal, this record probably represents an error in the statistics

PAKISTAN

DISTRIBUTION

Python molurus molurus Recent records are restricted to the Indus delta and lower valley in Sind, in the south-east sector of the country (Minton, 1966), mostly east of the river, and northward at least to the Nawabshah district (Pakistan CITES MA, 1986); also present in the Tharparkar desert area (Ghalib *et al.*, undated). The species may extend to the Punjab (cited from the Punjab area of pre-partition 'India' by Smith, 1943).

POPULATION

Python molurus molurus Cited as threatened (Ghalib *et al.*, undated). Populations have not yet been surveyed, but they are thought to have been very much depleted (Pakistan CITES MA, 1986).

EXPLOITATION

No evidence has been found of any trade in pythons from Pakistan.

DISTRIBUTION

Python reticulatus Widespread, including all the larger islands; recorded from Basilan, Bohol, Cebu, Jolo, Leyte, Luzon, Masbate, Mindoro, Mindanao, Negros, Palawan, Panay, Polillo, Samar and Tawi-Tawi (Leviton, 1963).

POPULATION

Python reticulatus According to A.C. Alcala (*in litt.*, 28 June 1986), few specimens are reported on Negros. On average, Alcala's laboratory is offered a couple of 1.5 m animals annually, reportedly from forest areas around the headwaters of rivers; no snakes more than 2 m long have been recorded in eastern Negros during the past decade, suggesting that population structure has been shifting. This last is ascribed to forest destruction and the habit of killing all snakes encountered. People in the interior are said to eat python occasionally, and hunting pressure for the skin trade is suspected to be negligible (Alcala *in litt.*, 28 June 1986).

Alcala (1986), on the other hand, reported that the species occurs throughout the Philippines group and is common. The species is hunted for food by tribal communities, and for skins, which command high prices. Alcala (1986) also noted that the species could be a more valuable source of skins if small animals were not hunted; this suggests that hunting pressure is not negligible but may be excessive.

EXPLOITATION

The Philippines are the reported source of relatively small quantities of *P. reticulatus* skins in CITES annual reports (Table 47). Most were imported to the USA and Japan. Japanese Customs statistics recorded quite large quantities of snake skins from this source in the 1970s (Table 27) but it is possible that some of these may have been sea snakes.

DISTRIBUTION

Python curtus First recorded from Singapore by Blanford, reporting in 1881 on a collection made by Dennys. This report (of a single specimen) seems to be the basis for all records of *P. curtus* from Singapore made by later authors (such as Ridley, 1899; Flower, 1899; Hanitsh, 1900; Boulenger, 1912), none of whom appear personally to have observed the species in Singapore. In a footnote in his annotated list of Singapore snakes, Sworder (1922:62) cautions that: "The snakes recorded from Singapore by Blanford in P.Z.S. 1881 were sent to him by Dr Dennys, who is known to have been careless in attaching localities to his specimens. Any records, therefore, by Blandford, in P.Z.S. 1881 and any specimens sent to British Museum by Dr Dennys have an element of doubt about them so far as locality is concerned". No later records can be traced, and recent information is that *P. curtus* is not present (P. Gopalakrishnakone *in litt.*, 13 March 1986); it is perhaps possible that the species was present in Singapore until the latter part of the nineteenth century, but this cannot be substantiated.

Python reticulatus Present (Ridley, 1899); formerly recorded within municipal limits (Sworder, 1922).

POPULATION

Python curtus Probably absent (see Distribution section above).

Python reticulatus Said to be "still far from rare" on Singapore in 1922, when several specimens were captured within Municipal limits (Sworder, 1922), and five individuals were included in a collection of snakes made over seven months, chiefly around the Nee Soon Forest Reserve (Harman, 1961). Apparently still relatively common (P. Gopalakrishnakone *in litt.*, 13 March 1986), although no details of distribution or abundance are available.

EXPLOITATION

Although pythons are sporadically reported in Singapore, the country serves principally as an entrepôt for reptile skins from all over South-east Asia, which are re-exported to the consumer nations of Europe, North America and the Far East. There are three tanneries which process small numbers of snake skins for use within Singapore, but the great majority of skins are re-exported raw.

Singapore joined CITES in 1986, the Convention entering into force on 28 February 1987; it has therefore only submitted CITES annual reports for one complete year. Even in that year (1988), Singapore reported importing a total of only 62 547 python skins, while the exporting countries reported exporting 601 774 to Singapore. The principal reason for this discrepancy is that Singapore reported no imports from Indonesia.

Table 34. Imports of python skins recorded in Singapore's CITES annual reports compared with exports to Singapore reported by the exporting countries.

	1985		1986		1987		1988	
	Exp	Imp	Exp	Imp	Exp	Imp	Exp	Imp
P. curtus								
Indonesia	0	-	37750	-	-	0	149270	0
Malaysia	0	-	0	-	0	0	203	209
P. molurus								
Malaysia	0	-	0	-	1508	1005	0	13200
Thailand	4176	-	0	-	0	1701	-	6077
P. reticulatus								
Indonesia	136301	-	313643	-	-	0	421708	0
Malaysia	0	-	0	-	16985	20361	30593	43061
Thailand	6254	-	0	-	0	3980	-	0
Total	146731	0	351393	0	18493	27047	601774	62547

Table 35. Numbers of python skins re-exported from Singapore from different reported countries of origin (as recorded in Singapore's CITES annual reports).

Origin	1987	1988
P. curtus		
Indonesia	21991	24222
unknown	11680	19397
P. molurus		
Malaysia	2	6078
Thailand	1701	4873
unknown	1081	10073
P. reticulatus		
Indonesia	128263	250217
Laos	10	0
Malaysia	1250	27721
Thailand	1157	1203
unknown	174386	95186

Singapore's CITES annual reports also record the re-export of python skins, and the quantities reported are shown in Table 35, subdivided by reported country of origin. From this it is clear that skins were imported from Indonesia, as re-exports from that source totalled 424 693 over the two years. When Singapore joined CITES, the dealers already held large stocks of reptile skins, which were inventoried by the CITES Management Authority. These are considered to be pre-Convention material and probably comprise the bulk of the re-exports recorded in Table 35 from unknown countries of origin.

Singapore's overseas trade statistics formerly (until 1982) recorded the import and export of snake skins as a separate commodity. The available data from 1958 to 1982 are shown in Tables 36 and 37. From 1965 onwards, no imports from Indonesia were reported, and total exports exceeded total imports. It is clear that skins continued to be imported from Indonesia after that date but they were simply not included in the import statistics. This policy appears to have been carried on ever since 1965 and into the compilation of CITES annual reports. It presumably reflects a high-level political decision and applies to all internationally traded commodities, and is not restricted to wildlife products.

An estimate of the amount of skins imported from Indonesia can be obtained by calculating the apparent net export (the difference between the total exports and total imports), and this statistic is shown in Table 37. If this is compared against the quantities of snake skins reported in Indonesia's overseas trade statistics (Table 25) to have been exported to Singapore, there is a striking correlation between the two (Figure 5). Skins from Indonesia apparently accounted for 90-99% of all snake skins imported to Singapore between 1958 and 1982.

Owing to its geographical position, Singapore has a long tradition of trading with Indonesia, and has established a free trade barter zone specifically for this purpose at Jurong, where small boats land to exchange their goods. The zone is under the control of the Port Authorities, but outside Customs controls; however, if the goods are to be moved into the rest of Singapore, they need to pass through Customs controls on leaving the port. It is also possible to transfer goods in bond from Jurong for onward flights from the airport, in which case the containers are sealed on leaving the port and not reopened before re-export. Thus, although it is possible for snake skins to be landed at Jurong and re-exported, possibly to non-Parties, without CITES documentation, all skins which pass through the hands of the Singaporean reptile skin traders should be subject to CITES controls.

Many of the Singaporean dealers have strong connections with the Indonesian exporters and have established trading practices (credit arrangements, methods of payment, etc.) which facilitate regular trade. By buying up skins from a number of sources and stockpiling, they are able to fill orders from importers to very

narrow specifications of size, cut and quality. More recently, the Indonesian exporters have been trying to develop their own contacts with the importers, thereby cutting out Singapore from the trade route. This process has been speeded up by the introduction of tanning facilities in Indonesia.

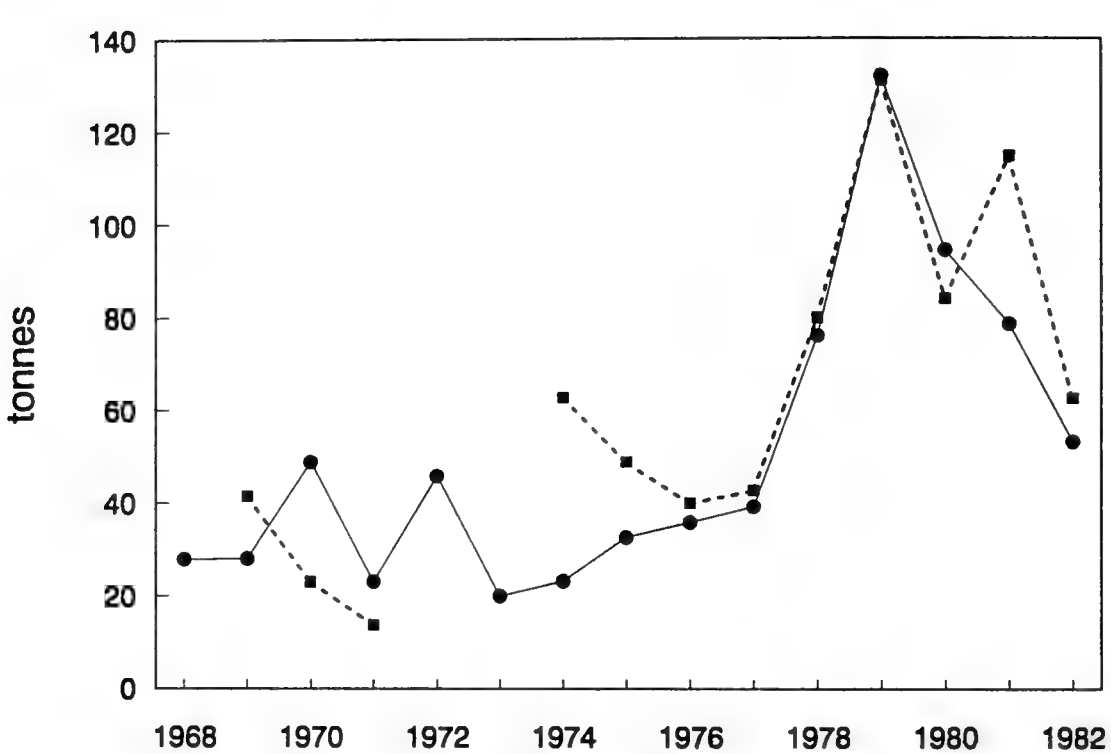
Table 36. Exports of snake skins recorded in Singapore Customs statistics (kg).

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
																								234	433
Argentina																									
Australia				18	349	221	165			10		30	1201	89			958								
Belgium																				86				541	
Canada																	250								
China														20											
Denmark							0					109													
FR Germany	1417	205				633	5287	2980	3630	11264		5652	4610	239			18178	5749	4710	7493	6309	22399	10205	9744	4264
France	1440	2274	290	49		4797	7352	5243	51	464		3137	2357				8855	15195	5807	2394	3439	14162	11678	16523	12090
German DR																					0	47	0		
Hong Kong						3118	4825	1883	105	2606		697	109	90			205	40		36	271	2877	0	4430	3926
Italy				5	5730	3656	9587	13369	3423	552		1543	3143	375			15598	3795	6655	1676	4740	27044	7646	4575	14637
Japan	242	3534	7310	14919	6257	11595	7971	13081	6851	10844		5664	9855	11995			8696	13386	14430	9623	7444	11176	19890	27083	9133
Malaya																									296
Netherlands	3958	1443	351	1152	10594	18963	9105	3653	1973	4091		3556	519	355			1953	1548	2918	4673	6828	9690	7117	7600	3980
Panama																									1251
Philippines																								2934	520
Spain				20				636		1002		18898	2949	1549			4911	7353	2540	4834	36528	5	7946	16395	16979
Sweden							11						136												
Switzerland								85	364	372		251	562				778		461	347	206	26420			
Taiwan														236			385		49	1507	2476	8341	3803	20771	8604
Thailand												4418	622	164											
UK	520		545	1680	3602	6207	3398	1558	1170	489		2293	1462	589			3665	2721	3620	8737	8628	5298	7934	6261	3930
USA		811	4534	15100	7409	5705	3011					86							1034	1784	2788	8191	9361	4832	1575
Venezuela																				271	147	0			
X Africa																		593		448	637	0	1538	3098	622
X Other																			187			1209	262	208	181
Total kg	7578	8267	13030	32944	33940	54895	50712	42489	17568	31693		46335	27524	15700			64432	50380	42411	43909	80441	136859	87380	125229	82421
Total SG$1000	180	124	213	697	634	1510	2177	2026	759	1411		3013	2560	1120			5073	3940	3741	3977	8955	19215	13	20	15
SG$/kg	23.71	15.03	16.35	21.15	18.69	27.51	42.92	47.69	43.22	44.53		65.03	93.01	71.32			78.73	78.22	88.20	90.58	111.32	140.40	0.15	0.16	0.18

Table 37. Imports of snake skin recorded in Singapore Customs statistics, with total values in SG$, and calculated apparent net exports.

	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Australia						1		1																200	
Brazil				897																					
Brunei						3																			
Cambodia		347		274	3654	18291	14744	7234	555	5727		682	1696	80			145	303							
China					27													19	507	139	108	76			1485
Colombia																									920
FR Germany																			184						
France														271											
Guatemala				123																					
Hong Kong				159	6795	1727						77					36	7	9	120		1494	216	779	2591
Indonesia	4421	3040	19146	16783	38016	19375																			
Borneo	1838	1085	14980	12072	27138	10633																			
Celebes	2156	364	114	880	872	250																			
Irian					30																				
Java	336	1590	3711	4030	9826	7645																			
Sumatra	91		342		150	847																			
India																						1120	2070		
Japan						305													1109						
Korea							218																		
Laos								195																	
Malaysia	792	584	390	579	411	556	1380	586	1153	555		461	121	117			64	185	253	262	321	174			
Peninsular	132	247		225		404	1303	486	683	220		322	21	11			48	35	234	238	308	173			
Sabah	44	95		172	103		62	60	423	87															
Sarawak	615	242	390	182	308	152	15	40	47	247		140	100	106			15	150	19	24	13	1			
Netherlands				1179		110																			
Nigeria										0															
Philippines										100															
PNG								886																	
Sri Lanka									68								145								
Taiwan																						360			
Thailand	1158	273	49	1089	216	234	913	5086	3539	3636		3664	2813	1453			400	576	430	296	28	2372	219	6925	10400
Viet Nam					61	5918	698	2				36					996	577		558	93	257	656	2473	4028
X Other				135																			153	278	504
Total kg	6370	4243	19585	21217	49181	46520	17954	13991	5315	10018		4921	4630	1921			1786	1668	2492	1375	550	5853	3314	10655	19928
Net Exports							32758	28498	12252	21675		41413	22894	13779			62646	48712	39919	42534	79891	131006	84066	114574	62493
Total SG$1000	96	38	53	134	239	295	232	305	172	620		148	141	87			265	125	95	73	37	831	0	2	3
SG$/kg	15.09	9.05	2.69	6.30	4.86	6.34	12.90	21.80	32.40	61 91		30.09	30.47	45.46			148.33	75.18	38.29	53.00	68.15	141.91	0.10	0.16	0.17

Figure 5. Comparison of the quantity of snake skins recorded in the Indonesian Customs statistics to have been exported to Singapore with the imports from Indonesia inferred from Singaporean Customs statistics (see text).



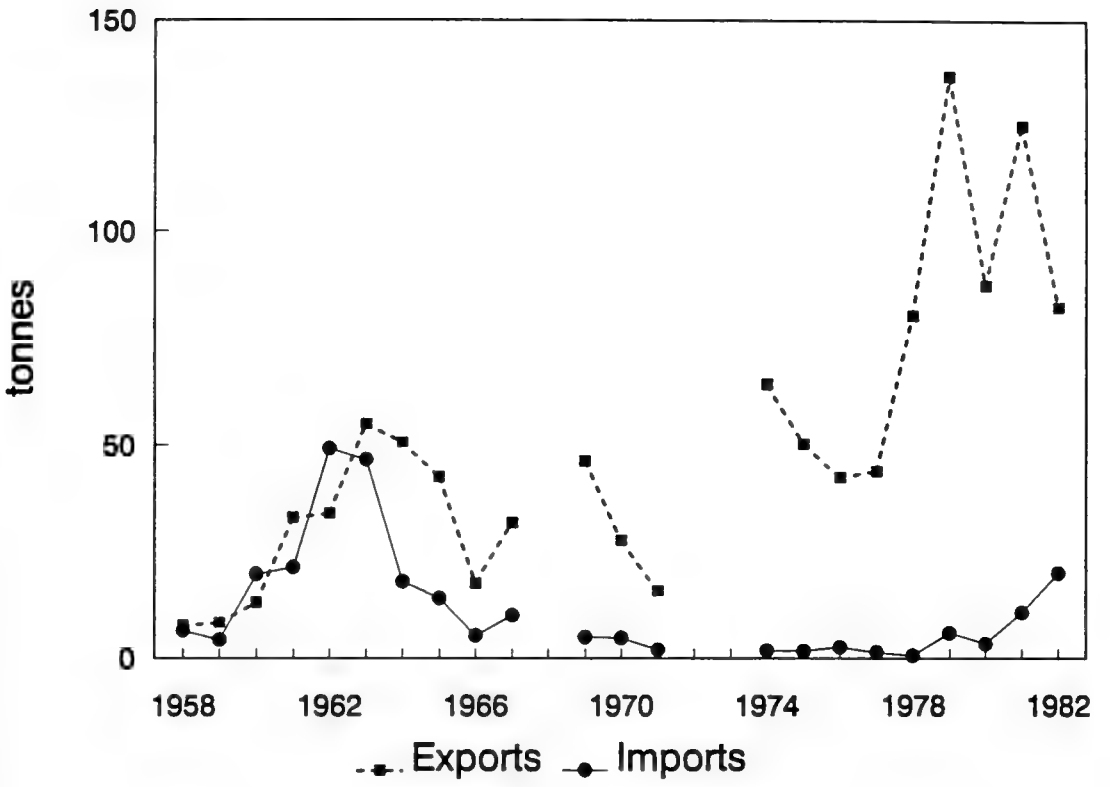


Figure 6. Exports and imports of snake skins reported in Singapore Customs statistics.

DISTRIBUTION

Python molurus molurus Occurs widely in the low country, occasionally ascending into the hills (De Silva, 1980).

POPULATION

Python molurus molurus Said to be one of the more common snakes of the country (Taylor, 1950), or common in the low country (De Silva, 1980). Formerly, pythons were used locally for food, and the fat used for medicinal purposes (Wall, 1912). De Silva (1982) noted that the taking of pythons for food or the skin trade was virtually non-existent, but that specimens were sometimes killed in grassland fires. Todd (1984) asserted that pythons are now largely restricted to the diminishing areas of undisturbed jungle, with permanent water; specimens are possessed by many snake charmers and not infrequently offered for sale.

EXPLOITATION

There is no evidence in the CITES annual reports of any trade in pythons or their skins originating in Sri Lanka.

DISTRIBUTION

Python curtus Restricted to the extreme south of peninsular Thailand, primarily in Changwat Pattani in the south-east (Taylor, 1965) although there are old records from the south-west (Jarujin, pers. comm.). Specimens are occasionally reported further north, but these appear to be escaped animals (Jarujin, pers. comm.).

Python molurus bivittatus Three specimens were recorded by Smith (1943), from the provinces of Raheng, Lopburi and Chonburi; he noted the absence at that time of authentic records from peninsular Thailand (and Peninsular Malaysia). More recent information is that *P. molurus* occurs throughout the country, except for the southern provinces (Soderberg, 1965); according to Jarujin (pers. comm.) it occurs throughout as far south as Chumpon. Wirot (pers. comm.) similarly reported the species to be widely distributed. It is remotely possible that certain Thai populations have been introduced; Flower (1899) found no confirmed records of this species in Thailand, but reported that one specimen brought to him in Bangkok had been brought there by an Indian conjuror from Bombay.

Python reticulatus Reportedly restricted to areas south of 18°N (Smith, 1943), although others (Taylor, 1965) regard the species' absence from the north as "possible" or state that it occurs commonly in all provinces (Soderberg, 1965). Said to be the most widespread *Python* in Thailand (Wirot, pers. comm.); according to Jarujin (pers. comm.) it occurs throughout the country. Reported to occur on most islands in the north of the Gulf of Siam; Koh Chang was cited as a confirmed locality (Smith, 1915).

POPULATION

Python curtus Reportedly rare within its very restricted range (Soderberg, 1965).

Python molurus bivittatus No details available. Literature records are from lowland areas, which in some cases may not have good snake populations; animal dealers are thought still to obtain specimens (Brockelman *in litt.*, 14 February 1986). Although Bain and Humphrey (1982) treat the species as threatened in Thailand, this is based on secondary sources, not on original data. Wirot (pers. comm.) reported reasonable numbers throughout its range in Thailand. The size of *Python* skins in trade has been decreasing (most are now in the 2 m range) (Jarujin, pers. comm.), from which it can be inferred that utilisation is having a significant effect on population structure.

Python reticulatus Probably present in all evergreen forests and apparently relatively secure (Brockelman *in litt.*, 14 February 1986). Seen occasionally in Khao Yai National Park, and more often in Khao Soi Dao in south-east Thailand (in slightly wetter forest) (Brockelman, *in litt.*). Reportedly once common on Koh Chang in the Gulf of Siam and not uncommon on the mainland

(Smith, 1915). Said to occur "commonly" in all provinces (Soderberg, 1965). Wirot (pers. comm.) reports that *P. reticulatus*, although the most widespread *Python* in Thailand, is frequently affected by clearance for agriculture. The species has declined around Kanchanaburi over the past 25 years because farmers kill them on sight, and many individuals are killed when fields are burnt. On Phuket Island (Frith, 1977) the species is apparently still common although larger individuals are now very rarely seen because of human predation; one young snake, kept in captivity for a time, was captured in the suburbs of Phuket town. Numerous specimens can be seen in the possession of local residents who collect them to sell, at a set price per metre, for skins; reportedly, any specimens found are sold for the skin or tourist curio trade (Frith, 1977).

At the end of the nineteenth century, said to be very common in the city and suburbs of Bangkok: "in almost every compound of which I know the occupants, either private houses or offices, one or more pythons have been found within the last few years" (Flower, 1899); the species is still found regularly in Bangkok (Wirot, pers. comm.). In the early twentieth century, considered "fairly common" (Smith, 1914) or "not uncommon" (Smith, 1937) in Bangkok. Smith (1914) speculated that pythons remained common in the Bangkok area at that time because of their prolificacy and nocturnal habits. Smith (1937) recorded finding one or two young pythons 12-13 ft in length in his garden every year (in a clump of bamboo overhanging a pond). Reticulated Pythons were often sold on the streets of Bangkok for the sake of their gall bladder (a supposed remedy for colic) and skin (Smith, 1914). The size of *Python* skins in trade has been decreasing (most are now in the 2 m range) (Jarujin, pers. comm.), from which it can be inferred that utilisation is having a significant effect on population structure.

EXPLOITATION

Python molurus and *P. reticulatus* are hunted throughout most of their range in Thailand, principally for their skins. There seems to be little distinction made between the two species for this purpose. *P. curtus* is restricted to the extreme southern part of the peninsula, and is not generally used for the skin trade, though it may occasionally enter the pet trade. The meat of pythons is said to be eaten by some local people, particularly the hill tribesmen of the north, where pythons may be hunted specifically for this purpose, but elsewhere any consumption of the meat is probably a by-product of the skin industry. Small pythons are also collected for the pet trade; the usual method being to capture gravid females and keep them until the eggs are laid, after which the female would be killed for her skin.

Most snakes would appear to be killed by farmers in the course of their normal activities, there being few specialist hunters. The skins are sold to middlemen in the provincial towns who, in turn, sell them to the major exporters, almost all of whom are

based in Bangkok. Some of the dealers in the south, especially in Haadyai City, are believed to send skins directly to Malaysia.

Major collection centres are said to be in Nakhon Sawan, Saphan Buri and Kamphaeng Phet. Many skins are said to come over the border from Laos and Cambodia. The skin pattern is no different from that found in Thailand, but the method used to stretch the skins for drying makes them readily distinguishable. One informant estimated that up to 67% of the python skins sold in Bangkok came from Laos and Cambodia.

The total number of python skins traded is difficult to estimate, but has probably declined since 1985 as a result of protection. Legal trade in 1989 is around 20 000 *P. reticulatus* and 20 000 *P. molurus*, but there is certain to be an additional illegal trade. In 1985, the reported trade was in the region of 190 000 *P. molurus* and 140 000 *P. reticulatus* (see under international trade); one exporter alone claimed to have sold 100 000 skins of the two species a year (Choon Koshpasharin, pers. comm., 1989), while another sold some 30 000 (Uthai Youngprapakorn, pers. comm., 1989). Thai Customs statistics indicate that the levels of trade in the 1970s were appreciably lower.

Domestic trade

In 1985, before pythons were protected, there were approximately 20 exporters working in Bangkok (Choon Koshpasharin, pers. comm., 1989), but in 1989 there were only two legally allowed to trade (see under legislation). One of these estimated that there were still about 6-7 other exporters working illegally in Bangkok, although noting that several had switched to other business as a result of the stricter controls.

Chai Lee Trading company has many commercial interests, ranging from property development to bone meal, but about 20% of the business is in reptile skins. The company has large stocks of snake skins of protected species, reputed to be left from before 1985. The company also has its own tannery, and has recently been tanning an increasing percentage of skins prior to export. The skins are stored in an air-dried state and are tanned once export orders have been received. In September 1989, remaining stocks of *P. reticulatus* and *P. molurus* were said to amount to 20 000 skins. Inspection of the warehouse showed that there were some 64 crates said to contain python skins, each of which could hold an estimated 300 skins.

The other company licensed to export python skins, C & P Chanida Trading, has recently built a tannery at Samutprakan, having imported Italian technology. Apart from a small consignment of python skins being processed, no stocks of skins were seen, and the Managing Director explained that she only bought skins from the middlemen once she had received export orders. She claimed that her company was the largest exporter of *Ptyas mucosus* skins in Thailand and bought relatively few pythons (see Table 38).

Table 38. Trading and export permits for skins of protected species of reptile granted to two companies in Bangkok for the period 1 January-8 September 1989.

	Chai Lee		C & P	
	Trade	Export	Trade	Export
Elaphe radiata	11280	20	250000	0
Ptyas korros	20000	20	0	0
Ptyas mucosus	301846	43958	500000	0
Python molurus	4860	3089	14000	5356
Python reticulatus	4670	2476	14000	73
Total	342656		778000	

Market prices for python skins in Bangkok in 1989 were said to be Bt170-200/m for raw skins and Bt200-300/m (Bt25 = US$1) for finished skins (Jang, pers. comm., 1989). In 1989, one exporter said that the purchase price of skins was US$5-10/m, while the other put it at US$7-10/m. A third informant reported that it had dropped from around Bt220/m in 1988 to Bt100 in September 1989 as a result of declining demand. The export prices of tanned skins were around US$13-17/m, *P. molurus* being slightly more valuable than *P. reticulatus*.

The majority of python skins traded in Thailand are ultimately exported, but a small quantity (an estimated 10%) are used locally to make leather goods, principally for tourists. To judge from the goods on display in the shops, the poorer quality skins are used for this purpose, the better ones being exported.

Handbags about 25 cm wide made from python skin were selling for around Bt1000-1500 in Bangkok in September 1989. Comparable items made from skins of other reptile species were: *Varanus salvator* Bt1500, *Ptyas mucosus* Bt800-1000, *Lapemis hardwickii* Bt700-900, *Caiman crocodilus* back skin Bt1500-2500, *Caiman crocodilus* belly skin, Bt2000-4500. Several shops sold whole python skins, tanned with the head on; prices were about Bt400-600/m.

International trade

CITES annual reports indicate that large quantities of snake skins of at least eight different species have been exported from Thailand since 1984 (Table 39). With the exception of the pythons, all these species were listed in Appendix III by India in 1984. It is therefore possible that the increase in the reported export of non-boid snakes was due to improved reporting rather than increased trade. The decline in reported exports of python skins in 1986 was almost certainly due to their receiving

protection in Thailand in 1985 (see under Legislation); however exports of *Ptyas mucosus*, which was protected at the same time, increased steadily. Some of the increase in reported trade in the non-protected Appendix III species, especially *Cerberus rhynchops* and *Naja naja*, may have been due to traders switching to these species.

Table 39. Exports of snake skins from Thailand recorded in CITES annual reports.

	1984	1985	1986	1987
Python spp.	1	0	2	0
Python molurus	72 919	187 668	35 235	57 447
bivittatus		80 810 m	0	0
Python reticulatus	70 632	135 293	50 452	68 460
	66 868 m	37 128 m	17 000 m	0
Cerberus rhynchops	250	22 881	673 299	70 531
Cyclagras gigas	53	0	0	0
Ptyas mucosus	2 000	34 265	344 227	883 544
Naja naja	0	5 278	260 432	46 245
Ophiophagus hannah	0	162	455	20
Vipera russellii	0	6 233	138 151	8 657

Thai Customs statistics separately specify "snake skins" (410111/4103.200-108) and, until 1987, two categories of snake skin leather: "tawed, dyed, designed" (410511) and "not tawed, dyed, designed" (410521). In 1988, imports of snake skin leather were combined in category 4107.210-100. Exports of snake skins are shown in Table 40, and combined exports of the two categories of leather in Table 41. The skin exports reached a peak of over 170 tonnes in 1986 (Fig. 7), mainly due to very large exports to Taiwan. Previously, Europe had been the major destination, but Taiwan predominated from 1985 onwards, with Hong Kong rising to second place in 1988. It is difficult to translate this into numbers of skins in the absence of information on the species composition; however, pythons skins weigh on average 260 g and, as these would be the largest skins, 170 tonnes would represent a minimum of 654 000 snake skins. As a large number of the smaller whip and water snake skins have also been exported recently, the true number of snake skins exported will have been very much greater. Exports in the early 1970s were relatively constant, and may have contained a higher percentage of pythons. The annual average of 15-20 tonnes would represent 58 000-77 000 skins if they were all pythons.

CITES annual reports show that pythons were the most numerous CITES-listed snake skin exported in 1985, with a total of over 300 000 pieces. These would weigh about 85 tonnes, well within the total volume recorded by Customs statistics.

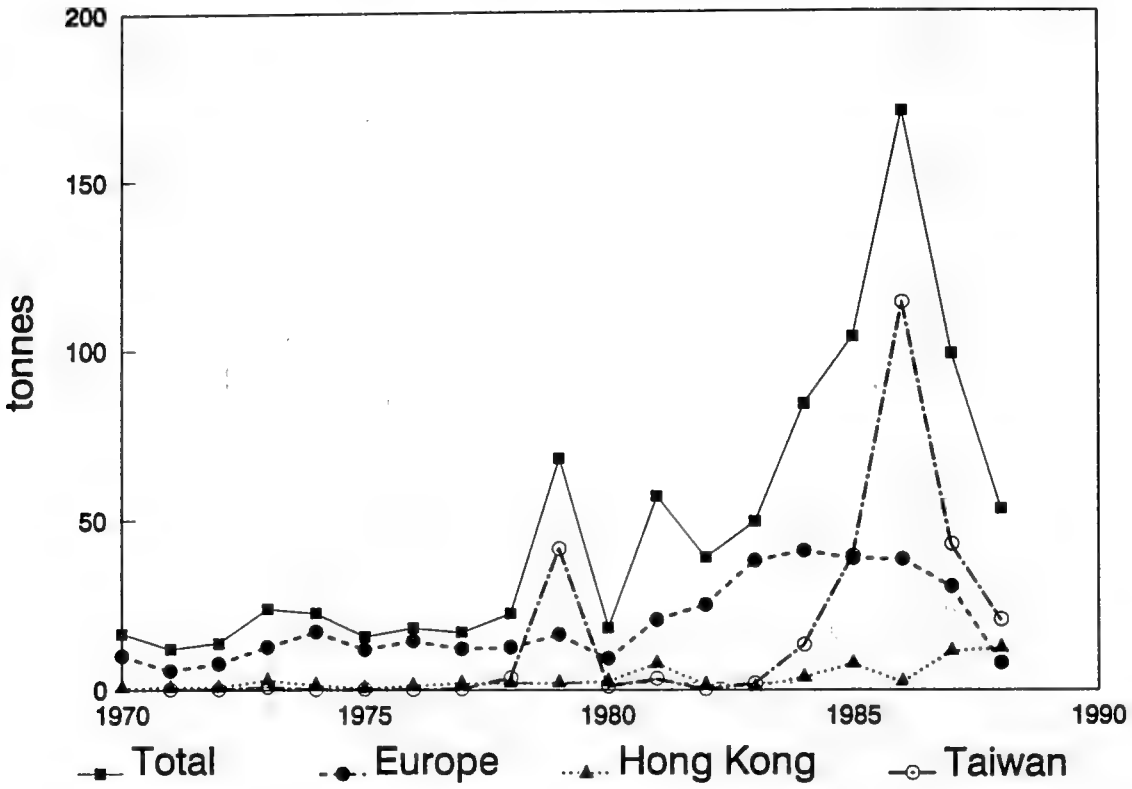
Table 40. Exports of snake skins (410111/4103.200-108) recorded in Thai Customs statistics (kg).

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Australia								18							13	6	2253		
Austria								1			3								137
Canada																			
China							41			1053								14	
Cyprus																	5		
Denmark																			
France	125				3688	1390	1444	771	593	1959	2279	6557	6680	8921	9412	7215	10050	4404	394
FRG	1120	54		367	1470	83	319			4944	3623	3912	2655	6109	2286	1508	694	490	
Greece											26		45	101					
Hong Kong	547	655	636	2754	1448	399	1220	1855	2018	1965	2375	7717	1491	860	3625	7706	2307	11227	12314
Indonesia	18																		
Israel																		2	
Italy	254				1098	1097	1194		190	2009	976	2189	10278	8873	16517	17714	22137	21150	7070
Japan	3012	2613	1909	3319	1900	1495	1518	1614	2560	3131	4272	5829	2148	2406	7014	8862	8103	8061	1515
Jordan											25								
Kenya			4																
Korea, Rep.		25								13	197	20			91	5	554	434	2161
Malaysia	185	109																	
Netherlands	6179	83	172	748	1652	378	10									284			
Pakistan										157									
Panama														367	234	141			
Philippines												3578	1893	2282	4946	3834	2861	1985	390
S Arabia																			30
Singapore	2120	1710	2085	4021	1189	432	30	37	228	1877	457	11301	7771	2803	10216	3527	319	2215	7810
Spain	1503	5407	6956	10713	8577	7792	10021	10528	10115	5381	1797	5937	4639	13090	12235	11640	5253	4159	446
Sweden					428	936		333								13			
Switzerland	667	13	353	40					640	507	16	2							
Taiwan		96	161	835	82	200	94	375	3558	41629	919	3231	247	1912	13207	39408	113767	42846	20665
UK	166		225	708	132	259	1491	481	1014	1502	416	1918	648	957	486	321	305	151	
Uruguay									420										
USA	593	1273	1137	226	930	1185	802	876	847	1917	839	4664	498	768	3826	1550	1891	1664	196
Venezuela									209										
Total	16483	12038	13638	23731	22594	15646	18184	16891	22392	68044	18220	56855	38993	49449	84108	103734	170499	98802	53128

Table 41. Exports of snake leather (410511 & 410521/4107.210-100) recorded in Thai Customs statistics (kg).

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Australia								2					8		7	78	7	5	
Austria										7	5		1			43		57	14
Belgium													60						
Brazil																		75	
Canada													2		45	117	97	54	104
China																			
Cyprus																			33
Denmark																	6	64	62
France							135				355	67	11	1	1362	779	76	68	105
FR Germany					44	1	6	2		2	8	3	48	253	3257	1314	70	104	3
Greece											23	245	261	899	88		17		
Hong Kong					10		145	45		109		92		327	2951	1721	149	2199	1241
Israel																		52	10
Italy								2		92			1309	1163	13023	6946	4188	4848	558
Japan					507	812	1103				28	204	1544	833	254	1024	1663	1239	166
Jordan											35							5	
Kenya																			2
Korea, N.										18					16				
Korea, S.										27	40		10	117	106	137	65	1701	252
Mexico																			34
Netherlands															8				
New Zealand															74	34	13		65
Norway																			3
Pakistan																			
Panama																			
Philippines												131			422		112	24	140
Singapore										250	5		8	8	212	543	20	393	41
Spain								272						694	1170	2092	2288	4594	151
Sweden										30				72	589	15			
Switzerland													22	14	159	25			30
Taiwan					603							103	92	53	466	44	557	4470	178
Turkey																		21	
UAE									2		4								
UK														436	283	841	935	523	
Uruguay																			
US									1		421	1926	1014	756	1124	5224	2970	7486	11065
Venezuela																			
X Other																136			
Total	166	226	109	446	1164	813	1389	323	3	535	924	2771	4390	5626	25616	21113	13233	27982	14257

Figure 7. Exports of snake skins from Thailand to various destinations recorded in Thai Customs statistics.



It is also possible to compare the exports reported in the Thai Customs statistics with the corresponding imports from Thailand recorded in the Customs statistics of Japan, Taiwan and Singapore (Table 42). Although differing in detail, there is relatively good correlation between the reported imports and exports for all three countries, particularly Japan and Taiwan, confirming that the Thai export statistics are likely to be reliable.

The Customs statistics may provide some indication of circumvention of CITES controls. As Thai domestic legislation on wildlife exports is so poor, many dealers only apply to the Royal Forest Department for an export permit if the importer requests it. If the skins are being exported to a non-Party there is little need to obtain a permit. It is therefore particularly suspicious that the exports to Taiwan increased substantially between 1984 and 1986 when Thailand joined CITES (1984) and introduced protection for pythons (1985).

Table 42. Imports of snake skins and leather reported in the Customs statistics of Japan, Taiwan and Singapore compared with the exports to these countries reported in Thailand's Customs export statistics (kg). - data not available.

	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Japan											
Imp	3189	3476	3990	5131	6119	3700	3558	7243	9405	5537	8803
TH exp	1614	2560	3131	4300	6033	3692	3239	7268	9886	9766	9300
Taiwan											
Imp	0	0	0	1697	2790	960	7520	-	43199	116109	58894
TH exp	375	3558	41629	919	3334	339	1965	13673	39452	114324	47316
S'pore											
Imp	296	28	2372	219	6925	10400	-	-	-	-	-
TH exp	37	228	2127	462	11301	7779	2811	10428	4070	339	2608

Another indication that Taiwan may be replacing the role of the European countries as a destination for snake skin exports is to be found in the values of skins declared in the Customs statistics. The overall value of snake skins exported rose from about Bt400/kg in 1970 to Bt2000/kg in 1987 (Fig. 8). The value of the exports to Europe was generally much higher than those to Taiwan, but the latter increased sharply from 1980 onwards, until they reached the same price in 1988.

The sudden increase in exports to Hong Kong in 1987 and 1988 deserves some comment. Table 43 shows the quantities of python skins recorded in the importing countries' CITES annual reports compared with the exports reported by Thailand. Although there are differences in detail, the reported imports mostly agree relatively well with the order of magnitude of the reported exports. A notable exception is the quantity of skins imported to Hong Kong in 1987, for which there is no corresponding export, suggesting that the skins were exported from Thailand with the knowledge of the Customs authorities but without that of the CITES Management Authority.

Some of the dealers questioned in Bangkok reported that Hong Kong was a popular destination for skins exported without permits.

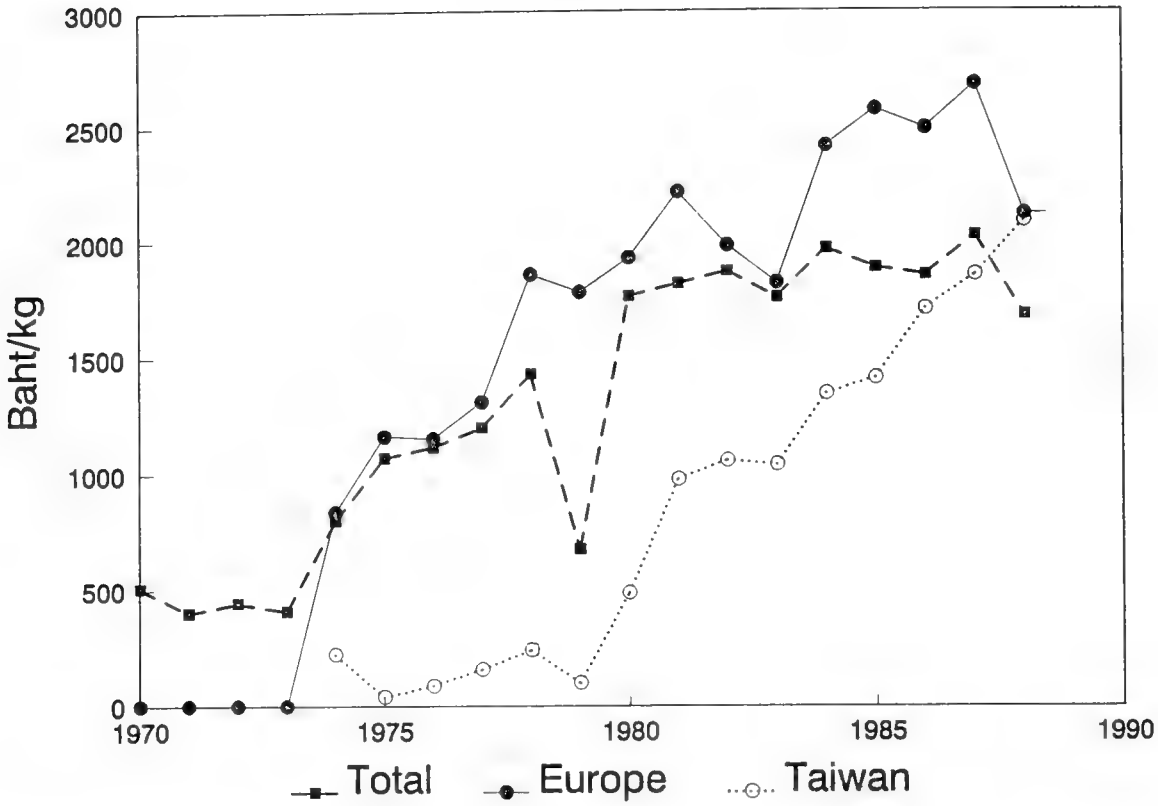


Figure 8. Values of snake skins exported from Thailand recorded in Thai Customs statistics.

A variety of means are used to export skins illegally. A common tactic is to declare the skins of protected species, such as *Python* spp. and *Ptyas mucosus*, as those of the non-protected water snake *Cerberus rhynchops*, and some such shipments have recently been detected and seized (Boonlert, pers. comm., 1989). One dealer reported that it was relatively easy to export skins by truck or rail to Malaysia and Singapore; another that skins were often sent in the mail to Hong Kong. Some skins are concealed in bales of clothing or cotton. In 1989, six forged CITES permits were reported to the CITES Secretariat by the importing authorities, covering a total of 155 python skins shipped to Singapore and 2234 to Japan (Boonlert, pers. comm., 1989). It was hoped that the introduction of CITES security stamps in July 1989 would improve this problem.

Table 43. Exports of python skins recorded in Thailand's CITES annual reports compared with imports reported by the importing countries. - No annual report received. 0 No trade recorded.

	1985		1986		1987		1988	
	Exp	Imp	Exp	Imp	Exp	Imp	Exp	Imp
P. molurus								
Canada	0	120	0	0	0	0	-	0
FR Germany	4658	1719	430	812	1284	786	-	0
France	64379	20567	2286	3705	8799	10073	-	0
Hong Kong	7429	5924	0	1186	0	10648	-	0
Italy	63759	18058	20821	17302	20583	14944	-	-
Japan	18945	10285	2151	4748	6338	9580	-	-
Panama	693	0	0	0	0	0	-	-
Singapore	4176	-	0	-	0	1701	-	6077
Spain	14878	-	1404	3192	0	0	-	-
Taiwan	450	-	0	-	0	-	-	-
USA	8181	6032	811	764	0	949	-	6
P. reticulatus								
Canada	0	0	244	0	0	0	-	0
Denmark	0	1	0	0	0	0	-	0
FR Germany	6567	6181	856	1952	498	0	-	0
France	22123	8160	6041	11528	3227	5622	-	0
Hong Kong	7075	5291	1586	586	0	10299	-	0
Italy	24758	9118	13347	15682	25853	14020	-	-
Japan	10431	9561	5145	2938	1502	2801	-	-
Netherlands	0	0	0	0	0	1863	-	0
Panama	2347	2347	0	0	0	0	-	-
Singapore	6254	-	0	-	0	3980	-	0
Spain	47331	-	12911	5522	3181	6913	-	-
Taiwan	4442	-	300	-	0	-	-	-
UK	0	0	2010	0	0	1	-	0
USA	15494	8050	4374	3223	0	5534	-	6

Legislation

The principal wildlife conservation legislation is the Wild Animals Reservation and Protection Act, B.E. 2503 (1960). All of the pythons and several other species of snakes considered to be important rodent predators (*Ptyas mucosus*, *P. korros*, *Elaphe radiata*, *E. flavolineata*, *Zaochys carinatus*, *Gonyosoma oxycephalum* and *Xenopeltis unicolor*) were listed as protected under Ministerial Regulation No. 15, B.E. 2528 (13 September 1985). Since that date, these species may be hunted and traded only under permit. As many of the major traders had large stocks of skins, they were granted permits to continue exporting existing stocks for an interim period of three years, during which period no hunting permits were issued.

In 1989 (17 April), the Ministry of Foreign Trade passed a regulation that companies exporting skins of protected species

must (1) have their own tanning facilities; (2) have a letter of credit with a foreign importer; (3) submit every export consignment for inspection by the Royal Forest Department; and (4) produce documentation to demonstrate that the skins had been legally obtained. As this was a trade regulation intended to ensure that maximum value was obtained by processing the skins before export, it is not clear why it only applied to protected species.

Only two companies (Chai Lee and C & P) qualified for exports under the new regulations. Chai Lee was granted permission to continue exporting old stocks of skins, and C & P was permitted to continue hunting snakes, the skins of which were to be processed through its newly installed tannery. The trade quotas and total export permits granted up until September 1989 are shown in Table 38. The difference between the trade and export columns represents unfulfilled quotas which may be used before the end of the year.

Although in theory it is necessary to have a permit to hunt protected species, in practice the hunting permits are issued to the major traders rather than the individual hunters.

A similar control has been exercised over the trade in live animals. Collection permits were not issued after pythons were listed as protected, but traders were allowed to export old stock for a three-year period. No export permits have been granted from 1989 onwards (Boonlert, pers. comm., 1989).

In general, Thai legislation does not control the import of any species, nor the export of CITES-listed species which are not protected (e.g. pythons before 1985). There is thus no requirement to inspect imports or exports of non-protected species. Although there are no official import controls, it may be possible to control the trade of protected species once they have been imported. It was formerly unclear whether the Wild Animals Reservation and Protection Act applied to animals originating outside Thailand, but following a judicial decision in the courts, it is now agreed that all members of the protected species are covered, irrespective of their origin.

Some further control of exports may be achieved by collaboration with the Veterinary Health Authority. If the importing country requires a veterinary health certificate this must be obtained from the Thai authorities. Since 1987, the Thai Veterinary Health Authority has agreed to refer all such applications relating to wildlife products to the Royal Forest Department.

DISTRIBUTION

Python curtus In the late nineteenth century, two specimens reportedly originating from near Saigon, southern Viet Nam, were recorded by Tirant (1885). Tirant noted features from the then recently published description of *P. curtus*, which would appear to reduce the possibility that his specimens were misidentified. However, there have been no later new records from Viet Nam. Although Bourret (1939) includes *P. curtus* in his list of snakes then known from 'Indochine Française', with the annotation "Cochinchine (rare)", he appears never to have seen specimens during his extended residence in southern Viet Nam, nor is the species mentioned in any of his many published reports on numerous new reptile collections made in several parts of the country (e.g. Bourret, 1934a,b). If the natural range does extend into Viet Nam, the species might be expected to occur in Cambodia also, although it has not been recorded there (Saint Girons, 1972). Overall, it seems most likely that the two specimens recorded by Tirant, if correctly identified as to species and locality, were introduced by man; there is an active trade in pythons and other large snakes in the region (Saint Girons, 1972).

Python molurus bivittatus Bourret (1939) implied that the species occurs throughout Viet Nam. Reportedly widespread in southern Viet Nam, although possibly absent from southern parts of the delta (Campden-Main, 1970). Localities cited by Campden-Main include: Da Nang, Nha Trang, Mui Chut, Bao Loc, Saigon, Bien Hoa and Can Tho.

Python reticulatus Bourret (1939) implies that the species occurs throughout Viet Nam. In 'Indochina' as a whole, generally more frequent in the south than the north (Bourret, 1936). Occurs throughout southern Viet Nam (Campden-Main, 1970) and extends north through most of the country at least to Yen Bai (near Hanoi) (Smith, 1943). Localities cited by Campden-Main (1970) comprise: Da Nang, Qui Nhon, Cau Da, Ban-me-thuot, Dau Tieng, Bien Hoa, Long Binh, Saigon and Con Son.

POPULATION

Python molurus bivittatus Said variously to be rare in southern 'Indo-China' generally (Smith, 1943), or common in the southern parts of Viet Nam (Campden-Main, 1970); no recent information is available for northern parts.

Python reticulatus Said to be common throughout the south (Campden-Main, 1970). Half a century ago reportedly not rare in the Indochinese region in general (Bourret, 1936).

EXPLOITATION

Substantial quantities of *P. molurus* skins and a few *P. reticulatus* originating in Viet Nam are recorded in CITES annual reports (Tables 48 and 47). Japanese Customs statistics have also recently recorded increasing quantities of snake skins from Viet Nam (Table 27). European traders have noted that they are often offered skins from this source, and it seems that it may develop further in future.

INTERNATIONAL TRADE

History of squamate skins in trade

The extensive use of lizard and snake (Squamata) skins for commercial production of leather in the United Kingdom was in the 1930s considered a comparatively recent phenomenon (Anon., 1933), although crocodilian skins had by then been in use for a considerable period.

A regular trade in squamate skins developed only in the mid 1920s, with Java (and nearby islands) and 'British India' (Pakistan, India, Nepal, Burma) as the principal sources of supply. These sources were later joined by Mexico, Brazil, and several former British Empire countries in Africa (Anon., 1933). By the 1930s, commercial collection of skins had been organised in India, Sri Lanka, Indonesia, Thailand, Philippines and Brazil.

Similarly, whilst Alligator hide had been in use in the USA since the mid-nineteenth century, snake skins only entered into commercial trade in the 1920s (Pope, 1962), accompanied by extensive advertising campaigns in which its merits were extolled.

Squamate skin was utilised initially for upper leather in high priced luxury fashion shoes, but by the 1930s was being used in mass produced shoes, bags and other items (Anon, 1933). It appears that the rapid development of trade in snake and lizard skins was triggered by technical developments, primarily associated with a French company, which for the first time allowed squamate skins to be processed on an industrial scale. These developments were accompanied by appreciation of the commercial properties of snake and lizard leathers: (a) available in a variety of tone and scalation patterns, (b) hard wearing, (c) able to be finished in a variety of colours.

A very large number of squamate skins entered commerce during the early years of international trade. It was estimated that Indonesia ('Dutch East Indies') exported to the UK around 2 000 000 reptile skins in 1931, while India exported some 2 500 000 reptile skins in 1932 (Anon., 1933). In 1929 (the first year in which reptile hides were separately categorised by Customs statistics), the USA imported around 1 899 000 lb (863 t) of reptile skins, the great majority from India, Colombia and Mexico. Reptile skin imports into the UK during this period were said to be markedly higher than to the USA (Pope, 1962).

The earlier Customs statistics do not differentiate between snake skins and those of other reptiles, but such data for snake skins alone are available for Singapore from 1958-1982, for Indonesia from 1968-1988 and for Thailand from 1970-1988 (Figure 1).The exports from Singapore actually represent skins re-exported, mostly from Indonesia, and thus parallel fairly closely the exports from Indonesia. The Singapore/Indonesia exports had risen from around 10 tonnes in 1958 to over 200 t in 1984. Thai

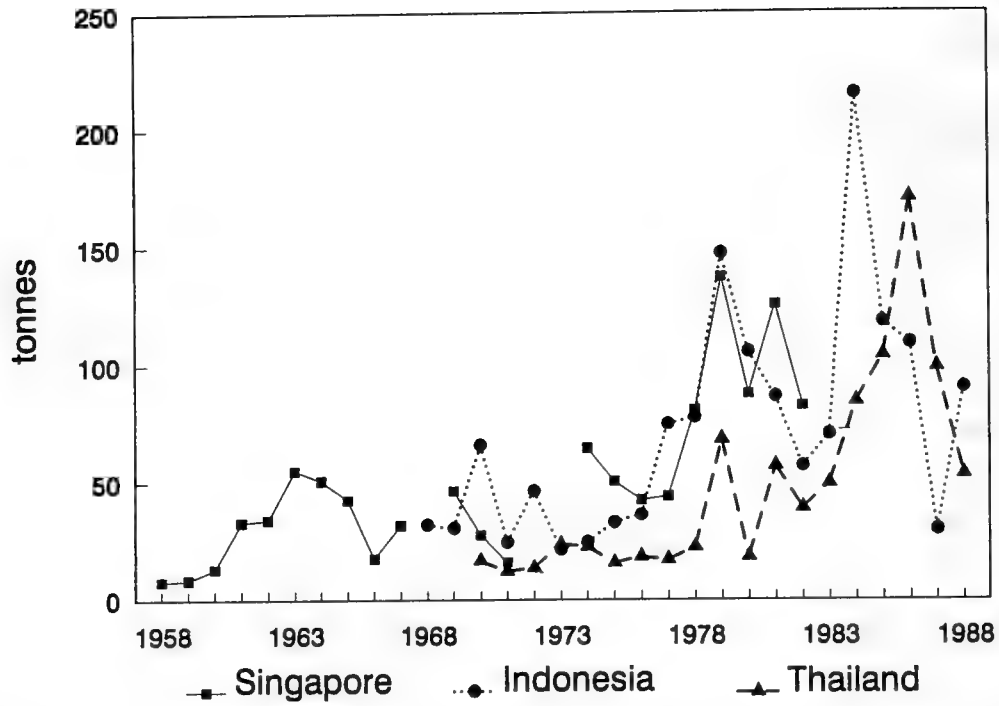


Figure 9. Weights of snake skins recorded in the Customs export statistics of Singapore, Indonesia and Thailand.

exports have also risen, peaking in 1986 at 170 t. It is difficult to ascertain what species were involved in the trade, but dealers in Singapore were of the opinion that prior to 1978 almost all were pythons. The market for other snake skins, notably *Ptyas mucosus*, *Cerberus rhynchops*, *Acrochordus javanicus* and *Naja naja*, only developed in the 1980s. The rapid rise in the snake skin trade seen in the 1980s is therefore the result of a combination of an increasing range of species as well as number of skins per species. Indonesian exports in the 1970s, running at 20-60 t a year, would therefore represent 80 000-240 000 air-dried python skins, assuming an average weight of 250 g.

In summary, it is evident that, whilst crocodilians have been persecuted heavily since at least the middle of the last century, and the skins of some species have long been in trade, large-scale commercial harvesting for leather production of certain snake and lizard species is a relatively recent practice that dates back only some 60 years. Captive specimens of python have been recorded to survive in excess of 20 years, and the 60 year period during which pythons have been subject to exploitation for the skin trade might correspond potentially to two or three lifespans in such species.

Table 44. Minimum net imports of *Python reticulatus* skins determined from CITES annual reports.

Importer	1980	1981	1982	1983	1984	1985	1986	1987
Andorra	-	-	-	19	-	-	-	-
Argentina	-	-	-	1852	-	-	-	4355
Australia	875	9	26	4002	18	-	-	-
	-	-	-	82 m	-	-	-	-
Austria	-	-	22	85	1051	294	154	173
	-	3 m	112 m	184 m	77 m	-	17 m	-
Belgium	-	-	27	28	646	-	-	-
	-	-	10885 m	-	875 m	-	-	-
Brazil	-	-	-	-	4	55	-	1
Canada	1568	4938	474	315	452	204	1280	525
	561 m	248 m	-	188 m	50 m	-	1183 m	859 m
China	-	-	-	-	-	-	-	721
Colombia	-	-	-	-	-	324	44	-
Cyprus	-	-	45	270	32	-	-	149 m
Czechoslovakia	-	-	-	-	-	-	266 m	-
Denmark	235	233	342	31	45	-	-	40
	-	-	-	-	-	-	-	299 m
Egypt	-	4	-	-	-	-	-	-
Finland	-	-	-	19	3	96 m^2	19	-
	-	-	-	-	98 m	150 m	-	-
France	-	-	-	-	8898	22932	10765	-
	-	6138 m	-	-	8000 m	2172 m	31 m	-
German DR	-	329	7142	-	-	-	-	-
Germany, FR	-	8009	-	636	-	6812	4590	6106
	55614 m	-	-	50913 m	38494 m	176 m	8734 m	-
Greece	-	442	64	113	1654	456	283	240
	-	-	-	179 m	3118 m	-	-	-
	-	-	-	-	84 m^2	-	-	-
Haiti	-	-	-	-	-	-	5 m	-
Hong Kong	1576	-	228	250	4766	5914	833	321
	-	-	-	3 m	3829 m	-	172 m	96 m
	-	-	-	-	-	-	67 m^2	-
Hungary	497	-	-	50	-	-	-	1
Indonesia	-	-	-	-	-	4 m	-	-
Israel	34	71	126	10	39	8	317	37
	-	276 m	-	-	22 m	-	-	-
Italy	13185	28251	61939	76866	54397	18586	54096	41173
	600 m	4112 m	65570 m	182254 m	61066 m	41855 m	14316 m	-
	-	23832 m^2	-	-	-	-	-	-
	-	-	12 kg	-	-	-	-	-
Japan	-	-	-	-	7992	70578	61331	105393
	-	-	-	-	9271 kg	4 kg	-	-
Jordan	-	-	-	-	38	-	-	-
Korea, Rep of	-	-	-	-	665	8	2	5090
	-	-	-	483 m	1851 m	1831 m	741 m	583 m
Korea, PDR	-	-	-	-	-	-	-	50
Lebanon	105	-	-	-	61	-	-	-
Malta	-	-	-	-	100	40	-	-
	-	550 m	-	-	-	-	-	-
Mexico	727	708	629	318	-	6730	15520	8646
	-	7 m	54 m	-	3508 m	2206 m	7175 m	6293 m
	221 m^2	44 m^2	24 m^2	-	92 m^2	-	16 m^2	886 m^2
	2 kg	29 kg	329 kg	-	340 kg	743 kg	4 kg	350 kg
Morocco	-	-	-	-	-	3	-	-
Namibia	-	-	-	-	-	11	-	-
Netherlands	-	445	-	-	883	308	-	1666
	-	-	-	-	2927 m	11760 m	-	7862 m
Neth. Antilles	-	-	-	13	-	-	-	-
New Zealand	553	700	257	713	1666	-	-	-
Norway	20	20	-	-	241	1	-	-
Panama	-	-	-	-	-	2937	-	-
Peru	-	-	-	-	-	-	32	8
Portugal	-	-	-	-	-	2	3547 m	1662
	-	-	-	-	-	-	-	4 m^2
Saudi Arabia	-	-	-	60	-	17	-	-
Senegal	-	-	-	-	-	-	-	16
	-	-	-	-	-	-	-	3 kg
Singapore	-	-	7758	150779	131046	-	93384	-
South Africa	-	402 m^2	-	-	-	-	1613	6232
Spain	5632	2942	-	-	-	199	48288	59952
	-	-	-	-	28307 m	-	-	-

Table 44 (cont.)

Importer	1980	1981	1982	1983	1984	1985	1986	1987
Sweden	-	-	-	-	8	10	1	-
Switzerland	-	-	1083	-	-	-	-	-
	-	13517 m	-	501 m	17752 m	-	-	54m
Taiwan	-	-	-	2757	232	3366	1000 m	14879
Tunisia	-	-	-	-	71	71	-	-
Turkey	-	-	-	55	148	389	1312	2847
	-	-	-	50 m	617 m	104 m	103 m	361 m
UAE	-	-	-	-	77	-	-	-
UK	834	5311	1201	-	-	-	-	53794
	-	15184 m	-	25167 m	21785 m	56915 m	-	-
Unknown	1956	2456	665	4	-	-	101484	7632
Uruguay	-	-	-	-	300 m	-	-	-
USA	90038	110577	37623	65696	169789	182972	74499	138617
	30429 m	104284 m	39212 m	59087 m	219624 m	300167 m	71852 m	85740 m
	-	-	81 m^2	-	2341 m^2	89 m^2	2054 m^2	37 m^2
	1873 kg	97 kg	-	-	-	-	580 kg	4467 kg
Venezuela	-	-	-	13	-	-	-	95
	-	-	-	-	-	-	-	1267 m
Total no	117835	165445	119651	304954	385022	323227	469847	460272
m	87204	144319	115833	322864	412300	417340	109142	103563
m^2	221	24278	105	-	2517	185	2138	927
kg	1875	126	341	-	9611	747	584	4820

Table 45. Minimum net imports of *Python molurus bivittatus* skins determined from CITES annual reports.

Importer	1980	1981	1982	1983	1984	1985	1986	1987
Australia	-	30	-	33	-	-	-	-
Austria	-	160	47	140	336	150	119	33
	-	-	-	14 m	-	-	-	-
Belgium	-	-	-	-	766	706	-	-
	-	-	-	-	248 m	-	-	-
Canada	14	-	102	78	16	148	4	47
	-	-	-	-	58 m	-	-	177 m
China	839	-	-	-	-	-	-	-
Cyprus	-	-	-	38 m	-	-	-	24 m
Denmark	386	-	-	-	-	-	-	-
Egypt	-	-	81	-	-	-	-	-
France	-	-	-	-	23839	54658	-	6718
	-	2890 m	-	-	28000 m	7500 m	-	500 m
German DR	-	5945	-	-	-	-	-	-
	-	-	3000 m	-	-	-	-	-
Germany FR	11851	21200	671	5546	6247	6807	-	3775
	-	-	-	-	37945 m	7603 m	5950 m^2	-
	-	-	-	-	-	80 kg	-	-
Greece	-	-	1	96	-	545	79	13
Hong Kong	10500 m	-	1623	5499	-	3140	-	215 m
Hungary	-	-	-	50	-	7	-	-
Israel	-	20	15	34	16	18	-	-
Italy	79	5210	13187	22255	7566	62650	25731	15756
	12000 m	7060 m	45183 m	180525 m	80226 m	28414 m	-	-
	-	52869 m^2	-	-	-	-	-	-
Japan	1847	-	409	5391	4060	18148	6526	12688
	-	-	-	1736 m	-	-	-	3836 m
	-	-	134 kg	-	1783 kg	-	-	-
Korea, Rep of	-	-	-	-	189	-	-	-
Lebanon	-	-	-	10	30	-	-	-
Mexico	-	64	-	-	3333	893	966	665
	-	-	-	-	396 m	-	150 m	750 m
	-	-	-	-	-	-	-	650 kg
Netherlands	-	-	-	1399	726	1394	-	3543
	-	-	-	-	7000 m	12150 m	-	-
New Zealand	-	-	1	15	115	-	-	-
Portugal	-	-	-	-	-	-	-	144
Saudi Arabia	-	-	-	30	3	-	-	-
Singapore	-	-	-	-	5355	-	-	412
South Africa	-	639	1	25	-	24	-	7
Spain	-	348	83	15	6855	13858	3442	5351
	-	2200 m	-	-	257 m	-	-	-
Sweden	638	-	-	-	-	-	-	-
Switzerland	-	-	1523	-	723	-	-	204
	-	2 m	-	693 m	-	-	-	-
Taiwan	-	-	-	-	1080	450	-	2
	-	-	-	-	2000 m	-	-	-
Turkey	-	-	-	-	22	100	-	-
	-	-	-	-	-	583 m	50 m	528 m
UK	-	-	2136	-	-	-	-	-
	10000 m	16839 m	-	3737 m	5000 m	-	-	-
Unknown	-	-	14	-	-	-	75	23
	-	2260 m	-	-	-	-	-	-
USA	6409	22319	7717	6204	20769	25372	6602	8405
	19667 m	32341 m	3337 m	4401 m	17453 m	6404 m	3312 m^2	264 m^2
	-	-	-	-	96 kg	-	10 m^2	1200 m^2
Venezuela	-	-	-	-	-	-	67 m	788 m
Total	22063	55935	27611	46820	82046	189068	43544	57786
	52167 m	63592 m^2	51520 m	191144 m	178583 m	62654 m	3579 m^2	7091 m^2
	-	52869 m^2	-	-	-	-	5960 m^2	1200 m^2
	-	-	134 kg	-	1879 kg	80 kg	-	650 kg

Table 46. Minimum net imports of *Python curtus* skins determined from CITES annual reports.

Importer	1980	1981	1982	1983	1984	1985	1986	1987
Austria	-	-	89	-	-	-	-	-
Canada	-	-	-	-	-	11750	-	-
	-	-	-	54 m	-	-	-	-
Finland	-	-	-	217 m	481 m	-	-	-
France	-	-	1427	-	-	-	40	4528
	-	76 m	-	2170 m	-	-	9 m	-
German DR	-	-	-	8822 m	-	-	-	-
Germany, FR	-	-	-	2391	655	-	-	50
	-	-	-	-	118 m	-	-	-
Greece	-	-	13	-	-	-	-	-
	-	-	-	71 m	-	-	-	-
Hong Kong	-	-	-	-	-	-	9 m	27 m
Italy	-	-	13910	4571	2544	-	4500	3811
	-	1440 m	7685 m	15732 m	1455 m	-	-	99 m
	-	2500 m^2	-	-	-	-	-	-
Japan	-	-	22	-	-	7527	-	-
	-	-	-	-	971 kg	-	-	-
Mexico	-	-	-	-	803 m	-	2868	-
Netherlands	72	-	-	-	-	-	-	-
Singapore	-	-	-	-	-	-	18768	-
Spain	-	1189	167	-	58	-	207	2026
Switzerland	-	-	-	1436	1449	-	-	-
	-	4001 m	-	-	-	-	-	-
Turkey	-	-	-	-	200	800	5 m	-
UK	-	-	222	-	-	-	-	-
USA	863	14891	3619	4083	9984	11902	12941	20230
	-	-	3762 m	700 m	15500 m	27393 m	20124 m	31149 m
	-	-	-	-	2 kg	-	26 kg	4 kg
Venezuela	-	-	-	-	-	-	-	17 m
Total	935	16080	19469	12481	14890	31979	39324	39883
	-	5517 m	11447 m	27766 m	18357 m	27393 m	20139 m	31292 m
	-	2500 m^2	-	-	973 kg	-	26 kg	4 kg

Table 47. Reported countries of export or origin (or exporting country if no original source reported) and quantities of transactions in skins of *Python reticulatus* reported to CITES.

Country	1980	1981	1982	1983	1984	1985	1986	1987
a. Countries with wild populations of *P. reticulatus*.								
India	21	510	-	900	900	3971	-	2
	-	1334 m	1000 m	-	254 kg	-	-	-
	-	1000 m^2	-	-	40 m^2	-	-	-
Indonesia	13811	72646	68404	242922	265639	176849	417814	327767
	5329 m	55248 m	56975 m	-	203441 m	273355 m	71956 m	84223 m
	254 m^2	15333 m^2	-	-	2433 m^2	-	923 m^2	104 m^2
	2 kg	125 kg	-	-	8447 kg	370 kg	505 kg	4147 kg
Laos	-	-	-	-	-	-	-	20
Malaysia	19069	2771	14	2751	4642	3775	-	21415
	-	150 m	-	-	-	-	-	-
	-	29 kg	213 kg	-	221 kg	271 kg	-	-
Myanmar	-	-	-	-	-	-	-	912
Philippines	497	1435	188	2144	480	2198	1497	704
	286 m	3069 m	600 m	-	1362 m	5349 m	-	607m
	-	500 m^2	-	-	-	-	-	-
Singapore	37702	62104	26535	36452	8754	90746	59178	51969
	37535 m	55083 m	20745 m	-	712 m	918 m	-	-
	-	800 m^2	125 kg	-	84 m^2	-	22 m^2	-
Thailand	36717	88025	31146	116110	119690	134959	55548	57548
	37954 m	49115 m	32172 m	-	86368 m	135431 m	38681	19355 m
	-	6796 m^2	24 m^2	-	52 m^2	89 m^2	55 m^2	886 m^2
	-	-	116 kg	-	878 kg	75 kg	79 kg	673 kg

Table 47 (cont.)

Country	1980	1981	1982	1983	1984	1985	1986	1987
Viet Nam	-	-	207	690	441	-	-	431
	-	-	-	-	-	4 kg	-	4500 m
b. Countries without wild populations of *P. reticulatus*.								
Argentina	-	-	-	15	4	-	-	-
	-	-	-	-	-	56 kg	-	-
Cameroon	-	2	-	-	-	-	-	-
Canada	-	-	-	-	-	520 m	-	-
Chad	-	-	-	-	-	500 m	-	-
China	-	-	-	-	160	-	-	-
Cote d'Ivoire	-	-	-	-	-	-	2	-
Denmark	-	-	-	-	1	8	-	-
France	-	-	-	630	100	-	-	-
German DR	170	-	-	-	-	-	-	-
Germany, FR	9447	3972	-	-	-	-	4	-
	-	12001 m	-	-	-	-	-	-
Hong Kong	-	-	-	-	-	-	46	-
Italy	4	-	-	-	-	-	2	11
Japan	873	1066	-	1212	8341	1	-	-
	5000 m	251 m	329 m	-	215 m	-	-	-
	-	-	-	-	77 kg	387 kg	-	-
Nepal	-	-	-	1265	-	-	-	-
Netherlands	1179	-	-	-	-	-	-	-
Nigeria	1740	66	3	-	-	5	-	-
	-	61 m	-	-	-	-	-	-
Panama	-	-	-	-	77	707	-	-
Paraguay	-	-	-	7	-	-	-	-
S Africa	1718	1055	23	471	-	-	-	120
	-	1623 m	-	-	-	-	-	8 m
Spain	2	-	-	-	-	-	-	-
Sudan	-	-	-	1	-	104	-	-
Switzerland	-	259	23	-	8	-	-	-
	-	466 m	-	-	-	-	-	-
Taiwan	100	18	18	1654	807	202	-	-
	-	4074 m	-	-	-	-	-	-
Tanzania	23	-	-	-	-	-	-	-
Togo	-	-	-	466	-	-	-	-
UK	16	334	-	226	66	18	30	16
	1720 m	891 m	-	-	-	-	-	-
USA	-	350	-	13	49	8	10	150
Unknown	28509	21607	32461	57121	16853	3122	1004	174437
	4380 m	6257 m	13832 m	-	133034 m	2077 m	-	1000 m
	1873 kg	-	15 kg	-	-	-	-	-
	37 m^2	-	104 m^2	-	-	-	-	-
Zimbabwe	-	31 m^2	-	-	-	-	1183 m^2	-
Totals								
	151598	257020	159022	465050	427012	416673	535135	635502
m^2	291	24460	128	-	2569	89	2183	926
m	92204	189623	125653	-	425132	418150	110637	109693
kg	1875	154	469	-	9877	1163	584	4820

Table 48. Reported countries of origin (or exporting country if no original source reported) and quantities of transactions in skins of *P. molurus bivittatus* reported to CITES.

Country	1980	1981	1982	1983	1984	1985	1986	1987
a. Countries having or possibly having populations of *P. m. bivittatus*								
China	-	280	-	-	233	-	856	-
Hong Kong	-	-	-	-	-	471	-	193
Indonesia	1244	11665	4724	19494	10887	3184	775	515
	-	-	-	-	-	-	111 m	250 m
Malaysia	104	770	-	-	-	-	-	1508
Myanmar	-	-	-	26	-	-	-	-
Thailand	19772	228772	53500	128321	159451	224315	53117	42106
	-	-	-	-	-	-	6591 m	3222 m
	-	-	-	-	-	-	1200 m^2	5960 m^2
	-	-	-	-	-	-	16 kg	-
Viet Nam	28654	25682	7062	27784	17075	1192	1948	442
	-	-	-	-	-	-	500 m	-
'Asia'	-	-	-	-	1	-	-	-
b. Countries without wild populations								
Argentina	311	92	-	-	-	-	-	-
Austria	-	-	-	-	-	-	-	-
Cameroon	-	-	-	-	-	-	-	-
Canada	3	-	-	-	-	-	-	1
Denmark	-	-	-	-	-	-	-	-
Ghana	-	-	-	-	4	-	-	-
India	-	4	-	-	-	-	-	-
Italy	-	57	-	-	-	-	5	-
Japan	-	160	-	-	-	-	-	-
Netherlands	1176	-	-	-	-	-	-	-
Nigeria	-	-	-	-	27	-	-	-
Singapore	5	15334	1731	654	1026	1363	1420	1310
	-	-	-	-	-	-	-	357 m
Spain	1	-	-	-	-	-	-	-
South Africa	-	3	254	5	-	-	-	-
Taiwan	-	-	-	1	1690	-	446	-
	-	-	-	-	-	-	650 m	-
UK	-	-	102	1	-	-	-	3
USA	-	-	-	34	-	-	-	-
Venezuela	-	-	6	35	-	-	-	-
Unknown	10598	6195	9178	6370	4099	94	1082	-

Table 49. Reported countries of origin (or exporting country if no original source reported) and quantities of transactions in skins of *P. curtus* reported to CITES.

Country	1980	1981	1982	1983	1984	1985	1986	1987
a. Countries having or possibly having populations of *P. curtus*								
Indonesia	-	9256	9256	11568	16708	28090	66872	31335
	-	10517 m	3012 m	23948 m	11480 m	27393 m	20148 m	31292 m
	-	2500 m^2	-	285 kg	975 kg	-	26 kg	4 kg
Malaysia	-	715	-	-	-	-	-	-
Thailand	-	-	-	-	1642	-	-	-
b. Countries without wild populations of *P. curtus*								
India	-	8	-	-	-	-	-	-
Japan	-	3479	-	-	59	-	-	-
Singapore	935	7579	8435	1289	272	11359	13774	8161
	-	-	-	8 m	1514 m	-	-	-

Table 49 (cont.)

Country	1980	1981	1982	1983	1984	1985	1986	1987
c. Country unknown								
	-	2899	24688	906	1642	6	-	11680
	-	-	-	8822 m	22559 m	-	-	-
	-	-	-	-	975 kg	-	-	-

Table 50. Reported countries of export or origin (or exporting country if no original source reported) and quantities of transactions in live *Python reticulatus* reported to CITES.

Country	1980	1981	1982	1983	1984	1985	1986	1987
a. Countries having or possibly having wild populations of *P. reticulatus*.								
Indonesia	-	9	-	4	1880	300	2	28
India	1878	-	-	-	-	-	-	-
Laos	-	-	-	-	-	-	50	-
Malaysia	513	161	37	101	449	114	4551	9382
Myanmar	-	-	-	-	-	1	-	-
Philippines	-	-	-	1	1	3	5	2
Singapore	-	-	5	-	-	-	5	-
Thailand	6346	4518	5255	5771	9619	15751	116	569
b. Countries without wild populations of *P. reticulatus*.								
Australia	4	-	-	-	-	-	-	-
Canada	1	1	2	-	-	-	-	2
Denmark	-	-	-	-	-	-	-	1
German DR	-	-	-	2	-	-	-	-
Germany, FR	10	4	-	4	4	-	2	-
Ghana	-	176	25	400	-	503	152	70
Guyana	1	-	-	-	-	-	-	-
Honduras	2	-	-	-	-	-	-	-
Japan	-	-	-	2	-	-	-	-
Netherlands	12	-	1	-	-	-	-	-
Poland	-	-	-	-	10	-	2	16
Sweden	-	-	-	-	1	-	-	-
Switzerland	1	-	-	-	15	7	-	-
Togo	-	75	25	10	-	294	125	228
UK	-	2	-	-	-	-	-	-
USA	2	-	22	-	27	1	-	-
USSR	-	-	-	-	2	-	-	-
c. Country Unknown								
	475	9	15	19	5	1	7	454

Table 51. Reported countries of origin (or exporting country if no original source reported) and quantities of transactions in live *P. molurus bivittatus* reported to CITES.

Country	1980	1981	1982	1983	1984	1985	1986	1987
a. Countries having or possibly having populations of *P. m. bivittatus*								
'Asia'	-	4	-	-	-	-	-	-
Burma	-	3	-	-	-	2	-	-
China	-	-	-	-	-	-	6	-
Hong Kong	-	-	-	-	-	-	6	9
India	-	-	-	-	-	-	-	3
Indonesia	-	2	-	-	-	-	-	-
Laos	-	-	-	-	-	-	2445	-
Malaysia	-	-	-	2	113	94	15006	17343
Thailand	6508	4847	1464	7334	15935	24903	208	746
Vietnam	-	-	-	-	-	308	-	-
b. Countries without wild populations								
Austria	-	2	1	3	-	1	-	2
Cameroon	-	-	-	2	-	-	-	-
Canada	-	13	11	-	-	-	3	6
Denmark	-	-	-	3	-	-	-	-
German DR	-	-	-	5	-	-	3	-
Germany, FR	24	13	3	4	2	1	-	4
Ghana	-	-	-	-	-	-	30	-
Guatemala	2	-	-	-	-	-	-	-
Italy	-	-	-	-	-	-	-	2
Netherlands	-	-	-	-	-	-	2	-
Poland	-	-	-	-	4	4	50	40
Singapore	-	-	-	-	-	-	4	-
South Africa	-	4	-	-	-	-	-	3
Switzerland	-	-	-	-	15	10	26	14
Togo	-	20	175	-	-	-	60	5
UK	-	-	-	-	2	-	-	5
Unknown	2	3	3	-	7	3	10	19
USA	1	-	29	-	19	2	3	4
USSR	-	-	-	-	-	-	40	15

Table 52. Reported countries of origin (or exporting country if no original source reported) and quantities of transactions in live *P. curtus* reported to CITES.

Country	1980	1981	1982	1983	1984	1985	1986	1987
a. Countries having or possibly having populations of *P. curtus*								
Indonesia	1	-	-	-	-	-	-	-
Malaysia	7	2	2	5	96	43	513	892
Thailand	354	185	279	135	-	11	-	14
b. Countries without wild populations of *P. curtus*								
Canada	1	-	-	-	-	-	-	-
Germany, FR	-	-	1	-	-	-	-	1
Ghana	1	-	-	-	-	-	-	-
Italy	-	-	-	-	-	-	-	1
USA	1	-	-	2	3	-	-	-
c. Country unknown	-	-	3	2	-	-	-	1

CITES statistics

All pythons have been included in CITES Appendix II since 1975, and thus statistics are available from then onwards, although their accuracy has been increasing as the number of Parties to the Convention has risen. CITES statistics have the great advantage over Customs statistics in that they identify which species is in trade.

CITES statistics: skins

Minimum net imports of South-east Asian python skins from 1980 to 1987 calculated from CITES annual reports are shown in Tables 44, 45 and 46. Trade in all three species has increased over most of this period, but *Python reticulatus* was traded in the greatest quantities, with nearly half a million skins recorded in 1986 (Table 44). Trade in *Python molurus* reached a peak of over 190 000 skins in 1985, and has subsequently declined slightly (Table 45), while fewer than 50 000 *Python curtus* skins have been traded each year (Table 46).

The majority of the skins have been imported by the USA and European countries, especially Italy, France and Spain. Japan has also reported importing substantial quantities, particularly of *P. reticulatus*, in recent years. The European imports will have been under-estimated in the early 1980s because France did not report imports of Appendix II material before 1984, and Spain did not become a Party to CITES until mid-1986. The skins of *P. curtus* are not very popular in Europe, the majority having been imported to the USA, where they are used for making cowboy boots.

The declared origins of the *P. reticulatus* skins are shown in Table 47, which indicates that the great majority are said to have come from Indonesia. Thailand was the second most important source, followed by Malaysia and the Philippines. Skins reported to have come from Singapore are believed to represent re-exports where the country of origin was not stated. It is most likely that they also came from Indonesia.

The majority of *P. molurus* skins have come from Thailand (Table 48), with significant amounts in recent years from Viet Nam. Few skins are said to have come from Indonesia since 1984 because the species is protected in that country and export permits have not been granted (see below). Several of the European importers noted that they now no longer trade in *P. molurus* because it is too difficult to get CITES permits.

Virtually all of the skins of *P. curtus* have originated in Indonesia (Table 49). The species does occur in southern Thailand but it is seldom hunted there for the skin trade.

CITES statistics: live animal trade

The international trade in live pythons is much lower than the trade in skins (Tables 50, 51 and 52). Since 1980, *P. molurus* has been the most popular species, with a peak of over 25 000 in 1985. Most of the live snakes have come from Thailand except in 1986 and 1987, when Malaysia emerged as the main source. This change coincides with the introduction of protective legislation in Thailand for pythons, and may indicate that the snakes were exported from Malaysia to evade the export controls in Thailand.

CITES statistics: trade in manufactured products

CITES annual reports also record trade in leather products manufactured from python skins. The minimum net trade for the three South-east Asian species is shown in Table 53. The most common items recorded were shoes (including boots), and the most popular species was *P. reticulatus*. In all years since 1985, the main exporters have been Spain, Italy and Mexico and the main importer the USA. Spain has accounted for 71-81% of the reported trade each year. It must be presumed that the skins imported to the other European countries and Japan are used to make products which are sold domestically.

Table 53. Minimum net trade in items manufactured from python skins recorded in CITES annual reports.

	Handbags	Shoes	Wallets	Items	Total
Python molurus					
1985	5 144	47 085	1 139	13 663	67 031
1986	6 246	47 092	36	37 938	91 312
1987	5 381	74 907	690	94 767	175 745
	16 771	169 084	1 865	146 368	
Python reticulatus					
1985	13 431	329 431	3 029	43 689	389 580
1986	13 291	224 968	3 635	43 224	285 118
1987	17 285	221 319	1 214	64 645	304 463
	44 007	775 718	7 878	151 558	
Python curtus					
1985	453	2 950	0	146	3 549
1986	216	1 540	0	156	1 912
1987	565	1 539	10	18	2 132
	1 234	6 029	10	320	

TRADE IN PYTHON SKINS

Size of skins

Python skins are measured and sold by a complex system designed to meet the needs of the leather industry. *P. reticulatus* and *P. molurus* are both treated in the same way. Skins are measured by both length and width; the width being taken at the mid-point between the neck and the anus. The standard size of python skin in an air-dried state has a minimum width of 20 cm. Length is measured between the neck and the anus, thereby omitting the head and tail sections. If the skin has any holes or other defects, the length of the affected sections is subtracted from the total length to give the effective length which is quoted in the invoice. Thus a 420-cm skin which has three holes, each 10 cm long, would be quoted as "390 cm". The skin is then sold at a fixed price per metre. If skins have more extensive areas of damage, they are classified as grade II. It is standard practice for shipments of python skins to contain 80% grade I and 20% grade II. The snakes are usually skinned with a ventral incision, and the skins are thus called "front-cut"; the few skinned with a dorsal incision are called "back-cut". A typical specification for a shipment of *P. reticulatus* skins would be: "322 pieces, air-dried, front-cut, total length 1000 m, size 20-34 cm, average width 22.5 cm, 80% grade I, 20% grade II". If the going rate was US$11 per metre, the total value of such a shipment would be US$11 000.

When the skins are shipped they are usually accompanied by detailed packing notes, giving the total number of skins at each width-class and their total effective length. The packing notes from three different exporters in Singapore were examined, covering 16 shipments of a total of 6964 skins of *P. reticulatus*. The width distribution of these skins is given in Figure 10; the modal width was 21 cm, and the arithmetic mean 22.49 cm. The average effective length was 3.22 m.

Smaller sized python skins, between 15 and 20 cm in width, are occasionally sold, and are referred to in the trade as "baby pythons". These are usually sold by the piece (rather than by length) and are measured in size intervals such as 10-14 cm, 15-17 cm, 18-20 cm. The size distribution of some 10 000 baby python skins obtained from the packing notes from some exporters in Singapore is shown in Figure 11. It is not known what proportion of the harvest baby pythons account for; estimates from the dealers ranged from "very little" to 50%. Most seemed to think it was around 10%. The fact that the modal class of baby pythons was 18-19 cm and that of standard skins was 21 cm suggests that the true modal class of the harvest would be 21 cm, although the mean would obviously be less than 22.49 cm.

The relationship between the width and mean length of each width-class of standard skins is shown in Figure 12 together with their fitted regression lines. The grade I skins are clearly longer in relation to their width than the grade II skins, as

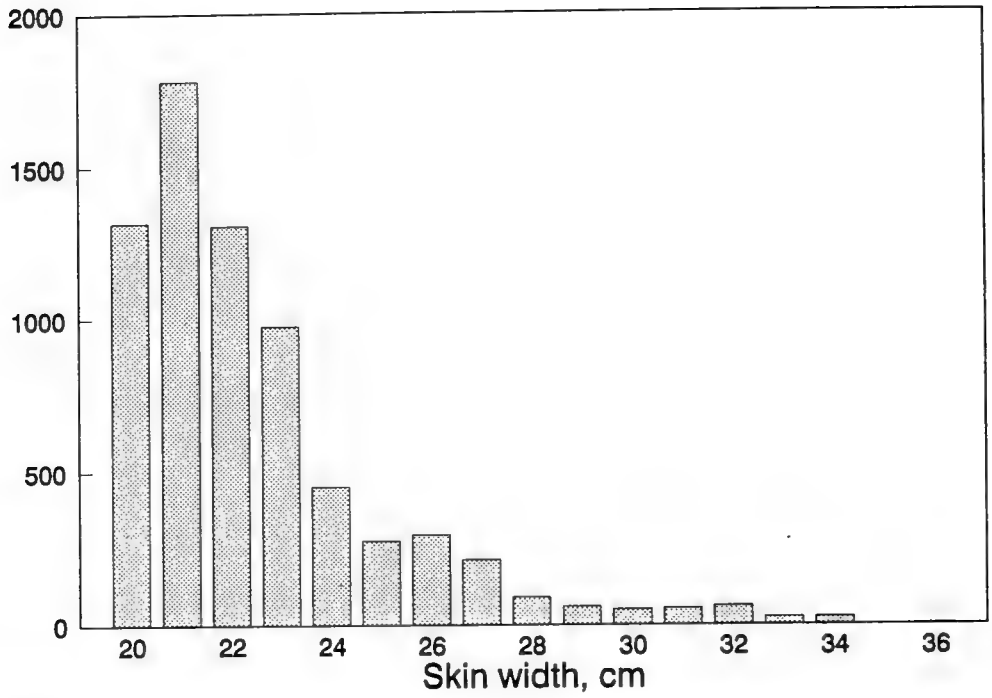


Figure 10. Frequency distribution of different width-classes of air-dried skins of *P. reticulatus* exported from Singapore.

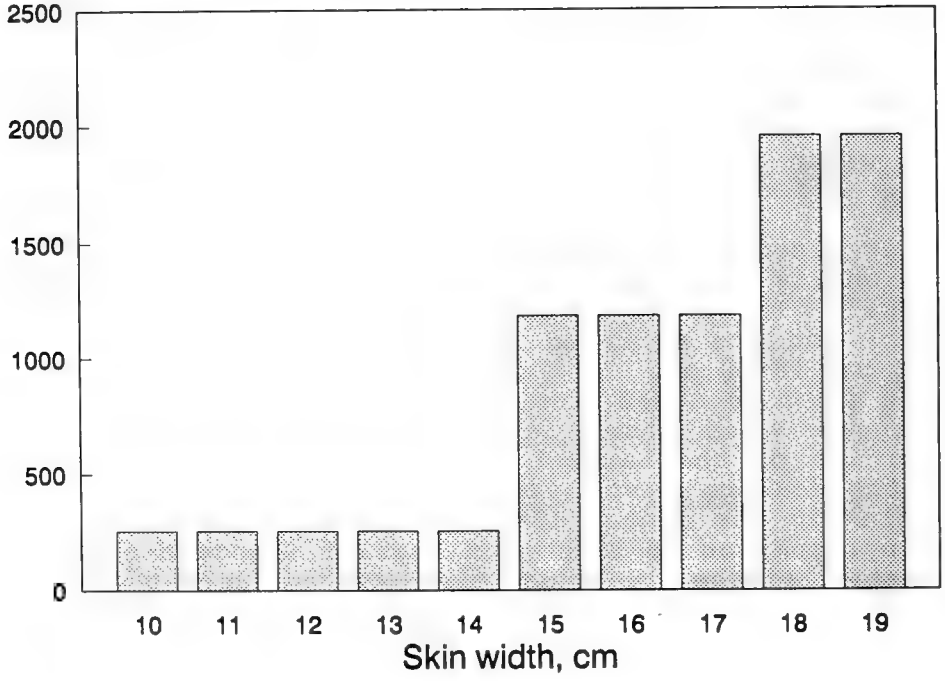


Figure 11. Size distribution of air-dried skins of *P. reticulatus* less than 20 cm wide exported from Singapore.

would be expected if the grade II skins have a greater proportion of their length deducted as a result of damage. Considering only the grade I skins, the length-width relationship (in m) is expressed by the formula:

Effective length = 15.48 x width - 0.20

Grade I skins also have their effective length reduced to exclude damaged sections. It is reasonable to assume that a maximum of 50 cm would be deducted before the skin was classified as grade II, and so the total length of grade I skins would on average be 25 cm more than the effective length; thus

Total length = 15.48 x width + 0.05

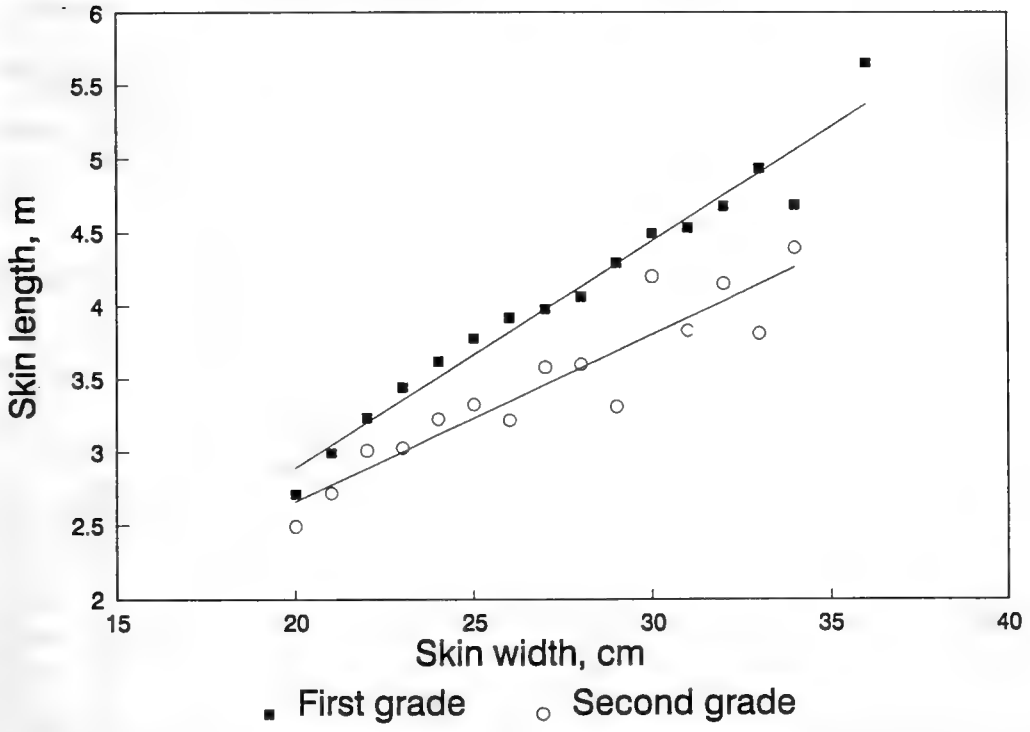


Figure 12. Relationship between total length and width for air-dried skins of *P. reticulatus* exported from Singapore, determined from Packing lists.

Using this formula, the total length of the modal size class of python skins (21 cm) would be 3.30 m, and that of the average sized standard skin (22.49 cm), 3.53 m. Skins stretch when they are removed from the live snake; several of the dealers in Indonesia buy snakes live from the catchers and, when doing so, they calculate the skin length as 4/3 of the live length. A skin of 3.53 m would therefore represent a snake of 2.65 m. The largest skins in the sample examined (36 cm) had an average

effective length of 5.65 m. The live length of these would be in the region of 4.42 m.

Snake skins shrink on tanning; skins that were 20 cm wide when raw tend to shrink by around 2 cm when crust-tanned. The standard size for crust-tanned *P. reticulatus* skins is therefore "18 cm up".

P. curtus is much shorter than the other two species, and is almost universally sold by the piece. The normal length of skins is 1-2 m, with a mean probably around 1.2 m. However, no packing lists are available for *P. curtus* skins, and so accurate data are not available. Most skins are around 20-25 cm wide, being distinctly wider in relation to their length than the other pythons. *P. curtus* skins are reported to be difficult to tan, having a tough streak along the mid-dorsal line which tends to cause tearing. For this reason, the skins are often back-cut.

Several of the packing notes also specify the total net weight of shipments of skins. A total of 16 shipments, comprising 7033 air-dried skins had a a net weight of 1753 kg, giving an average weight of 249 g per skin.

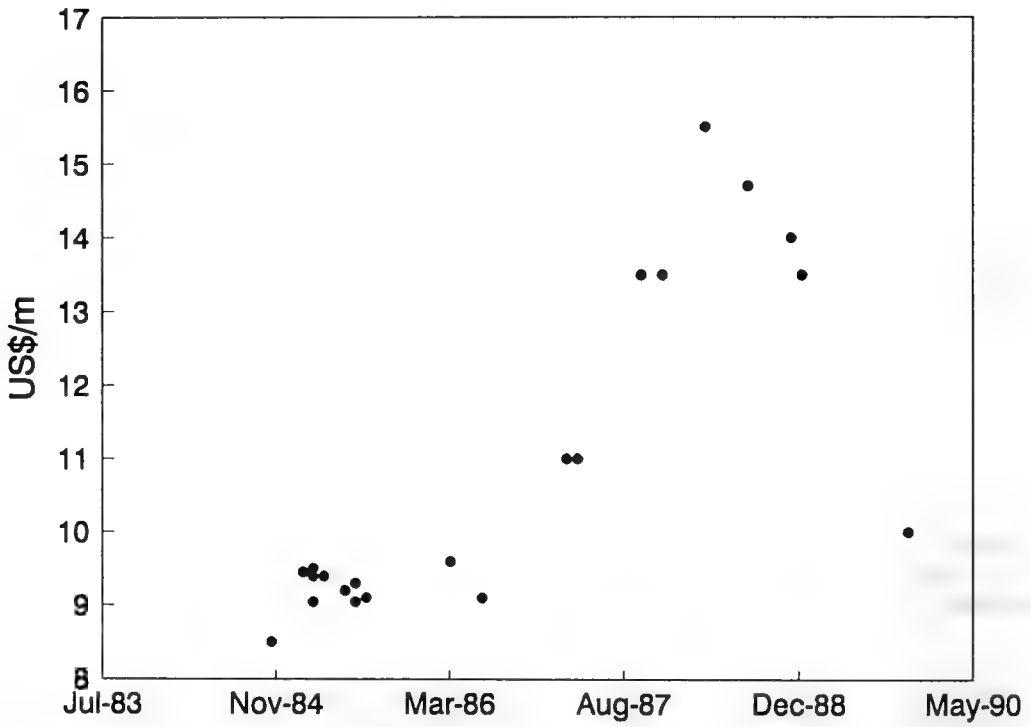


Figure 13. Prices paid for individual shipments of *P. reticulatus* exported from Singapore from 1983-1989.

Price

The price of python skins has fluctuated substantially in the past few years (Figure 13). In 1984-85, raw skins sold at around US$9-10/m, but this increased to a peak of over US$15/m in 1988. More recently, the demand for python skins has dropped substantially, and it is reported to be difficult to find buyers at US$10/m. These prices appear to have been driven principally by fashion. The skins were extremely popular in 1985, but the price rose too high and the manufacturers turned to other forms of skin for their products. Having geared up the industry to such other species, it has been slow to revert to using pythons even though the price has since fallen to more reasonable levels. The European manufacturers questioned were not surprised by these events; it is apparently common for skins prices to show periodic cycles, and they were anticipating that the price would start to rise again over the next few years. As python skins have gone out of fashion, those of lizards have come in. Skins of *V. salvator* which fetched around US$6 a piece in 1987 were selling at US$9-10 in 1989. Finished python skins are more valuable and were reported to be fetching US$22/m in mid-1989, compared with US$30/m in 1988. Wallis (1980) noted that changing fashions caused a slump in demand for snake skins in 1978/79.

Impact of Trade on Snake Populations

As discussed above, the great majority of *Python reticulatus* skins in trade are derived from animals with a calculated mean live length of 2.47 m. It appears, although the data available relate to captive animals, that sexual maturity is attained at around 3 m length in this species (mean values in each sex would be expected to differ significantly, and this is suggested by the sparse data available). Few skins in trade derive from animals 3 m in length or above.

The skin trade is therefore having a direct impact primarily on immature animals. It seems most probable that this is a direct result of animals of this size and age class being numerically the most abundant in natural habitats; it may to some extent indicate that these animals are the most susceptible to collection.

In the absence of critical demographic data, the importance to the local python population of these immature animals cannot be estimated. There exists no quantitative information on the demographic structure of wild python populations, in particular, none on mortality and survivorship among immature classes. It is thus entirely unknown whether there exists a surplus of immature snakes, harvestable without detriment to the overall status of the parent population.

In a stable population, experienced mature snakes must have greatest probability of contributing to future generations, and immature snakes a lesser probability. The reproductive value to

the population of a given number of mature snakes must be greater than that of the same number of immature snakes; similarly, the cost to the population of harvesting mature animals must be higher than in the case of immatures. The fact that python populations appear to be able to persist in the face of some collection pressure suggests that this form of artificial mortality among later immature classes may not necessarily have too deleterious an impact. It is self-evident, but worth noting, that this will always rest on (1) a core population of mature animals being able to survive and produce succeeding generations, some of which (2) must escape natural and artificial mortality in order to themselves attain maturity.

In these circumstances, the impact on snake populations of harvesting for the skin trade cannot be evaluated in detail, and it remains impossible to make recommendations of a quantitative nature on the management of python populations and the conduct of utilisation practices.

An absolute minimum requirement is to ensure that large areas of habitats suitable for use by pythons remain intact, sufficient to allow areas depleted of snakes to be replenished by natural dispersal.

Indonesia

1. Python skins constitute an important element of Indonesia's export trade, but the control of the trade should be improved to avoid threatening the survival of the resource.

2. *Python molurus* is restricted in distribution and should remain protected.

3. The quota system is potentially an excellent mechanism for managing the trade in the other two species of *Python*, but it requires some minor changes in the way in which it is operated. Some of these (recommendations 5 and 6, below) will necessitate the relevant Decree to be amended.

4. The provincial quotas should be completely reviewed in the light of what is known of *Python* distribution and abundance. The advice of the Scientific Authority should be sought for this. Overall quotas should not be increased before population monitoring programmes have been undertaken.

5. The issuing of export permits is the key step in controlling the trade, and this procedure should be brought more closely into line with the rest of the quota system. The total number of skins permitted for export must not exceed the capture quota. The authority which issues the export permits should ensure that all of the skins have either a valid transport, if they originated outside the province, or a valid capture permit, if they originated within it.

6. Domestic transport permits should be used for all trade between provinces. The authority which issues them should ensure that capture permits have been issued to cover all of the skins to be transported. The serial numbers of the capture permits should be recorded on the transport permits to verify this.

7. The procedure for monitoring the quota system needs substantial improvement. The regional offices of PHPA should be responsible for checking that capture permits issued correspond with the quotas set, and that all the transport permits issued correspond with the capture permits. Quarterly reports detailing these checks should be forwarded on a timely basis to Bogor to assist in the issuance of export permits.

8. The compilation of CITES annual reports should be improved and clarified. In 1988, permits were issued for the export of 827 036 python skins, but the annual report only recorded 630 477. This discrepancy should be investigated and steps taken to rectify any deficiencies in the reporting procedure.

9. The centralisation of processing facilities at a relatively small number of tanneries provides further opportunity for monitoring the trade. Tanneries should be required to maintain accurate records of their skin acquisition and throughput, and to make these available for inspection by local PHPA officers. They should be required to produce permits to account for all skins in their possession.

10. Closer collaboration should be established with the Customs authorities to ensure that they do not allow the export of wildlife products without valid export permits. All used export permits should be returned to the Directorate General of PHPA to record the number of specimens actually exported.

11. The requirement to export tanned skins has the advantage of increasing the export value of the product, but it carries a severe risk of encouraging over-exploitation. If all of the exporting companies are encouraged to establish tanning factories there will be strong pressure to increase their throughput and therefore profitability. There is already evidence that this is happening, the tannery in Samarinda having recently doubled its capacity. Consideration should be given to limiting the overall tannery capacity for reptile skins in Indonesia to decrease the risk of exceeding the sustainable offtake.

12. The system of levying export duties should be investigated. There is evidence that the true value of the skins is substantially under-declared, resulting in a major loss of revenue to the Government.

13. Python population surveys and monitoring systems should be set up as soon as possible to establish the impact of current levels of hunting. The surveys should be planned to run for at least two years and should cover other species of reptile exploited for the skin trade, such as *Acrochordus* spp., *Ptyas* spp., *Cerberus rhynchops* and *Varanus salvator*.

Thailand

1. As a matter of urgency, immediate steps should be taken to enact legislation in Thailand to implement CITES fully, allowing the control of imports and exports of all species listed in the Appendices.

2. Interim measures should be taken to improve the control of exports of native wildlife. These include listing as protected all species included in the CITES Appendices. No trade or export should be allowed for species included in Appendix I, with the exception of captive-bred specimens, but export quotas could be granted for Appendix II species. The possibility of using Customs legislation to control imports and re-exports of non-indigenous wildlife should be investigated.

3. In view of the persistent problems with the import, with or without documentation, of wildlife from the neighbouring countries Laos, Cambodia and Myanmar, none of which is party to CITES, Thailand should prohibit the re-export of wildlife from all non-Parties to CITES. This would impede the continuing use of Thailand as a laundering point for introducing illegally acquired wildlife into international trade.

4. The system currently practised of allowing some companies to export protected snake skins which are already held in stock is open to abuse, as it is impossible to verify that new skins are not being added to the stock. If the system is to be continued, then all stock should be inventoried under the supervision of the Royal Forest Department and the stocks should be open to periodic inspection.

5. There is evidence that increasing quantities of python skins are being illegally exported to Malaysia for subsequent re-export. Improved vigilance by Customs at the border, and checks of traders in southern Thailand may help to prevent this.

6. If continued trade in python skins is to be allowed, steps should be taken to survey and monitor the wild population.

Very many people have assisted with this project, by responding to questions, providing papers and other material, or by facilitating field survey work. Our most sincere gratitude is extended to all who have helped in this way, particularly those listed below. We are grateful also to Veronica Greenwood for her efficiency and meticulous attention to detail in editing and printing the final draft of this report. Numerous additional people and organisations have supplied us with information in the past; while not listed below, they are acknowledged elsewhere (Luxmoore *et al.*, 1988).

Angel C. Alcala, Andi Lesmana, Arifin Lison, B.S. Arumugam, Bambong Yuwono, Boonlert Angsirijinda, Warren Brockelman, Budiman H. Amin, Budiman, Budiyono Widjaya, Budyanto Tasma, Chaidir Sahid, Choon Koshpasharin, Fred Distenfeld, David C. Durland, Effendi A. Sumardja, George Tatang Saputra, Giam Choo Hoo, R. Graemer, Gunawan Rusli, Hasan Budiman, Masayoshi Hayashi, Herman Syafii, Herman Prayitno, Hui Kok Meng, Husin Wijaya, Jang Dobias, Jarujin Nabhitabhata, Koh Chon Tong, Leonard Kwan Keng Wah, Lai Kiew Kong, Leonardo Laloan, Jaques Lewcowicz, Herve Loubert, Kathy MacKinnon, M. Majunke, Muhammad Bakri Wainda, Panya Youngprapakorn, Pisit na Patalung, Piyanuj Charuchinda, Ramesh Boonratana, P. Rogwiller, Phil Round, Ugo Sanna, Charles Santiapillai, Stefano Segantini, Sumarto Gozal, Sunkorianto, Suprijadi, Swieto Makampo, Richard Tan Chye Hock, Taufik, Thalibsjah, Tham Muk, J.C. Thurlow, Uthai Youngprapakorn, Welly Mawengkang, Widodo Sukohadi Ramono, Yip Kok Yen, Zainal Makmur.

Particular thanks must be extended to the various government authorities and traders associations who supplied data and assisted with the field work. These include: the Primary Production Department, Singapore; the Royal Forest Department, Thailand; the Directorate General of Forest Protection and Nature Conservation, Indonesia. The staff of TRAFFIC(Japan) kindly supplied data from the Japanese Customs Statistics.

Alcala, A.C. (1986). *Guide to Philippine Flora and Fauna, Vol. X, Amphibians and Reptiles.* Natural Resources Management Centre (Ministry of Natural resources) and University of the Philippines.

Anon. (1980a). *Atlas of Chinese Snakes.* Technical Publishing House of Shanghai University.

Anon. (1980b). *Saving Siberut: a conservation master plan.* Prepared by WWF Indonesia Programme for the Government of Indonesia, with the support of WWF and IUCN.

Anon. (1988). World's largest python in Nicobar. News item based on a report from R. Whitaker in *News Today* 27th December 1988, reprinted in *Hamadryad* 13(2): 9.

Bain, J.R. and Humphrey, S.R. (1982). *A profile of the endangered species of Thailand.* Report No. 4, Office of Ecological Services, Florida State Museum.

Batchelor, D.M. (1958). Some notes on the snakes of Asahan, Malacca. *Malayan Nature Journal* 12(3): 103-111.

Bellairs, A. (1969). *The Life of Reptiles,* Vol. II. Weidenfeld and Nicolson, London.

Boulenger, G.A. (1912). *A vertebrate fauna of the Malay Peninsula from the Isthmus of Kra to Singapore, including the adjacent islands. Reptilia and Batrachia.* London.

Bourret, R. (1934a). Notes herpétologiques sur l'Indochine Française, III, Ophidiens d'Annam et du Moyen Laos. *Bulletin Général de l'Instruction Publique* 9, May 1934.

Bourret, R. (1934b). Notes herpétologiques sur l'Indochine Française, IV, Sur une collection d'Ophidiens de Cochinchine et du Cambodge. *Bulletin Général de l'Instruction Publique* 1, September 1934: 3-15.

Bourret, R. (1936). *Les Serpents de l'Indochine, II, Catalogue Systématique Descriptif.* Toulouse, Imp. H. Basuydu et Cie.

Bourret, R. (1939). Notes herpétologiques sur l'Indochine Française, XX, Liste des Reptiles et Batraciens actuellement connus en Indochine Française. *Bulletin Général de l'Instruction Publique* 4, December 1939: 49-60.

Brongersma, L.D. (1947). On the subspecies of *Python curtus* Schlegel occurring in Sumatra. *Proceedings of the Koninklijke Nederlandsche Akademie Van Wetenschappen* 50: 666-671.

Campden-Main, S.M. (1970). *A field guide to the snakes of South Vietnam.* Smithsonian Institution, Washington.

Cantor, T. (1847). *Catalogue of reptiles inhabiting the Malayan Peninsula and islands.* Baptist Mission Press, Calcutta (extracted from the *Journal of the Royal Asiatic Society*).

Clercq, P. de (1988). Note on breeding *Python molurus bivittatus. Litteratura Serpentium* 8(1): 50.

Daniel, J.C. (1984). *The book of Indian reptiles.* Bombay Natural History Society, Bombay, 141 pp.

Deuve, J. (1970). Serpents du Laos. *Mémoire O.R.S.T.O.M.* No. 39, Paris.

Dhungel, S.K. (1985). Ordeal with a Rock Python. *Tigerpaper* 10(3): 7-8.

Flower, S.S. (1896). Notes on a collection of Reptiles and Batrachians made in the Malay Peninsula in 1895-96; with a list of the species recorded from that region. *Proceedings of the Zoological Society of London* 1896: 855-914.

Flower, S.S. (1899). Notes on a second collection of reptiles made in the Malay Peninsula and Siam. With a list of the species recorded from those countries. *Proceedings of the Zoological Society of London* 1899: 600-697.

Frith, C.B. (1977). A survey of the snakes of Phuket Island and the adjacent mainland areas of Peninsular Thailand. *Natural History Bulletin of the Siam Society* 26: 263-316.

Fuchs, K. (1975). *Chemistry and technology of novelty leather*. FAO, Rome, 201 pp.

Ghalib, S.A., Rahman, H., Iffat, F. and Hasnain, S.A. (undated, post-1980?). A checklist of the reptiles of Pakistan. *Records of the Zoological Survey of Pakistan* 8(1-2): 37-59.

Greene, H.W. (1983). *Boa constrictor* species account, pp. 380-382 in Janzen, D.H. (Ed.) *Costa Rican Natural History*. The University of Chicago Press, Chicago.

Gusti Chairuddin, Gusti Rusmayadi, and Djasmani Hisbi (1990). *Trade in python and other reptile skins in South Kalimantan, Indonesia*. KPSL-UNLAM, Banjarbaru, Indonesia. Unpublished consultancy report. 4 pp.

Haas, C.P.J. de (1946). Some notes on the biology of snakes and on their distribution in two districts of West Java. *Treubia* 18(2): 327-375.

Haas, C.P.J. de (1950). Checklist of the snakes of the Indo-Australian Archipelago. *Treubia* 20(3): 511-625.

Hanitsch, R. (1900). *Check List of the Reptiles and Amphibians in the Raffles Museum, Singapore*. (Publisher uncertain, possibly Raffles Museum).

Harman, A.J.E. (1961). A collection of snakes from Singapore. *Malayan Nature Journal* 15: 181-183.

Hingley, K.J. (1987). Potential growth rates of pythons and boas. *Snake Keeper* 1(6): 4-5.

Karsen, S.J., Wai-neng Lau, M. and Bogadek, A. (1986). *Hong Kong Amphibians and Reptiles*. Urban Council of Hong Kong. 136 pp.

Khan, M.A.R. (1982). On the endangered snakes of Bangladesh. In: *Proceedings of the IUCN/SSC Snake Group First Meeting*, 8-12 November, 1982. Madras Crocodile Bank.

Kock, D. and Schröder, H. (1981). Die Gattung Python in Bangladesh. *Salamandra* 17(3/4): 112-118.

Kopstein, P.F. (1926). Reptilien van den Molukken und den Benachbarten Inseln. *Zoologische Mededeelingen* (Leiden) 9: 71-112.

Lederer, G. (1944). Nahrungserwerb, Entwicklung, Paarung und Brutfürsorge von *Python reticulatus* (Schneider). *Zoologische Jahrbücher (Anatomie)*, Jena 68: 363-398.

Leviton, A.E. (1963). Remarks on the zoogeography of Philippine terrestrial snakes. *Proceedings of the California Academy of Sciences 4th ser.*, 31(15): 369-416.

Lim, B.L. (1955). Snakes collected near Kuala Lumpur. *Malayan Nature Journal* 9(4): 122-125.

Lim, B.L. (1958). Colour patterns of some Malayan Snakes. *Malayan Nature Journal* 12: 116-118.

Lim, F.L.K. (1981). The Reticulated Python. *Nature malaysiana* 6(4): 14-17.

Luxmoore, R., Groombridge, B. and Broad, S. (Eds) (1988). *Significant Trade in Wildlife: a review of selected species in CITES Appendix II. Volume 2: Reptiles and Invertebrates.* IUCN, Gland and CITES, Geneva.

MacKinnon, J. (1979). A glimmer of hope for Sulawesi. *Oryx* 15: 55-59.

Mattison, C. (1988). *Keeping and breeding snakes.* Blandford Press, London.

Mehrtens, J.M. (1987). *Living snakes of the World.* Sterling Publishing Co., Inc. NY.

Minton, S.A. (1966). A contribution to the herpetology of West Pakistan. *Bulletin of the American Museum of Natural History* 134: 27-184.

Montgomery, G.G. and Rand, A.S. (1978). Movements, body temperature and hunting strategy of a *Boa constrictor*. *Copeia* 1978: 532-533.

Mora, J.M. and Robinson, D.C. (1984). Predation of sea turtle eggs (*Lepidochelys*) by the snake *Loxocemus bicolor* Cope. *Revista de Biologia Tropical* 32(1): 161-162.

Noble, G.K. (1935). The brooding habit of the Blood Python and of other snakes. *Copeia* 1935(1): 1-3.

Olney, P.J.S. (Ed.) (1984). Reptiles bred in captivity and multiple generation births, 1981. In: *International Zoo Yearbook,* 23.

Pope, C.H. (1962). *The Giant Snakes.* Routledge & Kegan Paul, London, 297 pp.

Reitinger, F.F. (1978). *Common Snakes of South East Asia and Hong Kong.* Heinemann Educational Books (Asia) Ltd., Hong Kong.

Ridley, H.N. (1899). The habits of Malay reptiles. *Journal of the Straits Branch of the Royal Asiatic Society,* 32: 185-210.

Romer, J.D. (1979). Second revised annotated checklist with keys to the snakes of Hong Kong. *Memoirs of the Hong Kong Natural History Society* No. 14: 1-23.

Rooij, N. de (1917). *The reptiles of the Indo-Australian Archipelago, II Ophidia.* E.J. Brill, Leiden. Reprinted 1970, A. Asher & Co. N.V., Vaals.

Saint Girons, H. (1972). Les serpents du Cambodge. *Mémoires Muséum National d'Histoire Naturelle, Paris, N.S., Ser. A (Zool.),* 74.

Salter, R.E. (1983). *Summary of currently available information on internationally threatened wildlife species in Burma.* F.O.: BUR/80/006. Field Document 7/83. FAO, Rangoon.

Sarker, Md, S.U. (1990). Ecological observations on the snakes of Sirajgonj (Pabna), Bangladesh. *Tigerpaper* 17(2): 28-32.

Sarker, S.U. and Sarker, N.J. (1983). Endangered wildlife of Bangladesh. *Tigerpaper* 10(2): 26-28.

Schmidt, K.P. (with abstracts from the field notes of C.H. Pope) (1927). The Reptiles of Hainan. *Bulletin of the American Museum of Natural History* 54 (3): 395-465.

Shaw, C.H. (1959). Longevity of snakes in the United States as of January 1, 1959. *Copeia* 1959: 336-337.

Shelford, R.W.C. (1916). *A naturalist in Borneo.* London, T. Fisher Unwin.

Silva, P.H.D. De (1980). Snake fauna of Sri Lanka with special reference to skull, dentition and venom of snakes. *Spolia Zeylanica* 34(I,II): 1-142.

Silvius, M.J., Simons, H.W. and Verheugt, W.J.M. (1984). Soils, Vegetation, Fauna and Nature Conservation of the Berbak Game Reserve, Sumatra, Indonesia. RIN Contributions to Research on Management of Natural Resources 1984-3. Research Institute for Nature Management, Arnhem, The Netherlands.

Singh, A.N. (1983). A study of diverse prey species of python (*Python molurus*) with special reference to its interaction with Jackal (*Canis aurius*) (sic). *Tigerpaper* 10(3): 31-32.

Slavens, F.L. (1985). *Inventory of live reptiles and amphibians in captivity, current January 1, 1985*. F.L. Slavens, Seattle, Washington, 341 pp.

Slip, D.J. and Shine, R. (1988a). Feeding habits of the Diamond Python *Morelia s. spilota*: ambush predation by a boid snake. *Journal of Herpetology* 22(3): 323-330.

Slip, D.J. and Shine, R. (1988b). Habitat use, movements and activity patterns of free-ranging Diamond Pythons, *Morelia spilota spilota* (Serpentes: Boidae): a radiotelemetric study. *Australian Wildlife Research* 15(5): 515-531.

Smith, L.A. (1985). A revision of the *Liasis childreni* species-group (Serpentes: Boidae). *Records of the Western Australian Museum* 12(3): 257-276.

Smith, M.A. (1914). The snakes of Bangkok. *Journal of the Natural History Society of Siam* 1: 5-187.

Smith, M.A. (1915). On reptiles and batrachians from the coast and islands of south-east Siam. *Journal of the Natural History Society of Siam* 1(4): 237-244.

Smith, M.A. (1930). The Reptilia and Amphibia of the Malay Peninsula. *Bulletin of the Raffles Museum, Singapore, Straits Settlements* No. 3.

Smith, M.A. (1937). Miscellaneous Notes Number 1. A Bangkok Python. *Journal of the Siam Society, Natural History Supplement* 11(1): 61-62.

Smith, M.A. (1943). *Reptilia and Amphibia, Vol. III, Serpentes*. In: The Fauna of British India. Taylor and Frances, Ltd., London. Reprinted 1973, Ralph Curtis Books, Florida, 583 pp.

Soderberg, P. (1965). The pythons of Thailand. *Conservation News S.E Asia* 5: 11-12.

Stafford, P.J. (1982). Further observations on the Blood Python in captivity including an effective method of inducing feeding. *The Herptile* 7(1): 21-22.

Stafford, P.J. (1986). *Pythons and Boas*. T.F.H. Publications, NJ.

Storr, G.M., Smith, L.A. and Johnstone, R.E. (1986). *Snakes of Western Australia*. Western Australian Museum.

Stimson, A. (1969). Boidae. *Das Tierreich*, Walter de Gruyter, Berlin 89: 1-49.

Stull, O.G. (1935). A checklist of the family Boidae. *Proceedings of the Boston Society of Natural History* 40: 387-408.

Stull, O.G. (1938). Three new subspecies of the family Boidae. *Occasional Papers of the Boston Society of Natural History* 8: 297-300.

Swan, L.W. and Leviton, A.E. (1962). The herpetology of Nepal: a history, check list, and zoogeographic analysis of the herpetofauna. *Proceedings of the California Academy of Sciences* 32(6): 103-147.

Sworder, G.H. (1922). A list of the snakes of Singapore Island. *Singapore Naturalist* 1(2): 55-73.

Taylor, E.H. (1950). The snakes of Ceylon. *University of Kansas Science Bulletin* 33(2): 519-603.

Taylor, E.H. (1965). Serpents of Thailand and adjacent waters. *University of Kansas Science Bulletin* 45(9): 609-1096.

Tikader, B.K. (1983). *Threatened Animals of India*. Zoological Survey of India, Calcutta, 307 pp.

Tirant, G. (1885). *Notes sur les reptiles et les batraciens de la Cochinchine et du Cambodge*. Saigon, Imprimerie du Gouvernement.

Todd, S. (1984). The Sri Lankan python (*Python molurus molurus*): spotlight on a crisis. *The Herptile* 9(3): 77-85.

Tweedie, M.W.F. (1983). *The Snakes of Malaya* (3rd edn.). Singapore National Printers (Pte) Ltd.

Underwood, G. and Stimson, A.F. (1990). A classification of pythons (Serpentes, Pythoninae). *Journal of Zoology, London* 221: 565-603.

Ussher, C. (1979). Brunei's largest snake. *The Brunei Museum Journal* 4(3): 180-181.

Wall, F. (1912). A popular treatise on the common Indian snakes. Number 17, *Python molurus*. *Journal of the Bombay Natural History Society* 21: 447-475.

Wall, F. (1926a). The Reticulate Python *Python reticulatus* (Schneider). *Journal of the Bombay Natural History Society* 31: 84-90.

Wall, F. (1926b). Snakes collected in Burma in 1925. *Journal of the Bombay Natural History Society* 31 (3): 558-566.

Wallis, B.E. (1980). *Marketing assistance programme for agricultural products from least developed countries. Market prospects for reptile leathers*. Report on a mission. International Trade Centre UNCTAD/GATT. ITC/DIP/12.

Watling, D. (1981). Lore Lindu National Park Management Plan 1981-1986. WWF Report to the Directorate of Nature Conservation, Bogor.

Whitaker, R. (1978). *Common snakes of India*. Macmillan and Co., Madras.

Whitaker, R. and Dattatri, S. (1986). The role of reptiles in controlling food pests. *Hamadryad* 11 (1,2): 23-34.

Whitaker, R. and Whitaker, Z. (1983). Herpetological conservation in India. Paper presented at Bombay Natural History Society Centenary Seminar. December 1983. (Proceedings in press).

Whitten, A.J., Mustafa, M. and Henderson, G.S. (1987). *The Ecology of Sulawesi*. Gadjah Mada Univesity Press.

Wood, G.L. (1982). *The Guinness Book of Animal Facts and Feats*. Guinness Superlatives, London, 252 pp.

Printed in France
91-02851—October 1991—500
ISBN 2-88323-003-X