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Summary:
1. The reproduction of the golden eagle *Aquila chrysaetos* was studied in southwestern Idaho for 23 years, and the relationship between eagle reproduction and jackrabbit *Lepus californicus* abundance, weather factors, and their interactions, was modelled using general linear models. Backward elimination procedures were used to arrive at parsimonious models.
2. The number of golden eagle pairs occupying nesting territories each year showed a significant decline through time that was unrelated to either annual rabbit abundance or winter severity. However, eagle hatching dates were significantly related to both winter severity and jackrabbit abundance. Eagles hatched earlier when jackrabbits were abundant, and they hatched later after severe winters.
3. Jackrabbit abundance influenced the proportion of pairs that laid eggs, the proportion of pairs that were successful, mean brood size at fledging, and the number of young fledged per pair. Weather interacted with prey to influence eagle reproductive rates.
4. Both jackrabbit abundance and winter severity were important in predicting the percentage of eagle pairs that laid eggs. Percentage laying was related positively to jackrabbit abundance and inversely related to winter severity.
5. The variables most useful in predicting percentage of laying pairs successful were rabbit abundance and the number of extremely hot days during brood-rearing. The number of hot days and rabbit abundance were also significant in a model predicting eagle brood size at fledging. Both success and brood size were positively related to jackrabbit abundance and inversely related to the frequency of hot days in spring.
6. Eagle reproduction was limited by rabbit abundance during approximately two-thirds of the years studied. Weather influenced how severely eagle reproduction declined in those years.
7. This study demonstrates that prey and weather can interact to limit a large raptor population's productivity. Smaller raptors could be affected more strongly, especially in colder or wetter climates.