

Partners of Scott County Watersheds



Our Mission:

To improve the stewardship of Scott County watersheds through education, technical guidance, and volunteer opportunities.

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Scott County 2019 Water Quality Snapshot Summary

**Partners of Scott County
Watersheds**



Steve Gustafson, PG, ICGP
PSCW Vice Chair

Background

- PSCW – diverse group with mission to develop and implement ways we can be better stewards of watersheds in Scott County. (reps from County, Bett, Dav, Eld, Corn Gwrs, **citizens**, EICC)
- Since 2002 water quality data has been collected annually in fall and spring around the county. This year we started summer as well, with macroinvertebrate analysis.
- PSCW coordinates snapshots, hosted by Eldridge, Davenport and Bettendorf.
- Utilizes volunteers/staff to collect and analyze water samples.
- Utilized Iowa DNR IOWATER program for equipment and resources until 2017.

Background

- 239 historical sample sites throughout Scott County through the years (mostly streams & some lakes), we don't sample all those though **(54)**.
- Analyze for nitrate, nitrite, phosphorus, chloride, pH, dissolved oxygen, air/water temperature, transparency, water color. Identified issues in local environment.
- Parameters analyzed with field kits or test strips.
- PSCW also conducted lab analysis on nitrate, phosphorus, pesticides, herbicides, and implemented microbial fecal source tracking. *Thank You Scott County Waste Commission/Xstream Cleanup and City of Davenport.*
- Indicator fecal bacteria lab analyses also conducted until 2014 (*e. coli*).
- Other testing in County done by state, federal or municipalities in the past.

Background

- As of Fall 2019 the PSCW Scott County Database (Oct 2000 to Oct 2019)* contains:
 - 24,619 individual records
 - 1999 *e coli* analyses
 - 2867 water temperature results
 - 814 air temperature
 - 2487 transparency
 - 3285 phosphorus
 - 2829 dissolved oxygen
 - 2577 nitrite
 - 2618 nitrate
 - 2711 pH
 - 2701 chloride
 - 20 herbicide/pesticide suite
 - 207 Microbial Source Tracking analyses

IOWATER Sampling Equipment



Quantab®

Low Range
30-600ppm Cl⁻
(0.005-0.1% as NaCl)

Chloride

Titratrs for

HACH®

40 Tests
Cat. 27449-40

1-724-817-0004
USE BY: 01/2011
Lot A0095

DIRECTIONS:

1. Remove a titrator from bottle and replace cap immediately.
2. Insert lower end of titrator into solution. Do not allow solution to reach yellow completion band at top of titrator.
3. Allow solution to completely saturate wick of titrator. Reaction is complete when yellow band turns dark.
4. Note where the tip of the white chloride peak falls on the numbered Quantab® scale. This represents the Quantab® unit value.
5. Refer to the table below to convert Quantab® units into salt concentration.

NOTE: Filtration of the sample solution may be needed to prevent obstruction of the titrator.

Quantab Units	%NaCl	ppm(mg/L) Cl ⁻	Quantab Units	%NaCl	ppm(mg/L) Cl ⁻
1.0	0.005	29	4.4	0.034	209
1.2	0.006	35	4.6	0.037	226
1.4	0.007	42	4.8	0.040	244
1.6	0.008	49	5.0	0.044	264
1.8	0.009	57	5.2	0.047	285
2.0	0.011	65	5.4	0.051	307
2.2	0.012	73	5.6	0.055	331
2.4	0.014	82	5.8	0.059	356
2.6	0.016	92	6.0	0.063	383
2.8	0.017	102	6.2	0.068	412
3.0	0.019	113	6.4	0.073	444
3.2	0.020	124	6.6	0.079	477
3.4	0.022	136	6.8	0.085	513
3.6	0.025	149	7.0	0.091	553
3.8	0.027	163	7.2	0.098	595
4.0	0.029	177	7.4	0.106	641
4.2	0.032	192			

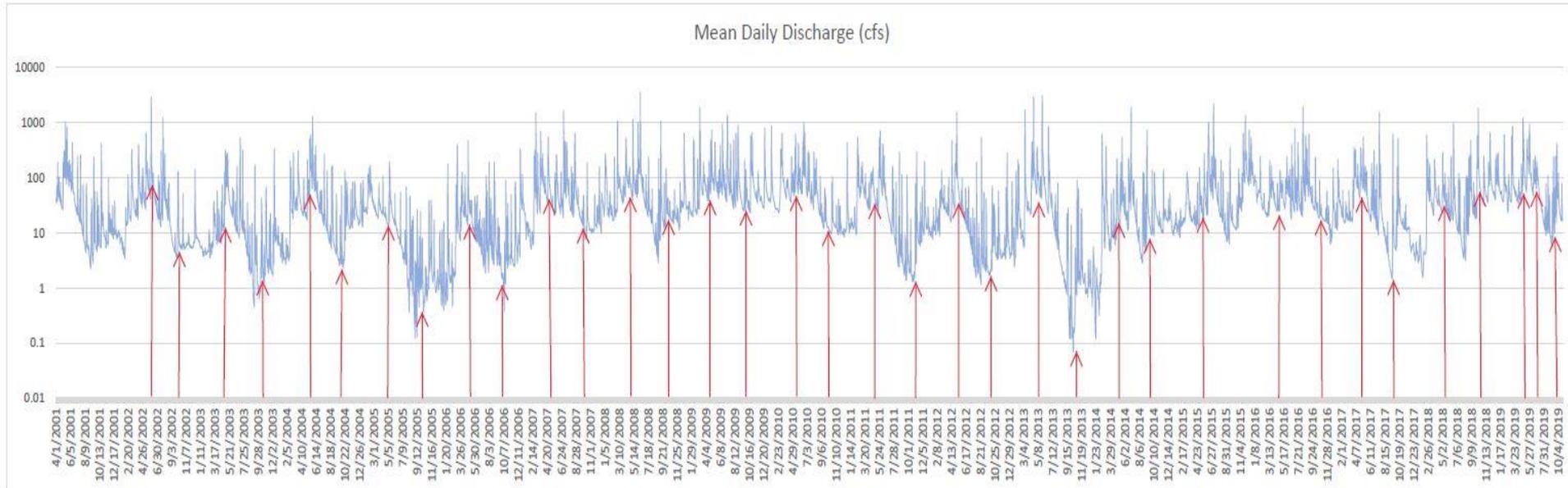
QUANTAB® Test Strip

Important: Keep Cap on Tight Between Uses.
STORE AT TEMPERATURES NOT TO EXCEED 86°F (30°C).

HACH® Hach Company, P.O. Box 389, Loveland, CO 80536 U.S.A.
(800) 227-4224 Outside U.S.A. (970) 669-3050
*Quantab® is manufactured by Environmental Test Systems, Elkhart, Indiana.

Duck Creek USGS Gauge @ Duck Creek Golf Course

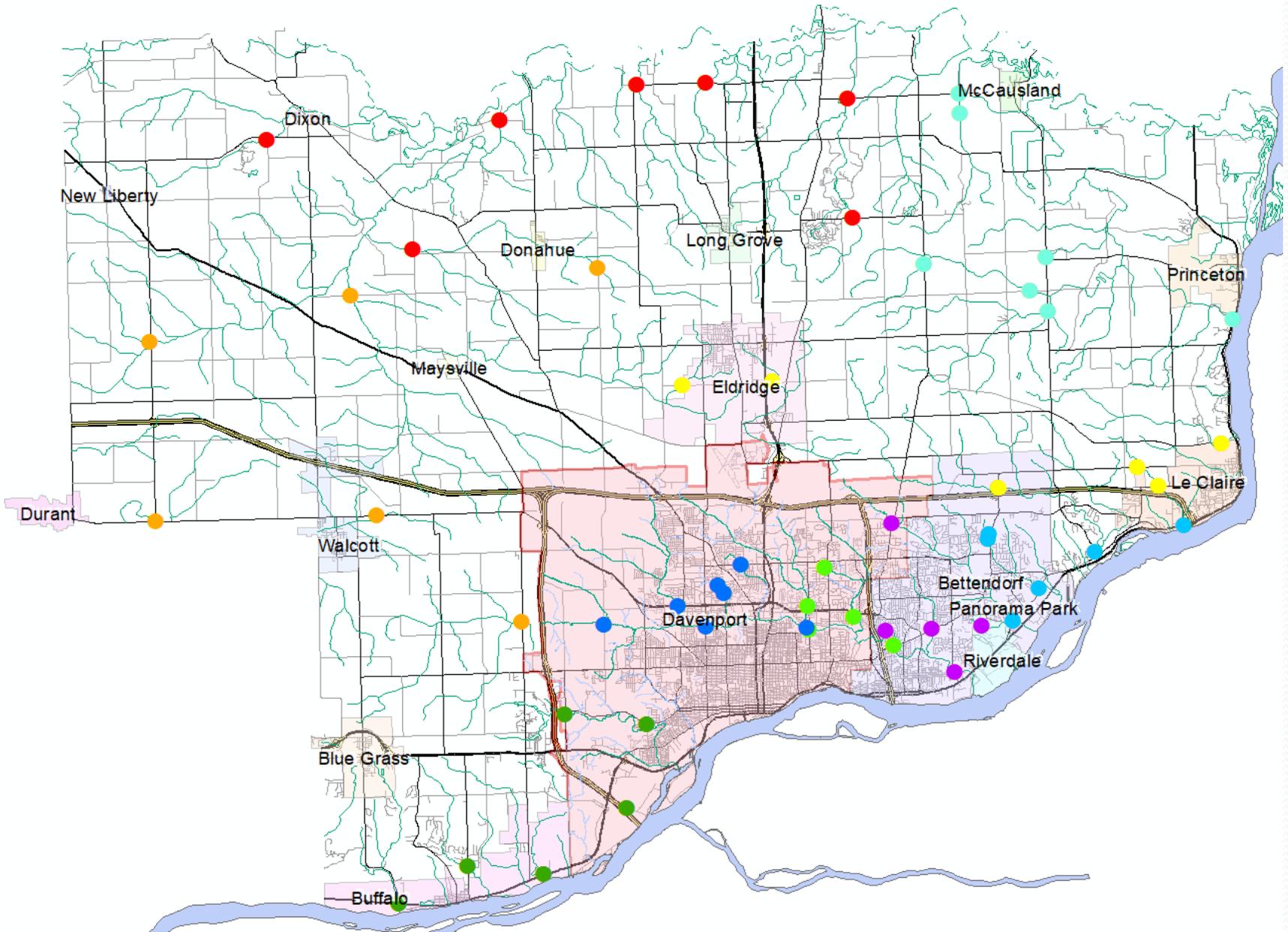
Mean Daily Discharge (cfs)



2019 – 3 Snapshots

- 54 sites, try to get at least one site on every stream.
- 88 volunteers. (25 spring, 35 summer, 28 fall)
- New this year, added a summer snapshot, and included a macroinvertebrate survey at 10 sites, and ammonia testing.
- Spring was flooding, very wet, limited access.
- Summer in the middle of a dry period.
- Fall in another wet period, not as much flooding as spring.
- Will look at individual parameters, but the discussion will tend to focus on the dataset trends including the 2019 data.

Snapshot Sites Map

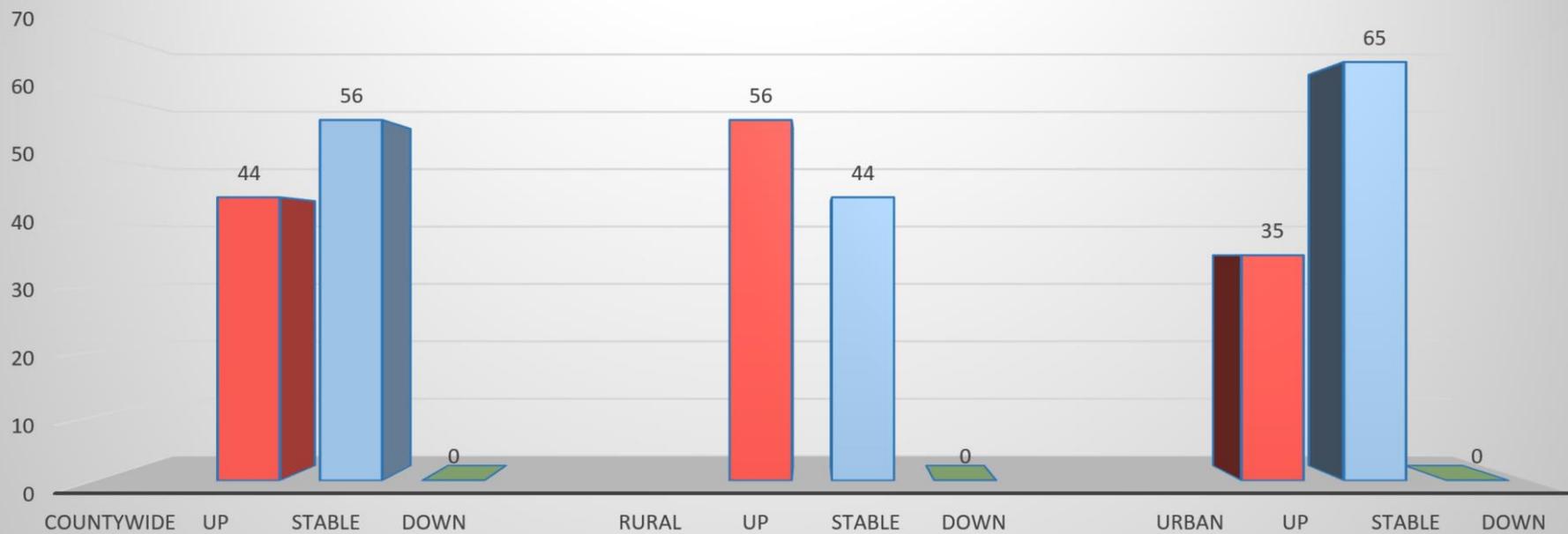


Nitrate

- Nitrates: 48 of 54 sites have enough data for trends .
 - 2019 data range: 0 to 10.8 mg/L. Most in the 2 to 5 mg/L range.
 - No spikes or unusual concentrations in 2019, numbers consistent with historical data.
 - 2002-2019: 44% of sites up trend, 56% stable, no down trends.
 - 2002-2019: average concentration for all sites = 4 mg/L, for rural sites = 5 mg/L, for urban sites 3 mg/L.
 - No water quality standard in Iowa besides drinking water (10 mg/L). One location 982157 with average above drinking water standard (not a DW source).
 - Urban/Suburban: 35% up, 65% stable. Most sites avg is in 2-4 mg/L range. High avg is 12 mg/L, low is 0.3 mg/L.
 - Rural: 56% up, 44 % stable. Most sites avg is the 3-7 mg/L range. High avg is 7 mg/L, low is 1 mg/L.

Nitrate

Snapshot Site Trend Percentages for Nitrate 2002-2019



Nitrate

Solely Urban Streams		
Stream	Avg Concentration (mg/L)	Trends
Candlelight Creek	0.3	stable
Greenway Creek	1	stable
Stafford Creek	1	stable
Robin Creek	0.3	stable
Hanlin Creek	0.3	stable
Pheasant Creek	1	stable

Suburban streams with rural portion		
Stream	Avg Concentration (mg/L)	Trends
Crow Creek	4	2 S, 1 U
Pigeon Creek	2	stable
Silver Creek	4	up
Sycamore Creek	9	up
Goose Creek	2	stable
Blackhawk Creek	0.6	stable

Rural Streams		
Stream	Avg Concentration (mg/L)	Trends
Hickory Creek	5	1 S, 1U
McDonald Creek	5	up
Spencer Creek	7	up
Lost Creek	3	stable
Mud Creek	5	1 S, 1U

- Duck Creek – rural, urban and suburban
 - Average 3 mg/L (4 mg/L rural, 3 mg/L sub, 3 mg/L urban)
 - Rural trend up, suburban trend up, urban trend stable

Nitrate

- Laboratory analysis: 38 samples in 2018/19 sent in for laboratory analysis, concurrent with snapshot field analysis.
- Allowed for lab/field comparison.
- 34% field result was higher, 66% field result was lower. Average difference was 1.8 mg/L.
- No water quality standard for prevention of excess nutrients, or aquatic wildlife affects. Political and science based reasons.
- Focus on trends, downward trends are the goal.
- Rural areas indicate higher average concentrations, with more sites with an upward trend. Suburban areas less, but with similar trends.
- Nitrates are present and a concern in Rural, Suburban and Urban? settings.

Nitrite

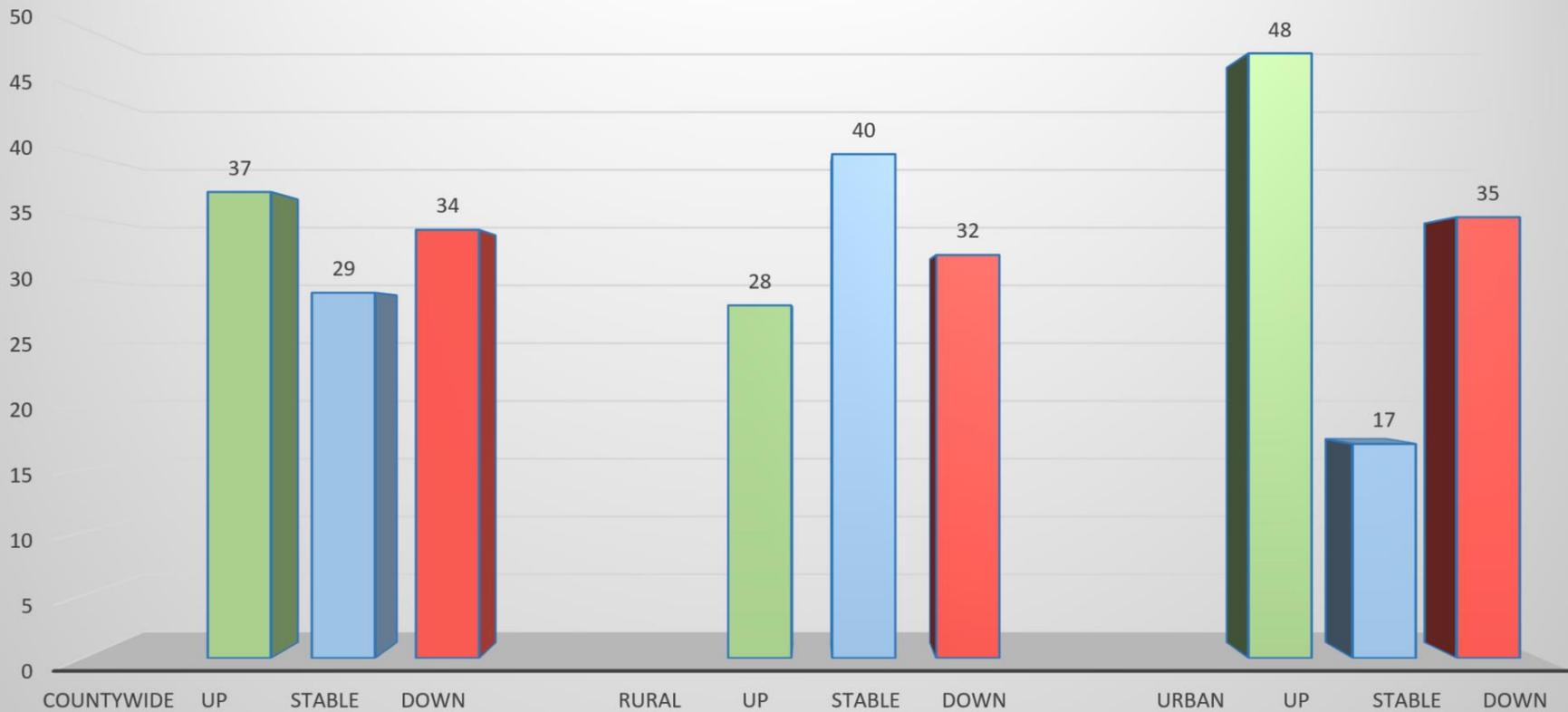
- No areas of concern. Vast majority of sites no detection.
- Short lived chemical in nitrogen cycle.
- Minor concern in rural and suburban settings.
- Trends are predominantly Down or Stable.

Transparency

- Transparency: measure of water clarity
 - 2019 values ranged from 5 cm to 60 cm.
 - Higher the value the better, upward trend is good.
 - 2002-2019 data: 37% of sites trending up, 29% stable, 34% down.
 - Average all sites = 40 cm, rural = 38 cm, urban 42 cm.
 - Urban/Suburban: 48% up, 17% stable, 35% down; averages range from 26-54 cm, most average values between 30 to 45 cm.
 - Rural: 28% up, 40% stable, 32% down, averages range from 26 to 52 cm, most average values between 30 to 40 cm.

Transparency

Snapshot Site Trend Percentages for Transparency 2002-2019



Transparency

Solely Urban Streams		
Stream	Avg reading (cm)	Trends
Candlelight Creek	52	down
Greenway Creek	51	up
Stafford Creek	45	up
Robin Creek	50	stable
Hanlin Creek	52	down
Pheasant Creek	46	down

Suburban streams with rural portion		
Stream	Avg reading (cm)	Trends
Crow Creek	46	stable
Pigeon Creek	54	stable
Silver Creek	41	stable
Sycamore Creek	45	down
Goose Creek	35	down
Blackhawk Creek	37	stable

- Duck Creek – rural, urban and suburban
 - Average 32 mg/L (29 cm rural, 26 cm sub, 40 cm urban)
 - Rural trend up, suburban trend stable, urban trend stable/down

Rural Streams		
Stream	Avg reading (cm)	Trends
Hickory Creek	38	stable
McDonald Creek	45	stable
Spencer Creek	34	1U, 1D
Lost Creek	30	2D, 2 U
Mud Creek	38	1 S, 1D

Transparency

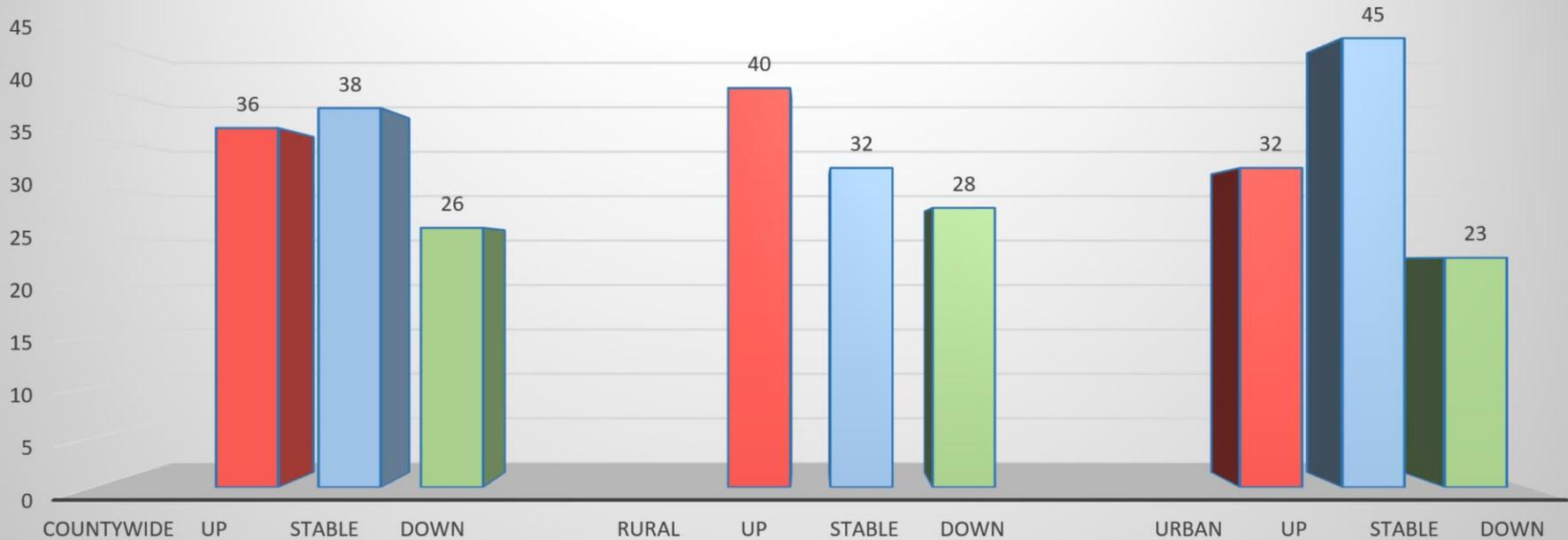
- Transparency: in general below 30 cm a concern
 - Spencer Creek, Duck Creek and Lost Creek near 30 cm for average and downward/stable trends.
 - Rural: in general most sites stable or increasing in clarity, the overall averages are lower than urban and suburban areas.
 - Urban/Suburban: same trends as rural, with more sites increasing in clarity. Averages slightly higher than rural.

Phosphorus

- 48 of 54 sites enough data for trends .
 - 2019 data range – 0 to 3 mg/L. Most in the 0.1 to 0.6 mg/L range.
 - No spikes or unusual concentrations in 2019, numbers consistent with historical data.
 - 2002-2019: 36% of sites up trend, 38% stable, 26% down.
 - 2002-2019 Data: average concentration for all sites = 0.5 mg/L, for rural sites = 0.4 mg/L, for urban/sub sites 0.6 mg/L.
 - No water quality standard in Iowa. Have seen multiple sources utilizing 0.1 mg/L (or lower) as a threshold for preventing excess veg growth/eutrophication.
 - Urban/Suburban – 32% up, 45% stable, 23% down. Most sites avg is in 0.2 to 0.4 mg/L range. High avg is 2.9 mg/L, low is 0.2 mg/L.
 - Rural - 40% up, 32% stable, 28% down. Most sites avg is the 0.2 to 0.4 mg/L range. High avg is 1 mg/L, low is 0.1 mg/L.

Phosphorus

Snapshot Site Trend Percentages for Phosphorus 2002-2019



Phosphorus

Solely Urban Streams		
Stream	Avg Concentration (mg/L)	Trends
Candlelight Creek	0.5	stable
Greenway Creek	0.2	stable
Stafford Creek	0.3	stable
Robin Creek	0.3	stable
Hanlin Creek	0.3	stable
Pheasant Creek	0.2	stable

Suburban streams with rural portion		
Stream	Avg Concentration (mg/L)	Trends
Crow Creek	0.5	1U, 1S, 1D
Pigeon Creek	0.3	up
Silver Creek	0.4	up
Sycamore Creek	1.6	down
Goose Creek	0.2	up
Blackhawk Creek	0.7	down

- Duck Creek – rural, urban and suburban
 - Average 0.3 mg/L (0.2 mg/L rural, 0.3 mg/L sub, 0.2 mg/L urban)
 - Rural trend down, suburban trend stable, urban trend stable

Rural Streams		
Stream	Avg Concentration (mg/L)	Trends
Hickory Creek	1.4	stable
McDonald Creek	0.3	stable
Spencer Creek	0.3	down
Lost Creek	0.3	1U, 1S, 1D
Mud Creek	0.3	stable

Phosphorus

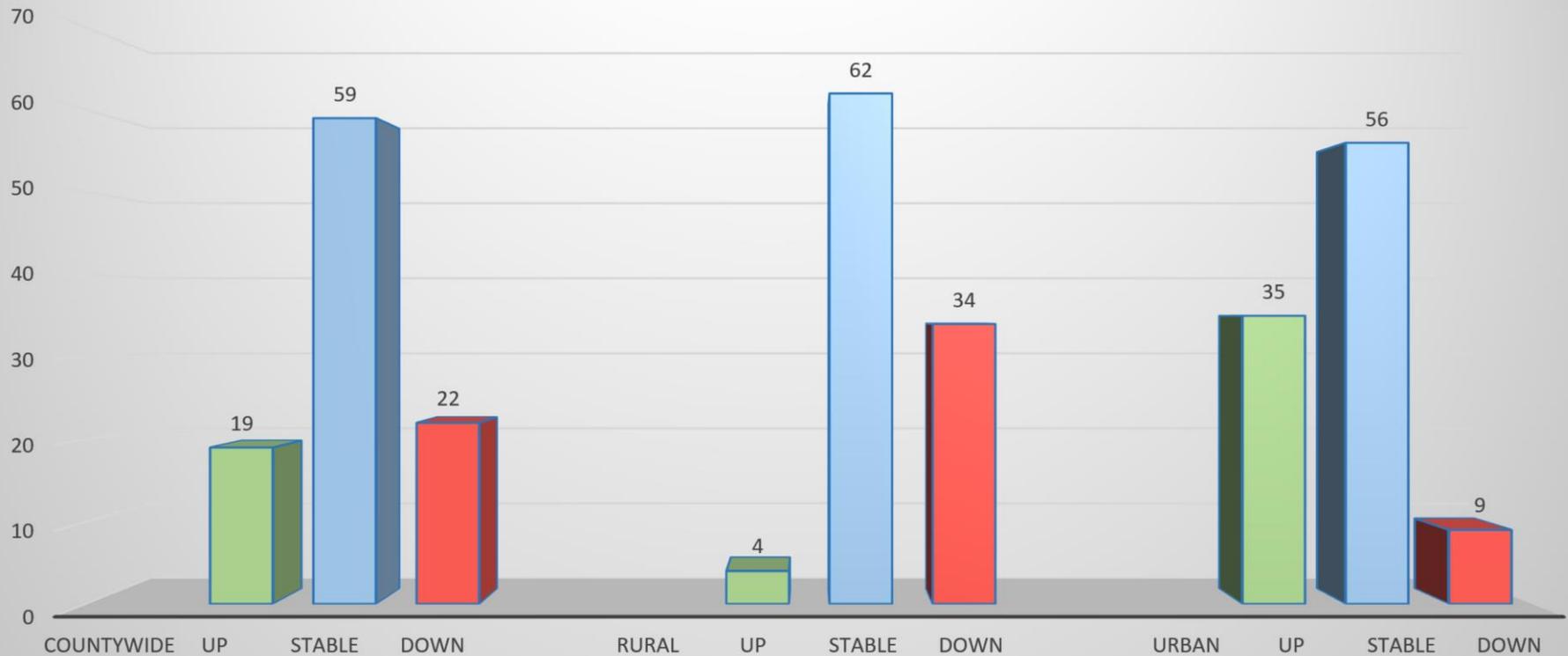
- Laboratory analysis – 20 samples in 2018/19 sent in for laboratory analysis, with concurrent snapshot field analysis.
- Range of lab data <0.1 to 0.895 mg/L.
- 13 samples field result was higher, 5 field result was lower, 2 right on.
- Majority of sites had field detections between 0.1 to 0.3 mg/L.
- Low concentrations hard to clarify with field kits, but threshold is also very low (0.1 mg/L for excess P), >0.6 mg/L is considered pretty high
- Focus on trends, downward trends are the goal.
- Urban/Suburban areas indicate higher average concentrations than rural. Overall, trends similar between the three land uses.
- Phosphorus is present and a concern in Rural, Suburban and Urban settings.

Dissolved Oxygen

- 47 of 54 sites enough data for trends .
 - 2019 data range – 4 to 12 mg/L. Most in the 6-9 mg/L range.
 - No spikes or unusual concentrations in 2019, numbers consistent with historical data.
 - 2002-2019: 19% of sites up trend, 59% stable, 22% down.
 - 2002-2019 Data: average concentration for all sites = 8 mg/L, for rural sites = 8 mg/L, for urban/sub sites 7 mg/L.
 - Minimum value for support of aquatic wildlife = 5 mg/L.
 - Urban/Suburban: 35% up, 56% stable, 9% down. Most sites avg is in 7 to 8 mg/L range.
 - Rural: 4% up, 62% stable, 34% down. Most sites avg is the 8 to 9 mg/L range.
 - Only concerns are Candlelight Creek and Hanlin Creek, 5 and 6 mg/L avg respectively, but stable trends.

Dissolved Oxygen

Snapshot Site Trend Percentages for Dissolved Oxygen

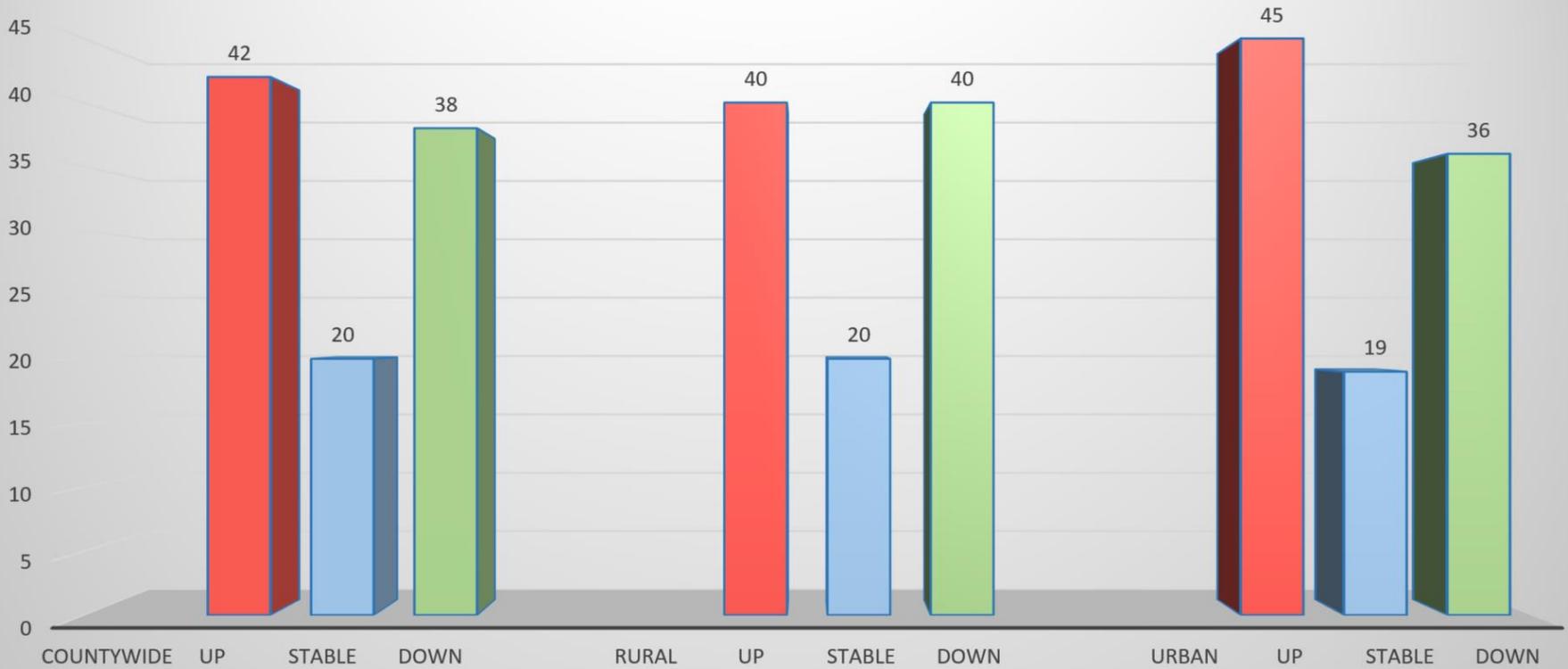


Chloride

- 48 of 54 sites enough data for trends .
 - 2019 data range – 20 to 186 mg/L. Most in the 25-80 mg/L range.
 - No spikes or unusual concentrations in 2019, numbers consistent with historical data.
 - 2002-2019: 42% of sites up trend, 20% stable, 38% down.
 - 2002-2019 Data: average concentration for all sites = 74 mg/L, for rural sites = 36 mg/L, for urban/sub sites 86 mg/L.
 - Default Acute standard is 629 mg/L, chronic is 389 mg/L.
 - Urban/Suburban: 45% up, 19% stable, 36% down. Most sites avg is in 50 to 90 mg/L range. 30% sites avg >100 mg/L.
 - Rural: 40% up, 20% stable, 40% down. Most sites avg is the 25 to 40 mg/L range.
 - Greenway Creek (173 mg/L), Stafford Creek (180 mg/L) and Candlelight Creek (133 mg/L) and Pheasant Creek (122 mg/L) have high avg and increasing trends.
 - Urban and Suburban concern currently. *Bettendorf efforts.*
 - Groundwater Cl⁻ concentrations a source as well as runoff.

Chloride

Snapshot Site Trend Percentages for Chloride



pH

- 48 of 54 sites enough data for trends .
 - 2019 data range: 6 to 9. Most in the 7 to 9.
 - No spikes or unusual concentrations in 2019, numbers consistent with historical data.
 - 2002-2019: 21% of sites up trend, 64% stable, 15% down.
 - 2002-2019 Data: average concentration for all sites = 8, for rural sites = 8, for urban/sub sites=8.
 - Desired range 5 to 9.
 - Urban/Suburban: 2% up, 63 stable, 28% down.
 - Rural: 32% up, 64% stable, 4% down.
 - No concerns currently.

Herbicides/Pesticides

- 20 samples total in 2018 and 2019. 10 urban, 10 rural.
 - Pesticides: Aldrin; alpha-BHC; beta-BHC; Lindane; Chlordane; delta-BHC; Dieldrin; 4,4-DDD; 4,4-DDE; 4,4-DDT; Endosulfan; Endosulfan sulfate; Endrin; Endrin aldehyde; Heptachlor; Heptachlor epoxide; Methoxychlor; Toxaphene.
 - Herbicides: Dicamba; Dichlorprop; 2,4-D; Silvex (2,4,5-TP); 2,4,5-T; 2,4-DB and Glyphosate (Roundup). Only 8 Roundup analyses....\$\$\$\$
 - Detections of Silvex (2.34 ug/L), 2,4-D (0.502 ug/L, 0.0588 ug/L) and Dieldrin (0.00242 ug/L).
 - Only Dieldrin could be said to exceed a DNR wq standard (0.00052 ug/L), but that is for human consumption of fish/shellfish. Site was on Hickory Creek, not sure if DNR would designate creek that way.
 - Not enough data to make any conclusions, though lack of detections is a good sign.

Microbial Source Tracking (MST)

- A set of techniques used to determine the sources of fecal indicator bacteria in the environment. There are characteristics unique to the fecal bacteria from a particular host and these characteristics allows identification of the source of the contamination. Genetic fingerprinting, \$\$\$, *e coli*.
- qPCR - quantitative polymerase chain reaction, used by labs we utilized
- 207 qPCR analyses, 52 in 2015, 155 in 2018/29
 - 89 by City of Davenport within city limits
 - 118 by PSCW in Duck Creek watershed and around County
 - Analyzed for Human, Dog, Cattle, Swine (in 2015 ruminant and bird also)
 - 2018/19 Human, Dog – 9 rural samples, 11 urban
 - 2018/19 Cattle, Swine - 9 rural samples, 14 urban
 - In 2019, PSCW focused only on Human/Dog in urban/suburban. Rural sites analyzed for H/D/C/S.
 - Davenport focuses on Human. Initially did H/D/C/S, wanted to clarify human input.

Microbial Source Tracking (MST)

- Human – 20 total analyses in 2018/19, 9 rural, 11 urban
 - qPCR gives presence and a value (mpn/100 mL)
 - Rural: 4 of 9 quantifiable detection (qd), 3 dnq (lab says present but so low they can't quantify), 77% samples indicated a presence.
 - Urban: 6 of 11 qd, 4 dnq. 90% samples indicated presence.
 - Davenport Study results: similar
 - No water quality standard, literature review suggests a threshold value of 4100 mpn/100 mL is indicative of a risk to human health
 - Urban – 27% of samples exceed proposed threshold (3 samples)
 - Rural – 22% exceed (2 samples)
 - Davenport Study – 24% exceed
 - 2015 data similar, bird and ruminant not a significant source
 - A Urban, Suburban, Rural issue.
 - Different sources likely depending on land use type. (Rural – leaky septic systems, small WWTPs, ??) (Urban - cross connections?, san sewer exfiltration, a lot more humans doing weird things)

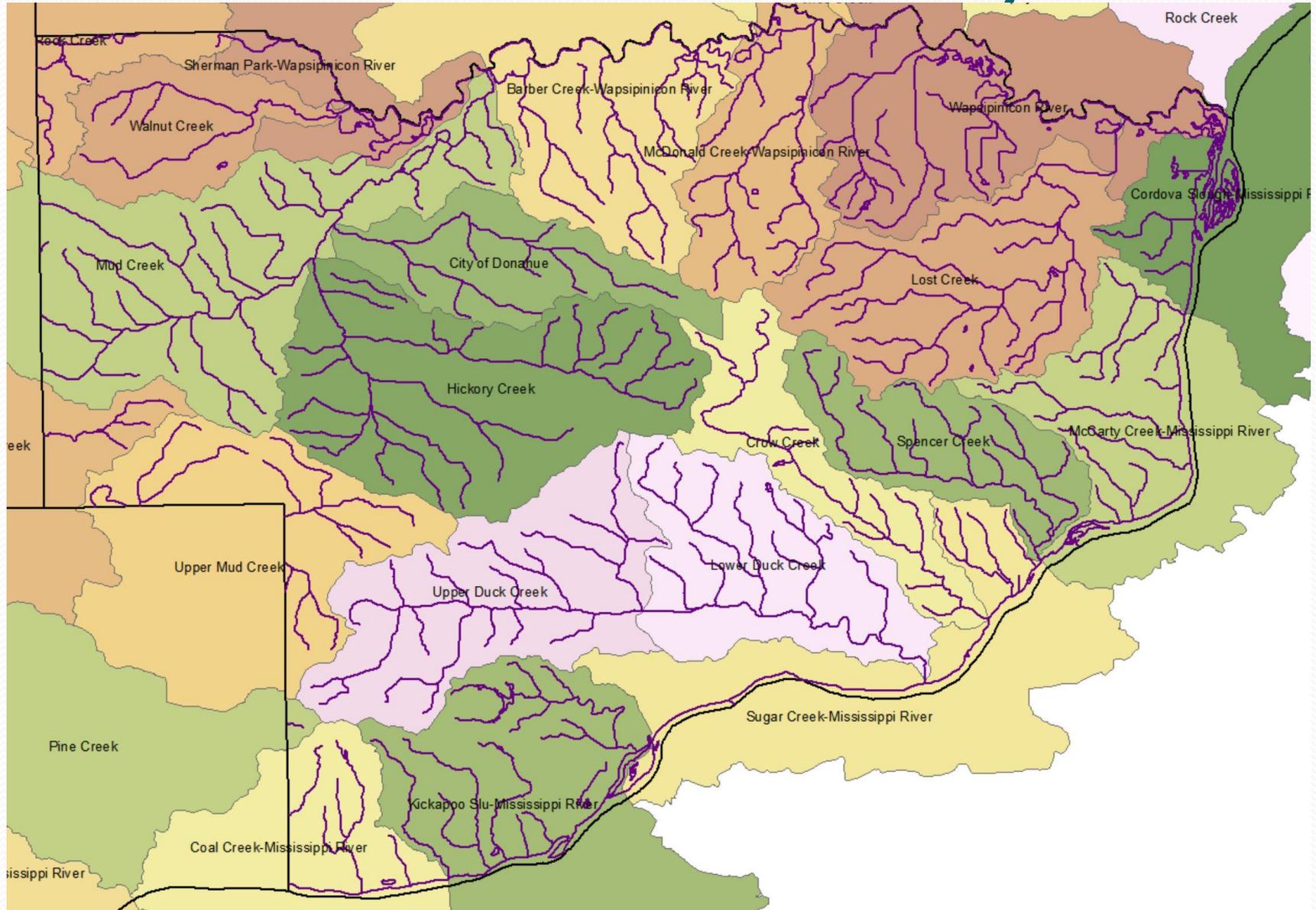
Microbial Source Tracking (MST)

- Dog - 20 total samples, 9 rural, 11 urban
 - Rural: 0 of 9 quantifiable detection (qd), 6 dnq.
 - Urban: 3 of 11 qd, 6 dnq. 81% samples indicated presence.
 - An urban issue mostly, no wq standard or proposed threshold, but a contributor to fecal load in urban/suburban streams.
 - Source – canines (domesticated but coyotes too?) Likely precip over fecal material, runoff into storm sewer system.

Microbial Source Tracking (MST)

- Cattle - 23 total samples, 9 rural, 14 urban
 - Rural: 3 of 9 quantifiable detection (qd), 3 dnq. 66% indicate some presence.
 - Urban: 1 of 14 qd, 0 dnq.
 - A rural issue, no wq standard or proposed threshold, but a contributor to fecal load in rural streams and any urban streams downstream.
 - Appears that the fecal material is there in significant quantities or not at all, not many dnq detections.
- Swine - 23 total samples, 9 rural, 14 urban
 - Rural: 2 of 9 quantifiable detection (qd), 2 dnq. 36% indicate some presence.
 - Urban: 0 of 14 qd, 0 dnq.
 - A rural issue, no wq standard or proposed threshold, but a contributor to fecal load in rural streams and any urban streams downstream.
 - Appears that the fecal material is there in significant quantities or not at all, not many dnq detections.

HUC 12 Watershed Analysis



HUC 12 Watershed Analysis

- Looked at nitrate, phosphate, transparency, DO and chloride data, and used it to compare the HUC 12 watersheds in Scott County.
 - Compared based on all sites within a HUC 12.
 - Compared avg concentrations and trends.
 - Doesn't include fecal bacteria impairments.
 - Selected top 5 and ranked.

Rank	Nitrate	Phosphate	Transparency	Chloride
1	McCarty Creek *	McCarty Creek *	Upper Duck Creek *	Lower Duck Creek *
2	Spencer Creek *	Hickory Creek *	Lost Creek *	Sugar Creek
3	Upper Mud Creek *	Kickapoo Slough *	Spencer Creek	Coal Creek
4	McDonald Creek *	Crow Creek *	Kickapoo Slough	Crow Creek
5	Mud Creek *	Barber Creek *	City of Donahue	McCarty Creek

* asterik denotes that mean concentration of parameter in HUC 12 is at a level that warrants concern

Snapshots -future

- PSCW will continue spring, fall and summer snapshots. Sites may be added or changed based on need and number of kits/volunteers.
- Need to purchase sampling kits, currently borrowing from Iowa DNR, but may end at any time. \$\$\$
- Phosphorus 0.45 um filter.
- Hope to continue lab analyses. \$\$\$ Pathogen testing??
- Utilize City of Davenports YSI ProPlus multi meter for select sites.
- Use data to prioritize conservation efforts and projects.
- Winter Training Sessions.

Conclusions

- Nutrients a concern in urban, suburban and rural areas
 - Not just coming in from rural to urban
 - General trends not desirable.
- Chloride trends currently an urban/sub concern, but no wq standard exceedances.
- DO generally OK, except for a few streams of concern.
- Transparency somewhat not desirable trends, few streams of concern.
- pH is OK.
- Herb/Pest promising initial data. More data, timing.
- Majority of streams originate within County borders, so WQ issues are our problem.
- Human a source of fecal matter in rural and urban streams (how to further clarify, Robin Creek stream inserts). Dog a urban/sub source also, cattle swine present rural, not widespread?
- There are WQ issues:
 - Not the end of the world, but not great either.
 - Too many undesirable trends.
 - Scott County is probably average in Iowa for our type of landforms (more research to verify)
 - Biggest concerns are likely nutrients and fecal bacteria impairments.

Amy Kay would like you to join their fundraising team for this campaign.

Join Team



Raised by 5 people in 4 months

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Created April 5, 2019



Partners of Scott County Watersheds

- Education
- DAVENPORT, IA



Funds raised will benefit:

Partners of Scott County Watersheds

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Recent Donations



\$40 Brian Ritter 5 days ago



\$25 Dawn McKinney 5 days ago

Water Quality Monitoring - Scott County, Iowa

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Partners of Scott County Watersheds is raising money to purchase water quality monitoring kits and a multi-meter needed for our Snapshot events! **Our main goal is to acquire the kits, meter sensors, and one year of kit restocking supplies for a total of \$10,625.**

A YSI ProPlus Multi-parameter Instrument was recently purchased by one of PSCW's partners for PSCW to test water quality in Scott County. This multi-meter will allow PSCW to obtain more accurate measurements on dissolved oxygen, conductivity, specific conductance, salinity, resistivity, total dissolved solids (TDS), pH, ORP, pH/ORP combination, ammonium (ammonia), nitrate, chloride and

SAVE THE DATES!

Snapshot Training:

Thursday, December 12	5:00-7:00pm
Saturday, February 1	10:00am-12:00pm

Forums:

Tuesday, February 18	12:00-1:00pm
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Snapshots:

Tuesday, May 5	8:00am-12:00pm
Saturday, July 18	8:00am-12:00pm
Tuesday, October 6	8:00am-12:00pm

Questions?

Partners of Scott County Watersheds

