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## **SPATIOTEMPORAL VARIATION IN GRASSLAND BIOMASS AND FORAGE QUALITY ACROSS THE UPPER YELLOWSTONE RIVER BASIN**

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Spatial and temporal heterogeneity in the abundance of high quality forage is known to play an important role in migratory ungulate ecology. While many studies have documented how variations in the timing of start of growth and land use affect the availability of high quality forage across temperate landscapes, few studies have quantified how the abundance of high quality forage varies across these gradients. In this study we quantified how aboveground biomass, crude protein, and digestibility varied throughout the growing season in (1) grasslands that start growth early, mid, and late in the season and (2) in irrigated agriculture, private grasslands, and public grasslands and then used these estimates to (3) assess how the seasonal abundance of high quality forage differed in these start of season and land use classes in the Upper Yellowstone River Basin. We found that grasslands that start growth late in the season had up to 150% greater aboveground biomass, 20% greater crude protein, and 15% greater digestibility at its seasonal peak than grasslands that start growth mid and early in the season. Irrigated agriculture had up to 500% greater aboveground biomass, 90% greater crude protein, and 10% greater digestibility at its seasonal peak than private and public grasslands. Overall, the abundance of high quality forage was greater in the late start of season and irrigated agriculture grasslands. Understanding these landscape-scale variations in the abundance of high quality forage may provide important information for migratory ungulate research and management.