2017 Western National Rangeland Assessment CDE
Habitat Improvement Problem

You work for the NRCS as a consultant for ranchers in the Treasure Valley area. A rancher approaches you and tells you that 2,600 acres of his ranch was burned in the recent wildfire. While many of the perennial grasses seem to be recovering for his herd of cows, his main concern is about a resident herd of pronghorn on his land.

A primary component of pronghorn diet consists of shrubs, followed by forbs, and then grasses. Unfortunately, most of the shrub species (including sagebrush), and desirable forbs were killed in the fire. On its own, the land could take decades for sagebrush to recover enough to support a large pronghorn herd. Additionally, the ranchers has seen several infestations of spotted knapweed and medusahead throughout the burned area (total infested area is 131 acres) which impedes the process of recovery in those spots. The rancher would like to speed up the natural process of recovery so that the pronghorn will return, and also create habitat for other important species, such as sage-grouse and mule deer.

To help reestablish wildlife habitat on the ranch, the rancher would also like to install three new water tanks. He knows of two undeveloped springs that could serve as water sources. The third water tank would need to have water piped from one of the other water tanks.

A recovery plan would include drill seeding desirable species, treating the areas of weed infestation, and developing and installing the water tanks. Weeds will be treated each year after initial treatment until adequate containment. Drill seeding will be done by a leased drill and tractor.

- Forb and grass seeding: 60% of the burned land will be drill seeded with forbs and grasses. Labor will be donated by the rancher.
- Sagebrush seeding: 20% of the burned land will be drill seeded with sagebrush. Labor will cost $8.20/acre.
- Drill seeding equipment: Rental cost of drill and tractor is $500/day and is expected to take 2 weeks.
- Weed treatment: Spot treatment with herbicide will be throughout the entire infested areas. Cost of herbicide and labor will be $10.37/acre. Treatment will continue every year, but the infestation area is projected to decrease by 28% every year.
- Water tank installation: Water tank materials will cost $1,200 each. To develop the two springs, it will cost $2,000 each. Labor will donated by the rancher and he will use his own backhoe. Third tank will need 550 ft of pipeline; pipeline costs $3.20/foot. Escape ramp for small animals will be installed in each water tank and costs $340 each.

Drilled Native Grass & Forb Seed Mix

Species	Lbs/acre	Cost/lbs
bluebunch wheatgrass	3.0	$3.10
Indian ricegrass	1.2	$4.20
tapertip hawksbeard	0.3	$32.23
arrowleaf balsamroot	0.3	$28.45
red penstemon	0.15	$35.67

Drilled Sagebrush Seed Mix

Species/Variety	Lbs/acre	Cost/lbs
Wyoming Big Sagebrush	0.8	$6.78
Black Sagebrush	0.15	$10.34

What is the total cost for the first year? (*30 points*)
What will be the total additional cost for weed treatments after five years (not including first year)? (*10 points*)
Make sure to show calculations. Round to the nearest hundredth decimal point.

Key

Grass and Forb Seeding

Species	Lbs/acre	Cost/lbs
bluebunch wheatgrass	3.0	$3.10
Indian ricegrass	1.2	$4.20
tapertip hawksbeard	0.3	$32.23
arrowleaf balsamroot	0.3	$28.45
red penstemon	0.15	$35.67

(3.0 lbs/acre x $3.10 cost/lbs) + (1.2 x $4.20) + (0.3 x $32.23) + (0.3 x $28.45) + (0.15 x $35.67) = $37.90 cost/acre
$37.90 x (2,600 acres x .60) = $59,124.00 total cost for grass and forb seeding

Sagebrush Seeding

Species/Variety	Lbs/acre	Cost/lbs
Wyoming Big Sagebrush	0.8	$6.78
Black Sagebrush	0.15	$10.34

(0.8 lbs/acre x $6.78) + (0.15 x $10.34) = $6.98 cost/acre
$6.98 x (2,600 acres x .20) = $3,629.60
(2,600 acres x .2 of area) x $8.20/acre labor = $4,264
$3,629.60 + $4,264 = $7,893.60 total cost for sagebrush seeding

Drill Seeding Equipment
$500/day x 14 days = $7,000

Weed Treatment
1st year: 131 acres x $10.37/acre = $1,358.47
2nd year: 131 acres x .72 = 94.32 x $10.37 = $978.10
3rd year: 94.32 acres x .72 = 67.91 x $10.37 = $704.23
4th year: 67.91 acres x .72 = 48.90 x $10.37 = $507.09
5th year: 48.90 acres x .72 = 35.21 x $10.37 = $365.13

Water Tank Installation
2 springs x $2,000 to develop = $4,000
3 tanks x $1,200 tank materials = $3,600
550 ft of pipeline x $3.20/foot = $1,760
$340 escape ramp x 3 tanks = $1,020
Total cost of tank installations = $4,000 + $3,600 + $1,760 + $1,020 = $10,380

Total cost of first year = $59,124.00 + $7,893.60 + $1,358.47 + $7,000 + $10,380 = $85,756.07
Additional cost of weed treatment (excluding first year) = $978.10 + $704.23 + $507.09 + $365.13 = $2,554.55