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## MONITORING HOARY MARMOTS: MATCHING OBJECTIVES TO AVAILABLE EFFORT

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Monitoring provides information necessary for managers to make informed decisions related to the status of populations. However, collecting sufficient data to reliably detect trends in abundance over a large area is costly in time and resources. Instead, detecting changes in distribution may be a more feasible goal, while still providing useful information. Hoary marmots are alpine obligates, patchily distributed throughout the mountains of western North America. This species requires deep winter snowpack to survive during winter and populations at the edges of their distribution are most likely to be vulnerable to changes in climate. We sought to design a monitoring plan that could identify changes in distribution of hoary marmot populations. We used occupancy methods to create a predictive habitat map for hoary marmots in western Montana. We evaluated designs that could be implemented by existing staff or with 2 dedicated technicians and assessed tradeoffs in the number of sites and surveys needed to detect a change in distribution. We also evaluated the effort needed to sample throughout Montana or within selected mountain ranges. Based on our analyses, managers will need to complete surveys at  $\geq 65$  sites at least twice a season and without dedicated technicians, the area sampled will be limited. Hoary marmots likely will be negatively impacted by climate change, especially in isolated mountain ranges at the southern extent of their distribution. Assessing the magnitude of these changes will be impossible without sufficient data, highlighting the importance of identifying monitoring objectives before data collection begins.