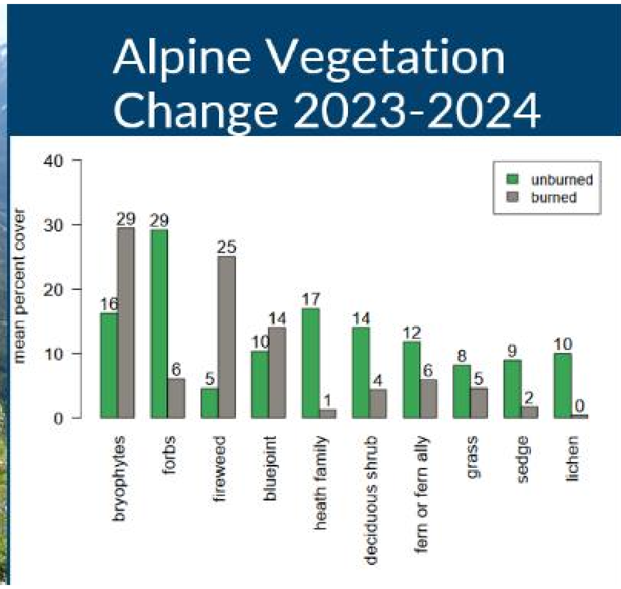

Operational Guidance: Evaluating the Effects of Wildfire on Dall's Sheep Habitat

Explaining field research methods and preliminary findings from the Kenai National Wildlife Refuge study as a step-by-step framework for evaluating whether wildfire changes snow accessibility, structural openness near escape terrain, vegetation composition, and diet signals for alpine ungulates.

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Step 1: Quantify Snow and Spring Access Dynamics

Evaluate whether burned south-facing and winter-slope terrain retain less snow or become snow-free earlier relative to an adjacent unburned reference area, while separating local site patterns from broader annual snow conditions.

- **Define target windows:** Focus on biologically relevant winter and spring access windows, with emphasis on late winter through green-up and the May 1-15 transition period.
- **Compare burned and reference areas:** Compare Mystery Hills with Round Mountain within the same years, and use external controls only as broader context where appropriate.
- **Estimate snow-covered fraction:** Use MODIS fractional snow-cover data on south-facing and winter-slope terrain, and summarize snow-free/open area where possible.
- **Account for regional snow background:** Compare local site patterns with SNOTEL/ERA5 winter-severity context so snowier or milder years do not drive false fire conclusions.
- **Next:** Expand beyond MODIS snow cover using process-based snow models such as SnowModel to evaluate snow depth, SWE, wind redistribution, and surface-energy effects.

Step 2: Map Structural Opening and Escape Terrain Access

Evaluate whether fire reduced or reorganized tall woody/high-NDVI vegetation in sheep-relevant terrain, especially south-facing slopes and areas near steep escape terrain.

- **Establish baselines:** Build pre-fire and post-fire Landsat/Sentinel composites to classify broad structure: persistent high-NDVI/tall vegetation, lower-stature green signal, and sparse or exposed substrate.
- **Quantify structural change:** Summarize areas where persistent high-NDVI structure was present before the fire but was not persistent after the fire. This is a structural proxy, not an alder-specific map.
- **Verify terrain context:** Overlay structural-change rasters on DEM-derived slope, aspect, ruggedness, Escape30/Escape35 terrain, and distance-to-escape bins.
- **Next:** Repeat or adapt the 2017 Forest Service Kenai Peninsula vegetation-classification approach over the burned area, using NDVI, dNBR, terrain, field plots, and high-resolution review as validation.

Step 3: Execute Field Vegetation and Feeding-Site Surveys

Ground-truth satellite products by measuring fine-scale vegetation composition, substrate cover, and forage-relevant plant groups across burned, unburned, and control/reference areas.

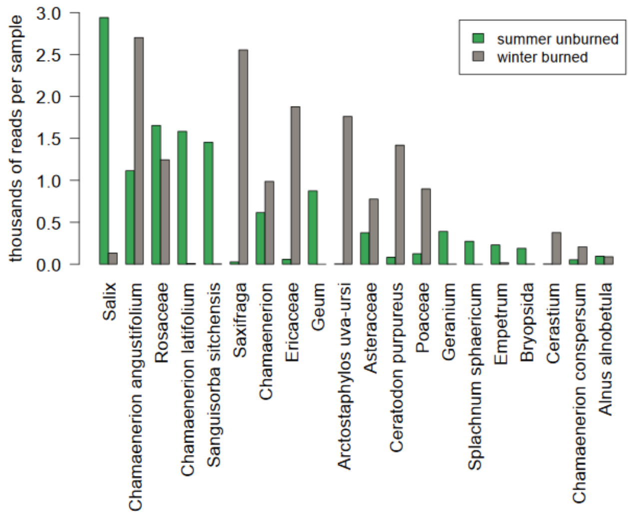
- **Use an LTEMP-adapted protocol:** Each survey is centered on a plot location and uses a 100-m2 circular plot (5.64-m radius) for plant inventory and site context, plus four 10-m point-intercept transects radiating from plot center to quantify vegetation and substrate cover.
- **Current sampling:** To date, we have collected about 30 burned and 30 unburned vegetation surveys in the Mystery Hills-Round Mountain study area, plus about 30 burned and 30 unburned feeding-site selection vegetation surveys using the same protocol.

- **2026 controls:** Repeat both survey types in external control/reference areas, targeting about 30 vegetation surveys and about 30 feeding-site selection surveys.
- **Next:** Compare burned, unburned, feeding-site, and control plots, and pair field vegetation with forage-quality clippings and camera-based feeding observations.

Step 4: Conduct Diet, Nutrition, and Use Validation

Evaluate whether diet composition, nutritional indicators, and observed foraging behavior are consistent with post-fire habitat changes, while recognizing that fecal DNA reads are not direct estimates of biomass consumed or forage quality.

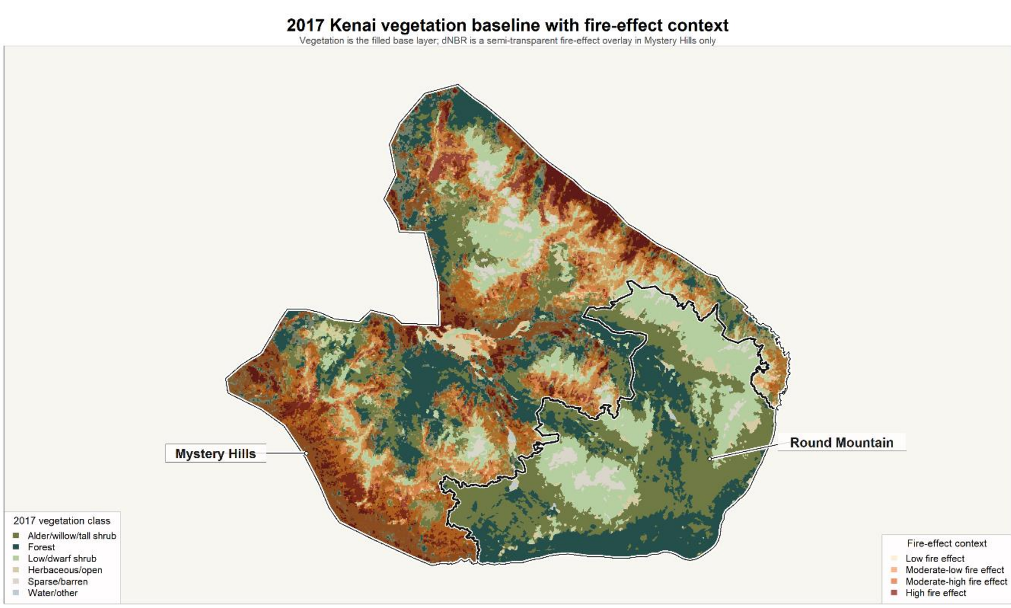
- **Collect fresh fecal material:** Sample pellet groups along alpine travel routes, snowfields, bedding areas, and feeding sites with location, date, season, and site/burn context.
- **Run fecal metabarcoding:** Identify plant taxa detected in fecal samples and compare profiles by season and site/burn context with sample-size caveats.
- **Pair with cameras and nutrition:** Use plant/fecal nutrition and camera-trap feeding observations to validate whether detected taxa match observed forage use.
- **Next:** Deploy GPS collars and GPS-video collars to link movement, habitat use, snow/forage access, feeding behavior, and diet validation.



Looking at diet composition in more detail:

Preliminary fecal metabarcoding indicates that Mystery Hills burned-area winter samples contain plant DNA from taxa such as fireweed, saxifrages, heathy shrubs, and fire moss/Ceratodon-type bryophytes. Round Mountain summer samples show a broader forb, graminoid, willow, and shrub assemblage.

Camera traps and future GPS-video collars provide an important cross-check because metabarcoding identifies taxa detected in feces; it does not directly measure bite counts, consumed biomass, or diet quality.



If you want to dive deeper into the field parameters, please reach out to Kristine Inman (presenter) kristine_inman@fws.gov, Colin Canterbury (PI) colin_canterbury@fws.gov, or Matt Bowser (PI) matt_bowser@fws.gov). I can also provide information on plant taxa detected in the metabarcoding data or expand on the GEE mapping criteria used for terrain, ruggedness, escape terrain, snow, and structural-opening models.