

Population and Root Estimates of Oshá (*Ligusticum porteri*) in the Rio Grande National Forest

Report for the US Forest Service 2018 work

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Executive Summary:

Through our work in the Rio Grande National Forest we were able to map and collect data on 4 large stands of oshá in the Cumbres Pass and Wolf Creek Pass areas. Using root weights from our sustainability of harvest experiments at our Cumbres Pass site, and sampling of the sites we visited, we were able to estimate that the four stands contain a total of 6,722 pounds (3,049 kg) of harvestable root. We feel it is important to document some of the harvestable material that is available.

Introduction:

Oshá (*Ligusticum porteri*) is a medicinal plant with a long history of use by Native Americans in the southwest United States. Historically, the roots have been used for a wide range of ailments. Today, oshá is commercially wild harvested to treat respiratory illness (West and Jackson 2004). As oshá is a slow-growing perennial of the parsley family, harvesting the roots can have detrimental long-term consequences for osha populations, especially given that larger roots of plants of 10-plus years are favored for commercial harvest (Scientific Authority of the United States of America 2000, Turi and Murch 2010). Thus, discovering new populations of oshá, and estimating the amount of harvestable root available is important for generating a sustainable harvesting strategy for the species. In this study, we identify and map previously unmapped populations of oshá in the Rio Grande National Forest, and use aboveground percent cover to estimate the amount of available root material.

Methods

Oshá can be found throughout the southern Rocky Mountains at high-elevations, between 9,500-11,500 feet and is often found growing in close proximity to aspen groves, conifers, fir, and oak trees (Cech 2002, Moore 2003, Scientific Authority of the United States of America

2000, Turi and Murch 2010). Oshá has been harvested on National Forest Lands in southern Colorado and northern New Mexico.

In August 2018, we searched for previously unmapped oshá populations by driving US Forest Service Roads in Rio Grande National Forest near Cumbres Pass and Wolf Creek Pass. Oshá populations were easily identified, as at this time of year, the plants have begun to turn yellow as they senesce. We located four new populations in this manner. Two were located near Cumbres Pass (Herrera Lake Site, Spruce Hole Site), and two near Wolf Creek Pass (Tucker Ponds Site and Shaw Lake Site). In addition to not having been previously mapped, these populations did not show signs of recent harvest.

We mapped the newly located populations using the GAIA GPS app (<https://www.gaiagps.com/>) to delineate the perimeter of the population by recording GPS coordinates every 100m. At Tucker Ponds and Shaw Lake, we delineated the populations with a single polygon. At Herrera Lake and Spruce Hole sites, the populations were delineated with two polygons, because we used these sites as our training sites, and had two teams working simultaneously. The two resulting polygons are adjacent, and could have been drawn as a single polygon. The polygons were used to estimate perimeter length (m) and area (m²) of each population using the ruler tool on Google Maps.

Plots for percent cover estimates were generated from the perimeter waypoints. We measured 20m from each perimeter waypoint into the interior of the plot, and placed a 4m² sampling plot there. A second and third 4m² plot were placed 10m to the left and right of the first. Percent cover was visually estimated in each of these plots. The percent cover values from these plots averaged to determine the average percent cover of the population.

Our next step was to estimate the amount (dry weight) harvestable oshá root at each population. In our previous work, we found that oshá population in southern Colorado had an average of 10% oshá cover and 0.033 kg/m² dry root available (Kindscher et al. 2013). We used these numbers in the following formula to estimate total amount of dry root availability.

a

$$\text{kg of dry root available in new population} = \frac{(\text{percentage of oshá cover in new population}) \left(0.033 \frac{\text{kg}}{\text{m}^2}\right)}{10\% \text{ Cover}} * \text{m}^2 \text{ of new population}$$



Figure 1. Tucker Ponds Site, a population near Wolf Creek Pass



Figure 2. Sampling at the Herrera Lake Population near Cumbres Pass



Figure 3. The researcher crew examining our Cumbres Pass sampling research site in mid-August 2018.



Figure 4. Shaw Lake site; note mature oshá plant next to a downed log after the area was severely burned. It is likely that oshá plants will be established now that tree cover is reduced.

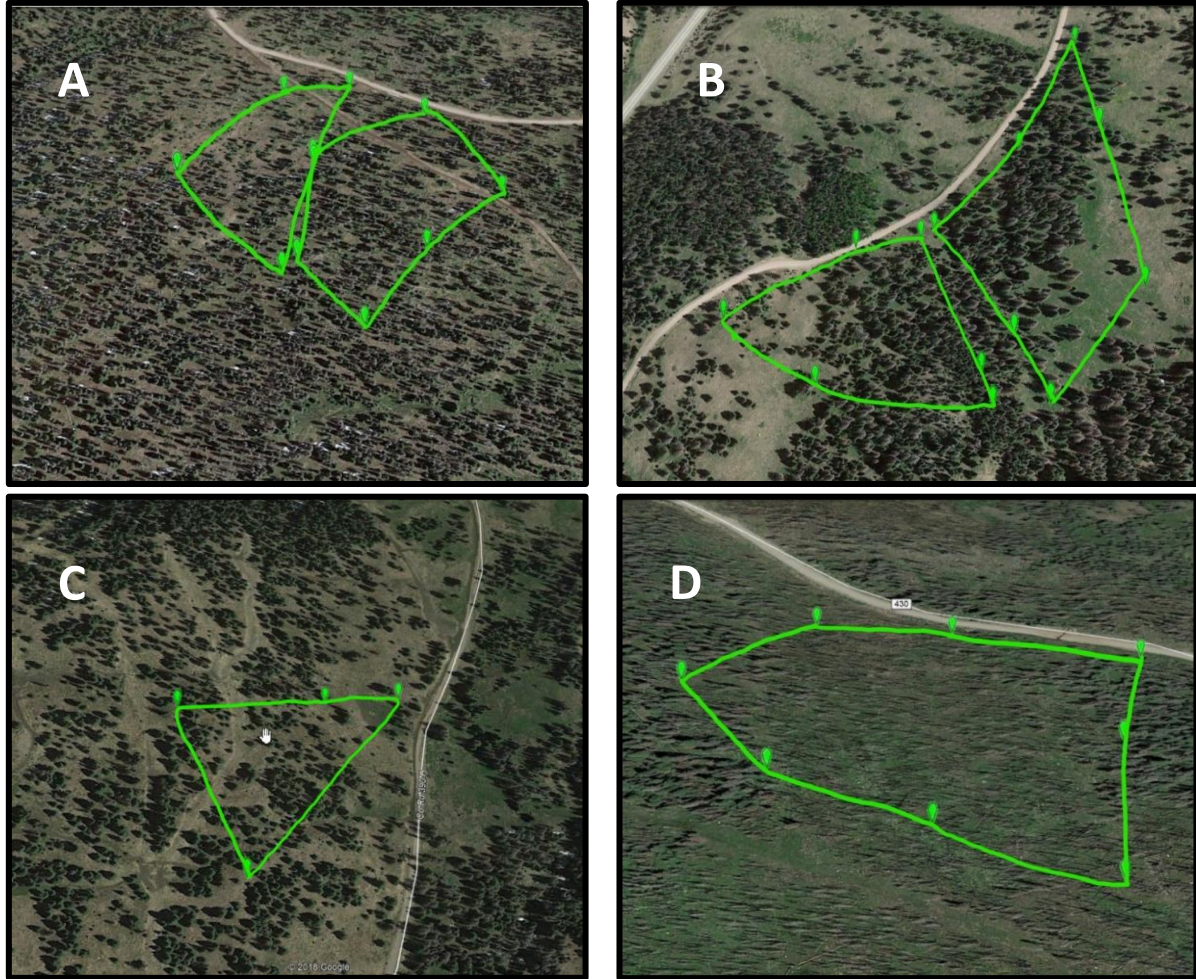


Figure 5. Polygons drawn at the four newly mapped populations. (A) Herrera Lake Site, and (B) Spruce Hole Site, located near Cumbres Pass. (C) Tucker Ponds Site and (D) Shaw Lake Site located near Wolf Creek Pass.

Results:

The estimates of root availability varied between 264 kg/m² and 1744 kg/m² (Table 1). The Spruce Hole population had the largest estimate of root availability due to both its large size and relatively high percent cover of oshá. Shaw Lake had the lowest estimate of available roots, both because of the small area of the population and low average percent cover. Overall, we estimate that these four populations represent an estimated 3000+ kg, dry weight, of harvestable root.

Herrera Lake and Spruce Hole populations appear to have longer perimeters than the other two sites, but this is because they were sampled with two polygons instead of just one, resulting in two additional central edges that are not present in the mapping of the Tucker’s Pond and Shaw Lake populations.

Table 1. Summary data for each newly located population including area (m²), perimeter length (m), average percent cover, and the estimated amount of dry root available for harvest.

Population/Site	Area (m²)	Perimeter (m)	Avg. % Cover	Estimated Dry Root Available (kg)
Herrera Lake	16367.8	1,075	4.90	264
Spruce Hole	34307.9	1,123	15.43	1,744
Tuckers Pond	8771.8	493	25.58	739
Shaw Lake	30058.6	697	3.04	301
Total				3,049

Conclusion:

Successful development of sustainable harvest practices for oshá requires knowledge about the oshá populations, and the availability of oshá root to harvesters. In this study we demonstrate one method for quickly making a rough estimate of the availability of harvestable root. Using these methods, we estimate over 3,049 kg (6,722 pounds) dry weight of oshá root available for harvest on four newly mapped populations. Given we located these populations from the roadside, and did not hike far into the forests, we believe that there is a considerable amount of oshá on National Forest land that could be harvested. We recognize that commercial harvesters tend to stay near roads, and harvest haphazardly, and that some populations may be too inaccessible. However, remote stands are important as they can serve as a refuge and sources of new seeds.

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