
PROYEK PENYELAMATAN HARIMAU SUMATERA

~ SUMATRAN TIGER PROJECT ~

TAMAN NASIONAL WAY KAMBAS, INDONESIA

*Department of Forest Protection & Nature Conservation (PHPA) ~ Indonesian Institute of Sciences (LIPI)
CBSG Indonesia Program at Taman Safari Indonesia (TSI)*



*Forest fires burnt a significant portion of Way Kambas, including part of the study site.
Note the infrared monitor at the base of the tree.*

PROGRESS REPORT (NO. 10), SECOND QUARTER, THIRD YEAR OCTOBER - DECEMBER 1997



SUMATRAN TIGER PROJECT: WAY KAMBAS NATIONAL PARK

PROGRESS REPORT (NO. 10)

Period from October – December 1997

Submitted to

Lembaga Ilmu Pengetahuan Indonesia (LIPI)

Kepala Biro Kerjasama Iptek

Directorate Jeneral Perlindungan Hutan dan Pelestarian Alam (PHPA)

Taman Safari Indonesia

Save the Tiger Fund, National Fish and Wildlife Foundation, USA

Zoological Society of London, UK

Federation of Zoos' *Tiger Week* Program, London Zoo, UK

Rhinoceros and Tiger Conservation Fund, U.S. Fish and Wildlife Service

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2. APPENDIX AND SUPPORTING DOCUMENTS

- A Summary Report on the Fires and Drought in Way Kambas National Park during the Dry Season of 1997 (*Kehidupan Satwaliar di Taman Nasional Way Kambas di Musim Kemarau 1997*) (in Bahasa Indonesia with English abstract)
- Drought and Fires Bring Death to Wildlife (*Kekeringan dan Kebakaran Hutan Membawa Maut Bagi Satwa Liar*) (newspaper article in *Suara Pembaruan*, 6 December 1997, with photographs, in Bahasa Indonesia with English translation)
- Program Penyediaan Sarana Minimum Bagi Satwa di Taman Nasional Way Kambas, Lampung, Okt-Nop 97 (in Bahasa Indonesia)
- Developments in the Technology of Remote Camera Monitoring for the Observation and Research of Wildlife (*Pengembangan Teknologi Kamera Remote Sistem Bagi Pemantauan dan Penelitian Satwaliar*, in Bahasa Indonesia with English abstract)
- Sumatran Rhino Breeding Well (*Badak Sumatra Berkembang Baik*) (newspaper article in *Suara Pembaruan*, 5 December 1997, with photograph) (in Bahasa Indonesia with English translation)

SUMATRAN TIGER PROJECT: EXECUTIVE SUMMARY

Ronald Tilson, Ph.D., Project Director

Note: This quarterly report is overdue by several months and I apologize for the delay. As one of the organizers of the Year of the Tiger Conference held in Dallas, Texas during 10-13 February 1998, I became overwhelmed with developing the conference agenda for 180 delegates from 13 tiger range countries. Immediately after the conference I was in Indonesia negotiating a new MoU for the field project with Indonesian officials and then traveled directly to Australia to support the Australian zoo association (ARAZPA) launch their Year of the Tiger fund-raising program to support in-situ tiger conservation in Indonesia. Upon returning to the USA I completed this report during the first three days back. I hope you can accept these diversions as an acceptable explanation.

The endangered status of the Sumatran tiger (*Panthera tigris sumatrae*) is based on an estimated population of 400-500 remaining in the wild (IUCN/SSC CBSG Sumatran Tiger PHVA Report, 1994; IUCN Cat Specialist Group Cat Action Plan, 1996). Another 240 Sumatran tigers live in zoos; 61 in the 11 Indonesian zoos that comprise the Indonesian Zoo Association (PKBSI). In recognition of the situation the Indonesian Government has attempted to prioritize the steps necessary for the species effective conservation, and these have been formalized in the Ministry of Forestry's (PHPA) *Indonesian Sumatran Tiger Conservation Strategy* published in 1994.

There are four general categories of recommendations that comprise the *Indonesian Sumatran Tiger Conservation Strategy* to ensure the long-term survival of Sumatran tigers throughout their remaining range. One category includes the initiation of field programs for ecological studies of the Sumatran tiger, the censusing of wild tiger populations over their entire range in Sumatra, and the establishment of criteria to resolve conflicts between tiger populations and surrounding human settlements. It is these aspects of the tiger's conservation that we propose to achieve within the framework of the Sumatran Tiger Project.

The Sumatran Tiger Project, located in Way Kambas National Park, is a collaborative research effort between the Indonesian Directorate Jeneral Perlindungan Hutan dan Pelestarian Alam (PHPA), the CBSG Indonesia Program at Taman Safari Indonesia (TSI), and the Minnesota Zoo. The Minnesota Zoo's Director of Conservation (R. Tilson) serves as project director. He also coordinates the CBSG Southeast Asia programs, the AZA Tiger Species Survival Plan (SSP) and is Director of the Tiger Information Center (www.5tigers.org). Research permits are provided by Lembaga Ilmu Pengetahuan Indonesia (LIPI). The field coordinator is Neil Franklin; field staff are Sriyanto, Bastoni, Muhamad Yunus, Sumianto and Apriawan. The project is administered through the Conservation Office of the Minnesota Zoo, USA.

Overview of Project Activities: October-December 1997

El Nino effects significantly altered the landscape of Sumatra and Way Kambas during this period. During a typical dry season of June – September, occasional rains keep the forest moist, but this year no rains fell at all during this period. The drought continued until the end of December. The forest became extraordinarily dry, many of the deciduous trees dropped their

leaves, all of the streams dried up, and the main river that flows through the park, the Way Kanan river, dropped so low that it became brackish with coastal water past the Way Kanan base camp (over 20 km upstream from the coast). During this period, fires raged throughout Sumatra. A significant portion of Way Kambas was also burnt. Most of these areas were the surrounding grasslands of *alang-alang*, but satellite images show that fires were also set in the interior of the park, probably by fishermen. These uncontrolled fires were a serious threat to the study area, to our base camp, to our staff and to all of the wildlife in the park. At the request of PHPA we pooled our resources and assisted in organizing fire fighting team comprised of park rangers, tiger staff, and youth volunteer organizations. Nearly three months were spent fighting fires until the rains finally fell. Very little field work was actually accomplished.

We are one of the only field teams in Sumatra that will have data on wildlife populations before, during and after a major fire event. We are currently analyzing the data and will submit a report about the effects of fire on local wildlife populations in the near future.

This second quarter report of the third year of the Sumatran Tiger Project contains information from the field study of tiger ecology (begun in June 1995), the community-based conservation program (begun in December 1995), and the Tiger Conservation Team (begun in September 1997). This report covers the period of 1 October to 31 December 1997. Previous quarterly reports about the project are listed below.

First Quarter Progress Report: Administrative Phase (No.1)

(1 June to 15 July 1995, submitted 15 September 1995)

Second Quarter Progress Report: Six-Month Summary (No. 2)

(1 July to 31 December 1995, submitted 31 January 1996)

Third Quarter Progress Report (No.3)

(1 January to 31 March 1996, submitted 10 May 1996)

Fourth Quarter Progress Report (No. 4)

(1 April to 30 June 1996, submitted 1 August 1996)

First Quarter, Second Year Progress Report (No. 5)

(1 July to 30 September 1996, submitted 5 October 1996)

Second Quarter, Second Year Progress Report (No. 6)

(1 August to 31 December 1996, submitted 10 March 1997)

Third Quarter, Second Year Progress Report (No. 7)

(1 January to 31 March 1997, submitted 10 August 1997)

Fourth Quarter, Second Year Progress Report (No. 8)

(1 April to 30 June 1997, submitted 20 September 1997)

First Quarter, Second Year Progress Report (No. 9)

(1 July to 30 September 1997, submitted 27 November 1997)

Field Support Activities

During this quarter my time was primarily spent overseeing field components of the Sumatran Tiger Project, in meetings with PHPA, LIPI and TSI to develop a new three-year plan (1998-2000) for an expanded tiger field program, and visiting Perth Zoo (Australia) in support of a joint Perth Zoo-TSI tiger conservation partnership. These components and other highlights for this quarter are listed below:

Field Ecology Program:

- Met (10/10/97) with Bapak Soehartono Soedargo (Head, Bureau of S&T Cooperation, LIPI, Jakarta) and his staff regarding preparations for the required annual presentation of results of the Sumatran Tiger Project, scheduled for 14 October. Met again (14/10/98) with Bapak Soehartono and Dr. Sugarjito regarding finalization of the agenda for the LIPI presentation.
- Met (15/10/97) with Bapak Johannes Subijanto (PHPA), Dr. Jito Sugarjito (LIPI), Tony Sumampau (TSI), Charles Joesriemerst, Dougal Muller (Fauna and Flora International), and Marco Romero (The Tiger Foundation) on the development of an MOU among Indonesian agencies (PHPA, LIPI and TSI) and the above foundations regarding establishment of a conservation partnership in support of the Sumatran Tiger Project. After the meeting, all of the above individuals met with the Director General of PHPA, Bapak Soemarsono, regarding this emerging relationship. Approval to finalize the agreement was given by the DG.
- Another meeting (17/10/97) involving the same individuals occurred in the office of Bapak Dwiatmo Siswomartono (Director of Fauna and Floral Conservation, PHPA). At this time, photographs of a possible problem tiger, photographed near Bukit Barisan Selatan National Park, and a wild dog in the same area were presented to Bapak Dwiatmo.
- Met (17/10/97) with staff from Price Waterhouse Accounting firm regarding the structuring of a Sumatran Tiger Foundation with Marco Romero and Charles Joesriemerst.
- Met (17/10/97) with Dr. Effendy Sumardja (Assistant to the Minister, State Ministry for the Environment) regarding his new position as a Council member on the *Save the Tiger Fund* Council.
- Met (19/11/97) with the organizing committee of the *Year of the Tiger Conference* in Washington, D.C. at the National Fish and Wildlife Foundation office. One of the issues discussed was the identification of appropriate representatives from Indonesia to be invited to this conference.
- Met (03/12/97) with Jansen Manansang (TSI) to discuss his proposal regarding "problem tigers" he was preparing for submission to the *Save the Tiger Fund*.
- Met (11/12/97) with Bapak Eko Wardayo (Kakanwil, Lampung) and Bapak Harjanto Wahyu Sukotjo (KSDA II, Lampung) in Bandar Lampung regarding sites to visit for rapid assessment of tiger populations.

- Met again (11/12/97) with Bapaks Dwiatmo (PHPA), Subijanto (PHPA), Sugarjito (LIPI), Dougal Muller (FFI), Tony Sumampau (TSI) and Neil Franklin (STP) at Taman Safari Indonesia regarding further development of the MOU and the draft Planning Report (1998-2000) of the Sumatran Tiger Project.
- Met (15/12/97) with Dr. Effendy Sumardja (Assistant to the Minister, State Ministry for the Environment) regarding his proposed presentation at the upcoming Year of the Tiger Conference scheduled for February 1998.
- Met (16/12/97) again with Bapak Dwiatmo in Manggala Wanabakti regarding further development of the Sumatran Tiger Planning Report and the Director General's proposed presentation at the upcoming Year of the Tiger Conference.

Sumatran Tiger Masterplan:

- Submitted a draft of the *PKBSI Sumatran Tiger Masterplan* to Jansen Manansang, Taman Safari Indonesia, for distribution to PKBSI members and comments from them for final revisions. This masterplan was supported by funds from the *Save the Tiger Fund*.

Tiger Conservation Team:

- Met (03/12/97) with Dwiatmo Siswomartono, Director of Flora, Fauna, and Nature Conservation of PHPA and Johannes Subijanto, Sub-directorate of Species Conservation (PHPA) regarding the development of the Tiger Conservation Team (see *Sumatran Tiger Project Report No. 6*). A permit was issued for the Tiger Conservation Team to census tiger populations outside of Way Kambas in protected areas within Lampung Province.
- Further meetings with Sumatran Tiger Project staff were held at Way Kambas in order to develop a comprehensive list of draft data sheets that will be experimentally used and refined for use by the TCT. This will not only simplify the process it will lead to a more error-free data base, allow comparison between sites, and will allow other researchers to collect similar data at their sites (see Tiger Field Ecology section).

Staff and UNILA students

- One new staff was recruited: Apriawan, PHPA park ranger, stationed at Way Kanan resort in Way Kambas National Park became a new member of the project. The UNILA student, Ma'turidi, completed his field project as part of his Skripsi Jurusan Biologi requirement at the University of Lampung (UNILA). He returned to UNILA to complete the writing of his field study as an intern to the Sumatran Tiger Project.
- Elly Rustiati, graduate student from Exeter University, U.K. and a faculty member at UNILA, joined the project as a research student, investigating the behavior of macaques in the presence of tigers as part of her thesis requirements.

Presentations

- Presented (06/10/97) an overview of the Sumatran Tiger Project to the Perth Zoo Zoological Society and Board of Directors as part of the celebrations commemorating a new conservation partnership being developed between Perth Zoo and Taman Safari Indonesia.
- OInterviewed (06/10/97) by Earth 2000, a special feature of *The West Australian*, a local newspaper in Perth, and ABC Radio 720, about tigers in general and specifically about the Sumatran Tiger Project
- Project staff presented (14/10/97) results of the field ecology program to LIPI staff at the main LIPI auditorium in Jakarta. This presentation satisfied LIPI's requirement for the field project to present an annual overview of their project (see Appendix).
- Project staff presented a seminar at the annual conference of the Biological Association of the Conservation of Natural Resources hosted by the University of Lampung.

Acknowledgements

The Sumatran Tiger Project, now based in Way Kambas National Park, is a collaborative research and conservation management program for tigers with the Directorate Jeneral Perlindungan Hutan dan Pelestarian Alam (PHPA), Taman Safari Indonesia (TSI), the Lembaga Ilmu Pengatahuan Indonesia (LIPI), and the Universitas Lampung (UNILA). The project is under the guidance of the IUCN- World Conservation Union's Conservation Breeding Specialist Group and the American Zoo and Aquarium Association's (AZA) Tiger Species Survival Plan (SSP). We are continually grateful to our Indonesian sponsors Ir. Dwiatmo Siswomartono (Director of Nature, Fauna and Flora Conservation, PHPA), Drs. Jansen Manansang (managing Director of Taman Safari Indonesia, TSI), and Bapak Suherti Reddy GT (Chief of Way Kambas National Park) for their assistance in every aspect of the project.

The Sumatran Tiger Project is funded primarily by the *Save the Tiger Fund*, a special project of the National Fish and Wildlife Foundation in partnership with Exxon Corporation, administrated through the Minnesota Zoo Foundation. The community-based conservation component of the project receives additional support from the *Rhinoceros and Tiger Conservation Fund* of the U.S. Fish and Wildlife Service. One of our conservation partners, the Zoological Society of London and the London Zoo, support operation of the mobile Tiger Conservation Team.

We are grateful to our many generous and considerate supporters, which includes David Phemister (National Fish and Wildlife Foundation), Dr. John Seidensticker (Chairman of the *Save the Tiger Fund*), Fred Bagley (U.S. Fish and Wildlife Service), Denice Fennell (Esso UK), Sharon Ament (London Zoo), Alexandra Dixon (Zoological Society of London), Sarah Christie (London Zoo and the Federation of Zoos *Tiger Week Fund*), Bung Hutabarat (Esso Indonesia), Drs. Jansen Manansang (CBSG Indonesia Program at Taman Safari Indonesia), David Jones (British Airways, Jakarta), and Kathryn Roberts (Minnesota Zoo Foundation).

We deeply appreciate the support of these organizations and everyone's enthusiasm for the project and for tiger conservation in Sumatra.

In Indonesia the work of the Sumatran Tiger Project is facilitated by the support of the PHPA chiefs and staff of Bali Konservasi Sumber Daya Alam II (BKSDA II) and Taman Nasional Way Kambas offices. The project is particularly grateful to Bp. Suherti Reddy GT for his coordination and assistance in Way Kambas and to Bp. Harjanto Wahyu Sukotjo and BKSDA II in Lampung. In the field we are continually assisted by many PHPA support staff, who are both actively involved in field work and enthusiastic about being trained in field methods and helping to train others in the same methods. For coordination of activities at the Way Kanan base-camp we are particularly grateful to Bp. Mukhlisin. Other PHPA staff that make extensive contributions to the field project include Darmiawan, Raden Mansyur Syah, Joko Trimahayomi, Sudrajat, Supriyono, Suprpto, Sukarman, Arifin Rifa'i, Surani, Sriartono, Deden Hemanto, Sudarmaji, Encang Sutarna, Sukatmoko, Bustami, Sutikno, Suyadi, Sucipto, Liyanto Bahri, Poniran Yulianto and Sudarto. We thank them all.

The University of Lampung has been the primary source of student counterparts during the first two years. We have benefited immensely by the considerable contributions of many bright, young and enthusiastic degree students from the Faculty Pertanian (Jurusan Sosial Ekonomi Pertanian), Faculty MIPA (Jurusan Biologi) and Faculty Sosial dan Ilmu Politik (Jurusan Sosiologi). The coordination of these activities is performed by Prof. Muharjir Utomo, Head of the Research Institute at the University of Lampung. We are also fortunate to have the support of Dr. Sugeng Harianto from the faculty of Pertanian. University student counterparts who are both friends and valued colleagues include Agus Subagyo, Ma'turidi, Wahyudi, Rachmat, Asri, M. Taufiq, Susilo Wiranto and Tri Rudianti.

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TIGER FIELD PROGRAM

Progress Report: October to December 1997

Bastoni, Sriyanto, Muhamed Yunus, Apriawan – Field Staff
Neil Franklin – Field Coordinator

Funded by the Save the Tiger Fund through the National Fish and Wildlife Foundation, with support from the Federation of Zoos' Tiger Week Program

The Tiger Field Program of the Sumatran Tiger Project is based upon recommendations set forth in the *Indonesian Sumatran Tiger Conservation Strategy* published in 1994 by the Indonesian Directorate General of Forest Protection and Nature Conservation (PHPA), Ministry of Forestry. This strategy outlines the steps necessary to develop and sustain a conservation program that will ensure the long-term viability of wild Sumatran tigers. The field ecology program addresses the need for information relating to the conservation needs of wild Sumatran tigers and is one of several programs that comprise the *in situ* component of the Sumatran Tiger Project.

Since September 1995 the Sumatran Tiger Project concentrated its efforts on the ecology and conservation needs of the Sumatran tiger in the lowland forests of Way Kambas National Park. This is the first stage of the research and management program for this endangered subspecies. This report represents a preliminary summary of activities and results for the Sumatran Tiger Project during the last quarter (October-December 1997).

Administration and Liaison

Administration and liaison represented a strong feature of this quarter because of the efforts underway to develop an operational plan for the Sumatran Tiger Project for the period 1998 to 2000. Coordination has been necessary with all the project's Indonesian collaborators, in particular with LIPI, PHPA and Taman Safari Indonesia. The administration activities that were carried out during this period are described below:

- PHPA Manggala Wanabakti – Regular reports on project activities in TNWK. Also discussions held as to the development of an MOU and planning document for the next three years.
- LIPI Bogor – Puslitbang Biologi – Discussions relating to the development of an MOU for the continued operation of the Sumatran Tiger Project and expansion of current activities.
- Way Kambas National Park (Head)- Field staff held regular meetings with the head of Way Kambas National Park in order to more closely coordinate field activities and report activities and progress. Coordination with park staff with activities related to forest fires and drought.
- Way Kambas National Park (Forest protection section) - Field staff coordinated closely with the forest protection sections of Way Kambas in order to improve protection coverage of the park, and to facilitate communications between patrolling teams. Combined attempts were

also made in the locating of stolen camera systems and the combating of forest fires and drought in the park.

- PHPA Manggala Wanabakti - Wildlife photographs from remote cameras and detailed supporting information were provided to the PHPA for the production of the Department of Forestry's guidebook to National Parks in Indonesia.
- PHPA Manggala Wanabakti (Conservation of Flora and Fauna) – report on progress to date and activities in Way Kambas made to Bapak Johannes Subijanto and Bapak Dwiatmo Siswomartono.
- LIPI Bogor – report on progress and discussions regarding development of the Tiger Conservation Team.
- Taman Safari Indonesia - discussions held and reports on progress and activities made. Discussions relating to the development of an MOU for the continued operation of the Sumatran Tiger Project over the next three years.
- BKSDA II – Discussions held in order to develop a working cooperative relationship for the Tiger Conservation Team surveys and other activities in protected forest areas of Lampung.
- LIPI Jakarta – discussions regarding publication of Sumatran Tiger Project presentation of 14th October, as a formal document.
- Kanwil Kehutanan Lampung – Reporting on project progress and introduction to the new Chief of Regional Forestry Office, Bapak Adjat Sudrajat.
- Fauna and Flora International Elephant Project – Discussions held to facilitate cooperation of field teams and sharing of information (STP Staff).
- University of Lampung (UNILA) – Presentation to the Biological Association of the Conservation of Natural Resources (Sumatra-wide) annual conference (two presentations and practical field demonstration).
- GEF Rhino Protection Unit – Discussions and coordination meetings held in order to facilitate the communication between groups and to facilitate protection of study site (STP Staff).
- University of Lampung (UNILA)– Sumatran Tiger Project presentation at National Biology Seminar (see Appendix).
- Further discussions with PHPA from Meru Betiri National Park about possible surveys for Javan tiger in East Java.

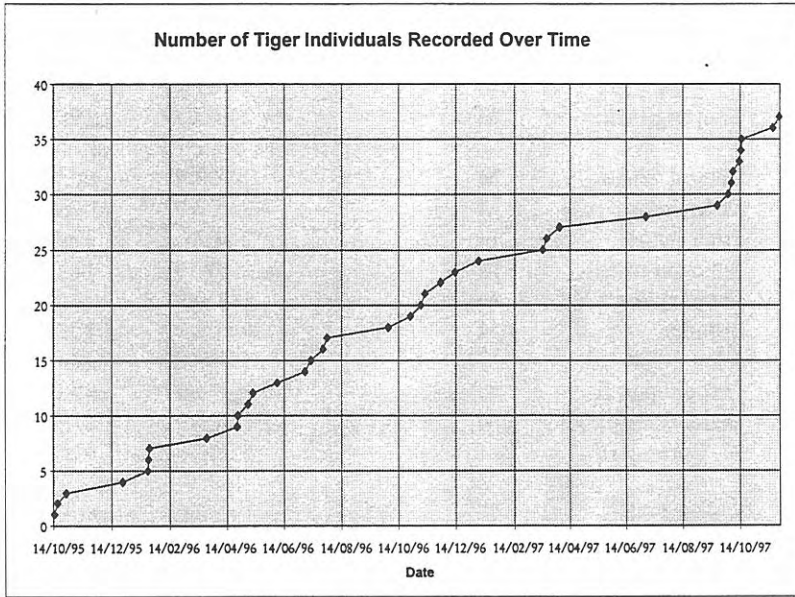
Sumatran Tiger Project Staff

Bapak Ma'turidi, an undergraduate student from University of Lampung, continued the research component of his degree under the project during this quarter. This study examines in more detail the ecology and avoidance behaviors of the two macaque species present in Way Kambas. The field work was completed in this quarter allowing time for writing-up of thesis as part of university graduation requirements.

Tiger Intensive Monitoring Area

Remote Camera Monitoring of Tigers

Remote camera monitoring of the intensive study site has continued, though the scale of the monitoring operation was, out of necessity, was downgraded during the period of intense forest



fires and drought (see Appendix). Field teams were hampered not only by the widespread burning, but were also limited by the lack of water in the field. Checking of cameras, usually requiring four days in the field, was carried out in two-day shifts, thus reducing the amount of water that needed to be carried by personnel. The number of cameras was also reduced, primarily to prevent the cameras from being damaged by fire. Operations were also carried out

to clear the area surrounding camera locations from brush and dry grass – thus creating fire-breaks. In many cases this was successful, though two camera units were unavoidably lost to the extreme heat generated.

It is the intention, over the first quarter of 1998, to obtain comparative data that will examine the effects of fire and drought on wildlife within the study site. Tiger dynamics and shifting home ranges will be investigated by comparing the tigers present in the study site before, during and after the dry season. As of the end of December 1997 the rains had still not started, and so it is assumed that at least another three months of field work will be required before the results are available. A preliminary inventory of tiger individuals identified from within the study site is included in the graph above. It suggests that the relatively constant rate of identification of new tiger individuals over the last two years has experienced a reduction during the early dry season. Tiger photographs were infrequent, though it is likely that this is primarily a result of the lower number of cameras and the reduced intensity of monitoring. Results of camera monitoring from the months towards the end of the fires (October) show a rapid increase in the number of new tigers entering the study site. This brings the total number of tigers identified by remote camera within the Way Kambas study site to 37 individuals. It is hoped that results from the months after the dry season will shown the changes in resident tiger territories where this has occurred, as well as highlighting individuals that have been lost from the study site. The table below shows tiger activity in the study site during this quarter.

Name	ID	No. photo	Location	Sex	New	Date	Jam
Rita	RT	249	Macan Lompat	F	Y	05/07/97	14:38
Rita	RT	250	Macan Lompat	F		05/07/97	14:39
Gembong	GR	251	Srijoden	M		05/07/97	12:58
Lewis	LW	252	Purbolinggo II	M		18/07/97	17:15
Bule	BL	253	Macan Lompat	M		19/07/97	01:49
Rita	RT	254	Macan Lompat	F		19/07/97	18:39
Rita	RT	255	Macan Lompat	F		21/07/97	11:52
Gembong	GR	257	Simpang mata	M		23/07/97	18:09
Dejay	DJ	258	Simpang mata	M		23/07/97	19:24
Dejay	DJ	259	Simpang mata	M		23/07/97	19:06
Dejay	DJ	256	Central Wako	M		24/07/97	09:57
Gembong	GR	264	Jalan Putus	M		24/07/97	06:45
Dejay	DJ	265	Jalan Putus	M		24/07/97	17:54
Dejay	DJ	260	Simpang mata	M		29/07/97	11:02
Dejay	DJ	261	Simpang mata	M		04/08/97	12:26
Dejay	DJ	263	Srijoden	M		04/08/97	12:26
Dejay	DJ	266	Jalan Putus	M		19/08/97	17:06
Dejay	DJ	262	Purbolinggo II	M		23/08/97	07:06
Gembong	GR	267	Wako Benteng	M		01/09/97	21:36
Gembong	GR	268	W. Gorong III	M		02/09/97	02:17
Lingga	LG	269	Kolam I – KB	F	Y	19/09/97	06:17
Gembong	GR	271	Simpang mata	M		24/09/97	02:18
Upik	UP	270	W. Gorong IV	F		28/09/97	04:40
Sarah	SH	272	Macan Lompat	F	Y	01/10/97	03:39
Shinta	SN	273	Purbolinggo I	F	Y	04/10/97	05:29
Lingga	LG	274	Kolam II - KB	F		04/10/97	06:23
Yoni	YN	275	Macan Lompat	M	Y	06/10/97	18:31
Gembong	GR	276	Simpang mata	M		12/10/97	00:01
Butet	BT	277	Purbolinggo II	F	Y	12/10/97	02:23
Butet	BT	278	Purbolinggo II	F		13/10/97	03:16
Buyung	BY	279	Kolam II - KB	F	Y	14/10/97	06:33
Buyung	BY	280	Kolam II - KB	F		14/10/97	06:34
Buyung	BY	281	Kolam I - KB	F		14/10/97	07:02
Tomboi	TB	282	Kolam II - KB	F	Y	15/10/97	00:00
Lewis	LW	283	Purbolinggo II	M		17/10/97	02:21
Gembong	GR	284	Jalan Putus	M		03/11/97	00:26
Lewis	LW	285	Purbolinggo II	M		05/11/97	19:33
Shinta	SN	286	Purbolinggo I	F		17/11/97	05:48
Rama	RM	287	Jalan Putus	M	Y	17/11/97	15:26
Upik	UP	288	Jalan Putus	F		17/11/97	15:27
Allisa	AL	289	Purbolinggo I	F	Y	24/11/97	17:17
Allisa	AL	290	Purbolinggo I	F		30/11/97	04:31
Allisa	AL	291	Srijoden	F		30/11/97	04:59
Upik	UP	292	Kolam I - KB	F		02/12/97	00:00
Gembong	GR	293	Srijoden	M		05/12/97	22:05
Gembong	GR	294	Srijoden	M		06/12/97	05:18
Upik	UP	295	Kolam II - KB	F		06/12/97	07:06
Sarah	SH	296	Macan Lompat	F		10/12/97	07:08
Butet	BT	297	Macan Lompat	F		14/12/97	04:58
Srikandi Putri	SP	298	Macan Lompat	F		20/12/97	19:53
Allisa	AL	299	Purbolinggo I	F		23/12/97	02:54

Other Research and Management Activities

As outlined above, much of this quarter has been spent combating the threats from fires and the prolonged drought. To this end much of the team's time was spent involved in coordinating activities with the goal of limiting the spread of fire, as well as improving accessibility of wildlife to fresh water. Several activities were conducted, in coordination with park management staff, utilizing personnel from six local organizations. These activities are described in a separate report in this document.. In summary these activities included:

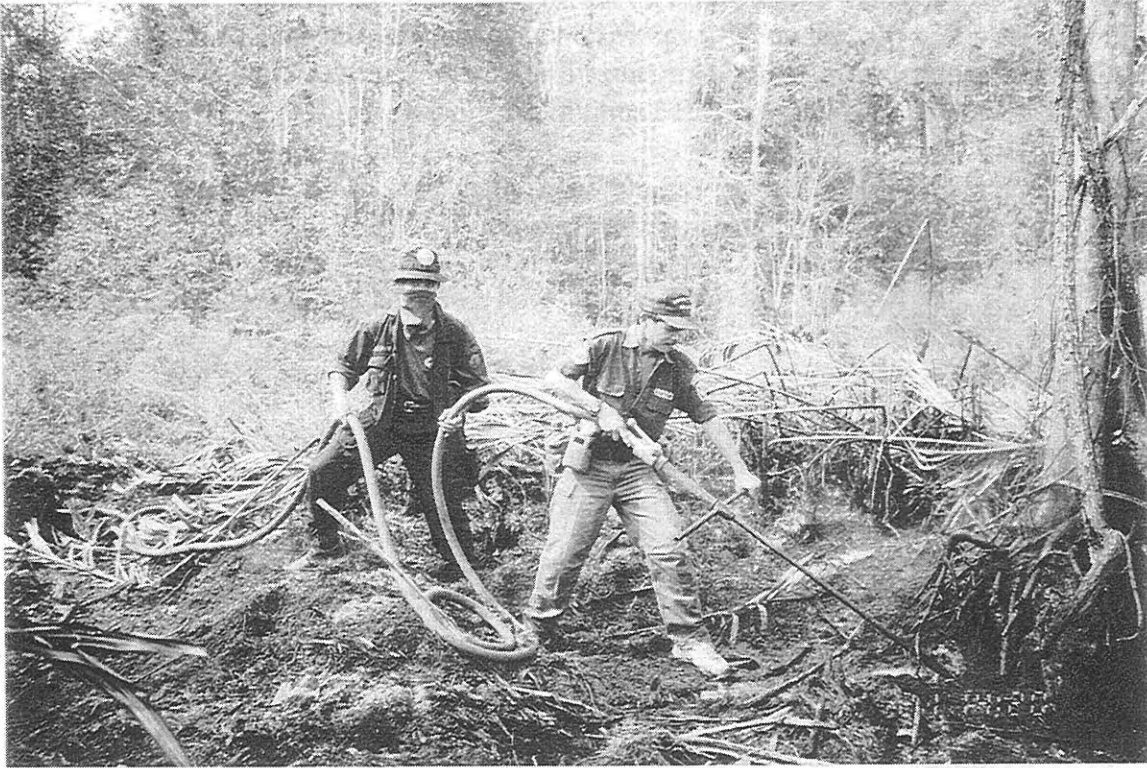
1. Deepening and cleaning of several remote water holes, providing catchment areas for ground water and improving water supply in several regions.



2. Providing more than 350 water troughs across a large expanse of the priority wildlife zone in Way Kambas National Park. More than 90 staff were used in this operation, and the troughs were maintained by a staff of 10 – requiring filling every three days.



3. General fire fighting and reporting of fire progress to the head of Way Kambas National Park. Several emergencies required the intense activity of all staff both night and day in the fight against these fires.



Staff have also been focusing on assessing the extent and damage of vegetation for the wildlife. GIS maps are being developed that show the intensity of burning and the extent of the fire's coverage. These maps will be compared to a satellite image of the same region during the next quarter. It is clear that fires and droughts have enormous implications for the management and conservation of the Sumatran tiger, as well as the other wildlife species sharing the tigers' range.

Tiger Prey Species

Staff have continued with this aspect of the intensive tiger ecology research program during this quarter, despite the difficulties presented by fires and drought. Preliminary results are now being written up for publication, and a summary is presented here.

Many cats are opportunistic in their prey preferences. In tropical forests cats seem to take what they can find up to their maximum prey size. Tiger prey on various species, on whatever animals it can catch, including birds, reptiles, amphibians, fish, and even some invertebrates, but mammals, in particular ungulate ones, make up the bulk of its diet. Based on scat analysis on 120 scats collected, it is found that Sumatran tiger mostly prey on five different species with four species comprises most common of the prey. The primary prey of tigers is wild pig, accounting for one third of their diet. The second most important prey species is sambar deer, followed by

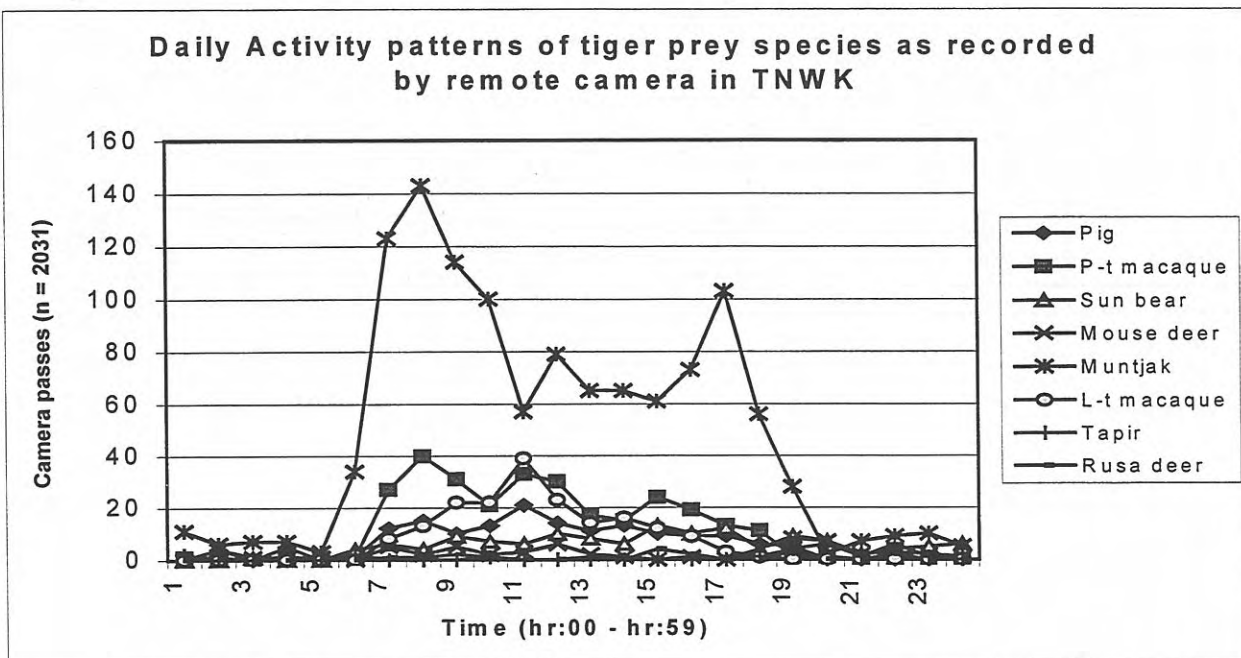
barking deer and macaques. Sun bear and other species also show up in the diet infrequently. So far, neither Sumatran rhino nor tapir have been discovered as a tiger prey item.

During this quarter the team has been focusing on establishing daily activity patterns for all potential tiger prey species in Way Kambas National Park. The remote camera systems record the time and date of all passing wildlife, and this data can be downloaded to a computer for storage. The graph below represents the daily activity patterns of eight potential tiger prey species over the period 00:00 hrs to 23:59 hrs. This data is accumulated over two years of intensive camera monitoring work.

The graph suggests these prey species are more often captured by the cameras during daylight hours. This indicates that the prey species, in general, are either more active during the day, or are more commonly found along the main trails during this part of the day. It will be important to investigate these prey species on an individual basis over the coming months, in order to better understand the ecology and behaviors – and their relationship to and importance for the management and conservation of the Sumatran tiger.

Remote Camera Monitoring of Other Wildlife

The inventory of other wildlife utilizing the tiger study site has been continued during this quarter and revised accordingly. These results are being developed and incorporated into both a local guidebook and scientific publication. The table below shows this revised inventory for Way Kambas National Park, with evidence from both remote camera monitoring, secondary signs and direct observation.



No	Order	Family	Latin Name	Indonesian Name	English namea Inggris	Keterangan
1	Artiodactyla	Cervidae	<i>Cervus unicolor</i>	Sambar	Sambar deer	Ph, F, J, V, S
2		Suidae	<i>Sus scrofa</i>	Babi hutan	Wild pig	Ph, F, J, V, S
3		Tragulidae	<i>Muntiacus muntjak</i>	Kijang	Barking deer	Ph, F, J, V, S
4			<i>Tragulus javanicus</i>	Kancil	Lesser mouse deer	Ph, F, V
5			<i>Tragulus napu</i>	Napu	Greater mouse deer	Ph, V
6	Carnivora	Canidae	<i>Cuon alpinus</i>	Anjing hutan	Asian wild dog	I
7		Felidae	<i>Catopuma temincki</i>	Kucing mas	Golden cat	Ph, V
8			<i>Neofelis nebulosa</i>	Macan dahan	Clouded leopard	Ph
9			<i>Panthera tigris sumatrae</i>	Harimau	Sumatran tiger	Ph, F, J, V, S
10			<i>Pardofelis marmorata</i>	Kucing bulu	Marbled cat	Ph
11			<i>Prionailurus bengalensis</i>	Kucing hutan	Leopard cat	Ph
12			<i>Prionailurus planicep</i>	Kucing pesek	Flat headed cat	Ph
13			<i>Prionailurus viverrinus</i>	Kucing air	Fishing cat	Ph
14		Mustelidae	<i>Aonyx cineria</i>	Berang-berang	Small clawed otter	Ph, F, V, S
15			<i>Mydaus javanensis</i>	Teledu/Senggung	Malayan badger	I
16		Ursidae	<i>Helarctos malayanus</i>	Beruang	Sun bear	Ph, F, V, S
17		Viveridae	<i>Artictis binturong</i>	Binturong	Binturong	Ph, V
18			<i>Cynogale bennetti</i>	Musang air	Otter civet	Ph
19			<i>Hemigalus derbyanus</i>	Musang belang	Banded palm civet	Ph, V
20			<i>Herpentes javanicus</i>	Garangan jawa	Javan mongoose	Ph, V
21			<i>Mustella flavigula</i>	Martin	Yellow throated martin	Ph, V
22			<i>Paguma larvata</i>	Musang merah	Masked palm civet	Ph
23			<i>Paradoxurus hermaphroditus</i>	Luak biasa	Common palm civet	Ph, V
24			<i>Viverricula malaccensis</i>	Musang biasa	Small Indian civet	Ph, V
25	Chiroptera	Pteropodidae	<i>Cynopterus spp.</i>	Kelelawar	Bats	V
26			<i>Pteropus vampyrus</i>	Kalong	Common flying fox	V, I
27	Perrisodactyla	Rhinocerotidae	<i>Dicerorhinus sumatranus</i>	Badak	Sumatran rhino	Ph, F, J, V
28		Tapiridae	<i>Tapirus indicus</i>	Tapir	Malayan tapir	Ph, F, J, V
29	Pholidota	Manidae	<i>Manis javanica</i>	Trenggiling	Pangolin	I
30	Primates	Cercophitecidae	<i>Macaca fascicularis</i>	Monyet	Long tale macaque	Ph, F, V, S
31			<i>Macac nemestrina</i>	Beruk	Pig-tale macaque	Ph, F, V, S
32			<i>Presbytis cristata</i>	Ceca	Silver leaf monkey	V, S
33			<i>Presbytis melalophos</i>	Lutung	Banded leaf monkey	V, S
34		Hylobatidae	<i>Hylobates agilis</i>	Owa	Agile gibbon	V, S
35			<i>Hylobates syndactilus</i>	Siamang	Siamang	V, S
36		Lorisidae	<i>Nycticebus caucang</i>	Kukang	Slow loris	V
37	Proboscidae	Elephantidae	<i>Elephas maximus sumatranus</i>	Gajah	Sumatran elephant	Ph, F, J, V, S
38	Rodentia	Hystriidae	<i>Hystrix brachiura</i>	Landak	Malayan porcupine	Ph
39		Muridae	<i>Mus musculus</i>	Tikus rumah	House mouse	V
40			<i>Rattus rattus</i>	Celurut	Roof rat	V
41		Sciuridae	<i>Aeromys tephomelas</i>	Bajing terbang hitam	Black flying squirrel	V
42			<i>Callosciurus finlaysoni ?</i>	-	Variable squirrel	V
43			<i>Callosciurus prevostii</i>	-	Prevost's squirrel	V
44			<i>Callosciurus notatus</i>	Tupai pohon	Plantain squirrel	Ph, V
45			<i>Lariscus insignis</i>	Tupai tanah	Three striped ground s.	Ph, V
46			<i>Petaurista petaurista</i>	Bajing terbang merah	Red giant flying squirrel	V
47			<i>Ratufa bicolor</i>	Jelarang	Black giant squirrel	V

Explanation: Ph: Photo V: Visual sightings by tiger project staff
 F: Feces S: Sound and vocalizations
 J: Prints/secondary signs I: Reliable observations by park staff

Rapid Evaluation of Tiger Status – Progress Report

Rapid evaluation of tiger status will provide information relating to the tiger's distribution, prey abundance, habitat type, human disturbance, human attitudes and land protection status. This data will be essential in future management initiatives concerning the conservation of the Sumatran tiger.

During this quarter, primarily because of the forest fires occurring over the majority of Sumatra, the Tiger Conservation Team focused its efforts in assessing the status of tigers in remaining areas of Way Kambas National Park – in preparation for the intensive field period that would occur once the rain fell. The team concentrated upon setting up a team management, reporting and data collecting system that will be used in the future months – both by this team, and by other mobile teams we hope to form.

It is considered vitally important that the field techniques used to rapidly evaluate the status of tigers in remote regions of Sumatra are logistically feasible under the difficult field conditions encountered. Techniques must also be repeatable, and they should be sufficiently straightforward that forestry staff with little experience should be able to carry out surveys of their own with little additional support.

With these objectives in mind a field handbook is being developed that will outline the methodologies and techniques used in all aspects of a rapid evaluation survey. This includes a set of form sheets for habitat survey, fauna inventory and abundance index, mapping techniques, wildlife secondary sign documentation, interview sheets for local people, questionnaire sheets for the assessment of local villagers knowledge about wildlife, GPS navigation forms, and time and resource management of all personnel. Other sheets included in the handbook include forms for field safety protocols, team communication protocols, food and logistic planning, team management, reporting and financial accounting. These forms have been developed over the last quarter, into a series of 25 sheets – from which data can be extracted with relative ease. Revisions have been ongoing whilst the utility of these form sheets are tested in the field.

Rapid Evaluation of Tiger Habitat: Techniques are being developed that will allow trained mobile teams (Tiger Conservation Units – PHPA, 1994) to rapidly assess the quality of a habitat, the abundance of tigers and their prey, and the likely threats that these tiger populations may face. The methodology currently used involves randomly selecting a site of dimensions 4 km x 10 km. This area is divided into a grid system, comprising ten square of equal area. A camera is allocated to each square in the grid, by a process of random generation of latitude and longitude. The locations are then programmed into hand-held GPS units, and field teams then travel to the locations by foot often over many km of difficult terrain.

On reaching the camera site as designated by the GPS unit, the team selects the best location for the placement of a camera, within 100 meters of the exact latitude and longitude as randomly generated by computer. The remote camera is deployed to standard specifications, and programmed to monitor the region over a 24 hour period. Cameras remain in the field for 2 weeks before they are checked and removed by the field teams. Films are developed, and data from the camera loggers downloaded to a computer for analysis.

Whilst setting up and maintaining the remote cameras the field teams are actively involved in the census of secondary signs encountered in the field. Teams look for secondary signs that indicate the presence and abundance of tigers, their prey and human intruders. Other data collected during these field surveys include characteristics of habitat, hydrology and topography. These observations are mapped using GPS and then integrated with GIS maps by the downloading of latitude/longitude data on exit from the field.

It is the intention that this handbook will be further developed into a standard document for all Forestry Department field staff of Sumatra, allowing coordinated and comparable rapid evaluation surveys to be carried out by independent teams. It will be printed in Bahasa Indonesia.

RAPID ASSESSMENT OF TIGER STATUS – A METHODOLOGY
Survei Harimau Sumatera Secara Cepat

Pendahuluan

Harimau sumatera (*Panthera tigris sumatrae*) merupakan keterwakilan terakhir dari tiga sub-spesies harimau yang ada di Indonesia, yaitu: Harimau jawa, bali, dan sumatera. Harimau jawa dan bali saat ini hanya tinggal kenangan. Harimau jawa (*Panthera tigris sondaica*) dinyatakan punah pada tahun 1980-an, dan harimau bali (*Panthera tigris balica*) dinyatakan punah pada tahun 1970-an. (Ditjen PHPA, 1994).

Berdasarkan hasil lokakarya harimau sumatera yang dilaksanakan di Padang tahun 1992, diperkirakan kurang lebih tinggal 400 ekor harimau sumatera hidup di lima kawasan taman nasional dan hutan lindung lainnya (tabel 1), sedangkan 100 ekor lagi hidup diluar daerah yang dilindungi yang dipastikan segera akan berubah menjadi kawasan pertanian.

Tabel 1. Ringkasan perkiraan populasi harimau sumatera di lima daerah suaka

Kawasan konservasi	Analisis vegetasi			Distribusi harimau dari plot			PHVA ^c
	Jantan	Betina	Total	Jantan	Betina	Total	Total
BBS	16-18	33-35	44-53	9-13	18-22	27-35	68
Berbak	6-7	12-14	18-21	6-7	12-14	18-21	50
Gunung Leuser	36-39	74-77	110-116	33-36	69-72	102-108	110
Kerinci Seblat	44-47	89-92	133-139	40-41	80-82	120-123	76
Way Kambas	7-8	14-15	21-23	6-7	13-14	19-21	20
Kerumutan	-	-	-	-	-	-	30
Rimbang	-	-	-	-	-	-	42
Total			339-361 ^a			268-287 ^{a,b}	396

Sumber: PHPA, 1994.

- Keterangan: a Tidak termasuk kawasan lain (Rimbang dan Kerumutan)
 b Termasuk perkiraan analisis vegetasi di berbak
 c Population and Habitat Viability Analysis Harimau Sumatera

Pengenalan Survei Harimau Sumatera Secara Cepat

Penurunan populasi harimau sumatera terutama disebabkan oleh berbagai faktor diantaranya kerusakan habitat dan perburuan liar yang berlangsung terus menerus. Pada tahun 1990 di sebagian besar pulau Sumatera masih banyak terdapat hutan primer yaitu mulai dari Aceh sampai ke Lampung. Beberapa tahun kemudian, karena perubahan hutan primer menjadi lahan pertanian dan pemukiman, distribusi harimau menjadi terkotak-kotak, terisolasi dan banyak berkurang (Ramono dan Santiapilai, 1994).

Untuk membuat suatu bentuk pengelolaan harimau sumatera yang baik dan tepat, diperlukan data-data yang lengkap dan terbaru. Akan tetapi karena beragamnya habitat harimau serta adanya daerah-daerah yang belum pernah disensus menambah sulit pengumpulan data-data harimau sumatera. Selain itu habitat harimau sumatera yang terbentang mulai dari dataran rendah sampai ke pegunungan menyebabkan diperlukan banyak tenaga dan dana dalam pengumpulan data. Ditambah lagi vegetasi hutan tropik yang padat, sehingga sulit melakukan pengamatan terhadap satwaliar.

Karena itu diperlukan suatu metode lapangan yang mudah dan efektif, sehingga data-data tentang harimau sumatera dapat lebih banyak dikumpulkan. Metode survei dan evaluasi secara cepat penting untuk dikembangkan karena metode ini dapat dilakukan oleh sejumlah besar tim lapangan (staf kawasan konservasi) yang dapat dipecah menjadi beberapa tim independen pada suatu daerah yang luas. Tim lapangan yang berbeda pada daerah berbeda akan menggunakan metode yang sama, sehingga hasil survei yang diperoleh dapat dibandingkan dengan hasil dari daerah lain (Sriyanto, dkk., 1997).

Metode survei dapat dilakukan oleh jagawana yang bertugas di daerah yang akan disurvei. Selain itu juga dapat dilakukan oleh sukarelawan konservasi dari berbagai macam organisasi seperti pecinta alam, himpunan mahasiswa biologi dan himpunan mahasiswa kehutanan dari universitas setempat.

Survei dapat juga dilakukan dalam bentuk rencana operasi staf lapangan pengelola kawasan, pada bulan-bulan aktif operasi lapangan di setiap taman nasional dan cagar alam atau kawasan lindung lainnya di Sumatera. Lamanya survei dapat bervariasi dari satu hari sampai beberapa hari, tergantung dari tingkat kesulitan lapangan dan jumlah personil yang melakukan survei. Staf pengelola kawasan harus mempunyai jadwal untuk melakukan survei secara teratur, paling sedikit satu kali dalam satu bulan (misalnya 10 hari setiap bulan). Informasi yang dikumpulkan menghasilkan nilai biologi kawasan dilindungi yang disurvei. Hal ini juga akan memberikan pengalaman bagi staf kawasan dalam memonitor satwaliar.

Survei perlu dilakukan di seluruh wilayah Sumatera, baik di daerah yang dilindungi atau di luar kawasan tersebut. Terutama diprioritaskan pada daerah yang belum pernah di survei dalam beberapa tahun atau daerah yang memiliki sedikit informasi. Diprioritaskan juga pada daerah tertutup di sekitar desa yang memungkinkan menjadi habitat harimau (koridor taman nasional)

Tanda-tanda Sekunder Harimau Sumatera

Survei harimau sumatera secara cepat selain menggunakan kamera sistem infra merah, juga menggunakan pengenalan tanda-tanda sekunder harimau sumatera. Untuk mengetahui keberadaan satwaliar dapat melalui tanda-tanda sekunder yang ditinggalkan, seperti jejak, kotoran, jalan setapak, sisa makanan, dan lain-lain (Robinowits, 1993; Strien, 1983). Untuk itu staf kawasan ataupun organisasi lain yang akan melakukan survei harimau sumatera secara cepat harus mengetahui tanda-tanda sekunder ini, sehingga hasil yang diperoleh dapat lebih representatif.

- **Jejak:** Jejak harimau sumatera mirip dengan jejak kucing rumah, akan tetapi mempunyai ukuran yang lebih besar. Empat parameter yang menunjukkan kestabilan dalam pengukuran yaitu: (1) *Panjang telapak*, (2) *Lebar telapak*, (3) *Luas telapak*, dan (4) *Luas total*. Ukuran jejak kaki harimau sumatera berdasarkan parameter yang menunjukkan kestabilan menurut kriteria umur **jantan dewasa**: untuk kaki depan: (1) 6,94-8,85 cm, (2) 5,35-6,09 cm, (3) 39,6-53,96 cm², (4) 54,6-72,68 cm², kaki belakang: (1) 5,95-8,05 cm, (2) 4,61-5,46 cm, (3) 28,35-43,65 cm², (4) 40,89-60,79 cm², **betina dewasa**: untuk kaki depan: (1) 6,40-6,80 cm, (2) 5,09-5,23 cm, (3) 28,35-43,15 cm², (4) 49,15-51,23 cm², kaki belakang: (1) 5,96-6,35 cm, (2) 4,70-5,11 cm (3) 28,20-32,42 cm², (4) 39,17-45,09 cm², dan **anak**: untuk kaki depan: (1) 5,10 cm, (2) 4,18 cm, (3) 21,33 cm², (4) 35,20 cm², Untuk kaki belakang: (1) 4,72 cm, (2) 3,29 cm, (3) 14,05 cm², (4) 25, 50 cm² (Subagyo, 1996).
- **Scrape (garutan):** Scrape atau garutan yang dibuat oleh hewan di atas tanah berfungsi untuk memberi tanda daerah jelajah (home range atau teritori) hewan tersebut. Tanda ini biasanya terdapat disisi jalan yang dilalui satwa. Garutan harimau sumatera biasanya mempunyai panjang sekitar 40 cm dan lebar sekitar 30 cm. Jejak kaki sering tercetak jelas pada garutan ini dan terkadang pada garutan ini juga ditemukan kotoran atau air seni harimau sumatera.
- **Feses (kotoran):** Feses harimau sumatera umumnya berbetuk bulat panjang. Diameter bulatan antara 4 - 6 cm dan panjang dapat mencapai 10 cm. Kotoran ini mempunyai bau yang khas/menyengat, serta terdapat rambut/tulang hewan yang dimangsa. Akan tetapi terkadang kotoran harimau ditemukan dalam keadaan cair (mencret), untuk mengetahuinya dapat melalui bau dan kandungan kotoran (rambut/tulang). Setelah beberapa lama (lebih kurang 2 minggu) kotoran sering tidak lagi berbentuk bulatan, akan tetapi hanya berbentuk setumpuk rambut/tulang hewan mangsa serta tidak berbau menyengat lagi.
- **Cakaran:** Cakaran harimau sumatera sering terlihat di pohon. Tinggi cakaran bervariasi mulai dari 30-120 cm dari permukaan tanah. Cakaran harimau sumatera mempunyai ciri tertentu, diantaranya adanya bekas 4 buah kuku pada kulit kayu, dengan panjang cakaran lebih kurang 15 cm, dan kedalaman 0,5 - 1,2 cm.

Pelaksanaan Survei Harimau Secara Cepat

Pengisian Lembar Data

Pengamat dapat berjalan dengan mengikuti jalan setapak (jalan satwa) atau dapat juga membuat jalan sendiri. Saat berjalan, pengamat memperhatikan tanda-tanda sekunder yang ditinggalkan satwaliar, baik berupa jejak, kotoran, garutan ataupun cakaran. Pada interval waktu tertentu (15 menit untuk daerah datar, 20 menit untuk daerah landai/menurun, dan 30 menit untuk mendaki) dilakukan pengisian lembar data. Penggunaan jangka waktu untuk mengisi lembar data didasarkan pada asumsi bahwa rata-rata kecepatan berjalan di daerah datar adalah 4 km/jam, daerah landai atau menurun 3 km/jam dan daerah mendaki 2 km/jam. Tambahan lagi, penggunaan interval waktu juga relatif lebih baik, karena jika menggunakan jarak, pada saat lelah pengamatan tidak efektif lagi, dan ada kemungkinan pengamat hanya mengejar target jarak berjalan. Hal ini berbeda dengan menggunakan jangka waktu, dimana pengamat tidak terburu-buru dan pengamatan dapat dilakukan lebih teliti.

Pengisian Lembar Data Satwaliar

Lembar data satwaliar diisi dengan membuat tanda "V" pada kotak yang telah tersedia (24j, 1m, 1b, 1t, 1b), setiap jangka waktu tertentu. Dari lembar data ini dapat diketahui daerah distribusi harimau sumatera. Selain pengisian lembar data, juga dilakukan pengukuran/penggambaran tanda sekunder harimau, misalnya menggambar jejak, mengukur jarak langkah atau mengumpulkan kotoran harimau.

Untuk menggambar jejak digunakan plastik transparan (*tracing*). Penggunaan plastik lebih efisien karena lebih mudah dibawa dan digunakan, dan dalam pelaksanaannya memerlukan waktu yang lebih singkat (dibanding dengan menggunakan gips). Plastik ini diletakkan di atas jejak harimau, dan dari atas plastik digambar jejak harimau dengan mengikuti model jejak yang tercetak di plastik (*ngeblat*, *jw*). Dari gambar jejak dapat diketahui struktur umur harimau (anak/dewasa).

Pengukuran jarak langkah harimau hanya dapat dilakukan jika jejak harimau yang ditemukan di lokasi survei minimal dua jejak. Pengukuran harus diakhiri pada posisi jejak yang sama dengan waktu memulai. Misalnya jika pengukuran dimulai dari pangkal jejak maka harus diakhiri pada pangkal jejak berikutnya, demikian juga jika dimulai pada ujung jari maka harus diakhiri di ujung jari pula. Dari jarak langkah kita dapat mengetahui struktur umur harimau (anak/dewasa).

Dari kotoran harimau dapat diketahui jenis-jenis hewan mangsa yang disukai oleh harimau (Sriyanto, 1995). Setiap kotoran harimau yang ditemukan harus diambil seluruhnya. Dalam satu kotoran mungkin saja diperoleh rambut lebih dari satu jenis hewan mangsa. Dengan membandingkan jumlah rambut tiap-tiap jenis hewan mangsa yang terdapat di dalam kotoran kita dapat mengetahui persentase hewan mangsa (Rustiati, 1998 *pers. com*).

Pengisian Lembar Data Habitat

Dalam pengisian lembar data habitat digunakan metode 4 titik contoh (*Point Quarter Sampling Methode*), serta tidak dibedakan jenis tumbuhan. Akan tetapi didasarkan pada tingkat vegetasi: pohon, mempunyai ukuran diameter batang lebih dari 10 cm; pancang (sapling) dengan diameter 2,5-10 cm; dan semai (sedling) mempunyai diameter kurang dari 2,5 cm (Soerianegara, 1978). Harus dibedakan antara semai dan semak. Semai adalah anak pohon yang dapat tumbuh menjadi pohon, sedangkan semak tidak dapat tumbuh menjadi pohon dan diameter batangnya tidak akan lebih dari 10 cm.

Harus diperhatikan, dalam pengisian lembar data habitat jika tidak terdapat suatu tipe vegetasi maka tidak boleh ditulis "0" akan tetapi harus ditulis "250". Hal ini karena semakin kecil angka yang ditulis berarti semakin rapat pohon, dan angka 0 berarti tumbuhan berada tepat di pusat (sedangkan tumbuhan tidak ada), hal ini menimbulkan bias. Pengisian dengan angka 250 dengan asumsi bahwa jarak pandang terjauh di dalam hutan adalah 250 m. Selain itu, penentuan titik pusat tidak boleh di tengah jalan, akan tetapi berjarak 5-10 m dari jalan, dan arah titik pusat dapat dilakukan secara acak mengikuti arah mata angin.

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COMMUNITY-BASED CONSERVATION PROGRAM

Progress Report: October – December 1997

Sumianto and Philip Nyhus, Co-Coordinator, Community-Based Conservation Program

Funded by the Save the Tiger Fund through the National Fish and Wildlife Foundation and by the Rhinoceros and Tiger Conservation Fund through the U.S. Fish & Wildlife Service

Introduction

The Community-Based Conservation Program (CCP) of the Sumatran Tiger Project is based upon recommendations set forth in the *Indonesian Sumatran Tiger Conservation Strategy* published in 1994 by the Indonesian Directorate General of Forest Protection and Nature Conservation (PHPA), Ministry of Forestry. This strategy formally outlines the steps necessary to develop and sustain a conservation program that will ensure the long-term viability of wild Sumatran tigers in Indonesia. The CCP addresses the critical human component of this strategy and is one of the projects which comprise the *in situ* component of the Sumatran Tiger Project.

Objectives

The goal of this program is to better understand park-people interactions near Way Kambas National Park (WKNP). Evaluating human resource use patterns and wildlife resource needs is an important step to establish criteria to resolve future conflicts between tiger populations and human settlements in this and other tiger protected areas in Sumatera. To accomplish this the following objectives for this program were set:

- to model human population growth and land use trends adjacent to WKNP;
- to evaluate human attitudes in communities near the park;
- to document human-wildlife interactions; and
- to integrate this information with data from tiger ecology studies to develop methods to resolve human-wildlife conflicts and develop tiger conservation education strategies.

Field Phase: October 1997 to December 1997

The Community-Based Conservation Program (CCP) was initiated in December 1995. This report contains the fourth quarter of the second year of this program. The primary objectives of this quarter of field work in villages bordering Taman Nasional Way Kambas were:

- to initiate education and awareness activities in villages near Way Kambas National Park;
- to continue to monitor the extent and frequency of human-wildlife conflicts and to work with local communities to reduce these conflicts;
- to continue data entry and analysis from 1996 field research;
- to evaluate opportunities for obtaining satellite imagery of Way Kambas National Park.

Conservation and Education Activities

Village meetings

Several meetings were held with community leaders. During these meetings Sumianto discussed opportunities for the communities to work with the Sumatran Tiger Project on several activities related to tiger conservation education.

In October, meetings were held with the following village representatives:

- Ny Sundari (Village secretary, Rantau Jaya Baru, Kecamatan Rumbia)
- Bapak Sunyoto (Village head, Rantau Jaya Ilir, Kecamatan Rumbia)
- Bapak Damanuri (Village head, Rawa Betik, Kecamatan Surabaya)
- Bapak Poniman (Village secretary, Cempaka Putih, Kecamatan Seputih Surabaya)
- Bapak Kodrat (Village head, Cabang, Kecamatan Surabaya)

In November, STP staff worked with representatives of the youth conservation organization Pramuka (Saka Wana Bhakti, Way Kambas) in the village of Braja Indah, Kecamatan Braja Selehah to discuss conservation issues and present conservation education material. These meetings were attended by:

- Bapak Prijono and Bapak T. Hasa (PHPA staff, Way Kambas)
- Sumianto, Sriyanto, and M. Yunus (STP Staff, Way Kambas)
- Arief Rubianto, Parmin, Joko (Staff RPU, Way Kambas)
- Representatives of Saka Wana Bhakti, Way Kambas (50 people)
- Representatives of Pemuda Pecinta Alam (Gempala), Way Kambas (10 people)

STP staff have also worked with the representatives of Gempala (roughly translated, the “young generation of nature lovers”) at Way Kambas. STP has helped to sponsor some of the activities of this group and a presentation was made at a seminar during the Natural Resources Conservation Week for all of Sumatra held at the University of Lampung, Bandar Lampung on 13-14 November.

Conservation education materials

An important task of the Community Conservation and Education program is to work with local groups to develop conservation education materials. During this period, leaflets and stickers were developed with a conservation theme related to tigers (see examples in back of report). These materials have been given to the general public, and in particular to a community groups and school children. A handbook is being prepared that can be used by community groups to talk about tiger conservation and information about the Sumatran tiger and a poster about the Sumatran tiger is also under preparation.

Assistance in providing drinking water to wildlife during the Way Kambas fires

Sumianto assisted other STP and PHPA staff during the major fires that occurred within the park in mid-November. These activities, undertaken with assistance from the Gempala group, the youth scouts group (Saka Wana Bhakti), and the Park's Rhino Protection Units, included deepening springs at Rawa Gajah, placing water along locations the length of the road from Plang Ijo to Way Kanan, and also along some of the forest paths.

Activities with LIPI

Sumianto participated with other STP staff in a presentation at the headquarters of the Indonesian Institute of Sciences (LIPI) in Jakarta 12-18 October. This program was an opportunity to discuss a summary of activities by the STP since its inception in 1995.

Human-Wildlife Conflict

Data continues to be collected in our long-term study of human-wildlife conflict in villages adjacent to Way Kambas National Park. Every month, information is collected from informants in 11 different villages. The results of this database continue to be entered into a central database to better understand the type of wildlife, number of animals, and the damage done by these animals. The time of day and sex of the animals are noted where possible.

Elephants continue to be one of the major conflicts between the park and people living adjacent to the park. As part of the STP's community-conservation activities, STP helped to obtain a matching grant from the Adopt-A-Park Program for one of the villages (Labuhan Ratu VI, Kecamatan Way Jepara) to improve their elephant ditch. This activity was carried out with support from the Head of Way Kambas National Park. A summary of this project follows:

Background

During the past decade (from approximately 1980 to present), the primary conflict between Way Kambas National Park and people living near the park has been with elephants. Elephants regularly leave the park and damage crops, houses, and has even resulted in human fatalities.

Several different efforts have been undertaken to control the intensity and frequency of crop raiding in communities near the park. One of the most common control measures to date has been for villagers to try to ward off individual elephants as they leave the park using locally available "weapons" including fire torches, loud drums, bright hand-held floodlights, and even water buffalo (some villagers believe that the presence of water buffalo frighten elephants, although others disagree). Recently, several attempts have been made to dig ditches at the edge of the park's border as a way to keep elephants from leaving the forest and entering agricultural fields.

The first elephant ditch was built by a local banana plantation (PT Nusantara Tropical Fruit). Several other villages have also built elephant control ditches: Rantau Jaya Udik II (Kec. Sukadana), Labuhan Ratu VI (Kec. Way Jepara), Dusun Margahayu/Labuhan Ratu Lama (Kec. Way Jepara), Braja Yekti (Kec. Way Jepara). The goal of this ditch is to reduce the number of elephants that enter the villages or agricultural areas. To date, many of these areas have reported a reduction in the total number of crop-raiding incidents, but some crop-raiding continues.

The Elephant Canal in Labuhan Ratu VI village

One of the first villages to build its own elephant control ditch was Labuhan Ratu VI, located close to the entrance of Way Kambas National Park. This village is also unique in that the villagers themselves, without outside assistance, raised money to build the ditch. Starting in May 1995, a 5.8 kilometer long canal was dug using an excavator. The ditch was approximately 2.5 m wide and 3 m deep. The total cost of the initial construction of the ditch was Rp. 25,000,000.

Problems with the ditch

Way Kambas National Park is a lowland forest criss-crossed by streams, rivers, and seasonal flooding in different areas. Eight streams and wetlands bisect the length of the 5.8km ditch. These wet areas along the border with Labuhan Ratu VI reduce the effectiveness of the ditch because it is either impossible to dig where there is standing water, or the wet earth easily erodes the sides of the ditch near the wet areas. As a result, elephants are still able to leave the forest and enter village agricultural areas through these gaps in the ditch.

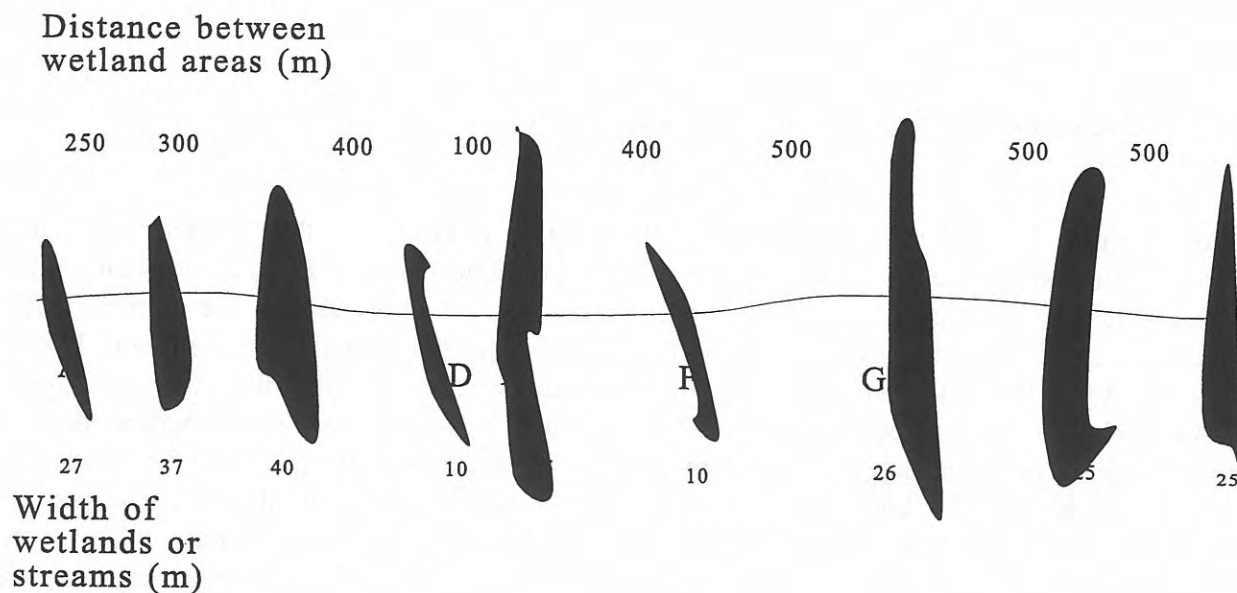
Efforts to overcome these problems

The citizens of Labuhan Ratu VI have worked to improve the effectiveness of the canal and to reduce the number of elephants that come through the wetland areas by building barriers and adding cement pipes in the location of the wetlands to allow water to flow through. The following sketch shows the approximate distance between wetland/stream areas and the approximate width of these areas. This sketch is *not* to scale and is not intended to be an accurate representation of the area, only a diagram showing the approximate dimensions of these breaks in the canal. Construction of these sites was completed as follows: Sites A and B 50%; C, D, and H 75%-90%; D, F, and G 100%; and I not yet started.

Cost of improving the canals

The cost of improving the "holes" in the canal was estimated by the villagers to be Rp. 15 million. Funds were generously provided by the Adopt-A-Park program of the Minnesota Zoo and by donations from the village itself as follows:

- Adopt-A-Park provided Rp. 7 million specifically to purchase materials (cement, rocks, iron rods, sand, and barbed wire).
- Villagers of Labuhan Ratu VI village donated Rp. 3.5 million for builders and operating costs for construction. Villagers donated their labor for free.



Data Analysis

Data from the 1996-97 field research continues to be entered and analyzed by P. Nyhus in the United States. A summary of some of these activities follows:

Quantitative surveys

Data entry was completed for 622 surveys. These surveys represent 6 different sub-districts and 10 different villages. Basic socio-demographic variables that have been coded and are being included in different analyses include:

- Status of the respondent in the family
- Year respondent moved to Lampung and to the village
- Reasons moved to Lampung and the village
- Geographic origins of the respondent and his/her family
- Marital status and number of children
- Number of people living in the household
- Religious affiliation
- Highest education completed
- Village leadership positions of respondent, if any
- Permanent and seasonal employment
- Village and household access to electricity
- House type (including floor, roof, and walls)
- Household belongings (e.g., radios, TVs, bicycles)

Analyses are being conducted in three broad categories:

1. Knowledge and attitudes about/toward tigers, wildlife, Taman Nasional Way Kambas, and PHPA

For example, one of the questions we are examining is how well the villagers can identify wildlife, including tigers and related animals, that are found within Way Kambas National Park. Respondents were shown ten different photographs and asked to identify the animal, whether they had ever seen the animal, and whether they thought this animal existed in Way Kambas. Preliminary results suggest that most villagers can correctly identify the elephant (close to 100%), close to half can correctly identify the Sumatran tiger, Sumatran rhino, barking deer, and sun bear, and few can identify the rest to the level of genus or even family. Information about the villagers' level of knowledge about wildlife, ecology, and their attitudes towards these animals and the park may have significant implications for developing future conservation education programs at this and other protected areas in Sumatra. For example, approximately 40% of respondents believe there are *more* tigers in Sumatra and in Way Kambas National Park today than there were 20 years ago, and almost 25% believe there are still tigers on the island of Java.

English Name	Genus	Species	ORDER		FAMILY		GENUS	
			N	%	N	%	N	%
Asian Elephant	Elephas	<i>maximus</i>	607	97.59	607	97.59	607	97.59
Barking deer	Muntiacus	<i>muntjak</i>	519	83.44	355	57.07	240	38.59
Leopard cat	Felis	<i>bengalensis</i>	468	75.24	194	31.19	1	0.16
Malay civet	Viverra	<i>tangalunga</i>	253	40.68	63	10.13	0	0
Malayan tapir	Tapirus	<i>indicus</i>	157	25.24	140	22.51	140	22.51
Sumatran rhino	Dicerorhinus	<i>sumatrensis</i>	301	48.39	294	47.27	294	47.27
Golden cat	Felis	<i>tenninckii</i>	316	50.80	84	13.5	2	0.32
Masked Palm civet	Paguma	<i>larvata</i>	108	17.36	77	12.38	0	0
Sun Bear	Helarctos	<i>malayanus</i>	216	34.24	203	32.64	203	32.64
Sumatran Tiger	Panthera	<i>tigris</i>	603	96.95	286	45.98	280	45.02
		<i>Mean</i>	354	56.99	230	37.03	177	28.41

2. Human-wildlife conflicts

A range of questions were asked about conflict with tigers, elephants, and other wildlife. These conflicts appear to be the most important factor affecting village attitudes toward the park. More than 1/3 of villagers reported elephant damage within the last year and close to 1/2 of those reporting damage described the damage as occasional or often. Detailed data on the time and amount of damage reported was collected and will be analyzed by location, and compared to the field study on human-wildlife conflict we are undertaking at the same time.

3. Land and resource use (including type and amount of land cultivated, grass and wood use)

The majority of respondents are farmers. Questions were asked about the size, tenure status, and cropping patterns of their land. Additional questions were asked about their livestock, grass and wood use, and other resources they collect inside and outside the park. The goal of these

questions is to gain a better understanding of the needs of people living near the park, as well as the extent of the impact they may be having on the park

Remote Sensing and GIS

P. Nyhus attended a week of training at the headquarters of ERDAS, Inc., for advanced satellite imagery analysis training. This training was part of a generous grant from ERDAS for software and assistance to enable the STP to incorporate satellite images into our GIS maps. The following three mini-courses were completed:

1. *Erdas Imagine Essentials*. This course included background information for using Erdas Imagine, histogram contrast, vector display, image drape, importing SPOT and TIFF images, registration, unsupervised classification, creating map frames, and making maps.
2. *Erdas Imagine Advantage*. This course included information on orthorectification, image mosaic strategies, and using the image interpreter (including GIS analysis)
3. *Erdas Imagine Professional*. This course included training in classification (including unsupervised classification), using radar, introductory spatial modeling, and elementary Erdas Macro Language.

Further assistance has been provided by Mr. Ben Drake, a consultant to ERDAS. Through Mr. Drake and Erdas, a free image of the Way Kambas areas was obtained from Space Imaging/ EOSAT corporation. The Sumatran Tiger Project gratefully acknowledges this generous gift. Plans are underway to obtain an additional image that is more current and has less cloud cover. The goal is to incorporate these images into the ongoing GIS maps currently being developed by the field team in Indonesia.

Publications

Together with R. Tilson, P. Nyhus submitted a note to the journal *Conservation Biology* regarding tiger-human conflicts in Sumatra. This note is a condensed version of a paper under preparation from an analysis of tiger-human conflict over the last 20 years in Sumatra.

Planned activities during January-March 1998

- Further sharing of information and community discussions about conservation are planned. In particular, events are planned during the holy month of fasting (Puasa).
- Education and awareness materials will be continued. In particular, "buku paduan", brochures and leaflets, and stickers will be completed.
- Activities are planned in conjunction with the local PHPA office and the Department of Religious Affairs (Kantor Urusan Agama, KUA) in Way Jepara to develop a "Buletin

Dakwah Konservasi” (conservation education bulletin through Islamic channels) that could possibly be published on a monthly basis

- Continued activities with students from the University of Lampung, especially students from the Department of Extension. These students will be asked to assist with conservation education activities in communities near the park individually and in groups.
- Two former UNILA students who helped with STP research activities will be contacted to see if they would like to help with conservation education activities.
- Activities will be continued with representatives of the youth scouts program (Saka Wana Bhakti and Gempala), Way Kambas, to undertake education activities in communities near the Way Kambas.
- Further development of satellite remote sensing/GIS maps.
- Continued data analysis.