

A landscape photograph of a hillside. The foreground is filled with green shrubs and yellow wildflowers. In the middle ground, there are several trees, some of which are dead and skeletal. The background shows a blue sky and distant hills. The title 'Listen to the Trees' is overlaid in large, bold, dark purple letters on a white background.

Listen to the Trees

RUTH WALLEN

CALIFORNIA



Torrey Pines Natural Reserve, 2019
50" x 36

Torrey Pines State Natural Reserve is a truly special place, a forested oasis along the San Diego coastline. Hundreds of people hike the trails of this much-loved park every day, tourists and residents alike, to marvel at the twisted pines, eroded cliffs and spectacular views of the ocean. The reserve is home not just to Torrey pines, which are native only to this small spot and Santa Cruz Island off the California coast, but to coastal maritime chaparral and a list of rare and endangered plant species that runs a full page.

To find more conifers in San Diego, one must travel over forty miles to the mountains that rise to the east. Much of the forested area burned in the 2003 Cedar fire, which until 2017 was the largest in the state's history.¹ After many hikes among blackened tree trunks and the dense ceanothus that quickly grew where the forest had been, I was amazed to travel a bit further east, to the Laguna Mountains, and find verdant stands of Jeffrey pine and cedar. But in recent years some of the trees that didn't burn turned brittle and brown. The same thing happened to the Torrey pines. At first, I saw parched needles on a few trees along the road. But then, on each hike there were a few more trees dying along a trail leading down towards the beach. A sign explained that the series of black funnels hanging from a string emitted pheromones to trap the bark beetles. Although they helped, they evidently were not enough.

It is heartbreaking to watch the trees die, but I feel compelled to return to these places that I love. I come to these sites and others in San Diego regularly, walking the same trails, standing with the trees, periodically stopping to photograph. I assemble these photographs into large photomontages that evoke my feelings of the essence of each place. As opposed to the grandiose sublime, my images encourage active exploration, offering a series of glimpses, incomplete views at a variety of scales evocative of the enchanted vibrancy of life. These montages are my way of expressing the beauty, wonder and love that I feel. Even as some of the trees are dying, I want to communicate the aliveness of each place.

Walking among the trees, I recognize that most of them are older than I am. The seedlings growing now will live longer than my daughter. Torrey pines



Walker Pass, 2017
Dying forest of pinyon pines and juniper.
56" x 38"

have of a life span of about hundred and fifty years. Jeffrey pines live much longer—four to five hundred years. That means that many of the Jeffrey pine alive today were present long before the arrival of the first European settlers. What have they witnessed? What will they see? What can we learn from them?

Just to the south of Torrey Pines State Park is the University of California, San Diego and Scripps Institute of Oceanography. In 2015, I was invited to collaborate with scientists at Scripps. Fascinated by their use of tree rings to study the climate of the past, I wondered—what will tree rings of the future look like? The vascular cambium in a tree's trunk continues to grow throughout its life. In years of more favorable conditions, trees grow more, resulting in growth rings that are further apart, whereas in less favorable years a tree's rings are closer together.

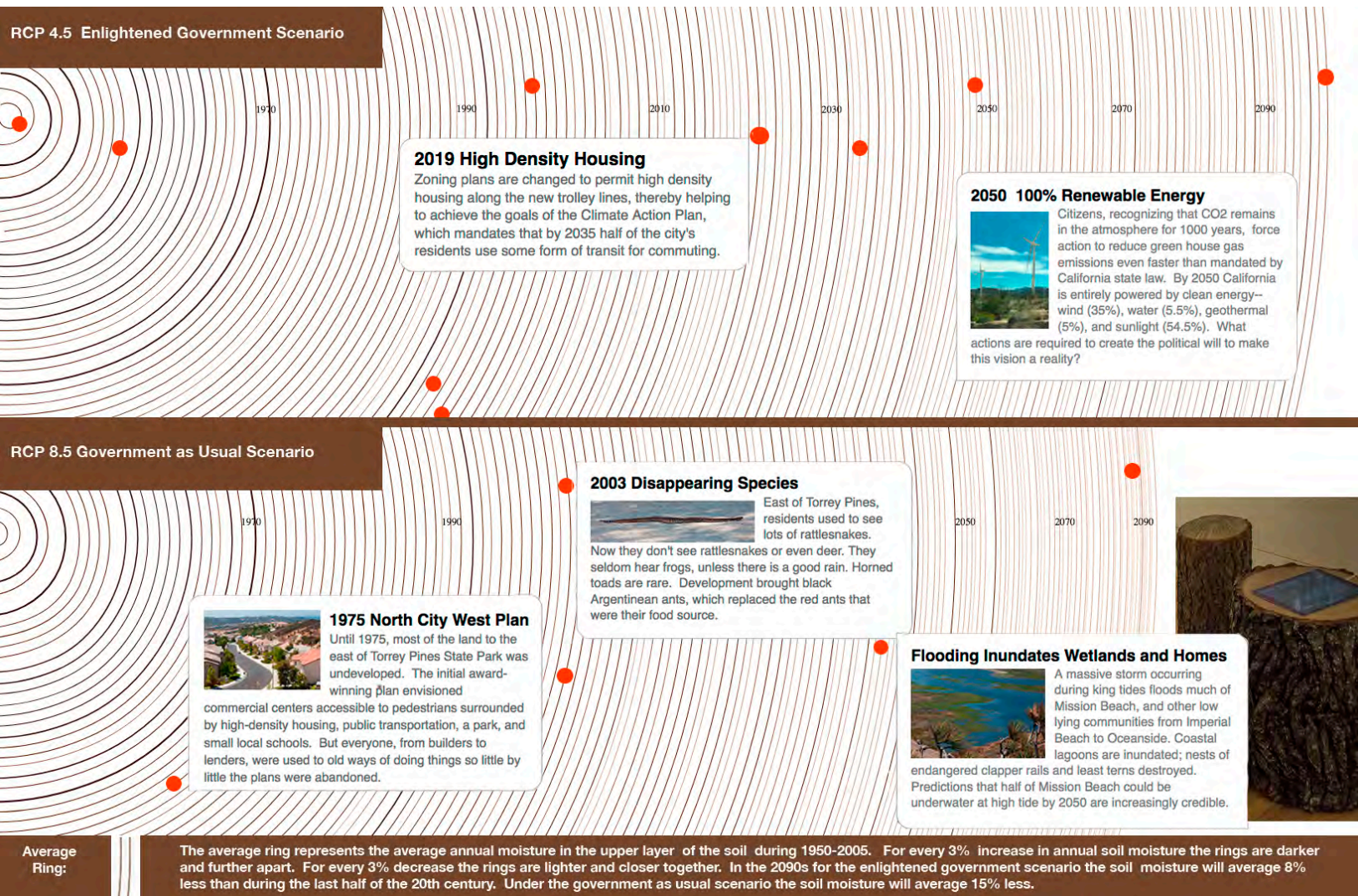
Listen to the Trees is an ongoing project to honor the trees by drawing attention to local ecology and advocating for a future where the forests may thrive. In addition to photomontages of the trees, my installations include faux tree trunks with interactive touchscreen displays of the tree rings of Torrey pines and Jeffrey pines that record past climate and visualize possible climates of the future. Pressing on selected rings brings up information about events that have occurred or might occur in a given year. These evolving displays, to which I continue to add new locations and additional information, draw upon extensive research on local ecology and proposals for local climate action.

Choosing the appropriate climatic variable to correlate with tree growth is challenging. For Torrey pines, the amount of rainfall has been closely correlated with tree growth.² Summer fog is also an important variable.³

Although in recent years California has suffered from a severe drought, some climate models suggest that rainfall may actually increase in the future. Unfortunately, this doesn't mean that trees will thrive, because temperature will become an increasingly important influence, even if it wasn't a significant, or limiting factor in the past. The hotter the temperature, the more water trees lose to evapotranspiration. Therefore, after extensive research, I chose soil moisture data, which combines the influences of temperature and rainfall, to diagram the tree rings of Torrey pines.⁴

The tree ring diagrams presented in the installation or on the project web site compare two models of future climate, the “business as usual scenario,” RCP 8.5, and the “enlightened government scenario,” RCP 4.5. By the end of the century, these diagrams show a significant difference in the size of the trees. For the RCP 8.5 model, tree ring size decreases dramatically, illustrating the predicted 15% decrease in soil moisture for 2090-2099 in comparison to the average soil moisture between 1950 and 2005. This 15% decrease means that by 2090 the average soil moisture will be worse than any year between 1950 and 2000! Even for the RCP 4.5 scenario, which assumes that governments take significant action and temperatures may remain below 2° C, the tree rings are significantly smaller by 2090, as soil moisture decreases by 7%. (*see figure on the right*)

The first Torrey pines to die from bark beetles grew on a small hill that looks out to the east. The view from my seat on a fallen limb, a panorama which has changed dramatically over the years, suggests some of the causes of a changing climate. When I first hiked to this spot in the eighties, I saw mostly chaparral, including manzanita, chamise, scrub oak and ceanothus. Although the interstate along the coast had been completed a decade earlier, only a dirt road extended eastward. Now, sitting in the same spot, I



Composite of images from touch screen displays, for more see www.ruthwallen.com/listentothetrees

see seas of houses, some office buildings, and know that a new freeway connects the inland interstate to the one running along the coast. It didn't have to turn out this way. As described in the interactive touch screen display, visionary plans included walkable suburbs, public transportation and some high-density housing. But in the words of former San Diego City Architect Mike Stepler:

Eventually it was death by a thousand cuts ... Over the years the traffic engineers felt that the streets were not wide enough, the school district no longer wanted neighborhood schools, but larger schools located somewhere else, the lenders said that they'd never lent on anything like this, and the home builders, while they understood the suggestions for energy efficiency, said they had their standard way of building things.⁶

San Diego residents have long voiced fears of sprawling "Los Angelization." Despite being vastly outspent by developers, Proposition A passed in 1985, setting aside a large "future urbanizing area." Developers weren't successful in passing proposition M, which allowed for the area to be developed, until they acceded to some of the activist's demands for affordable housing, conservation, and energy efficiency in 1998. But looking back, these efforts did not significantly change the process of unbounded growth. About three hundred acres including vernal pools were left as a preserve, solar panels were put on about ten percent of the homes, and a few affordable apartments, far from jobs or reliable public transportation, were constructed. Meanwhile wild spaces continued to be paved over, the average size





Torrey Pines Natural Reserve Extension
2016
trptych 76" x 49"





Laguna Mountains, Cleveland National Forest

2016

triptych 79" x 50"

of a home more than doubled that of a half century earlier,⁷ and more cars packed the roads, while greenhouse gas emissions, from this development and similar instances throughout the world, continued to rise.

At Scripps, Charles Keeling first sounded the alarm with his now infamous diagram of rising greenhouse gas emissions, the Keeling curve, in 1958. The consequences of rising emissions have been felt quickly in San Diego. It was only forty-five years later, in late October 2003, that skies turned an ominous greyish white and ash rained down from three fires raging to the east. Schools closed for the week while well over half the forested area in the county burnt. The same thing happened four years later when seven separate fires burned in the county and half a million people were ordered to evacuate their homes. A year after that, the Goldspotted oak borer, a beetle likely introduced from Arizona, began to devastate inland oaks.

Years of drought have made the oaks more susceptible to this pest, which first hit coast live oaks around Descanso but gradually spread up the mountains to the black oaks that grow among the Jeffrey pine and cedar.⁸ For the Jeffrey Pine, I diagramed the tree rings based on the Palmer Drought Severity index, which combines temperature and precipitation to calculate relative dryness, using data for Laguna Mountains from 1895 to 2016. The diagram of those tree rings shows that in the first sixteen years of this century, the number of years where drought was rated as moderate or worse, ten, is almost as many, eleven, as in the entire previous century! Again, this is not just because of a decrease in precipitation, but because temperatures are rising, resulting in hot droughts.⁹

Wanting to know more about the ecological changes beyond the small forests of San Diego, I picked up

the Pacific Crest Trail about two hundred and fifty miles north of the Lagunas, at the Walker Pass Campground, in 2016. I was shocked by what I saw. Almost the entire pinyon pine and juniper forest was dead. Driving a bit further, to the southernmost point of the Sierras, large swathes of dying conifers painted the mountainsides an alarming orange. Indeed, the devastation of drought, coupled with bark beetles and fire can be seen throughout California. Nearly 150 million trees have died since 2010!¹⁰

As the tree rings diminish in size due to the changing climate, the urgency of the crises increases. Tree rings can be visualized as constricting circles, a tightening noose. An animation I created using this imagery explains that carbon emitted into the atmosphere stays there. The longer humanity waits to reduce emissions, the more rapidly we need to do so.

This is the huge challenge of our times. Pressing on the tree rings in the RCP 8.5 scenario reveals some of what has already been lost as well as some of the impending local catastrophes. As opposed to constricting in fear, how can we imagine new ways of being and doing?

Even after they've died, tree stumps offer a place to sit and reflect. Imagine sitting on a dead stump and looking around you. Can you dare to mourn the loss of so many trees and all that perishes with them? Can you dare to imagine what the trees have experienced? An old growth Jeffrey pine must bear so much loss, as settlers cut down their kin, killed the humans and bears with which they had co-habited for eons, introduced noxious chemicals in the air and the water, and so much more.

Trees are living beings with whom we are bound in reciprocity. They convert the carbon dioxide we exhale and emit into the atmosphere into life, while providing the oxygen we breathe. Viewers of the tree



Lake Wohlford, Escondido 2018
Oak dying from infestation of Goldspotted oak borer.
65" x 40"

ring display are invited to write letters to the trees and read the letters of others, an invitation that I extend to everyone reading this article.¹¹ It is time to recognize the vast interconnected rings of life that connect all of us. It is time for those of us who have forgotten, to open our hearts, to learn to listen to the trees, express our love and sense theirs. It is time to place the well-being of trees at the center of our concerns. It is time for relentless revisioning of economic and political systems—how we grow food, provide shelter and consume energy. It is time to love and truly care for the welfare of all living beings.

Multi-media artist and writer, Ruth Wallen is dedicated to encouraging dialog on eco and social justice. After initial training as an environmental scientist, she turned to art to pose questions beyond disciplinary boundaries, address values informing environmental policy, and contribute to the developing field of ecological art. She works in a variety of media on many scales, from intimate artist books and performative lectures, to large installations, web sites and public projects. Her critical writing addresses ecological art and race, gender and visual culture. Active in the border region, she was a Fulbright lecturer at the Autonomous University of Baja California, Tijuana. Currently she is co-Chair of the MFA in Interdisciplinary Arts Program at Goddard College. www.ruthwallen.net

FOOTNOTES

¹ “Top 20 Largest California Wildfires,” Cal Fire, August 8, 2019, https://www.fire.ca.gov/media/5510/top20_acres.pdf

² Franco Biondi, Daniel R. Cayan and Wolfgang H. Berger, “Dendroclimatology of Torrey Pine (*Pinus torreyana* Parry ex. Carr.),” *The American Midland Naturalist* 138, no. 2 (1997): 237-251.

³ Douglas T. Fischer, Christopher J. Still, and A. Park Williams, “Significance of summer fog and overcast for drought stress and ecological functioning of coastal California endemic plant species,” *Journal of Biogeography* 36, no. 4 (2009): 783-799.

⁴ Thanks to David Pierce, Scripps Institute of Oceanography, for supplying this data.

⁵ <http://www.ruthwallen.com/listentothetrees>

⁶ Personal communication. *Part of Preserving Paradise: a conversation about suburbia, sustainability and climate change.*

See <http://www.ruthwallen.com/ppclimate/index.html>

⁷ Dolores Hayden, *Building Suburbia: Green Fields and Urban Growth, 1820-2000* (New York: Pantheon Books, 2003).

⁸ “Goldspotted Oak Borer,” University of California Cooperative Extension, accessed January 6, 2020. <https://ucanr.edu/sites/gsobinfo/>

⁹ Daniel Griffin and Kevin J. Anchukaitis, “How Unusual is the 2012-2014 California Drought?” *Geophysical Research Letters* 41, no. 24 (2014): 9017-9023.

¹⁰ “Survey Finds 18 Million Trees Died in California in 2018,” *California Tree Mortality, USDA Forest Service*, February 11, 2019, <https://www.fs.usda.gov/detail/catreemortality/toolkit/?cid=FSEPRD609121>. Note that as reported here, over 147 million trees died between 2010 and 2018. The data for 2019 have not yet been released.

¹¹ <http://www.ruthwallen.com/listentothetrees/write-letter.html>



Alta Vista (southernmost Sierras), 2017
Many pines, cedars and firs are dying.
56" x 32"