results

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## Snow depth and twig availability over winter

Transect data on average found starting willow biomass to increase with height (P = 0) class with average availability being 4.8, 8.6, and 12.7 g for the low, medium, and high heights, respectively. The maximum snow depth recorded was 90 cm in both winters. Maximum snow depth was reached on 2023-03-07 in 2022-2023 and 2024-03-16 in 2023-2024. Low twigs remained 100% available until snow began to accumulate, after which medium twigs became available followed by high twigs. The maximum availability, based on daily averages, was 67% and 21% for medium and high twigs, respectively. Low twigs became completely unavailable as winter progressed, while medium twigs became the most available proportion-wise. High twigs showed the least variation in availability, always remaining relatively less available over winter relative to other height classes.

## Twig and nutrient availability in response to snow depth

GAMs that modeled willow availability in response to snow depth found that PTA behaved non-linearly in response to snow depth for all height classes (edf > 2; Table 1). Low PTA decreased exponentially with snow, as expected, becoming 0% available at roughly 50 cm of snow, or the maximum height of the low twig category (edf = 6.6, P < 0.001, R2 = 0.81). Medium twigs showed an inverted, quadratic response, increasing in availability up to 50% at 30 cm of snow, after which availability decreased until they became nearly 0% available after around 75 cm of snow (edf = 7.2, R2 = 0.36). High PTA was the most difficult to predict (R2 = 0.07). These branches were easily pushed down by snow, and then covered quickly as snow continued to accumulate. As snow melted, they would become temporarily available for a few days before springing back to > 1 m when enough snow melted (edf = 8.4). As a result, high twigs rarely surpassed 50% in availability.

After we converted predictions for PTAs to total available biomass (g/m2), our findings matched our predictions. We found that from zero to 90 cm of snow, the total biomass of willow available to hares decreased 68%, from 5.3 to 1.7 g/m2. However, this trend was very non-linear; available biomass peaked at mid ranges of snow, as we predicted. Specifically, we found that as snow increased from 0 to 10 cm available biomass increased by 44.5% of what was available pre-snow, up to 1.7g/m2. Available biomass remained high until 30 cm after which it declined steadily until the maxmimum snow depth.