# Hypotheses

1. Heat benefits African wild dogs
   1. African wild dogs can compensate for high temperatures through hunting at night
      1. Impala congregate in glades at night
         1. Wild dogs are more likely to hunt at night and have longer, more intense nocturnal hunts when it has been hot the previous day
         2. Wild dogs target glades when hunting at night
   2. Impala are easier to hunt when it is hot
      1. Habitat use by impala and wild dogs is more similar when it is hot
   3. Dikdik are easier to hunt when it is hot
      1. Habitat use by impala and wild dogs is more similar when it is hot
   4. Wild dogs are more likely to eat impala when it is hot
2. Heat negatively impacts wild dogs
   1. There are negative impacts of temperature on wild dog hunting behaviour
      1. Wild dog crepuscular hunts are shorter, less intense and less likely to occur when it is hot

# Results

## Habitat Use

There were significant differences between woody cover use for each of the three species (Kruskal-Wallis chi-squared = 13151, df=2, p<0.001). Dik-diks preferred woodier areas than impala, and wild dogs tended to hunt in areas of denser cover than those preferred by either of their prey species.

#### Impala

Impala were found in areas with a lower proportion of woody cover than would be expected at random (W = 3.07 x 1010, p < 0.001). This effect was consistent for crepuscular (W = 1.09 x 1010, p<0.001) and nocturnal hunting periods (W = 4.73 x 109, p<0.001). Impala were also found closer to glades than expected at random (W = 3.62 x 1010, p<0.001). This was true for crepuscular (W = 1.08 x 1010, p<0.001) and nocturnal periods (W = 7.45 x 109, p<0.001). There was a significant difference between probability of being in glades and woody cover use between the morning and evening periods (Table1).

Impala were closest to glades in the day (Table 1), followed by at night. They were furthest from glades in the evening, which was also the time period that they were least likely to be found in glades. Impala were most likely to be found in glades, and in the lowest levels of woody cover, at night. The highest levels of woody cover were used in the mornings. Impala were closer to glades and in greater levels of woody cover at higher maximum temperatures at all times of day. Impala were less likely to be in glades in the morning and evening on hot days and more likely to be in glades on nights following hot days. In wet seasonal periods impala were further from glades at all times of day other than during the evenings, when they were also found in less dense woody cover in wet periods, and impala were more likely to be found in glades in daytime and evening periods. Rainfall had a variable relationship with the likelihood of impala being in glades depending on the time of day. Impala were closer to glades at higher levels of moonlight during the evenings and at night, and more likely to be found in glades in mornings following nights with high levels of moonlight and evenings proceeding nights with high moonlight levels. Impala were less likely to be in glades when moonlight levels were higher.

#### Dikdik

There was no difference between dik-dik use of woody cover and random locations within their home ranges (W = 4.80 x 108, p = 0.1045). This was true for crepuscular (W = 1.38 x 108, p = 0.1029) and nocturnal periods (W = 1.03 x 108, p = 0.5257). Dik-diks were found further from glades than expected at random (W = 1.40 x 108, p<0.001). This was true for crespuscular (W = 4.03 x 107, p<0.001) and nocturnal hunting periods (W = 3.01 x 107, p<0.001). There was no significant between distance to glades, probability of being in glades and woody cover use between morning and evening (Table 2).

Dikdik were closest to glades when rainfall had been higher in that 24h period at all times of day (Table 1), and less likely to be in glades during seasonal periods with higher rainfall. During wetter seasonal periods dikdik were found in higher woody cover at all time periods other than the middle of the day, when they were found in more open areas. At higher temperatures dikdik were more likely to be in glades, and in lower levels of woody cover, during crepuscular periods, and were found in higher levels of woody cover during the day. Dikdik were found in areas with less woody cover, closer to glades and were more likely to be found in them at night when moonlight levels were higher (Table 2).

#### Wild dogs

Wild dogs hunted in areas with a lower proportion of woody cover than expected at random (W = 2228900, p<0.001). While this effect was strong at night (W = 82250, p<0.001), there was no significant difference in woody cover between crepuscular hunt locations and random points (W = 1454100, p = 0.2744). There was no significant between distance to glades, probability of being in glades and woody cover use between morning and evening (Table 3).

African wild dogs hunted closer to glades at bigger pack sizes during both crepuscular periods and at night. When African wild dogs were denning they hunted closer to glades during crepuscular periods but further from glades during the night, and in less woody cover at all times of day. Wild dogs hunted further from glades at higher levels of moonlight. Temperature did not influence the location of wild dog hunts.

## Wild dog diet

Wild dogs ate fewer impala at higher temperatures and when they were resident on pastoral land (Table 4)

## Wild dog hunts

At high temperatures wild dogs had shorter, less intense morning and evening hunts, and evening hunts were less likely to occur. Night time hunts were more likely to occur following a hot day and were longer and of greater intensity. There was a positive interaction between temperature and rainfall on the duration of morning and evening hunts and the intensity of evening hunts. Morning hunts were less likely to occur when the previous night had been brighter, and evening hunts were shorter and less intense when proceeding nights with greater levels of moonlight. Night time hunts were more likely to occur and were longer and more intense when moonlight levels were higher. Morning hunts were shorter during the denning period, and evening and night time hunts were longer. Hunts during all time periods were more intense during the denning period, evening hunts were more likely to occur, and night-time hunts were less likely to occur. There was a positive interaction between the effect of denning and temperature on the duration of morning and evening hunts and a negative interaction between the effect of denning and temperature on the duration of night-time hunts.

# Discussion

1. Heat benefits African wild dogs
   1. African wild dogs can compensate for high temperatures through hunting at night
      1. Wild dogs are more likely to hunt at night and have longer, more intense nocturnal hunts when it has been hot the previous day

* Yes
  + 1. Impala congregate in glades at night
       - * Yes

1. Wild dogs target glades when hunting at night

* No
  1. Impala are easier to hunt when it is hot
     1. Habitat use by impala and wild dogs is more similar when it is hot
* Yes
  1. Wild dogs are more likely to eat impala when it is hot
* No

1. Heat negatively impacts wild dogs
   1. African wild dogs can’t compensate for high temperatures through hunting at night
      1. Wild dogs aren’t more likely to hunt at night and have longer, more intense nocturnal hunts when it has been hot the previous day
         * + No
      2. Impala don’t congregate in glades at night
         * + No
         1. Wild dogs don’t target glades while hunting at night
            * Yes
   2. Impala aren’t easier to hunt when it is hot
      1. Habitat use by impala and wild dogs is not more similar when it is hot
         * + No
   3. Wild dogs aren’t more likely to eat impala when it is hot
      * + - Yes
   4. There are negative impacts of temperature on wild dog hunting behaviour
      1. Wild dog crepuscular hunts are shorter, less intense and less likely to occur when it is hot

* Yes