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# Surfactants, Sulfide and Ecoli levels on Bainbridge Island

Developing curiousity and confidence through student-led scientific research on the waters of the Salish Sea

# Surfactants, Sulfide and Ecoli levels on Bainbridge Island

Ground water v. Surface water
City v. Non-City

# Prediction in Period 3

IF we test ground water and surface water for E coli and surfactants, THEN we will find that surface water consistently will have almost as many E coli and surfactants as ground water BECAUSE ground water is surface water that has passed through the earth, carrying most things with it.

IF we test ground water and surface for E coli and surfactants, THEN we will find more surfactants BECAUSE E coli is a bacteria and surfactants are soaps and therefore can not coexist with eachother.

# Surfactants

What is a surfactant and why is it harmful?

A surfactant is a wetting agent that companies combine with their products to decrease the surface tension to help the other substances mix. Companies add surfactants to anything from soaps to inks which find their way into the water systems.

Harmfulness is not quite clear when there are only low levels; mostly an indicator of pollution.

# E coli

What is E coli and why is it harmful?

E coli is found in warm blooded animals intestines. It is a bacteria in the lower intestines that can hurt or help the animal it is harbored in.

Most strands of E coli are harmless, but some are harmful. E coli is mostly an indicator of fecal contamination, which can be detrimental to the health of an environment.

# Gathering Data

## Ground Water

Students collected ground water from their source of drinking water, either from their well or tap water.

No E coli was found, but surfactants were always present.

# What does this tell us?

We use ground water as drinking water because the process of water moving through the ground acts as a natural filter; filtering out bacteria, viruses, and other organisms we don't like having in our drinking water. This data shows us that natural filtering is not enough to protect us from ourselves. It shows that man made pollutants are able to travel through our natural filter system.

What about water treated by the city systems?

Our data tells us that all water samples had some surfactants present. This shows that the city filtering system, that some sample water passed through, isn't able to filter out pollutants either. In finding this, we can see the warnings of pollutants being present in our drinking water.

# Gathering Data

## Surface Water

Students collected surface water from local streams by their homes.

E coli and surfactants were both prevalent in surface water.

When pulling the class's data together, we found that as surfactant levels increased, the E coli levels increased.

# Surfactant v. E coli in Surface water

| Ecoli | Surfactants 0- 1 | 1- 1.5 | 1.5- 2 | 2- 2.5 | 2.5- 3 ppm |
|---|---|---|---|---|---|
| 400-500 | 0 | 0 | 1 | 0 | 1 |
| 200-300 | 0 | 0 | 0 | 1 | 1 |
| 100-200 | 0 | 0 | 0 | 0 | 0 |
| 20-50 | 0 | 2 | 0 | 0 | 0 |
| None | 4 | 2 | 1 | 0 | 0 |


Old Man House State Park
305
Fay Bainbridge State Park
WA-305 NE
NE Hidden Cove Rd
Manzanita Bay
Meadowmeer Golf And Country Club
N Madison Ave NE
NE Valley Rd
Miller Rd NE
Manzanita Beach Dr NE
Fletcher Bay
Sportsman Club Rd NE
NE High School Rd
Wing Point Golf And Country Club
32.36 miles
2:41:38
Start
Gazzam Lake
Bucklin Hill Rd NE
Seattle-Bainbridge Island Fry
Arbor Dr NE
Blakely Ave NE
Seattle-Bremerton Fry
Fort Ward State Park
Manchester State Park
Beach Dr E

# Conclusion for Period 3

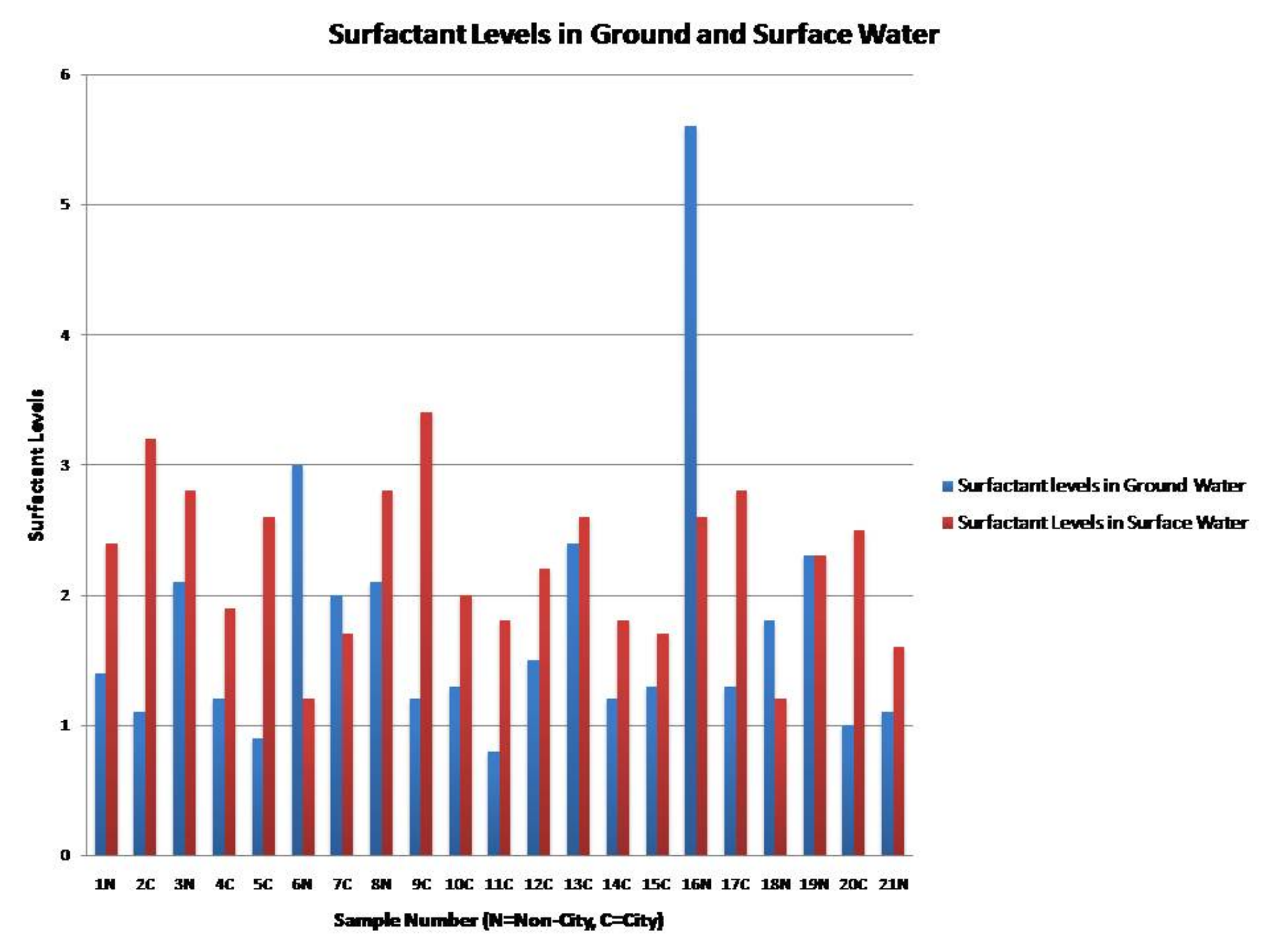
We were wrong in thinking that surface water carried most of the things in it into the ground water. It carries surfactants but not E coli.

We were wrong in thinking that E coli and surfactants can not coexist. Apparently E coli is unaffected by the presence of surfactants. Usually when one is abundant, the other will be; they seem to travel harmoniously together through pollution.

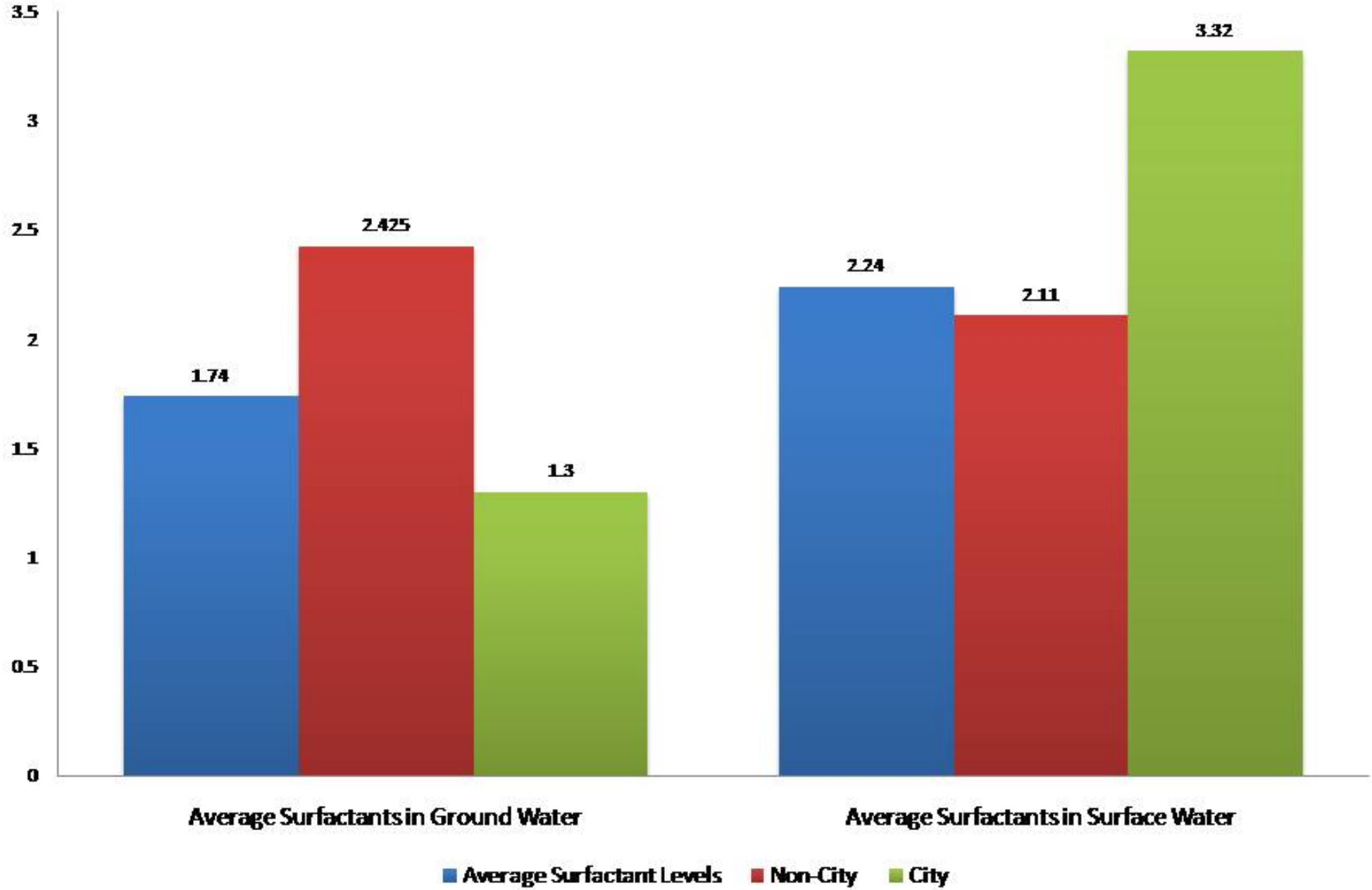
# Prediction of Period 5

- IF we test sulfides in surface and ground water THEN there will be more sulfides in ground water than surface water BECAUSE the ground water algae creates more sulfides than surface water algae do.

- IF we test surfactants in surface and ground water THEN there will be more surfactants in surface water BECAUSE surfactants will run off into streams and stay there, and the ground will filter the water and remove surfactants.


Surfactant Levels in Ground and Surface Water
Surfactant Levels
0
1
2
3
4
5
6
1N
2C
3N
4C
5C
6N
7C
8N
9C
10C
11C
12C
13C
14C
15C
16N
17C
18N
19N
20C
21N
Sample Number (N=Non-City, C=City)
Surfactant levels in Ground Water
Surfactant Levels in Surface Water

# Surfactant Averages

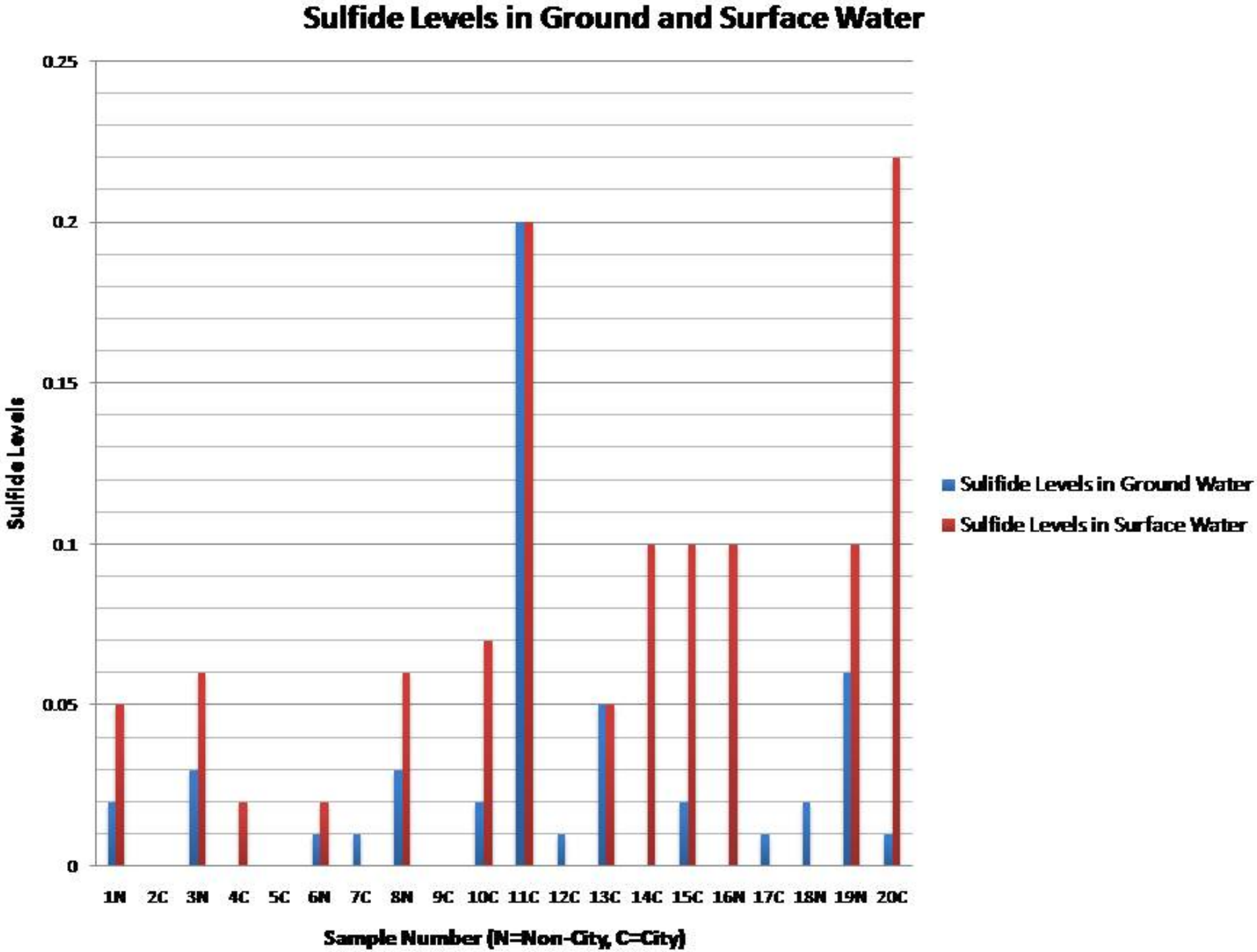


# Sulfides

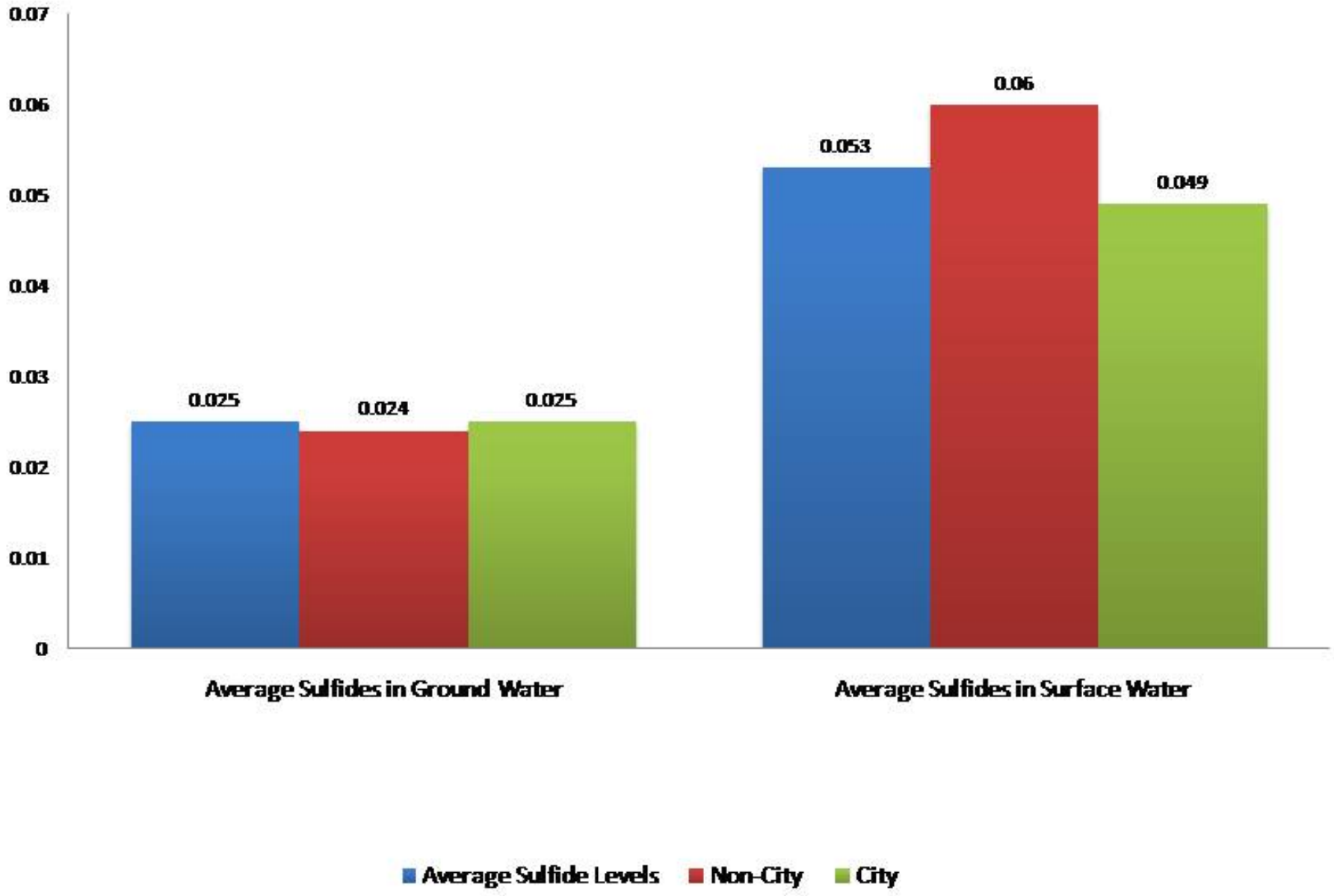
A sulfide is an anion of sulfur at its lowest oxidation number (-2)

Sulfides are not extremely harmful.

Sulfides are responsible for the rotten egg smell in drinking water


Sulfide Levels in Ground and Surface Water
0.25
0.2
0.15
0.1
0.05
0
Sulfide Levels
1N 2C 3N 4C 5C 6N 7C 8N 9C 10C 11C 12C 13C 14C 15C 16N 17C 18N 19N 20C
Sample Number (N=Non-City, C=City)
Sulfide Levels in Ground Water
Sulfide Levels in Surface Water

# Sulfide Averages



# Conclusion for Period 5

- For sulfides, we were undecided. If sulfides were present, they were always higher levels in Surface than in Ground waters. However, they were often not present at all
- For Surfactants, we confirmed our prediction. However, we found that surfactants were not only found in surface waters, but in ground water as well