Well & Septic Workshop

Water Awareness

Speaker Series 2025

Colby Pitts

FFL Program Coordinator

Your watering day is based on the LAST digit of your address

Monday **Tuesday** **Wednesday** **Thursday** **Friday**

You can water before 8:00 am **OR** after 6:00 pm on your designated day

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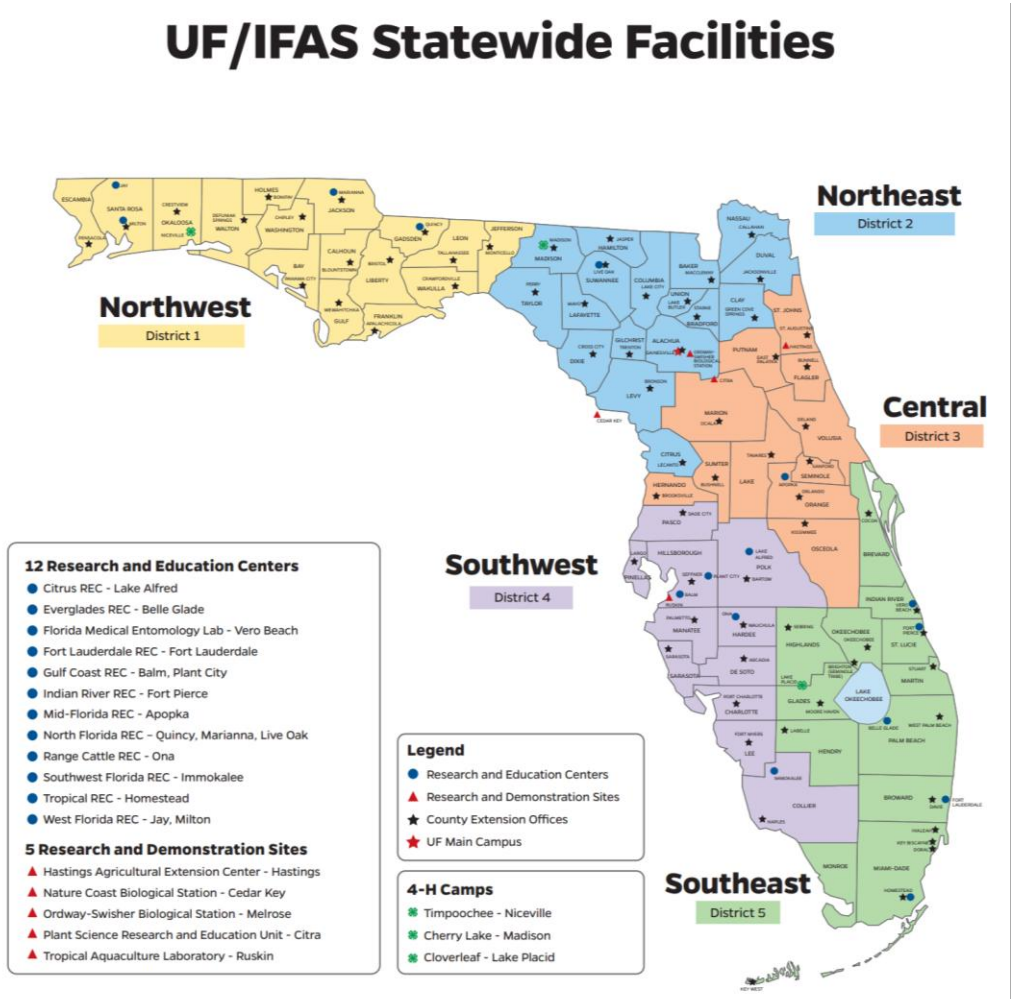
FLORIDA WELL
OWNER NETWORK

Private Wells and Septic Systems 101: Maintenance, Safet, and Preparedness

Yilin Zhuang, Ph.D.
Water Resources Regional Specialized Agent
UF/IFAS Extension Central District
Mid-Florida Research and Education Center
University of Florida

What is Extension?

- A partnership between state, federal, and county governments to provide **scientific knowledge** to the public:
  - Agriculture, natural resources, food safety, money management, lawn care and gardening, 4-H youth development, sustainable living, family issues,
  - Classes, consultations, demonstrations, field days, and more through county Extension offices
  - sfyl.ifas.ufl.edu



Florida Well Owner Network (FWON)

- To **educate** residents about well water quality and quantity, and best practices to ensure well maintenance and groundwater protection.
- To **facilitate** access to well water testing and provide information about treatment options if problems are found.
- To **foster** community engagement by connecting well users with resources and local experts.
- To **complement** efforts by agency partners to increase awareness among Floridians about best practices regarding wells, septic systems, and drinking water quality.

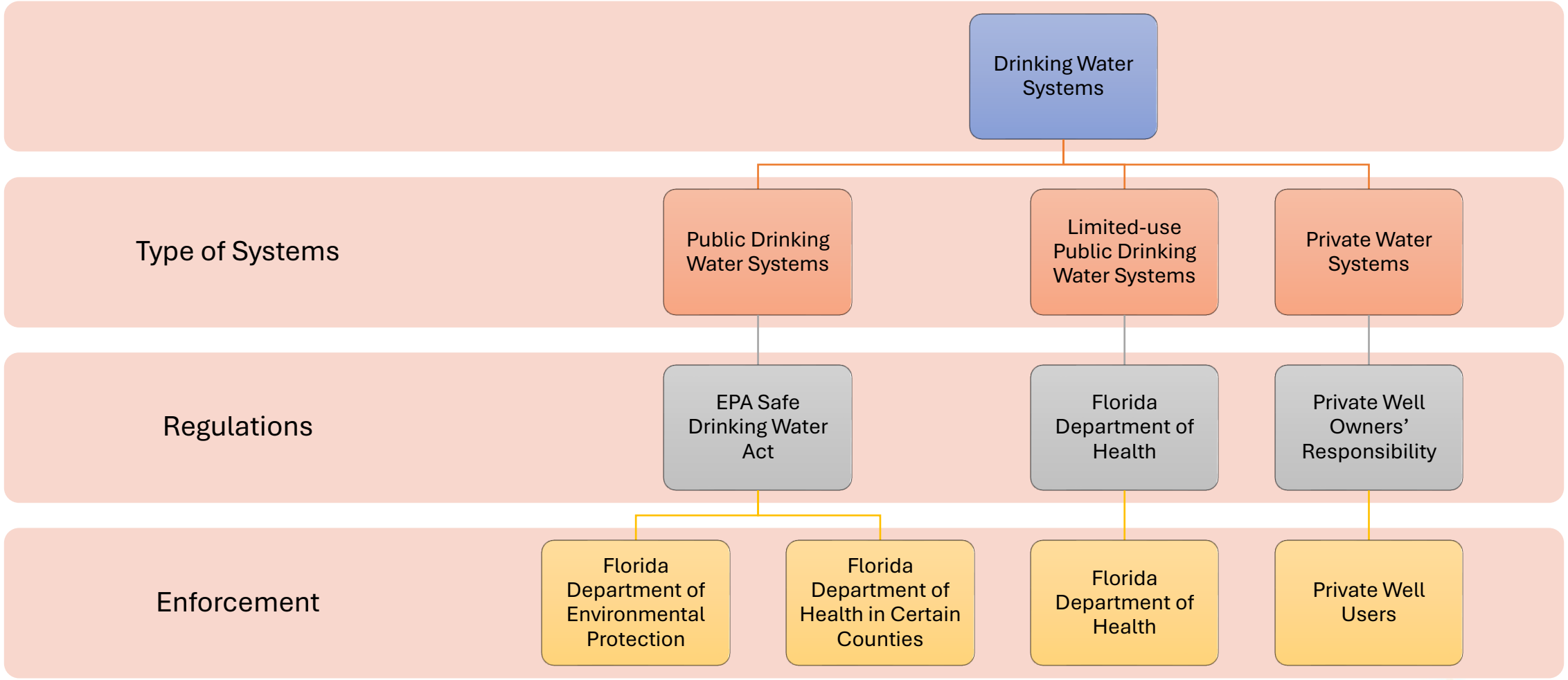
Private Wells in Florida

- An estimated 2.5 million Floridians (approximately 12% of the population) rely on private wells for home consumption.
  - Approximately 800,000 private wells.
- Private well users control the management and protection of their wells.
  - U.S. EPA safe drinking water regulations do not apply to residential private wells.

Private Wells in Florida

- Florida Department of Health (FDOH) provides information to well users.
- FDOH Wells Surveillance Program identifies and monitors areas where contaminated drinking water is suspected.
  - Surveyed over 19,000 sites and sampled nearly 48,000 wells since 2005.
- Limited public data exist on how many well users regularly test their water or drink from contaminated wells.

Regulatory Landscape of Drinking Water Systems



Source: https://edis.ifas.ufl.edu/publication/FE1156

Septic Systems in Florida

- Nearly one in three household in Florida depends on septic systems.
- More than 2.5 million septic systems are in use across the State of Florida.
- The Basin Management Action Plans identify septic systems as a major source of nitrogen to impaired water bodies.

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Private Wells in Florida:

How They Work, What Can Go Wrong, and How to Keep Your Water Safe

What will be covered in this presentation?

- Where does our water come from?
- What are the basic well components?
- What can contaminate well water?
- What should you have your water tested for?
- Where can you have your water tested?
- How to maintain your private well?

Where does our water come from?

The Floridan Aquifer System

- It is one of the most productive aquifers in the world.
- It covers approximately 100,000 square miles of the southeastern U.S. including all of Florida and parts of Georgia, Alabama, Mississippi, and South Carolina.

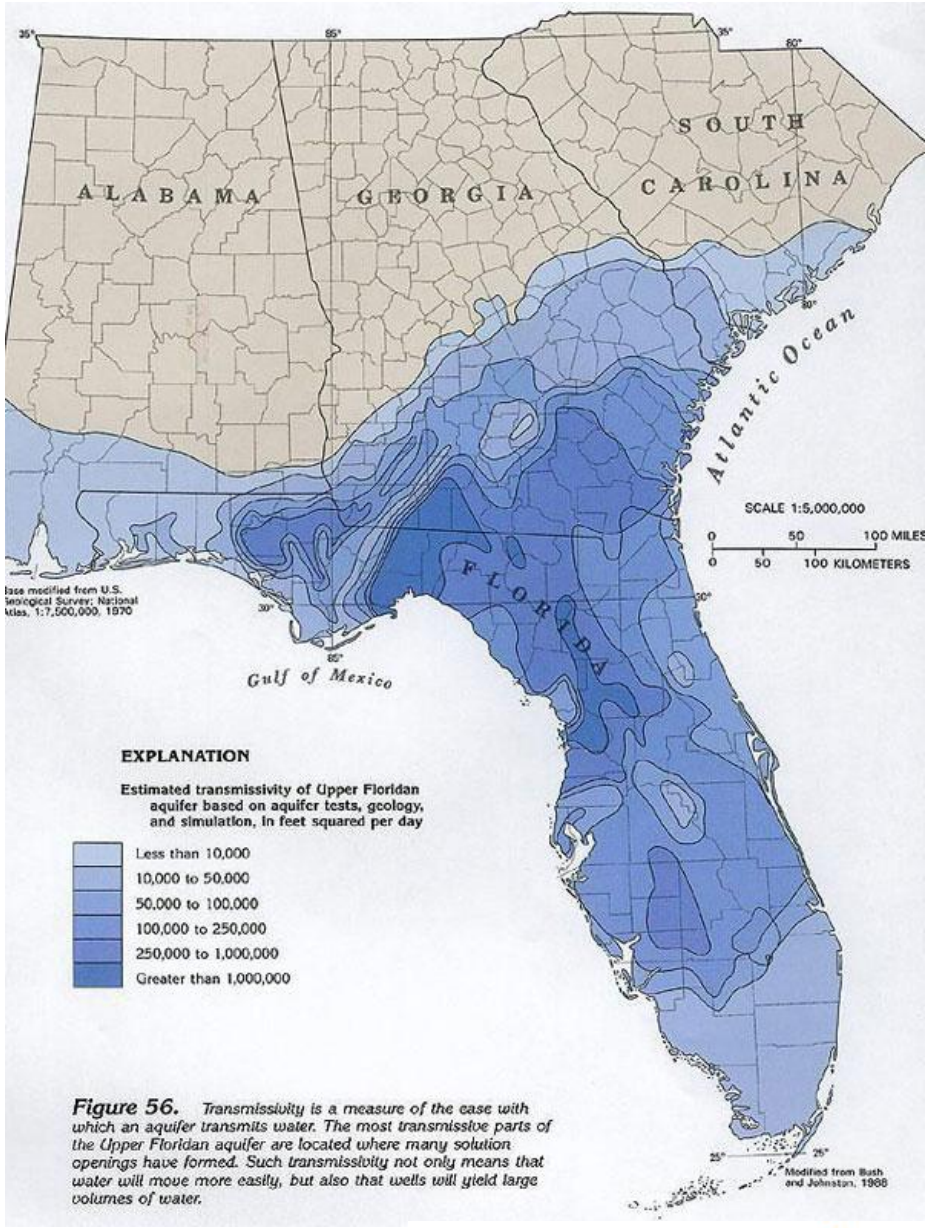


Figure 56. *Transmissivity is a measure of the ease with which an aquifer transmits water. The most transmissive parts of the Upper Floridan aquifer are located where many solution openings have formed. Such transmissivity not only means that water will move more easily, but also that wells will yield large volumes of water.*

Photo: U.S. Geological Survey
Floridan Aquifer System Groundwater Availability Study: Additional https://fl.water.usgs.gov/floridan/intro.html

Commonly Used Aquifers in Florida

- Floridan aquifer
- Surficial aquifer
- Sand & gravel aquifer
- Biscayne aquifer
- Intermediate unit

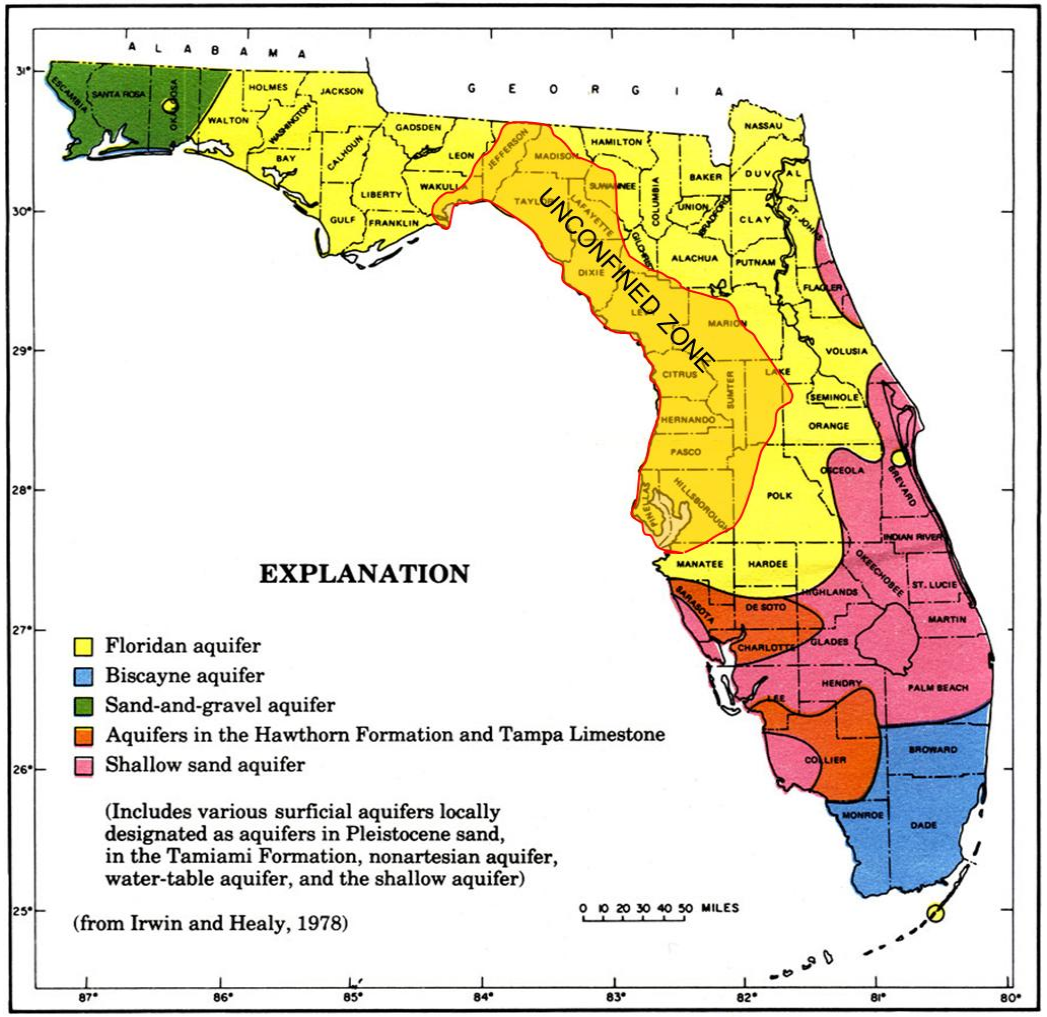


Photo: Provided by FDOH, courtesy of FCIT
http://fcit.usf.edu/florida/maps

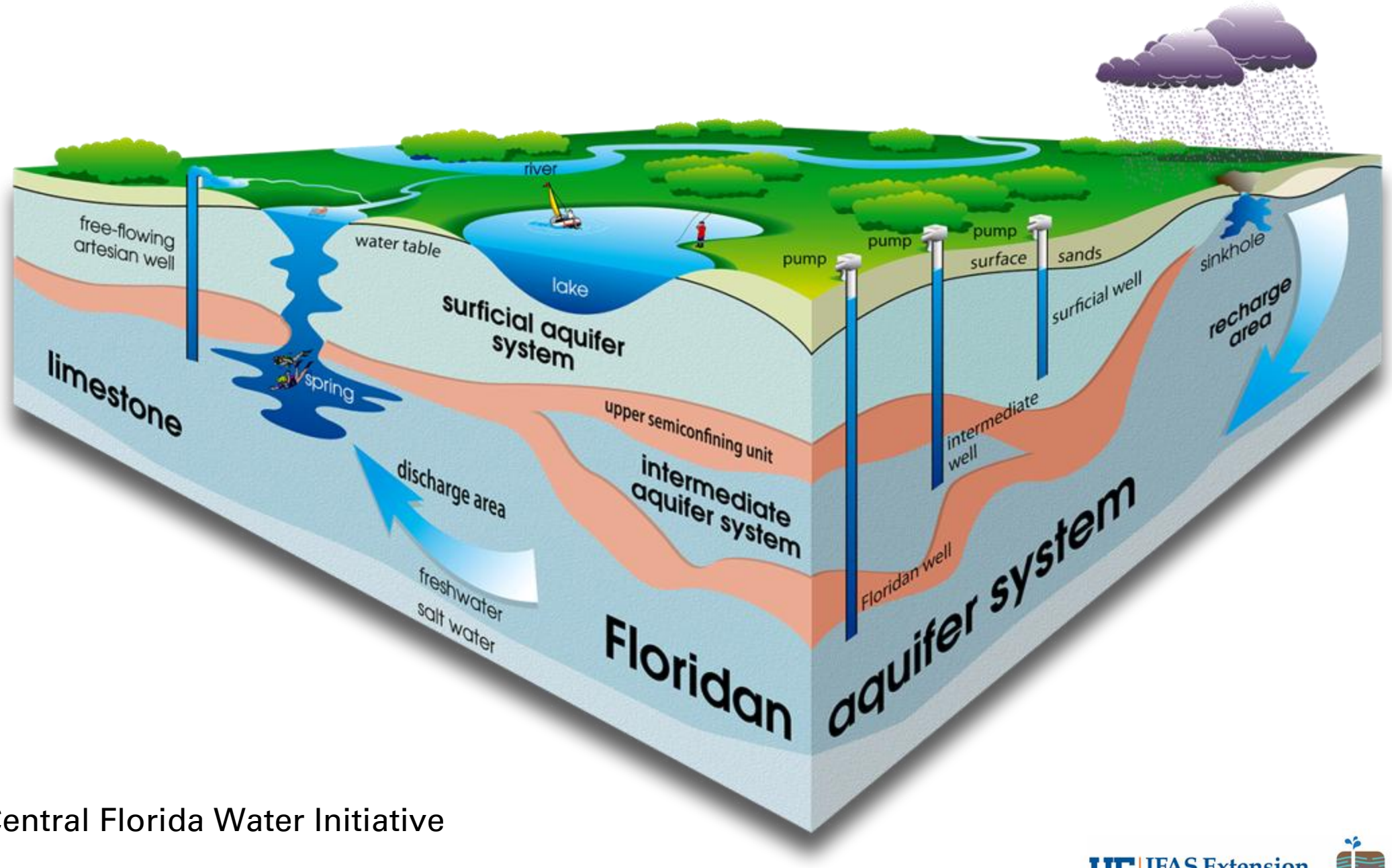


Photo: Central Florida Water Initiative

What are the basic well components?

Types of Wells in Florida

Well Type	Typical Depth	Pros	Cons	Typical Use in Florida
Drilled	100–400 ft	• Deeper access • Less vulnerable to contamination • Long lifespan	• Higher cost • Requires specialized equipment	Most common for new private wells; preferred for long-term household water supply
Driven	30–50 ft	• Lower cost • Quick installation • Works in shallow sand/gravel aquifers	• More vulnerable to contamination • Limited yield	Rural areas with shallow clean aquifers; seasonal or supplemental water use
Dug	10–30 ft	• Low cost • Simple construction	• Highly vulnerable to contamination • Seasonal water level changes • Not recommended for new wells	Older properties; rare for new installs; some agricultural use

Basic Well Components

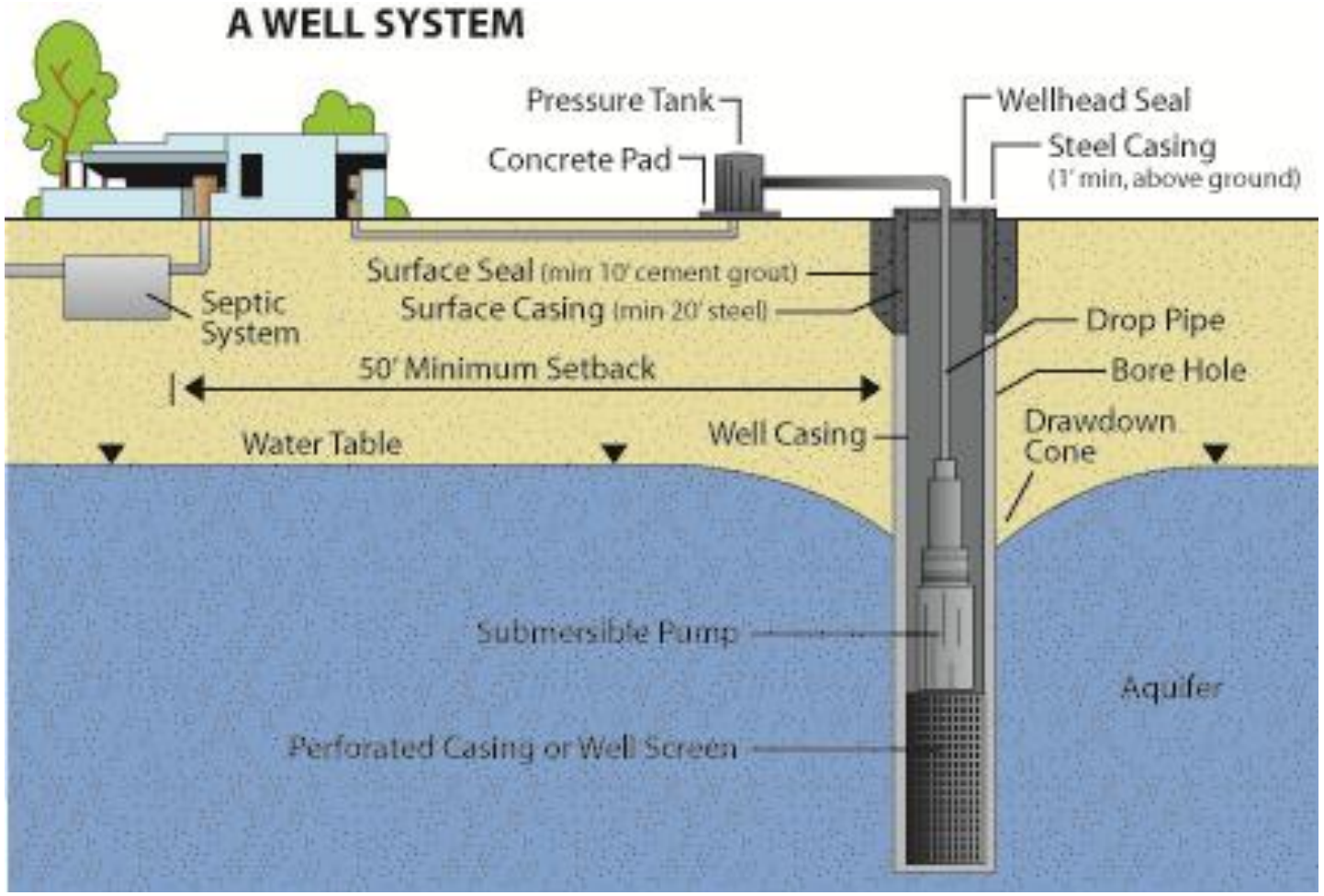
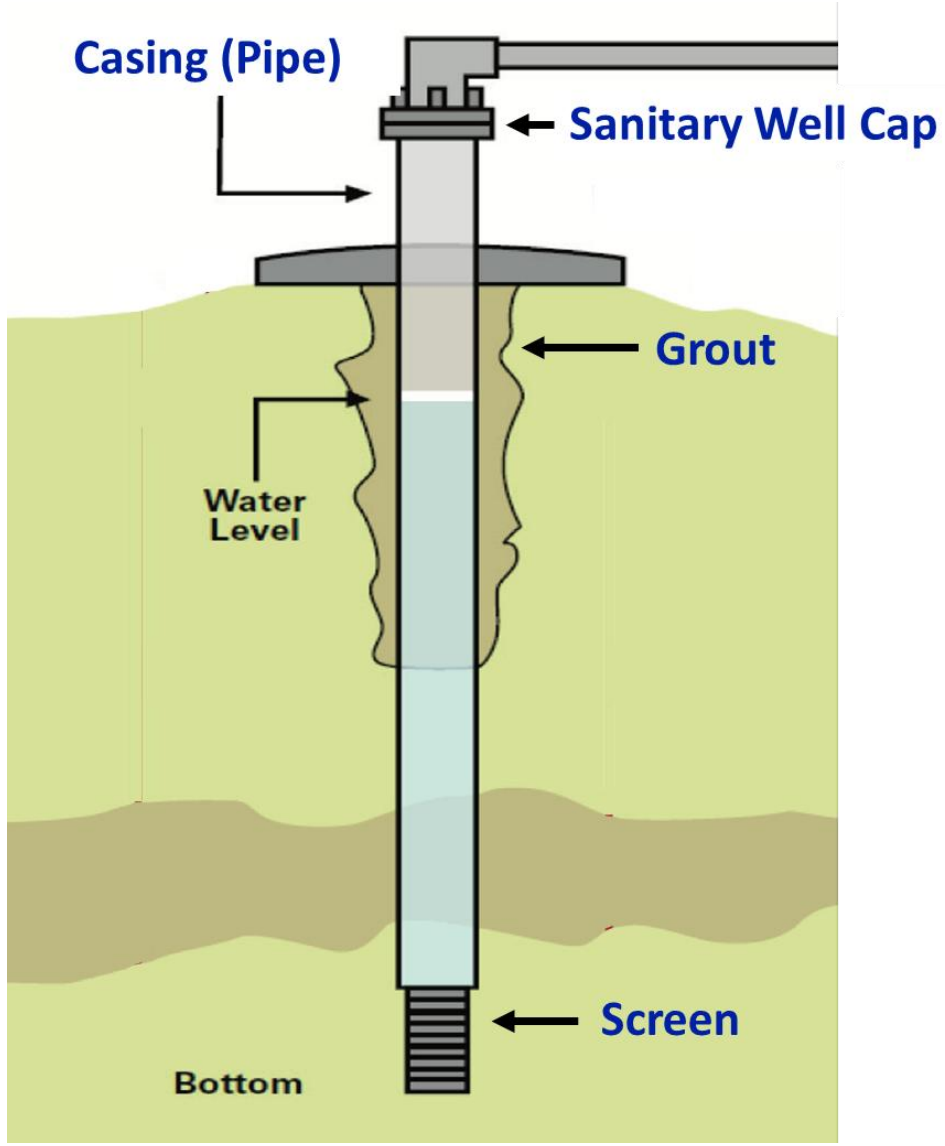


Photo: University of Georgia

Photo: Y. Zhuang

Casing

- Maintains an open access in the earth
- Doesn't allow any entrance or leakage into the well
- Nontoxic and durable material
- Popular materials include black steel, galvanized steel, PVC pipe and concrete pipe.
- At least 12 inches above land surface.



University of Georgia

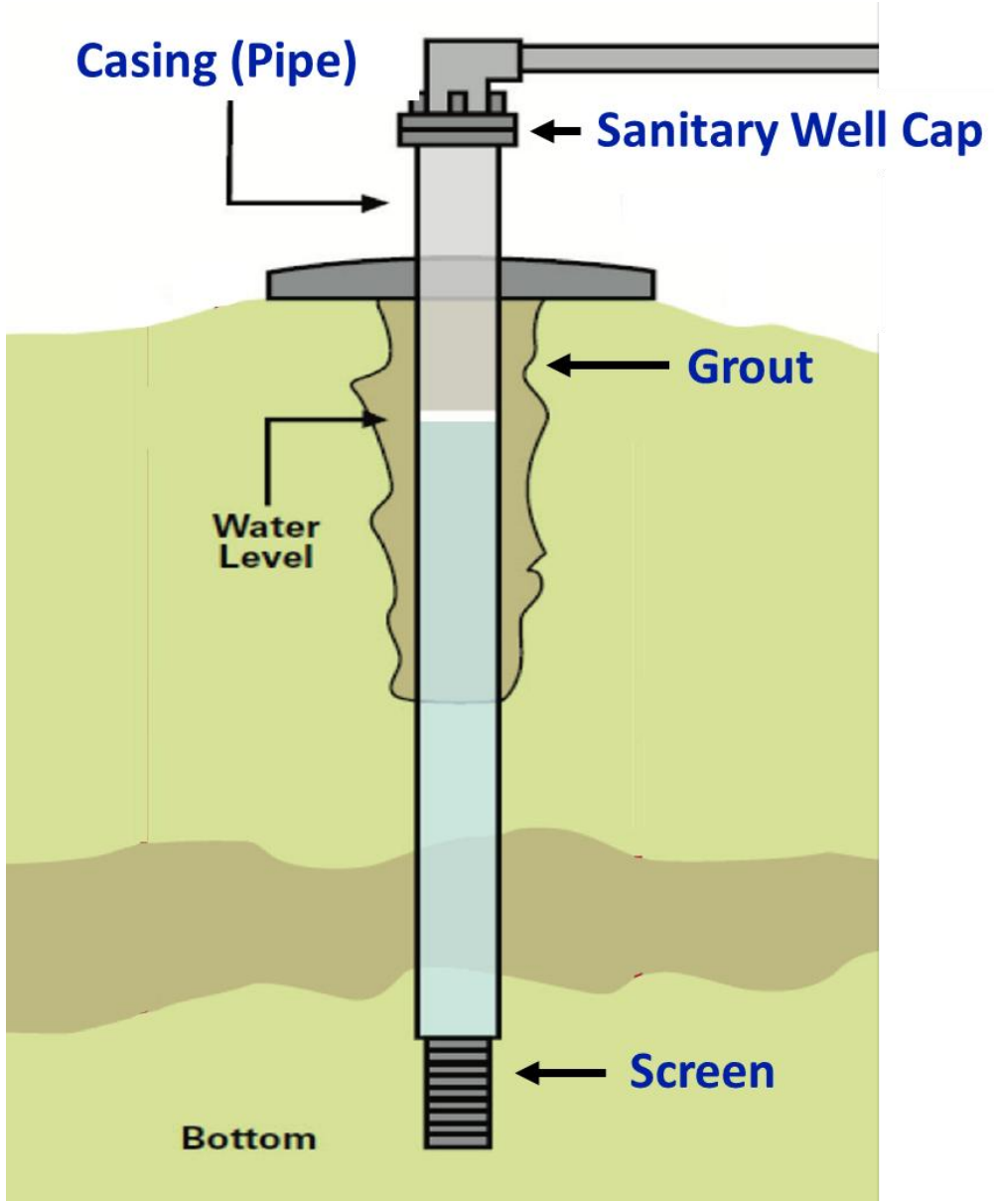
Screen

- Keeps sand and gravel out of the well
- Allows groundwater to enter into the well
- Popular materials are stainless steel and slotted PVC pipe.
- Used when wells are drilled into unconsolidated materials.

Photo: Y. Zhuang

Grout

- Sealant
- Used to fill in the spaces around the outside of the well
- Protects the well against the intrusion of contaminants
- Made of cement, bentonite, or concrete (each used separately)



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Well Cap

- Watertight well cap
- Prevents contamination from flowing down the inside of the well casing
- Aluminum or a thermoplastic
- At least 12 inches above the ground (or flood level)
- Sanitary Well Caps: https://extension.psu.edu/sanitary-well-caps

Photo: FL Dept. of Health

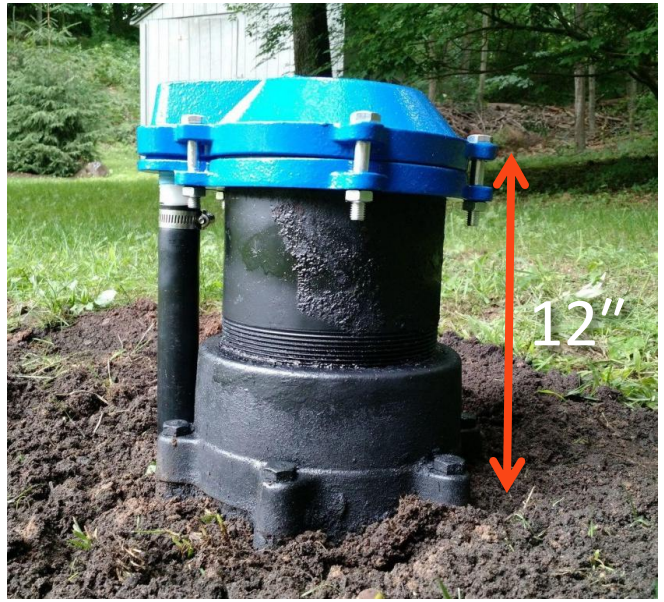
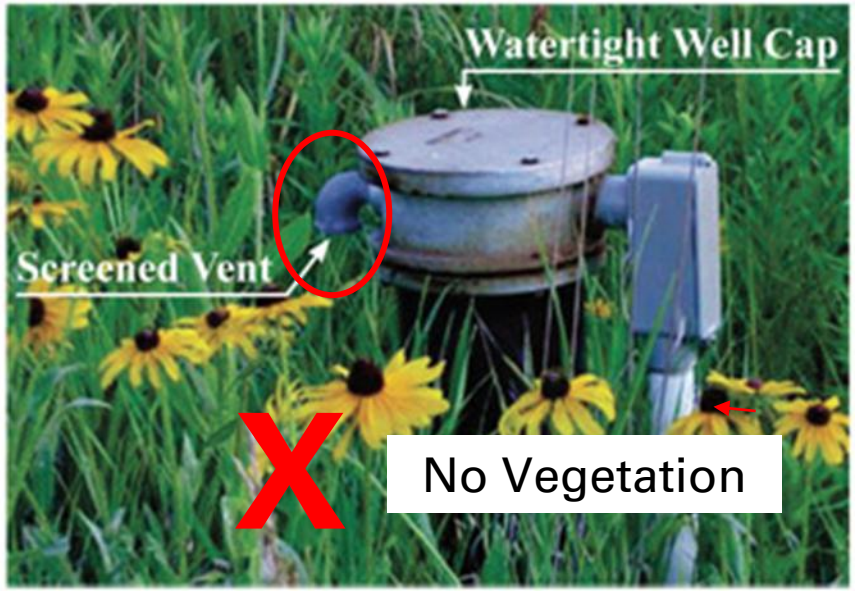


Photo: University of Georgia

Screened Vent

- Screened vent (on the cap)
- Wire mesh
- Equalizes the air pressure inside the well with that of the atmosphere



Well Development

- After drilling, contractor will remove excess grout, silt, or clay left over from the drilling operation.
- New drinking water wells must be disinfected to ensure that water is safe for drinking as soon as the disinfectant is flushed.
- Typically, household non-scented bleach is used for disinfecting a well.

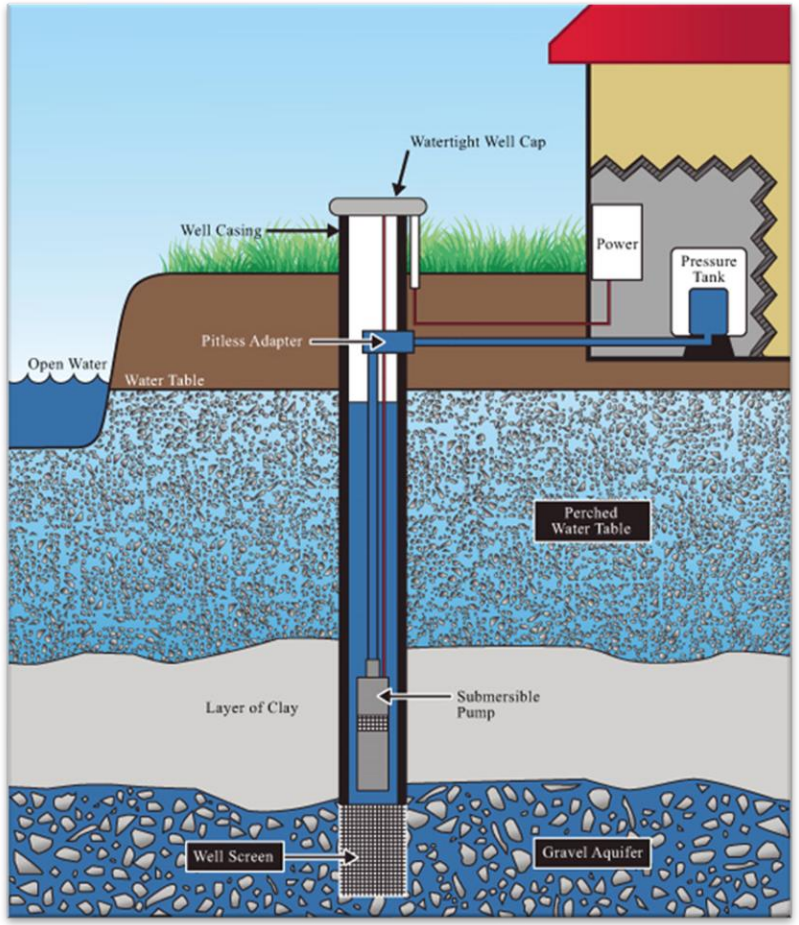
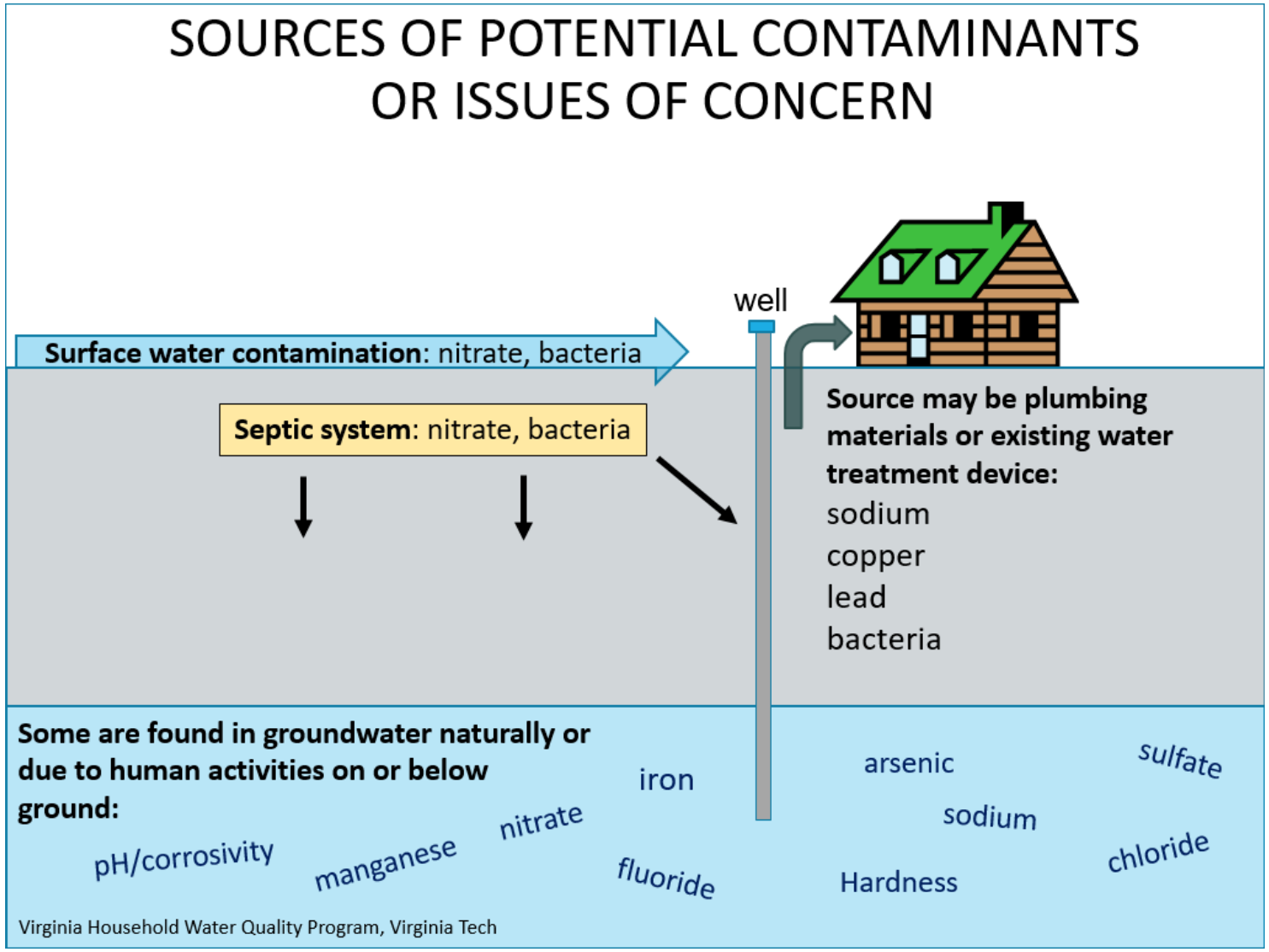


Photo: University of Nebraska-Lincoln

What can contaminate well water?

Potential Contaminants

- Inside your house
- Outside your house
- Naturally occurring
- Human activities



What should you have your water tested for?

EPA Safe Drinking Water Act

Primary Standards

- Also called Maximum Contaminant Level (MCL)
- Cause health problems
- Enforced for municipal systems
- Includes specific chemicals and pesticides
- Over 80 contaminants, including
  - Coliform and *E. coli* bacteria
  - Nitrate
  - Lead
  - Arsenic
  - Copper

Secondary Standards

- Also called SMCL (Secondary) or RMCL (Recommended)
- Cause aesthetic problems:
  - Staining
  - Taste
  - Odor
- Many naturally occur in groundwater
- About 15 contaminants, including:
  - Iron
  - Sulfate
  - Manganese
  - Hardness

Basic Water Testing Parameters

- Every year test for coliform bacteria, nitrate, lead, and pH.
  - These tests should also be conducted after repairing or replacing an old well or pipes, and after installing a new well or pump.
- Contaminants of local concern.

Where can you have your water tested?

Certified Water Labs

Florida Department of Health website

Private Well Testing

Welcome to the Florida Department of Health's Private Well Testing web site. Detailed information is found within the topics listed below.

Contact Water Programs

850-245-4250
AskEH@flhealth.gov
Fax
850-487-0864
Mailing Address
Bureau of Environmental Health, Water Programs
4052 Bald Cypress Way, Bin A-08
Tallahassee, FL 32399-1710

View a list of water testing Laboratories Certified by the Florida Department of Health

UF/IFAS Analytical Services Laboratories (ANSERV Labs)

Irrigation and Household Water Quality Testing

- Calcium
- Magnesium
- Iron
- Manganese
- Sodium
- Chloride
- pH
- Suspended solids
- Electrical conductivity (measure of dissolved salts in the water)

ANSERV Labs https://soilslab.ifas.ufl.edu/extension-soil-testing-laboratory/

Water Test Form https://edis.ifas.ufl.edu/publication/SS184

Water Testing Frequency

- Test your water more than once a year if
  - Someone in your household is pregnant or nursing
  - There are unexplained illness in your household
  - Your neighbors find a dangerous contaminant in their water
  - You note a change in water taste, odor, color or clarity
  - You have a spill of chemicals or fuels into or near your well

How to maintain your private well?

Annual Inspection of Wellhead and Cap

- What to check:
  - Cracks, corrosion, or damage to casing.
  - Secure, sanitary well cap in place (tight fit, gasket intact).
  - Screened vent present and unobstructed to allow air exchange while keeping insects/rodents out.
- Florida tip: Raise casing **at least 12 inches** above ground or flood level to reduce floodwater entry risk.
- When to inspect: At least once per year, after major storms, or if the area around the well has been disturbed.

Keep Records

- Maintain a well log including:
  - Date of construction, depth, casing and pump specifications.
  - Water testing results (annual and event-based).
  - Any repairs, maintenance, or disinfection treatments performed.
- Why? Helps track changes in water quality and equipment performance over time, and is valuable if selling the property.

Maintain Safe Distances from Contamination Sources

- Florida Department of Health requires minimum 75 feet from septic tanks and drainfields.
- Maintain clear zone free of chemicals, fuel storage, and debris around the wellhead.
- Keep the area sloped away from the well to prevent surface runoff from pooling around the casing.

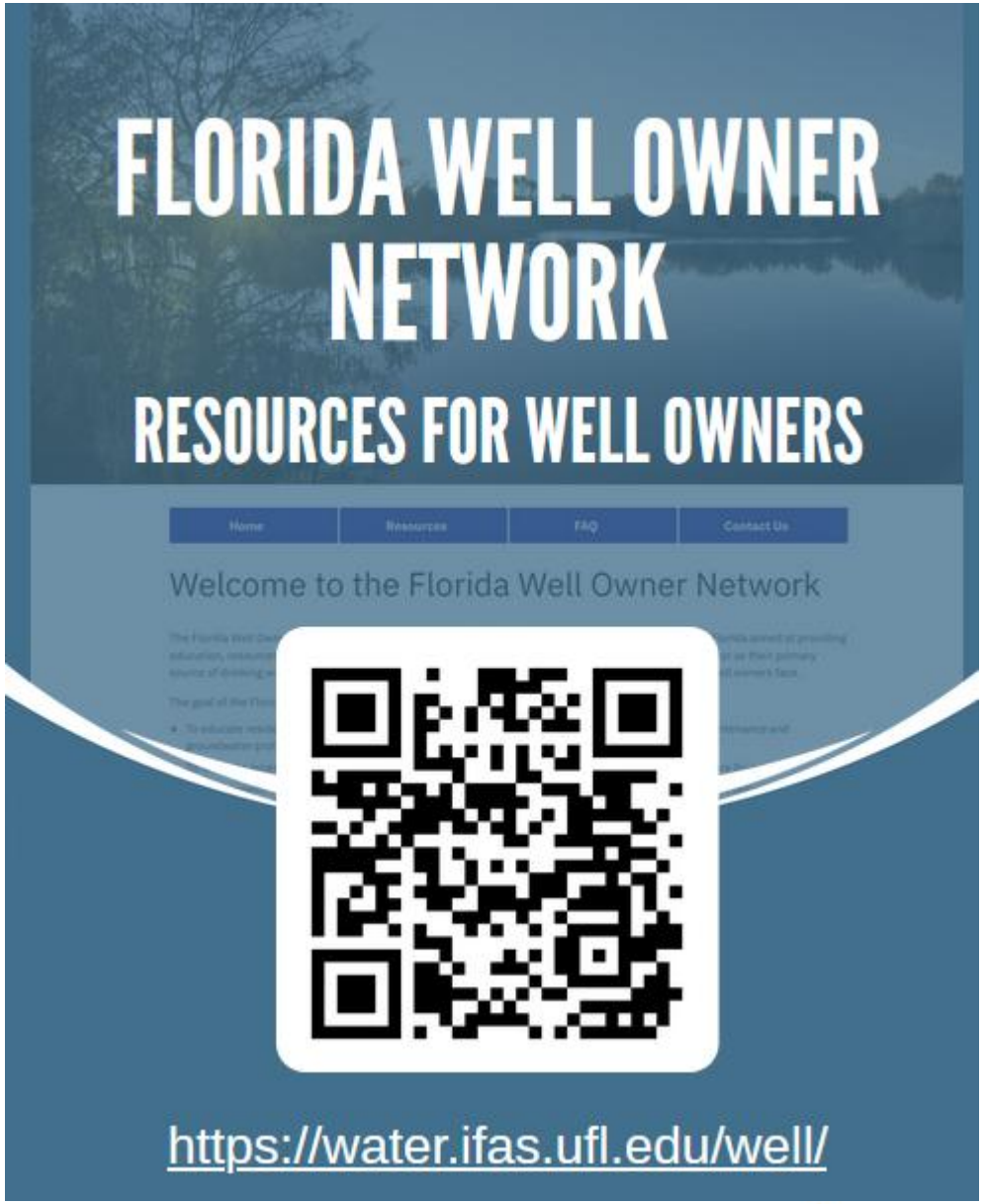
Backflow Prevention

- Install a backflow prevention device if your well connects to irrigation systems, livestock watering systems, or other equipment that could draw contaminants back into the well.
- Have devices inspected annually by a licensed professional.

Additional Resources

Florida Well Owner Network website

https://water.ifas.ufl.edu/well/



Intermission

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Septic Systems in Florida:

How They Work, New Rules, and How to Protect Water Quality

What will be covered in this presentation?

- Why are we concerned about septic systems in Florida?
- How do conventional systems work?
- 2016 Florida Water Bill
- Advanced N-reducing technologies and resources
- Septic system maintenance

Onsite Sewer Treatment and Disposal Systems in Florida

Onsite Sewer Treatment and Disposal Systems – OSTDS – Septic Systems

Septic systems are a source of nitrogen to soil and groundwater

- Septic systems are designed from a public health perspective, to remove **pathogens**.
- When properly sited and maintained, they do a good job of this.
- They were not designed to remove nutrients, like nitrogen and phosphorus.
- Nitrate-nitrogen readily leaches to groundwater.

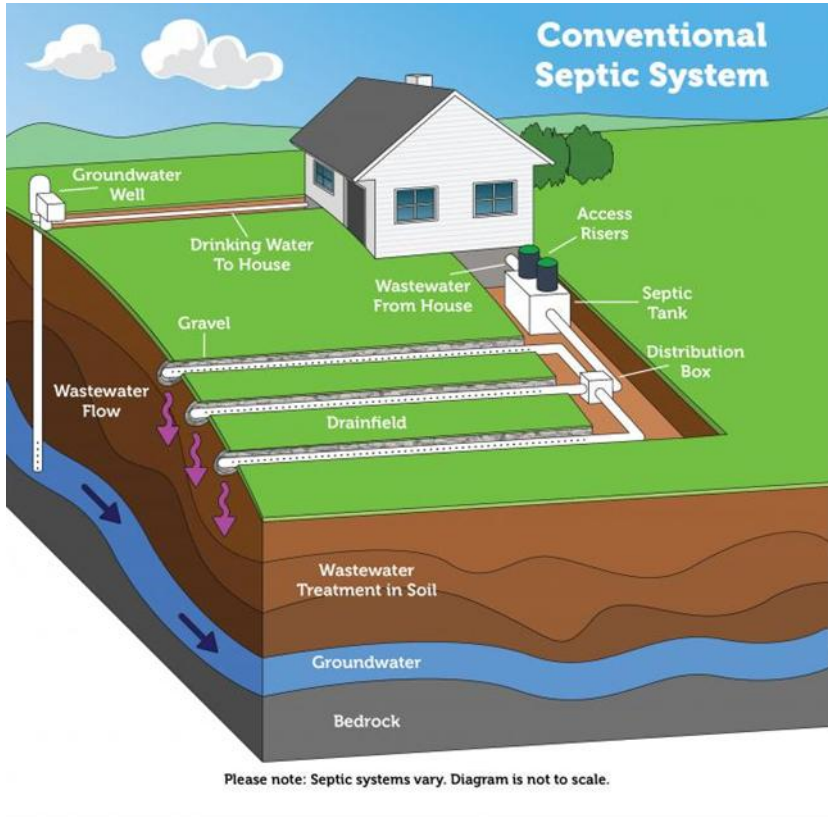


Photo by U.S. EPA

How do conventional septic systems work?

Conventional Septic System

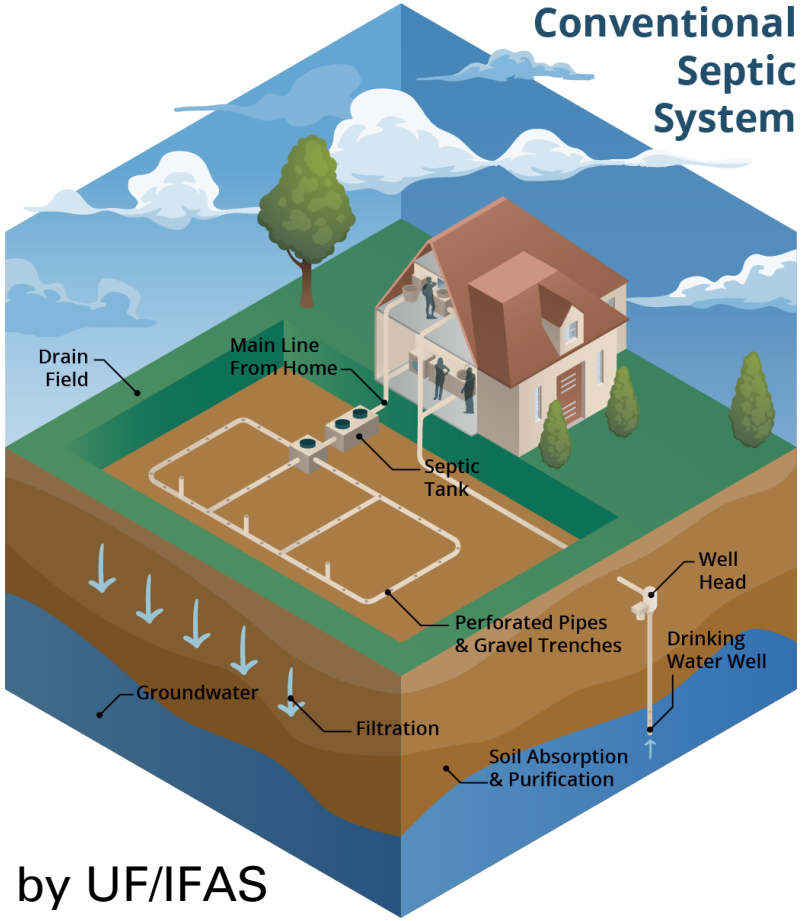


Photo by UF/IFAS

Septic tank + Drainfield (Leachfield)

Septic Tank

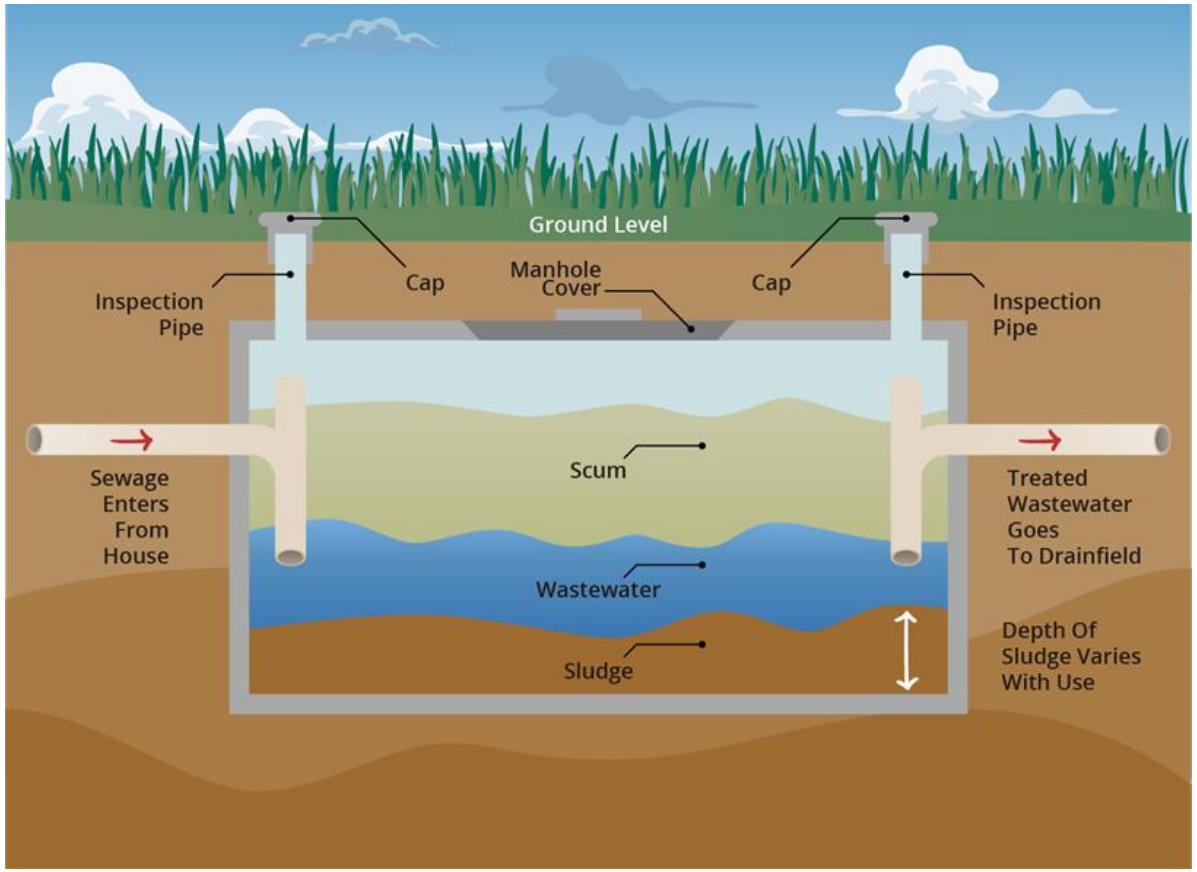


Photo by UF/IFAS

- Designed for the size and expected water usage of the home
  - Solid waste (aka Sludge) settles to the bottom
  - Oil and grease (aka Scum) rise to the top
  - Liquid (aka Effluent) moves on to the drainfield
- Nitrogen in effluent largely in the ammonium (NH4) form initially and then quickly converts to nitrate (NO3) in the presence of oxygen in the drainfield

Septic Tank

- Common materials: concrete and plastics
- Size: depends on bedrooms
- 2 feet below the surface
- At least 75 feet* from a drinking well
- 10 to 15 feet from the house

Septic Tank Size

# of Bedrooms	Daily Flow (gallons/day)	Minimum Tank Size (gallons)
1	0 – 200	900
2	201 – 300	900
3	301 – 400	1050
4	401 – 500	1200

Source: Florida Administrative Code, Rule 64E-6 (FL Department of State 2011).

Drainfield

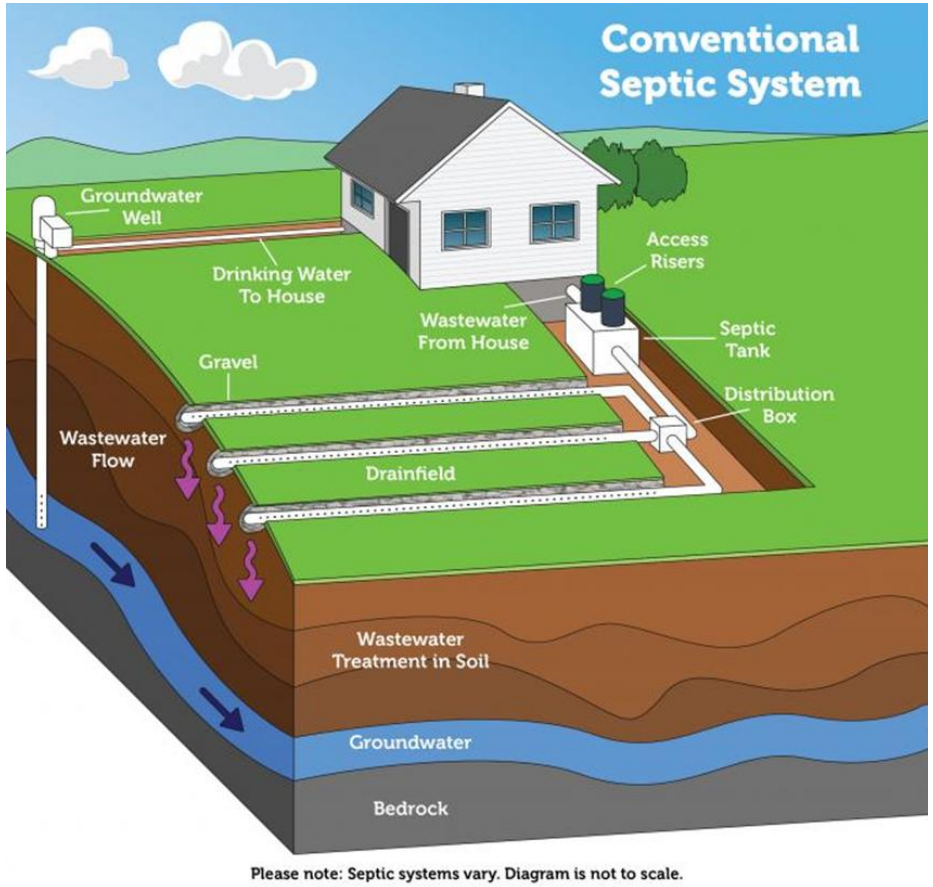


Photo by U.S. EPA

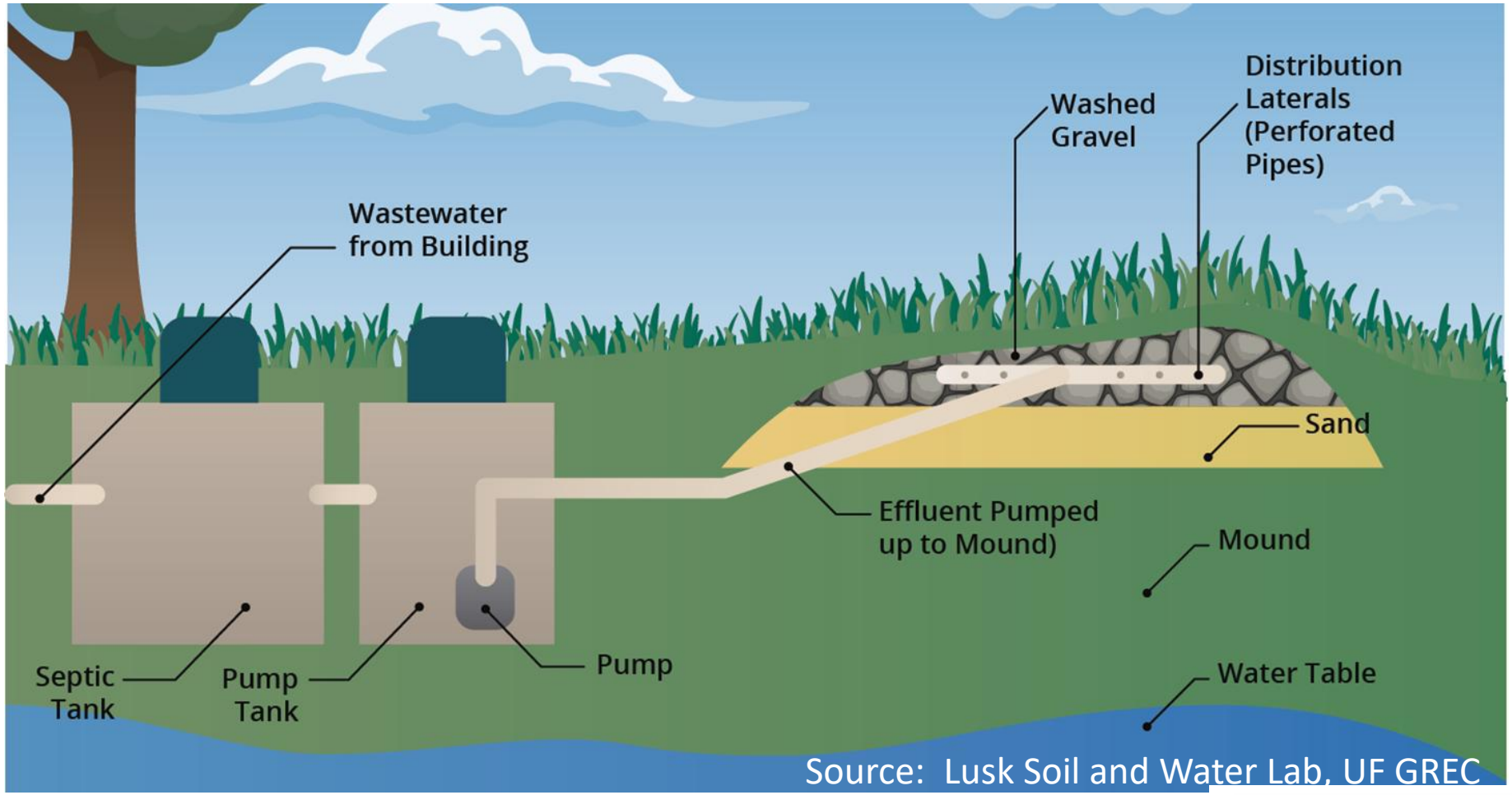
- Most treatment takes place here
- Series of trenches or a single bed with perforated pipes
- Filtering, removal, and transformation of contaminants as effluent moves through the soil

Drainfield

Photo by B. White

- Buried 1 to 3 feet below surface
- Need unsaturated soil
- **24 inches** from the bottom of drainfield to the wet season high water table

Mound Systems



Source: Lusk Soil and Water Lab, UF GREC

Septic System Setback

Feature	Setback distance (ft)
Bottom of drainfield to the wet season high water table	2 (vertical)
Building foundations, mobile home walls, swimming pool walls, or property lines	5
High water line of retention areas, detention areas, or swales	15
Nonpotable water well	50
Private potable well	75
Surface water body—mean high water line or annual flood line	75

Quiz 2: In Florida, septic system drainfields must be installed with at least how much separation between the bottom of the drainfield and the wet season high water table?

A. 6 inches

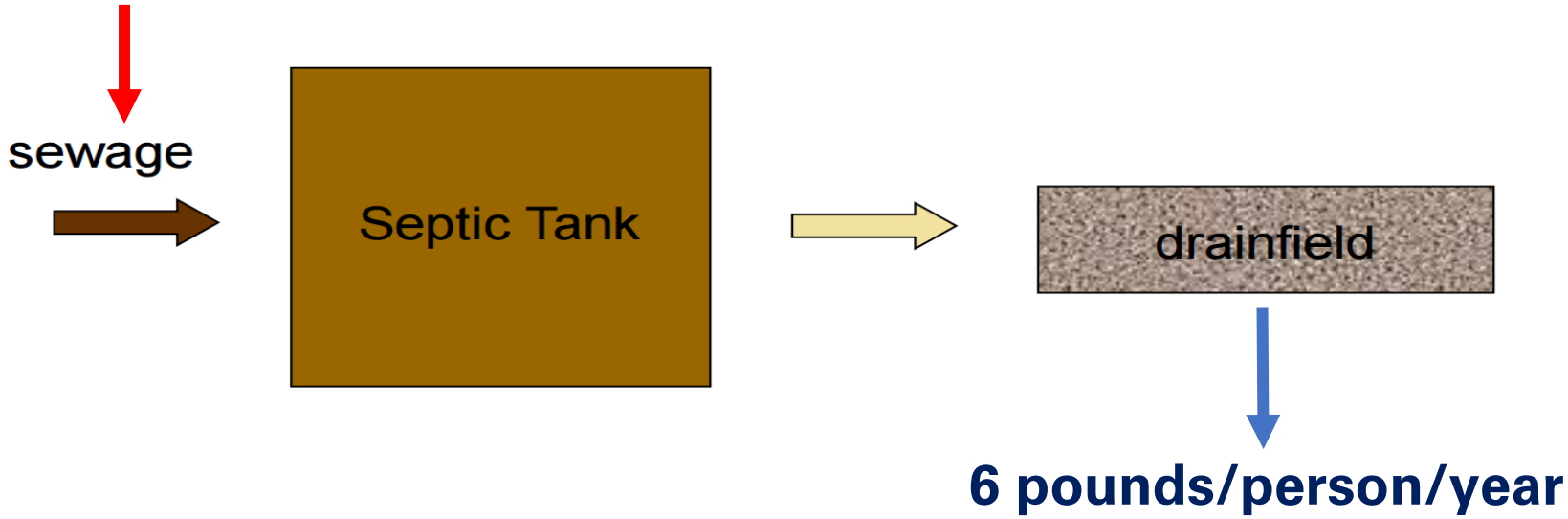
B. 12 inches

C. 18 inches

D. 24 inches

How much nitrogen flows out of a septic system?

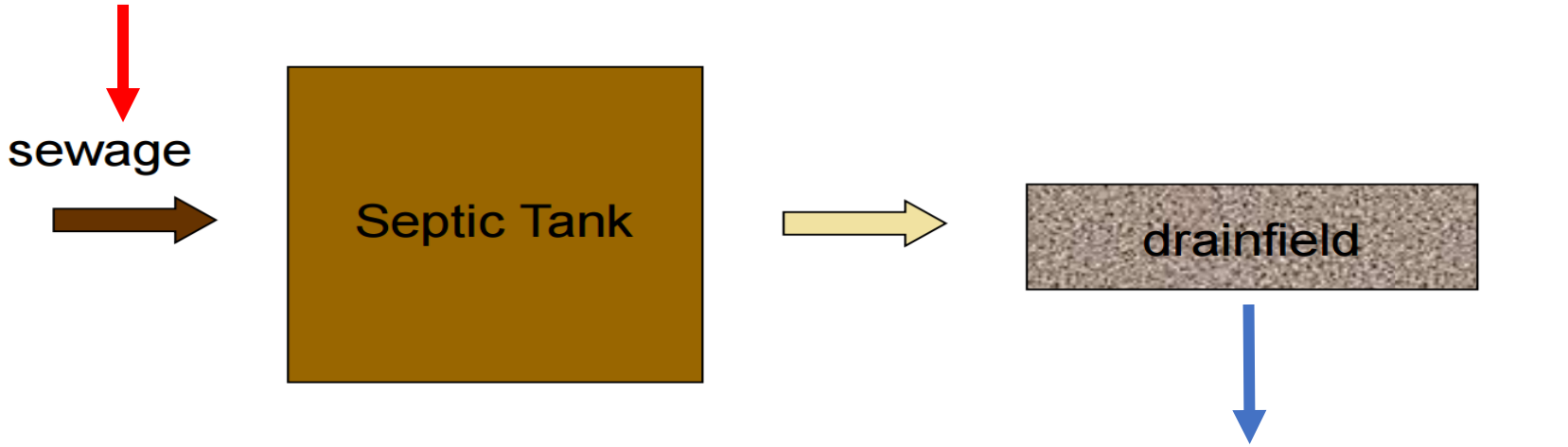
9 pounds nitrogen/person/year



The conventional septic system only removes about **30%** of N input

How much phosphorus flows out of a septic tank?

2.2 pounds phosphorus /person/year



The conventional septic system removes about **80%** of P input.

Septic systems create an even bigger problem if they fail

- Poor design and placement
  - Inappropriate soils – need them to drain well, but not too quickly
  - High groundwater tables
  - Excessive slopes
- No routine maintenance done
- Overuse of water in the household

Signs of A Failing Septic System

- A sulfur or rotten egg smell in the vicinity of the system or indoors
- Water and possibly solids surfacing in the drainfield
- Sewage backing up in the house
- Well water tests showing high levels of nitrates or coliform bacteria

Photo by University of Illinois Extension

Leaching from septic systems is one source of excess N and P to water bodies, and one source of N and P that can lead to water quality deterioration.

Photo by NOAA

Septic System Maintenance

Septic System Maintenance

- Septic system maintenance is largely common sense, relatively simple and inexpensive (as compared to replacing a failed system)
- It boils down to 4 key components:
  - Properly dispose of waste
  - Maintain your drainfield correctly
  - Use water efficiently
  - Inspect and pump when needed

Properly dispose of waste

- Toilets
  - Only toilet paper and human wastes
- Kitchen sinks
  - Minimize the use of garbage disposal
  - Minimize the disposal of fat and grease into the sink
- No additives

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Maintain your drainfield correctly

- Good vegetative cover is important for drainfield function and maintenance.
  - Remove nutrients like phosphorus and nitrogen by using them for plant growth.
  - Grass should be mowed regularly to encourage growth without using fertilizers.

Photo by B. White

Maintain your drainfield correctly

- Do **NOT** drive or park anything heavier than a lawnmower over any part of your system.
- Do **NOT** plant trees or shrubs near/over any part of your system.
- Do **NOT** cover the drainfield with additional soil if wastewater surfaces.
- Do **NOT** use fertilizers over drainfield.
- **DO** mow regularly over the drainfield
- **DO** divert surface water runoff from roofs, driveways, downspouts, etc. away from the drainfield.

Use water efficiently

- Minimize water use in order to keep solids well settled on the bottom of the tank
- Water conservation is the key!

Inspect and pump when needed

- Pumping should remove all scum, sludge, and liquid from the tank.
- The tank should be pumped through the manhole, not the inspection ports.
- Pumping frequency is dependent on the tank's capacity, the amount of wastewater entering the tank, and the volume of solids in the wastewater.

Photo by B. White

Septic Tank Pumping Frequency Based on Tank and Household Size

Source: Pennsylvania State University Cooperative Extension Service

Tank Size (gallons)	Household Size (number of people)						Number of Years
	1	2	3	4	5	6	
750	9.1	4.2	2.6	1.8	1.3	1.0	
1000	12.4	5.9	3.7	2.6	2.0	1.5	
1250	15.6	7.5	4.8	3.4	2.6	2.0	
1500	18.9	9.1	5.9	4.2	3.3	2.6	
1750	22.1	10.7	6.9	5.1	3.9	3.1	
2000	25.4	12.4	8.1	5.9	4.5	3.7	
2250	28.6	14.0	9.1	6.7	5.2	4.2	
2500	31.9	15.6	10.2	7.5	5.9	4.8	

Additional Resources

- Florida Department of Environmental Protection Onsite Sewage Program: https://floridadep.gov/Water/Onsite-Sewage
- UF/IFAS Septic System: https://water.ifas.ufl.edu/septic-systems/
- UF/IFAS Florida Well Owner Network: https://water.ifas.ufl.edu/well/
- U.S. EPA SepticSmart Education Materials: https://www.epa.gov/septic/septicsmart-education-materials

SEPTIC SYSTEM OWNERS

▸ Useful Links

▾ Fact Sheets & EDIS Publications

FACT SHEETS FOR SEPTIC SYSTEMS

- How Does a Septic System Work
- Septic Systems and You
- Be Septic Smart
- Septic System Maintenance
- Septic System Landscaping Tips
- Flooding and Septic Systems

EDIS PUBLICATIONS ON SEPTIC SYSTEMS

- Overview - OSTDS
- Nitrogen - OSTDS
- Phosphorous - OSTDS
- Bacteria and Protozoa - OSTDS
- Viruses - OSTDS
- Trace Organic Chemicals - OSTDS

▸ Video Gallery

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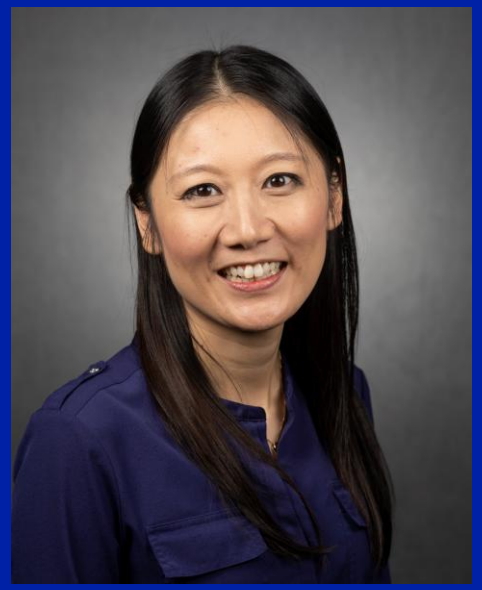
Questions and Comments



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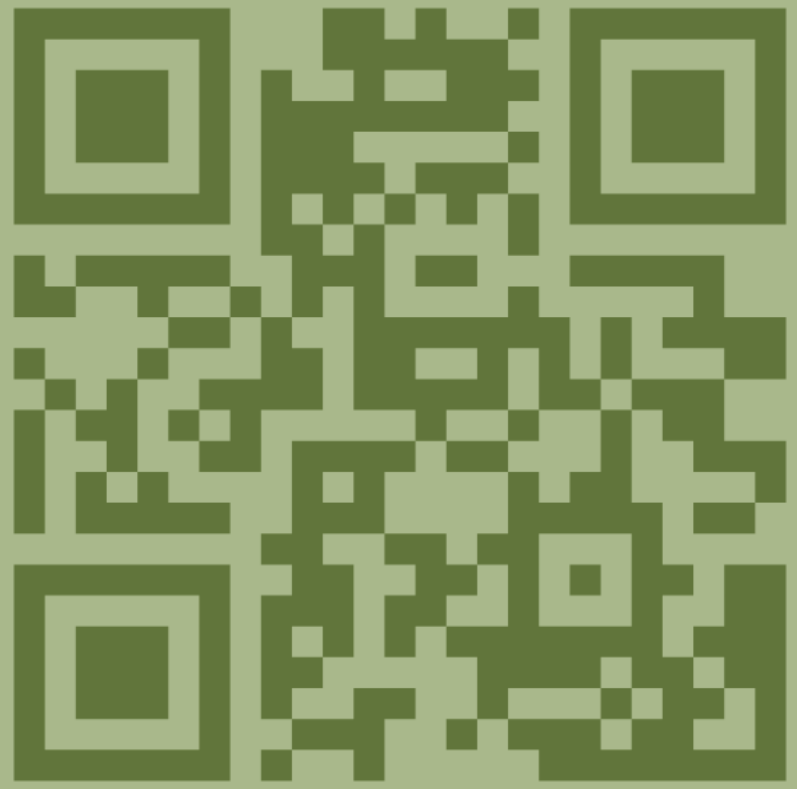
Check out Hernando FFL!



Next Time:

November 12th

Crazy for Compost

Liana Teague

Hernando County Solid Waste & Recycling

Hernando County Compost Program

Colby Pitts

Hernando County FFL Coordinator

Compost Use for the Home Landscape