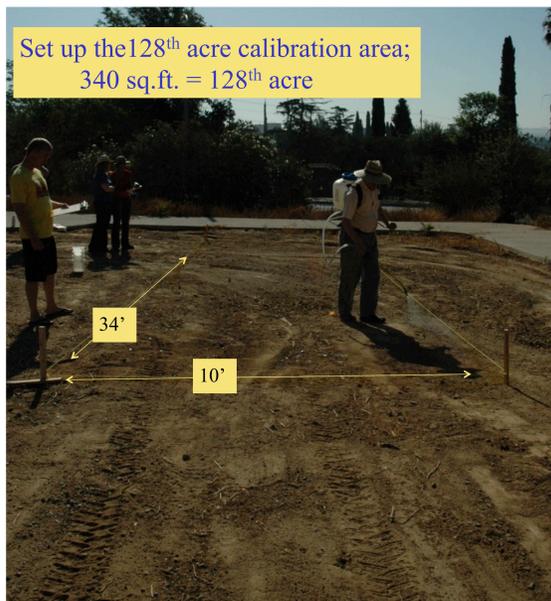


Herbicide Application Schools: Teaching proper sprayer use and calibration to wildland weed warriors

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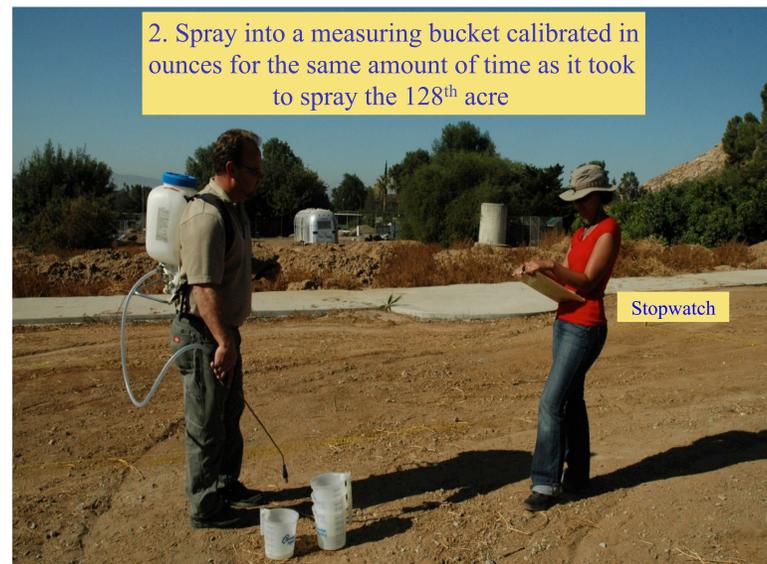
Introduction: In Southern California thousands of acres of land have been acquired over the past three decades by public agencies and private organizations like The Nature Conservancy as wildland reserves. Invasive plants are widely recognized as an important problem regarding preservation and restoration of these lands. Herbicides have become one of the most widely used of these techniques because they are low cost and very effective. These reserve managers do not typically have educational backgrounds or training that includes weed management. Their introduction to herbicide use is often by word of mouth or by instruction from co-workers and colleagues that likewise have little or no training or professional expertise. This has led to frequent lack of success and misuse of herbicides. We decided to conduct herbicide application schools for this clientele group.



Set up the 128th acre calibration area;
340 sq.ft. = 128th acre



1. Record the time
in seconds to spray
the whole area.



2. Spray into a measuring bucket calibrated in
ounces for the same amount of time as it took
to spray the 128th acre

Stopwatch

Ounces in bucket = gallons per acre (GPA)

3. Use GPA in worksheet to determine amount of herbicide to put in tank

4. Fill in the blanks in the worksheet to
determine GPA and amount of herbicide
to use

Easy, No Math, 128th Acre Broadcast Sprayer Calibration

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Herbicide sprayer calibration	
Step 1	Measure out the 128 th acre calibration area: two suggested sizes are 10' by 34' or 18.5' by 18.5'
Step 2	Spray the calibration area evenly while recording the amount of time to complete the spray: Time 35 seconds
Step 3	Spray water into a bucket for the same amount of time. Measure the amount of water in the bucket in ounces; this will equal the gallons per acre (GPA) that the sprayer is applying. Put this value in Step 3 in the formula below.
Herbicide Rate Calculation	
Step 4	Total volume of herbicide spray tank in gallons. Put this value in Step 4 below.
Step 5	From the herbicide label, determine the amount of herbicide product to be applied per acre in ounces. Put this value in Step 5 below.
Step 6	Divide Step 4 by Step 3, this will determine the amount of acres sprayed per tank load. Put this value in the box labeled Step 6 below.
Step 7	Multiply Step 5 times Step 6, this will determine the amount of herbicide to be added to each tank load.

$$\text{Step 4 } \frac{3 \text{ gallons}}{\text{(spray tank volume)}} \div \text{Step 3 } \frac{30}{\text{(GPA)}} = \text{Step 6 } \frac{0.1 \text{ acres}}{\text{(acres per tank load)}}$$

$$\text{Step 5 } \frac{32 \text{ oz}}{\text{(oz herbicide per acre)}} \times \text{Step 6 } \frac{0.1 \text{ acres}}{\text{(acres per tank load)}} = \text{Step 7 } \frac{3.2 \text{ oz}}{\text{(herbicide per tank load in oz.)}}$$

Notes:
1. This works for both liquid and dry herbicides measured in ounces. (1 gallon = 128 oz, 1 quart = 32 oz, 1 pint = 16 oz.)
2. If the area to be sprayed is less than the area that a full tank load will spray, reduce the amount of water and herbicide by the same proportion as the reduction in area to be sprayed. (1 acre = 43,560 square feet.)
3. Each person spraying should do their own calibration and spray mixing.
4. Surfactants are added to the spray mix on a percent volume basis. Multiply the recommended percentage by 128 to determine ounces per gallon of mix. For example, 0.5% surfactant X 128 = 0.64 oz (its OK to round up to the nearest ounce, so 1 oz per gallon of mix).

Method: The schools consisted of a 3 hour classroom session on herbicide basics, followed by 3 hours in the field using the 128th acre calibration method.

Results: There was a wide range of GPA's among the participants (Table). The common practice in the field is to use percent concentrations of herbicides instead of determining a rate per acre. The right column in the table shows how many actual gallons of glyphosate herbicide would be applied per acre if the tank had a 1% concentration of glyphosate. The glyphosate label says that a 1% concentration of the herbicide is intended to be equivalent to 1 quart of herbicide per acre. **We found that most individuals are over applying herbicide, many by a factor of 2-14 times the recommended rate.** Importantly, most do not realize the size of their error. We are continuing the schools, two more were held in 2012, in an effort to improve the practice of applying herbicides for wildland weed control.

Sprayer type	Mean GPA	GPA Range	1% glyphosate quarts/acre Mean(range)
Backpack	41	10-100	1.64 (0.4 - 4)
Orchard Gun	127	24-352	5.2 (0.96 - 14)
Spot Spray	628	80-1560	25.2 (3.2 - 63.6)

Table. The actual GPA for the 80 students from 4 schools 2009-10.

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