

Forester's Log: Cone Counting

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The Forester's Log is a syndicated monthly column published in newspapers and magazines primarily in the American west. Mary Stuever is the Burn Area Emergency Rehabilitation Coordinator for the White Mountain Apache Tribe.

This is a story about pine cones and numbers. Although there are many reasons math nerds get excited about pine cones, cone counting can get even more exhilarating when one climbs eighty-foot tall trees to collect them. Tree climbing is not for the faint of heart. Generally there is a breeze up there, and the tree not only sways in response to the wind but also from the climber's movements cutting the cones from tips of the branches. Still, the idea of making a living climbing trees appeals strongly to twelve-year old kid inside of me. Cone counting is not for the faint of heart either. Working with numbers that have more than a half-dozen digits can also be pretty exhilarating. At least that's how I consoled that kid in me while I stayed on the ground when over 1500 bushels of pine cones were collected on the reservation this past month.

I head up a major reforestation effort to plant ponderosa pine seedlings on the 2002 Rodeo-Chediski burn and the 2003 Kinishba burn on the White Mountain Apache tribal lands in east-central Arizona. The tribe, under contract with the Bureau of Indian Affairs, grows the seedlings in five greenhouses located on the reservation.

To date we have planted over a million seedlings since the fire, which seems like a major undertaking but pales when we consider the lost forest we are trying to replace. Roughly 150,000 to 180,000 acres have had at least 75% tree mortality from the burn. If these forests supported an average of 200 trees per acre before the burn (actually many of these acres had much more than that, which is a story of its own for another day), then we are facing replacement of 30 million to 36 million trees at maturity. Our survival rates are roughly around 25% (tree planting during a drought in burned country is quite challenging!), so we need somewhere between 120 to 144 million trees to replace the burnt forest. Mother Nature is doing her part where live trees are nearby, but much of the area had no seed source. Our million seedling effort seems hopeful, but in the face of the problem, rather small.

Prior to the burn, the seed stored in refrigerators of forest offices seemed adequate since no one really expected the huge reforestation efforts needed on the many recent landscape scale fires. Now what seemed like a twenty or thirty year supply of seed is rapidly disappearing. Therefore, even though we did not experience a bumper crop of pine cones this year, we still wanted to replenish some of the seed we've been using.

Cone collecting is tricky business. The cones must be collected when the seed is mature, but before the cones open and disperse the seed. Usually there is only about 10 to 15 days when the cones can be collected. The timing of this biological event varies from year to year and I felt like an expectant mother waiting for birth, collecting cones and cutting them open all through September looking for signs of mature seeds.

Historically, when cones were collected on the reservation, the trees producing the cones were cut down, the cones were gathered and the logs went to the reservation sawmill. This year though we wanted to gather cones as close to the burn and within the burn so that the seed source closely matches the location where we will plant the seedlings. Since these trees grow either in stands that were already thinned or had survived the burn, we chose not cut the trees down, but rather to contract professional tree climbers to gather the cones.

While my heart would rather have been climbing the trees, my job was to figure out how many cones we needed to collect. First, there are around 40 to 70 healthy seeds in a cone providing the various insects and diseases that jeopardize seed production are at normal levels. If current germination rates hold for our newly collected seed, we will need to sow about 66 seeds for the 44 trees we grow in each basket in the greenhouse. Roughly then we need to collect one pine cone for each basket of trees we want to grow. Each greenhouse table holds 56 baskets, and each greenhouse has 28 tables. We can grow two crops each year in the five greenhouses so we need about 15,000 cones to gather enough seed for one year of maximum production. There are approximately 60 cones per bushel, so we need to collect 250 bushels for each year. Allowing approximately 10% mortality through the seedling production phase, our maximum in-house capacity is to grow and plant around 620,000 seedlings each year.

The reality is that we won't collect cones every year, and so we tried to collect all the cones we could get in the short time frame we had to get them. If our assumptions are correct, this year we collected about 6 years worth of seed. And now our challenge this winter is to separate the seeds from the cones and winged tissue that surrounds each seed. Again the task seems challenging, and I'm looking forward to a whole new set of fascinating numbers inspired by pine cones.



Cones are sliced to examine if seeds are healthy and mature.



There are approximately 60 ponderosa pine cones per bushel.



Tree climber Andres Velasquez (right) shows tribal member Merlon Indian the ropes for cone collecting. Indian works as a contract inspector for the White Mountain Apache Tribal Forestry BAER program.