**Bison Impact Grassland Analysis – Flow Chart**

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**Script 1: Vegetation Processing (New\_vegetation.Rmd)**

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**1. Load & Combine Vegetation Data**

- Load packages: tidyverse, vegan

- Load bison data: PVC021.csv

- Load cattle data: PBG011.csv

- Rename cattle columns to match bison structure

- Combine datasets using rbind()

**2. Create Plot ID**

- Standardize transect letters: A→a, B→b, C→c, D→d

- Construct plot\_ID by concatenating:

WaterShed + Plot + transect + SoilType + RecYear + RecMonth + RecDay

**3. Create Species Matrix**

- Generate scientific\_name by combining genus and species

- Convert CoverClass to pctCover using case\_when:

CoverClass 1–7 mapped to percent midpoint values

- Remove duplicate record: plot\_ID = "004b1dt2024816", species = "teucri canad"

- Apply pivot\_wider:

plot\_ID as rows, scientific\_name as columns, pctCover as values

values\_fn = mean, values\_fill = 0

- Optionally check for and remove all-zero rows

**4. Calculate Diversity Indices**

- Create plot\_info table with plot\_ID, WaterShed, RecYear

- Calculate:

Richness using specnumber()

Simpson diversity index

Shannon diversity index

- Join diversity results with plot\_info

- Optionally check for NA or zero-richness rows

Output: spp\_matrix + diversityIndex **with watershed and recyear**

**Script 2: Environmental + Final Join (New\_Environmental.Rmd)**

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**1. Process Meteorological Data**

- Load packages: tidyverse

- Load meteorological data: AWE012.csv

- Load watershed metadata: Watersheds.csv

- Rename RECYEAR → RecYear, RECMONTH → RecMonth, RECDAY → RecDay

- Convert climate variables to numeric:

TAVE, DHUMID, DSRAD, DPPT

**2. Create Yearly Averages**

- Filter for growing season months: April–October (4–10)

- Group by RecYear

- Calculate means:

mean\_temp, mean\_DHUMID, mean\_DSRAD, mean\_DPPT

- Output: yearly\_temp **(43 rows)**

**3. Final Joins**

- Join diversityIndex with yearly\_temp by RecYear

- Join result with watershed data by WaterShed

- Remove AltName column from final\_data

- Check NA counts for richness, shannon, and simpson

Output: final\_data – analysis-ready dataset with vegetation, diversity, watershed, and climate attributes