

Conserving the endangered dhole in Cambodia: minimum reserve size and prey numbers

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Dholes have disappeared from most of their distribution during the past 50 years, and remaining populations occur in small isolated populations in India and Southeast Asia. Reasons for their decline are unknown, although two important factors likely are reserve size and prey numbers. In January 2013, we initiated a project on dholes in Cambodia with funding from PTES. The overall aim of this project is to determine the minimum reserve size and prey densities needed to conserve viable dhole populations in Cambodia. Research will be carried out in Mondulkiri Protection Forest (MPF; 3,631 km²) in eastern Cambodia. GPS collars will be placed on dholes from at least 3 adjacent packs to determine their area requirements. Dietary habits and prey requirements will be determined by collecting and dissecting dhole feces, and comparing contents to local prey numbers. Because competition with other carnivores likely affects dhole populations, we also will study the dietary overlap between dholes and leopards, as well as the dietary and spatial overlap between dholes and golden jackals. Consequently, jackals also will be captured and monitored to determine how they share space and limited resources with dholes. Overall, this project will include training programs to help build local capacity, while also assisting long-term conservation efforts for dholes.

Progress to date

The initial field work was delayed 3 months, to 1 January 2013, due to unusually late monsoon season which flooded areas around the study site and inhibited access. Due to heavy monsoon rains, field work only can occur from Nov to June each year.

Dietary result: From January 2013 to June 2015, we established 30 transects (2 km each) throughout the core zone of MPF to record carnivore sign and collect scats (i.e., droppings). These all walked several times each year to collect scats and record carnivore sign. To date, we and collected 107 dhole scats, 109 leopard scats, and 200 jackal scats, and 160 small felid scats. The scats are being dissected in a laboratory by Cambodian students to determine the prey contents (Fig. 1). Initial results show that dholes have a rather narrow dietary niche, and consume mainly muntjac and wild pig, with some banteng. In contrast, leopards have a broad niche breadth, and consume prey ranging from rodents and small carnivores to banteng. However, muntjac and wild pig are the two most important prey items for leopards, thus they likely compete with dholes for these prey species. For jackals, preliminary results indicate they consume mainly termites during the dry season, but also small rodents and some small ungulates such as muntjac. For small felids, preliminary results indicate that both jungle cats and leopard cats prey mainly on small rodents, and also some birds and small reptiles. During 2014, the prey populations in MPF were determined by park rangers and WWF staff using distance sampling. Results showed densities of 2.3 ± 0.4 muntjac/km², 6.0 ± 1.8 wild pig/km², and 2.2 ± 0.5 banteng/km². Dietary results will be compared to prey availability to determine prey selection for dholes, leopards, and jackals.

Dhole population: A recent canine distemper outbreak, introduced from village dogs brought into MPF by poachers, decimated the dhole population over the past few years. Camera trap data

showed a steep decline in dhole numbers starting in 2011, with no dholes being recorded in camera traps in 2013. Our transect lines in 2013 recorded little sign of dholes, suggesting the population did not breed successfully in 2013. In 2014 we established another camera trapping grid in MPF, and recorded 4 independent photos of dhole packs. Although pack size appeared to be small (2-3 adults), we obtained two records of at least one pup, possibly from the same pack. Similarly, results from transect lines resulted in a 60% increase in dhole sign in 2014 compared to 2013, providing further evidence the dhole population is growing on MPF. In 2015, we did opportunistic camera trapping and recorded a photo of a dhole near one of the ranger stations (Fig. 2). Additionally, during surveys we recorded at least twice as much dhole sign along roads in 2015 compared to 2014, with evidence of breeding in several packs. These results indicate the dhole population is rapidly increasing in MPF as it continues to recover from the disease outbreak.

Capture and monitoring: The low numbers of dholes in MPF prevented us from capturing any during the past several field seasons. Trapping consisted of setting traps along roads, with radio monitors attached to them. The monitors were checked every 2-3 hr during the night to determine if animals were captured. In 2015, using 6-10 traps at a time, we captured 0 dholes, 3 jackals, and 1 large Indian civet in 406 trap nights. The female jackal (10.2 kg) was captured on 14 Mar (Fig. 3), and she was a re-capture from last year who had been wearing a broken GPS collar, which we replaced with a radio collar. One male jackal (8.0 kg) was captured on 13 March, whereas a second male jackal (9.6 kg) was captured on 20 March, and GPS collars were placed on both of them.

The GPS collars obtain 4 locations/day, which are emailed to me on a weekly basis. For the female jackal with the radio collar, we monitored her movements with telemetry equipment to determine her home range. Additionally, a female jackal captured and radio collared in Feb 2013 was still monitored during the past field season to determine her home range. Preliminary results show that home ranges of jackals are relatively large, with an average of 55 km² (50-60 km²).

Building local capacity and education: A total of 15 park staff and rangers have been trained in the identification of dhole sign, as well the identification of sign from other carnivore species. Additionally, two Cambodian biologist and three Cambodian students are being trained in field research methods for monitoring dhole populations (Fig. 4). We are incorporating into the project at least 1 MSc thesis for a Cambodian student. Cambodian biologists and students are involved with all aspects of this project, from capturing and monitoring dholes and jackals, to collection of scats along transect lines. Students also are dissecting carnivore scats in the laboratory to determine prey remains. Presentations about dhole ecology and conservation have been given to two different government ministries in Cambodia, as well as NGO's that are involved with conservation efforts in the country.

Future plans

I plan to return to Cambodia for a fourth and final field season from November 2015 to June 2016. The main goal will be to capture 3 dholes from different packs to monitor their movements using GPS collars. I will use data collected from the previous field seasons (e.g., sign, camera traps) to focus trapping efforts in dhole "hot spots." The chance of success will be significantly greater than the previous field seasons due the increasing dhole population on MPF. I will

continue monitoring the collared jackals, and complete analysis of the food habits and dietary overlap of dholes, leopards, jackals, and small felids. I also will continue to train local students and researchers, and give educational talks about dhole ecology and conservation.

Ultimately, results of this project will be used to make recommendations in Cambodia and other Asian countries regarding the appropriate reserve size and prey numbers needed to protect the last remaining dhole populations, estimated at less than 2,500 mature individuals worldwide and still declining. Our research also will emphasize the importance of disease monitoring in dhole populations, because this species appears to be especially susceptible to epizootics introduced from local village dogs.



Fig 1. Dhole scat dissected in laboratory



Fig 2. Dhole near ranger station in April



Fig 3. Female jackal re-captured in 2015



Fig 4. Ranger monitoring collared jackals