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Ten Years of Oak Restoration in City of Walnut Creek Open Spaces

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Abstract

The Oak Habitat Restoration Project began in 1991 when several individuals recognized that the oak woodlands and savannas of Walnut Creek's nearly 2,800 acres of open spaces had little natural regeneration. This group gathered volunteers who harvested acorns, planted them, and then installed tree shelters and watered the resulting seedlings. The Project soon became a unit of the Walnut Creek Open Space Foundation, which now provides most of our equipment and materials. The Project usually has 18 activity dates each year, nearly all on Saturday mornings. We usually plant 250 to 300 sites per year. About 75 percent of the sites initially contain at least one seedling from the three acorns planted in each site. At the end of the first growing season about 60 percent remain. We estimate that in 4 to 5 years about one-third of sites have become strong saplings. We have used a number of planting and maintenance methods which, over the years, have provided us with a preferred set of procedures that others may find useful.

Starting the Project

In 1989, Dick Daniel noticed that there were few oak seedlings and saplings in the Walnut Creek Open Spaces. He planted about 100 sites in a small fenced area in the open space and found very good success. During 1990, I made the same observation of lack of oak regeneration, and in the spring of 1991 Dick and I, together with Walnut Creek's newly hired Open Space Superintendent, Dan Cather, recruited volunteers for the Oak Habitat Restoration Project. The Project began with about 50 volunteers who typically attend 4 to 8 of our 18 activities per year.

We are fortunate that the City of Walnut Creek encourages our work and trusts the Project's judgment in restoration activities. This has enabled us to work with different restoration methods over the years until we found the methods we believe are well adapted to our warm and moderately dry climate.

The City provides storage space for our equipment and materials. The Project is now an activity of the non-profit Walnut Creek Open Space Foundation which funds most of our necessary equipment and materials. Vehicle needs are provided by volunteers. Grants from the California Native Plant Society, Chevron, and California ReLeaf and the California Department of Forestry and Fire Protection were important to our success in several of our early years. Walnut Creek is located 22 miles directly east of San Francisco. In 1974 and 1975, the City acquired about 1,800 acres in four open space parcels on its periphery.

The open space now totals over 2,700 acres. These hilly oak woodland, savanna and chaparral areas were intensely grazed for many years prior to 1975, and this continued until 1990 when about 425 acres in Shell Ridge were withdrawn from grazing. In 1997 about 375 acres of Lime Ridge were

withdrawn. These are the areas in which we have done most of our planting.

Procedures

Acorn Harvest

Our Project year begins in September with the acorn harvest. The crop varies widely from year to year and sometimes from species to species. We have three oak species, blue oak, valley oak and coast live oak *(Quercus douglasii, Q. lobata,* and *Q. agrifolia*) and we harvest only from open space trees to maintain local genetic integrity. In years with small acorn crops there is often a higher proportion of insect damaged acorns so we tend to pick earlier, before maximum predation occurs. We continue picking as long as acorns hold on trees, usually after three harvest dates. We provide volunteers with the following acorn harvest directions: Equipment needed: 1 quart plastic collecting bags, swab pen for labeling bags, hook pole for harvesting acorns higher in tree (optional; use especially in years with poor acorn crop), larger bag for holding 1 quart bags.

1. Collect acorns only from a tree, never from the ground.

2 . Remove caps and check acorns for damage before placing them in a collecting bag. Reject any acorn with damage to the base of the acorn, usually caused when removing the cap from an immature acorn. Also reject acorns with evidence of insects, bruises, cracks, misshapenness or very small. In years with poor acorn crops it may be necessary to keep some acorns with bruises or minor insect damage.

3. Use 1 quart collecting bags, no more than 100 acorns per bag, and be sure to label each with oak variety, date and general location.

4. Do not mix oak varieties in one bag. If you're not sure how to identify different varieties, ask!

We store acorns until planting in quart plastic bags, top partly open, in our refrigerator, just above freezing to retard sprouting and mildew. We dry the acorns monthly during storage to retard mildew, a somewhat laborious process. We have found a significant difference in storage capability among our three oak species. Blue oak acorns sprout radicles and often develop mildew after just 3 to 5 weeks in storage. Valley oak acorns tend to sprout radicles 6 to 8 weeks after harvest, and are slower to develop mildew. Coast live oak acorns rarely develop radicles before 8 weeks, and many do not sprout for several months after harvest. Some of our 1999 coast live oak acorns stored in our refrigerator in partly open plastic bags within a closed heavy carton sprouted successfully when planted in midsummer of 2000. Similarly, many coast live oak acorns collected in 2000 were viable in July 2001.

Planting

We begin planting after fall rains have moistened the soil to 8 to 10 inches and usually have five planting dates between late November and mid-January. We provide teams of two volunteers with the following directions for planting 10 sites. Materials needed: 10 mulch mats, 40 mulch mat staples, 10 aluminum tags, 10 36-inch survey flags, ball point pen, trowel, clipboard with pre-numbered data sheet and procedures sheet, bag with 30 acorns, floral shovel. Units of 10 screen cylinders have been previously placed in the field.

1. Select a site at least 50 feet from other plantings. Site should be on a sufficient slope that there will not be standing water during heavy rain periods.
2. With the shovel or other tool remove grass and weeds from an area 3+ feet square.

3. Dig a hole in the center of the cleared area about 8 inches deep. Keep the dirt within the cleared area for refilling the hole.

4. Place a screen cylinder in the hole, at least 6 inches deep and fill inside the screen to about 1 inch below the surface level. Fill outside the screen to surface level. Tamp the filling to reduce future compaction, a major cause of failure due to acorn rot from water accumulation in a compaction "lake."

5. Place three acorns inside the screen, on their side, near the screen, points toward the center. Make a hole for any root (radicle) showing from the acorn. Fill inside the screen to ½ to 1 inch above the surface level.

6. Open the center slot of a plastic mulch mat about 1 inch on each side so the slot is just large enough to slip over the screen. Install the mat over the screen, shiny side up. Fold over the corners of the mat 3 to 4 inches and staple each corner through the folded layers of plastic.

7. With a ball point pen firmly write the site number on an aluminum tag (00-123, for example) using fairly large letters and attach the tag at the top of the screen. The "00" identifies the year of acorn harvest. The site number is preassigned on your data sheet.

8. Fill out the data sheet.

9. Pinch together the upper 1_ inches of the screen and fold this over about 45 degrees from vertical. DON'T FOLD TIGHTLY! We have to get back inside the screen in the spring to weed and install treeshelters.

10. Insert a survey flag through the three layers of screen. Don't bend the flag wire. Extend the flag as high as possible above the screen so we can locate the site after the grass grows tall in the spring.

Spring Maintenance

Spring maintenance includes inspection of winter plantings, weeding inside screen cylinders and installing treeshelters on seedlings. Seedlings begin to emerge in mid-March. Some delay until early May, depending, we believe, on the planting date, acorn variety, depth of planting and amount of sun on the site. We weed all sites as we inspect them, whether or not a seedling can be found. Discovering new seedlings is a highly satisfying activity! We provide teams of two volunteers with the following list of procedures for spring maintenance and treeshelter installation.

Materials: clipboard with data sheet and procedures list, pen, swab pen, trowel, 10 bird nets, small sledge hammer (10 Tubex treeshelters, 10 rebar posts and water are already in the field).
1. At a site, remove the flag, open the screen cylinder and look and feel for seedlings. You will often see

mostly grass and weeds. Remove them. Oak seedlings are stiff and like a short brown blunt toothpick when they first emerge. Later a couple of small leaflets show.
2. If no seedling has yet emerged, or you're unsure whether something is actually a seedling, close the screen and replace the flag. We will recheck the site later in the spring.

3. If you find a seedling, after removing the grass and weeds, use a trowel to loosen the soil around the inside edge of the screen. If the soil is too firm, soften with some water. Of course, no damage to the oak seedling! Rotate the treeshelter into the soil at least 2 inches.

4. Push a rebar post through the plastic ties on the treeshelter and into the ground (use a hammer if necessary) below the top of the treeshelter if possible. Tighten the plastic ties. Add some water to settle the soil. Put a bird net over the treeshelter. Bend the top of the screen cylinder as necessary to minimize the space between the cylinder and the treeshelter to exclude rodents and lizards.

5. Complete the data sheet with the site number and seedling information. Dittos or arrows are fine for other notes.

6. Use the swab pen to place a 6+inch number reflecting the year of acorn harvest on the treeshelter visible from the nearest service road direction. This helps us identify which seedlings need to be watered during the summer.

The bird net is used to exclude birds who often perch on the treeshelter and occasionally fall in, killing themselves and usually any seedling present. The screen cylinder is left in place to protect the tender root system from rodent predation. The Tubex treeshelters serve several purposes. Most important, they conserve moisture by recirculating daily condensation inside the shelter back down to the seedlings. The shelter also focuses summer watering on the seedling root system for deeper watering rather than spreading widely with shallow soil penetration. A third very important function of the treeshelter is discouraging predation by wildlife. We have found two sources of deer predation, browsing and antler rubbing on saplings in the fall.

We leave treeshelters on the plantings as long as the shelters hold together, many nearly 10 years at this time. Treessentials of Mendota Heights, MN (800-248-8239) is our supplier for the Tubex treeshelters, the plastic mulch mats and staples, as well as the small bags of slow release fertilizer we sometimes use in plantings.

Summer Watering

We try to water seedlings for two summers to provide moisture during the critical summer dry period in their early years. We have no field source of water for piped irrigation, so we must carry water to the seedlings. Prior to the announced watering day we fill 1 and 1½ gallon plastic jugs and truck them to the planting area where they are dropped along service roads near the seedling sites. Volunteers then carry the water jugs to the seedlings, placing about ½ gallon in each treeshelter. During the first watering sessions we inspect the plantings that have not yet
shown a seedling. If a seedling does not show by June we recover the screen cylinder for

reconditioning and reuse. At the end of the watering season we're already in the next acorn harvest.

Learning Experiences

Our learning experiences from these 10 years of restoration work are categorized into treeshelters and posts, screen cylinders, grazed area planting, fire effects and volunteer programs.

Treeshelters and Posts

We have experimented with various materials for the treeshelters, but have always returned to the stiff preformed plastic treeshelter under the Tubex brand. One year we used a corrugated plastic material that is shipped flat and shaped into a treeshelter in the field. In parts of the country with cold winters this system is reported to have advantages. In our area these treeshelters begin to deteriorate within 2 to 3 years and form a fragmented mess that is difficult to clean up. We have also experimented with shelters made of heavy film. These are short, require wire exclosures and also deteriorated within 2 years.

In our early years we tried all available lengths of Tubex treeshelters, from 1 to 6 foot lengths. We no longer use the 5- and 6-foot shelters. Their original purpose was to protect seedlings from cattle browsing. We have found that seedlings have difficulty overtopping the taller shelters in our lower rainfall environment. The 1, 2 and 3-foot treeshelters require that we install exclosures to protect against deer browsing. Thus, the 4-foot treeshelters best satisfy our local needs.

In our first years we used T-bar fence posts to stabilize treeshelters. In order to reduce costs we then tried oak and redwood posts. The best of them rotted within 4 years. We have settled on 3/8-inch diameter rebar posts and find them cheaper than wood. In addition they can be recycled indefinitely.

Screen Cylinders

We tried a number of materials to build screen cylinders to defend the acorns from rodent and insect predation before settling on 24-gauge hardware cloth (screen). We purchase this material in 100-foot rolls of 2 foot width, cut it into 20 inch lengths and wire the resulting pieces into the 2 foot by 6 inch diameter cylinders. Lighter weight materials were too easily penetrated by our abundant ground squirrels.

Planting In Grazed Areas

We currently plant only in areas which are not grazed. In our early years we tried planting in grazed areas with disappointing results. The cost in materials and volunteer time is about double the cost for planting in ungrazed areas. Our method was to install a planting site as described earlier and add a 3½ -foot diameter exclosure of 5 foot welded wire fencing stabilized with 2 or 3 rebar posts of ½-inch diameter. This is usually satisfactory where there are plenty of trees for cattle rubbing, but in areas with fewer trees our plantings became the principal rubbing target and were often severely damaged.

Fire Effects

Our single experience with fire 3 years ago showed it quite damaging to our plantings, but the effect can

be short term. Heat melted the plastic treeshelters against the young oaks and killed the stems. However, we found that four of five plantings resprouted and grew rapidly from the undamaged root system.

Volunteer Programs

Volunteer recruitment has been a challenge over the years. The best sources have been members of our sponsoring Walnut Creek Open Space Foundation, the local Volunteer Center, open space kiosk signs and publicity in the local newspaper. Occasional "Volunteer Day" programs sponsored by the City of Walnut Creek have been helpful, and one was the largest source for our beginning volunteer group. Volunteer retention is also a problem. We have a core group of 12 to 15 who have been frequent participants over the years. Others come once or twice per year and still others find the activities too strenuous or not as interesting as they anticipated. A few others, largely the younger group, find new parenting or changed work responsibilities become higher priorities. Or they move out of the area. Teenage participants are welcome, but only a few attend more than once, usually to satisfy a high school community service requirement. The best volunteers are the newly retired who have not yet fully committed their time.

We publish a simple monthly newsletter, *Oak News,* which announces coming Project activities, notes volunteers present at recent field efforts, and comments on oaks, other native plants and general open space programs. We find the newsletter useful as an activity reminder, as an educational tool and to publicize the program to City officials and others.

Future Programs

In our early years we prepared for planting by dropping bundles of 10 screen cylinders at the 3 entrances to the Shell Ridge Open Space planting area. We found that areas distant from open space entrances received much less attention from volunteer planters than areas closer to the entrances. In recent years we have dropped the screen cylinders in the field at a number of locations closer to the target planting areas with much improved planting distribution.

We are planning to try planting without screen cylinders in areas that are more difficult to reach so that volunteers will not need to carry full kits of materials long distances. This will involve planting about 20 acorns around a marker we can identify later. Then, after the grass dries we will return to these locations and search out any seedlings for installing treeshelters. Experiments with this method in past years haven't been successful. We will need to be especially careful to plant in areas without ground squirrels.

As noted earlier we have done most of our planting in the ungrazed areas of the City's open space. Many plantings in grazed areas have largely been severely damaged by cattle. In the future we hope to fence small plots, perhaps 20 to 30 foot squares, and plant several sites within each plot.

Results

We have recently made field checks of all surviving planting sites in order to compare our actual success with our estimates of success. Data from our first 6 years of planting in Shell Ridge Open Space is in poor condition so detailed analysis is not possible. We found 547 living sites from those plantings.

Assuming an average of 300 sites planted per year yields a 30 percent success rate.

Analysis of sites planted during November 2000 to January 2001 with acorns harvested the previous September has provided much more useful results that will help direct our future planting methods and data recording.

Conclusions

The preceding data analysis suggests several additions to our data recording. Topographic aspect of the planting site, soil character and possibly treeshelter diameter may help explain why some plantings are more successful than others. We can conclude that blue oaks, despite their abundance as living trees, have more trouble regenerating. We should plant four rather than three acorns in each blue oak site, and plant them early in the season, before mildew attacks elongated radicles.

Analysis by planting date and correlation with rain periods may help increase efficiency of planting. Our trial and error approach through this decade has led us to conclude that most of our current procedures are effective for a regeneration program of our size and budget in our environment. We welcome suggestions that may improve our results, and we will be happy to discuss our methods in more detail and provide field visits for those interested in our oak regeneration activities.