

# Coliscan Easygel: A Useful Tool to Find Bacteria Sources

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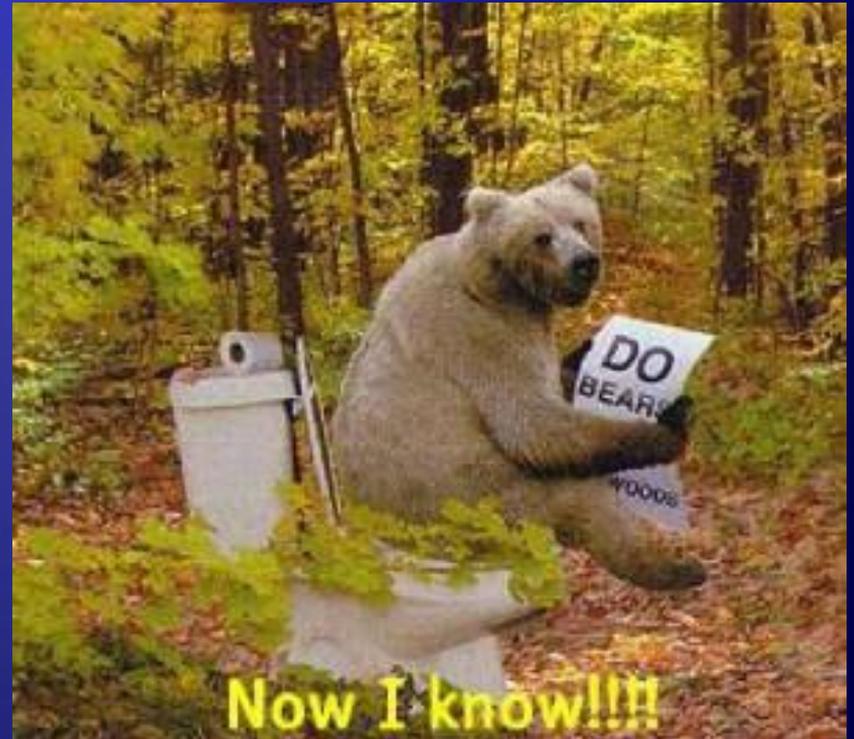
Virginia Department of  
Environmental Quality

# What is E. coli

- ◆ A member of the coliform family
- ◆ Lives in the gut of warm blooded animals and most types are harmless to humans and animals
- ◆ Presence in the water means fecal waste is present
- ◆ Fecal waste is a major cause of disease transmission

# E. coli and Water Quality

- ◆ Some E. coli is expected due to wildlife
- ◆ E. coli above 235 CFU/100 ml means 0.4% swimmers may get sick and is unlikely due to wildlife input
- ◆ Not all water borne illness is due to fecal waste
- ◆ E. coli and related sampling is the fastest and most cost effective way to estimate contact risk to swimmers



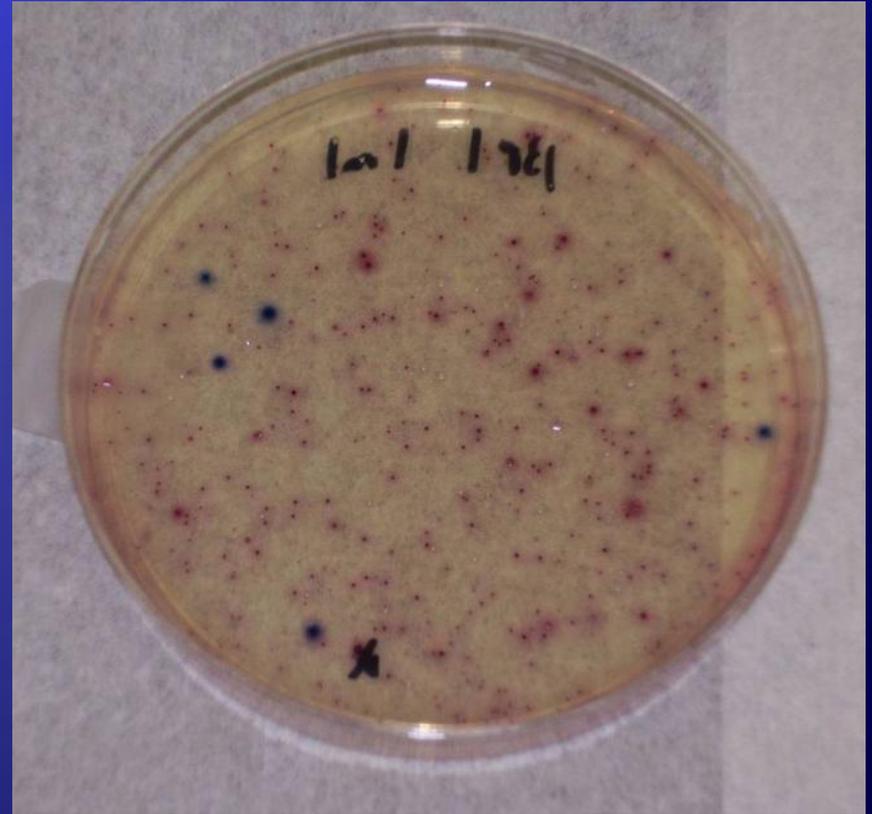
And knowing is half the battle

# Sources of E. coli

- ◆ Failing septic or sewer systems
- ◆ Straight pipes
- ◆ Runoff from farms or lawns
- ◆ Direct deposit in the water from animals
- ◆ Waterfowl like ducks and geese
- ◆ Illegal discharges

# What Is Coliscan Easygel

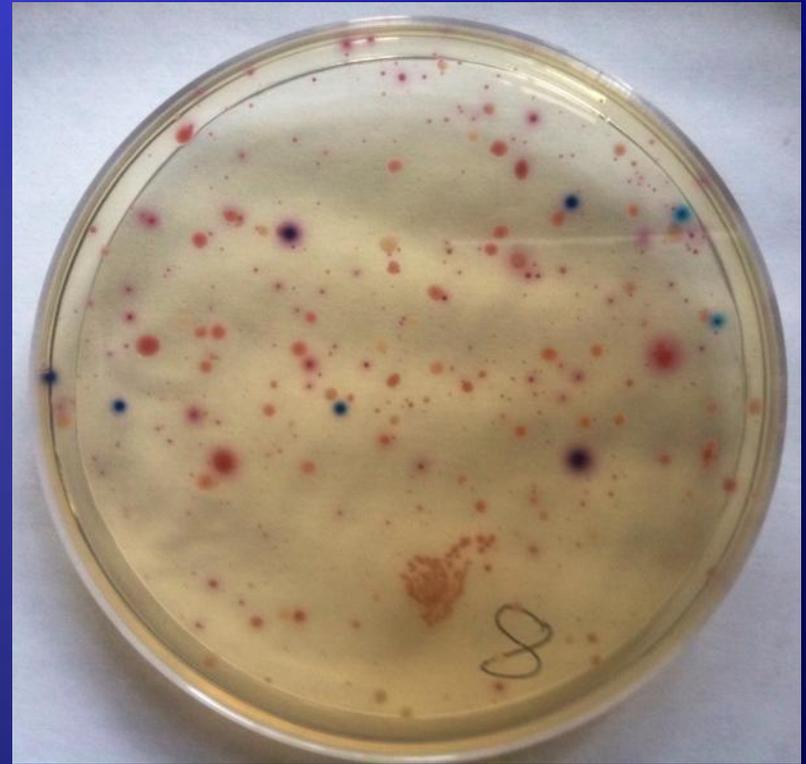
- ◆ An inexpensive and easy to learn test for E. coli
- ◆ Can be done at home, does not need a laboratory
- ◆ No specialized skills or equipment necessary
- ◆ Nearly as accurate as traditional methods
- ◆ Effective tool for TMDL tracking and identify sites for future BMP installation and sampling



1 ml sample with 5 E. coli colonies

# How Does Coliscan Easygel Work

- ◆ Media contains inhibitors for non-coliform bacteria
- ◆ Two proprietary stains are present in the media
  - ◆ Coliform bacteria stain red and E. coli stain blue
- ◆ E. coli (a member of the coliform family) will appear dark blue to purple as it picks up both stains
  - ◆ Only look at the center of the colony when considering color



3 ml sample with 8 E. coli colonies

# Steps For Using Coliscan

- ◆ Samples collected using sterile sample bottles
- ◆ A known quantity of sample (0.5 – 5.0 ml) is placed into a bottle of thawed Coliscan media and mixed
- ◆ The prepared media goes into a specially pretreated Petri dish that turns into a gel (~45 min)
- ◆ Samples incubated for 24 hours at ~35 °C (95 °F)
  - Or 48 hours at ~25 °C (77 °F)
- ◆ Plates are removed from the incubator and scored
  - E. coli appears dark blue to royal purple dots
- ◆ Training videos available at <https://www.youtube.com/channel/UCtaMR8FpnJ2jcEeM37HLw2g>

# Coliscan vs. DEQ/State Lab Results

Station	Coliscan	DEQ/State Lab
North River	2,270	2,250
Willis River	400	460
Appomattox River	200	130
Spring Creek	30	70
Buffalo Creek	230	130
Saylers Creek	130	210
Big Guinea Creek	170	510

# Limitations Of Coliscan

- ◆ Can only detect E. coli bacteria
  - ◆ Cannot directly correlate to fecal coliform or Enterococcus standards (shellfish, saltwater recreation)
- ◆ Can test up to 5 ml of sample
  - ◆ Minimum detection limit is 20 CFU/100 ml
- ◆ Data cannot be used for 303(d) listing or delisting waters
  - ◆ Requires DEQ or a DEQ recognized laboratory method follow up sampling for listing/delisting needs

# Coliscan Benefits

- ◆ Can provide a ‘poor man’ version of Bacteria Source Tracking
  - ◆ >50 Coliscan samples compared to one BST sample
  - ◆ Identify specific sources such as sewer line breaks or farm runoff by sampling above and below suspected sources
- ◆ Prioritize areas for Best Management Practices (BMP) installation and outreach
  - ◆ Showing results to landowners or at watershed meetings has been successful in educating the public

# Coliscan vs. Laboratory Costs

- ◆ Assuming a 10 station monthly watershed study, the current yearly cost is:

- ◆ **Coliscan**

- \$360 for Coliscan kits (\$30 per kit of 10 samples x 12 kits)

- \$30 for incidentals (pens, tape, disinfectant, gloves)

- \$390 per year\***

\* Onetime cost of \$100 to purchase recommended incubator, coolers, and samplers

- ◆ **Laboratory**

- >**\$4,200** (\$35 per sample x 120 samples) per year

Coliscan provides more than **10 times** the return of data per monitoring dollar compared to laboratory methods

# Who Uses Coliscan

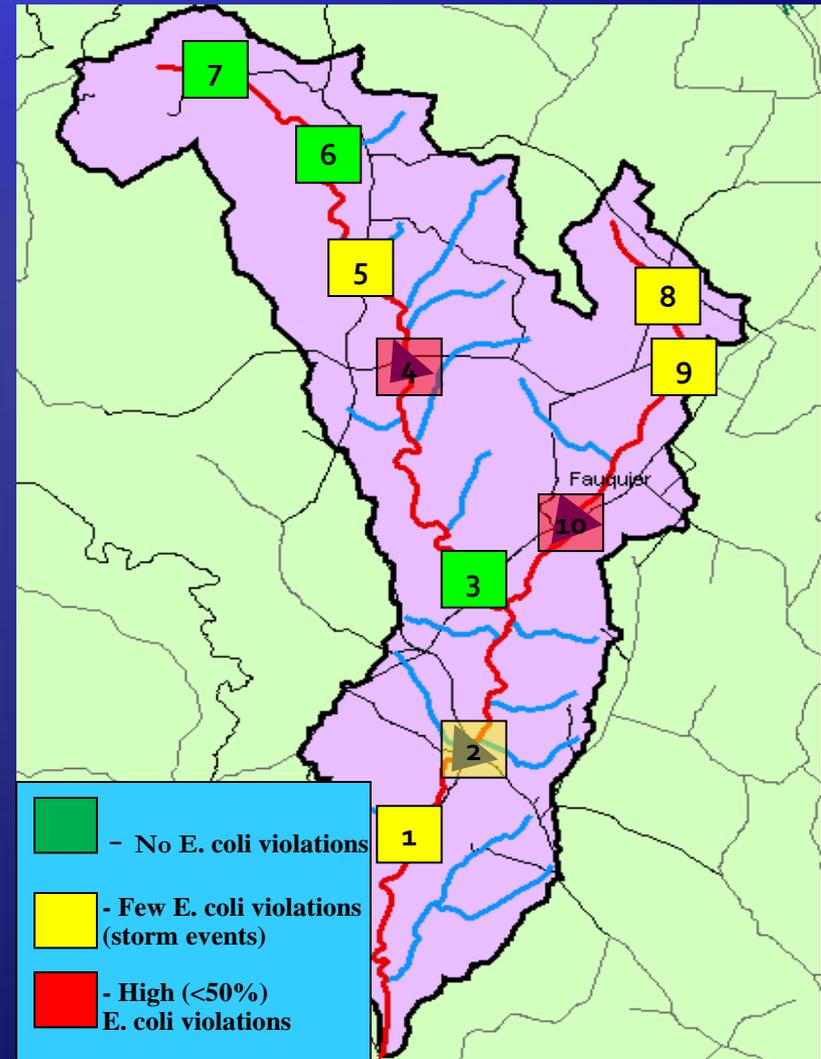
- ◆ Alliance for the Chesapeake Bay
- ◆ Arlington County
- ◆ Blackwater/Nottoway Riverkeeper
- ◆ City of Williamsburg
- ◆ Dividing Creek Association
- ◆ Fairview Beach
- ◆ Friends of Blacks Run
- ◆ Friends of Chesterfields Riverfront
- ◆ Friends of the Opequon
- ◆ John Marshall SWCD
- ◆ Lake Anna Civic Association
- ◆ Leesville Lake Association
- ◆ National Committee for the New River
- ◆ Prince William SWCD
- ◆ Poquoson Citizens for the Environment
- ◆ Roanoke Trout Unlimited
- ◆ Southside SWCD
- ◆ Thomas Jefferson SWCD
- ◆ Timberlake Homeowners Association
- ◆ Town of Dumfries
- ◆ VCU Engineers Without Borders
- ◆ And many more

# Typical Coliscan Monitoring Strategies

- ◆ “Shotgun” method
- ◆ Targeted source identification/verification
- ◆ Carpet sampling (“B-52” method)
- ◆ Storm event sampling
- ◆ Lake Sampling

# Shotgun Method

- Stations scattered in the watershed
  - Public access points like bridges often sampled
- Ideal for initial recon to find E. coli ‘hot spot’ segments
- Moderate labor and cost intensive



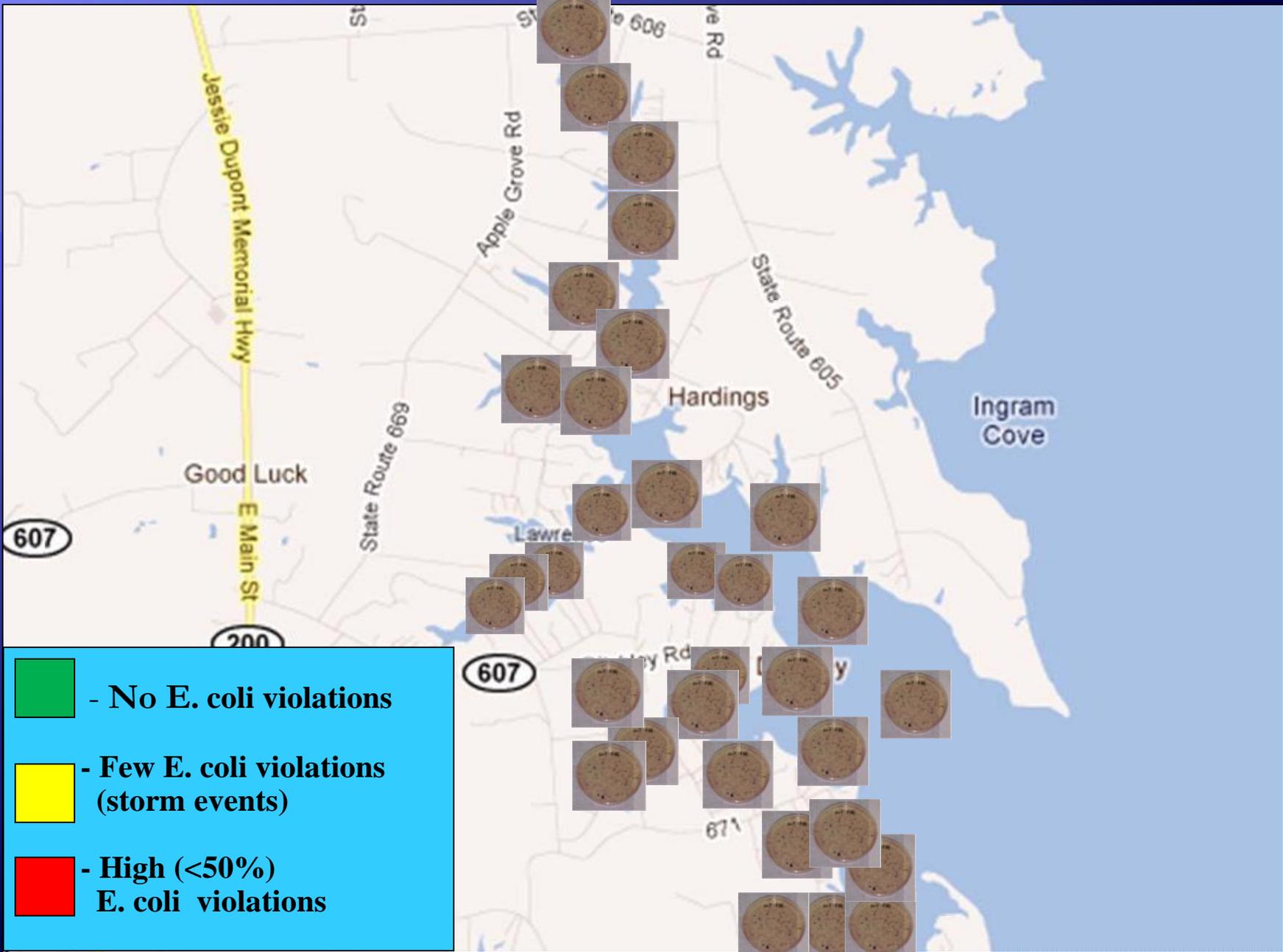
# Targeted Sampling

- Sample likely sources of fecal bacteria
  - Sewer line crossings or near septic systems
  - Areas of known animal activity
  - Proposed or installed BMP locations
- Good to quickly rule out or confirm fecal sources and gauge BMP performance



# Carpet Sampling

- ◆ Sampling every possible source and waterbody segment
- ◆ Extremely labor and cost intensive
- ◆ Provides the most detailed picture of fecal sources in the shortest amount of time



# Storm Event Sampling

- ◆ Sampling at the first stages of a major rainstorm
  - ◆ Shows the worst case scenario of site bacteria levels
  - ◆ Helpful in identifying sources of bacteria not readily seen during dry sample events
- ◆ Most effective if samples are collected within the first hour of a storm
- ◆  $>1/4''$  rainfall is often enough to elevate bacteria levels
- ◆ Storm event sampling can be a part of any plan

# Lake Sampling

- ◆ Bacteria tends to drop out of still water
- ◆ Sample near shoreline or areas used for swimming
- ◆ Sample tributaries that feed the lake
- ◆ Samples near marinas may show boat issues
- ◆ Sample after rain events to see what is entering the lake
- ◆ High bacteria levels several days after rain are signs of sewage/ boat hold problems

# In Conclusion

- ◆ Coliscan is a simple and cost effective method to estimate fecal bacteria levels in water
- ◆ Localities and citizen monitors who have used Coliscan have identified sources and seen rapid improvements after addressing the problem
- ◆ Coliscan can help determine if a lake or stream has significant inputs of fecal bacteria effecting recreation

# Questions Or Help Identify Colonies

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