

# How much could grazing address?

HENDERSON FIRE / CAMP PENDLETON

## Grass within a brush landscape

How much of Henderson's fuel load could grazing address?

**29-37%**

Estimated herbaceous share of modeled surface fuel

Herbaceous vegetation means grasses and other nonwoody plants.

**60-64%**

of modeled herbaceous mass lies outside mapped grassland.

Grazing opportunities therefore deserve assessment within scrub as well as open grassland.

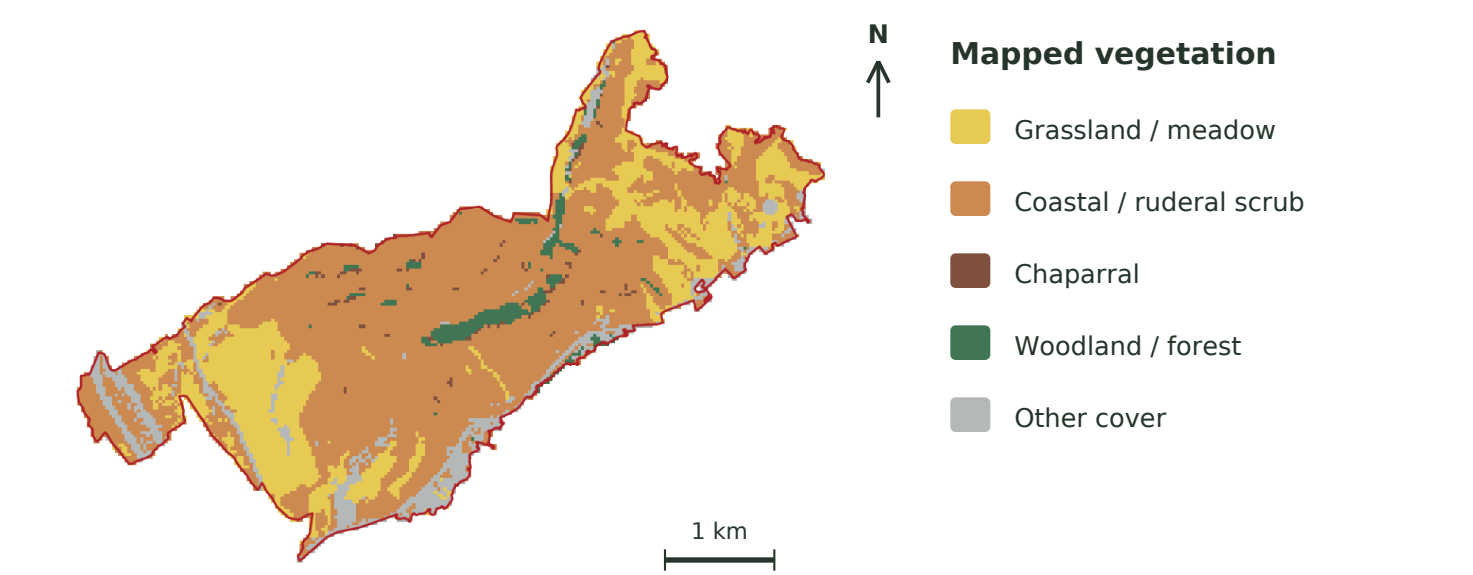
**A screening study, not a treatment measurement.** These estimates describe pre-fire surface-fuel dry weight across the 3,260-acre footprint. They do not measure fuel consumed or the share cattle could remove. Access, palatability and required residual vegetation determine the grazeable portion.

Based on vegetation and fuel maps, satellite imagery, aerial samples and Camp Pendleton records. Technical assumptions and sources follow the findings.

# Where the herbaceous fuel occurs

## Mapped vegetation communities

Henderson Fire | Full 3,260-acre mapped footprint



Sources: NIFC WFIGS components 68018 + 68020 (retrieved Oct. 21, 2026); LANDFIRE 2025, 30 m; EPSG:5070.  
Red outline: full mapped extent; interior may include unburned patches. Vegetation map, not aerial imagery.

| Mapped vegetation              | Acres        | % of area   | Herbaceous % of fuel weight* |
|--------------------------------|--------------|-------------|------------------------------|
| Grassland / meadow             | 779          | 23.9%       | 75-91%                       |
| Coastal scrub                  | 1,710        | 52.5%       | 23-30%                       |
| Disturbed-land scrub (ruderal) | 359          | 11.0%       | 23-30%                       |
| Chaparral                      | 27           | 0.8%        | <1% modeled                  |
| Other                          | 385          | 11.8%       | 14-19%                       |
| <b>Whole footprint</b>         | <b>3,260</b> | <b>100%</b> | <b>29-37%</b>                |

Share of modeled surface-fuel dry weight within each row, across annual and fall layers. This is not grass ground cover or measured consumption. Dead-grass attribution scenarios are additional.

**60-64% of modeled herbaceous mass lies outside mapped grassland.**  
Low modeled chaparral values do not establish an absence of grass.

# What the findings mean for grazing

**Managed grazing reaches beyond grasslands.** It also targets grasses and other grazeable fine fuels growing between and beneath other species in scrub, chaparral, and woodland ecotypes. Removing these fuels reduces the overall fuel load and interrupts the fuel continuity that helps fire spread through these landscapes.

## What Henderson indicates

Most modeled herbaceous fuel occurs outside mapped grassland. This makes grass-rich openings within scrub an important part of screening potential treatment areas.

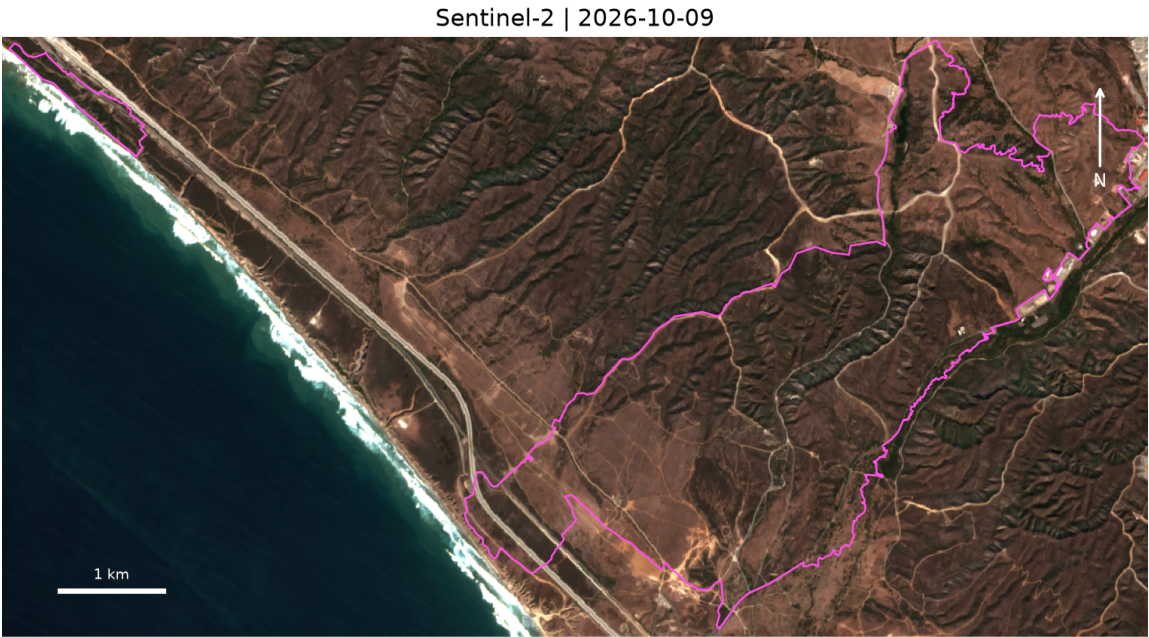
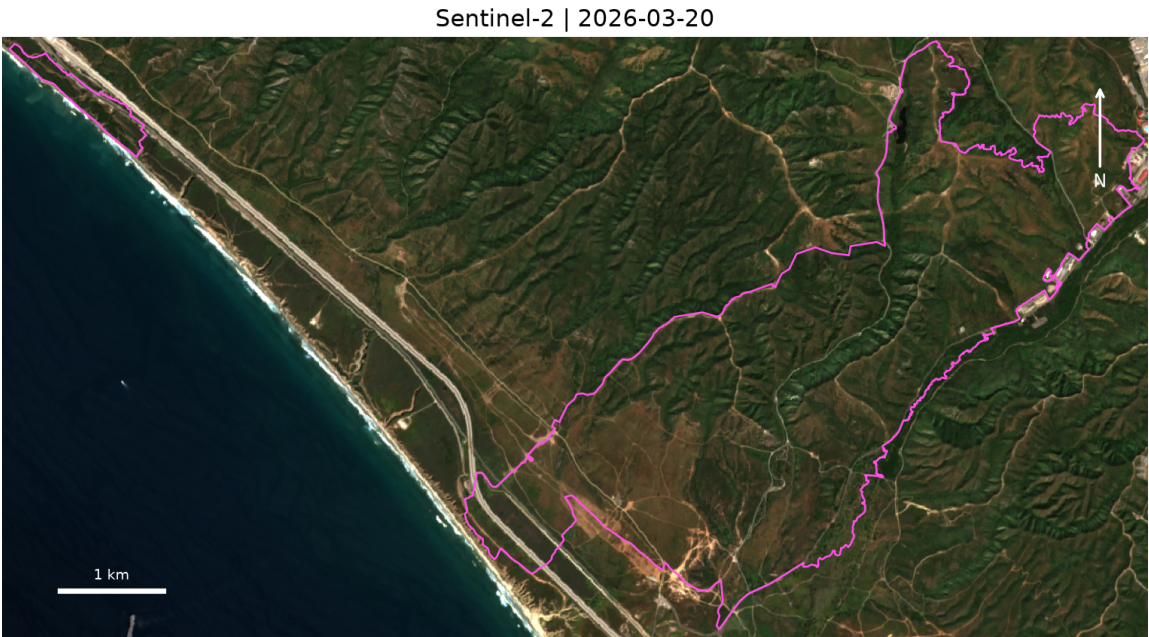
## From screening to a grazing plan

Include grass-rich openings within scrub when identifying potential grazing areas. Field assessment can then establish treatable acreage, available forage and appropriate residual vegetation targets.

For military installations, align treatment with training access and sensitive habitat. For water districts, account for watershed protection and infrastructure access.

This is a general management application, not a measured Henderson grazing outcome. Fuel-continuity basis: USFS fire-spread research and Chambers et al. (2024), a review of sagebrush systems. Sources on page 7.

# Pre-fire satellite check: spring to fall



Magenta outline: mapped Henderson extent. Copernicus Sentinel-2 L2A, 10 m visible bands, March 20 and October 9, 2026. October image predates ignition by six days. North and scale shown; no burn-severity inference is made.

| Vegetation class   | March greenness | October greenness |
|--------------------|-----------------|-------------------|
| Grassland / meadow | 0.53            | 0.21              |
| Coastal scrub      | 0.65            | 0.31              |
| Ruderal scrub      | 0.64            | 0.29              |

**Result:** Scrub shows strong seasonal greenness decline. Both herbs and drought-deciduous shrubs can contribute; the satellite greenness index (NDVI) does not measure grass biomass. Matched clear pixels cover 97.5% of the footprint.  
Henderson Fire | Full 3,260-acre mapped extent | October 22, 2026

# Aerial check: scrub is a mosaic

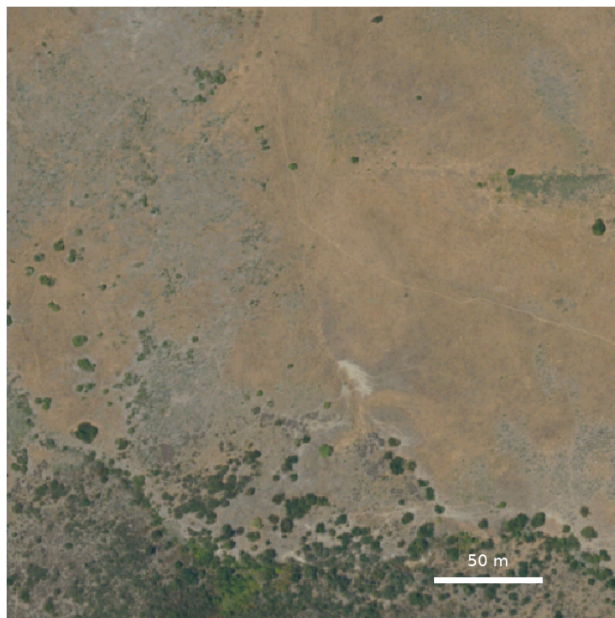
Sample 3 | Coastal scrub: broad open areas



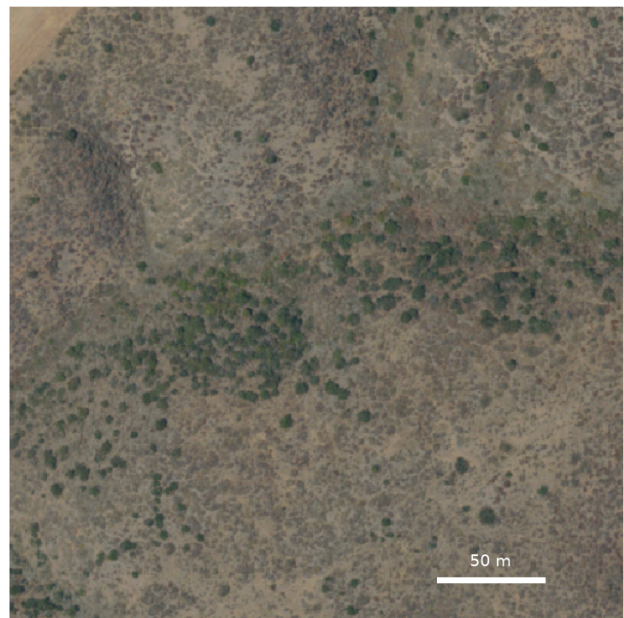
Sample 6 | Coastal scrub: shrub/terrain mosaic



Sample 11 | Mapped grassland: open cover



Sample 12 | Mapped chaparral: visible gaps



USDA NAIP acquired May 30, 2022; native resolution 0.6 m. Each panel covers 300 x 300 m, exported at 0.5 m display spacing (no additional detail). North is up approximately (UTM grid). These are four examples from eleven successfully retrieved samples, not a full-footprint grass-cover classification.

**Visible evidence:** Sample 3 has extensive smooth, low-cover openings around shrub clusters. Sample 6 is a dissected shrub/opening mosaic. Sample 11 is predominantly open. Sample 12 shows gaps even at a point mapped as chaparral. Pale ground can contain cured herbs, bare soil or litter; these images do not establish species or biomass.

**Implication:** Keep grass-rich openings within scrub in the analysis. Do not interpret the earlier <1% modeled chaparral value as a measured absence of grass. The 2022 images also cannot rule out changes before the 2026 fire.

# Method and dead-grass scenarios

**Estimate the fuel mix.** Intersect the full WFIGS perimeter with 30 m LANDFIRE vegetation and annual/fall fuel models. Weight boundary cells by intersected area; multiply model acres by standard dry-fuel loads. Divide herbaceous mass by total modeled surface-fuel mass.

**Count dead grass once.** The original herbaceous compartment already includes its cured portion. Additional scenarios reassign pre-existing dead fuel to grass without increasing total fuel mass. Trampling changes arrangement, not remaining mass.

**Check against imagery and records.** Compare March 20 and October 9, 2026 Sentinel-2 imagery and eleven 300 m NAIP samples from May 30, 2022. For NDVI, subtract the 1,000-DN offset and retain matched scene classes 4/5. Review the base monitoring protocol; it describes a 2014 fuels map supported by about 1,500 field plots.

**What remains uncertain.** Standard loads are fire-behavior parameters, not field biomass measurements. The base GIS and plot data were not obtained; the 2024 INRMP download was inaccessible. No consumption model or cattle-access survey was completed. Pre-fire biomass plots and locally calibrated grass/litter weights are needed to estimate actual grazeable fuel.

## Dead-grass attribution: sensitivity tests

| Allocation assumption                             | Annual dataset | Fall dataset |
|---------------------------------------------------|----------------|--------------|
| Original herbaceous load (H)                      | 28.7%          | 36.6%        |
| H + all selected dead fuel in grass classes (G)   | 29.7%          | 38.1%        |
| H + G + 50% of selected grass-shrub dead fuel (S) | 36.9%          | 43.7%        |
| H + G + 100% of S                                 | 44.1%          | 49.2%        |

G and S are pre-existing 1-hour dead-fuel pools: a fire-model category of rapidly drying fine dead material, which can include woody matter. Assigning it to grass is an assumption. The 37-44% half-allocation scenario is illustrative, not a validated grazeable share.

Annual and fall refer to two fuel-model datasets, not repeated field measurements. All percentages use total modeled surface-fuel dry weight; ranges are not statistical confidence intervals.

# Sources and supporting data

Scott & Burgan (2005): fuel-model definitions and loads

LANDFIRE: vegetation and surface-fuel models

NIFC WFIGS: full perimeter, components 68018 and 68020

Camp Pendleton CSS/Chaparral Monitoring Protocol (2020), pp. 27-34

USDA NAIP: 2022 aerial imagery, native 0.6 m

Copernicus Sentinel-2 L2A, tile 11SMS, via Planetary Computer

Sentinel-2 radiometric offset documentation

USFS: fire spread across gaps in discontinuous fuels

Chambers et al. (2024): grazing and other fuel treatments

Evidence collected October 21, 2026. Perimeter area: 3,260.06 acres (EPSG:5070). Maps may include unburned patches. Underlying rasters, sample locations and calculation outputs are retained in the supporting evidence package.