

# Animals balance threat of starvation with threat of predators to stay alive

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Sea otters sometimes respond to ecotourists as though they are predators.

(Phys.org)—In the natural world, searching for food is a high-stakes game in which animals risk starving to death or being killed by a predator. New research from the University of Bristol shows that to stay alive in a changing environment, animals must carefully time when they go out looking for food and when they hide from predators.

Animals must go out into the open and look for food to avoid [starvation](#), but in doing so they expose themselves to the risk of predation. The Bristol team, led by research associate Dr Andrew Higginson, built a [computer model](#) to predict how animals should manage these risks when the [environmental conditions](#) change over time.

In the model, sometimes conditions were good, with plentiful food or few [predators](#), and sometimes they were bad, with little food or many predators. The results of the study, published in The [American Naturalist](#), show that the critical factor affecting survival is how long the good and bad periods last.

"If conditions change quickly, the animal can get enough food by only going out into the open when times are good, and resting otherwise" Dr Higginson explained. "But if [harsh conditions](#) persist, the animal has to find food during those times as well."

"For example, if predators tend to hang around for long periods, the animal should almost ignore them. It is forced to go looking for food anyway, otherwise it will starve," added Dr Higginson.

A similar [hypothesis](#) was proposed 13 years ago, but fails to predict how real animals behave under the risk of predation. Dr Higginson said: "The previous theory was too simple, because it didn't allow for the fact that current conditions may sometimes persist for a long time. Building this into our model, we find a much better match to what real animals do."

The model also makes the surprising prediction that many animals are killed by predators not when times are hard but when good conditions return, for example at the start of spring. "It is at this time that food is plentiful and animals are hungry, so they pay less heed to the risk of predation," said Dr Higginson.

The team's findings may have important implications for the ecotourism industry, as Dr Higginson explained: "Animals sometimes respond to ecotourists as if they are predators. Tours could be more sensitively designed to ensure that the animals spend enough time eating to meet their needs."

**More information:** 'Generalized Optimal Risk Allocation: Foraging and Antipredator Behavior in a Fluctuating Environment" by Andrew D. Higginson, Tim W. Fawcett, Pete C. Trimmer, John M. McNamara and Alasdair I. Houston in *The American Naturalist*.

[www.jstor.org/stable/10.1086/667885](http://www.jstor.org/stable/10.1086/667885)

Provided by University of Bristol

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