

MS Thesis
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Title: Influence of Environmental Factors on Red Panda (*Ailurus fulgens*) Welfare

Thesis Director: Dr. Elizabeth Freeman

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ABSTRACT

Animals in zoological institutions are exposed to a multitude of environmental elements daily. Understanding which factors may invoke a stress response and be indicators of negative well-being is important to improve captive management of species and enhance reproductive success. Red pandas (*Ailurus fulgens*) are an endangered species facing multiple threats in the wild including habitat destruction, forest fragmentation and poaching. Captive populations are vital for longevity of the species, as numbers in the wild continue to decline. Red pandas are commonly housed in zoos across the United States, yet growth of the ex-situ population is hindered by high cub mortality. Behavioral and physiological responses of red pandas to climate (temperature, humidity and windspeed), zoo visitors, noise and season were assessed. From June 2018 to June 2019, behavioral observations were conducted 1-2 times per week between 0800 and 1000 h on red pandas housed at the Smithsonian's National Zoological Park and Conservation Biology Institute. Fecal samples were collected 3-7 days per week on ten individuals housed at four zoos in the U.S. Fecal glucocorticoid metabolites (fGM) were measured with a corticosterone enzyme immunoassay and related to environmental conditions. Increased temperatures were associated with decreased activity and increased coping behaviors, including panting and straddle. Season, daily average temperature and the number of zoo visitors from the previous day affected fGM concentrations. Red pandas had lower glucocorticoid concentrations in the spring and/or summer compared to other seasons. Increased zoo visitor numbers and daily average temperature led to lower fGM concentrations the following day. Results suggest that environmental temperature impacts red panda behavior and the species displays seasonal variability in fecal glucocorticoid metabolites. Findings from the study may prove useful in improving *ex-situ* management and enhancing welfare of red pandas.