



Imagining Our Oaks Through Time: Care and Nurture for Their Graceful Aging

by *Jocelyn Cohen*



Valley oak at Morgan Territory Regional Preserve

photo by Alma Hecht

We readily condemn the ruthless logging and greedy timber practices of large corporations and short-sighted frontiersmen in the 19th and early 20th centuries. Yet we unintentionally jeopardize oaks and remnant oak woodlands in our backyards and gardens, public places, and transition zones

because we do not understand their habits, life cycles, and horticultural needs. Imagine that the oak in your garden or near where you live could be viable for 100 to 500 years beyond your own lifespan. Then realize that how you care for it will determine whether it follows its full life cycle or not. In this

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MANZANITA

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The Board of the *Friends* generally meets at the Visitor Center in the Regional Parks Botanic Garden the second Wednesday of the month at 10:00 AM. All members are welcome. Call ahead to verify meeting date and time.



Deadline for submission of announcements and editorial material for the winter issue is October 15, 2010; for the spring issue, January 15, 2011.

article I hope to weave a story about our oaks and the care and attention these urban icons require to live well, mature, and rejuvenate for generations to come.

Life forms that far outlive us

Trees or tree-like plants appeared on earth about 360 to 270 million years ago. Oaks showed up a bit later, a mere 100 million years ago, when the dinosaurs were romping around. Trees evolved unique physiologies and anatomies that enabled them to survive for very long times. Most oaks are predisposed to live hundreds of years; even trees considered short-lived actually live longer than we humans.

We have a tendency to think about other life forms in comparison to ourselves, yet people and trees are different in fundamental ways. Mammals, including people, must work to stay upright. Trees naturally grow upward. They defy gravity. With an untiring ability to reach for the sky, and thanks to their tension wood and mechanics, oaks hold their massive loads on horizontal branches.

Trees produce their own food through photosynthesis. Like most plants, they give back much more than they take. Without them, life on earth for humans could never have developed or been sustained.

Trees heal differently than people. When trees are wounded, they must seal or compartmentalize the wound. As a result, wounds are contained within trees forever. Unlike humans, who usually regenerate new cells in the same place that the wound occurred, trees must regenerate cells in a new place to replace those that die.

Perhaps the most miraculous difference between humans and trees lies in the fact that trees can reverse the aging process. Throughout their lives, trees produce new stems, branches, roots, and foliage, effectively making old trees young again. Unfortunately, many pruning and garden practices and horticultural conditions undermine this phenomenon and often lead to the oak tree's demise.

How oak trees rejuvenate

We can understand rejuvenation processes in trees by observing older coast live oaks (*Quercus agrifolia*) in the Bay Area. Some sprout bushy, leafy twigs in the inner canopy. This leafy new growth often appears on large branches that have few other small side branches. Current arboriculture studies show that this bushy growth increases photosynthesis in the specific part of the tree where it occurs. Some trees produce vertical sprouts above or below a branch or limb, similar to watersprouts. This odd-looking vertical growth shows the opportunistic nature of the tree as it shoots out branches in search of light and space.

Another regenerative habit in old oak trees is crown reduction, a physiological mechanism where-



This multi-trunk oak split and one part fell to the ground, where it is acting as a nurse tree generating a new grove of oaks.

by branches toward the outside of the canopy begin to shed. The movement of water and nutrients from the roots throughout the tree occurs through the xylem, one of two transport tissues in the vascular system. Pumping water from the roots to the outer edges of the canopy becomes more taxing and may slow as trees mature. To compensate, trees naturally shed. Some lose height and width as branches shorten, others lose more in height but stay broad. Often old oak trees will be really wide but not very tall as they shrink with age. At the same time shed-

ding occurs, some of the bunchy new growths or vertical sprouts may form viable new branches or even new trunks. Ingeniously, the tree, or part of the tree, moves from senescence back to youth.

Cultural aging, or aging imposed by abiotic or nonliving factors, results from the stresses we impose with pollution, irrigation, construction, compaction, grade changes, poor pruning, and so forth.

A combination of factors is involved in cultural aging: Trees grow and age at different rates depending on their species, their locations, and what happens to them during their lifetimes. Coast live oaks in particular are very persnickety about their cultural conditions. They thrive in the Bay Area, yet abiotic stresses easily lead to their demise.

Benefits of old oak trees

Who benefits from oaks? According to the *Guide for Plant Appraisal*, by the Council of Tree and Landscape Appraisers, a single mature oak can increase the value of a home by 5 to 15 percent. Even young oaks approximately one inch in diameter may be appraised at \$350. A mature oak with a trunk diameter greater than 40 inches could be valued at \$30,000, depending on the tree's condition and location.

Groups and groves of oaks take on even greater dollar as well as ecological value. Oaks are both dominant tree species in California and backbone species, part of the permanent habitat and a sustaining factor in the ecosystem. Oak

woodlands as well as backyard oaks provide habitat, home, and food for dozens of birds, mammals, reptiles, and amphibians as well as an astonishing number of invertebrates. One oak can host thousands of species of invertebrates that thrive on living and dead tissue. The exceptionally species-rich communities associated with decaying wood and the bare surfaces of trunks, boughs, and roots make old trees unique as wildlife habitat. Inside the aging woody structure invisible to our eyes, invertebrates find their place in the web of life.

Old oak trees, with their nooks, crannies, holes, and dead and rotting wood, provide perfect homes for thousands of species of plants, animals, and fungi, including many rare and threatened species. Groups and groves of older trees provide an even greater niche for specialist species in just one small area.



Large trees in San Francisco were and are rare. This valley oak lived in the Mission District from pre-settlement days until the property owner felled it, thinking it reduced property value. In fact, it added thousands.

Defining the aging process

The aging process begins the moment the acorn germinates. Think of trees aging in three different ways.

Chronological aging can apply to the whole or part of the tree. Often we cannot determine the chronological age of a tree, especially a very old one or one that lives symbiotically with fire, because hollows take the place of concentric annual rings as the inner wood rots or burns.

Genetic aging has to do with the species' potential or predisposition for longevity. Is it genetically encoded to grow quickly, be short-lived, and not recover well from pathogens and injuries? Or does it grow slowly and carefully, like our oaks, while storing and allocating resources? A Monterey pine (*Pinus radiata*) is predisposed to live about 100–150 years, whereas a coast live oak may live 300 years or more.



Result of a neighbor's topping cuts on an oak tree drifting across a property line.

by a Certified Arborist early in the project. This can save hundreds or thousands of dollars and much heartache from damage to trees and soil.

View and sunlight issues, trees drifting across property lines as branches extend, and an array of urban situations also contribute to the demise of our oaks. Too often, unaware or untrained workers perform tree work that infringes on tree canopies or root zones and causes irreversible damage. These entities include utilities; building, painting, plumbing, and concrete contractors who find plants' branches or roots inconvenient to their projects; and unqualified, ill-trained, or negligent

How we harm our urban oaks

The current model for most tree practices and management disciplines imposes constraints on the tree's growth and biology. Though many of these constraints are unseen, they affect the whole tree. For example, any type of wound introduces openings for pests and pathogens and has repercussions throughout the entire life of the tree.

Many large old oaks situated on the front edges of properties come into contact with power lines. Sadly, the trees usually end up with misshapen and unnatural canopies. Even utility undergrounding may harm trees: Cutting and tearing roots hidden underground can cause unexpected tree failure years later. Many municipalities actually foster fear of big trees and advocate removal for reasons of imagined risk instead of advocating for careful monitoring when venerable species are in close proximity to homes or high-use areas.

Politics, too, can come into play and be friend or foe to our native oaks. As urban areas expand, natural areas disappear. Small remnants of open space become prime parcels for construction and development. Often oaks outside the footprint of a new structure are inadvertently injured or killed by heavy equipment that causes root zone compaction and/or injuries to the canopy, branches, and trunk. Through preparation of tree preservation reports and employment of appropriate practices, many of these injurious acts could be avoided.

Plans for new construction, remodeling, or landscaping on a property with trees should always include preparation of a "tree preservation plan"

tree or landscape workers who are ignorant about the proper care of trees. Fortunately, many municipalities, including Berkeley, Oakland, Piedmont, Palo Alto, Los Angeles, and others, now have oak protection ordinances.



The same tree, left undisturbed for three years after topping, has formed a new branch.

Life stages of an oak

Let's look at the life phases of an oak tree, concentrating on the special consideration we need to give mature oaks for their graceful aging.

Seedling through juvenile: Off to a good start

The seedling phase begins the moment the acorn germinates, and it extends roughly to the end of

the oak's first growing season. Once rooted in, the whole tree, or parts of it, may have spurts of growth, not always where we want them and not always in ways that are good for the long-term structure of the tree. Juvenile oaks sprawl and leap, branches race to out-lead the others, and foliage can look like a wild mop of hair after a day of play.

Youth through early maturity: Free-spirited and adaptive

This is the period when the habit of the oak tree evolves. Often the "line" of the tree (its general shape and movement from trunk to tip) becomes defined. Yet the habit, essence, or character as we imagine it from experience or photos comes later for many oaks. As an aesthetic pruner, rather than wait until the tree reaches maturity, I may combine my art with sound arboriculture practices to define this character earlier in the tree's development so we can enjoy it in our lifetimes.

As an oak begins to spread, we notice the large trunk with a wide taper, often two to three times greater at the ground than at about four feet, or what is called DBH (diameter at breast height).

Maturity: The stately years, the noble tree

This is perhaps the longest period in an oak tree's life. Sadly, urban oaks rarely reach this phase: We lose many of them due to conflicts and stresses. Maturity is also the period when an oak develops its full, mature form and individual character and provides the most qualitative environmental benefits. At this phase, the oak's growth rate slows, especially in height. In general, trees dislike changes in their environment, and older oak trees in particular adapt poorly to change.

Topping becomes increasingly common as people think the tree is too big or is blocking views. Often people find unqualified tree workers to perform this act, which is unviable and is also illegal in many municipalities. Instead of topping, think of framing views, creating keyholes or peek-a-boo views. Consider the particular aesthetics of the tree and artistic ways the branches can draw the eye to distant or close views. Trees are dynamic

life forms. Integrate them into your environment to enhance your life, not to cause conflicts.

The tree's ability to rejuvenate may apply to selected or localized portions of the tree. Experienced pruners know to watch for branches and stems the tree is forming in order to rejuvenate. In these places the tree begins forming a whole new little tree within the old tree, in a sense beginning the life process all over again.

Maturity through senescence: Graceful aging

What are "old" or "ancient" oak trees? They are huge, wide, and bigger than other trees but probably not taller. Remember, trees shrink down with age. Mature oaks are the most important trees for wildlife in California, providing whole ecosystems with habitat in their hollows, holes, wounds, and large dead branches. Due to the stresses of urban life, middle-aged oaks may take on premature aging characteristics. In the Oakland hills we have many notable oaks that are significant to the community because they survived the 1991 fire and thus have



Coast live oak grove on Novato hillside

the look, feel, and sense of history of older trees.

It would be impossible for any of us to witness all the phases of an oak tree's life in just one tree. We can, however, watch these cycles across a spectrum of trees in our gardens, parks, and public areas.

Thinking for the future

In our urban areas we are losing old trees, including oaks, much faster than we are gaining them. Some of our most venerable oak trees live hidden in gar-

dens belonging to people like you and me, and they depend on us for proper care and protection. Even the oldest specimens, such as the San Francisco valley oak that had grown since pre-settlement times to about 50 feet tall with a circumference of eight feet at breast height and 21 feet at ground level, are vulnerable. In January 2007, while awaiting the Board of Supervisors' stamp of approval for landmark status, this august tree was cut down.

It is often difficult to realize that what we do today for trees in our own landscapes can affect or change the ecology of our communities and biomes far beyond our time on earth, especially in terms of

our long-living native oaks. If we pay attention to the surrounding landscape, use up-to-date arboriculture practices in every phase of the oak's life, and learn to notice signs of the tree generating new growth to restore vitality, our careful stewardship can greatly enhance the graceful aging of our native oaks. 🌿

Jocelyn Cohen brings the eye of an arborist, ecologist, artist, and passionate advocate for trees to her pruning practice. She is a Certified Arborist who teaches Arboriculture and Urban Forestry at Merritt College and combines tree care and preservation with aesthetic pruning, garden design, and landscape restoration in her own business, Poetree Landscapes and Arboriculture.

All photos are by the author, except as noted.

Some Thoughts on the Winter Garden

by Glenn Keator

To many, winter may be a reprieve from gardening and a time to relax. For better or worse, though, I like being engaged in my garden throughout the seasons, so for me winter is a time to take action in several important ways.

The first activity involves no physical effort—it's simply making time to plan for the coming year, to assess the current status of the garden, and to dream about possible new acquisitions. Nothing instills in me a greater passion for getting into the garden than anticipating what I could plant from the numerous catalogs available. Keep in mind that by midwinter, time is growing short because new plants need to be installed while the rains last and the weather remains cool. Although by Thanksgiving it is already too late to plant most spring-flowering bulbs, there still await seeds, divisions, and new purchases that must go in very soon. So a last look at those lists and visits to local nurseries are inspiring and timely.

I find that I tend to put off basic tasks like moving plants that are not happy in their current homes and dividing plants I'd like more of. So my assessment of the garden involves systematically going through the garden beds to check on the vigor and health of the plants there, compiling a list of those that are dying or struggling for survival, and coming up with a plan for where to relocate them. Sometimes I may have to accept that a particular plant simply won't thrive in my garden regardless of where I put it—I generally give a species three trials before I give up on it.

When it comes to new acquisitions for the garden, try to avoid a common pitfall of most gardeners: going to a nursery without a plan and falling in love with a plant you simply can't resist, then finding out

that your new possession doesn't really fit into your current garden and will take a lot of effort to keep alive. That's why planning ahead is so important.

In addition to the armchair aspect of winter gardening, there are many ways to engage intimately in the garden itself. For example, if I haven't finished the job of cutting off old growth to promote new, or of removing old flowering stalks to help promote new ones, this is my best chance to follow through. I often put off cutting off these old growths because they may provide seed and fibers for native birds, but I eventually get tired of their unkempt look. Those who are not particularly neat gardeners may disagree.

Finally, don't forget the weeds! Every time we get a soaking rain, a new batch appears out of nowhere. It's much easier in the long run to get out and pull those weeds when they're tiny and have not yet established deep taproots. It's also especially important to remove those like bitter cress (*Cardamine oligosperma*) that bloom quickly and make an abundance of seed for next year's crop. Perhaps I'm unusual, but I find weeding a meditation. Weeding also helps you learn plant identification: Each weed has its own signature cotyledons, which immediately announce their identity. Learn these cotyledon patterns and you're one up on the game. Happy winter gardening! 🌿

Glenn Keator is the chairman of the Friends Advisory Council. He is a popular instructor of botany and field trip leader in the Bay Area, and he teaches the docent training course at the Regional Parks Botanic Garden. He is the author of a number of books on native plants.

Tips and Techniques for Oak Care

by Jocelyn Cohen

An oak's life stages may vary according to its source, species, and growing conditions. "Tips and Techniques" provides a snapshot reference guide. The accompanying article, "Imagining Our Oaks Through Time," offers more detailed information, as do many websites and books.

General Care (for all life stages)

- Mulch oaks by leaving the tree's own fallen leaves, twigs, acorns, and catkins on the ground.
- Do not allow mulch or soil to build up against an oak's trunk.
- Never fertilize an oak at any stage; this may disrupt the tree's growth processes or provoke insect damage.
- Remove nearby competing plants from around the tree's drip line, where absorptive roots reside.

Planting

- Consider the mature size of the tree and its soil needs when selecting a planting location.
- Avoid planting oaks in lawns or with plants that need summer water.
- Plant the top of the oak's root crown level with the soil (at grade) or slightly above.
- Stake a young oak only if it is falling over; generally, remove the stakes after one year.

Watering

- Adequate water is essential to establish a healthy oak. Water a newly planted oak deeply for the first two years, generally 15 gallons weekly for the first two years and 15 gallons every other week in the third. After the first three years do not water oaks in summer except during extreme droughts lasting three to five years, and then only deeply once a month.
- Direct irrigation heads away from the trunk.

Pruning: General Tips

- Hire a reputable, qualified arborist to perform tree work and inquire about her or his oak knowledge and training (Certified Arborist, Certified Climber, etc.).
- Proper pruning technique is essential; poor pruning causes damage that lasts for the life of the tree.
- Prune to develop structure when the tree is young and to send branches in the directions you want them to go.
- Have a purpose in mind before making any cut. Every cut has the potential to change the tree's growth.
- Prune oaks toward summer's end when the weather is dry. Powdery mildew and then witches' broom (a fungal disease producing a dense mass of shoots) may result from pruning in damp conditions.
- Younger trees tolerate removal of a higher percentage of living tissue than do mature trees.
- Trees recover from several small pruning wounds faster than from one large wound. Do not try to make up for lack of early pruning all at once later.
- Avoid construction, including new landscaping, within the oak's root zone.
- Hire a Certified Arborist, Consulting Arborist, or other qualified arborist to prepare a preservation plan when planning construction or major landscaping near an oak. Attach the plan to the contractor's contract.



The client chose to mitigate the risk of trunk failure by having a specialized arborist install a tree prop.

More Specific Pruning Tips for the Oak's Life Stages

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| Seedling | No pruning. |
| Juvenile (first or second growing season up to 15 yrs): trees put on much new growth | <p>First prune an oak just before planting while it is still in the container, then in years 2 or 3, 5 or 6, 10, and 15.</p> <p>Maintain low branches, even if temporarily, as they help the trunk develop strength, girth, and good taper.</p> <p>Establish good structure of primary scaffold branches. Proper pruning/training of young trees is essential to develop strong structure and desirable form. Remove co-dominant leaders.</p> <p>Balance the frequency of pruning to assure a strong structure while giving the tree time to develop character.</p> <p>Do not remove more than 25 percent of foliage annually.</p> |
| Adolescent (15–50 yrs): spurts of growth | <p>Maintain inner branches.</p> <p>Avoid lion-tailing (removing foliage except at the end of the branch), which diminishes photosynthesis, opens the tree to sunburn, stresses its vascular system, and drains its resources.</p> <p>Do not top the tree (arbitrarily chopping the tree to shorten it). Topping destroys its form, leaves it open to decay, and is illegal in many municipalities.</p> |
| Early Mature (50–100 yrs): growth levels off | <p>Prune oaks in urban areas to reduce risk of limb failure, promote human safety, and allow for safe passage.</p> <p>Judiciously thin an oak's top to allow sunlight to reach interior branches, which keeps them alive and vibrant, as well as to increase sun penetration to understory plants.</p> |
| Mature (75–200 yrs): reaches maximum canopy size, growth slows greatly, tree is vulnerable to damage/disease | <p>Decrease the removal of live tissue. Only remove more than 10 percent of live foliage on a mature oak for a significant reason such as a cracked branch over a house. Removing a single large-diameter limb creates a wound that won't close, allowing entry of pathogens and/or pests.</p> <p>Avoid over-thinning, which reduces sugar production and may create tip-heavy limbs that are prone to failure.</p> <p>If an oak becomes too tall, slow its vertical growth with "reduction" cuts back to diagonal or horizontal branches and twigs at least two thirds the diameter of the one being removed. This requires the expertise of a skilled pruner.</p> <p>Maintain even distribution of foliage. A balanced canopy helps prevent uprooting or cracking by wind and maintains health and vigor throughout the tree. Keep interior branches, which are important for photosynthesis.</p> |
| Over-mature thru Senescent (200+ yrs—California's oldest oak is 13,000 yrs old!): canopy thins, outer limbs die | <p>Prune as little as possible.</p> <p>Maintain new growth, even if it resembles water sprouts or epicormic growth, as it provides photosynthetic leaves to invigorate the tree.</p> <p>Reduce long lateral branches back to interior branches to redirect the old tree's vigor from the branch tips toward the center.</p> <p>Prop mature or over-mature tree limbs as necessary for safety or to preserve large, low horizontal limbs.</p> <p>Check for pathogens.</p> <p>Correct weakness in the main branching system.</p> <p>Remove some dead wood and twigs, but leave some to provide habitat for wildlife.</p> |