Canoa Hills Golf Course Invasive Species Study Plots

INTRODUCTION

The Canoa Hills Golf Course was recently acquired by Pima County Regional Flood Control District (District) via donation. The property is located in Township 18, Range 13, Sections 33 and 34, in the community of Green Valley (Exhibit A). Land cover on the 130 acre property includes 4.1 acres of sand trap/tee box, 12.6 acres of native trees preserved in place, 56.2 acres of native plant communities preserved in place, 3.1 acres of former ponds, and 54 acres of retired golf course. The retired golf course contains primarily non-native invasive species and is the subject of this study.

TREATMENT PLAN

The purpose of this study is to determine an effective treatment to restore 54 acres of retired golf course to a native plant community. Four treatments will be applied to eight subplots to determine which treatment achieves the study's goal of restoring a native plant community in the most efficient and cost-effective manner.

Initially, removal of accumulated biomass created by existing weeds needs to be addressed. Two methods will be used, 1) mowing, and 2) discing 6-12" deep. Once the biomass has been removed, new plant growth will be treated with herbicide using a 1) one-time application, and 2) multiple applications over several seasons. A previous study at Canoa Ranch found that Kleenup Pro mixed with Weather Gard Complete and Turf Trax was most effective at killing the target species. Once the herbicide treatment is complete, the plot will be seeded with native seed mix and monitored.

Two study sites have been selected:

Study site 1 (Exhibit A) contains primarily Palmer's Amaranth (*Amaranthus palmeri*). The site is located on top of a hill on relatively flat terrain (exhibit A). The plot is split into four subplots (Exhibit B). Each subplot is 38' x 145' with a 5' "kill zone" around the entire plot.

Study site 2 (Exhibit A) contains primarily Russian thistle (*Salsola sp.*). The site is located in the bottom of a wide swale on relatively flat terrain (exhibit A). The plot is split into four subplots (Exhibit B). Each subplot is 45' x 120' with a 5' "kill zone" around the entire plot.

The kill zone will be mowed or disced initially and then treated with herbicide throughout the study period. The treatment plan for the subplots is provided in Exhibit C.

MONITORING

District staff will monitor progress of treatments throughout the study period. Monitoring will occur per the treatment schedule (Exhibit C) and for two seasons (Spring and Fall 2021) following application of seed at plots 1b, 2b, 1.d, and 2.d.

To evaluate treatment effectiveness, plots will be monitored for vegetation characteristics, rainfall, and treatment characteristics.

1. Vegetation Characteristics. Quantitative vegetation monitoring will measure percent cover using the line-point intercept method (Herrick et. al, 2009). Following treatment, plots will be surveyed twice during the active growing season, once in the spring and once in the fall, post-monsoon. One 10 m transect will be established in each subplot for a total of 8 transects. Transects will be randomly oriented across the center of each plot.
2. Rainfall. Daily rainfall amounts will be monitored through the District's ALERT system (http://webcms.pima.gov/cms/one.aspx?portalId=169&pageId=60223) using data from ALERT sites #6060 (Santa Cruz River at Elephant Head Road) and #6050 (Santa Cruz River at Continental Road.)
3. Treatment Characteristics and Other Information. Staff will track and record the date of herbicide treatments and amount of herbicide used, and observations on species and vegetation green-up made during periodic inspection of the plots.

Results will be evaluated at the end of each season to determine the effectiveness of each treatment and modifications will be made if needed.

LITERATURE CITED

Herrick, J.E., et. al. 2009. Jornada Manual Volume 1: Monitoring Manual for Grassland, Shrubland and Savanna Ecosystems.

EXHIBIT A

Exhibit A - Canoa Hills Golf Course Study **Sites**

800.0 0 400.00

Feet

Pima County GIS

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map are subject to Pima County's ITD GIS disclaimer and use restrictions.

Legend

- Parcels
- Drainageway Maintenance Res
  - Maintenance value not yet defined
  - RFCD Full Responsibility
  - RFCD Full Responsibility - IGA
  - RFCD Easement Responsibility
  - RFCD Easement Responsibility - IC
  - RFCD Special Conditions
  - Other's Responsibility
  - Veterans Tract
  - Undetermined Responsibility

Notes:

1/8/2019

EXHIBIT B

Exhibit B

Plot 1. Primary target species is Palmer's Amaranth (*Amaranthus palmeri*). Plot dimensions 38' x 145' (Total plot acreage = 0.5 acre, each subplot = 0.125 acre).

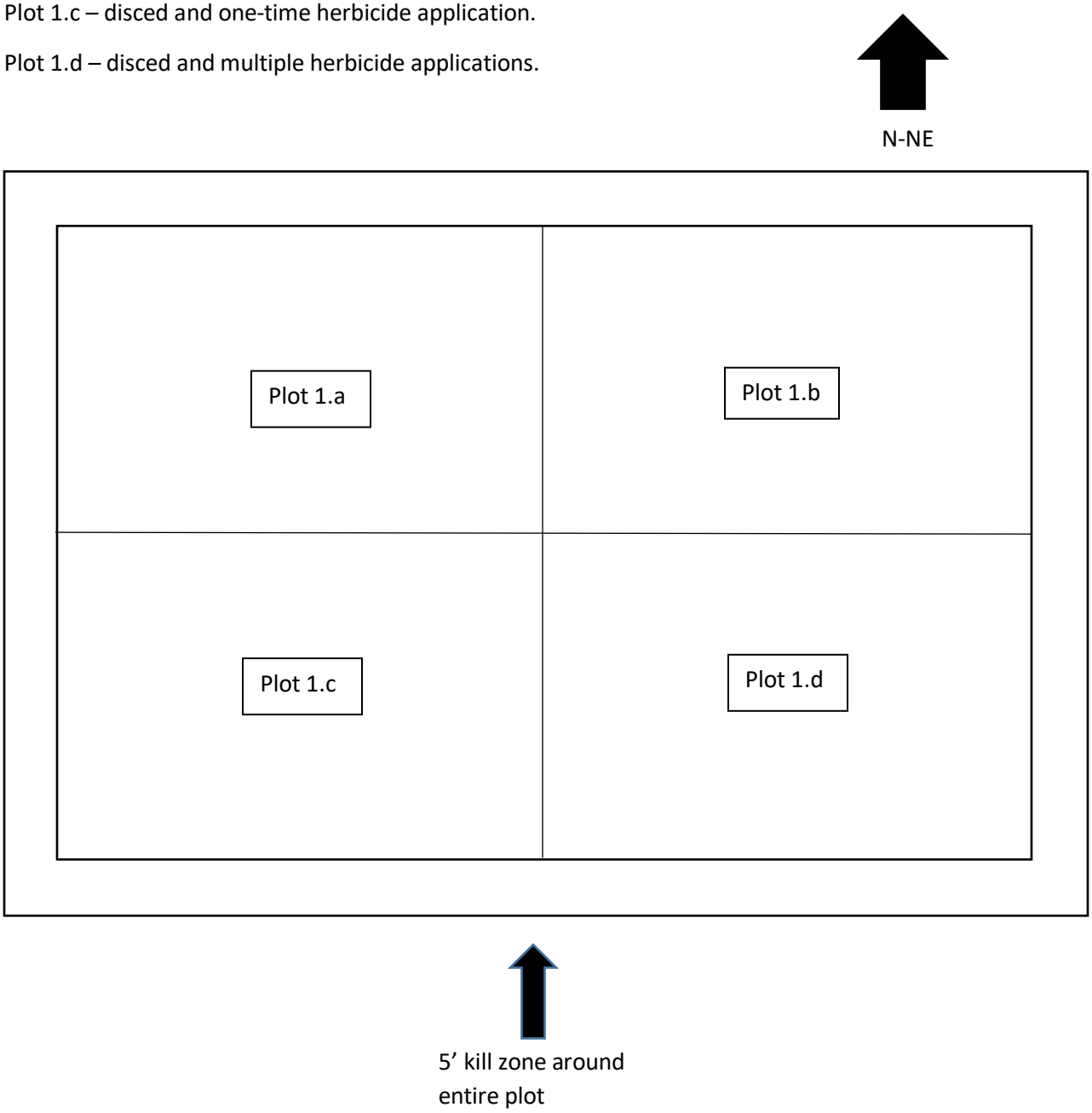
Treatment:

Plot 1.a – mowed and one-time herbicide application.

Plot 1.b – mowed and multiple herbicide applications.

Plot 1.c – disced and one-time herbicide application.

Plot 1.d – disced and multiple herbicide applications.



Plot 2. Primary target species is Russian thistle (*Salsola sp.*). Plot dimensions 45’ x 120’ (Total plot acreage = 0.5 acre, each subplot = 0.125 acre).

Treatment:

Plot 2.a – mowed and one-time herbicide application.

Plot 2.b – mowed and multiple herbicide applications.

Plot 2.c – disced and one-time herbicide application.

Plot 2.d – disced and multiple herbicide applications.

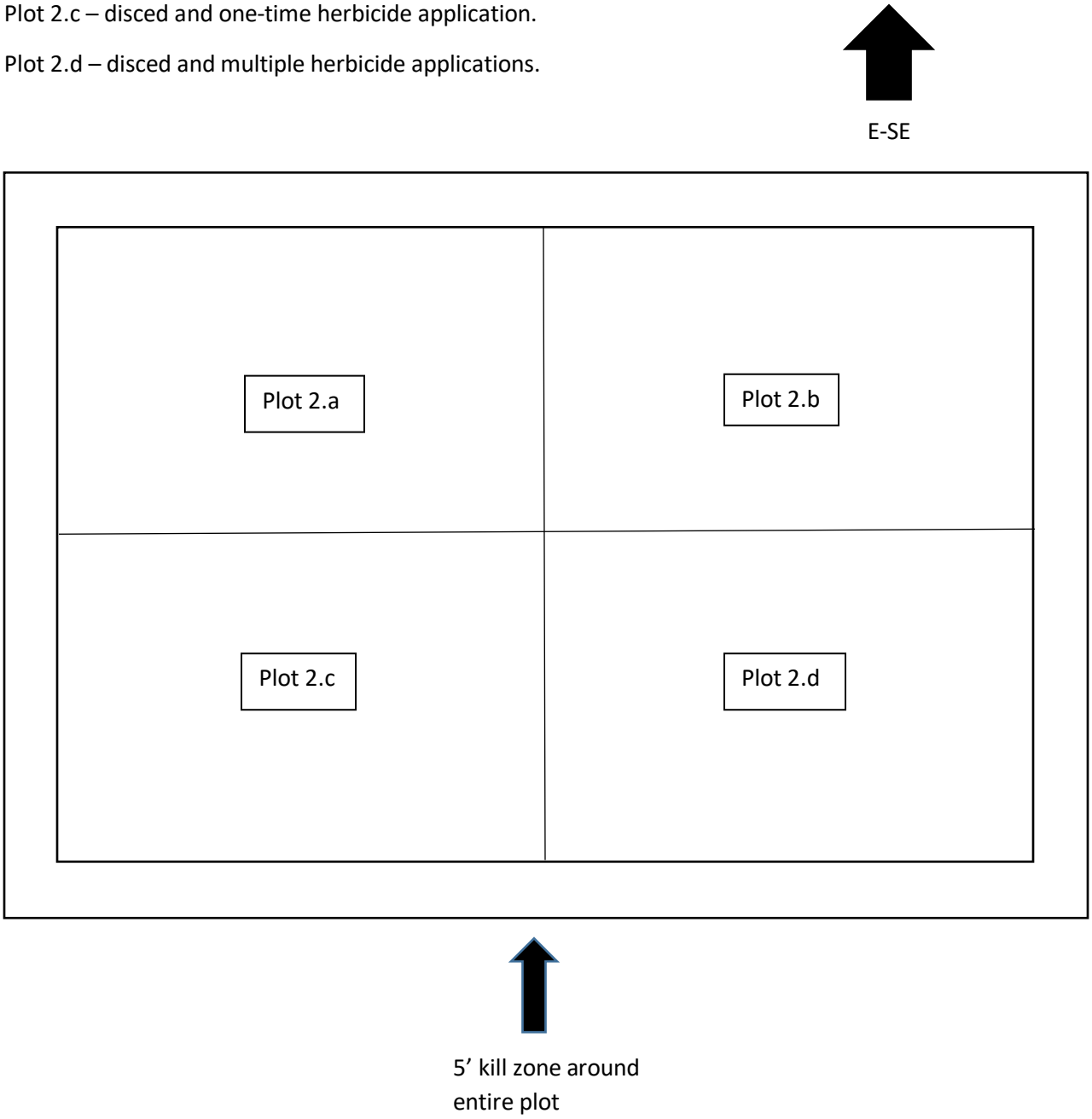


EXHIBIT C

Exhibit C - Canoa Hills Golf Course Invasive Species Treatment Plan

Spring 2019 Treatment

Treatment Date	Plots	Treatment
ASAP or February 2019	1.a, 1.b, 2.a, 2.b	mow
ASAP or February 2019	1.c, 1.d, 2.c, 2.d	disc 6-12"
February-March 2019	1.a, 1.b, 2.a, 2.b, 1.c, 1.d, 2.c, 2.d	Following mowing/discing, monitor for new plant growth. Once plants germinate, but prior to seed set, treat with post-emergent herbicide. Recommend using a mixture of Kleenup Pro – EPA#34704-890 (2.5 oz/gal), Weather Gard Complete (0.32 oz/gal), and Turf Trax (0.3-0.4 oz/gal) – this mix was used by John Bonillas (AAA) at Canoa Ranch.
March-June 2019	1.a, 1.b, 2.a, 2.b, 1.c, 1.d, 2.c, 2.d	Re-treat new growth as needed until plants die back due to heat. It's expected that 1-2 more treatments will be needed prior to June.

Fall 2019 Treatment

Treatment Date	Plots	Treatment
June-July 2019 – just prior to the summer rains	1.a, 2.a, 1.c, 2.c	Apply native seed mix.
July-August 2019 - once the summer rains begin	1.b, 2.b, 1.d, 2.d	Monitor for new plant growth. Once plants germinate, but prior to seed set, treat with post-emergent herbicide. Recommend using a mixture of Kleenup Pro – EPA#34704-890 (2.5 oz/gal), Weather Gard Complete (0.32 oz/gal), and Turf Trax (0.3-0.4 oz/gal).
August-November, 2019 – until plants die back, first freeze	1.b, 2.b, 1.d, 2.d	Re-treat new growth as needed until plants die back due to cold. It's expected that 1-2 more treatments will be needed prior to November.

Spring 2020 Treatment

Treatment Date	Plots	Treatment
Spring 2020	1.a, 2.a, 1.c, 2.c	No action, just monitor.
February-March 2020	1.b, 2.b, 1.d, 2.d	Monitor for new plant growth. Once plants germinate, but prior to seed set, treat with post-emergent herbicide. Recommend using a mixture of Kleenup Pro – EPA#34704-890 (2.5 oz/gal), Weather Gard Complete (0.32 oz/gal), and Turf Trax (0.3-0.4 oz/gal).
March-June 2020	1.b, 2.b, 1.d, 2.d	Re-treat new growth as needed until plants die back due to heat. It's expected that 1-2 more treatments will be needed prior to November.

Fall 2020 Treatment

Treatment Date	Plots	Treatment
Fall 2020	1.a, 2.a, 1.c, 2.c	No action, just monitor
June-July 2020 – just prior to the summer rains	1.b, 2.b, 1.d, 2.d	Apply native seed mix