TEXAS A&M AGRILIFE EXTENSION

Texas SmartScape
Protecting Water Resources

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Biological and Agricultural Engineering
Texas A&M AgriLife Research and Extension
Dallas, TX

ISSUES

- Water Quality
  - Contamination/pollution due to runoff from landscapes, parking lots and construction sites
- Water Conservation
  - Irrigation increases water use by 35 to 70% during irrigation season

Water Quality

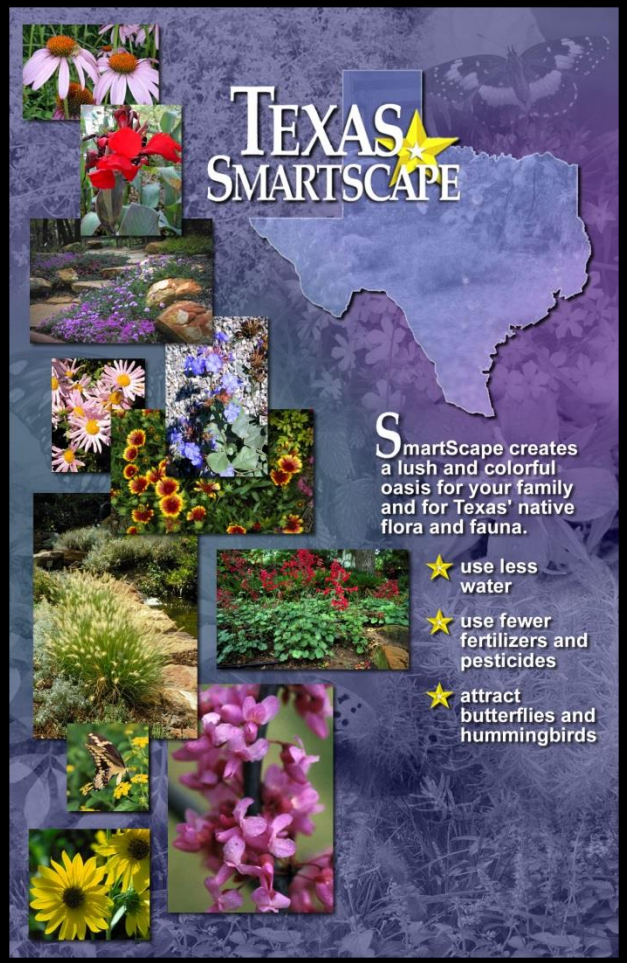
- **Runoff from commercial and home landscapes is the greatest source of non-point source water contamination**
- Stormwater
- Irrigation

Conservation

Conservation is the easiest and least expensive method to sustain our water resources

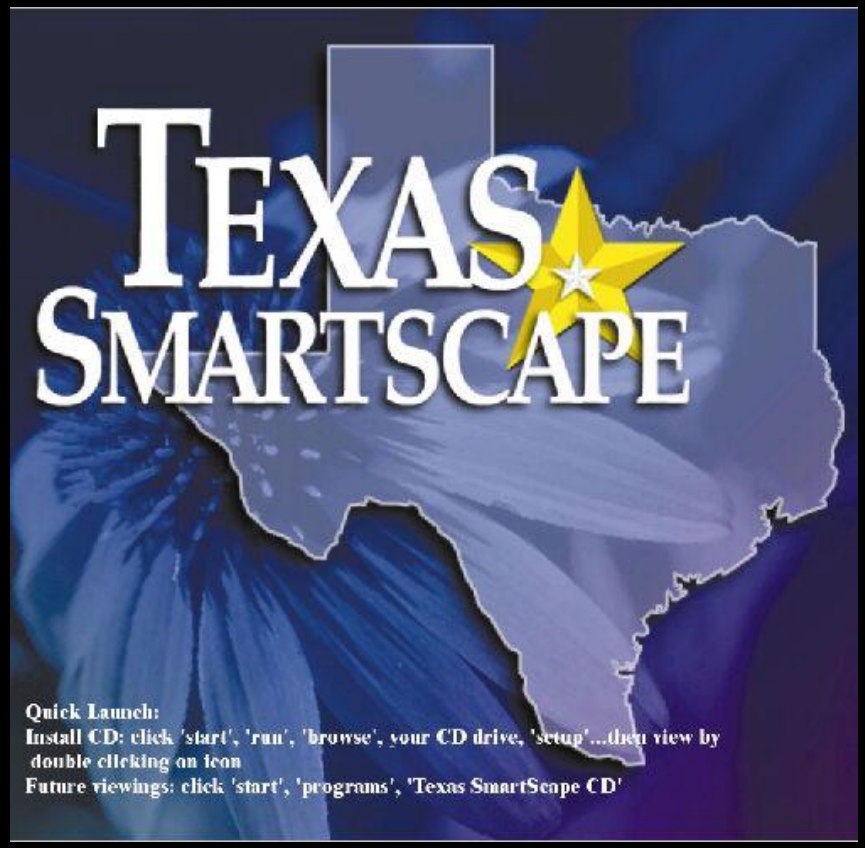
What is Texas SmartScape

- A landscape management program that utilizes xeriscape principles, providing
- Design, care, and plant search tools specific to North Central Texas
- Ecological, economic, and aesthetic benefits of using native or adapted plants specific to our regional climate, soil and rainfall
- The goal is to conserve local water supplies and improve stormwater runoff quality by reducing the amount of water required to maintain landscapes while decreasing the amounts of pesticides and fertilizers used in landscaping practices



Development of Texas SmartScape

- Developed by North Central Texas Council of Governments' Regional Stormwater Management Program
- 1999
- Went online 2002



Target Audience

- Decision Makers
  - City Planners
  - Landscape Ordinance
  - Irrigation Ordinance
  - Water Conservation Educators
  - Stormwater Educators
- Developers
- Property Managers
- Park Managers/Employee
- Landscape Professionals
- Licensed Irrigators
- Homeowners

Activities for Texas SmartScape Month

- Provide a link to the SmartScape web site from home page
- Ask city or county to declare March Texas SmartScape month
- Participate in all Texas SmartScape promotions
- Team with local Keep Texas Beautiful coordinator, local newspaper, or garden club to organize a yard contest or recognition program
- Partner with your local county Extension office and Texas A&M AgriLife Research and Extension Center
- Provide contact information for key city staff/departments to neighborhood associations to inform them who to contact for information about stormwater, water conservation, composting, recycling, etc.
- Offer to present SmartScape presentation to employees at large local businesses
- Ask businesses like garden centers if you could provide informational literature on water quality and Texas SmartScape
- Ask local homebuilders, realtors, and mortgage lenders to post a SmartScape web link from their home page, or provide a SmartScape brochure and/or bookmark to new homeowners
- Ask local hardware, home improvement, and/or bookstores to setup a display with information on Texas SmartScape

Education Methods

- Texas SmartScape web site
- Texas SmartScape Fact Sheet
- Texas SmartScape Month Campaign – March
- Landscape Demonstration
- Landscape Series
  - Weekly during month
  - All Day Event
- Newspaper
- Television
- Radio
- Social Media
- Water Bill Insert

Promotions

- Texas SmartScape Month
  - March
  - http://www.nctcog.org/envir/seeclean/txsmartscape/index.asp

- Texas SmartScape Plant Sale
  - http://www.txsmartscape.com/
  - Stephanie Zavala, FWWD
  - Many dates

- Fix-a-leak Day
  - March 19, 2016
  - Dustan Compton, TRWD
  - http://www3.epa.gov/watersense/our_water/fix_a_leak.html

Texas SmartScape Plant Sale

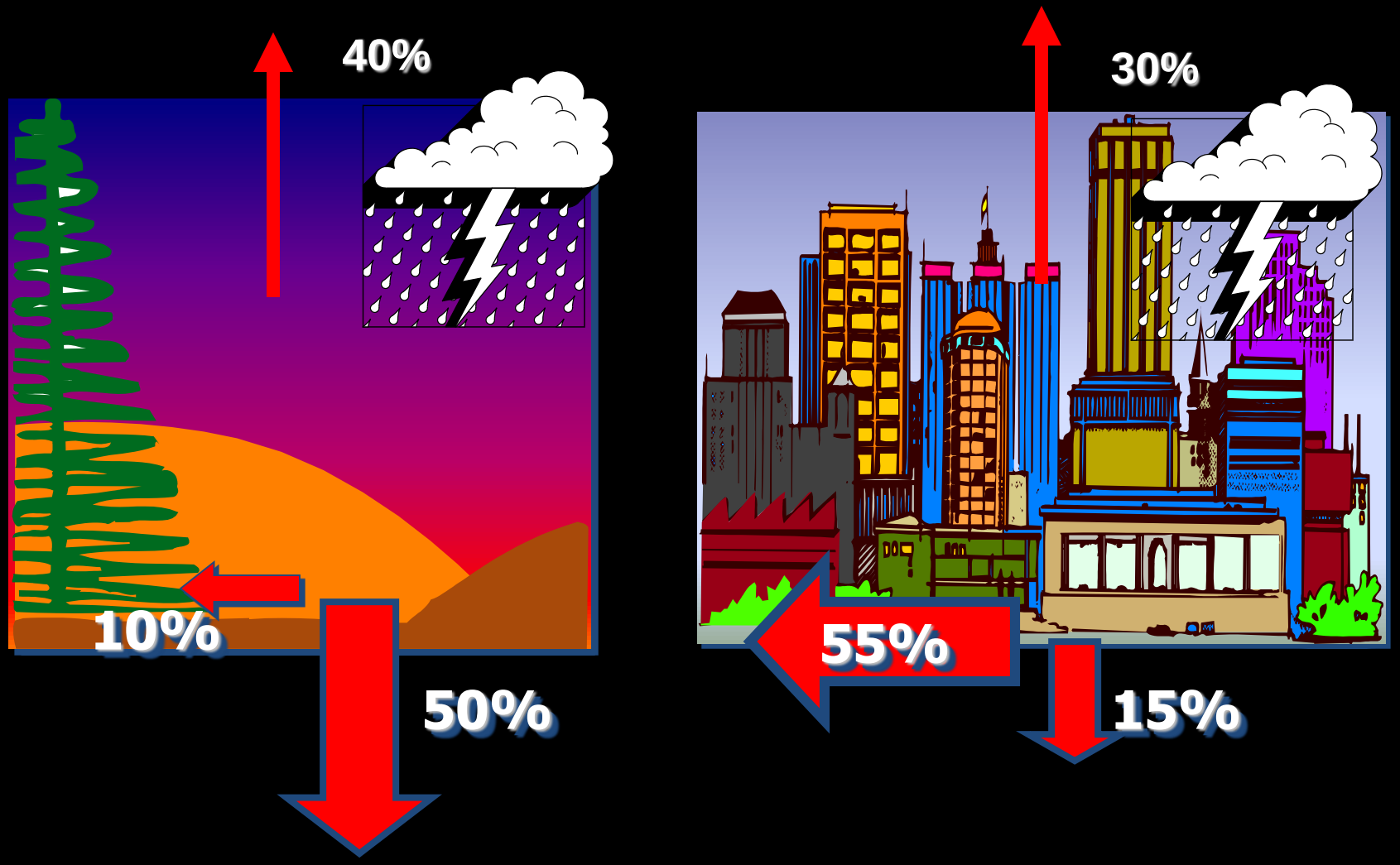
- Home Depot
- Independent Garden Center
- 8 am to 12 pm
- List of participating locations, dates and promotional materials on Texas SmartScape web site
- Set up information booth
- Distribute your cities information materials

Fix-a-Leak Day

- Fix-a-Leak Week
  - EPA Water Sense program
- TRWD set up Fix-a-Leak day at area Home Depots
- Free Fix a Leak Workshops
- Saturday, March 19, 10 am - 12 pm
- 10 - 10:40 am..... Repair/Replace Leaking Faucets
- 10:40 - 11:20 am.... Repair/Replace Leaking Toilets
- 11:20 am - 12 pm....Repair/Replace Sprinkler Heads

- 61 Home Depots
- Contact Dustan Compton at: dustan.compton@trwd.com

Development Impacts on the Water Cycle



Development Impacts on Water Quality

Increased Quantity

Decreased Quality

Greater Speed

Fertilizer

Pesticides

Sediments

Pet/animal waste

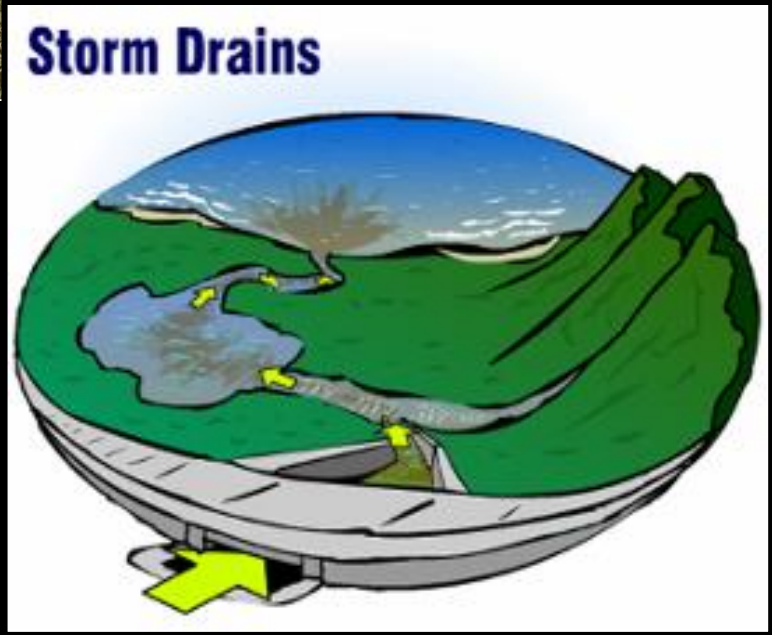
Toxic Contaminants

Debris

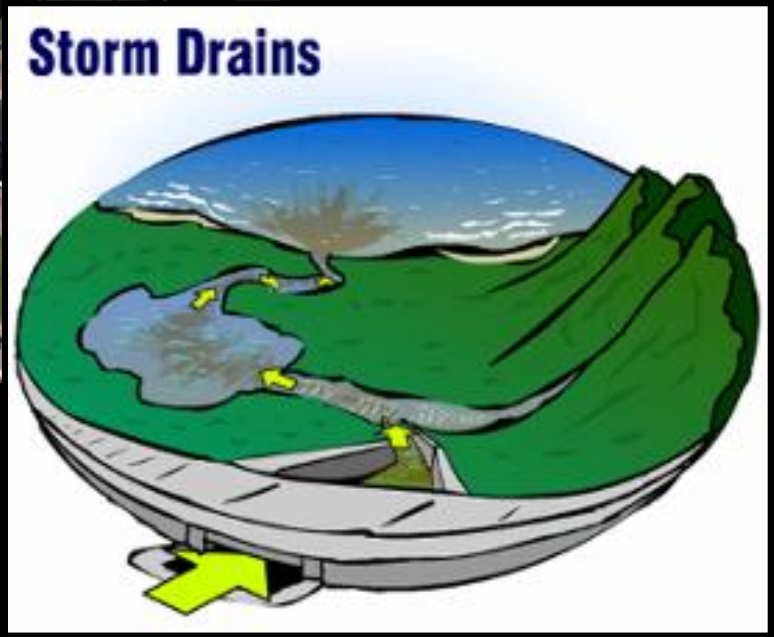
Thermal Stress


Agriculture Pollution
Polluted water


Construction Pollution
Polluted Water


Storm Drains

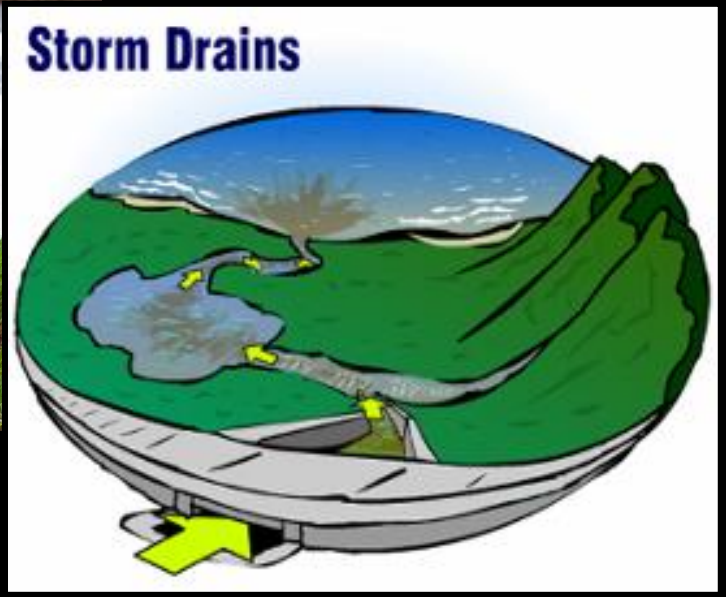

Urban Pollution
Polluted Water
Causes
Effects


Storm Drains


Residential Pollution
Polluted Water
Toxics
Effects


PET WASTE STATION
PLEASE CLEAN UP AFTER YOUR PET
Dog Waste Bags


Agri-Fab

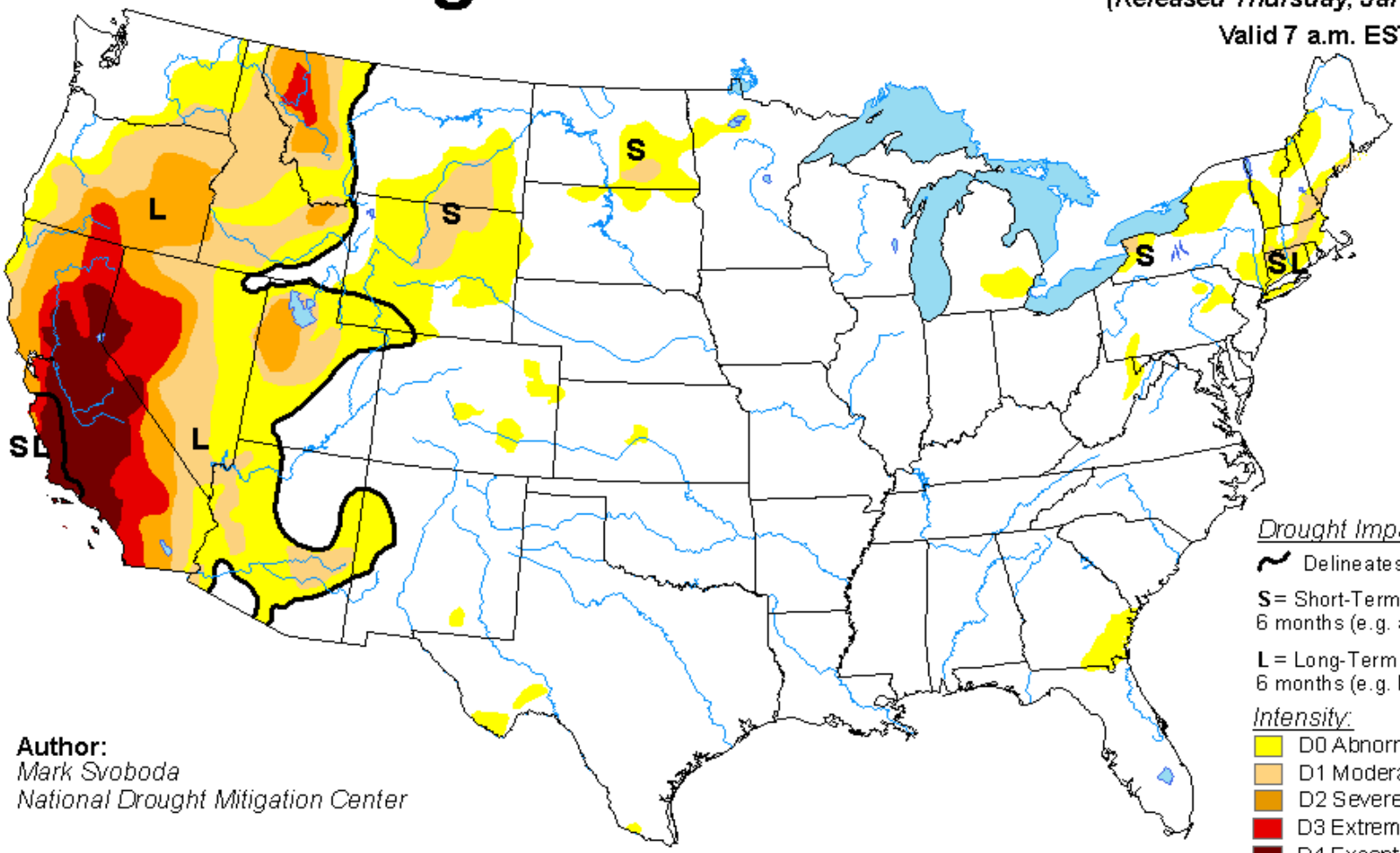

Storm Drains

U.S. Drought Monitor

January 26, 2016

(Released Thursday, Jan. 28, 2016)

Valid 7 a.m. EST



Author:
Mark Svoboda
National Drought Mitigation Center

Drought Impact Types:

Delineates dominant impacts

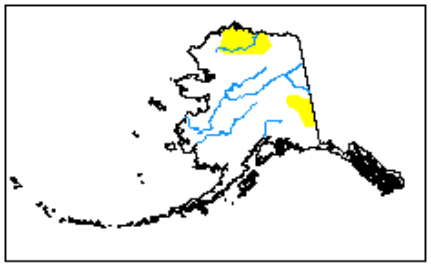
S = Short-Term, typically less than 6 months (e.g. agriculture, grasslands)

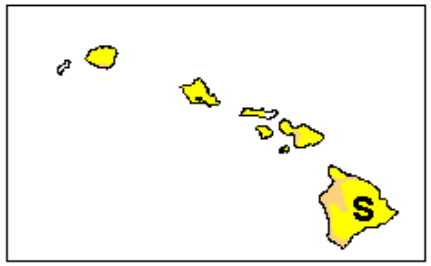
L = Long-Term, typically greater than 6 months (e.g. hydrology, ecology)

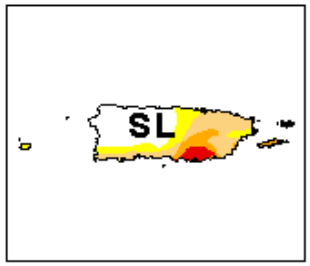
Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.





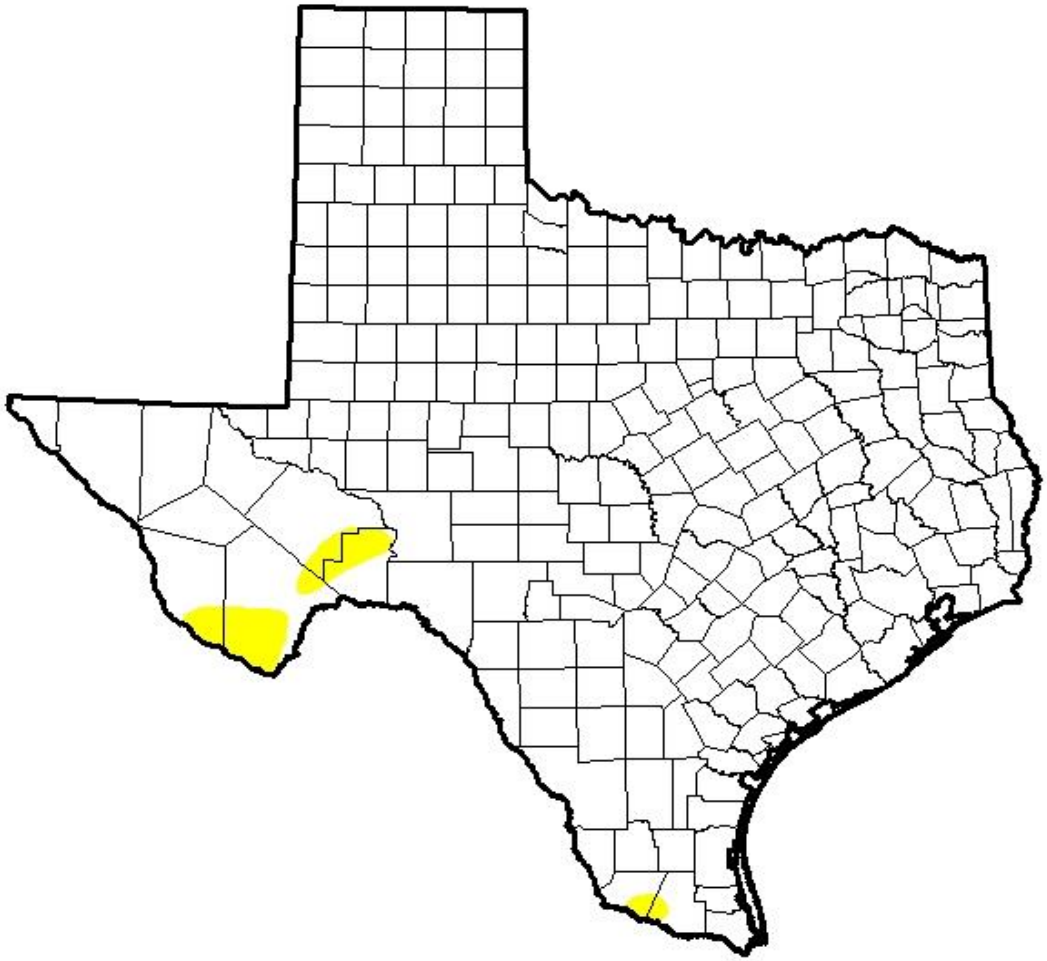


USDA National Drought Mitigation Center

http://droughtmonitor.unl.edu/

U.S. Drought Monitor

Texas



January 26, 2016

(Released Thursday, Jan. 28, 2016)

Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	98.05	1.95	0.00	0.00	0.00	0.00
Last Week *1/19/2016*	98.31	1.69	0.00	0.00	0.00	0.00
3 Months Ago *10/27/2015*	56.34	43.66	15.67	2.85	0.00	0.00
Start of Calendar Year *12/29/2015*	95.48	4.52	0.00	0.00	0.00	0.00
Start of Water Year *9/29/2015*	34.51	65.49	38.32	17.55	6.27	0.00
One Year Ago *1/27/2015*	41.42	58.58	39.22	23.93	11.24	3.05

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
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- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Mark Svoboda
National Drought Mitigation Center

http://droughtmonitor.unl.edu/

U.S. Drought Monitor

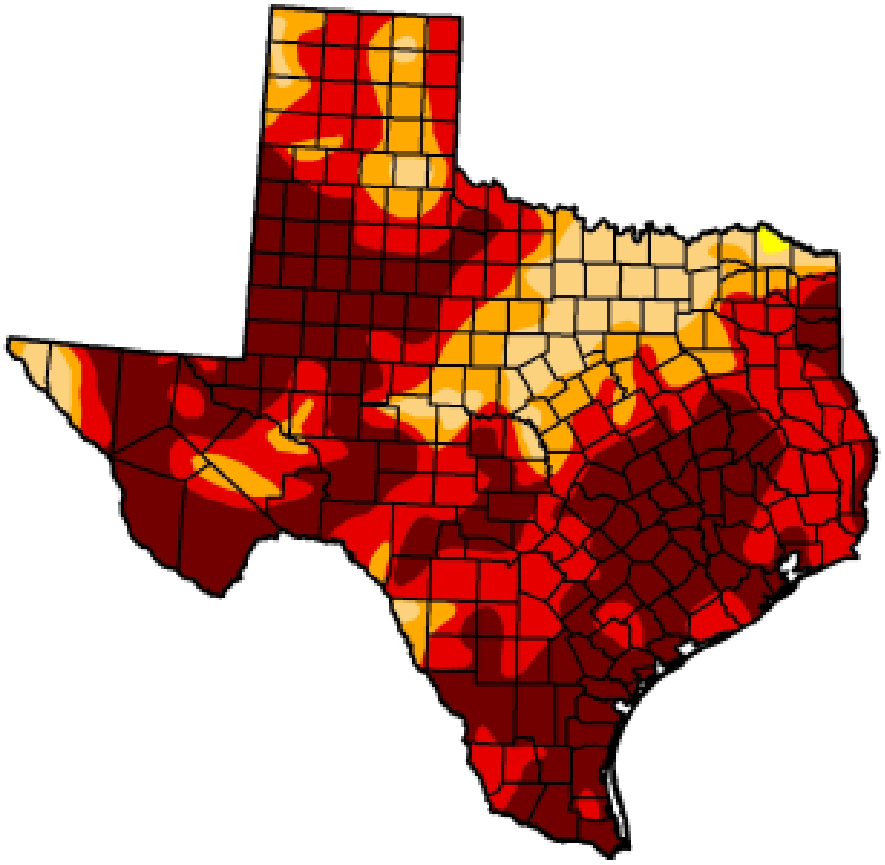
December 6, 2011

Valid 7 a.m. EST

Texas

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	99.83	90.33	76.55	43.29
Last Week (11/29/2011 map)	0.00	100.00	100.00	94.23	82.66	52.67
3 Months Ago (09/06/2011 map)	0.00	100.00	99.93	99.01	95.68	81.06
Start of Calendar Year (12/28/2010 map)	7.89	92.11	69.43	37.46	9.59	0.00
Start of Water Year (09/27/2011 map)	0.00	100.00	100.00	99.16	96.65	85.75
One Year Ago (11/30/2010 map)	29.55	70.45	32.51	14.28	0.81	0.00



Intensity:

- D0 Abnormally Dry
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The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

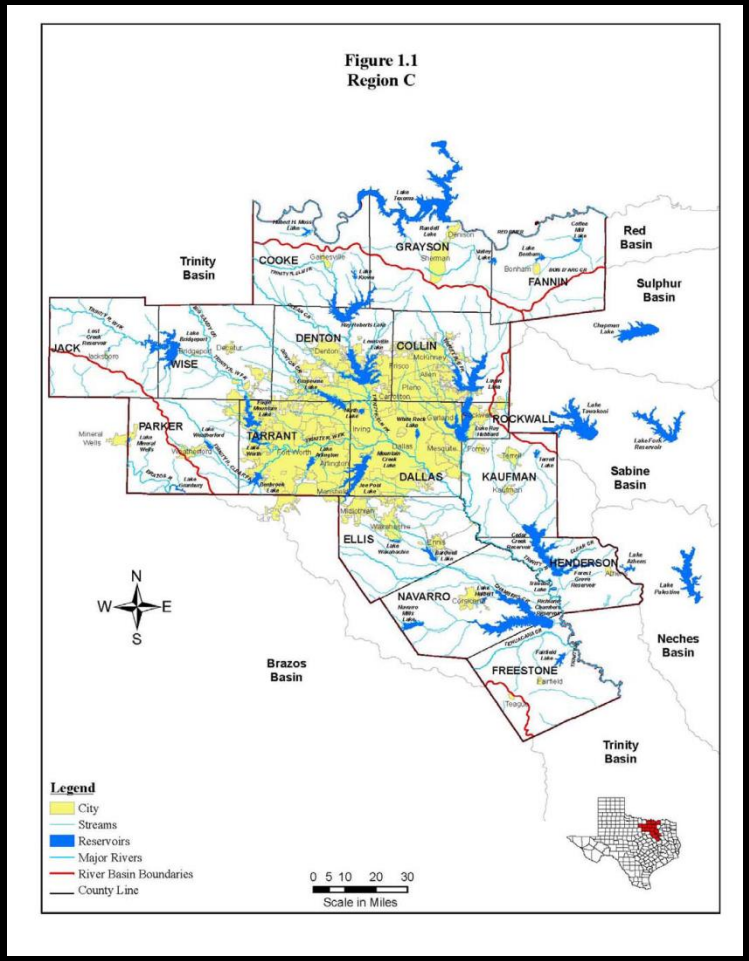
http://droughtmonitor.unl.edu

Released Thursday, December 8, 2011

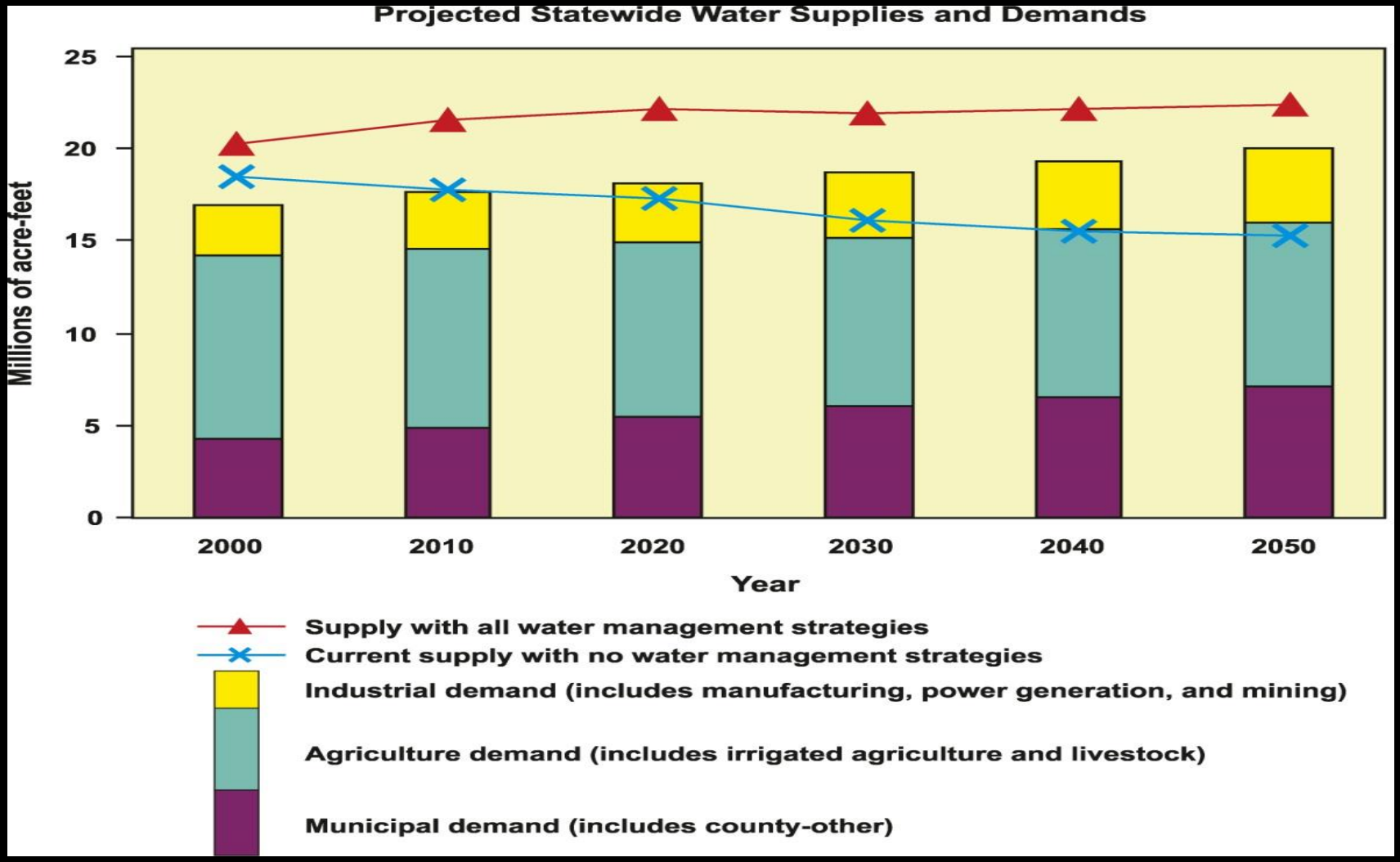
David Miskus, NOAA/NWS/NCEP/Climate Prediction Center

Conservation

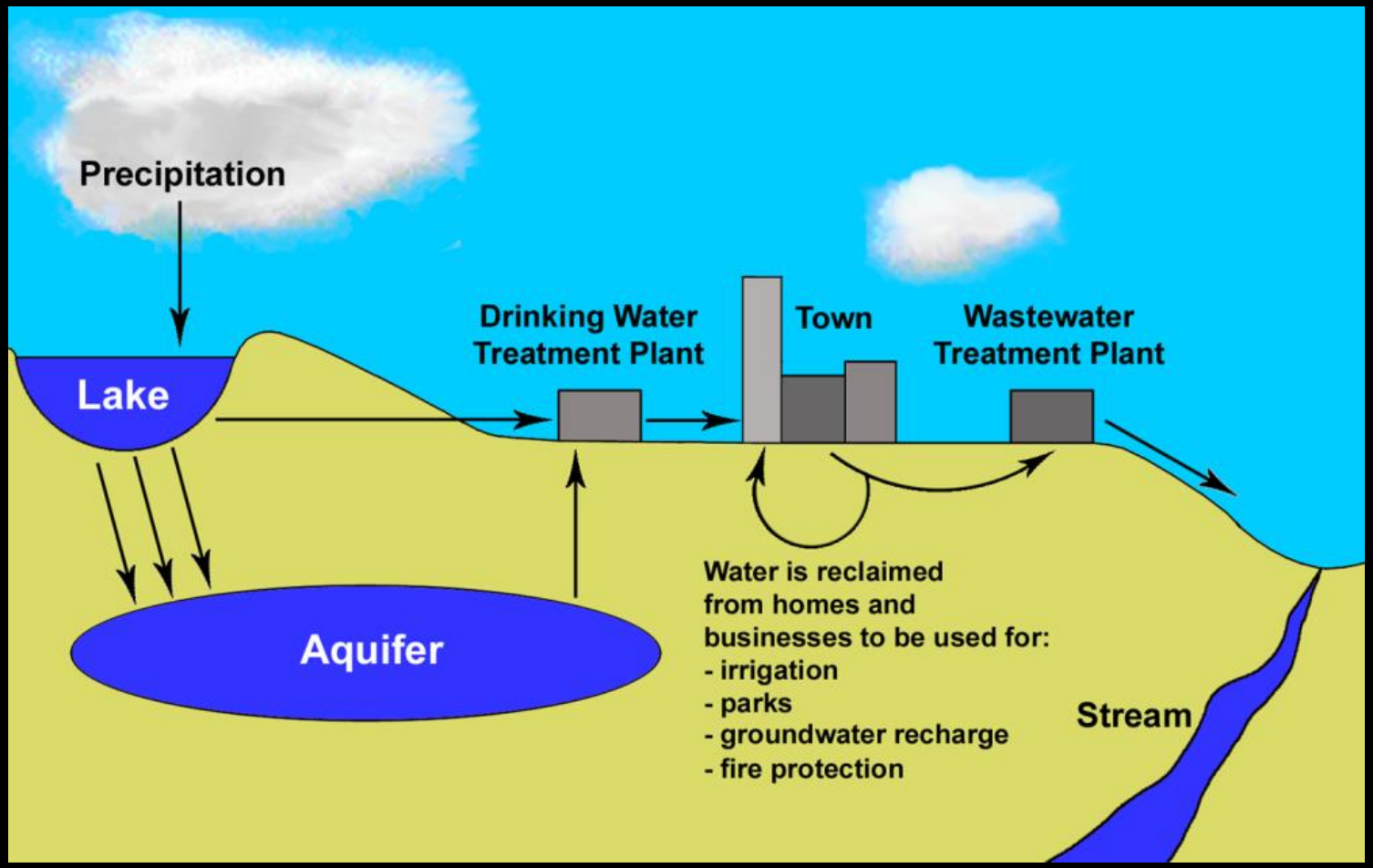
- Drought
  - Surface water
  - Groundwater
- Growth and Development
- Resources
  - Sedimentation
  - Groundwater recharge
- Infrastructure



Growth and Water



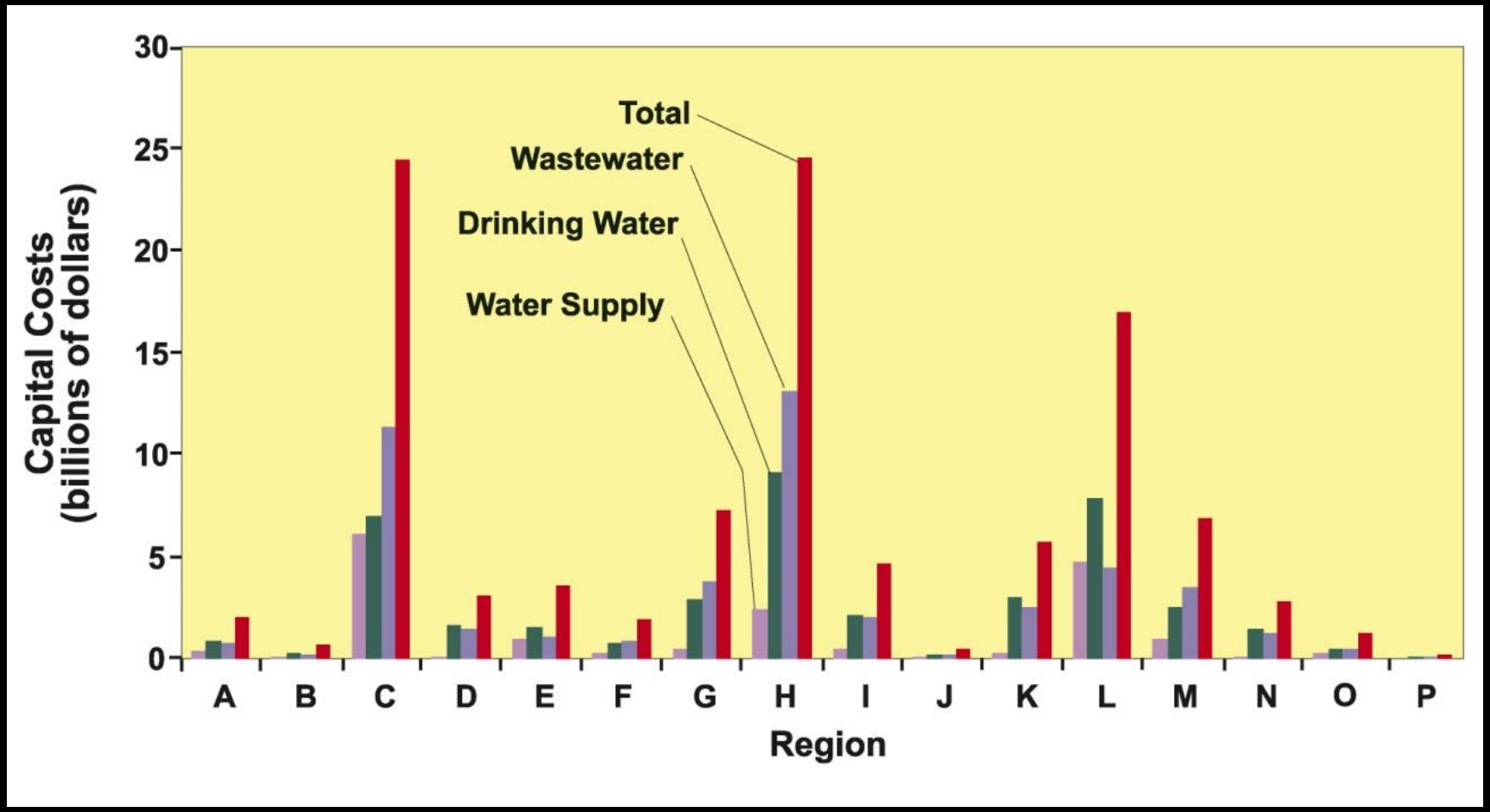
Water Cycle


Precipitation
Lake
Drinking Water Treatment Plant
Town
Wastewater Treatment Plant
Aquifer
Water is reclaimed from homes and businesses to be used for:
- irrigation
- parks
- groundwater recharge
- fire protection
Stream

Water Resources

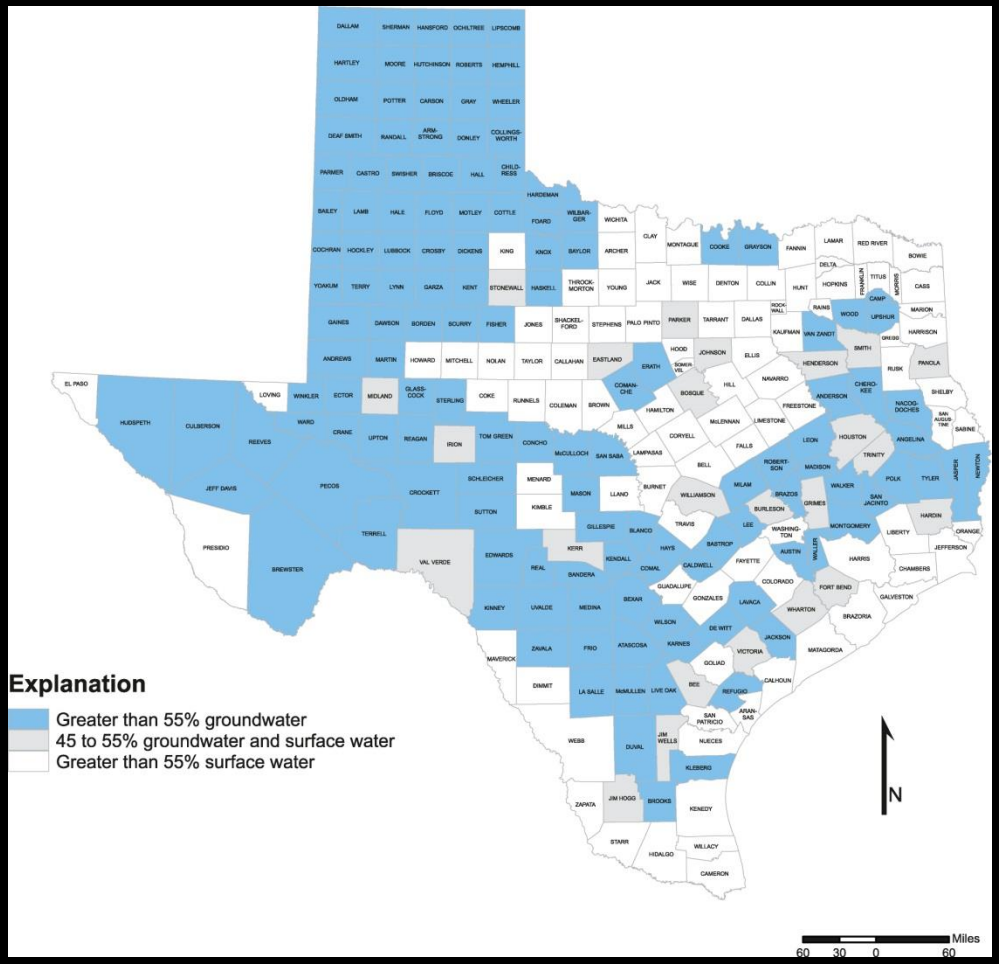
- **Texans use between 8 and 9 billion gallons of water per day**
- **During the irrigation season water use can increase 35 to 70%**

Cost of State Water Plan per Region



Texas Regional Water Planning Groups

Groundwater



Conservation

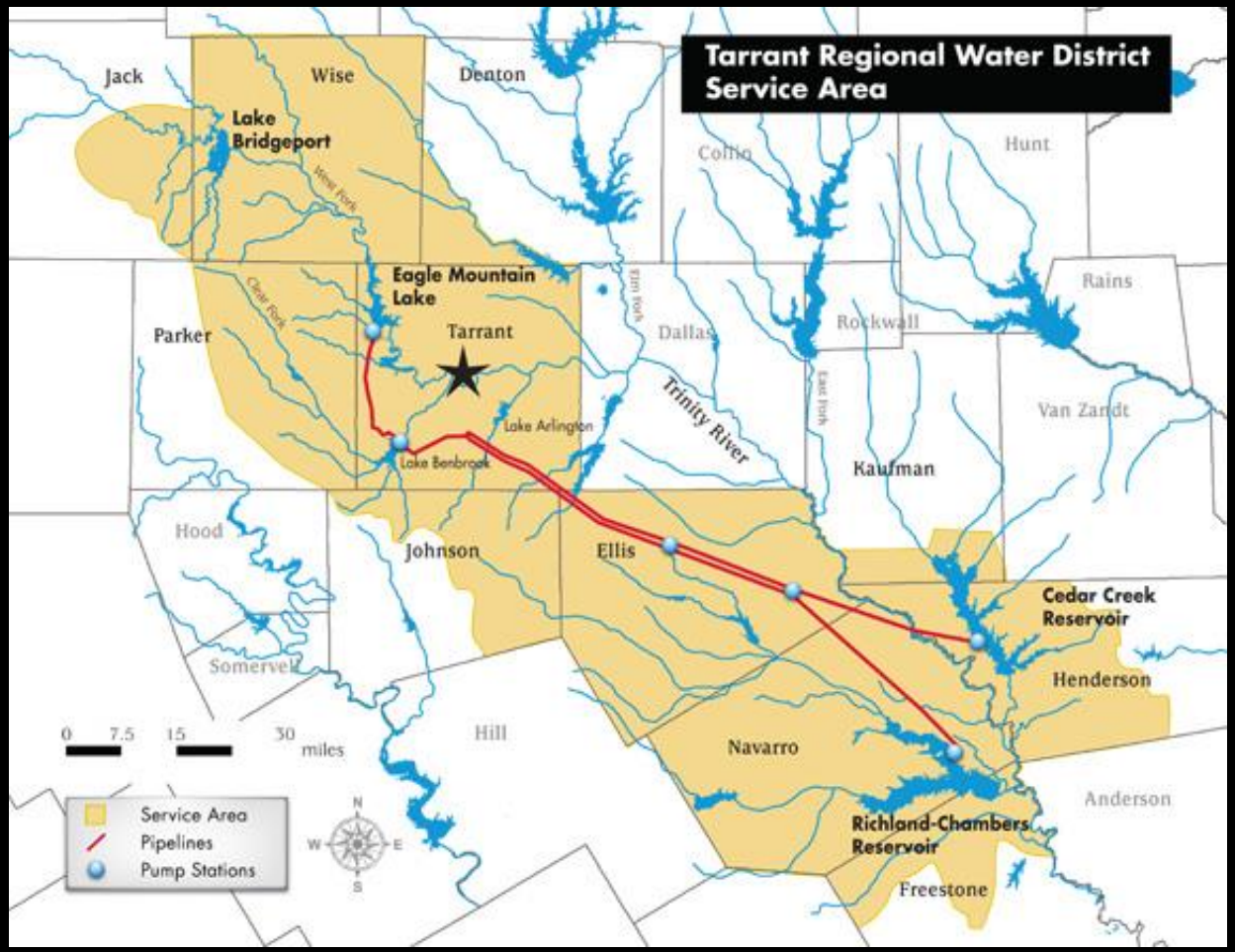
Conservation is the easiest and least expensive method to make our water resources sustainable

- Education
- Forced
  - Tiered water bills
  - Water restrictions
  - Landscape ordinances
  - Irrigation ordinance
- Volunteer
  - Indoor
  - Outdoor

Conjunctive Use

- Surface water mixed with groundwater

Interbasin Transfer



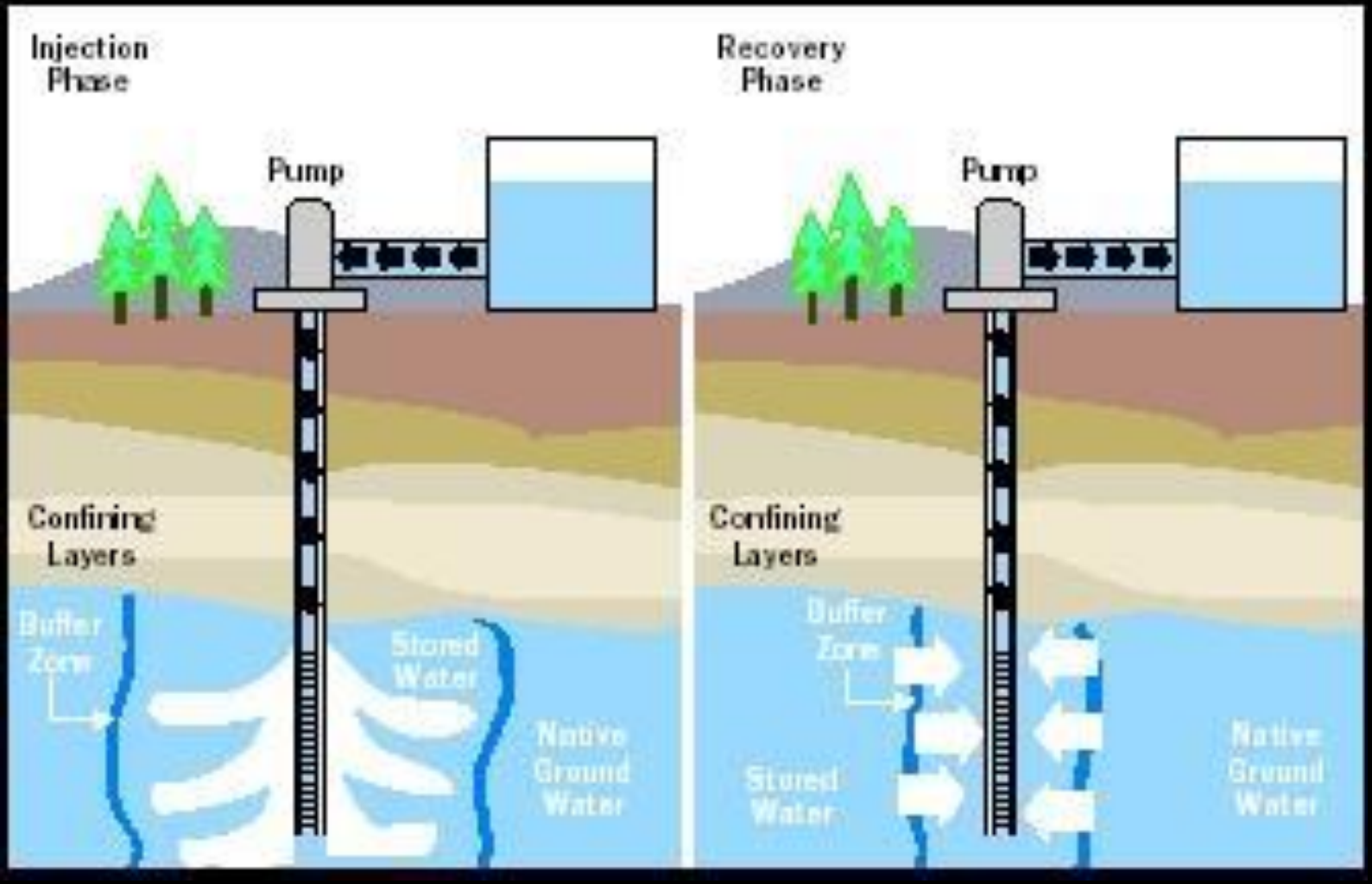
Wetland Water Reuse
John Bunker Sands Dallas

Recycled Water
Fort Worth

Desalination
El Paso, Texas

27 million gallons a day

Aquifer Storage and Recovery



Direct Potable Reuse

Cypress Water Treatment Plant Wichita Falls

How cloud seeding is done

1 > Cloud seeding is a form of weather modification to induce rain
> Towering cumulus – rain clouds – are targeted
> These clouds must be over dams and catchment areas

2 A salt and water solution is used;

150kg salt to 1,000 litres

> The solution is placed into four 250-litre containers

3 An RMAF C130 aircraft lifts the containers into the sky

The plane enters the clouds, usually 1,524 to 4,267m above ground

4 Crewmen spray the salt water solution into the clouds

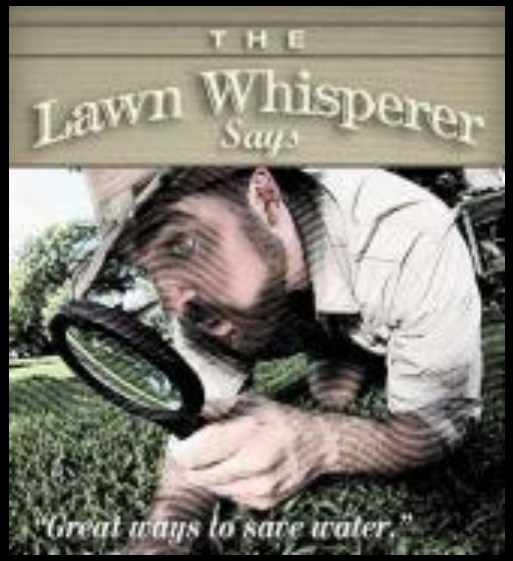
5 > The salt water encourages the formation of ice particles

> If sufficient, the particles become heavy enough to fall as rain

6 Typically, rain falls within 15-20 minutes of cloud seeding

dams

Education



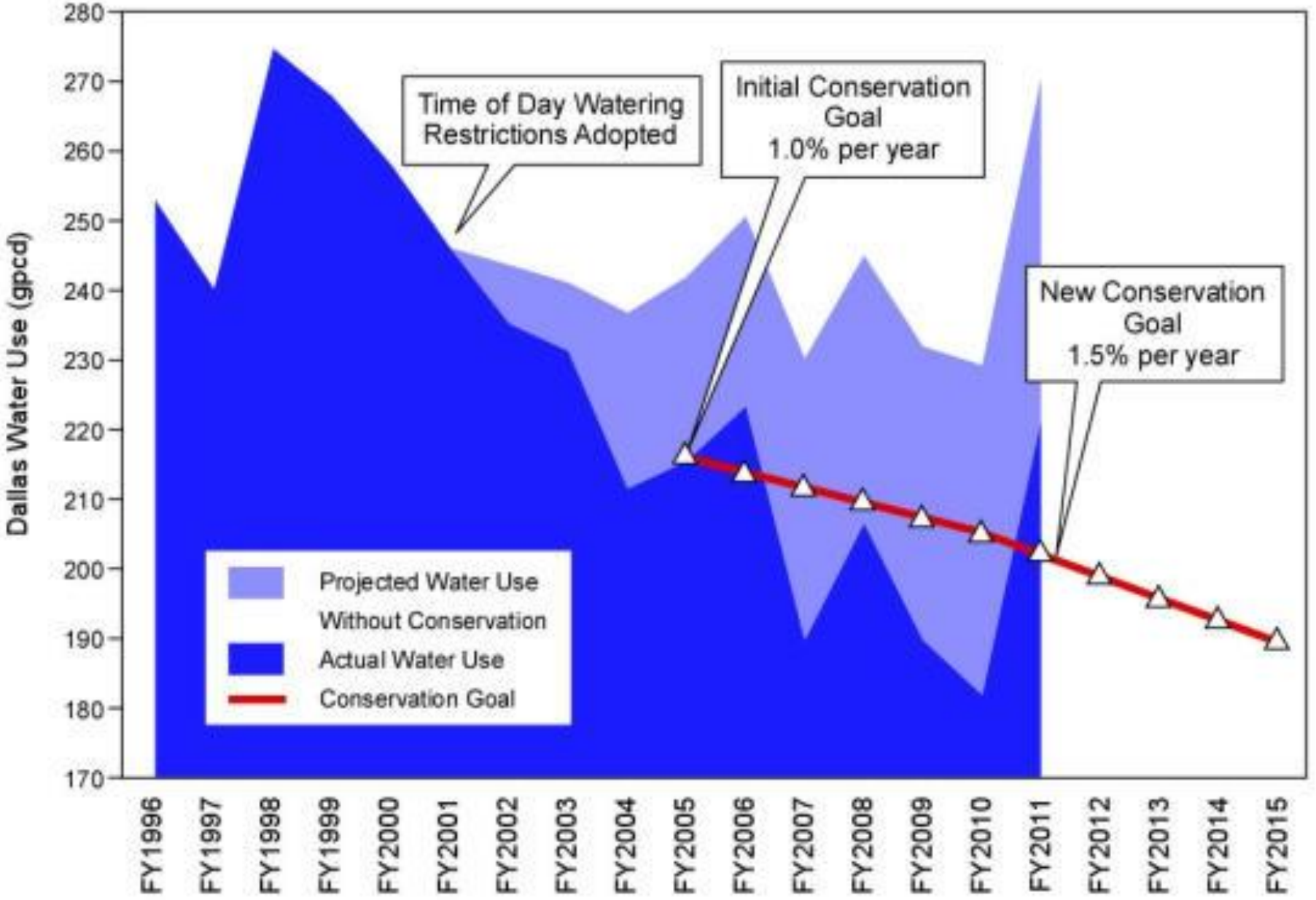
Earth-Kind

WATER IQ
SM
Know your water.

EPA WaterSense

waterSmart

Per Capita Water Consumption Goal, FY 2011-2012 thru FY 2014-2015



Texas SmartScape
Protecting Water Resources

- Design
- Plant Selection
- Soil Preparation
- Efficient Irrigation
- Maintenance

Landscape Water Conservation

- Earth Kind
- Texas SmartScape
- Xeriscape
- Water Smart
- Waterwise
- Yard Smart

Water Conservation Immediate Recommendations

- Educate yourself about water conservation practices
- Set irrigation controller to comply with water restrictions
- Install/check Rain and Freeze Sensor
- Upgrade Controller
- Check irrigation system for efficiency
  - Make any repairs
- Create Cycle and Soak schedule if necessary
- Correct irrigation design if necessary
- Replace spray emitters with water conserving emitters
- Mulch all planted beds - shrubs, groundcover, flowers
- Cut lawn 1/3 taller during hot summer
- Aerate compacted lawns
  - Add ½" compost to increase infiltration rate
- Don't Bag It

Long Term Investments in Landscapes

- Redesign Landscape for water conservation
  - Plant selection
- Convert to drip irrigation
- Add shade cloth or structure or plant trees
- Rainwater harvesting for landscape use
- Rain Garden for stormwater protection

Water Restrictions VS Conservation

Water Restriction

- Stage 1
  - Water 2/week
  - except
- Stage 2
  - Water 1/week
  - except
- Stage 3
  - Water every other week
  - except
- Stage 4
  - No out door watering
  - except

Water Conservation

- Install/check Rain and Freeze Sensor
- Upgrade Controller
- Check irrigation system for efficiency
- Make any repairs
- Create Cycle and Soak schedule if necessary
- Correct irrigation design if necessary
- Replace spray emitters with water conserving emitters
- Mulch all planted beds - shrubs, groundcover, flower
- Cut lawn 1/3 taller during hot summer
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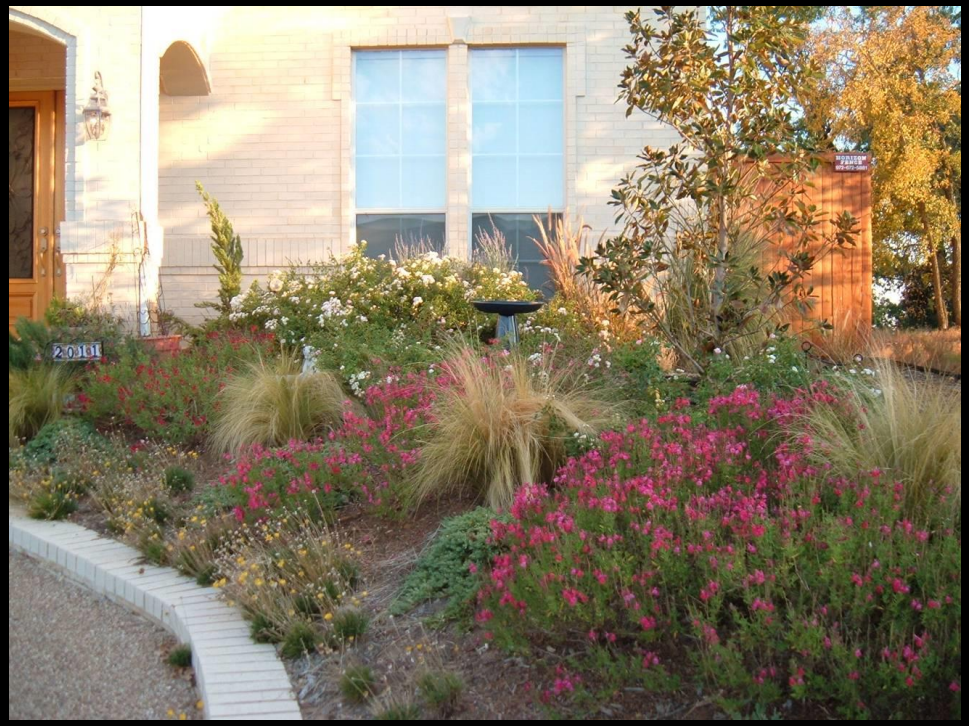
Basic Principles

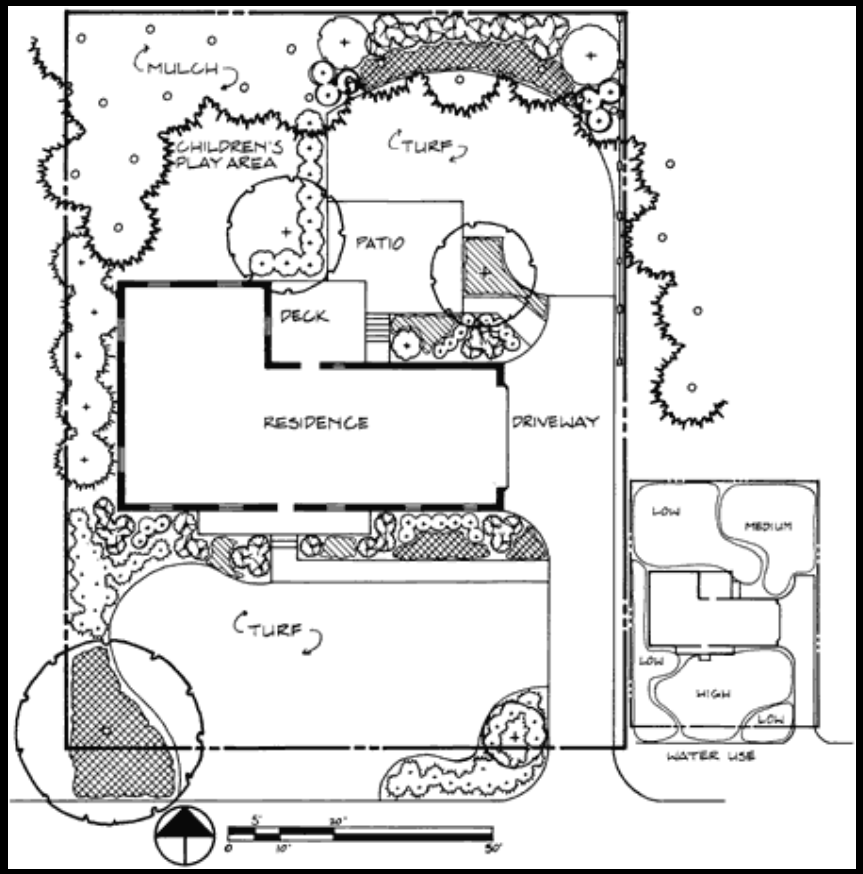
- Planning and Design
- Soil Analysis and Preparation
- Plant Selection
- Practical Turf Areas/Management
- Irrigation Efficiency
- Mulch
- Pest Control
- Rainwater Harvesting
- Rain Gardens



Water Conserving Landscape

Planning and Design

- Planted beds surrounding a practical turf area
- Stormwater and irrigation water
- Planted beds infiltration rate higher
- Mulch keeps infiltration rate higher



Landscape Design

Soil Preparation

- Clear Vegetation
- Add Compost
- Expanded Shale if drainage is bad

Plant Selection
Native and Adapted Plants

Native and Adapted Plants

- Thrive
- Use less water
- Less pest problems
- Source: Texas A&M University

WWW.TXSMARTSCAPE.COM

Plant Search

Use this form to search our database of SmartScape Plants

Region: North Central Texas

Plant Type: All

Light Requirement: All

Ornamental Color: All

Wildlife Value: Butterflies

Blooming: All

Deciduous Or Evergreen: All

More Options...

-OR -

Enter part or all of plant's common name or botanical name (e.g. lily):

Butterfly Bush

Botanical Name: Buddleia davidii

Plant Type: Perennial

Plant Form: Upright

Light Required: Full Sun

Water Demand: Medium

Plant Height (ft.): 6'

Plant Spread (ft.): 4'

Ornamental Value: White, Pink, Purple, Red

Months Of Bloom: Jun - Sep

Native Texas Plant: Adapted

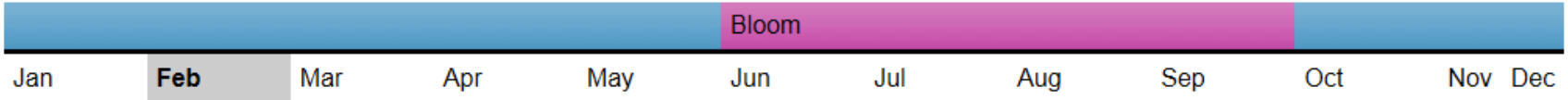
Decidiuous/Evergreen: Deciduous

Wildlife Value: Birds (including Hummingbirds), Butterflies (nectar source)

Comments:

As name implies, this shrub will attract a myriad of butterflies for much of summer. Wet feet will rot the root system. Cut back every year for best bloom and shape.

Plant Timeline



Butterfly Bush

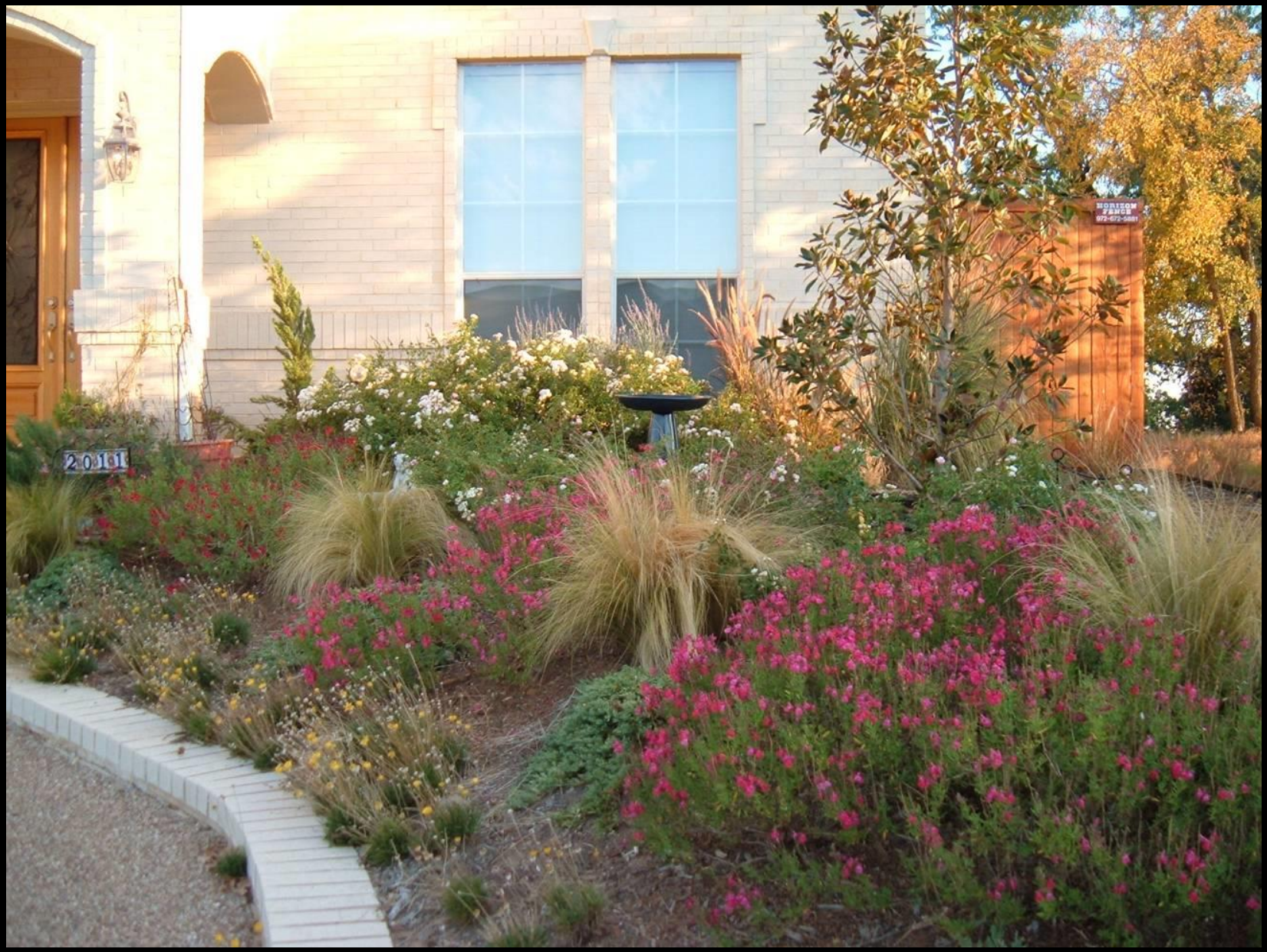
Butterfly

Plant List Index

This page lists all the plants in our plant database by their common name and botanical name.
Click the header to sort by that field.

	Common Name	Botanical Name	Plant Type
1	Afghan (or Eldarica) Pine	*Pinus eldarica*	Shade Tree
2	Agarita	*Berberis trifoliolata*	Shrub
3	American beautyberry	*Callicarpa americana*	Shrub
4	American Elm	*Ulmus americana*	Shade Tree
5	Angels Trumpet	*Datura wrightii*	Perennial
6	Anise-Hyssop	*Agastache foeniculum*	Perennial
7	Arizona Cypress	*Cupressus arizonica*	Shade Tree
8	Aromatic Sumac	*Rhus aromatica*	Shrub


2500


2011
HORIZON
FENCE
972-672-5881


16904


Hillcrest
STOP
Hillcrest


17215

Zone Landscape by Water Requirements

- High water requiring area
- Medium
- Low

Appropriate Turf Areas

- 1/3 Turf
- 1/3 to 2/3 Plantings Beds
- 1/3 permeable Hardscape

Efficient Irrigation

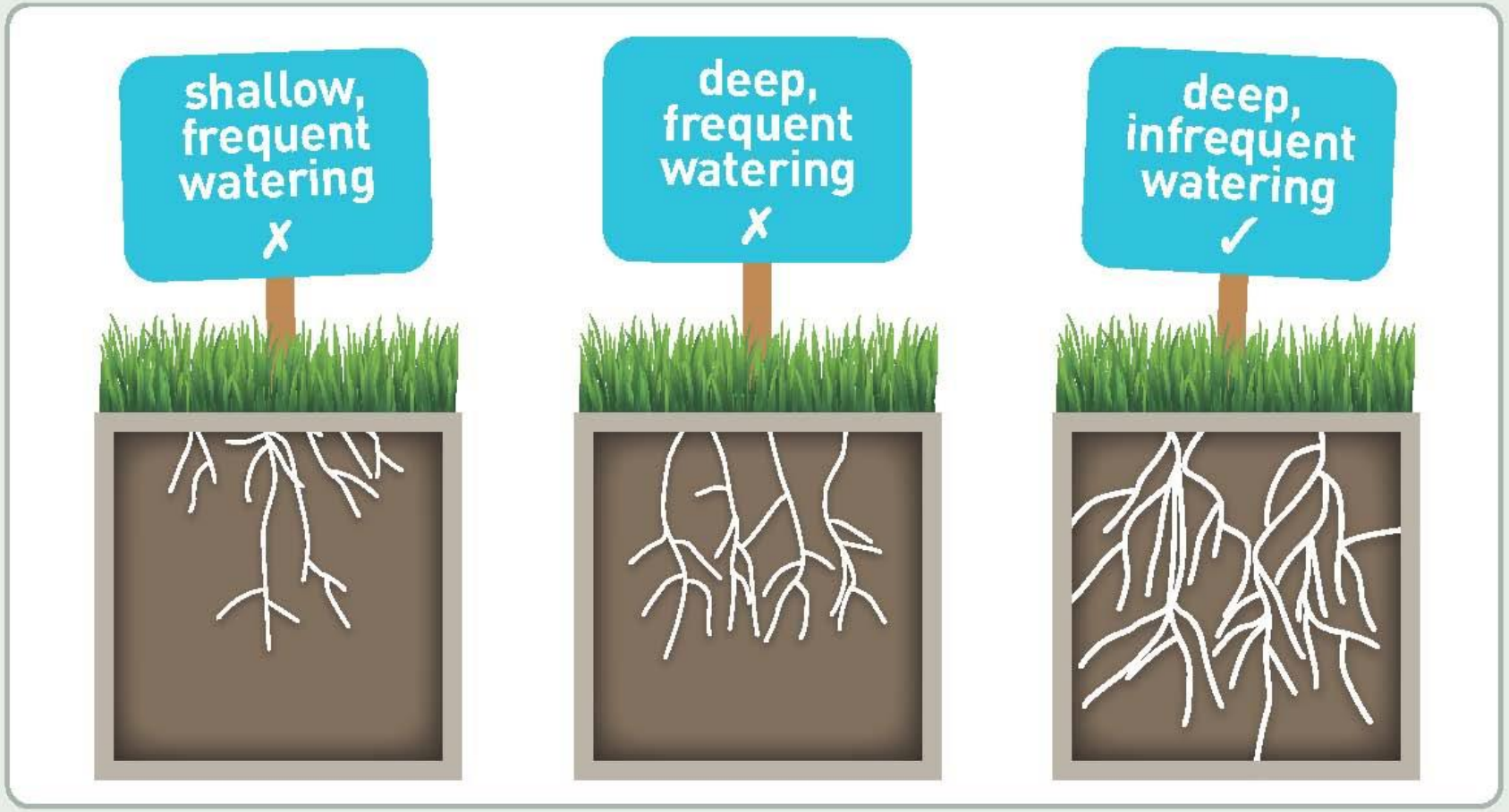
- **Water usage increases 35 to 70% during the irrigation season**

Irrigation Efficiency

- Water only when plants require water
- Visually only judge water requirements in the morning
- Water deeply to promote deep and healthy roots
- One inch of water will generally penetrate the soil to a depth of six inches (soak and cycle)
- Water slowly for better absorption. Use drip irrigation wherever possible
- Wind displaces and evaporates water
- Water after 6:00 pm and before 10:00 am to reduce wasteful evaporation
- Maintain a 2 to 4 inch mulch layer in planted areas
- Water newly planted flowers, shrubs and trees individually
- Water without creating runoff
- Check irrigation system monthly

HOW TO BEST WATER YOUR LAWN

Based on AgriLife's Recommended Landscape Practices.



Different types of watering methods have a huge impact on the health of lawn root systems. Watering your yard deeply (about 1 inch) and infrequently (about once a week) produces a beautiful and healthy lawn that's more likely to withstand heat and drought.

WATER IQ
Know your water.

Provided by North Texas Municipal Water District. **Visit WaterIQ.org for more info.**

Irrigation System Check

- Check every sprinkler head
  - Misaligned Heads (throwing water into street or driveway)
  - Heads Not Vertical
  - Sunken Heads
  - Clogged Nozzle
  - Leaking/Broken Head, Valve, Pipe
  - High Grass
- Make any repairs
- Run system with catchment cans
- Correct any poor distribution
- Time how long each station needs to run
- Set controller

Tuna Can

Aggie Catch Can

Screw Driver

Cycle and Soak Irrigation Method

- Use on Clay soil and slopes
- Lawn area
- Run station 5 to 10 minutes
- Turn system off
- Wait 30 to 60 minutes or more
- Run station again and a 3rd, 4th or 5th time if needed
- Program controller

New Irrigation Technologies

Drip Irrigation

Multi-stream nozzles

New Irrigation Technology
SMART CONTROLLERS

Evapotranspiration (ET)

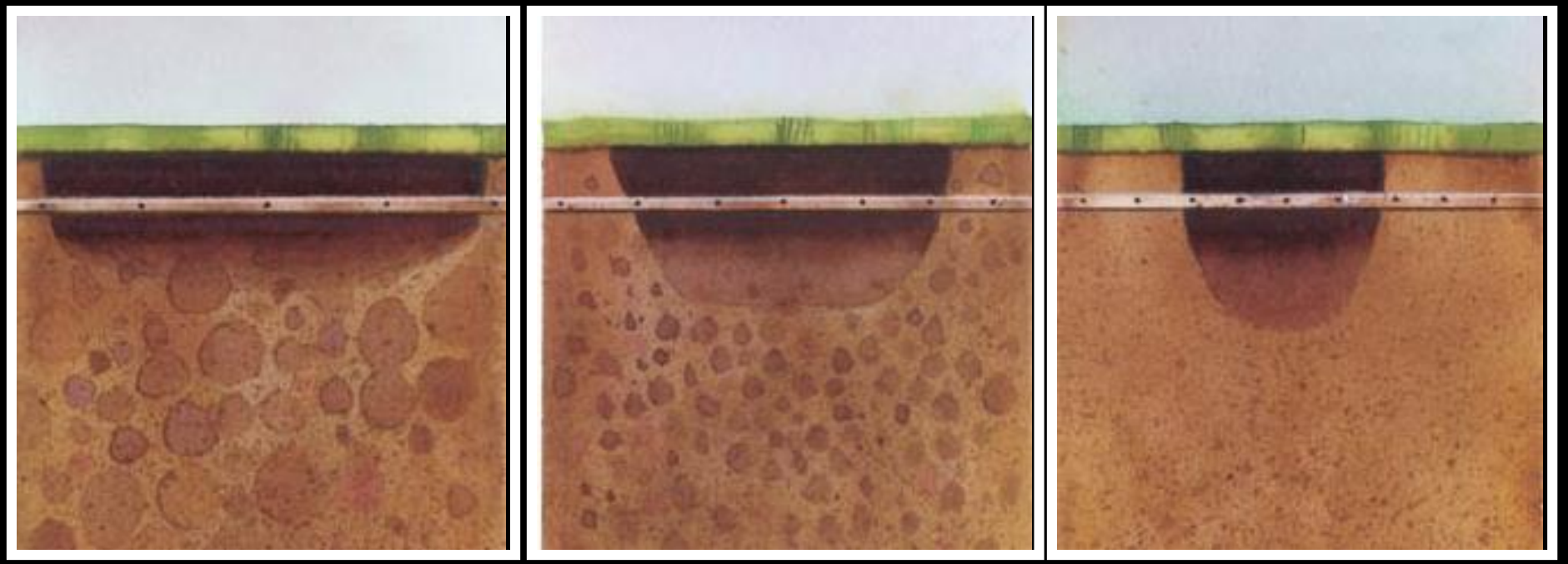
Moisture Sensor

Use Drip Irrigation
90% efficient

- Shrubs areas
- Flower beds
- Vegetable Garden
- Groundcover areas
- Lawn

Soil Wetting Patterns

Downward by gravity
Spread and Upward by capillary action of soil



CLAY **LOAM** **SAND**

Sub-Surface Dripline

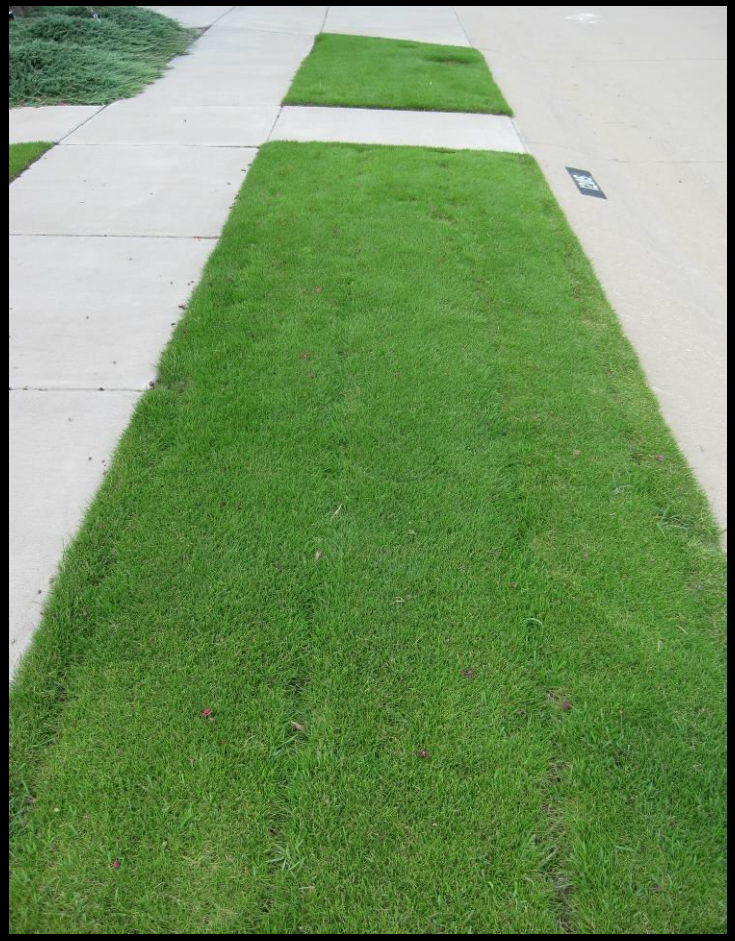
Rotary trencher leaves a small mound of dirt that is easy to rack back into the trench after dripline installation

Dripline with insert fittings

After dripline installation the trenches are backfilled

1 week after installation

90 days later – zoysiagrass
Spring Installation



After approximately 12 minutes of operation coverage is nearly complete

After 12 minutes of operation the zone was allowed to rest and water to move through the soil

Native soil was then placed over the dripline

Newly Installed Sod
Winter

MULCH

MULCH

MULCH

MULCH

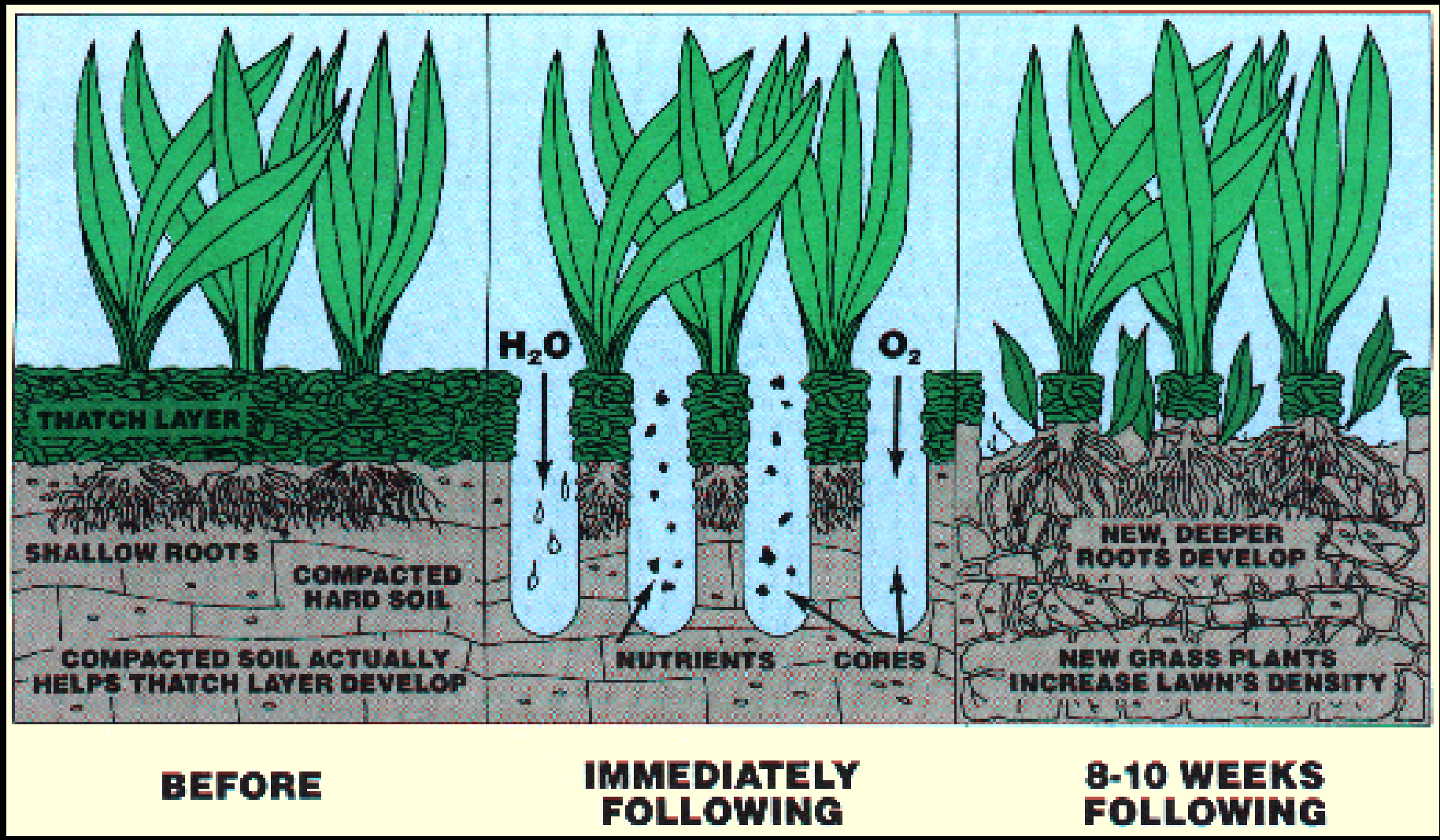
- Increases water absorbing capacity
- Increases water holding capacity
- Reduces water evaporation
- Reduces erosion
- Helps control weeds
- Moderates soil temperature
- Break down into plant nutrients

Compost All Yard Waste
Don’t Bag It

Compost Available for Pickup or Delivered From Compost Businesses or Plano Pure

Compost applied by blower

Aerate and Spread Compost on Compacted Soils in Lawn Areas to Increase Infiltration Rate



Water Conserving Lawns

Zoysia ‘Palisades’

Landscape Maintenance BMPs

- **Mowing**
  - **Remove 1/3 leaf blade**
  - **Shape blades**
  - **During drought or hot summer, do not mow in non-irrigated areas – creates dust and erosion**

Fertilizer

- **Fertilizer**
  - **Soil test**
  - **Slow Release**
  - **Do not fertilize during drought**

Pest Control

- **Pest Control**
  - **IPM**
  - **Identification of pest**
  - **Least toxic pest control method**

Rainwater Harvesting for Irrigation

Rain Garden

Landscape Series Sample

- Lawn Care
- Landscape Design for Water Conservation
- Plant Selection for Water Conservation
- Irrigation Efficiency
- Drip Irrigation
- Making a Rain Barrel
- Rain Gardens
- Community Gardens
- Vegetables Gardening
- Composting

Networking

- NCTCOG Regional Stormwater Management Program
  - Share Ideas
  - Cost Share
  - Meets quarterly
- WENNT
  - Share Ideas
  - Cost Share
  - Meets every month

Resources

- Texas A&M AgriLife Extension
- North Central Texas Council of Government
- Texas SmartScape web site
- Aggie-Horticulture
- Water Providers
- Texas Nursery and Landscape Association
- Landscape Water Conservation Demonstrations
- Compost Demonstrations
- Weston Gardens in Bloom
- Texas Super Stars
- Earth Kind Roses

Resources

- County Extension Offices
  - http://counties.agrilife.org/
- Tarrant County Extension office
  - http://tarrant-tx.tamu.edu/
- Tarrant County Master Gardener Help Desk
  - http://tarrantmg.org/
  - 817-884-1944
- Dallas County http://dallas-tx.tamu.edu
- Dallas County Master Gardener Help Desk – 214-904-3053
- Denton County http://denton-tx.tamu.edu
- Denton County Master Gardener Help Desk – 940-349-2892
- Collin County http://collin-tx.tamu.edu
- http://txsmartscape.com
- http://aggie-horticulture.tamu.edu/
- http://aggieturf.tamu.edu/
- http://rainwaterharvesting.tamu.edu/
- http://earthkindroses.tamu.edu/
- http://dallas.tamu.edu/

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