

**Survey, Assessment and Conservation
of the Sumatran Tiger (*Panthera tigris sumatrae*)
in Bukit Barisan Selatan National Park - III**

12-month Final Report
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INTRODUCTION

Bukit Barisan Selatan National Park (BBS) in Sumatra, Indonesia, is one of three national parks in Sumatra identified as high priority tiger conservation areas in the Wildlife Conservation Society (WCS)/World Wildlife Fund-US (WWF) tiger conservation prioritizing exercise, *A Framework for Identifying High Priority Areas and Actions for the Conservation of Tigers in the Wild*. The third largest protected area in Sumatra, BBS is one of the only protected areas in the country large enough to maintain a viable population of tigers. Because of WCS research, survey and monitoring activities in the park, BBS has become an internationally recognized tiger conservation area and an important component of the WWF AREAS Program.

With funding from the National Fish and Wildlife Foundation and in collaboration with the Indonesian Conservation Department (PHKA, formerly PKA), WCS initiated a park-wide survey in BBS in 1998 to determine the status of tigers and their prey. This survey has been completed and a manuscript *Crouching Tigers, Hidden Prey: Sumatran Tiger and Prey Populations in a Tropical Forest Landscape* has been submitted to Animal Conservation as well as a report to PHKA *Status of Sumatran Tigers in the Bukit Barisan Selatan National Park, Sumatra, Indonesia*. The surveys revealed that the average density of tigers in the park was 1.56 tigers per 100 km². The surveys also revealed that the abundance of tigers was associated with the abundance of their main prey, Sambar deer and wild pig, and that the density of human settlements within 10 km of the park boundary has a strong negative effect on tigers and prey. This relationship most likely reflects hunting pressure on tigers and prey. WCS has identified organized hunting groups that target prey and recorded poaching of tigers in the park.

This report highlights activities over the past 12 months of year three of a three-year project to assess the status of tigers and prey and initiate conservation activities. Specifically, year three activities included:

1. To survey the southern part of the park (where tigers appear more abundant) more thoroughly to improve density estimates and learn more about tigers where they are most abundant.
2. To implement a long-term monitoring program.
3. To continue development of tiger a GIS database for the park and assess the degree of habitat loss.
4. To continue identifying and training wildlife personnel and others to support conservation efforts.
5. To work with government agencies and NGOs to assist in formulating tiger conservation strategies.

The WCS tiger program is carried out in collaboration with existing tiger projects in the region including the local and national offices of PHKA, BBSNP management, LDP, Kerenci Seblat NP GEF, WWF, FFI, WATALA, PRATALA, University of Indonesia and University of Lampung.

Tiger and Prey Monitoring with Camera Traps

In January and February 2001 we completed a survey of the park south of the Sukaraja road (initiated in late September 2000) using paired cameras, in an attempt to improve our CAPTURE estimate of tigers calculated in 1999. During 1,355 trapdays, we managed to photograph only three individual tigers. Based on this, we estimated that as few as 4-5 tigers remain in the south, compared to 13 tigers in 1999. The new figure is significantly lower than the 1999 estimate and we believe it reflects a round of severe poaching in the south. In collaboration with PRATALA, we found evidence of eight tiger poaching incidents, including five skins.

We spent the remainder of the year conducting surveys in Sukaraja, Way Marang, Way Ngaras, Liwa, and Rata Agung and Way Canguk (Table 1). Surveys of the final two blocks are currently underway (and are being completed with funds from other sources).

Table 1. Monitoring effort in late 2000 and 2001.

Location	# camera points	Trapdays	# tigers
South Block	60 pairs	1,355	3
Sukaraja	20	493	0
W. Marang	20	393	0
W. Ngaras	23	612	2
Liwa	20	529	0
Rata Agung	13	361	1
Way Canguk	31	937	0
total	187	4,680	6

Comparisons for the first survey (1999) and results to date for the second survey are presented in Figures 1a, 1b and 1c. The data show the general trend in abundance of tigers and prey in the south (Blambangan to Sukaraja), middle (Sukaraja to Rata Agung) and north (Tangung Iman and Puncak Beringin, 1999 data only). We have already determined that the north and south tend to have higher abundance of prey than the middle where human density adjacent to the park is highest. Tiger abundance has stayed relatively constant in the middle but declined dramatically in the south, reflecting high poaching recorded by our undercover monitoring. Interestingly, we also note a decline in macaques and pigs in the south. Sambar and muntjac have stayed relatively constant throughout the park, whereas mousedeer and porcupine have doubled in the south. These results should be treated cautiously because they represent only two points per region of the park. As explained above, we feel more confident that the tiger result is real rather than an artifact of small sample size because of documented poaching.

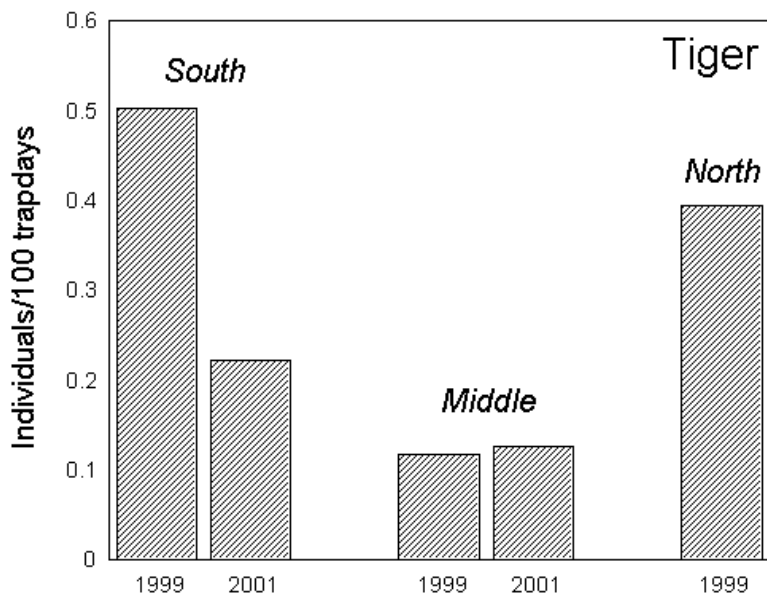


Figure 1a. Relative abundance of tigers in the south, middle and northern parts of BBSNP during 1999 and 2001 surveys. Note that 2001 survey has not been completed in the North as of December 2001.

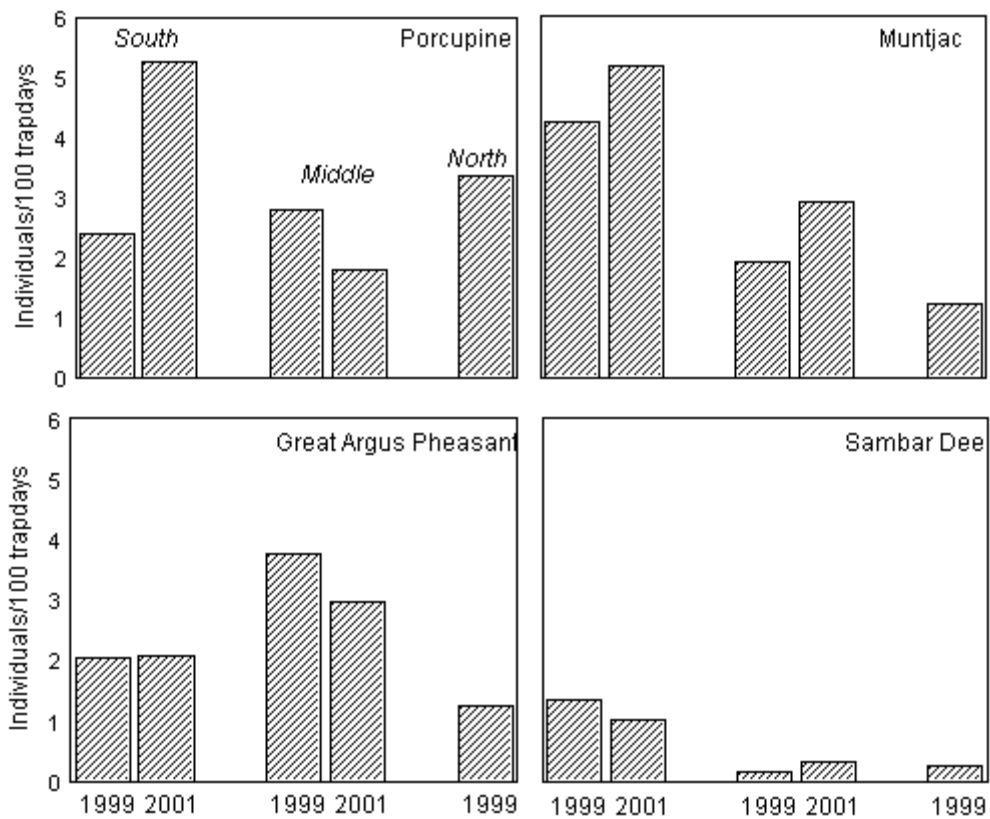


Figure 1b. Relative abundance of prey in the south, middle and northern parts of BBSNP during 1999 and 2001 surveys.

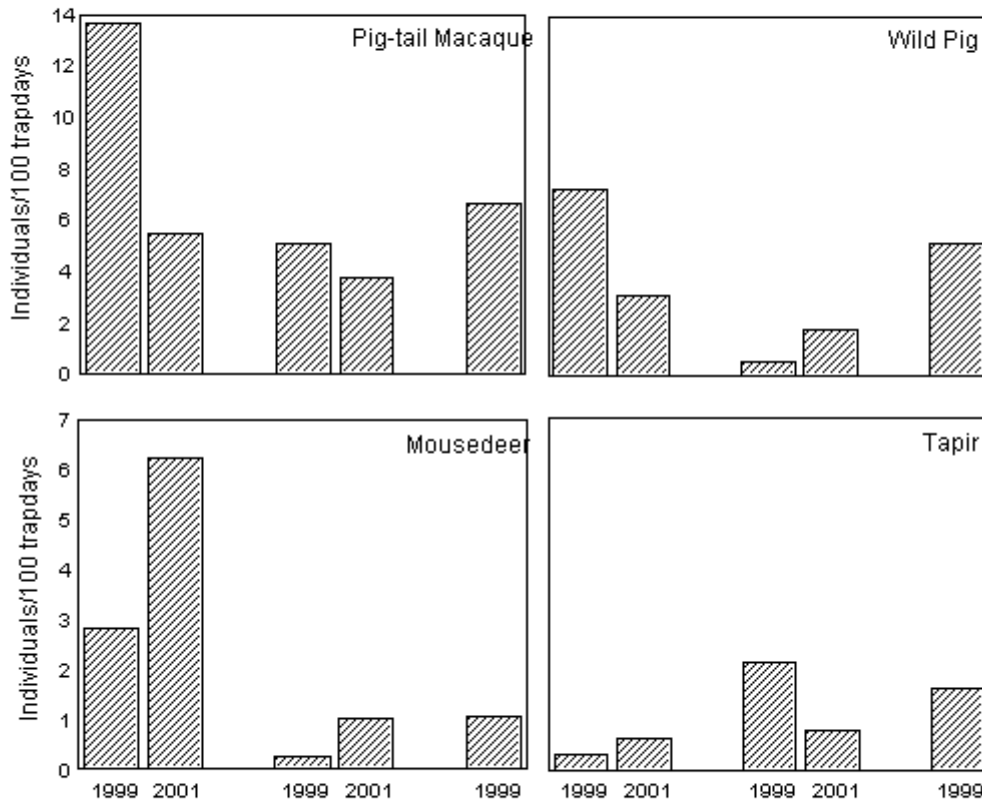


Figure 1c. Relative abundance of prey in the south, middle and northern parts of BBSNP during 1999 and 2001 surveys.

Interview Survey of Crop Depredation by Tiger Prey

We interviewed 236 farmers in seven villages in the south and 102 farmers in five villages in the middle of the park about the incidence and nature of crop damage. Almost 95% of the people claimed to suffer from some level of crop damage due to wildlife. Wild pigs are considered the main pest in the south and middle part of the park accounting for 60 – 70% of the reports. Rice is the crop most preferred by wildlife, followed by vegetable gardens in both areas. Most crop depredation by wild pig and sambar deer occurs at night, while macaques and muntjacs tend to raid crops during the day. The result for pigs is interesting because activity patterns of pigs based on camera trap data suggest that they are strictly diurnal. When asked about poaching of tiger prey, people responded that muntjac, sambar and pigs are killed much more often in the middle of the park than in the south (Table 2). Thus, our monitoring data coincides with the camera trap results: poaching of prey is a more severe problem in the middle of the park.

Table 2. Comparison of the level of poaching in the south and middle part of the park (measured in # prey/person/month).

Prey	South	Middle
Muntjac	0.004	0.039
Sambar Deer	0.005	0.157
Wild Pig	0.118	1.050
Pig Tail Macaque	0.009	0.000

Encroachment and GIS

We completed the initial analysis of forest loss in and around BBSNP and evaluated the potential effect on Sumatran tigers, elephants, and rhinoceros. These results are detailed in the accompanying manuscript *Deforestation trends in a tropical landscape and implications for endangered mammals* prepared by this project in collaboration with the WCS Landscape Ecology Program. The analysis is based on the southern 70% of the park for which we have a series of LANDSAT photographs extending back to 1985. We have found that the park has lost 662 km² of forest inside the park boundaries and all forest within a 10 km distance around the park has been eliminated. Patterns of deforestation indicate that, unsurprisingly, lowland forest on gentle slopes has been most severely affected. In addition to reducing forest area, fragmentation will increase, resulting in large numbers of very small forest patches. Projections further indicate that under current rates and patterns of forest loss, by 2036 all lowland forest in the park will be destroyed.

We next examined the consequence of forest loss patterns for large mammals in the park. We concentrated on Sumatran tigers, elephants and rhinoceros, animals with large home ranges, low reproductive potential, and that are highly endangered. Using the camera trap data, we determine that tigers and rhinos avoid the forest edge for up to 2 km and elephants avoid the forest edge up to 3 km. We call the avoided area peripheral forest habitat and argue that these areas are suboptimal because of the increased risk of mortality associated with encountering humans on the forest edge. The interior forest is called core forest habitat and represents the preferred habitat for these species. As forest

loss progresses, core forest habitat shrinks faster than overall forest. We argue that tigers, elephants and rhinos all attempt to maximize the amount of core forest in their range and that forest loss and fragmentation reduces the amount of core forest habitat available, increases the proportion of peripheral habitat in the range and increases the risk of mortality due to contact with humans. By reducing human activity on the forest edge, the quality of peripheral habitat may improve, making it a safer place for tigers and other endangered mammals.

To refine this analysis, we have been working with WWF and PHKA to document the deforestation and groundtruth the LANDSAT imagery in an attempt to develop a supervised habitat classification for the BBSNP. We visited 21 points spread over 30 km² near Krui and found most of the land was planted in coffee with some pepper, rice and cinnamon. At Kubu Perahu, we surveyed 25 points covering @ 80 km². The main land use was gardens (51%) with the remainder in primary (15%) and secondary forest (34%). At Rata Agung we sampled 24 points spread over 96 km². Primary forest covered 33% of the points, although there was early stages of logging at some points. Cultivation and gardens were present at 58% of points and 67% of the points had evidence of recent logging activity to clear for new cultivation, timber removal, or both. At Suoh we sampled 41 points across 675 km². The sample points were dominated by agricultural gardens and rice (66%), and secondary and logged forests (27%). These data will be integrated into the GIS database, along with the data collected in forested areas during camera trapping.

Boundary demarcation

Land-use conflicts with villages along park's boundary are often attributed to the lack of a clear border. Locals claim that since they do not know where the park border lies, they do not know when they are violating the border. While villagers are arguably justified in defending their fields against crop-raiding wildlife outside the park, defense of fields inside the park boundary is not justified. During the Tanggamus conservation workshop (see below) unclear park boundaries and crop damage were identified as major problems. In response, we initiated the process of delineating the original park boundary to help mitigate conflicts with villages. The objective of this project is to locate the original Dutch colonial markers and markers placed by the park in the 80's and early 90's, and to clearly delineate the current boundary.

To date we have walked most of the eastern boundary on the peninsula south of Sukaraja (@68 kms) and located 114 boundary markers. Of these, 43% were in scrub, agricultural clearings and cultivated areas. An additional 28% of the markers have been destroyed, knocked down or moved. The implication that almost half of the boundary is deforested is worrisome.

Conservation and communication

A major goal of year three efforts was to increase public participation by facilitating communication between the national park and the *kabupatens* (districts) that overlap the park. Economic and political collapse has made decentralization of authority a new mantra. As a result, *kabupatens* have become more independent from central government.

Corruption has increased as well, and this year up to 40% of the government's allocation to the *kabupatens* went missing (the 2002 budget for Lampung Province allocates 70% of funds to 'administration'). Control of natural resources has been given to the local government as well, and this gives rise to conflicts with the national park. Local governments with large tracts of land under park management are arguing that parks should compensate for lost revenues, especially taxes, or be degazatted. In some cases, local governments are actively parceling out tracts of parkland for exploitation or are covertly supporting illegal activities in the park.

BBSNP has had little interaction with the Tanggamus District which incorporates 10,000 ha in southeast part of the park, or the West Lampung District which incorporates the biggest part of the park (@2,500 km²). This has resulted in numerous problems, including the following in the past six months:

- demonstrations in front of park headquarters
- poaching of tigers, elephants and rhino
- appearance of elephant ivory in local markets
- increased hunting by police and military
- invasion of WCS field station by illegal loggers.

We initiated meetings to facilitate communication between the park and the *kabupatens* and to get conservation on the agenda for local land use planning. The goals of the workshops are to adjust the development program and structure of the *kabupatens* to include BBSNP as a large mammal conservation area. The specific objectives are:

- To increase the involvement of people and local government in BBSNP conservation efforts through local partnerships;
- To reduce human-wildlife conflict (especially for tiger and elephant conflict) through integrated planning of development and conservation;
- To increase the effectiveness of BBSNP management in meeting the needs of people who live around the park.

In order to collect the opinions and advice of local stakeholders, WCS-IP met with the following people and institutions during February and March of 2001:

Head of District Government Tanggamus (Bupati)
Head of District Government Lampung Barat (Bupati)
Secretary of District Government Tanggamus (PEMDA)
Planning Unit Tanggamus (BAPPEDA)
Planning Unit Lampung Barat (BAPPEDA)
District Forestry Office Tanggamus (DKB)
District Forestry Office Lampung Barat (DKB)
YMHI (NGO)
LK21 (NGO)
WATALA (NGO)
PRATALA (NGO)

WWF-Indonesia (NGO)
 Head of Commission B of Lampung House of Representatives (DPRD)
 Director General of Forest Protection and Nature Conservation (PHKA)
 Director of Park Conservation (PHKA)
 Director of Biodiversity Conservation (PHKA)
 Head BBSNP (PHKA)
 Assistant Head BBSNP (PHKA)

The Tanggamus workshop was held in Kota Agung 31 May – 1 June 2001. It was attended by representatives of district government, sub-district government, village representatives, local NGOs, police, PHKA and WCS-IP (Table 3). Presentations were made on the ecology and conservation of large mammals in the park, as well as laws relating to the national parks and wildlife. Local problems were discussed including encroachment based on a poor understanding of the new community forest law, encroachment due to unclear boundary marking, law enforcement, access and utilization of NTFPs and timber, need for coordination between park and local governments, and transparency in park planning to better incorporate community participation in park protection.

A series of recommendations to the Ministry of Forestry were discussed and a steering committee was established to continue the dialogue. The committee will develop solutions for resolving boundary conflict, developing park zonation, and proposing regulations for multiple use zones. WCS-IP sponsored the first Tanggamus steering committee on 30 June 2001. There was agreement to resolve encroachment issues and support park protection on the peninsula.

Table 3. Attendees at District and provincial conservation workshops

Sector	Tanggamus	Liwa	Provincial
Government	29	49	43
PHKA	7	11	7
Local people	18	24	6
Local NGO	44	20	36
Others	5	17	5
Total	103	121	97

We held our Lampung Barat (West Lampung) workshop in Liwa on 23-24 July 2001 and the final provincial workshop in Bandar Lampung on 3-5 August 2001. These meetings followed similar formats as the Tanggamus workshop. The process revealed similar problems as the Tanggamus workshop and also gained promises of future cooperation. The provincial government, for example, invited NGOs to participate in conflict resolution over natural resources. The workshops have been very useful for bringing together NGOs interested in park and people issues, and have alerted the local government that they must deal with issues in a fair and legal manner. We are continuing to follow-up with meetings and workshops in 2002 and are in the process of hiring a conservation facilitator to continue activities.

Conservation Networks

The Governor of Lampung invited WCS-IP and other NGOs to establish the Lampung Voluntary Group on Natural Resources and the Environment. The group includes the Planning Unit for Lampung (BAPPEDA) as well as WWF-Indonesia, International Center for Research in Agro-Forestry, University of Lampung, LATIN and WATALA. The goal of this collaboration is to assist the Lampung government in solving problems in natural resource management. The MOU was signed in October and the first working meeting will be in January 2002.

WCS-IP established the Lampung NGO Information Exchange Forum in September 2001. The goal of this informal group is to exchange information on recent activities and research, and to collaborate on certain conservation actions. The format is quarterly roundtable discussions open to park staff and interested NGOs. The most important topic to date has been poaching issues in BBSNP and Way Kambas National Park. The group is pressuring the House of Representatives to make sure the police enforce and obey the law regarding illegal hunting activities.

WCS-IP also initiated an Anti-Poaching Alliance to bring attention to this serious problem. WCS and ISHA (an environmental law foundation) invited PHKA, WWF, the Rhino Protection Units, and PRATALA to participate. The goal is to develop a strategic plan for anti-poaching activities, capacity building for law enforcement agencies, improving law enforcement, and mobilizing public opinion against illegal hunting. Activities include urging the President of Indonesia (Margaret prepared a letter to President Megawati Sukarnoputri), Minister of Forestry, and the head of Police to support activities aimed at curbing illegal hunting. The alliance has grown to 14 organizations including Conservation International-Indonesia, Gibbon Foundation, PKBI/IRF, Flora and Fauna International and the Tiger Foundation.

Training

We continued to conduct formal and informal training programs for our staff, for local people, local NGOs and PHKA.

- We held training programs for new tiger staff, PRATALA, and PHKA (21-25 September).
- We sponsored an intern in July- August who assisted in camera trapping and the crop damage interviews.
- We held Tiger Protection Unit training for 16 PHKA staff and local people in April 2001. This training involved monitoring (WCS), patrol techniques (Rhino Protection Units) and law enforcement (Police).
- A one day workshop for the park staff on Indonesian environmental law conducted by an environmental policy specialist who helped with workshops was also convened.

Tiger Protection Units (TPU)

During January and February 2001 we worked with International Rhino Foundation (IRF) and Program Konservasi Badak Indonesia (PKBI) to develop the TPU collaboration. This involved several meetings between us and PHKA to work out a

Memorandum of Understanding and a Plan of Operation for Tiger Protection Units. In March and April, we purchased equipment and interviewed, hired and trained the units. Nine local people and seven PHKA candidates were trained in law enforcement, orienteering, and patrol techniques. Of these people, six local and two PHKA were chosen to form the two TPU. Patrols were initiated 13 April 2001 and to date there have been 36 patrols conducted over 1,050 km of trails.

TPUs also monitored illegal activities related to tigers. During 23 operations, the teams visited villages on more than 60 occasions. These operations collected information on the activities of local hunters, and known tiger, elephant and rhino poachers. PERBAKIN, the Indonesian equivalent of the National Rifle Association, continues to hunt illegally in the park, as do military and police. We are currently holding discussions with PHKA and other NGOs on how to handle information on poaching and WCS is supporting legal action against one elephant poacher.

Other activities

Weekly coordinating meetings with the assistant manager and/or manager of BBSNP.

15-20 January 2001: Biba, Margaret and Tim attend the Indonesian Primate Conservation and Management Plan meetings.

22-25 January 2001: Biba attended the Indonesian Communication Forum on Community Forestry in Bandar Lampung

23 April 2001: Biba, Darmawan, Iqbal, Minda, Cathy, Margaret and Tim meet with Directors of PHKA to discuss WCS-IP work in BBS and collaboration with PHKA. Presented final results of park survey, habitat analysis and poaching analysis with recommendations for action.

20-28 June 2001: Margaret and Tim attend meeting of WCS tiger biologists to discuss methods, strategies, five-year plans and 100-year vision.

21-26 July 2001: Margaret and Tim presented deforestation results at annual meeting of Society for Conservation Biology.

26-27 October 2001: Margaret and Tim met with NFWF/Save the Tiger Fund, WWF, CI and USFWS in Washington. Helped CI develop the Critical Ecosystem Partnership Fund for Sumatra. This project will provide funds for collaborative work between NGOs in BBSNP.

30-31 October 2001: Biba attended the Indonesia Biodiversity Strategy and Action Plan Workshop to formulate guidelines for revising the 1993 Action Plan.

10-11 December 2001: Margaret, Tim and Biba presented WCS activities to the PHKA as part of the PHKA workplan development process.

Reports and Publications

Kinnaird, M.F., E.W. Sanderson, T.G. O'Brien, H.T. Wibisono, and G.T. Woolmer. *Deforestation trends in a tropical landscape and implications for endangered mammals*. Submitted to Conservation Biology. 39 pp.

O'Brien, T.G., H.T. Wibisono and M.F. Kinnaird. *Crouching Tigers, Hidden Prey: Sumatran Tiger and Prey Populations in a Tropical Forest Landscape*. Submitted to Animal Conservation. 47 pp.

O'Brien, T.G., H.T. Wibisono and M.F. Kinnaird. *Status of Sumatran Tigers in the Bukit Barisan Selatan National Park, Sumatra, Indonesia*. WCS-IP report to the Directorate of Forest Protection and Nature Conservation. 28 pp.

Wildlife Conservation Society – Indonesia Program. 2001. *Taman Nasional Bukit Barisan Selatan dalam ruang dan waktu: laporan hasil penelitian*. WCS-IP report to the Directorate of Forest Protection and Nature Conservation. 164 pp. (Annual activity report).

Wildlife Conservation Society – Indonesia Program 2002. *Laporan Tahunan Kegiatan Tiger Protection Unit (TPU) di Taman Nasional Bukit Barisan Selatan April – Desember 2001*. 21 pp. (Annual Activity Report for TPU).