

MAP METHODS WITH HIGH-LEVEL VALUES FOR IMPROVE, RESTORE, & KEEP IN-TACT

The Grasslands Risk Map (below) was developed using a combination of cropland conversion and woody encroachment data, recognizing that all acres are not equal and that prioritization on the landscape will need to happen. Maps and acreage estimates are based on currently available data. Areas at risk of cultivation or converted to plowed land since 2009 are from Plowprint data (WWF; plowprint.com) and Olimb and Robinson (2019). Areas at risk to woody encroachment of infested by woody plants are from the Rangeland Analysis Platform (rangelands.app) and a derivative model showing early warning for woody transitions (Uden et al. 2019; Twidwell et al. 2021; available at wlfw.org/landscapes/great-plains/woodland-expansion/).

METRICS TO MEASURE PROGRESS

Keep Intact: Preventing more loss of intact habitat is necessary for maintaining ecological function, protecting critical habitat, supporting grass-based economies, and anchoring restored and improved areas. Continue to conserve the remaining 186 million acres (25% of Central Grasslands) of core grassland. [Note: The green (“cores”) on the map indicates grassland as of 2020 at lower risk of conversion to cropland and least compromised by woody plant encroachment].

- o Prevent further agriculture conversion of intact grasslands with low cropland potential through voluntary protection instruments (such as the CRP grasslands program and other perpetual easements, short and long-term leases, voluntary programs etc.) and improved/enhanced management (more sustainable grazing management, prescribed fire, invasive species management, etc.)

- o Prevent further loss of intact grasslands to woody encroachment by using preventative methods that prevent dispersing seeds and recruitment of young woody plants in this 186 million acre core, and also to prevent compromising the grasslands protected from land use conversion.

Improve: Ensure or increase ecological function and reduce the risk of conversion across 134 million acres (17% of Central Grasslands) at risk of conversion or encroachment of woody or other invasive species. [Note: The yellow (“at risk”) on the map indicates intact grassland as of 2020 at high risk of conversion to cropland or woody plant encroachment].

- o At current rates, nearly 2 million acres/year of Grasslands are being lost to conversion. Beginning in 2023, reduce the rate of conversion by 50% annually from the previous year. This annual reduction will lead to nearly no new conversion by 2032, by providing ranchers, landowners, and public land managers the support and resources they need to maintain profitable grass-based economies through more sustainable grazing management, prescribed fire, and invasive species management. Also, through voluntary protection instruments (perpetual easements, short and long-term leases, voluntary programs, etc.).

- o Grassland losses to woody encroachment now occur at rates similar to agricultural conversion. To meet our goals in the intact core, we need to prevent vulnerable grasslands from transitioning to woody dominance and halt major economic losses for grass-based economies. Beginning in 2023, conserve the 57 million acres of grasslands at high risk of invasion by 2032, while recognizing effort needed is not uniform across the ecoregion, by halting the advancement of woody encroachment within high-risk

grasslands at an average rate of 5.7 million acres per year. High-risk grasslands are compromised by dispersing seeds from invasive, nearby seed sources and the recruitment of new seedlings, and an *Early Detection, Rapid Response* approach can help prevent dispersing seeds and recruitment of young woody plants (Twidwell et al. 2021).

Restore: Through active restoration, grassland cover is increased across the 435 million acres (58% of Central Grasslands) of already converted (248 million acres) or encroached (187 million acres) land to anchor, grow, and connect intact grasslands, mitigate impacts to wildlife, and better support grass-based economies. [Note: The purple (“converted/encroached”) on the map indicates historic grassland converted to cropland or encroached by woody plants (with >5% cover)].

- o By 2032, restore 30% (7.5 million acres) of the 25 million acres of current cropland that has been converted on soils of low quality for crop production¹. These croplands have lower yields and require greater inputs and are more likely to be retained as grassland once restored, therefore are most suitable for restoration while still supporting crop production on highly productive soils.

- o By 2032 restore 50% (25 million acres) of the approximately 50 million acres of grassland that have been encroached (now >5% cover) by woody plants since 1990². Emphasizing low (< 5%) and moderate (< 15%) cover encroachment is most cost effective and impactful for preventing loss to grassland wildlife and grass-based economies. Nevertheless, targeting high cover encroachment (> 20%) is necessary to strategically expand intact grassland areas of high conservation value or when mitigating for critical habitat loss.

SUMMATIVE TALKING POINTS

The CGR Assessment Map serves as a coarse filter and accounts for the various biome types that exist in central North America. Forest and desert/shrubland are accounted for as masked layers, and more modern anthropogenic (potential) biome types, such as agricultural lands and urban lands, are also accounted for.

Yes, additional information is needed to account for ‘finer filter’ of information. The Map does not account for roads, some local wetlands that rely on surrounding grasslands, locations of energy development, fences, etc. **but the Assessment Map absolutely accounts for where the Great Plains grasslands biome still occurs (and biomes are always described through a coarse filter).**

Places like the Wyoming basin (sagebrush) are most often described globally as ‘grassland steppes or grassland shrub steppes’. It is a more arid grassland and includes a shrub component. It has a climate signature consistent of grassland biomes everywhere (unimodal distribution of precipitation and temperature that peaks in the summer). This is why it is part of a temperate grassland biome. Once you

¹ Approximately 14% of cropland in the US and Canada boundary has been converted on soils of poor quality for crop production (Olimb and Robinson 2019).

² Estimate is from Morford et al. 2022 and for the US only; data trends have not yet been established for Canada and Mexico.

go further west, you lose more of the perennial component and move into more of a true shrubland (which has a bimodal precipitation distribution but a unimodal temperature distribution – which leads to more shrubs).

The Assessment Map does a good job of simply showing where the grassland biome persists today (as a coarse filter like all biome maps do) while also accounting for the top two threats driving biome loss.

People should be encouraged to add local filters to the biome map – as needed for local conservation goals/implementation – and this further improves mapping products for local use.

CITATIONS

Dirac Twidwell, D. Twidwell, Dillon T. Fogarty, D. T. Fogarty, & John R. Weir, J. R. Weir. (2021). Reducing Woody Encroachment in Grasslands: A Guide for Understanding Risk and Vulnerability.

<https://naldc.nal.usda.gov/catalog/7548409>

Morford, S. L., Allred, B. W., Twidwell, D., Jones, M. O., Maestas, J. D., Roberts, C. P., & Naugle, D. E. (2022). Herbaceous production lost to tree encroachment in United States rangelands. *Journal of Applied Ecology*, 59(12), 2971-2982.

Olimb, S. K., & Robinson, B. (2019). Grass to grain: Probabilistic modeling of agricultural conversion in the North American Great Plains. *Ecological Indicators*, 102, 237-245.