
CSI: CPAWS Science Investigation

Black bears can be...white??

ALONG the Pacific coast in British Columbia's temperate rainforests wander three populations of rare white-coloured bears. Some people believe they are albino black bears, while others believe they are polar bears. In actuality, they are a sub-species of black bear called the Kermode bear, *Ursus americanus kermodei*. Named after a Canadian scientist who studied them, the Kermode bear (also known as the Spirit Bear) has been protected from sport-hunting since 1925.

Researchers at the University of British Columbia decided to study the populations to find out

why some bears in the region were coloured white, while the majority were coloured black. Researchers used hair-snares to help them with their analysis: they put bait (animal carcasses) in trees surrounded with barbed wire. The bears attracted to the odour would catch their fur on the wire, which researchers collected and analyzed for DNA. They sampled 220 bears across the region where white bears occur.

After studying the samples, they concluded that white bears were the result of a recessive gene, W (the dominant gene for the black colour is B). Further genetic analysis demonstrated that of the

220 bears, the following genotypes were found: 22 white bears (WW), 34 black bears (BW), and 164 black bears (BB). These results confirmed a genetic control and recessive inheritance of the white coat.

This kind of information can be useful in predicting and monitoring the numbers of Kermode bears in coastal British Columbia, and may have implications for forest management and sport-hunting. There are estimated to be less than 400 Kermode bears in the world.

What are the observed frequencies in this population?

BB: BW: WW:

What percentage of bears is likely to be coloured white?

Assuming a total coastal black bear population of 4352, how many will likely be coloured white?

What are the five assumptions of the Hardy-Weinberg Equilibrium?

What is the allele frequency (p) of B? p =
What is the allele frequency (q) of W? q =

Assuming HWE, what are the genotypic frequencies?

$p^2 =$ $2pq =$ $q^2 =$

Given a population of 220 bears, fill in the following table:

Genotypes	BB	BW	WW	total
Observed #s				
HW genotype frequencies	$p^2 =$	$2pq =$	$q^2 =$	1
HW predicted numbers (frequency x population)				

Is this population in Hardy-Weinberg Equilibrium? Explain.

If white bears prefer to mate with white bears, which HW assumption is violated?

You are the senior wildlife biologist for Spirit Bear Park, which provides critical habitat for both black and white bears. While hunting for white black bears is prohibited, hunting for black bears in this area is still permitted. The Park Manager is reviewing the hunting policy. What do you tell her? Given your knowledge of genetics, how might this affect the white bear gene pool over time?

A forestry company is proposing to clear-cut an area adjacent to Spirit Bear Park. As a wildlife biologist, you have been called upon to comment on the proposal. You know that black bears prefer forested landscapes and are likely to migrate into neighbouring habitat if they become displaced. How do you think this immigration of black bears into Spirit Bear Park would affect the Kermode bear gene pool?

Spirit Bear Youth Coalition

In grade nine, Simon Jackson wanted to help protect B.C.'s spirit bears (the rare white Kermode bear). He launched a letter writing campaign to protect the bears' habitat.

Simon went on to become the founder of one of the largest youth environmental networks in the world. Time Magazine honoured him as one of 60 Heroes for the Planet. To find out more about Kermode bears and how you can get involved, visit:

<http://dsimonjackson.com/>