

Species Diversity, Distribution and Proposed Status of Monitor Lizards (Family Varanidae) in Southern Thailand

KOMSORN LAUPRASERT¹* AND KUMTHORN THIRAKHUPT²

¹ Department of Biology, Faculty of Science, Maha Sarakham University, Kamriang, Kantarawichai, Maha Sarakham 44150, THAILAND

² Department of Biology, Faculty of Science, Chulalongkorn University, Bangkok 10330, THAILAND

ABSTRACT.—Field studies of species diversity and distribution of monitor lizards were carried out from January 1998 to February 2000. Four species were found in southern Thailand, comprising *Varanus salvator* (Laurenti, 1768), *V. rudicollis* (Gray, 1845), *V. bengalensis nebulosus* (Gray, 1831) and *V. dumerilii* (Schlegel, 1839). *V. flavescens* (Hardwicke and Gray, 1827) and the *Varanus salvator komaini* Nutphand, 1987 were not found during the field survey. *V. salvator* and *V. b. nebulosus* distributed throughout southern Thailand in undisturbed forests and agricultural areas while *V. rudicollis* and *V. dumerilii* were usually found in undisturbed forests. The former three species distributed in three main mountain ranges (MR); Phuket MR, Nakhon Si Thammarat MR and San Kara Kiri MR, whereas the latter was found only in Nakhon Si Thammarat MR and San Kara Kiri MR. All species are being threatened by human activities. In Southern Thailand based on the IUCN's criteria for the categories of threat, *V. salvator* and *V. b. nebulosus* should be classified under the vulnerable category while *V. rudicollis* and *V. dumerilii* should have endangered status. *Varanus salvator komaini* is critically endangered and its natural habitat is still unconfirmed.

KEY WORDS: monitor lizard; *Varanus*

INTRODUCTION

There are approximately 317 species of reptiles from 3 orders and 23 families in Thailand (Thirakhupt, 2000). Almost all of them are still little known, and even the most basic data are absent for most species. In addition human activities, especially hunting and habitat destruction threaten many species, including the Thai monitor lizards.

All monitor lizards belong to Family Varanidae, Genus *Varanus*. Currently, more than 46 species of monitor lizards are recognized and are found on three continents; Africa, Australia and Asia (Bennett, 1998). There are approximately 9 species in Asia. Five species (Taylor, 1963; Nutphand, 1987) and a new subspecies (Nutphand, 1987) of varanids have been reported to occur in Thailand. They are the clouded monitor *Varanus bengalensis nebulosus* (Gray, 1831), the water monitor *Varanus salvator* (Laurenti, 1768), the rough-necked monitor *Varanus rudicollis* (Gray, 1845) Dumeril's monitor *Varanus dumerilii* (Schlegel, 1839) and *Varanus flavescens* (Hardwicke and

* Corresponding author.
e-mail:komsorn@usa.net

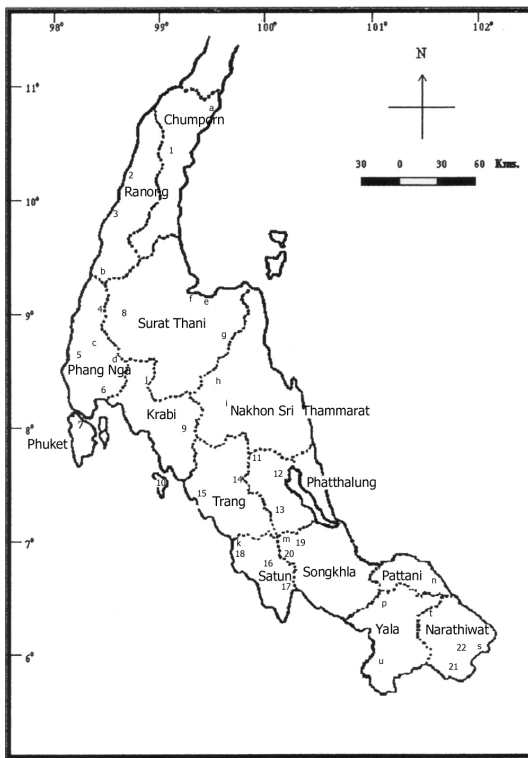


FIGURE 1. Map of study sites consists of protected areas and villages, Arabic numbers are for protected areas and letters are for villages

Gray, 1827). The new subspecies described by Nutphand (1987) is the black water monitor *Varanus salvator komaini*, which was reported to occur at Amphoe La-ngu, Satun Province and the area near the Thailand-Malaysia border. Previous data concerning monitor lizards were confused by several local names. In this study, the local name of each monitor lizard was obtained from interviews in all field studies.

Luxmoore and Groombridge (1990) reported that hunting of *Varanus* has occurred throughout Thailand, but is most intense in southern parts. Viable populations are likely to persist only in areas, which have received total protection. Therefore, conservation and management are important requirements for the protection of these animals from human disturbance.

The objectives of this study were to accumulate basic information on species diversity and distribution, and to determine the

status of the monitors of southern Thailand. This information would be very useful for the conservation and management of monitor lizards in natural habitats.

MATERIALS AND METHODS

During January 1998 to February 2000, Twenty-two protected areas and seventeen villages in the southern part of Thailand were used as study sites. Species diversity, distribution and status of monitor lizards were studied at each site, by sight, traps and interview.

In interviews, the relevant forest officers and villagers were contacted. The pictures of monitor lizards were shown to them and local names, characteristics and habitats were obtained through questioning. The data were specially selected from available persons who could correctly identify monitor lizards. Wildlife checklists recorded by National Parks, Wildlife Sanctuaries and other government agencies in the areas were also reviewed. The map of study sites is shown in Fig. 1 and the details of their habitats are shown in Table 1.

Trapping techniques

Two methods were used for capturing monitor lizards: 1) Using a cage. The cage is 30 x 30 x 120 cm., built from wire net which was about 0.5 mm. in diameter. We used fresh meat or dead fish as bait. 2) Using a noose. The noose consists of a long pole, with a loop of string at the tip, which can be tightened around the neck, trunk or leg of a monitor lizard.

Traps were set in eight study sites in six provinces for the capture of monitor lizards (i.e. Lumnam Kraburi National Park (NP) in Ranong, Khao Krung Sator and Amphoe Kanchanadit in Surat Thani, Thale Noi Non-hunting Area (NA) and Khao Pu Khao Ya NP in Phatthalung, Amphoe La-ngu in Satun, Amphoe Betong in Yala and Amphoe Rueso in Narathiwat Province). Places selected for trapping were lowland locations, near to watercourses (i.e. in mangrove forests and freshwater swamps), both in human settlements and in the wild.

TABLE 1. Study areas in southern Thailand.

Provinces	Protected Areas	Habitats	Agricultural areas	Habitats
Chumphon Ranong	(1)Prince Chumphon Park (South Section)	WS	Tropical rain forest	Shrimp farm, Mangrove forest
	(2)Lumnum Kraburi NP		Tropical rain forest, Mangrove forest	Farmland
	(3)Mu Ko Payam MNP		Mangrove forest	
Phang-nga	(4)Sri Phang Nga NP		Tropical rain forest	Rubber plantation within
	(5)Khao Lak-Lum Ru MNP		Tropical rain forest, Mangrove forest	tropical rain forest
	(6) Ao Phang-nga MNP		Mangrove forest	
Phuket	(7)Khao Pra Taew WC		Tropical rain forest	-
Surat Thani	(8)Khao Sok NP		Tropical rain forest	Rubber plantation
				Orchard plantation
Nakhon Si Thammarat				
Krabi	(9)Khao Pra-Bang Kram WS		-	Rubber plantation
	(10)Mu Ko Lunta MNP		Tropical rain forest	Rubber plantation
Phatthalung	(11)Khao Pu Khao Ya NP		Tropical rain forest	Rubber plantation
	(12)Thale Noi NA		Freshwater swamp	
	(13)Ban Tha Mot WPU		Tropical rain forest	
Trang	(14)Khaochong WC		Tropical rain forest	
	(15)Had Chao Mai MNP		Tropical rain forest, Mangrove forest	
Satun	(16)Nong Prag Praya NA		Freshwater swamp	Mangrove forest
	(17)Thaleban NP		Tropical rain forest, Mangrove forest,	
	(18)Mo Ko Phetra NP		Tropical rain forest, Mangrove forest	
Songkhla	(19)Ton Nga Chang WRS		Tropical rain forest	Coconut plantation
	(20)Hat Yai NWSC		Tropical rain forest	
Pattani	-		-	Coconut plantation
Yala	-		-	Rubber plantation
Narathiwat	(21)Hala-Bala WS		Tropical rain forest	Rubber plantation
				Orchard plantation
(22)Sirindhorn Peat Swamp Forest RNC		Peat swamp forest		Rubber plantation

Note: MNP = Marine National Park; NA = Non-hunting Area; NP = National Park; NWSC = Nature and Wildlife Study Center; RNC = Research and Nature Study Center; WC = Wildlife Conservation Development and Extension Center; WPU = Wildlife Protection Unit; WRS = Wildlife Research Station; WS = Wildlife Sanctuary. Arabic numbers are for protected areas and letters are for villages.

RESULTS AND DISCUSSION

Species diversity

Fifty-five individuals of four species of monitor lizards were found in field surveys. There were thirty-five individuals of *Varanus salvator*, thirteen individuals of *Varanus bengalensis nebulosus*, three individuals of *Varanus rudicollis* and four individuals of *Varanus dumerilii*. All species are shown in Fig. 2.

Several local names of monitor lizards in this study were noted for avoiding misidentification. Local names were in Table 2.

Distribution and Habitat

Varanus salvator and *V. bengalensis nebulosus* are the most common species and are widespread in natural, semi-natural and agricultural areas of southern Thailand, while *V. rudicollis* and *V. dumerilii* are relatively rare and were found mostly in or near to dense and moist forests (Table 3). The first three species were found to inhabit all the main mountain ranges in the south, whereas *V. dumerilii* was found only in Nakhon Si Thammarat and San Kara Kiri

TABLE 2. Local names of monitor lizards in southern Thailand

Species	Local names
<i>V. salvator</i>	Hiea (เหี้ย), Laan Dok-mai (แลนดอคไม้), Tua Nguen Tua Tong (ตัวเงินตัวทอง)
<i>V. b. nebulosus</i>	Ta-kuat (ตะกวัด), Laan (แลน), Kuat Prow (กวัดพร้าว)
<i>V. rudicollis</i>	Ngu-hao Chang (งูเห่าช้าง), Kor Lung (คอหลั่ง), Hao Dong (เห่าดง), Hao Chang (เห่าช้าง), Thao Ra-toei (เต่าว่าเคย หรือ เต่าระเคย)
<i>V. dumerilii</i>	Tut-too (ตุ๊ดตู่), Hao Chang Kao (เห่าช้างขาว)
<i>V. s. komaini</i>	Hiea Dam (เหี้ยดำ), Laan Kiam (แลนเคี่ยม), Mongkorn Dam (มังกรดำ)

Mountain ranges from Surat Thani to Narathiwat Provinces (Fig. 3). Although *V. salvator komaini* may occur in southern Thailand, it was not encountered in the field during this study. Its distribution and habitat are still unknown.

Varanus salvator was found in tropical rain forest, mangrove forest and freshwater swamp areas. In agricultural area, it was found in orchard plantations, farmland and shrimp farms. Most of them were seen near or in watercourses.

TABLE 3. The number of monitor lizards found in each habitat.

Habitat types	Species			
	<i>salvator</i>	<i>b. nebulosus</i>	<i>rudicollis</i>	<i>dumerilii</i>
Forested areas				
Tropical rain forest	2	7	1	1
Mangrove forest	14	-	-	-
Peat swamp forest	-	-	-	1
Freshwater swamp area	1	-	-	-
Agricultural areas				
Farmland	1	2	-	-
Orchard plantation	13	1	-	-
Rubber plantation	-	2	-	-
Coconut plantation	-	1	-	-
Shrimp farm	4	-	-	-
Coffee and rubber plantation within tropical rain forest area	-	-	2	2
Total	35	13	3	4

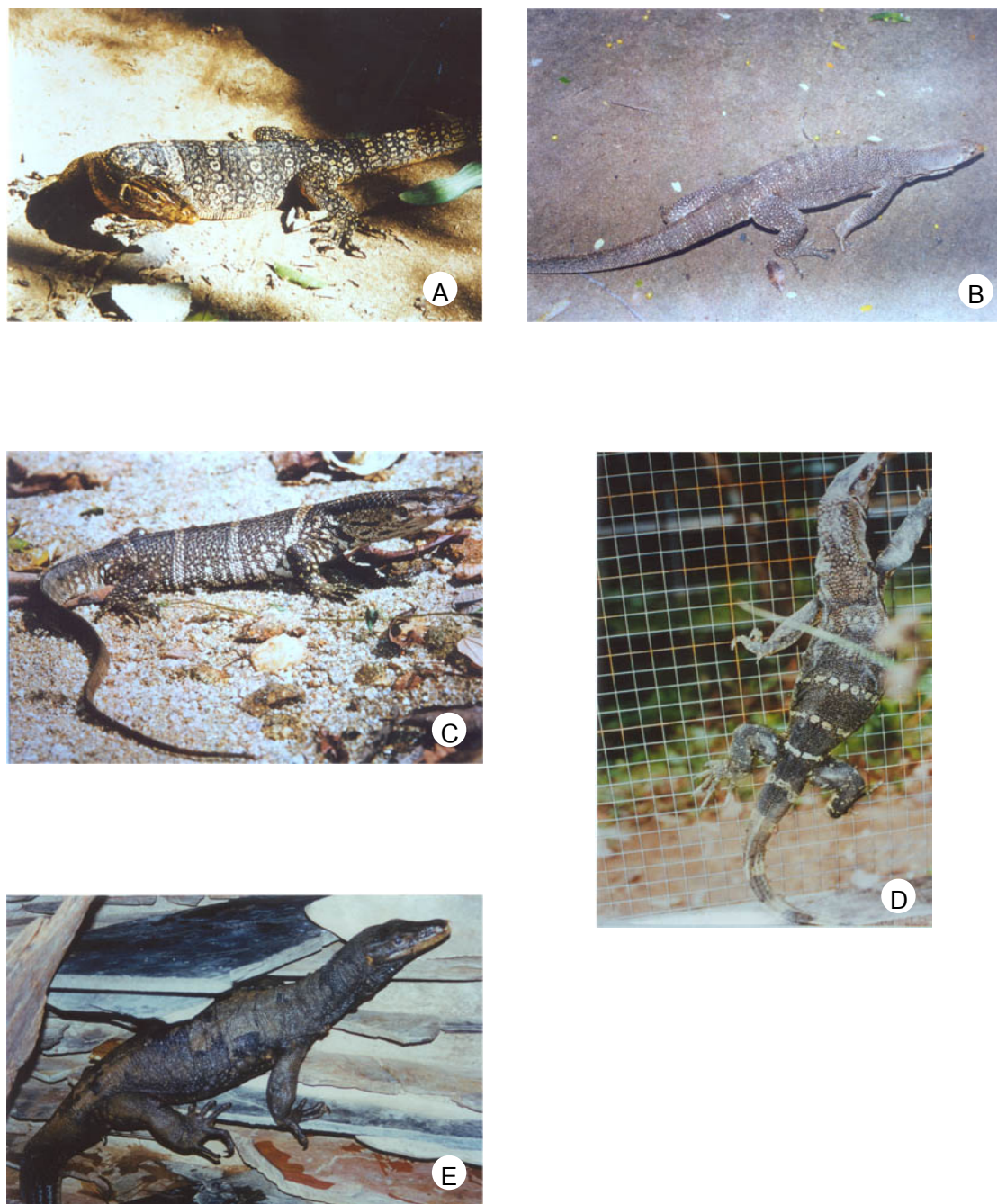


FIGURE 2. (A) *Varanus salvator* ; (B) *Varanus bengalensis nebulosus*; (C) *Varanus rudicollis*; (D) *Varanus dumerilii*; (E) *Varanus salvator komaini*.

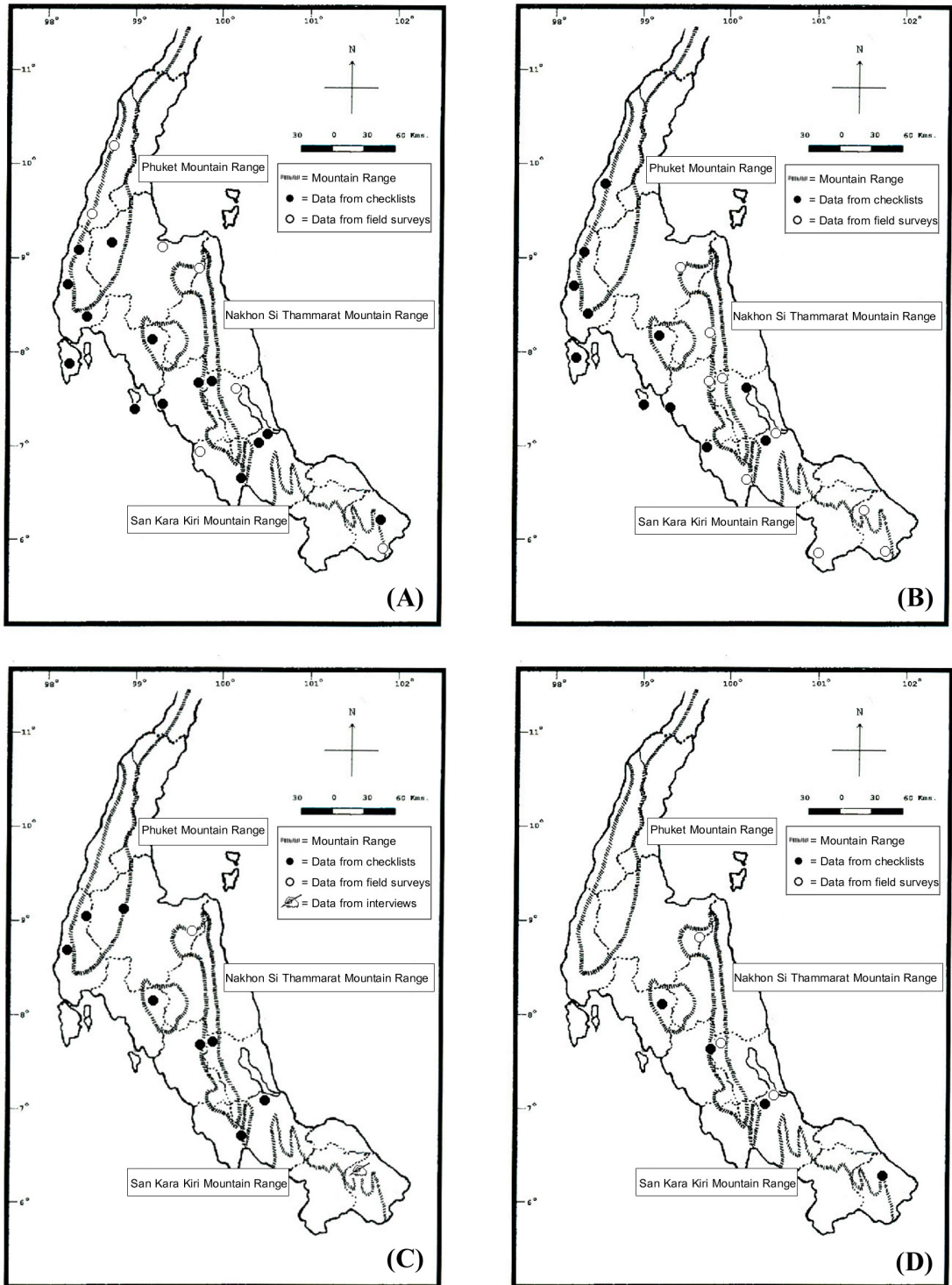


FIGURE 3. Distribution in southern Thailand. (A) *Varanus salvator*; (B) *Varanus bengalensis nebulosus*; (C) *Varanus rudicollis*; (D) *Varanus dumerilii*.

Varanus bengalensis nebulosus was found in tropical rain forest areas, rubber plantations, farmlands near villages, orchard plantation and coconut plantation. *V. b. nebulosus* spent most of the time basking on the trees and was often seen far away from watercourses.

Varanus rudicollis was found in dense evergreen forest at high elevation. In the dry season, it was sometimes found near the watercourses in coffee plantations which are surrounded by tropical rain forest at lower elevations.

Varanus dumerilii was also seen near watercourses. In this study, they were found in four habitat types; tropical rain forest, coffee and rubber plantation within tropical rain forest and peat-swamp forest.

The proposed status

All *Varanus* species in Thailand are protected under the Wild Animal Reservation and Protection Act (WARPA) of 1992. This study supports the current legal protection.

The relative abundance, based on this survey, of *Varanus salvator* and *V. b. nebulosus* in southern Thailand is common and uncommon, respectively. The other species, *V. rudicollis* and *V. dumerilii* should be classified as rare while *V. s. komaini* is very rare.

Based on the criteria of IUCN (1996), the Thai Red Data Book should classify *Varanus salvator* and *V. b. nebulosus* as vulnerable. *V. rudicollis* and *V. dumerilii* should be listed as

endangered. *V. s. komaini*, (if considered as a separate subspecies from *V. salvator*) should be classified as critically endangered, because the wild populations of this varanid are small and rarely found (Table 4).

CONCLUSION

In this study it was found that southern Thailand has at least four species of monitor lizards. *Varanus flavescens* and *V. salvator komaini* were not found in natural habitat. *V. flavescens* has not been found or reported to occur for more than twenty-five years. Three specimens of *V. s. komaini* from the Pata Zoo, Bangkok and from wildlife traders were studied, but their origin is not known.

Varanus salvator and *V. bengalensis nebulosus* both were habitat generalist species. They occurred in all mountain ranges of southern Thailand and were found in all habitat types. However, *V. salvator* preferred the river and riparian areas more than *V. b. nebulosus*. On the contrary, *V. rudicollis* and *V. dumerilii* were habitat specialist species. Dense evergreen forest and high humidity were very important environmental factors for them.

All species were threatened by human disturbances. For the proper conservation management, research into the natural history, ecology and other requirements for survival of these species is required.

TABLE 4. Status of monitor lizards in southern Thailand suggested by this study.

Criteria based on	<i>V. salvator</i>	<i>V. b. nebulosus</i>	<i>V. rudicollis</i>	<i>V. dumerilii</i>	<i>V. s. komaini</i>
WARPA (RFD, 1992)	Protected	Protected	Protected	Protected	Protected
This study	Protected	Protected	Protected	Protected	Protected
Luxmoore and Groombridge (1990): Relative abundance	Common	Uncommon	-	-	-
This study	Common	Uncommon	Rare	Rare	Very rare
Humphrey and Bain (1990)	-	Threatened (-)	Threatened (-)	Threatened (-)	-
This study	Threatened (V)	Threatened (V)	Threatened (E)	Threatened (E)	Threatened (CE)

Note: CE = Critically Endangered; E = Endangered; V = Vulnerable

ACKNOWLEDGMENTS

This research was supported by the TRF/BIOTEC Special Program for Biodiversity Research and Training grant BRT 541005. We thank Dr. Thomas Ziegler, Dr. Don Moll, Dr. Art-ong Pradatsundarasar, Mr. Jarujin Nabhitabhata, Mr. Jonathan Murray and Group Captain Wirot Nutphand for their invaluable suggestions. We also grateful to Dr. Bennett for his invaluable suggestion and useful book. We would like to offer special thanks to the Royal Forest Department for their cooperation and support, in particular to Mr. Nakin Kaeobonsong and Mr. Prateep Ekkachant from Thale Noi Non-hunting Area, and Lumnam Kraburi National Park, respectively.

LITERATURE CITED

- Bennett, D. 1998. Monitor Lizards: Natural History, Biology and Husbandry. Warlich Druck Press, Germany.
- Humphrey, S. R. and J. R. Bain. 1990. Endangered Animals of Thailand. Sandhill Crane Press, Florida.
- IUCN. 1996. 1996 IUCN Red List of Threatened Animals. IUCN, Gland, Switzerland.
- Luxmoore, R. and B. Groombridge. 1990. Asian Monitor Lizards. CITES, Lausanne.
- Nutphand, W. 1987. Monitors of Thailand. Journal of Thai Zoological Center 2(15): 1-16.
- Royal Forest Department. 1992. Ministerial Regulations under the Wild Animal Reservation and Protection Act (B. E. 2535) of Thailand. RFD, Bangkok.
- Taylor, E. 1963. The lizards of Thailand. Univ. Kansas Sci. Bull. 44(14): 914-928.
- Thirakhupt, K. 2000. Amphibians-Reptiles. In: Review of Biodiversity Research in Thailand, pp.149-171. BRT program, Bangkok.

Accepted: 1 August 2001