

Using BAD for good: how best available data facilitated a precautionary policy change to improve protection of the prey of the tiger *Panthera tigris* in Malaysia

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SUPPLEMENTARY INFORMATION 1

The detection rate of the i th species at the j th site is defined as:

$$D_{ij} = 100 * \frac{\sum photo}{\sum trapnight}$$

where one trap-night is defined as a 24-hour period in which a camera-trap is functioning at a trap location. Mean detection rates for the i th species across n sites

$$\bar{D}_i = \frac{\sum_{j=1}^n D_{ij}}{n}$$

were used to compare the relative ranking in abundance of the target species. All samplings at n sites were considered independent. No sites have been monitored repeatedly over the years to assess possible trends.

SUPPLEMENTARY TABLE S1 Results of the 23 camera-trapping studies conducted in Peninsular Malaysia (Fig. 1) between 1997 and 2008, used in this analysis to assess the status of the four large ungulate species. Data on the tapir and gaur are included for comparison.

Location	State	Protected status*	Sampling period (month/year)	Approx. Study area (km ²)	Total no. of trap nights	No. of photographs						Source
						Wild boar	Bearded Pig	Sambar deer	Barking deer	Tapir	Gaur	
1, Taman Negara Merapoh	Pahang	PA	4/1999–5/2000	200	4,336	132	0	20	138	317	5	Kawanishi & Sunquist, 2004
2, Taman Negara K Terengan	Pahang	PA	3/2000–1/2001	200	4,847	117	0	7	155	78	4	Kawanishi & Sunquist, 2004
3, Taman Negara K Koh	Kelantan	PA	10/2000–8/2001	200	4,871	256	0	293	262	137	0	Kawanishi & Sunquist, 2004
4, Krau	Pahang	PA	8/2000–8/2001	440	5,591	104	0	15	141	45	1	Laidlaw et al., 2000; DWNP/DANCED 2001
5, Jerangau 1	Terengganu	FR	2/2000–10/2001	170	5,972	774	0	0	172	280	0	Ahmad Zafir et al., 2006
6, Jerangau 2	Terengganu	FR	5/2003–9/2003	170	1,641	141	0	0	23	54	0	Ahmad Zafir et al., 2006
7, Gunung Basor	Kelantan	FR	10/2004–7/2005	125	2,664	311	0	0	174	81	0	Darmaraj, 2007
8, Gn Tebu	Kelantan	FR	6/1998–8/1998	40	807	131	0	0	10	30	0	Lynam et al., 2007
9, Ulu Temiang	Kelantan	FR	8/1998–9/1998	40	557	59	0	0	43	37	0	Lynam et al., 2007
10, Bintang Hijau	Perak	FR	2/1998–3/1998	40	646	34	0	0	77	25	0	Lynam et al., 2007
11, Temmengor (north)	Perak	FR	10/1997–2/1998	40	785	16	0	63	60	7	0	Lynam et al., 2007
12, Ayer Ngah	Kelantan	FR	6/1998–8/1998	40	562	129	0	0	7	12	0	Lynam et al., 2007
13, Lepar	Pahang	FR	9/1999–12/1999	40	1,172	11	0	0	51	43	0	Lynam et al., 2007
14, Cameron Highlands	Pahang	FR	2/1999–3/1999	40	495	6	0	0	19	0	0	Lynam et al., 2007
15, Taman Negara Ulu Sat	Pahang	PA	5/1999–8/1999	40	768	10	0	0	35	2	0	Lynam et al., 2007
16, Jengai	Terengganu	FR	6/1998–6/1998	40	467	64	0	0	24	8	0	Lynam et al., 2007
17, Lenggong	Johor	FR	12/1998–1/1999	20	517	9	4	0	35	2	0	DWNP, unpubl. data
18, Bubu Virgin Jungle Reserve (Bintang Hijau)	Perak	FR	12/2006	200	173	28	0	0	22	0	0	Shariff et al., 2010
19, Gunung Mandi Angin (Pasir Raja)	Terengganu	FR	6/2004–8/2004	ND	240	19	0	0	7	2	0	Ahmad Zafir & Sharma, 2006
20, Ulu Muda	Kedah	FR	10/2003–1/2004	16.9	470	16	0	2	4	1	0	Sharma & Ahmad Zafir 2005
21, Bukit Labohan, Ma' Daerah	Terengganu	FR	10/2003–12/2003	6.3	120	28	0	0	0	0	0	Sharma & Ahmad Zafir, 2007
22, Temengor (central)	Perak	FR	8/2007 – 4/2008	60	2,364	170	0	3	281	6	9	M.R. Darmaraj & W.M. Shariff, unpubl. data
23, Endau Rompin	Johor	PA	10/2007–3/2008	15	238	4	3	11	1	3	0	WCS & JNPC, unpubl. data

*PA, Protected Area recognized by the Department of Wildlife and National Parks; FR, Forest Reserve or Permanent Reserved Forest managed by the Department of Forestry

SUPPLEMENTARY INFORMATION 2 Recommendations (abbreviated) by NGOs submitted to the Department of Wildlife and National Parks for better legal protection of large ungulates.

1. Large mammals that reproduce slowly and are subject to heavy illegal extraction such as sambar deer should no longer be 'game species', especially when there is no biological evidence for sustainable use.
2. Continued hunting, whether legal or illegal, is not sustainable and sambar deer deserves the same level of legal protection as the tapir and gaur. Given the new IUCN Red List recognition of its Vulnerable status and its critical status uncovered in this study, the sambar deer should be upgraded to the totally protected status, with a total ban on hunting and trade. Since this may take some time, we strongly recommended an 8-year moratorium on the issuance of hunting licences be put in place so that the populations can recover. Females reach sexual maturity at 18–24 months and, after 8 months of gestation, give birth to one young. Since birthing interval is about 12 months (Leslie, 2010), the minimum moratorium period of 6 years will allow reproduction by the second generation.
3. Given the new international recognition of its Vulnerable status, its restricted distribution and that it may be endemic to Peninsular Malaysia (Kawanishi et al., 2006), the bearded pig should be upgraded to a status of totally protected.
4. The number of licences issued needs to be closely monitored. As the sambar deer population decreases, more hunting pressure on the barking deer is expected. Although the wild boar is a Least Concern species, the 'no-bag-limit' style of management that assumes an infinite supply needs to be remedied. A closer investigation of the number of animals harvested and traded legally, or illegally, will be useful for the management of this species and conservation of large predators as the wild boar is the most abundant prey species in Malaysia.