

DISEASE SURVEILLANCE AROUND WAY KAMBAS NATIONAL PARK TO SUPPORT SUMATRAN RHINO CONSERVATION AND HEALTH

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Introduction

Suaka Rhino Sumatera (SRS) is a semi *in situ* breeding program for the endangered Sumatran rhinoceros (*Dicerorhinus sumatrensis*, CITES, APPENDIX I) located within the rainforests of Way Kambas National Park (TNWK), Lampung. Since 1998, the SRS mission has been to repatriate Sumatran rhinos remaining in *ex situ* zoological settings back to a more natural environment to promote breeding. Health is a critical component of any captive-based program and warrants intensive investigation. In 2003, the last 5 captive rhino in peninsular Malaysia died suddenly of trypanosomiasis (Mohamad et al., 2004). More recently the SRS team identified chronic trematode parasitism (Paramphistomidae) in one of its rhinos and abundant trematode organisms in the gastrointestinal tract of an emaciated elephant that died at the nearby TNWK elephant sanctuary. These health issues invariably are linked to the wildlife and domestic animal contact in the national park area. Increasingly, conservationists are recognizing the "one health" principle in which the people, domestic and wild animals all share a common health (WCS, 2004). Mapping of potential disease agents around TNWK was first implemented prior to the translocation of the male Sumatran rhino from the Los Angeles Zoo. This animal, Andalas, is the first captive-born Sumatran rhino ever to be returned to his species homeland in Indonesia. Coming from a zoo environment in North America, Andalas was never exposed to the disease agents he would encounter in TNWK. Therefore, the SRS conducted a survey and mapped the disease risk in the national park area.

Materials and Methods

Samples were collected during July-August 2006 and July 2007 from five Sumatran

rhinoceroses at the Sumatran Rhino Sanctuary, 49 Sumatran elephants at the Way Kambas Elephant Conservation Center, and 191 livestock (152 cattle, 26 water buffalo, 12 goats and 1 sheep) in six villages bordering Way Kambas National Park. Samples collected for this study were blood, serum, feces and ectoparasites from the animals and environment. Blood and serum samples were analyzed for hemoparasites using giemsa and diff quick stains and molecular analysis with Reverse Line Blot Hybridization (RLB) and PCR for species sequencing. Both qualitative methods (native and sedimentation) and quantitative methods (Mc Master and hemocytometer) were used to identify and measure endoparasite infections.

Results and Discussion

Hemoparasites identified using microscopy include *Anaplasma marginale*, *Anaplasma centrale*, *Theileria sp.*, and *Babesia sp.* Molecular analysis using Reverse Line blot Hybridization (RLB) and nested PCR revealed three species of hemoparasite; *Theileria bicornis* was discovered in one Sumatran rhino, while *Theileria buffeli*, *Theileria orientalis* and *Plasmodium sp.* were identified in water buffalo. *Theileria bicornis* has been reported to cause mortality in black rhino in Africa (Nijhof, 2003). In our study in and around TNWK, PCR analysis of the DNA extracted from blood samples of domestic ungulates revealed a significant number of trypanosome-infected animals in the villages sampled. The primary animals affected were cattle and water buffalo. The incidence of trypanosome infection in water buffalo (n=26) was 19% and cattle (n=147) was 17%. The Sumatran Rhinoceroses and the Sumatran Elephants in comparison both had low rates of trypanosome infection, with only two of the 53 captive wildlife species (1 rhino and 1 elephant) testing

positive for trypanosomes. The species of trypanosome remains unidentified, although efforts to identify the species of organisms are ongoing.

Endoparasite identified from Sumatran rhino include *fasciolidae*, *paramphistomidae* and *oxyuris* sp. A land snail of the genus *lymnaea* sp. was also identified in the wallowing area of the Sumatran Rhino Sanctuary. Stool analysis from 37 Sumatran elephants revealed that 31 were infected with trematodes of the genus *Paramphistomidae* with high worm burdens estimated at up to 352.73 eggs per gram of feces. The elephant conservation center houses snails of the genus *Planorbis* that is suspected to be the intermediate host for the genus *Paramphistomidae*. A number of parasitic protozoa have also been identified from 3 families and 9 genera; almost all protozoan parasites found in domestic animals have also been found in wildlife (Sumatran rhino and elephant). From these results we conclude that the rhino and elephant of TNWK are at high risk for acquiring parasitic infection from cohabitating with domestic animals. Protozoan parasites from the genera *entamoeba*, *cryptosporidium*, *balantidium* and the family *Ophryoscolecidae* are present in rhino, elephant, cattle and buffalo. *Cryptosporidium* and *Entamoeba* are zoonotic parasites commonly transmitted through contamination of water and grazing areas.

Ectoparasites were identified from 24 species in 9 families from the Insect class and one family from the Arachnida class. Two species of tick (family *Ixodidae*) were identified in the SRS: *Haemaphysalis hystrix* and *Amblyomma testudinarium*. Both of these ticks are known reservoirs and vectors for trypanomiasis (Thekisoë et al., 2007)

Many species of parasite play an important role in disease transmission as mechanical and/or biologic vectors; these roles are connected with a life cycle that requires a mammalian host. Given the significant risks to wildlife, TNWK park policy should consider restricting domestic animal traffic in and around the park area.

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