

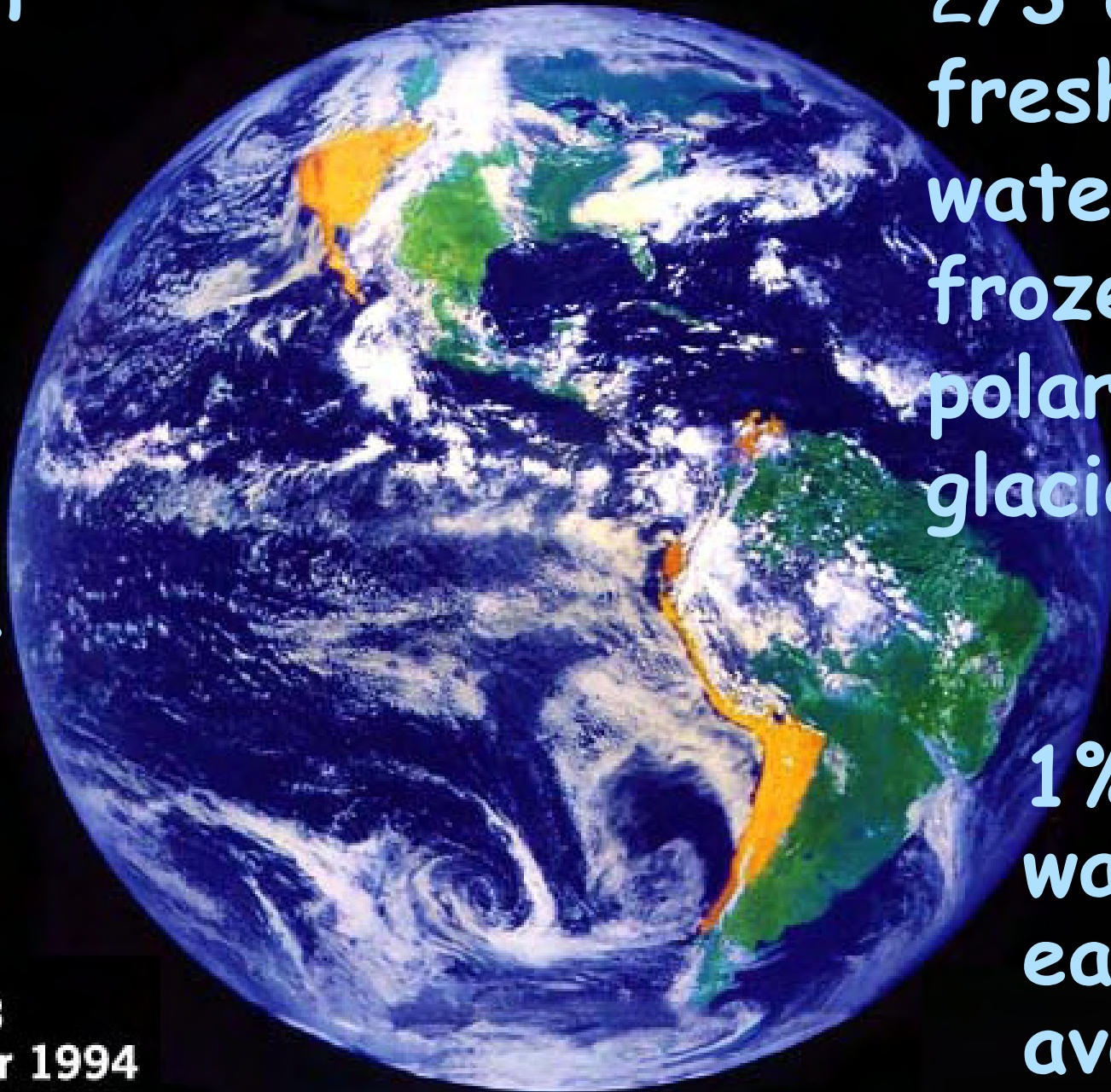
Watering Efficiently in the Florida Keys

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97% of
all
water
on
earth
is
salt
water.



2/3 of all
fresh
water
frozen in
polar &
glacial ice.

1% of all
water on
earth is
available
to drink.

Satellite
GOES 8
September 1994

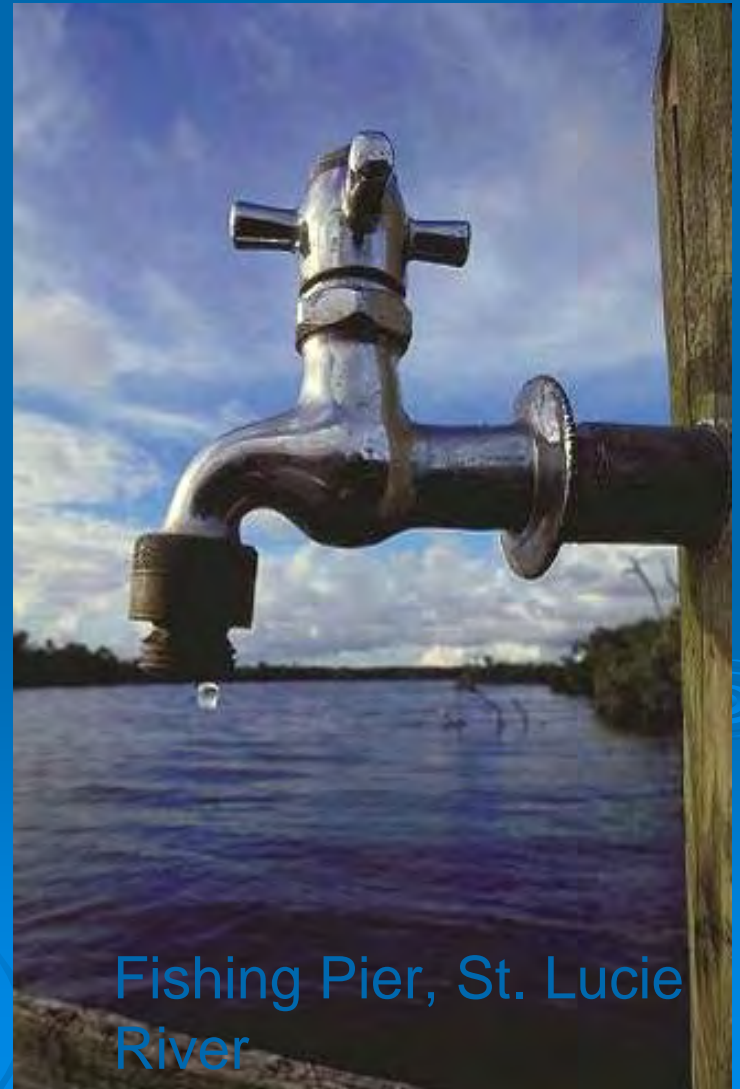
American Water Use

- Consumption in the U.S. is about 370 gallons/person/day.
- 80 gallons/person/day of residential use
- 290 gallons/day of agriculture and industry use



Florida Water Use

- Florida has the highest domestic water use in U.S.
 - Partly due to irrigation of lawns and landscapes



Fishing Pier, St. Lucie River



Recharged from rainfall – produces large amount of fresh water.



GREATEST DEPTH – 250'

Clay, silt – does not produce sufficient water.



GREATEST DEPTH – 800'

Brackish to salty water – can produce a large amount.

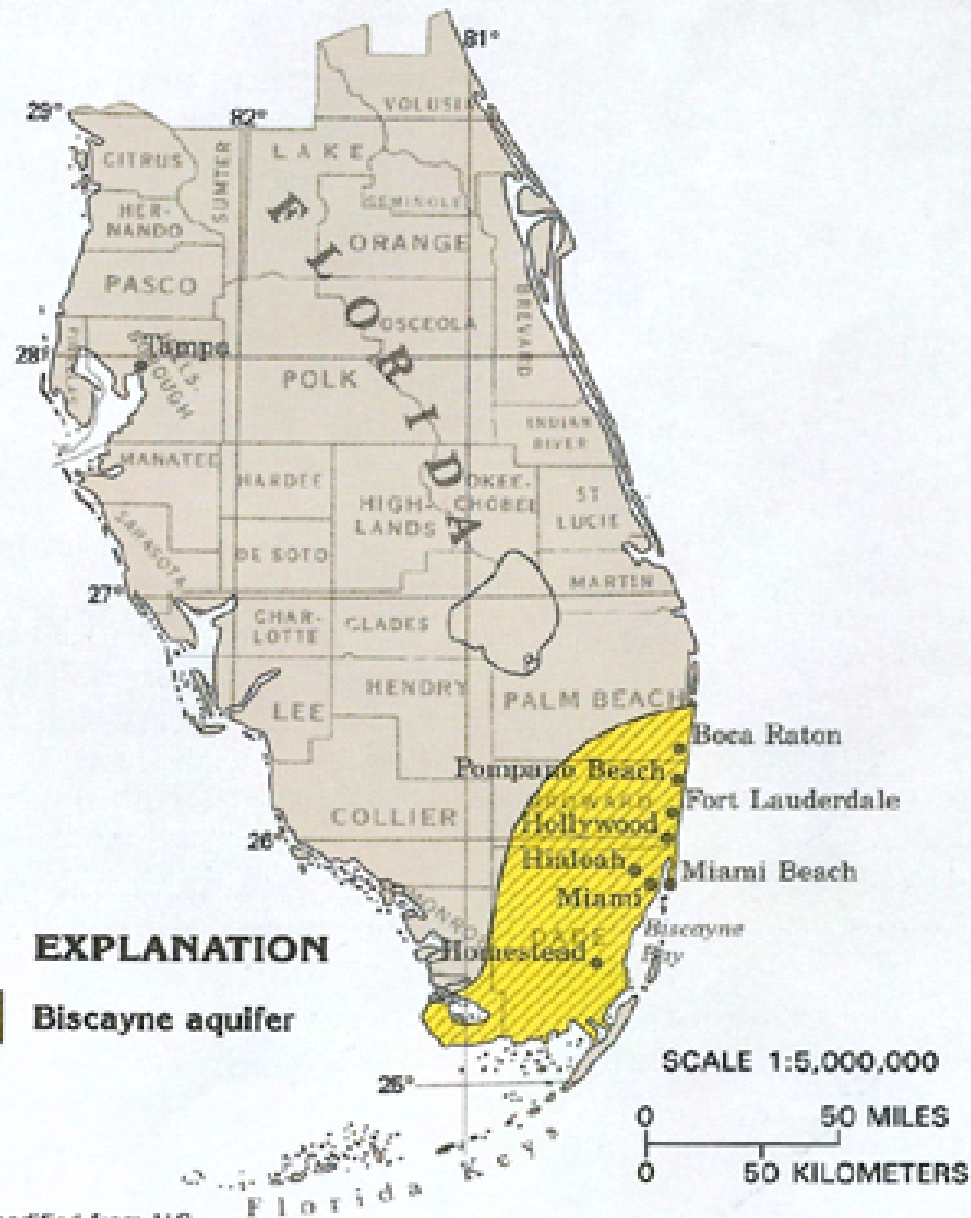


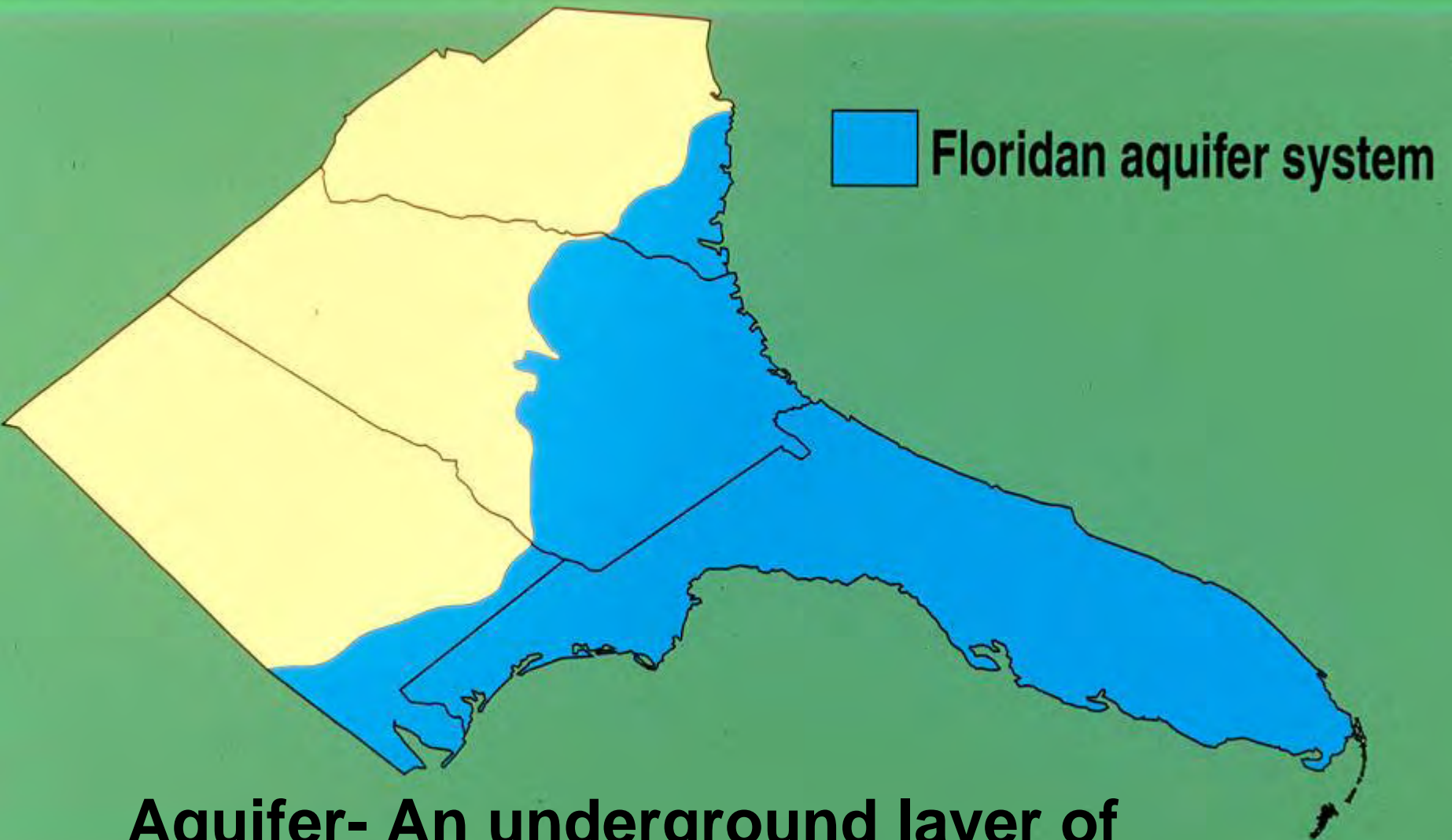
GREATEST DEPTH – OVER 3000'

South Florida Water Management District

Biscayne Aquifer

Figure 26. The Biscayne aquifer underlies parts of four counties in southeastern Florida, and consists predominantly of limestone.





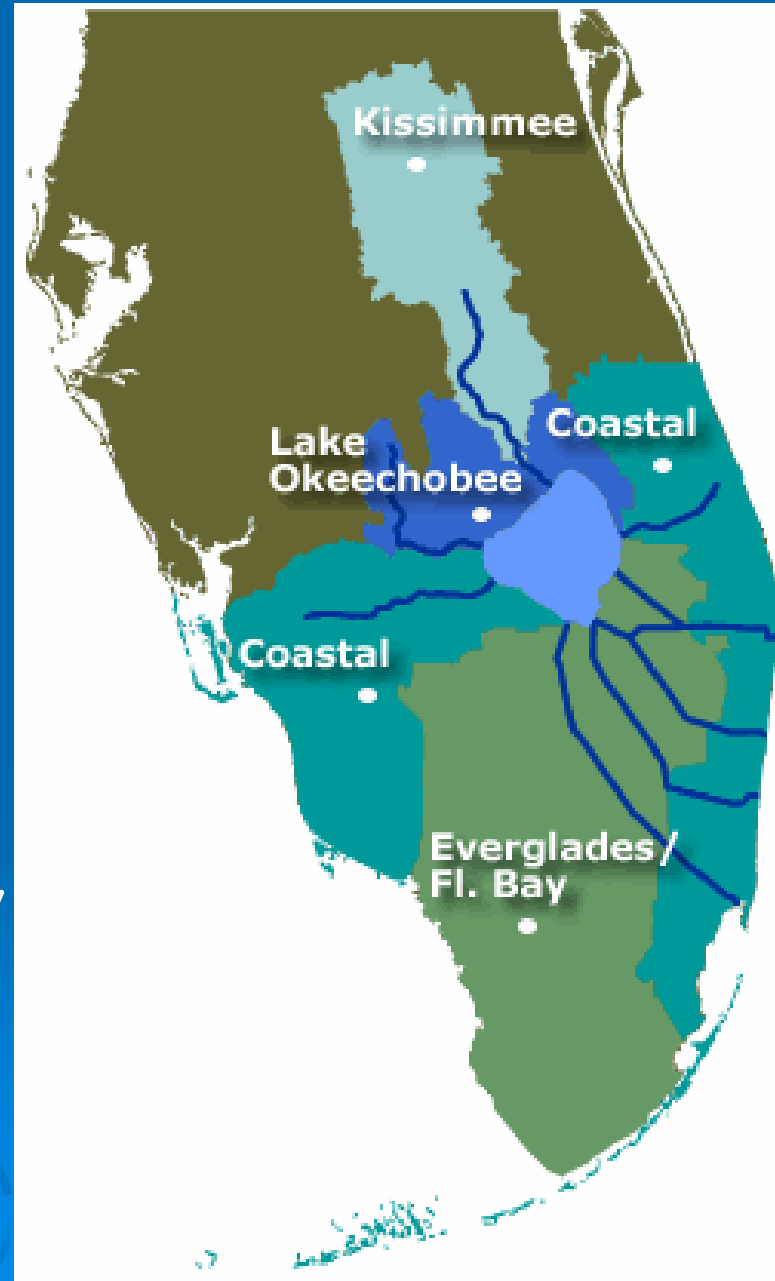
Aquifer- An underground layer of limestone that stores and carries water.

Kissimmee-Okeechobee-Everglades watershed

Technically, a **watershed** is the **divide separating one drainage area from another** (Chow, 1964).

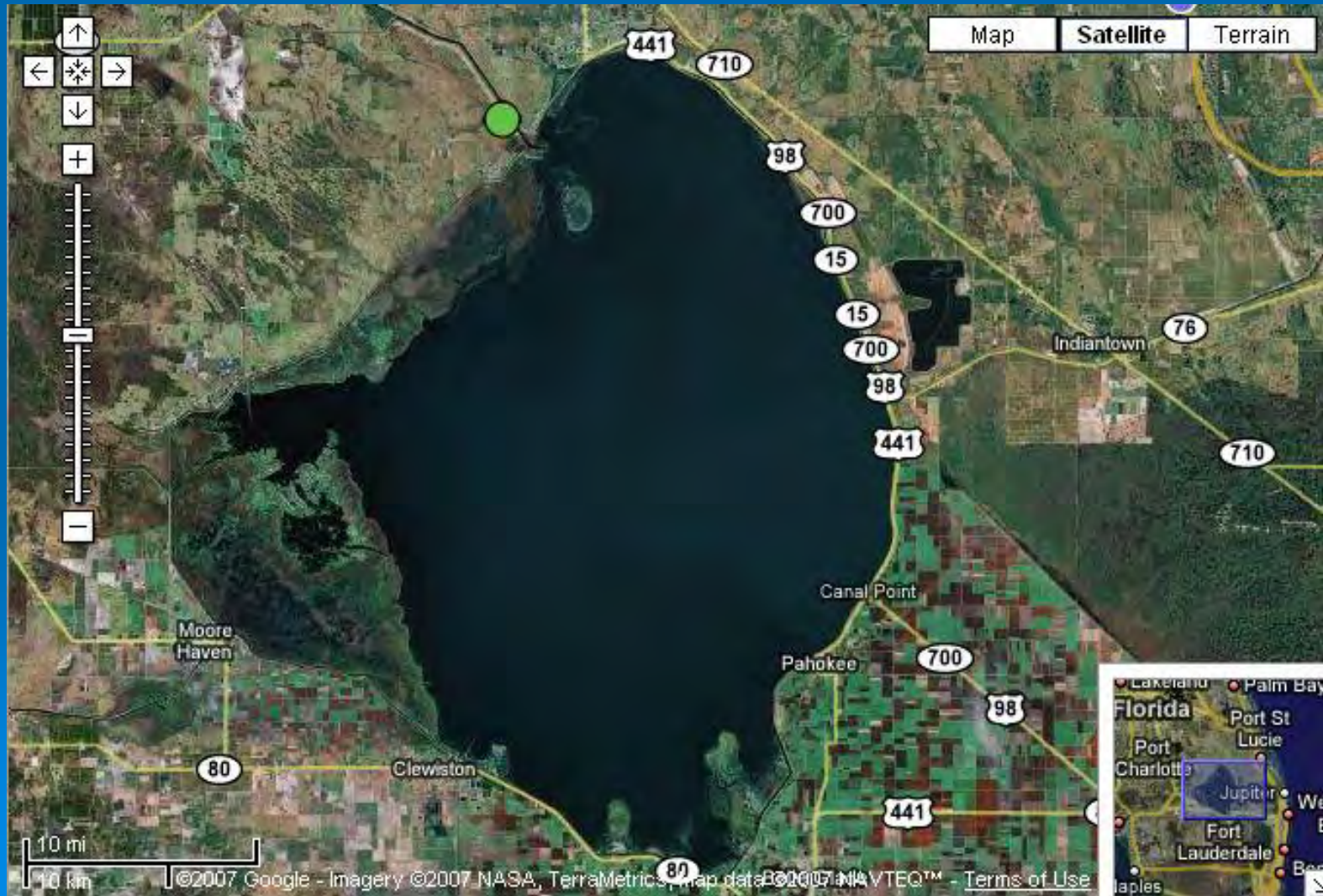
"Watershed" refers to the entire area that water **flows across, under and through** on its way to a common body of water.

In hydrologic terms, watershed is a land area that delivers **runoff water**, sediment and dissolved substances to a major river and its tributaries. A watershed includes **atmospheric, surface and subsurface water**.



Lake Okeechobee water level as of Jan 04, 2008 10.10 ft.

Approx. 5 ft. below its historical average for this time of year.



SFWMD Water Restrictions

- Highlights of the Modified Phase III water shortage order, which will be enforced beginning January 15, 2008, include:
- Residents and businesses of Okeechobee, St. Lucie, Martin, Palm Beach, Broward, Miami-Dade, Monroe, Hendry and Glades counties are limited to a one-day-per-week landscape irrigation schedule with two "watering windows."
- Odd street addresses may irrigate lawns and landscapes on Mondays between 4:00 a.m. and 8:00 a.m. or 4:00 p.m. and 8:00 p.m.
- Even street addresses may irrigate lawns and landscapes on Thursdays between 4:00 a.m. and 8:00 a.m. or 4:00 p.m. and 8:00 p.m.

New plants watering restrictions

When can I water my newly planted landscaping and sod?

In place for 30 days or less can be watered:

- From 2 a.m. to 8 a.m., Mondays, Tuesdays, Wednesdays, Thursdays, Saturdays and Sundays, on properties less than five acres in size. Irrigation is not permitted on Fridays.
- New plantings, sod or landscaping in place for 31 to 60 days can be watered:
 - From 2 a.m. to 8 a.m. on Mondays, Wednesdays, Thursdays and Saturdays, on properties less than five acres in size.
- These rules permit new landscape watering only. Homeowners should keep documentation on any new landscaping, such as a dated receipt of purchase, in case they are required to provide proof of the installation date.

https://my.sfwmd.gov/pls/portal/docs/PAGE/Common/NEWSR/WS_FAQS_MEDIA_20071213.PDF

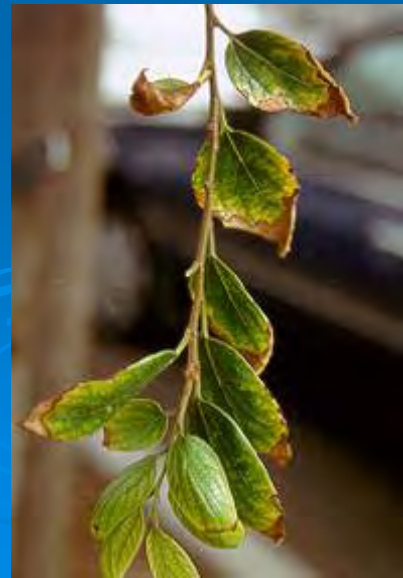
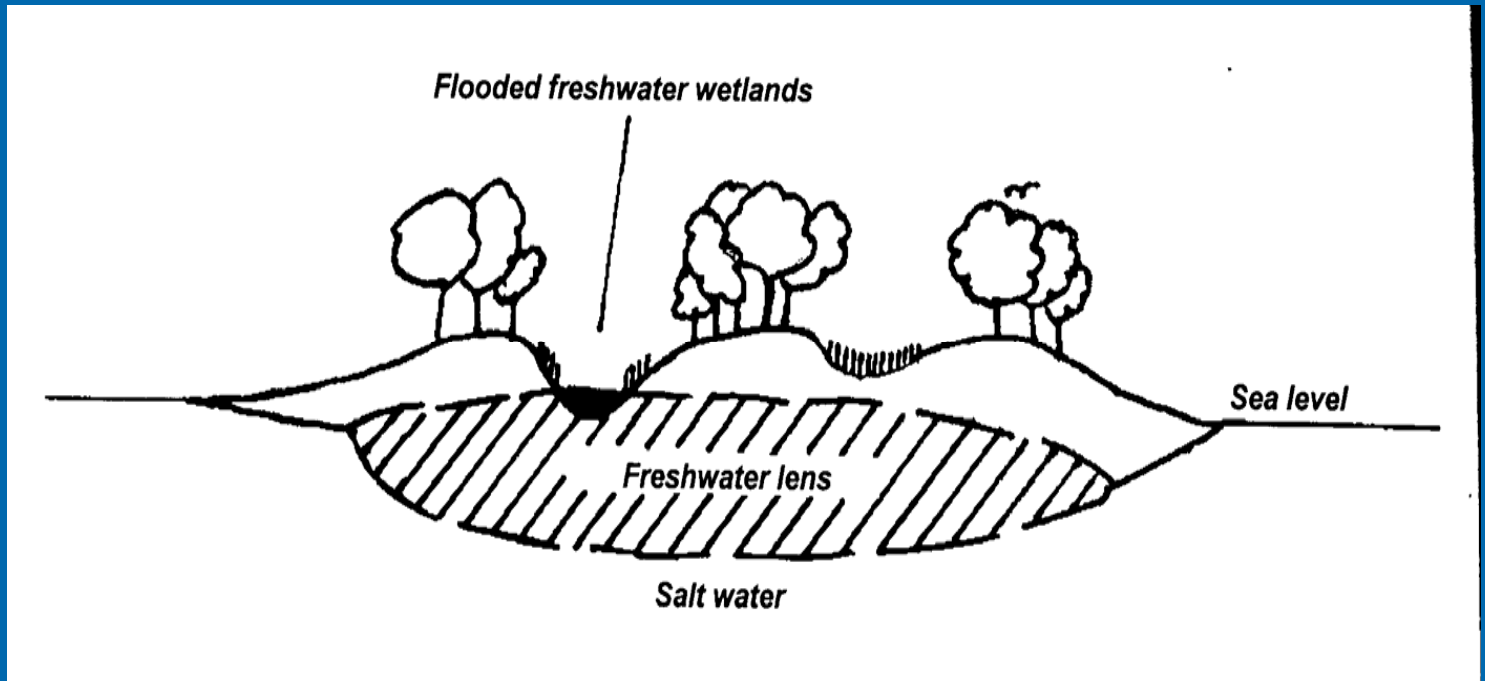
➤ Groundwater pumped from 60-80 ft deep wells located southwest of Florida City

➤ The treated water is pumped through a 130-mile long transmission main to Key West

FKAA water



Shallow Individual wells



Plants Need Water Too...

- For cell growth and expansion.
- For plant metabolism.
- Transporting soil minerals to roots.
- Physical support through turgor pressure.
- Transporting sugars within the plant.
- Cooling through transpiration.

What Can I Do?

Design a water efficient landscape:

- Right plant, right place.
- Choose natives or low maintenance plants.
- Group plants according to their water needs.
- Use mulch.



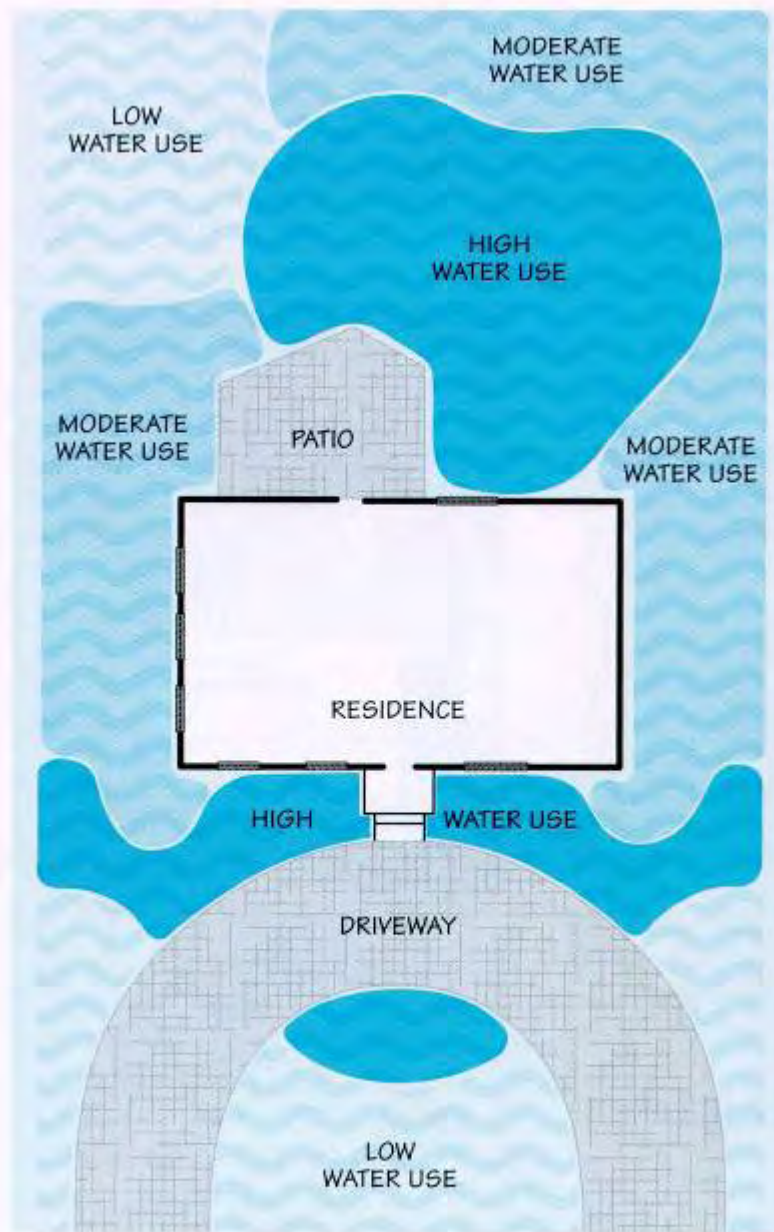


Figure 2 Diagram of water use zones of property

Water Use Efficiency

Controllable Factors

- Plant selection
- Plant placement
- Soil structure
- Mulching
- Irrigation
- Maintenance practices
- Human Tolerance
- Education

Uncontrollable Factors

- Temperature
- Precipitation
- Sunlight
- Wind
- Soil texture
- Drainage
- Water quality
- Local water restrictions

Landscaped Beds or Lawn?

Depending upon location, lawns need 20 to 35 inches of irrigation water* per year while most woody plants in mulched areas require approximately 10 inches*.

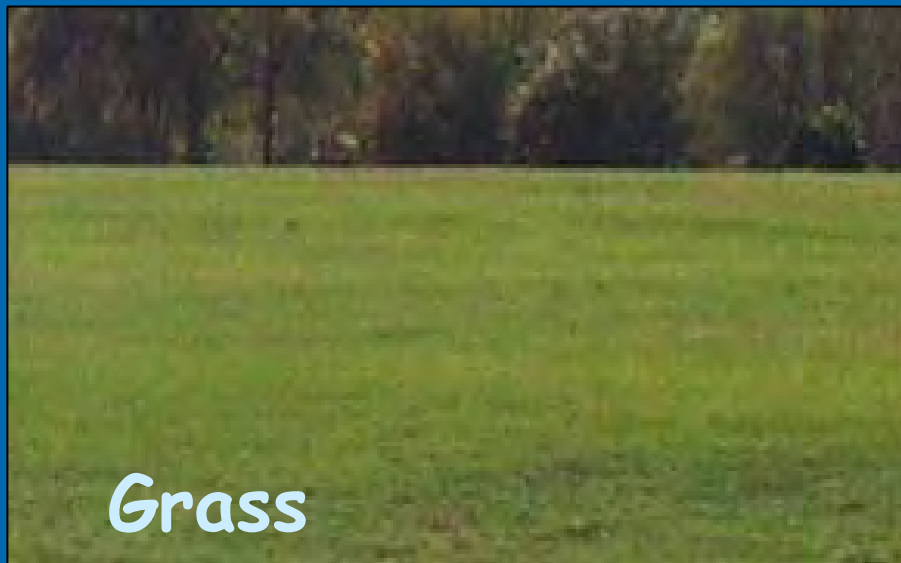
*In addition to 50+ inches rainwater/year

U.F. Circular EH 320; 1993

1 inch of water/ 1,000 ft² = 624 gallons

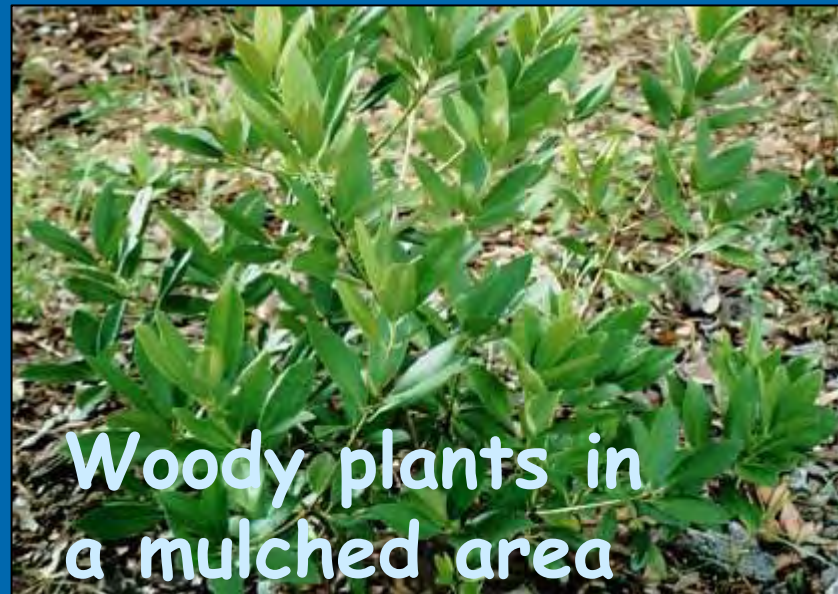
International Turf Producers Foundation

Based on these numbers, 1,000 ft² of:



Grass

requires 12,480 -
21,840 gallons of
irrigation water/year.



Woody plants in
a mulched area

require 6,240 gallons
irrigation water/year.

Woody landscapes can conserve up to
15,600 gallons of irrigation water/year.

Functional Turf Areas

- Berms and Swales
 - Turf is an excellent filter, helping to diminish pollutants and stormwater run-off.
- Recreational areas
 - Turf is resistant to foot traffic, and reduces temperature, glare, noise, and dust.
- Pet areas



Functional Landscaped Beds

Annuals, perennials, ground covers, shrubs or trees in a mulched area, to...

- screen a view.
- cover oddly-shaped areas difficult to mow or irrigate.
- plant a shady area where turf won't grow.
- group plants for easy maintenance.
- provide color, shade, or windbreak.

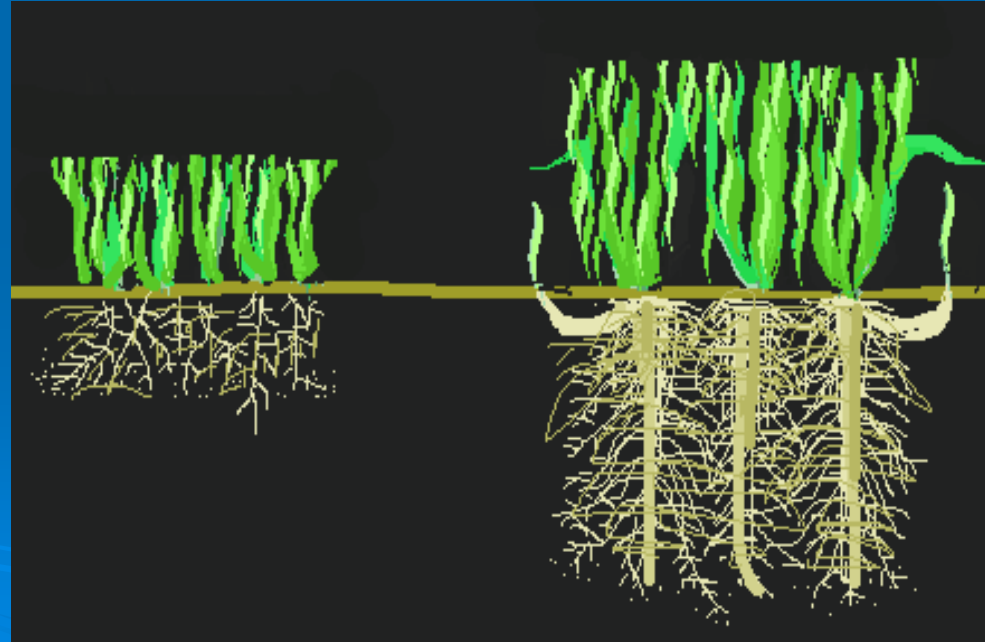


Drought Tolerant Turf

- **Select drought tolerant turf varieties.**
 - In Florida, [bahiagrass](#), [bermudagrass](#), and [zoysiagrass](#) all have excellent drought tolerance and may be suitable for your area as well. During dry periods, allow the turf to go dormant. When the rain comes, these grasses will turn green again.
- **Follow maintenance guidelines to promote drought tolerance.**
 - During extreme drought, many turf species enter dormancy, ceasing growth and turning golden brown. Very little water is required to keep the turf alive and turf recovers quickly once irrigation is resumed.

Maintenance Guidelines for Drought Tolerant Turf

- Never mow grass needing water.
- Never mow wet grass.
- Keep blade sharp.
 - Clean cuts heal quickly and reduce water loss.
- Mow lawn at the highest setting.
 - Taller grass has deeper, more extensive roots.



Turf grass Maintenance

- Fertilize conservatively
 - Use UF/IFAS guidelines and BMP's.
 - Rapid growth promotes thatch build-up.
- Remove thatch
 - Thatch restricts water movement.
 - Use a stiff rake or coring tool to aerate the soil.



Landscape Maintenance

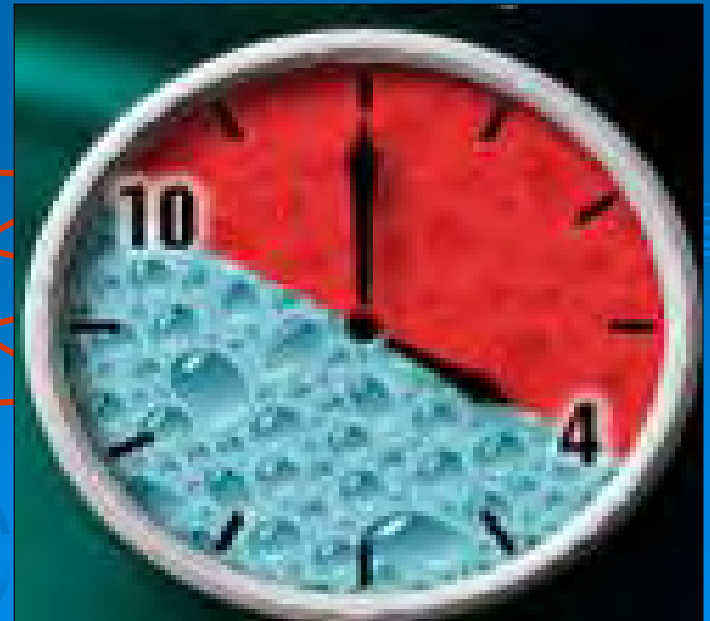
- 2-3 inches of mulch in plant beds
 - improves water infiltration.
 - reduces storm water runoff.
 - reduces evaporation.
 - prevents erosion.
 - controls weeds.
- Minimize pruning



When Do I Water?

- Early morning or evening
 - Temperature is cool and wind is calm
 - 40% - 60% of water applied evaporates in the afternoon sun!
- Some Water Management Districts mandate:

No watering between
10 AM and 4 PM
Year - round!



How Much?

- Apply $\frac{1}{2}$ to $\frac{3}{4}$ inch water per application.
- Soak soil thoroughly to promote a deeper, more drought tolerant root system.



Efficient watering wets only the root zone.

Measure It

- Use a rain gauge, or...



- 1) Place cans of equal diameter in random places underneath the sprinkler's spray pattern.
- 2) Measure the depth of water in each can.
- 3) Add depth measurements & divide by the number of cans.

Determine the length of time it takes for your sprinkler system to deliver $\frac{3}{4}$ inch water.

How Often?

- Water “as needed,” not routinely!
- Less frequently in the fall and winter.
- Check with the Water Management District about water restrictions during drought.



Typically,
Florida's rainy
season is June -
September.

Watering Tips



- Learn to recognize when plants *need* water.
- In the heat of midday, some plants wilt. No amount of water will change this. If the plant is still wilted by evening, water it then.

Water "As Needed"



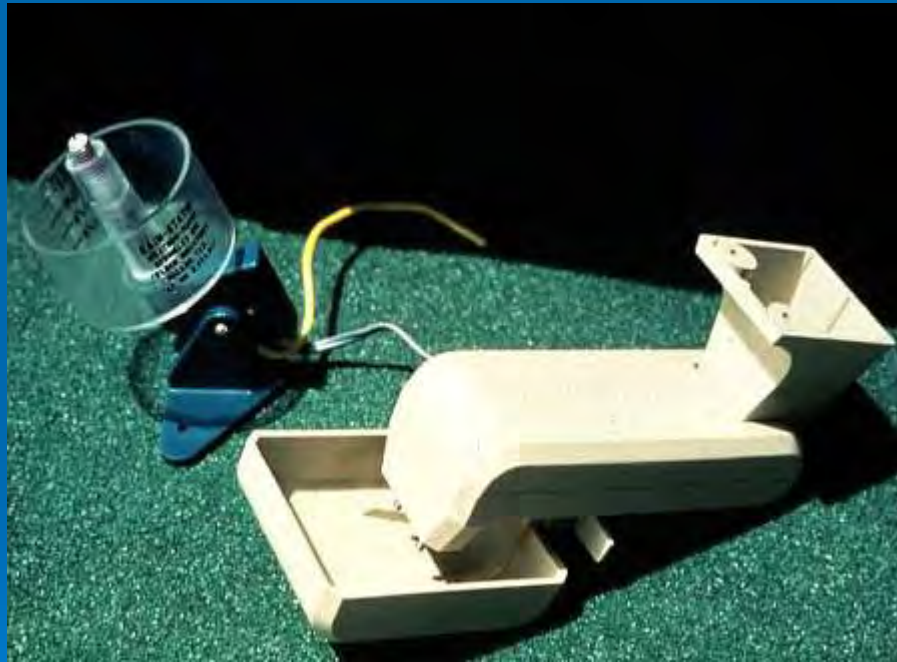
Folded leaflets, a blue color, and footprints that remain on the lawn are indications of a lawn that needs water.

Too much of a good thing?

- Over watering occurs when water is applied too frequently or in excessive amounts.
 - Encourages growth of fungi and bacteria
 - Promotes a shallow root system
 - Reduces oxygen to the roots, causing stress
 - Encourages weed growth



Efficient Irrigation System

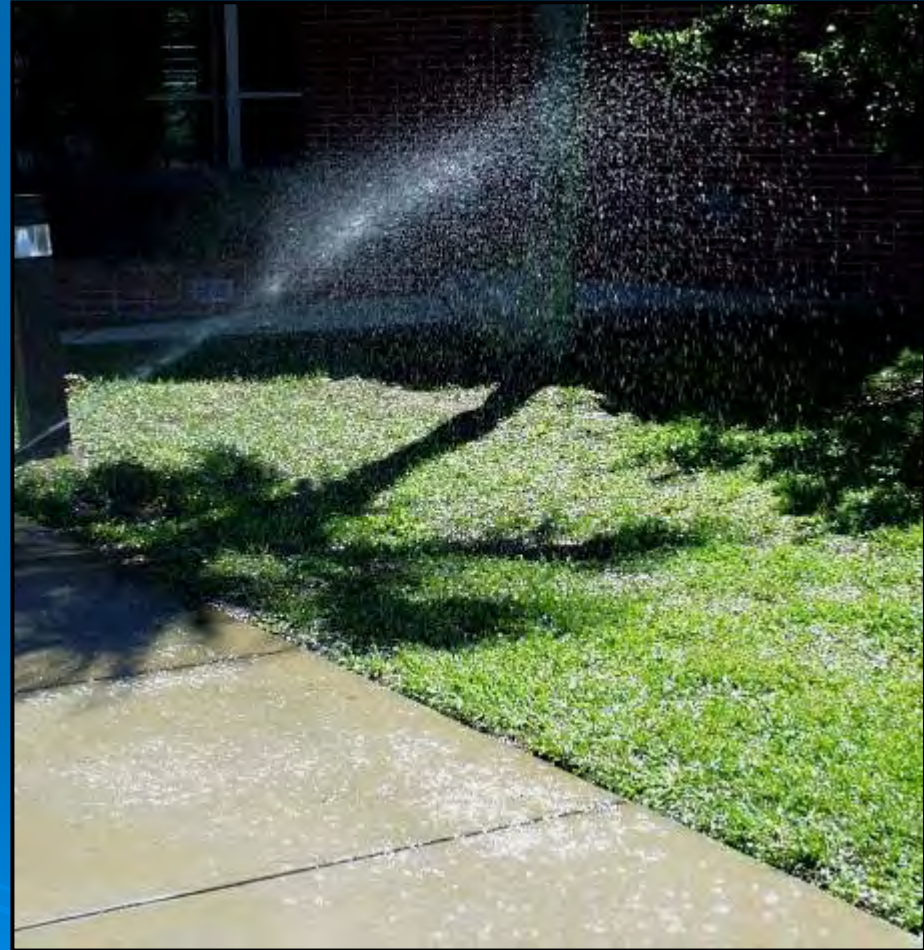


Rain Shut-off Device

- Calibrate the sprinkler system.
- Install a rain shut-off device.
- Have your sprinkler system "tuned up" yearly.
- Replace worn hose and faucet washers.

Efficient Irrigation

- Separate lawn zones from landscape zones.
- Convert landscape beds to drip or low volume irrigation.
- Divert sprinklers to avoid spraying water on sidewalks and streets.



Low Volume Sprinklers



Micro-jet sprinkler



Drip emitters

Micro-irrigation can improve watering efficiency.

Ooze Tube & Treegator



You control drip times from five days
to four weeks
Dramatically reduces hand watering
costs

Zip heavy-duty bag around tree, fill
with water, and let Treegator drip
water to your tree for up to nine hours.

Tips on Conserving Water

- Use recycled or gray water to irrigate.
 - From showers or washing machines, but not toilets
- Direct downspouts toward beds or lawn.
- Cover pools and hot tubs to prevent evaporation.



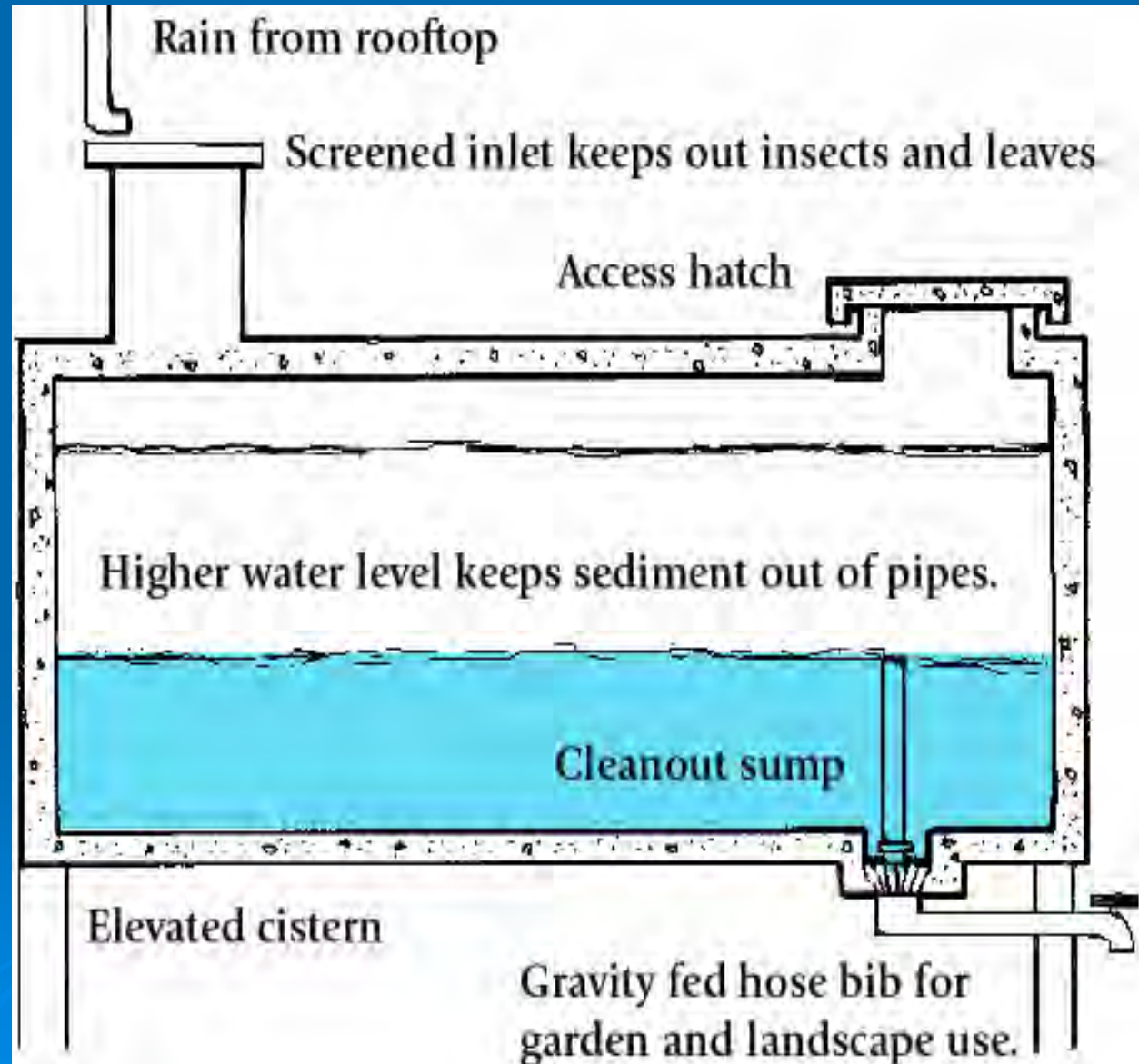
Rain Barrels



- Collect and harvest rain water for irrigation purposes.
- Rainwater runs off roof into the barrel from the downspout.
- A screen fastened over the inlet prevents leaves or insects from entering.

Cisterns

- Imply greater storage capacity and a bit more engineering.
- Water travels by gravity or pump action.



Water Test Information Sheet

<http://edis.ifas.ufl.edu/SS184>

The Water Test Information Sheet is the form which must accompany water samples submitted to the UF/IFAS Extension Soil Testing Laboratory. This service is available to all Florida residents.

Analyses performed are pH, electrical conductivity, Ca, Mg, Fe, Mn, Na, Cl, hardness, total carbonates, and suspended solids.

Please note that these tests will not determine if the water is suitable for human consumption. Bacteriological tests may be available from the county Health Department or from some commercial laboratories.



Extension Soil Testing Laboratory

PO Box 110740 / Wilcox Building 601, UF / Gainesville, FL 32611-0740
SOILSLAB@IFAS.UFL.EDU

Water Test Information Sheet

Mailing Address (please print)

Name _____ Phone _____
Address _____
City _____ FL Zip _____
Date _____ E-Mail _____

Direct any questions regarding this test or the interpretation of the results to your county Extension Agent.

NOTE: These tests will not determine if the water is suitable for human consumption. Bacteriological tests may be available from the County Health Department or from select commercial laboratories.

Fill in all requested information, using one line per sample and additional sheets for more than 5 samples.

Lab Use Only	Sample ID	County	Crops to be grown	Water Source Information					Water Use Information			Cost		
				Well		Surface ditch or pond	General Household Use	Irrigation		Irrigation and micro-irrigation	Household			
				Check	Range			Township	Section			Check	Household	Overhead or seep
												\$10.00	\$9.00	
													\$10.00	\$9.00
													\$10.00	\$9.00
													\$10.00	\$9.00
													\$10.00	\$9.00

SPECIAL PROBLEMS NOTED:

Check _____ Money Order _____ Cash _____ Total _____

SAMPLES WILL NOT BE PROCESSED WITHOUT PAYMENT.
Please enclose payment and this sheet in the same package as sample(s).
Do not send cash through the mail.

Revised July 2005

How to do a Water test

Equipment:

3 clean test tubes

1 test tube rack

E-C Meter (Electrical Conductivity Meter)

Water Sample

Procedures:

Test Tube 1: Conductivity Solution

Test Tube 2: Water Sample

Test Tube 3: Distilled Water

1. Fill the liquid just above the bottom blue test tube rack level. The probe has to be totally immersed in fluid.
2. Turn on the E-C meter.
3. Press mS/cm button (marked with a black dot.)
4. Calibrate the E-C meter by using the Test Tube 1 (conductivity standard solution), so that the meter should read at 0.72 after probe immersion. You may need to move the probe up and down to eliminate the bubbles in the solution for the probe to reach 0.72. You may need to use a small screw driver to adjust the meter to reach 0.72.
5. Remove the probe from Test Tube 1 and immediately immerse into Test Tube 2 (sample water).
Class of Water Electrical Conductivity dS/m or mmhos/cm
Excellent 0.25
Good 0.25 to 0.75
Doubtful 0.75 to 2.00
Unsuitable > 3.0
6. Read the meter register and record on the report
7. Remove the probe from Tube 2 and immerse it into Test Tube 3 (Distilled water). Wait until the EC meter read to 0.00. You may need to use another clean test tube filled with the distilled water to bring the probe reading back to 0.
8. Gently dry the probe and turn the meter off. Pack it away.
9. Triple-rinse all test tubes used. Turn the test tubes up-side-down with paper towel underneath until completely dried.
10. Store the clean test tubes in the test tube rack. Place them along with the EC meter on the shelf above the work desk.