# *E.Coli* Monitoring: Building a Network to Assess Recreational Uses


James Harris

August 4, 1010

2010 SLCo Watershed Symposium

# Overview of Presentation

- **Background**
- **DWQ Assessment Process**
- **E Coli Workgroup**
- **Cooperative Monitoring**
- **Beach Closure Process**
- **Salem Pond Example**
- **Next Steps….**

# Clean Water Act (CWA)

- Restore and maintain the chemical, physical, and biological integrity of the nation's water

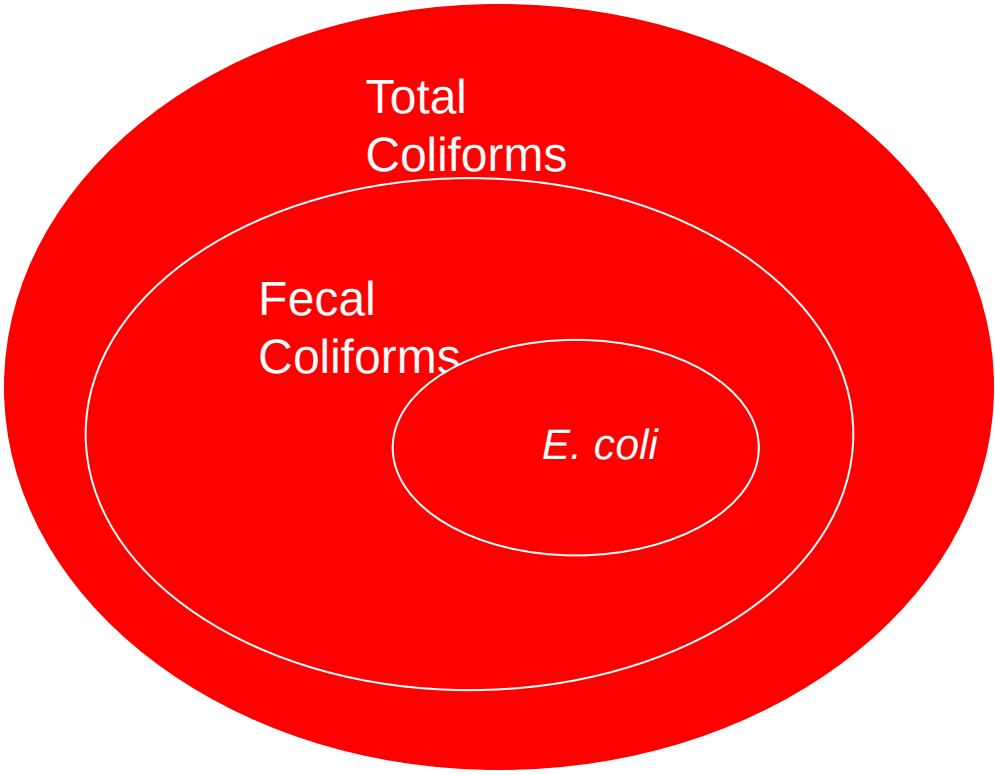
- National Goal- "Fishable and Swimmable"

# CWA Requirements

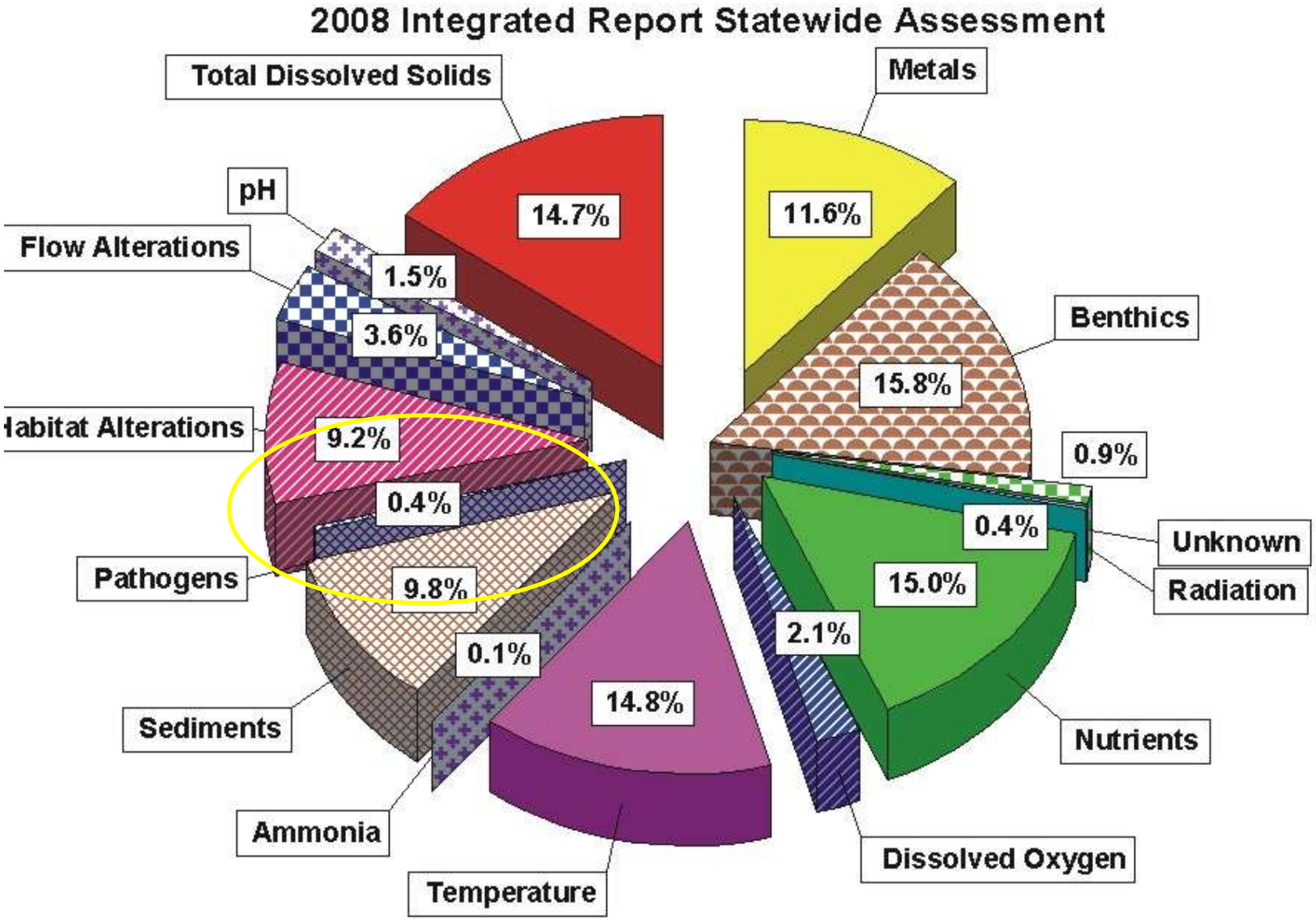
- Identify **Beneficial Uses** for Water Bodies
- Identify **Water Quality Standards** to meet **Beneficial Uses**
- List waters that do not meet **Water Quality Standards (303d List)**
- Identify sources and reductions needed (**TMDL study**)
- Provide “Reasonable Assurance” for pollutant reduction
- Continue monitoring to ensure progress and attainment

# DWQ's Bacteriological Program

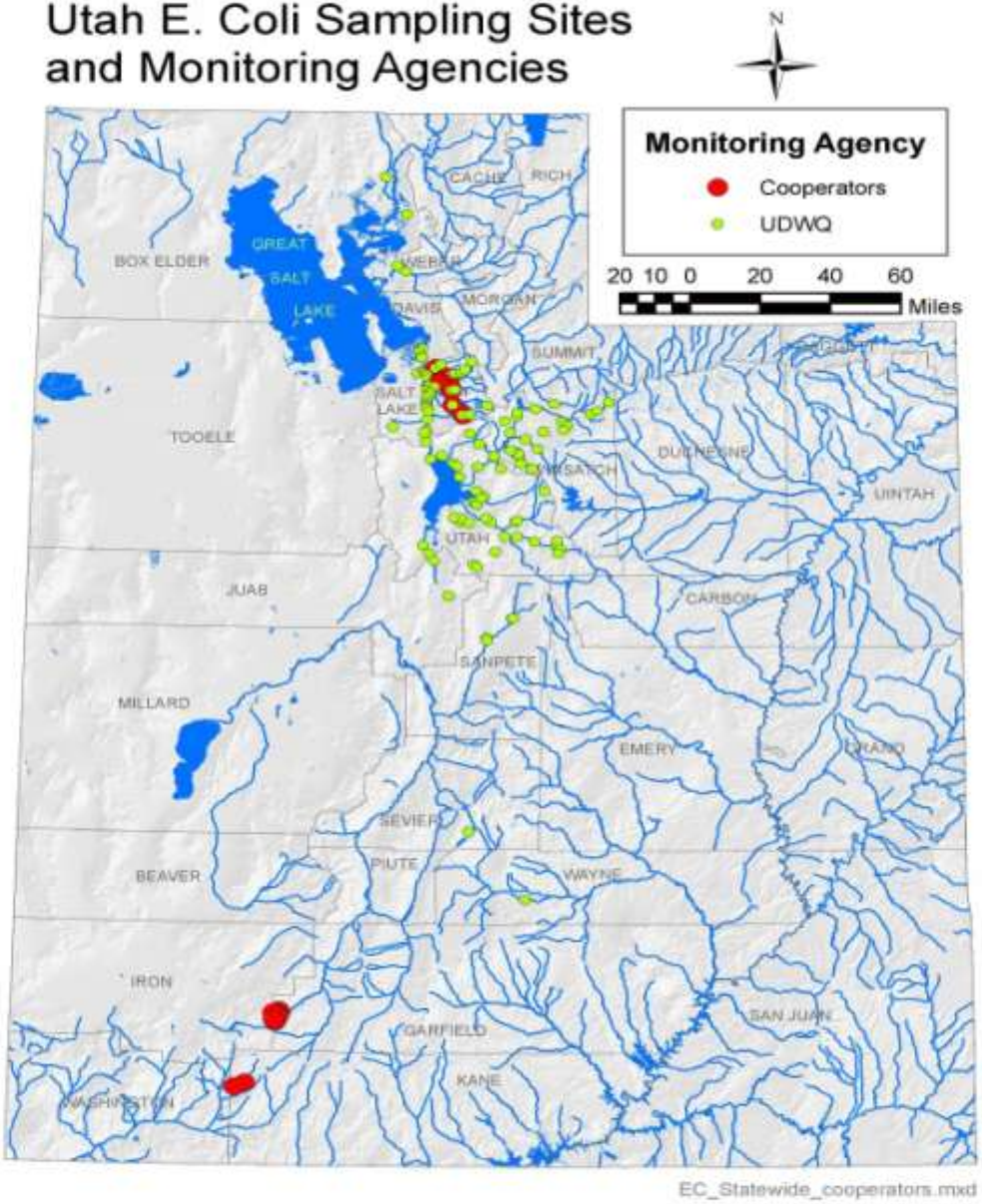
- For Utah, surface waters will be analyzed for fecal contamination.
- Not feasible to monitor for all pathogens, thus we will analyze for *E. coli,* an indicator of fecal contamination.
- *E. coli* is easy to detect, not present in clean water & is a conservative indicator of pathogens.



# Causes of Stream Water Quality Impairments



# Utah E. Coli Sampling Sites and Monitoring Agencies

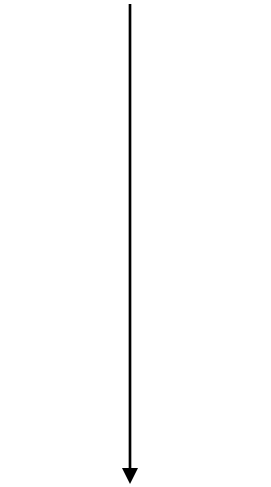



EC_Statewide_cooperators.mxd

# Monitoring Objectives

- Protect Human Health
- Assess Attainment of Standards
- Identify Sources
- Develop Solutions to Problem Areas

# Data Objectives




- Protect Human Health
- Assess Attainment of Standards
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# *E. coli* Numeric Standards

- For drinking water and secondary contact (2B) recreation uses:
  - Not to exceed 206 MPN per 100 ml as 30 day geometric mean
  - Not to exceed 668 MPN per 100 ml in one sample in 30 days
- For primary contact recreation (2A) use:
  - Not to exceed 126 MPN per 100 ml as 30 day geometric mean
  - Not to exceed max of 409 MPN per 100 ml in one sample in 30 days
- Geometric mean is based on no less than 5 samples equally spaced over 30 days.
- The 126 MPN geometric mean standard is associated with an acceptable risk level of 8 illnesses /1,000 swimmers.
- 409 MPN ~ 10 / 1,000

# UDWQ's Bacteriological Monitoring Strategy - Sampling

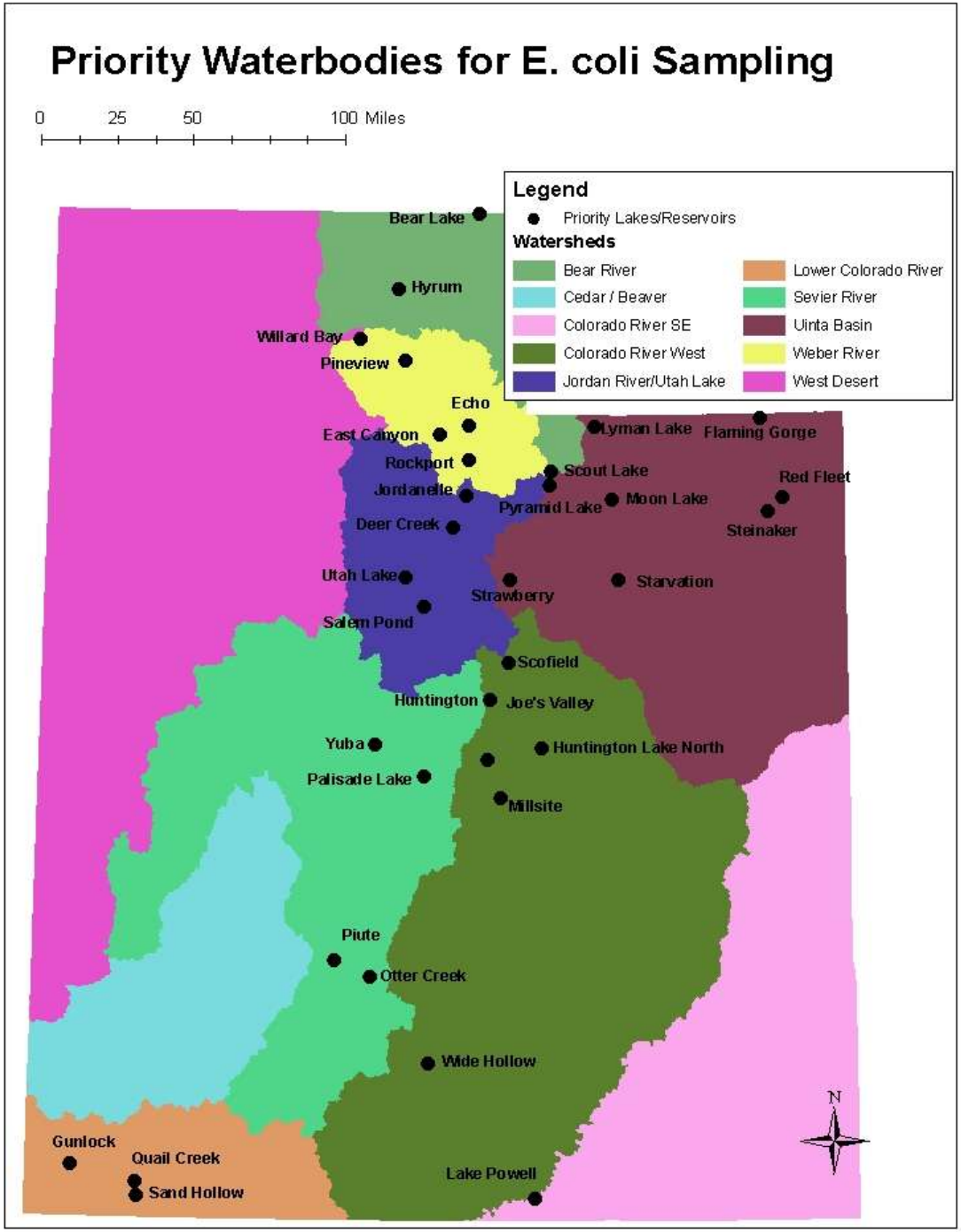
Lakes/ Reservoirs

- 2A / highly recreated/ State Parks
- Sampled during recreation season (May-Sept)
- Beaches, campgrounds, marinas targeted

Rivers/ Streams

- Follow Targeted rotating basin schedule
- Once every 6 years
- Sample in main flow

# Priority Waterbodies for E. coli Sampling



# UDWQ's Bacteriological Monitoring Strategy

- Tiered Monitoring Strategy
  - Tier 1: Focus efforts at high-use and 2A waters
  - Tier 2: Intensively sample "hot spots"
- Collect 4 additional samples when results from one sample exceed 126 CFU (MPN) per 100ml
- Samples should be collected within 30 days of initial collection and evenly spaced to reduce bias.
- Use Idexx Quanti-Tray 2000 methodology for collection (24 hour test)
- Requires a statewide network to monitor!

# Cooperative Monitoring

- Such intensive monitoring not feasible on a statewide basis given limited monitoring resources thus will use cooperators to assist in collection.
- Form an agreement with cooperators:
  - DWQ: Assist funding equipment ($50K/year)
  - Cooperators: Assist in collecting samples

# Monitoring Equipment List

- Equipment
  - Incubator (~$2,000)
  - Sealer ($3,500)
  - UV Light ($120)
- Supplies (200 samples)
  - Vessels ($200)
  - Reagent ($600)
  - Quanti Trays ($250)
- Total Cost ~$6700
- Provides fast results

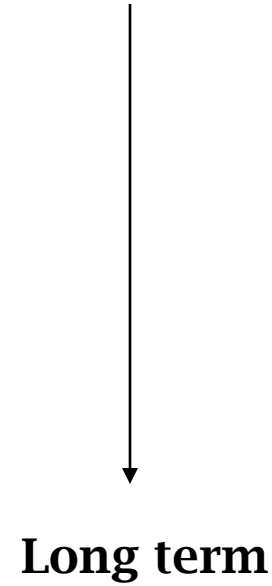
# E coli Cooperators

- USU Extension (citizen volunteers)
- University of Utah & Westminster College
- BLM- Moab, Kanab
- USFS – Ashley, Fish Lake, Wasatch-Cache-Uinta
- NPS – Zion, Capital Reef, Glen Canyon
- State Parks
- Health Departments – Tricounty, Weber-Morgan, Davis, Utah
- Salt Lake County
- Local watershed coordinators

# Current *E. coli* Projects

- Zion NP – North Fork Virgin River
- Westminster College – Emigration and Parley Creeks
- USU Extension – Utah Botanical Ponds
- Bear River Watershed Coordinator – Field Drains in Bear River
- City of Salem – Salem Pond
- Salt Lake County – Jordan River & tributaries

# Data Objectives




- Protect Human Health
- Assess Attainment of Standards
- Identify Sources
- Develop Solutions to Problem Areas

# *E. coli* Work Group

- *E. coli* Work Group currently compromised of UDWQ, State Parks, DOH, LHD, DNR, NPS, USDAF, USU Ext, and SL City.
- Develop consistent sampling, warning and closure protocols.
  - Agreed that a swimming advisory will be issued if 2 samples > 409 MPN.
  - Advisory removed when all samples < 409 and geometric mean < 126 MPN for 5 days.
- Formed Outreach Subcommittee to develop public education and info materials.

# Welcome to www.ecoli.utah.gov



This site serves as the public outreach component of the State of Utah Division of Water Quality's collaborative *E. coli* monitoring of highly recreated lakes and reservoirs. The information on this Web site is maintained by a multi-agency committee on *E. coli*, and is intended to be accessible for up-to-date advisory information about *E. coli* levels in State lakes and reservoirs. See the map below of locations currently being monitored for *E. coli*.

## Current Swimming Advisories

Knoll Beach at Salem Pond, Salem UT

*Press Release*, June 10, 2010

## Frequently Asked Questions

- What is *E. coli*?
- Why should I care about *E. coli*?
- How does *E. coli* affect individuals? (symptoms)
- How does *E. coli* get into lakes and reservoirs?
- Are all waters tested for *E. coli*?
- Why is my lake (not) being tested for *E. coli*?
- What is my risk if there is an advisory?
- How can I reduce my risk of *E. coli* exposure?
- Should I be concerned about swimming or boating because of *E. coli*?
- Is the *E. coli* in lakes and streams

## What is *E. coli*?

*Escherichia coli* or *E. coli* is a type of bacteria commonly found in the intestines and feces of healthy warm-blooded animals and humans.

Utah Division of Water Quality - E. coli Workgroup - Mozilla Firefox

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# *E. coli* Workgroup

Home | Background | E-mail Notices | Members | Meetings | Contact | DWQ Home

## Welcome to the *E. coli* Workgroup!

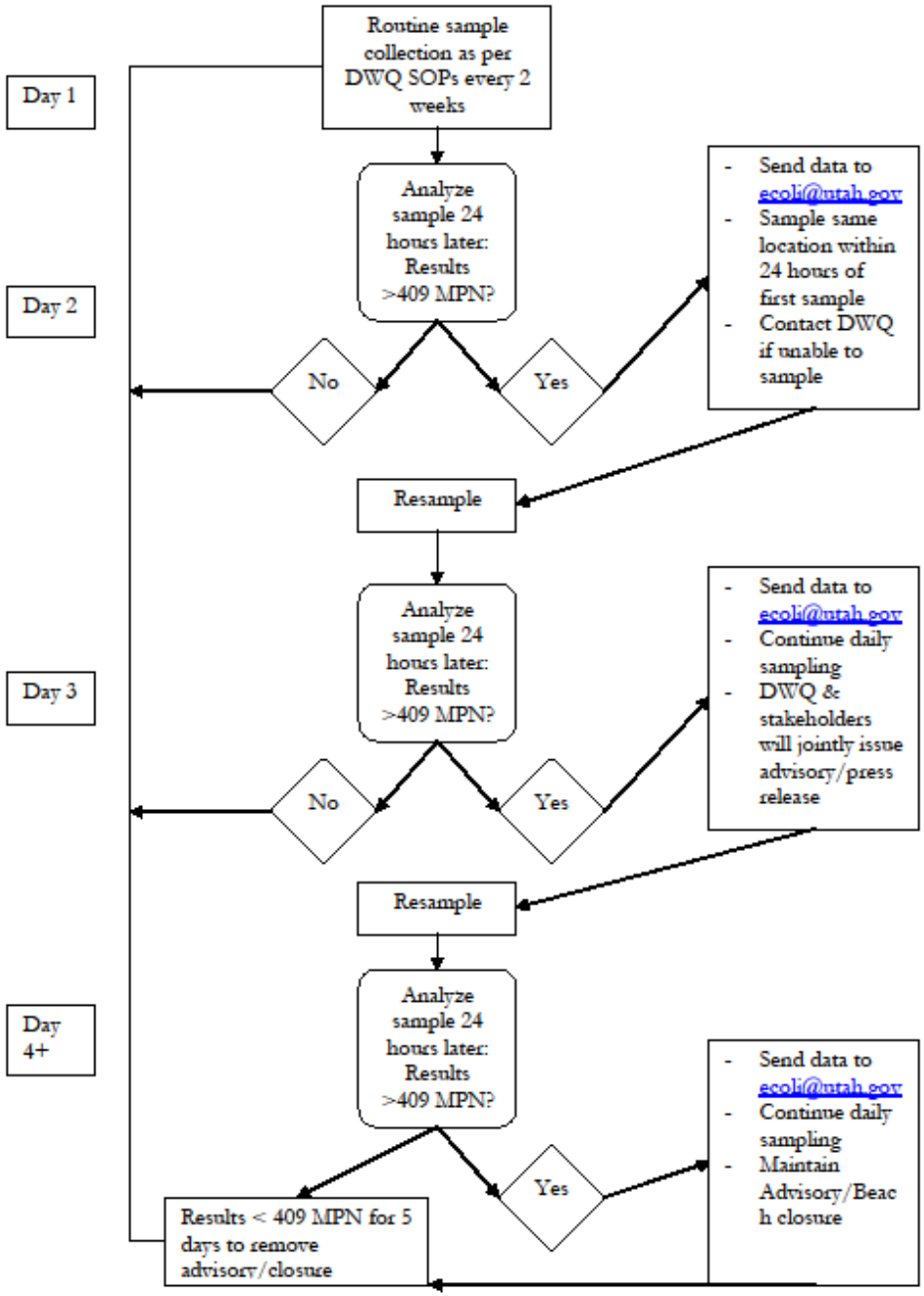
The Utah Division of Water Quality (DWQ) is facilitating an *E. coli* Workgroup to develop consistent statewide policies outlining actions to be taken when violations in the *E. coli* water quality standard for recreational waters occur.

DWQ adopted a new *E. coli* field methodology and created a Monitoring Council to expand cooperative monitoring of recreational waters throughout the state. It is anticipated that the increased monitoring will result in more findings of recreational waters exceeding the water quality standard for *E. coli* which may pose health risks to recreationists.

The*E. coli* Workgroup is comprised of stakeholders from a broad base of state, federal, and local agencies with land management, health, environment, and recreation duties. Workgroup meetings are open to all interested parties and will be held quarterly, as best as possible. The initial objectives of the group include:

* Benchmark other states to determine best practices regarding *E. coli* sampling, assessment methods, health advisories and beach closure protocols.
* Develop protocols outlining when and how to issue warnings, closures, and reopening of recreational waters when *E. coli* exceedances occur.
* Develop public information materials, including facts sheets, pamphlets, advisory notices, and website to inform the public about *E. coli* health advisories and closures of recreational waters.
* Coordinate with the Utah Monitoring Council as they are the technical experts on *E. coli* field methodology IDEXX Quanti-Tray/2000 System SOPS and DOC, cooperative sampling locations, and data.
* Formalize protocols with interagency MOUs.

### E-mail Notices

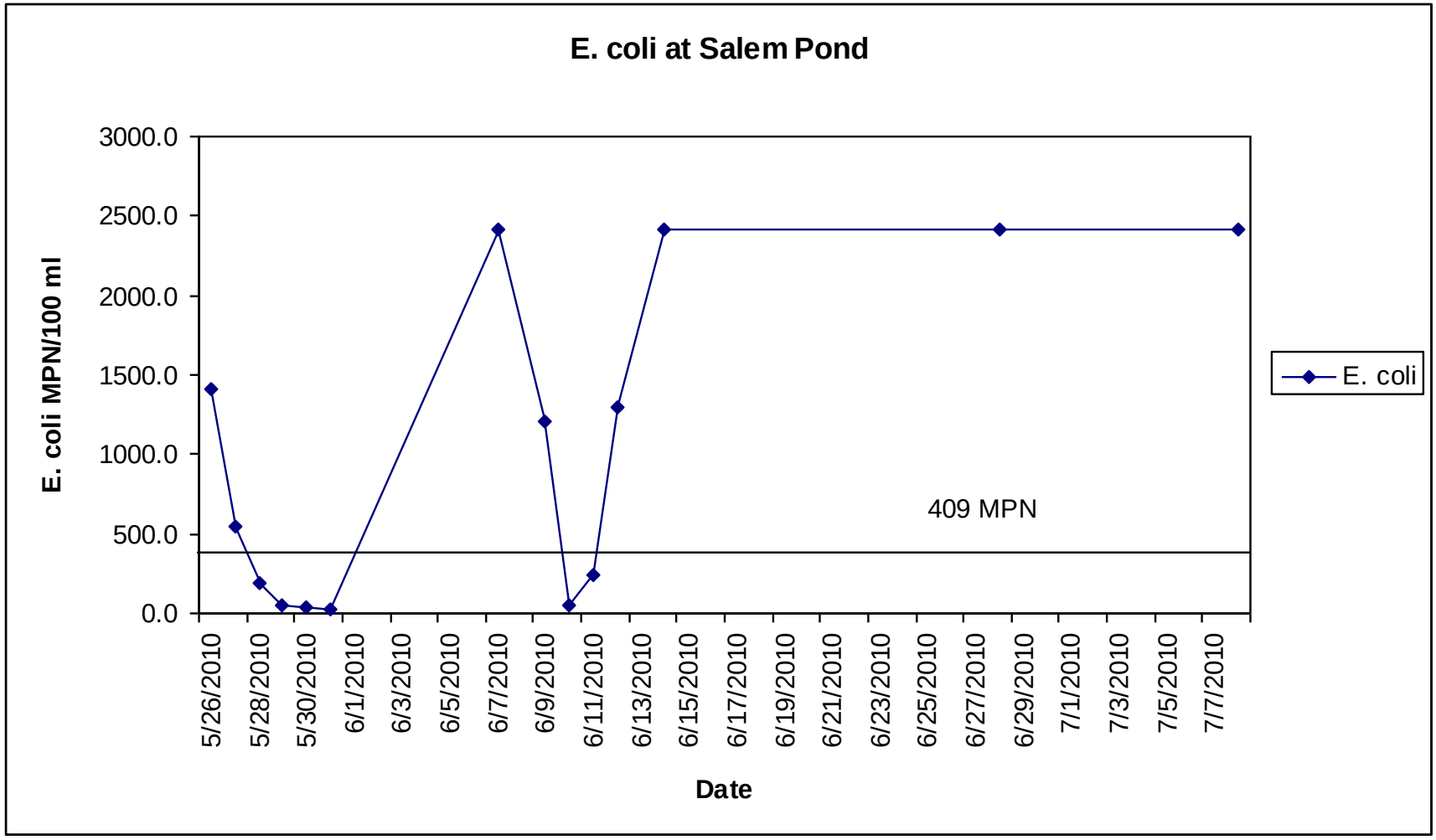

Day 1
Routine sample collection as per DWQ SOPs every 2 weeks
Day 2
Analyze sample 24 hours later: Results >409 MPN?
No
Yes
- Send data to ecoli@utah.gov
- Sample same location within 24 hours of first sample
- Contact DWQ if unable to sample
Resample
Day 3
Analyze sample 24 hours later: Results >409 MPN?
No
Yes
- Send data to ecoli@utah.gov
- Continue daily sampling
- DWQ & stakeholders will jointly issue advisory/press release
Resample
Day 4+
Analyze sample 24 hours later: Results >409 MPN?
Yes
- Send data to ecoli@utah.gov
- Continue daily sampling
- Maintain Advisory/Beach closure
Results < 409 MPN for 5 days to remove advisory/closure

# Statewide E. coli Network for Lakes

| | Local HD | Health Officer | LDH Env Director | UDWQ District Engineer | State Park Ranger | Cooperator |
|---|---|---|---|---|---|---|
| Bear Lake State Park | Bear River | Lloyd Berentzen | Grant Koford | N/A | Richard Droesbeke | Mitch Poulsen (BRC) |
| Hyrum Reservoir | Bear River | Lloyd Berentzen | Grant Koford | N/A | Steve Bulloch | Steve Bullock (SP) |
| Willard Bay Reservoir | Bear River | Lloyd Berentzen | Grant Koford | N/A | Wayne Monroe | USU Ext |
| Huntington Lake North | Central | Bruce Costa | John Vercoe | John Chartier | Dan Richards | Dan Gunnell |
| Otter Creek Reservoir | Central | Bruce Costa | John Vercoe | John Chartier | Bob Hanover | USU Ext |
| Palisades Lake | Central | Bruce Costa | John Vercoe | John Chartier | Shon Tripp | USU Ext |
| Piute Reservoir | Central | Bruce Costa | John Vercoe | John Chartier | Bob Hanover | USU Ext |
| Scofield Reservoir | Central | Bruce Costa | John Vercoe | John Chartier | Dan Richards | Dan Gunnell |
| Yuba Lake | Central | Bruce Costa | John Vercoe | John Chartier | Jeff Rasmussen | USU Ext |
| Joe's Valley Reservoir | SE | David Cunningham | Claron Bjork | Dave Ariotti | N/A | Dan Gunnell |
| Millsite Reservoir | SE | David Cunningham | Claron Bjork | Dave Ariotti | Dan Richards | Dan Gunnell |
| Lake Powell | SE + SW | Cunningham + Blodgett | Bjork + Jenkins | Ariotti + Chartier + Wright | N/A | Glen Canyon |
| Echo Reservoir | Summit | Brent Ovard | Robert Swensen | N/A | N/A | Lars Christensen |
| Lyman Lake | Summit | Brent Ovard | Robert Swensen | N/A | N/A | DWQ + USU Ext |
| Rockport Reservoir | Summit | Brent Ovard | Robert Swensen | N/A | Joe Donnell | Lars Christensen |
| Gunlock Reservoir | SW | David Blodgett | Steve Jenkins | John Chartier + Paul Wright | Laura Melling | USU Ext |
| Quail Creek Reservoir | SW | David Blodgett | Steve Jenkins | John Chartier + Paul Wright | Laura Melling | USU Ext |
| Sand Hollow State Park | SW | David Blodgett | Steve Jenkins | John Chartier + Paul Wright | Laura Melling | USU Ext |
| Wide Hollow Reservoir | SW | David Blodgett | Steve Jenkins | John Chartier + Paul Wright | Kendall Farnsworth | USU Ext |
| Flaming Gorge | Tricounty | Joseph Shaffer | Darrin Brown | Scott Hacking | N/A | Tricounty LHD? |
| Moon Lake | Tricounty | Joseph Shaffer | Darrin Brown | Scott Hacking | N/A | DWQ + USU Ext |
| Pyramid Lake | Tricounty | Joseph Shaffer | Darrin Brown | Scott Hacking | N/A | DWQ + USU Ext |
| Red Fleet Reservoir | Tricounty | Joseph Shaffer | Darrin Brown | Scott Hacking | Mike Murray | Tricounty LHD |
| Starvation Reservoir | Tricounty | Joseph Shaffer | Darrin Brown | Scott Hacking | Mike Neally | Mike Neally (SP) |
| Scout Lake | Tricounty | Joseph Shaffer | Darrin Brown | Scott Hacking | N/A | DWQ + USU Ext |
| Steinaker Reservoir | Tricounty | Joseph Shaffer | Darrin Brown | Scott Hacking | Mike Murray | Mike Murray (SP) |
| Salem Pond | Utah | Joseph Miner | Terry Beebe | N/A | N/A | USU Ext |
| Utah Lake | Utah | Joseph Miner | Terry Beebe | N/A | Ty Hunter | Westminster + USU Ext |
| Deer Creek Reservoir | Wasatch | Cameron Mitchell | Tracy Richardson | N/A | Rick Redmon | Westminster + USU Ext |
| Jordanelle Reservoir | Wasatch | Cameron Mitchell | Tracy Richardson | N/A | Laurie Backus | Westminster + USU Ext |
| Strawberry Reservoir | Wasatch | Cameron Mitchell | Tracy Richardson | N/A | N/A | DWQ |
| East Canyon Reservoir | Weber-Morgan | Gary House | Louis Cooper | N/A | John Sullivan | Lars Christensen |
| Pineview Reservoir | Weber-Morgan | Gary House | Louis Cooper | N/A | N/A | USU Ext |

# Beach Data at Work
## Salem Pond, Utah County

- Started sampling on 5/26/10 per citizen volunteer w/ USU Ext.
- Samples exceeded 409 MPN (beach screening value).
- Following Beach Advisory Protocol, sampled 5 days. Averages from Day 1 to Day 6 ranged from 364 (5/26) to 20 MPN (5/31).


E. coli at Salem Pond
E. coli MPN/100 ml
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
409 MPN
5/26/2010
5/28/2010
5/30/2010
6/1/2010
6/3/2010
6/5/2010
6/7/2010
6/9/2010
6/11/2010
6/13/2010
6/15/2010
6/17/2010
6/19/2010
6/21/2010
6/23/2010
6/25/2010
6/27/2010
6/29/2010
7/1/2010
7/3/2010
7/5/2010
7/7/2010
Date
E. coli

# Beach Data at Work
## Salem Pond, Utah County

- Swimming advisory posted
- City of Salem posted on 6/10/10.
- Workgroup decided to issue press release.
- Posting will stay up.

•Next steps – investigative sampling & MST

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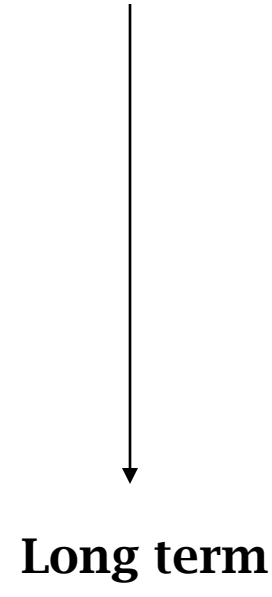
Done

| | | | | | |
|---|---|---|---|---|---|
| (Site 30) | 2010 | 2. 1.0 | | | |
| Rockport State Park @ Marina near Beach Boat Storage | May 18, 2010 | 1. 0<br>2. 1.0 | | Summit | |
| Rockport State Park @ Twin Goves Campground (Site 14) | May 18, 2010 | 1. 0<br>2. 5.2 | | Summit | |
| Salem Pond @ Knoll Park | June 12, 2010 | 1. 1299.7<br>2. 816.4<br>3. 686.7 | June 12 samples were above the 409 mpn threshold and DWQ is currently re-sampling at Knoll Park beach until 5 days of results are all under 409 mpn.<br>The City of Salem has posted advisory notices for the time being. These are advisory only - the beach is still open. | Utah | *PDF of Salem Data* |
| Sand Hollow State Park @ Day Use Beach | May 12, 2010 | All samples 0 | | Southwest | |
| Sand Hollow State Park @ South of Boat Ramp | May 12, 2010 | All samples 0 | | Southwest | |
| Scofield State Park @ DWR Angler's Access | May 18, 2010 | All samples 0 | | Central | |
| Scofield State Park @ Madsen Bay | May 18, 2010 | 1. 2.0<br>2. 2.0<br>3. 3.1 | | Central | |
| Scofield State Park @ Mountain View | May 18, 2010 | 1. 1<br>2. 0<br>3. 0 | | Central | |
| Scofield State Park | | | | | |

# Beach Advisories

- Challenging process
- Multiple jurisdictions and responsibilities
- Requires

# Data Objectives

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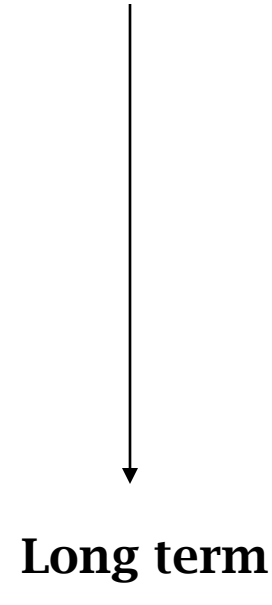
# Source Tracking

- Microbial Source Tracking (MST) tools
- Library Independent
- Quantify Human and Bovine Sources
  - Zion NPS
  - Salt Lake County
  - Bear River
  - Salem Pond
  - Etc….
- Epidemiological Investigation

# Data Objectives

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# Using Network to Foster Implementation

- Involve stakeholders to address individual sources
  - Stormwater
  - Septic
  - Recreation
  - Grazing
  - Dog Parks
  - Etc…

# More Information

Sandra Wingert – E. coli Coordinator
swingert@utah.gov (801) 536- 4338
Jim Harris – Monitoring Section
jamesharris@utah.gov (801) 536-4360

Webpage: www.ecoli.utah.gov