

Healthy mom with lots of help key to thriving brood, scientists say

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Yearling littermates engage in a game of chase in Yellowstone's Druid Peak pack. Credit: Dan Stahler/NPS

(Phys.org)—What does it take to raise successful, self-sufficient offspring? A healthy mom with lots of in-house help, says Utah State University researcher Dan MacNulty. While this advice may benefit humans, a recent study by MacNulty and colleagues actually focuses on another group of large, social mammals – namely, wolves.

"Using 14 years of data from the long-term study of [wolves](#) in Yellowstone National Park, we examined a number of key traits that allow wolves to overcome environmental stress," says MacNulty, assistant professor in USU's Quinney College of Natural Resources. "We discovered mother wolves' body weight and pack size play a crucial role in enabling pups to survive and thrive from birth to [young adulthood](#)."

With Dan Stahler and Doug Smith of the National Park Service's Yellowstone Wolf Project, as well as Robert Wayne and Bridgett von Holdt of the

University of California, Los Angeles, MacNulty published findings in the Oct. 9, 2012, online edition of the [Journal of Animal Ecology](#). The study, which stems from a newly established collaboration between the wolf project and USU, was funded by the National Science Foundation, National Park Service and the Yellowstone Park Foundation, along with private donors.

Environmental conditions that impact wolf reproduction, the researchers say, include disease prevalence, especially deadly canine distemper – caused by a contagious virus to which pups are especially vulnerable; resource availability and population density. In addition to body weight and pack size, the researchers examined effects of maternal age, color (gray or black coat) and wolf population size on reproductive success.

"Each of these factors affects reproduction but, overwhelmingly, female body weight and pack size are the main drivers of litter size and pup survival," says Stahler, the study's lead author. "Bigger females produce bigger litters; bigger packs are better equipped to hunt and defend pups and resources from competitors."

Social carnivores, wolves live in territorial, kin-structured packs. Female wolves depend on other adults in the pack to help them provide food for their pups and defend the youngsters from predators; mainly, competing packs of wolves.

"Motherhood is a challenge for any species," Stahler says, "But the evolution of cooperation in wolf societies is a notable benefit to mother wolves."

As wolf management in the United States moves from recovery to a new era of conservation, the researchers believe knowledge of reproduction will help managers maintain [wolf populations](#). With the recent de-listing of gray wolves in Wyoming, state managers assume control of the last federally

protected group of these animals in the Northern Rockies this fall. wolves."

"While these animals are no longer protected under the Endangered Species Act, states are required to maintain a minimum number of wolves and breeding pairs to prevent re-listing," MacNulty says. "As in Idaho and Montana, Wyoming is legally required to maintain a statewide population of at least 100 wolves, including 10 breeding pairs."

A breeding pair, he says, is defined as an adult male and female with at least two pups surviving to the end of the calendar year.

He adds the Yellowstone study highlights factors that determine the number of pups surviving to the end of the year, and this information may help state managers meet population objectives.

"Managers could use information on pack size, weight of harvested female wolves, or [disease prevalence](#) as indicators of future population growth and set harvest limits accordingly," MacNulty says.

If pack sizes are small, female wolves are underweight or disease outbreaks occur, he says, managers could reduce harvest to ensure sufficient numbers of breeding pairs. On the other hand, if pack sizes are relatively large, female wolves are at healthy weights and acute diseases are absent, managers can have confidence that current harvest levels are appropriate.

"Biologists and managers have long recognized the resiliency of wolves," Stahler says. "Our findings point to traits that help explain wolves' ability to overcome environmental challenges like human exploitation or competition with other wolves."

While these findings are specific to the unexploited [Yellowstone National Park](#) population, they may well represent important biological drivers of reproduction in any wolf population, he says.

"Long-term, detailed studies from wild ecosystems like Yellowstone's enhance our knowledge about these charismatic, but controversial carnivores," Stahler says. "This type of research has great value in informing anyone who has an opinion about

"Our results should reassure wolf conservationists," MacNulty says. "If female body weights are high and pack sizes are sufficiently large, wolves can successfully reproduce despite the impact of environmental factors, such as disease and competition."

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