General Information for the case study:

WRL reference	M03 D01	
Module	M03 Animal Behaviour	
Data Set	D01 Bull elephant dominance relationships after contraception	
Research questions	1. How do you identify individual elephants based on their physical appearance? 2. Is the dominance hierarchy of bull elephants at Pongola determined by age or has it been affected by the vasectomies?	
Keywords	**Behaviour;** bush ecosystem; **conservation; contraception; dominance hierarchies;** human management; hormones; **population control**; reproduction; sampling; sustainability	
Potential Curriculum links for Biology	**AQA**	3.4.1;3.4.7; 3.7-f and J; 3.9
	edexcel	App 10
	IB	11.4; G.4.4
	Camb.Pre-U	5.2; app 3
	OCR	2.3.4; 5.3.2
	WJEC	4.5; BY6; app 3; 5.8
	SQA	Case studies; FH2J (2); H0AL ; H0AM
	CCEA	2.2; 2.3; 4.4; 5.6; Maths and Stats knowledge
Summary	This study investigates the effect of vasectomies on the behaviour of young bull elephants in a small herd in Pongola Game Reserve in South Africa. After a number of the elephants were vasectomized, behaviour studies were used to determine dominance hierarchies in the bulls under study. The data from these studies were used to produce a rank order for dominance amongst the bull elephants. The first exercise gets students to identify the 8 bull elephants from identification sheets and photographs. The second part of the study constructs a 'dyadic dominance matrix' (pairs of competing individuals) from collected data and then plotting the results in a scatter plot . Reasons and consequences of the study are considered and related to the population control and management of elephants in fenced reserves. **Difficulty:** **Research Q1 (identification): 4/10** **Research Q2 (Dyad matrix and scatter plot): 7/10**	