

USDA Forest Service

URBAN FOREST CONNECTIONS

webinar series

Second Wednesdays | 1:00 – 2:15 pm ET

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Forest Service
Urban Natural Resources Stewardship

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COMMUNITY FOOD FORESTS: FRUITFUL AND FIRE-SMART



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LEAF Network



Linking Edible Arizona Forests

USFS Webinar April 11, 2018

Community Food Forests—Fruitful and Fire-smart

**Designing for local site conditions
and reducing wildfire risks**

Ann Audrey, LEAF Network

DESIGN: First, learn the edible trees that grow in your area



ALMOND



APPLE



APRICOT



CAROB



MESQUITE



MULBERRY



OAK



OLIVE



CHERRY



CITRUS



DATE PALM



ELDERBERRY



PALO VERDE



PEACH



PECAN



PERSIMMON



FIG



GUAVA



HACKBERRY



HAWTHORN



PINYON PINE



PISTACHIO



PLUM



POMEGRANATE



IRONWOOD



JUJUBE



JUNIPER



LOQUAT



QUINCE



SAGUARO



SAPOTE



WALNUT

Look at tree elevation, water and chill hours needs

ELEVATION AREAS, WATER NEEDS AND CHILL REQUIREMENTS FOR SELECTED EDIBLE TREES IN ARIZONA

TREE SPECIES	Low Desert Lake Havasu City, Phoenix, Yuma	Mid Desert Ajo, Casa Grande, Tucson	High Desert Globe, Kingman, Sierra Vista, Willcox	High Plateau, Mountain Page, Prescott, Winslow, Tuba City	High Mountain Flagstaff	WATER USE: low 12-20in/yr med 20-40 in/yr high 30-50 in/yr	CHILL: Hours between 32 - 45°F needed for proper bud growth, fruit set and growth
Almond	X	X	X			medium	yes
Apple	X	X	X	X	X	medium	yes
Apricot	X	X	X	X		medium	yes
Carob	X	X				medium	no
Cherry	X	X	X	X	X	medium	yes
Citrus	X	X				high	no
Date Palm	X	X				high	no
Elderberry		X	X	X	X	medium	no
Fig	X	X	X			medium	yes
Guava	X					medium	no
Hackberry			X	X	X	medium	no
Hawthorn	X	X	X	X	X	medium	yes
Ironwood	X	X				low	no
Jujube	X	X	X	X	X	medium	yes
Juniper			X	X	X	low	no
Loquat	X	X				medium	no
Mesquite	X	X	X			low	no
Mulberry		X	X	X	X	medium	yes
Oak			X	X	X	medium	no
Olive	X	X				medium	yes
Palo Verde	X	X				low	no
Peach	X	X	X	X		medium	yes
Pear, Asian		X	X	X	X	medium	yes
Pecan	X	X	X			high	yes
Persimmon	X	X	X	X	X	medium	yes
Pinyon Pine			X	X		low	no
Pistachio		X	X			medium	yes
Plum	X	X	X	X	X	medium	yes
Pomegranate	X	X	X			medium	yes
Quince		X	X	X		medium	yes
Saguaro	X	X				low	no
Sapote	X					medium	no
Walnut			X	X		medium	yes

Low Desert: Glendale, Lake Havasu City, Phoenix, Yuma

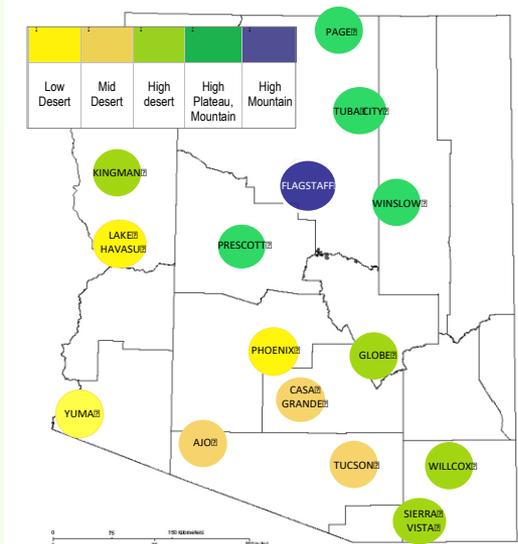
Mid Desert: Ajo, Casa Grande, Tucson

High Desert: Globe, Kingman, Sierra Vista, Willcox

High Plateau/Mountain: Page, Prescott, Winslow, Tuba City

High Mountain: Flagstaff

MAP OF SELECTED ARIZONA CITY AND TOWN ELEVATION AREAS



Observe and map conditions at the planting site

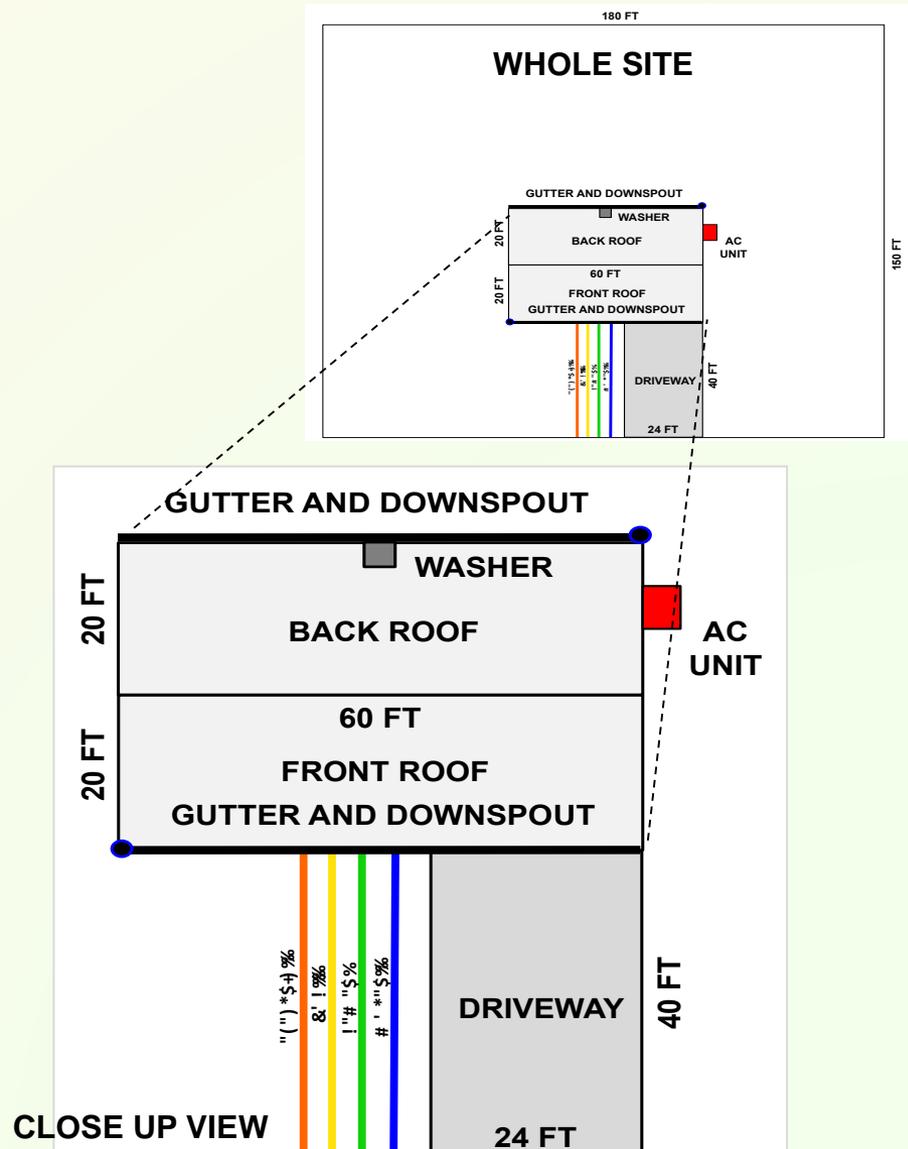
Walk the site

- Observe slope, soil, water flow, wind patterns and other microclimate conditions

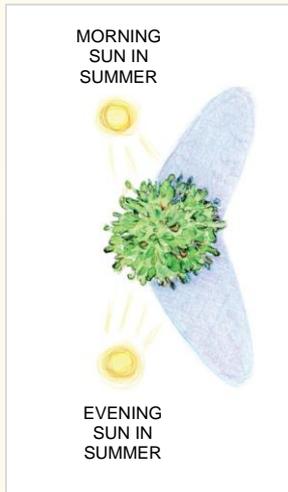
Map site conditions

- Show dimensions, water sources, existing plants, utilities and other permanent features

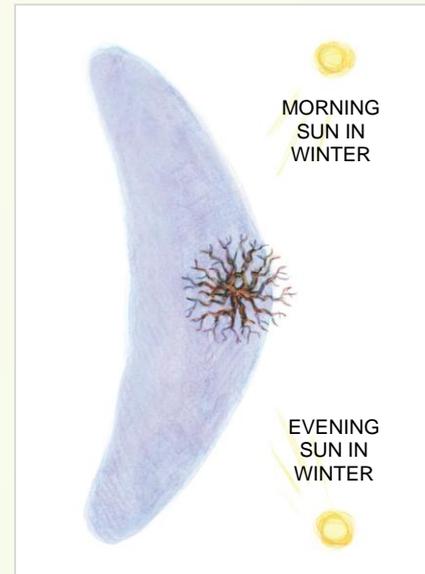
Find, mark and avoid utility lines



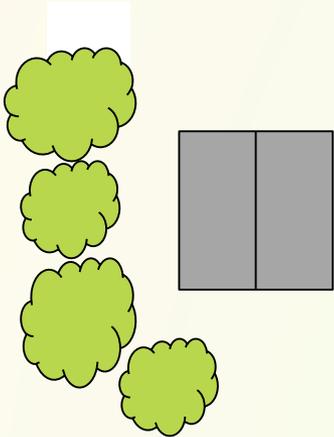
Place trees based on their needs for sun or shade



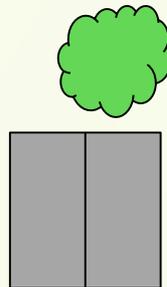
SUMMER: Sun in the northern sky



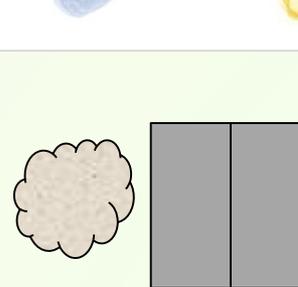
WINTER: Sun in the southern sky



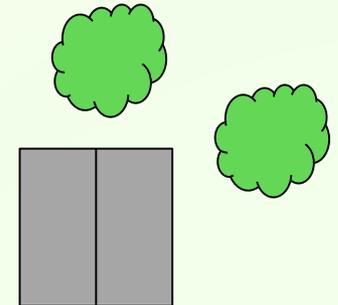
Place hardy natives west/northwest of houses to cast afternoon shade



Place heat- and sun-sensitive trees east of buildings for afternoon shade



Place chill-loving trees north of buildings for deep winter shade



Place cold-sensitive trees south and southeast of buildings to gain winter sun

Place trees based on site cold-air conditions

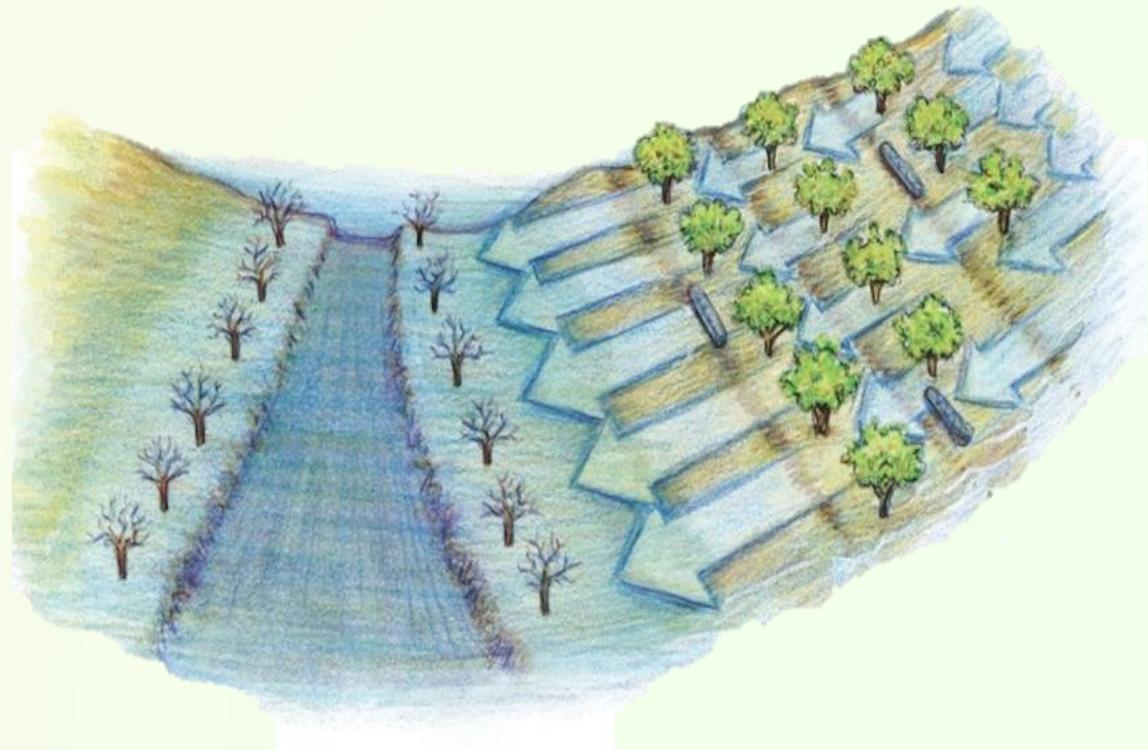
Cold-sensitive trees

- Place higher on hillsides on south-facing slopes to receive winter sun
- Do not place in areas where cold air pools
- Place south of walls that radiate warmth at night

Trees that need chill hours

- Place at the bottom of drainages
- Place on north-facing slopes

As night falls, cold air drains down slopes and pools in low areas



Design to address strong prevailing winds

Understand prevailing winds

- Find local wind data
- Observe wind-shaped trees in the area

Position trees according to winds

- Plant hardy native trees upwind to protect buildings and sensitive trees
- Plant sensitive fruit trees downwind of hardy native trees and buildings
- Do not plant sensitive trees where winds are “pinched” by canyons, buildings and other obstructions

Water trees outside the drip line to encourage wide root growth and strong tree anchoring

Strong prevailing winds (red arrows) have permanently shaped these windbreak trees



Determine appropriate tree spacing

Leave space around buildings, walls & curbs

- Plant > 2-feet from buildings, walls and curbs
- Avoid putting trees against shared walls
- Follow wildfire guidelines in fire-prone area

Design for easy access to trees

- Lay out pathways to and around trees
- Plan access for vehicles or machinery

Space trees for pollination

- For bee pollination, plant trees ≤ 100 feet apart
- Plant wind-pollinated trees within 50 feet apart

Provide space for trees to reach mature size

- Plant full-sized trees at least 30 feet apart
- Semi-dwarf and dwarf trees require less space

Consider multistory plantings

- Interplant *overstory* edible trees with *midstory* edible shrubs and *understory* plants



Well-spaced native edible trees along raised sidewalk that provides runoff to trees.



Edible understory plants placed under edible tree within the same water harvesting basin.

Shape sites to harvest rainwater directly in soil



Harvest large volumes of rain in depressions shaped in the soil



Shape sites to harvest stormwater

Harvest stormwater runoff from streets, parking lots, roofs, and other hardscapes to help support edible trees



A newly constructed water harvesting basin will receive street runoff through a curb cut

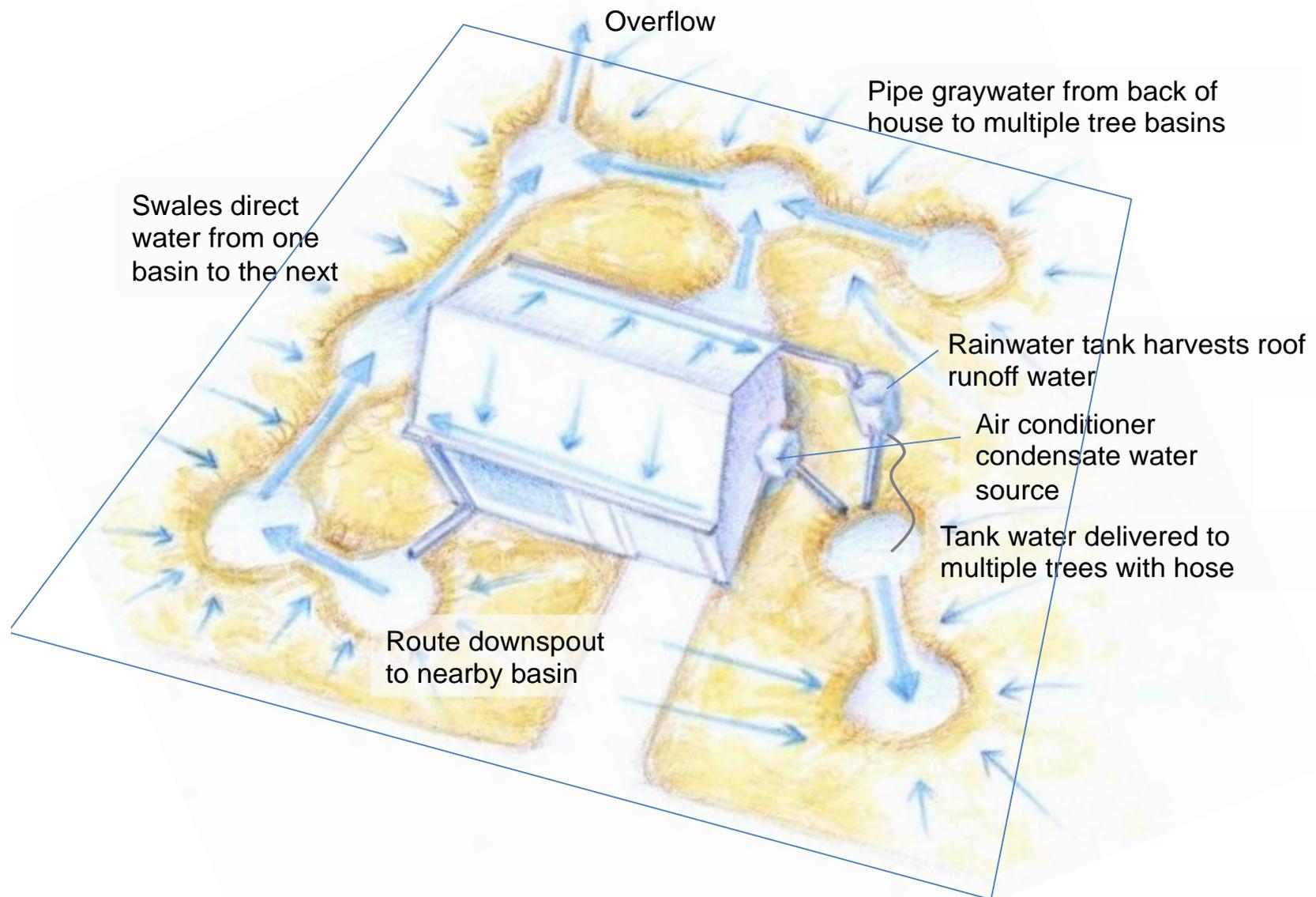


Add tanks to increase rainwater harvesting capacity

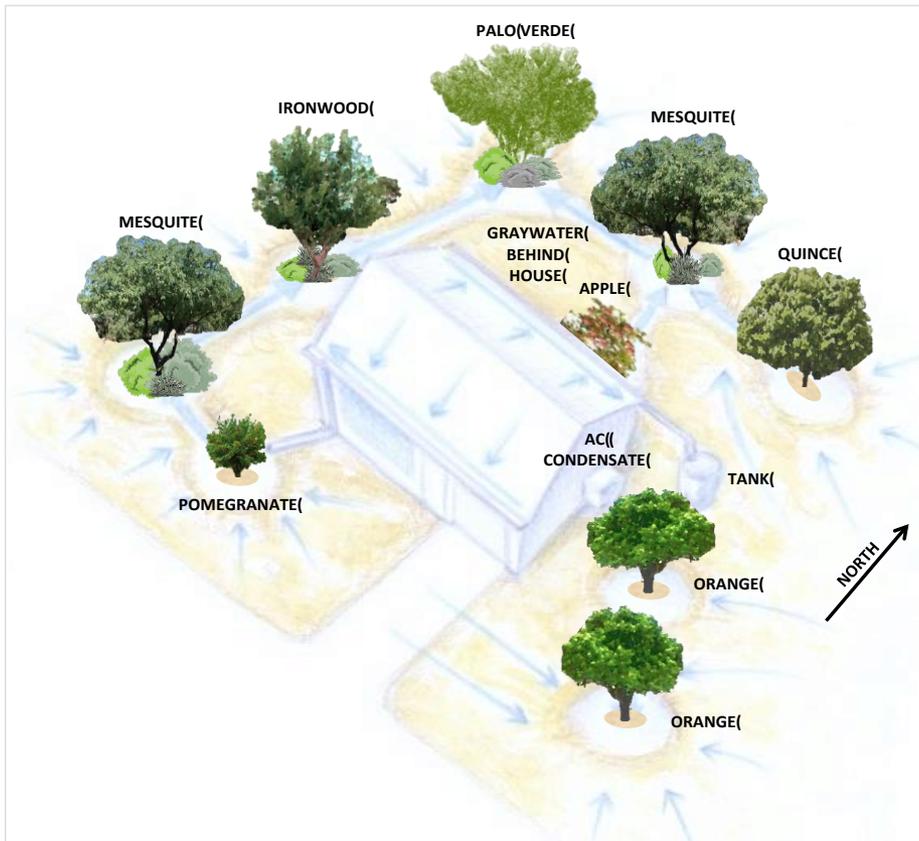
Use rainwater tanks to store rainwater for later use. Tanks can also moderate temperatures around heat and cold-sensitive edible trees.



Design the site to make maximum use of water sources



Example planting design for mid-elevation desert



- Passive water harvesting throughout
- Rainwater tank harvests north half of roof
- Tank, graywater and AC condensate water apple and oranges
- South roof downspout flows to elderberry
- Mesquites, ironwood and palo verde west and north of house shade summer sun and buffer strong winds
- Mesquite shades and buffers quince to the east from wind
- Mesquite south of house shades pomegranate
- Cold-sensitive oranges east and southeast of house warmed by morning sun in winter
- Apple north of house gets chill in shade
- Edible wolfberry, chiltepine, and desert hackberry planted under native trees



2016 © Rafael de Grenade

APPLE?



IRONWOOD?



2016 © Carolyn Niethamm

MESQUITE?



ORANGE?



PALO VERDE?



2016 © Rafael de Grenade

POMEGRANATE?



QUINCE?

Anticipate and prepare for extreme conditions

Prepare for extreme cold and frost

- Plant cold-sensitive trees in warm microclimates
- Plant late blooming or cold-hardy varieties
- Wrap sensitive trees in sheets or blankets
- Build structures over trees & drape with tarps
- Place lamps in or under trees to give warmth

Prepare for extreme heat events and drought

- Plant sensitive trees east of hardy natives or buildings for shade
- When pruning, leave branches that shade trunk
- Hang shade cloth over sensitive trees
- Provide extra water and mulch

Prepare for intense storms

- Strong winds, heavy snows, ice can damage trees
- Keep trees well pruned to reduce damage

Design and prepare for fire in wildfire-prone areas



A sheet protects a blooming pear tree from a late season snowfall

Wildfire example: Semi-arid grasslands, Sonoita, AZ



- Typical fire frequency in semi-arid grasslands: 2 to 5 years
- Keeps woody species from encroaching on grasses
- Grasses are the usual fire fuel, but everything burns except rock
- Fires are generally fast and flashy due to wind and fuel type

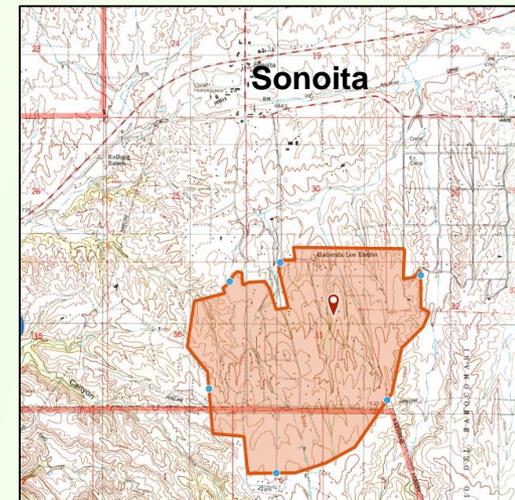
Encino Wildfire, burned June 20, 2017, Sonoita, AZ



- Started by lightening
- 1,289 acres burned
- 155 homes in the burn area
- 5 buildings lost

Slides that follow show trimming before the fire, and photos taken after the fire at a residence located within the fire footprint.

Fighting the Encino Fire, June 20, 2017
Photo from <https://inciweb.nwcg.gov/state/3/>



**DESIGN: Learn how protect your home at
www.firewise.org**



FIREWISE USA™

RESIDENTS REDUCING WILDFIRE RISKS

Wildfire Preparedness

Find out what the experts know about the best way to make your home and neighborhood safer from wildfire. From the basics of defensible space and sound landscaping techniques to research on how homes ignite (and what you can do about it), there are tips, tools and teachings you can use!

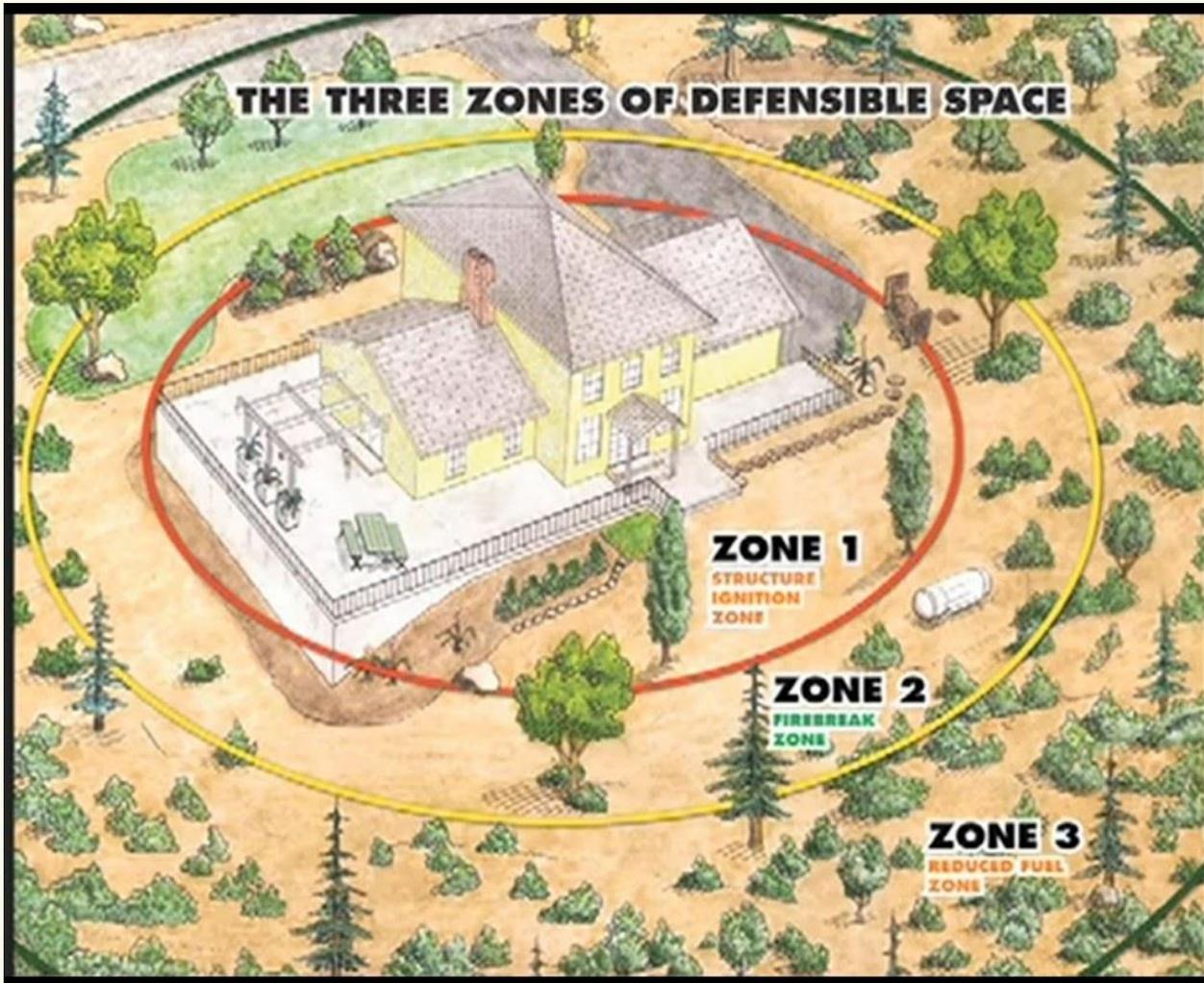
Share your knowledge with others using our Firewise USA™ Toolkit tip sheets or our videos and Public Service Announcements (PSAs).

Subscribe to our free monthly newsletter

Fire Break, our free, monthly newsletter will keep you up to date on the latest news and information on mitigating your wildfire risk. Subscribe today.



Create three zones of defensible space



Defensible space is the area between a structure and an oncoming wildfire where nearby vegetation has been modified to reduce a wildfire's intensity and ability to spread.

- ZONE 1
Structure Ignition Zone
- ZONE 2
Firebreak Zone
- ZONE 3
Reduced Fuel Zone

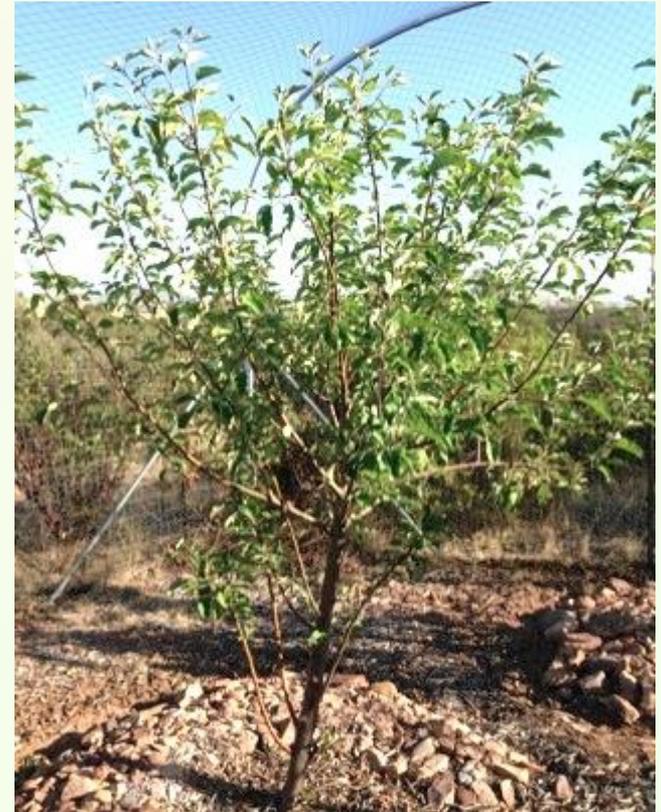
Carefully select edible trees. Design for fire safety



Oak and manzanita removed near buildings



Flammable juniper trimmed up near building



Deciduous apple tree has high moisture content

- Avoid planting flammable edible pines, junipers and oaks in Zones 1 and 2
- If they are present, remove them, or trim and space these trees carefully
- Deciduous plants are more fire-resistant due to higher moisture content but remove litter
- A diverse, healthy landscape deflects insects and diseases to resist catastrophic fires

Time wildfire-prevention activities carefully

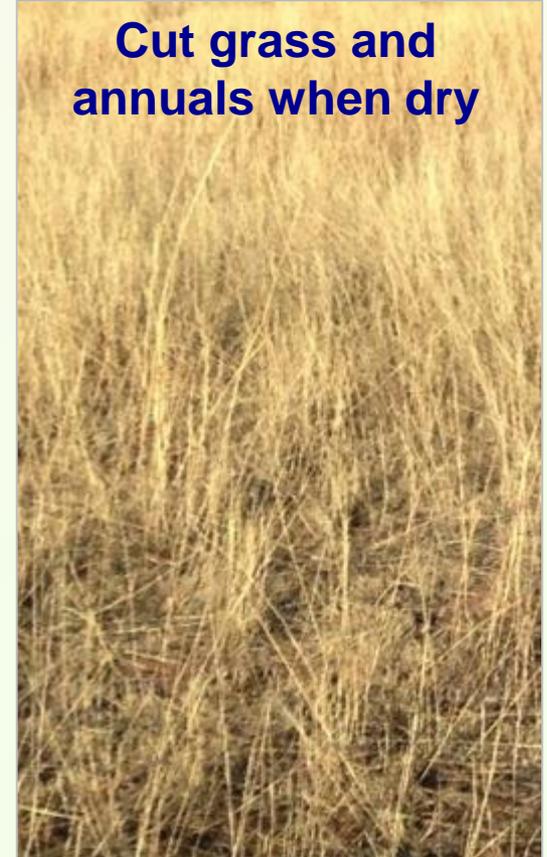
Prune in winter



Rake in April or sooner



Cut grass and annuals when dry



- Prune trees while dormant to reduce fuel volume and maintain healthier plants
- By April, rake around vegetation and structures
- Cut grass and remove annual plants after they go to seed or dry out
- Be vigilant with maintenance during wildfire season: **May through August, BUT ITS GETTING LONGER**

Remove dead, diseased and low-hanging branches



Sprawling manzanita with multiple low-growing branches and understory grass



Mazanita and juniper, after trimming

Do not plant understory. If it is present, remove it.



Fire's path: Understory plants "laddered" fire up this tree



Rake litter and remove from defensible space



- Clean branches and wood from the ground
- Rake litter at least 3 to 5 feet away from structures
- Rake litter at least 1 foot away from tree canopy lines

Remove trimmings from defensible space

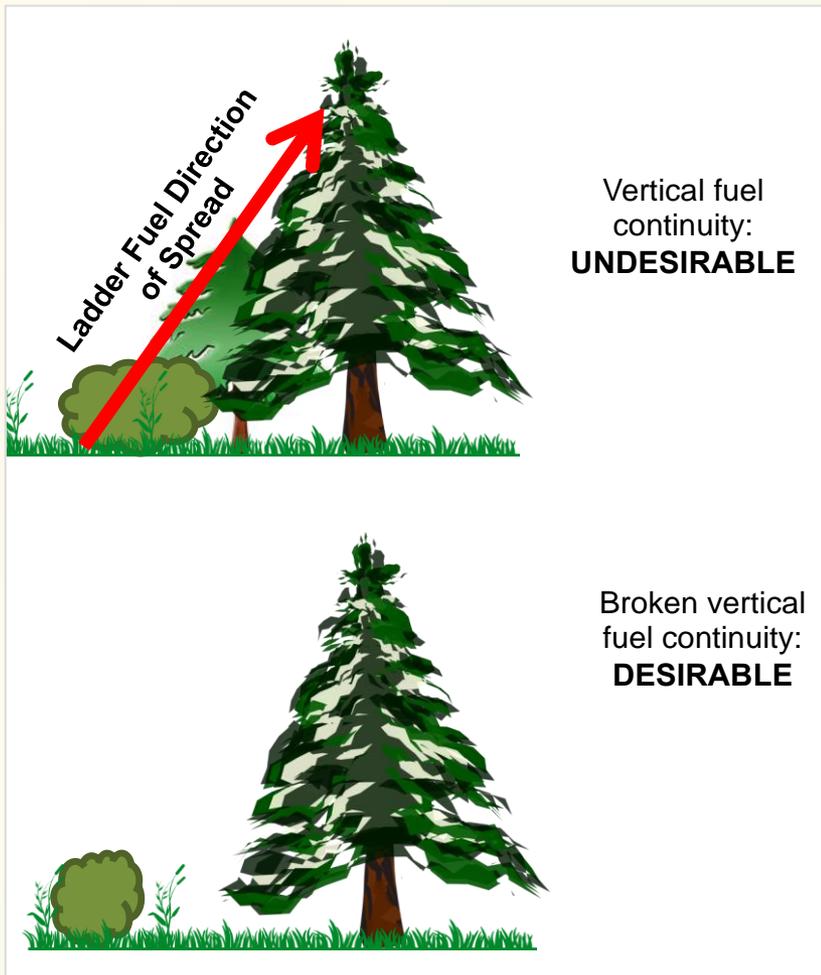


Trimmings are piled in place, then moved the same day to a fire-safe area for later hauling.



Trimmings held in a fire-safe area, ready to be loaded. Total volume of trimmings were two long-bed trailer loads, 4-feet high.

Avoid vertical continuity of ladder fuel near structures



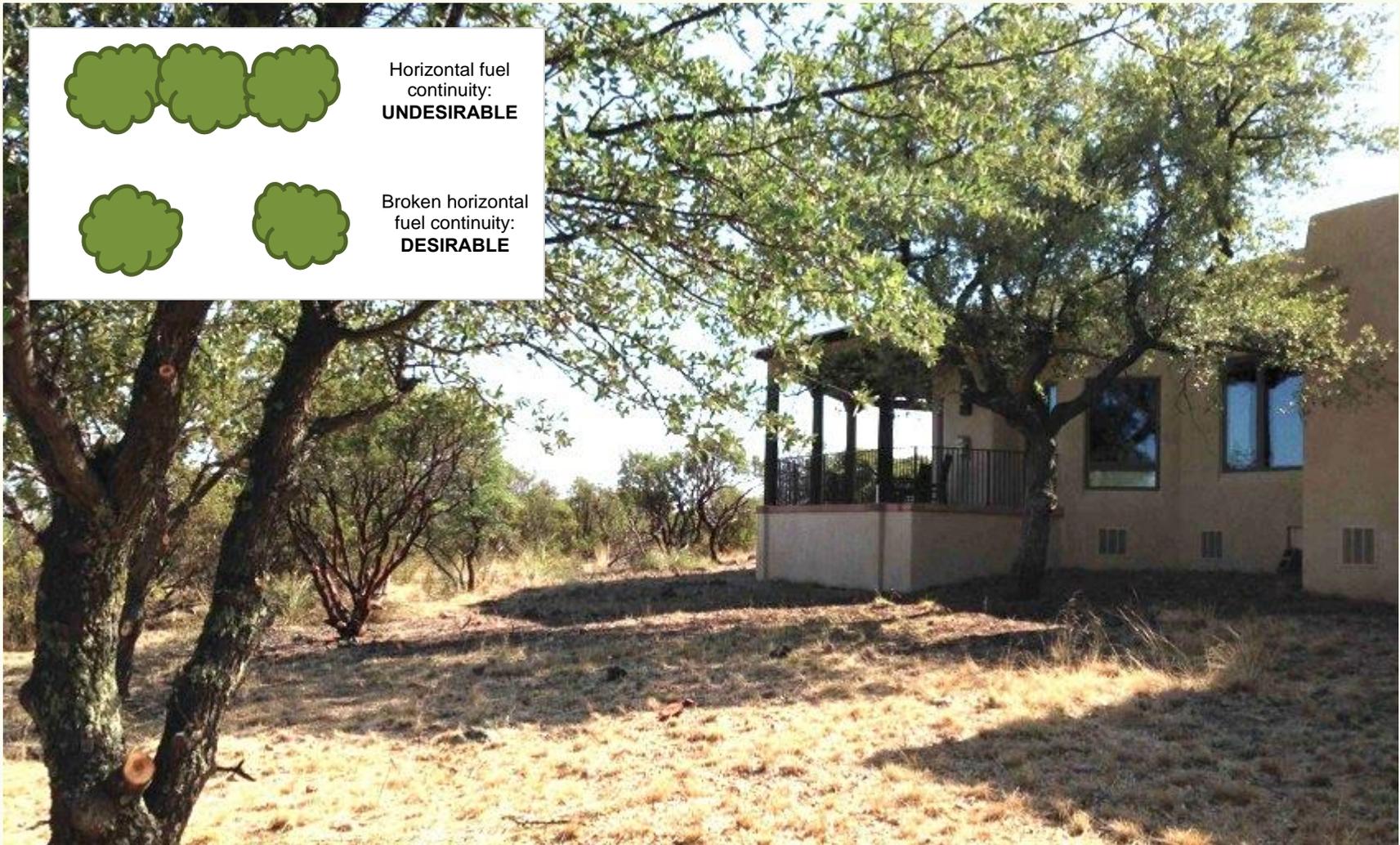
Remove vegetation near larger trees to reduce ***ladder fuels*** within 100-feet of structures to prevent fire passing from grass to shrubs to trees.

Manzanita and grass being cleared under oak

Fire's path: Removing vertical fuels protected the oak



Avoid horizontal continuity of fuel near structures



- Avoid horizontal continuity of fuel within 100 feet of structures
- Create gaps between neighboring trees and shrubs to slow fire
- Plant in small, irregular clusters and islands, not large continuous masses

***Fire's path:* Less horizontal and vertical fuel continuity slowed the fire and helped protect the house**



Fire's path: Well-watered, mulched orchard did not burn



Prepare for wildfire to help those who fight the fires



Neighborhood water tank provided gravity-fed water to firefighters.



MANY THANKS to local, regional and state firefighting professionals and trained volunteers.



Electric company quickly got electricity turned back on.

LEAF Network resources to help design food forests



The LEAF Network is a community-based organization with the mission to link people with the benefits of edible trees and support edible trees with people's stewardship.

ABOUT • EVENTS • NEWS • CONTACT • GLOSSARY • STATEWIDE-RESOURCES



The LEAF Network is a community-based organization with the mission to *Link people with the benefits of edible trees and support edible trees with people's stewardship.*

We use the term edible trees to describe native and nonnative trees that produce fruits, nuts, seeds and pods that suit human tastes.

For more information about the LEAF Network, [click here](#).



To start enjoying the benefits of edible trees, go to the....

Edible Tree Guide

The LEAF Network's publication, *Growing Edible Arizona Forests, An Illustrated Guide*, helps you LEARN, CHOOSE, PLANT, CARE for, and HARVEST edible trees. You can [download the PDF of the entire Guide](#) or go to sections of the Guide at this website. This website offers explanations, photos, illustrations, and resources to help you get started enjoying edible trees. At the top of each Guide section is a link that allows you to print that section.

LEAF Network Mission

To link people with the benefits of edible trees and to support edible trees with people's stewardship

View and download at
leafnetworkaz.org

Growing Edible Arizona Forests, an Illustrated Guide

Plus view lots of additional supporting information

LEAF Network resources to help design food forests



LEAF Network



Linking Edible Arizona Forests

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Arizona Edible Tree Directory

If you are considering planting an edible tree in your yard or garden, or creating an entire food forest, the Arizona Edible Tree Directory can help.

This searchable directory contains detailed information on edible trees from the apples that thrive in highlands to the citrus that grows in lowlands around the state.

The directory provides advice on which plant types are suitable for different Arizona climate zones, along with other valuable information, such as tree size, preferred soil type, pollination, water requirements, and time of harvest. This directory lists a sampling of available plants to help you get started. [Local nursery resources](#) will be able to provide additional ideas and suggestions.

A directory of other woody "understory" plants can be found at our [Edible Understory Plant Directory](#).



AZ Native or Introduced

Native of Arizona (16)
Introduced to Arizona (39)

Growth Form

Tree (55)
Shrub (13)
Cactus (1)
Succulent (1)
Vine (0)

Appropriate Arizona Elevation Categories

HIGH MOUNTAIN: Flagstaff - USDA Zone 6b (-5°F-0°F) (17)
HIGH PLATEAU, MOUNTAIN: Prescott, Tuba City,

leafnetworkaz.org

Arizona Edible Tree Directory

Search through 55 edible trees and 28 edible understory plants for plant pictures, water use, size, chill requirements and other information



LEAF Network



Linking Edible Arizona Forests

THANK YOU

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