



Differences in Buffelgrass Abundance Between Wash and Upland Habitats, Santa Rita Experimental Range

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Introduction

Understanding the spatial pattern of an invasive species' spread will contribute to developing more efficient efforts to detect and control that spread. For example, does the abundance of buffelgrass (*Pennisetum ciliare* (L.) Link) differ between washes and uplands and does that difference change over time? To understand these patterns, the occurrence (discoveries \cdot km⁻²) and plant density (plants \cdot km⁻²) of buffelgrass were estimated for both habitats.

To estimate change over time, we describe abundance in relation to distance from large patches because we assume large patches represent later stages of buffelgrass spread.

Objectives

- Compare the abundance of buffelgrass between wash (>5 m channel width) and upland habitats on the Santa Rita Experimental Range.

- Determine if differences between wash and upland are associated with later stages of buffelgrass invasion.

Methods

- Established study locations with different proximities (630 to 2600 m) to large stands (>500 plants \cdot km⁻²) of buffelgrass (Table 1 and Figure 1).

- Established survey path to sample uplands and washes across study locations. The path in the upland had a width of 30 m and at each wash encountered we surveyed 50 m up and down the wash (Figure 1).

- Density of occurrence and plant density were estimated for wash and upland habitats based on the area of each habitat in the survey path.

- Described relationship between distance to large buffelgrass patches and abundance using the centroid of each study location. For our analysis, we assume that the greater distance from larger stands suggests early stages of buffelgrass spread in the survey area (Figure 2).

- Our survey path under sampled uplands and therefore densities of occurrence and plants may be under-estimated for uplands (Table 2).

Results and Discussion

In general, buffelgrass abundance was greater in washes than uplands (Table 1 and Figure 2).

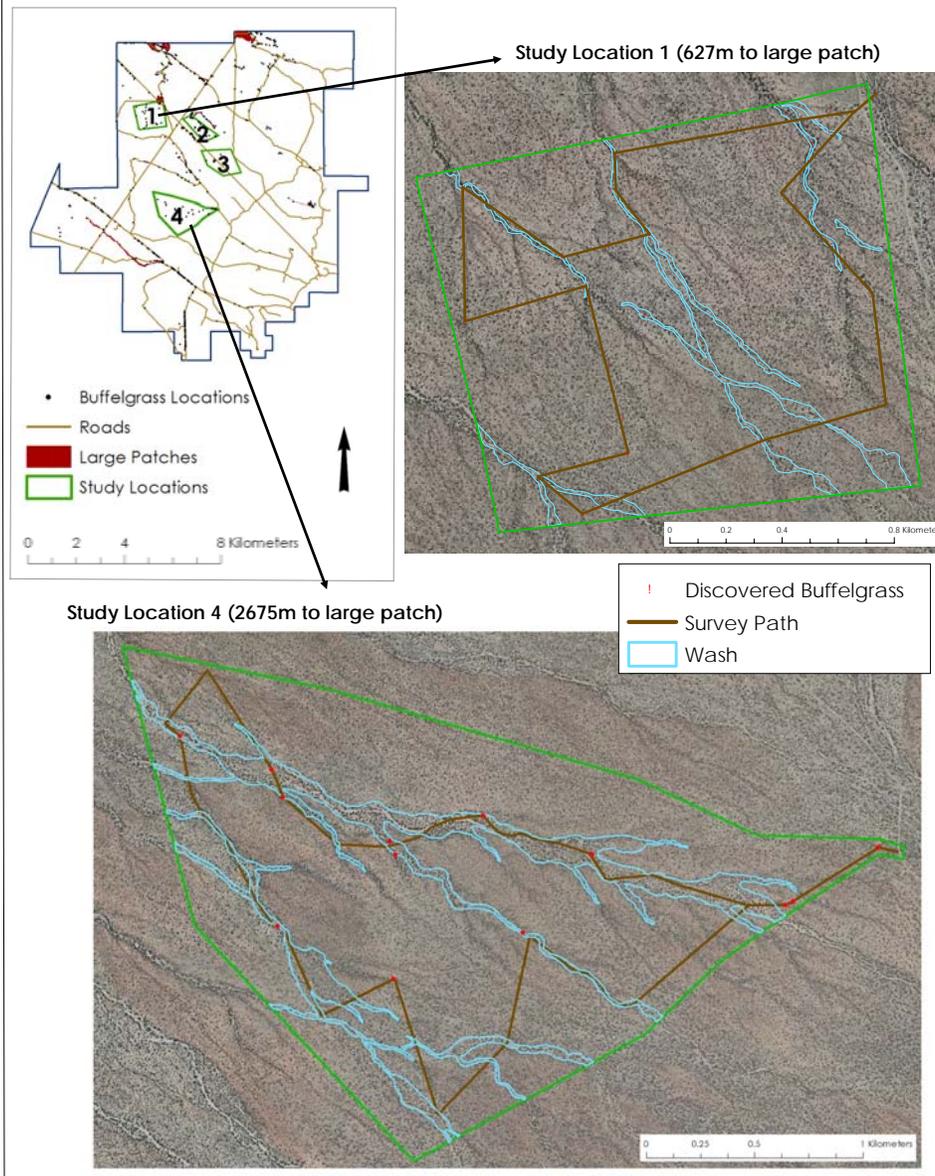
In washes, occurrence and density decreased as distance to large patches increased; however, this relationship was not seen in the uplands (Table 1 and Figure 2).

This pattern of spatial distribution suggests that buffelgrass establishment is:

- Not restricted to washes, and is very likely to occur in uplands
- In later stages of spread, buffelgrass density increased more in washes than uplands, possibly because washes offer a more favorable habitat.

These results suggest that early detection of buffelgrass spread should include surveys of both upland and wash habitats, and early control of buffelgrass spread should focus on small patches, particularly those in washes.

Figure 1. Distribution of study locations on SRER in relation to large patches, with insets of study areas including survey paths and washes.



Results and Discussion continued

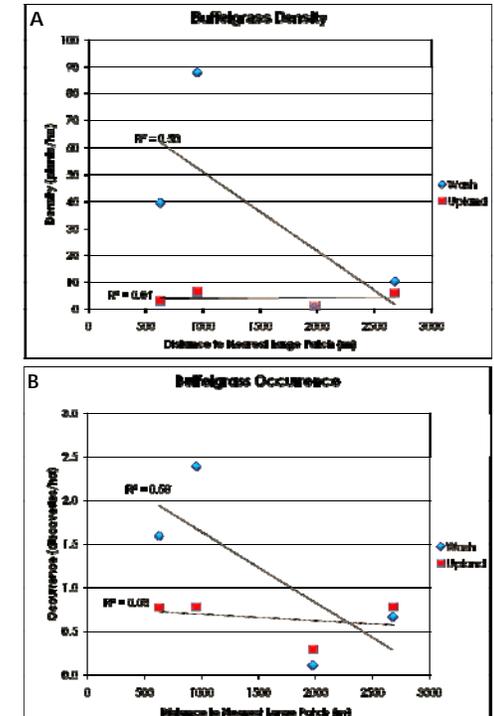
Table 1. Study location area, distance to large patches, buffelgrass occurrence and density.

| Study Location | Area (ha) | Distance to Patch (m) | Occurrence (discoveries/ha) | | Density (plants/ha) | |
|----------------|-----------|-----------------------|-----------------------------|--------|---------------------|--------|
| | | | Wash | Upland | Wash | Upland |
| 1 | 110.71 | 627 | 1.58 | 0.77 | 39.61 | 3.22 |
| 2 | 215.77 | 952 | 2.39 | 0.78 | 87.81 | 6.48 |
| 3 | 208.05 | 1975 | 0.11 | 0.29 | 1.08 | 1.26 |
| 4 | 415.75 | 2675 | 0.66 | 0.29 | 10.31 | 5.93 |

Table 2. Percent wash and upland for path and study locations.

| Study Location | Percent Wash in Path | Percent Wash in Area | Percent Upland in Path | Percent Upland in Area |
|----------------|----------------------|----------------------|------------------------|------------------------|
| 1 | 50 | 5 | 50 | 95 |
| 2 | 29 | 13 | 71 | 87 |
| 3 | 47 | 15 | 53 | 85 |
| 4 | 75 | 13 | 25 | 87 |

Figure 2A and 2B. Buffelgrass abundance in relation to distance to nearest large patch.



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