

Lake and Stream Data Introduction

Water quality trends conducted on stream and lake locations within the Cannon River Watershed utilized water quality information stored on the MPCA STORET database. Based on the water quality data gathered in STORET, grading tables were created to provide a general interpretation of the water quality conditions for surface waters in the Cannon River Watershed. Lake water quality was evaluated using an A-F grading system while the stream water quality was graded using a simple improvement (symbolized by a “↑”) or degradation of water quality (symbolized by a “↓”). Data collected for the stream portion of this evaluation was collected from 2007 through 2010. The abundance of water quality data collected on the lakes varied greatly. Some lakes had only one year of water quality samples collected while others lakes had data spanning over multiple decades. The years observed in the lakes table should be evaluated cautiously. The years evaluated in which samples were collected is not a complete record. Some of the lakes had years where data was not collected or some of the water quality parameters were missing. However, this information is very useful determining water quality condition of lake over a given time period. The lake trend data used only evaluated three water quality parameters (secchi depth, total phosphorus and chlorophyll-A concentrations) using the Metropolitan Council lake rating scale. It is important to note that there are a few lakes (8) in the watershed that have no water quality information and lakes that have one year’s worth of water quality data collected. These lakes should be considered “not fully evaluated” and targeted for future water quality assessment projects. Due to the fact there are no established water quality standards for streams in the State of Minnesota, the chemical parameters (chlorophyll-a, nitrate, total kjeldahl nitrogen, total phosphorus, and E. coli bacteria) used to evaluated trends was done by plotting chemical data concentrations for the multiple years of data collected. A trend line was established for each of the above mention water quality parameters. The slope of each line was used to determine if the concentrations increased or decreased over the evaluated time period. It is important to note that seasonal variations, temperature fluctuations, land-use changes and other unforeseeable variables can influence chemical concentrations and should be judged with some skepticism and caution.

Upper Cannon River Lobe Lake Monitoring Data Summary

| German | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|---------------|--------|-----------|----------------------|
| Mean | 1.37 | 60.05 | 30.50 |
| Maximum | 5.42 | 277.00 | 81.00 |
| Minimum | 0.55 | 19.00 | 1.00 |
| Count | 46 | 57 | 56 |

| Caron | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|--------------|--------|-----------|----------------------|
| Mean | 0.49 | 345.00 | 103.00 |
| Maximum | 0.76 | 657.00 | 200.00 |
| Minimum | 0.15 | 126.00 | 13.00 |
| Count | 15 | 15 | 11 |

| Volney | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|---------------|--------|-----------|----------------------|
| Mean | 2.64 | 100.00 | 29.60 |
| Maximum | 6.70 | 722.00 | 341.00 |
| Minimum | 0.53 | 3.00 | 1.00 |
| Count | 50 | 50 | 50 |

| Cedar | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|--------------|--------|-----------|----------------------|
| Mean | 0.80 | 79.00 | 46.00 |
| Maximum | 1.68 | 185.00 | 122.00 |
| Minimum | 0.40 | 36.00 | 7.00 |
| Count | 36 | 36 | 28 |

| Cannon | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|---------------|--------|-----------|----------------------|
| Mean | 1.08 | 365.00 | 60.00 |
| Maximum | 2.74 | 775.00 | 170.00 |
| Minimum | 0.30 | 65.00 | 3.00 |
| Count | 29 | 28 | 25 |

| Diamond | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|----------------|--------|-----------|----------------------|
| Mean | 0.61 | 114.00 | 16.00 |
| Maximum | 0.91 | 367.00 | 139.00 |
| Minimum | 0.46 | 40.00 | 1.00 |
| Count | 7 | 13 | 12 |

| Wells | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|--------------|--------|-----------|----------------------|
| Mean | 0.50 | 317.00 | 65.00 |
| Maximum | 1.60 | 548.00 | 165.00 |
| Minimum | 0.20 | 73.00 | 3.00 |
| Count | 13 | 13 | 12 |

| Dora | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|-------------|--------|-----------|----------------------|
| Mean | 0.91 | 353.00 | 52.00 |
| Maximum | 1.67 | 810.00 | 174.00 |
| Minimum | 0.61 | 88.00 | 2.00 |
| Count | 12 | 12 | 12 |

| Reed | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|-------------|--------|-----------|----------------------|
| Mean | 1.50 | 35.00 | 21.00 |
| Maximum | 4.80 | 63.00 | 48.00 |
| Minimum | 0.60 | 23.00 | 1.00 |
| Count | 27 | 28 | 27 |

| Charles* | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|-----------------|--------|-----------|----------------------|
| Mean | 1.41 | 55.00 | 25.00 |
| Maximum | 1.52 | 85.00 | 48.00 |
| Minimum | 1.22 | 38.00 | 8.00 |
| Count | 4 | 4 | 4 |

| Rice-Lesueur* | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|----------------------|--------|-----------|----------------------|
| Mean | 3.30 | 278.00 | 1.90 |
| Maximum | 5.40 | 628.00 | 4.40 |
| Minimum | 1.60 | 84.00 | 1.00 |
| Count | 5 | 10 | 6 |

| Roemhildts | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|-------------------|--------|-----------|----------------------|
| Mean | 3.00 | 17.00 | 5.80 |
| Maximum | 4.80 | 26.00 | 12.00 |
| Minimum | 1.50 | 15.00 | 2.00 |
| Count | 13 | 13 | 13 |

* Indicates only one year of WQ data collected, 2 years required to be "fully assessed".

Upper Cannon River Lobe Lake Monitoring Data Summary

| Roberds | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|----------------|--------|-----------|----------------------|
| Mean | 0.90 | 232.00 | 77.00 |
| Maximum | 4.00 | 469.00 | 180.00 |
| Minimum | 0.15 | 23.00 | 2.24 |
| Count | 37 | 38 | 30 |

| Round* | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|---------------|--------|-----------|----------------------|
| Mean | 0.43 | 130.00 | 58.00 |
| Maximum | 0.46 | 155.00 | 85.00 |
| Minimum | 0.40 | 110.00 | 37.00 |
| Count | 5 | 5 | 5 |

| Silver | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|---------------|--------|-----------|----------------------|
| Mean | 2.00 | 96.00 | 42.00 |
| Maximum | 4.27 | 203.00 | 126.00 |
| Minimum | 0.50 | 1.00 | 1.00 |
| Count | 12 | 16 | 12 |

| Sabre | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|--------------|--------|-----------|----------------------|
| Mean | 1.84 | 517.00 | 17.00 |
| Maximum | 4.30 | 1540.00 | 79.00 |
| Minimum | 0.50 | 125.00 | 1.00 |
| Count | 22 | 30 | 22 |

| Tetonka | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|----------------|--------|-----------|----------------------|
| Mean | 2.10 | 580.00 | 45.00 |
| Maximum | 7.50 | 1980.00 | 256.00 |
| Minimum | 0.30 | 102.00 | 1.20 |
| Count | 28 | 42 | 30 |

| Shields | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|----------------|--------|-----------|----------------------|
| Mean | 1.14 | 447.00 | 46.70 |
| Maximum | 5.10 | 1430.00 | 178.00 |
| Minimum | 0.30 | 44.00 | 1.05 |
| Count | 26 | 38 | 22 |

| Tustin | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|---------------|--------|-----------|----------------------|
| Mean | 0.85 | 201.70 | 93.50 |
| Maximum | 1.50 | 530.00 | 372.00 |
| Minimum | 0.20 | 5.00 | 1.00 |
| Count | 19 | 20 | 20 |

| Sunfish | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|----------------|--------|-----------|----------------------|
| Mean | 0.82 | 66.00 | 44.00 |
| Maximum | 1.07 | 123.00 | 171.00 |
| Minimum | 0.40 | 46.00 | 13.00 |
| Count | 13 | 14 | 14 |

| East Jefferson | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|-----------------------|--------|-----------|----------------------|
| Mean | 1.48 | 75.04 | 31.63 |
| Maximum | 5.00 | 192.00 | 84.00 |
| Minimum | 0.31 | 14.00 | 3.00 |
| Count | 55 | 62 | 62 |

| Toners | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|---------------|--------|-----------|----------------------|
| Mean | 0.67 | 177.00 | 74.00 |
| Maximum | 1.50 | 389.00 | 285.00 |
| Minimum | 0.30 | 92.00 | 9.00 |
| Count | 7 | 9 | 9 |

| Jefferson (swede's Bay) | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|--------------------------------|--------|-----------|----------------------|
| Mean | 0.96 | 223.75 | 45.57 |
| Maximum | 1.83 | 644.00 | 129.00 |
| Minimum | 0.30 | 29.00 | 1.00 |
| Count | 22 | 48 | 33 |

| West Jeffersc | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|----------------------|--------|-----------|----------------------|
| Mean | 1.05 | 82.79 | 50.27 |
| Maximum | 4.00 | 178.00 | 96.00 |
| Minimum | 0.30 | 27.00 | 1.00 |
| Count | 53 | 62 | 63 |

* Indicates only one year of WQ data collected, 2 years required to be "fully assessed".

Upper Cannon River Lobe Lake Monitoring Data Summary

| Dudley | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|---------------|--------|-----------|----------------------|
| Mean | 2.02 | 30.00 | 11.50 |
| Maximum | 3.05 | 38.00 | 27.00 |
| Minimum | 1.22 | 21.00 | 5.00 |
| Count | 17 | 17 | 7 |

| Kelly | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|--------------|--------|-----------|----------------------|
| Mean | 1.75 | 39.00 | 7.70 |
| Maximum | 2.10 | 150.00 | 36.00 |
| Minimum | 1.50 | 3.00 | 1.22 |
| Count | 11 | 24 | 24 |

| Fish | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|-------------|--------|-----------|----------------------|
| Mean | 4.00 | 14.80 | 3.60 |
| Maximum | 5.00 | 36.00 | 7.00 |
| Minimum | 3.50 | 8.00 | 1.00 |
| Count | 12 | 12 | 12 |

| Lower sakatah | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|----------------------|--------|-----------|----------------------|
| Mean | 2.22 | 326.00 | 36.00 |
| Maximum | 5.20 | 669.00 | 153.00 |
| Minimum | 0.79 | 95.00 | 1.20 |
| Count | 11 | 20 | 0.3 |

| French | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|---------------|--------|-----------|----------------------|
| Mean | 1.20 | 1.01 | 53.00 |
| Maximum | 4.20 | 264.00 | 142.00 |
| Minimum | 0.46 | 4.00 | 7.30 |
| Count | 34 | 36 | 28 |

| Mabel | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|--------------|--------|-----------|----------------------|
| Mean | 1.10 | 110.00 | 81.00 |
| Maximum | 5.40 | 173.00 | 178.00 |
| Minimum | 0.30 | 39.00 | 12.00 |
| Count | 12 | 16 | 11 |

| Gorman | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|---------------|--------|-----------|----------------------|
| Mean | 1.79 | 952.00 | 29.00 |
| Maximum | 6.50 | 1980.00 | 68.00 |
| Minimum | 0.30 | 0.34 | 1.60 |
| Count | 24 | 32 | 21 |

| Upper Sakatah | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|----------------------|--------|-----------|----------------------|
| Mean | 1.40 | 637.00 | 36.00 |
| Maximum | 4.60 | 1710.00 | 117.00 |
| Minimum | 0.35 | 171.00 | 1.80 |
| Count | 20 | 39 | 31 |

| Horseshoe | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|------------------|--------|-----------|----------------------|
| Mean | 0.56 | 87.00 | 69.00 |
| Maximum | 1.50 | 113.00 | 107.00 |
| Minimum | 0.30 | 46.00 | 13.00 |
| Count | 17 | 17 | 17 |

| Perch* | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|---------------|--------|-----------|----------------------|
| Mean | 2.30 | 20.50 | 6.00 |
| Maximum | 2.90 | 24.00 | 12.00 |
| Minimum | 1.80 | 19.00 | 3.00 |
| Count | 4 | 8 | 4 |

| Hunt | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|-------------|--------|-----------|----------------------|
| Mean | 0.80 | 90.10 | 61.00 |
| Maximum | 2.70 | 142.00 | 115.00 |
| Minimum | 0.30 | 28.00 | 3.00 |
| Count | 11 | 11 | 11 |

| Middle Jefferson | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|-------------------------|--------|-----------|----------------------|
| Mean | 0.85 | 164.76 | 56.80 |
| Maximum | 1.95 | 861.00 | 426.00 |
| Minimum | 0.15 | 22.00 | 1.00 |
| Count | 54 | 66 | 59 |

* Indicates only one year of WQ data collected, 2 years required to be "fully assessed".

Straight River Lobe Lake Monitoring Data Summary

| Sprague* | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|-----------------|--------|-----------|----------------------|
| Mean | 0.18 | 357.73 | 279.97 |
| Maximum | 0.25 | 388.00 | 602.00 |
| Minimum | 0.15 | 313.00 | 18.90 |
| Count | 3 | 3 | 3 |

| Goose* | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|---------------|--------|-----------|----------------------|
| Mean | 0.93 | 180.40 | 18.40 |
| Maximum | 1.66 | 350.00 | 34.00 |
| Minimum | 0.50 | 54.00 | 53.00 |
| Count | 5 | 5 | 5 |

| Oak Glen | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|-----------------|--------|-----------|----------------------|
| Mean | N/A | N/A | N/A |
| Maximum | N/A | N/A | N/A |
| Minimum | N/A | N/A | N/A |
| Count | N/A | N/A | N/A |

| Watkins* | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|-----------------|--------|-----------|----------------------|
| Mean | 0.86 | 154.80 | 19.80 |
| Maximum | 1.33 | 198.00 | 39.00 |
| Minimum | 0.33 | 111.00 | 6.00 |
| Count | 5 | 5 | 5 |

| Beaver* | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|----------------|--------|-----------|----------------------|
| Mean | 2.40 | 22.00 | 6.40 |
| Maximum | 2.44 | 28.00 | 8.00 |
| Minimum | 2.29 | 20.00 | 5.00 |
| Count | 5 | 5 | 5 |

| Clear | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|--------------|--------|-----------|----------------------|
| Mean | 1.44 | 103.22 | 29.40 |
| Maximum | 4.57 | 303.00 | 118.00 |
| Minimum | 0.24 | 1.00 | 0.40 |
| Count | 108 | 125 | 116 |

| Rice* | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|--------------|--------|-----------|----------------------|
| Mean | 0.60 | 1403.00 | 60.60 |
| Maximum | 0.83 | 5170.00 | 112.00 |
| Minimum | 0.33 | 26.00 | 2.00 |
| Count | 5 | 5 | 5 |

| Loon | Secchi | TP (ug/L) | Chlorophyll-A (ug/L) |
|-------------|--------|-----------|----------------------|
| Mean | 1.09 | 268.31 | 35.10 |
| Maximum | 2.40 | 3043.00 | 187.00 |
| Minimum | 0.24 | 28.00 | 1.12 |
| Count | 81 | 100 | 88 |

* Indicates only one year of WQ data collected, 2 years required to be "fully assessed".

Middle Cannon River Lobe Lake Monitoring Data Summary

| Byllesby | Secchi (m) | TP (ug/L) | Chlorophyll-A (ug/L) |
|-----------------|------------|-----------|----------------------|
| Mean | 0.91 | 232.04 | 48.57 |
| Maximum | 2.70 | 482.00 | 98.00 |
| Minimum | 0.30 | 80.00 | 4.00 |
| Count | 73 | 75 | 35 |

| Fox | Secchi (m) | TP (ug/L) | Chlorophyll-A (ug/L) |
|------------|------------|-----------|----------------------|
| Mean | 1.36 | 81.09 | 43.03 |
| Maximum | 3.50 | 290.00 | 192.00 |
| Minimum | 0.46 | 5.00 | 1.60 |
| Count | 34 | 34 | 31 |

| Chub | Secchi (m) | TP (ug/L) | Chlorophyll-A (ug/L) |
|-------------|------------|-----------|----------------------|
| Mean | 0.58 | 181.06 | 143.67 |
| Maximum | 1.50 | 335.00 | 178.00 |
| Minimum | 0.20 | 40.00 | 95.00 |
| Count | 11 | 17 | 6 |

| Union | Secchi (m) | TP (ug/L) | Chlorophyll-A (ug/L) |
|--------------|------------|-----------|----------------------|
| Mean | 0.48 | 368.00 | 71.00 |
| Maximum | 0.61 | 610.00 | 172.00 |
| Minimum | 0.38 | 40.00 | 20.00 |
| Count | 11 | 17 | 6 |

| Circle | Secchi (m) | TP (ug/L) | Chlorophyll-A (ug/L) |
|---------------|------------|-----------|----------------------|
| Mean | 0.87 | 435.39 | 77.14 |
| Maximum | 3.25 | 2743.00 | 425.00 |
| Minimum | 0.23 | 40.00 | 3.00 |
| Count | 30 | 36 | 24 |

| Mazaska | Secchi (m) | TP (ug/L) | Chlorophyll-A (ug/L) |
|----------------|------------|-----------|----------------------|
| Mean | 1.14 | 130.44 | 109.23 |
| Maximum | 3.20 | 1760.00 | 1690.00 |
| Minimum | 0.66 | 27.00 | 6.09 |
| Count | 30 | 32 | 23 |

Met Council Grades for Cannon River Watershed Lakes

| Lake (Years observed) | Met Council Secchi rating (m) | Met Council TP rating (ug/L) | Met Council Chlorophyll-A rating (ug/L) |
|--------------------------|----------------------------------|---------------------------------|--|
| Beaver* (2008) | B | A | A |
| Bossuot** | | | |
| Byllesby ('91-09) | F | F | D |
| Cannon ('03-09) | D | F | D |
| Caron ('02-08) | F | F | F |
| Cedar ('80-09) | D | D | C |
| Circle ('80-09) | D | F | F |
| Charles* (2007) | C | B | B |
| Chub ('95-04) | F | F | F |
| Clear ('60-09) | F | D | C |
| Diamond ('07-08) | F | D | B |
| Dora ('07-08) | D | F | F |
| Dudley ('99-08) | C | B | B |
| Everson** | | | |
| Fish ('07-08) | A | A | A |
| Fox ('55-08) | C | D | C |
| Frances ('80-07) | F | C | B |
| French ('79-08) | C | D | D |
| German ('56-09) | F | C | C |
| Goose* (2010) | D | F | B |
| Gorman ('89-08) | C | F | C |
| Horseshoe ('81-08) | F | D | D |
| Hunt ('07-08) | D | D | D |
| East Jefferson ('56-09) | F | D | C |
| Middle Jefferson ('79- | F | F | D |
| West Jefferson ('90-05) | F | D | D |
| Jefferson (Swede's Bay) | F | F | C |
| Kelly ('80-08) | C | C | A |
| Knutson** | | | |
| Loon ('73-09) | D | F | C |
| Lower Sakatah ('03-07) | B | F | C |
| Mabel ('07-08) | D | D | F |
| Mazaska ('55-07) | F | D | D |
| Mud** | | | |
| Oak Glen** | | | |
| Perch* (2008) | B | A | A |
| Reeds ('81-08) | C | C | C |
| Rice-Lesueur* (2007) | A | F | A |
| Rice-Waseca*(2010) | F | F | D |
| Roberds ('80-07) | D | F | F |
| Roemhildts ('08-10) | A | A | A |
| Round* (2008) | F | D | D |
| Sabre ('07-08) | C | F | B |
| Sasse** | | | |
| Shields Lake ('80-07) | D | F | C |
| Silver ('08-10) | C | D | C |
| Sprague* (2002) | F | F | F |
| Sunfish ('80-08) | D | C | C |
| Tetonka ('55-07) | C | F | C |
| Toners ('08-10) | F | F | D |
| Tustin ('96-08) | F | F | F |
| Union ('03-04) | F | D | D |
| Upper Sakatah ('07-08) | C | F | C |

Met Council Grades for Cannon River Watershed Lakes

| | | | |
|---------------------|---|---|---|
| Volney ('81-07) | D | C | C |
| Watkins* (2010) | F | F | B |
| Weinberger** | | | |
| Wells ('99-08) | F | F | D |
| Willing** | | | |

* Indicates only one year of WQ data collected, 2 years required to be "fully assessed".

** Indicates no water quality data available

Years observed is the range in which lake data was derived

Data Summaries for Stream Monitoring Sites in the Cannon River Watershed

| S000-003 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|--------|
| Mean | 0.022 | 2.65 | 1.17 | 0.20 | N/A |
| Maximum | 0.126 | 6.81 | 1.94 | 0.47 | N/A |
| Minimum | 0.001 | 0.43 | 0.60 | 0.07 | N/A |
| Count | 24 | 25 | 25 | 25 | N/A |

| S001-445 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | N/A | 10.11 | 0.15 | 0.11 | 878.00 |
| Maximum | N/A | 16.60 | 0.36 | 0.49 | 2420.00 |
| Minimum | N/A | 0.03 | 0.06 | 0.01 | 69.70 |
| Count | N/A | 27 | 8 | 64 | 32.00 |

| S000-038 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.014 | 2.81 | 1.52 | 0.42 | 372.90 |
| Maximum | 0.033 | 7.75 | 2.67 | 0.77 | 2419.60 |
| Minimum | 0.002 | 0.81 | 0.90 | 0.19 | 1.00 |
| Count | 24 | 24 | 23 | 24 | 29.00 |

| S001-446 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | N/A | 12.65 | N/A | 0.07 | 420.00 |
| Maximum | N/A | 17.70 | N/A | 0.19 | 2420.00 |
| Minimum | N/A | 2.32 | N/A | 0.03 | 4.10 |
| Count | N/A | 14 | N/A | 18 | 30.00 |

| S000-543 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.029 | 2.10 | 1.76 | 0.29 | 348.00 |
| Maximum | 0.077 | 6.17 | 2.60 | 0.50 | 2420.00 |
| Minimum | 0.001 | 0.29 | 1.13 | 0.02 | 1.00 |
| Count | 15 | 14 | 13 | 15 | 60.00 |

| S001-582 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|--------|
| Mean | 0.015 | 2.82 | 1.20 | 0.30 | N/A |
| Maximum | 0.051 | 7.77 | 1.60 | 0.40 | N/A |
| Minimum | 0.003 | 1.00 | 0.83 | 0.18 | N/A |
| Count | 22 | 22 | 22 | 22 | N/A |

| S001-244 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|--------|
| Mean | 0.213 | 3.16 | 0.65 | 0.08 | N/A |
| Maximum | 4.000 | 7.88 | 1.27 | 0.34 | N/A |
| Minimum | 0.001 | 1.31 | 0.33 | 0.04 | N/A |
| Count | 19 | 24 | 23 | 24 | N/A |

| S001-762 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.015 | 2.66 | 1.15 | 0.30 | 301.00 |
| Maximum | 0.070 | 9.09 | 4.27 | 0.45 | 2420.00 |
| Minimum | 0.020 | 0.85 | 0.08 | 0.05 | 3.00 |
| Count | 26 | 26 | 26 | 26 | 60.00 |

| S001-275 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|--------|
| Mean | 0.003 | 4.61 | 0.76 | 0.06 | N/A |
| Maximum | 0.010 | 8.29 | 1.65 | 0.15 | N/A |
| Minimum | 0.001 | 2.39 | 0.36 | 0.02 | N/A |
| Count | 20 | 25 | 20 | 25 | N/A |

| S001-766 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 1.740 | 2.84 | 0.89 | 0.16 | 259.00 |
| Maximum | 22.000 | 6.69 | 1.51 | 0.33 | 2420.00 |
| Minimum | 0.002 | 1.46 | 0.53 | 0.07 | 0.50 |
| Count | 27 | 24 | 20 | 24 | 61.00 |

| S001-396 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|--------|
| Mean | 0.013 | 2.71 | 1.21 | 0.35 | 30.50 |
| Maximum | 0.046 | 7.53 | 1.60 | 0.53 | 33.10 |
| Minimum | 0.002 | 0.92 | 0.73 | 0.18 | 27.90 |
| Count | 24 | 25 | 25 | 25 | 2.00 |

| S001-782 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 13.160 | 2.71 | 1.21 | 0.35 | 222.00 |
| Maximum | 46.000 | 7.53 | 1.60 | 0.53 | 2420.00 |
| Minimum | 2.000 | 0.92 | 0.73 | 0.18 | 2.00 |
| Count | 24 | 25 | 25 | 25 | 58.00 |

Data Summaries for Stream Monitoring Sites in the Cannon River Watershed

| S001-397 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|--------|
| Mean | 0.007 | 1.94 | 1.22 | 0.21 | N/A |
| Maximum | 0.049 | 4.36 | 1.97 | 0.56 | N/A |
| Minimum | 0.001 | 0.46 | 0.53 | 0.04 | N/A |
| Count | 23 | 23 | 18 | 23 | N/A |

| S001-783 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.019 | 0.30 | 1.65 | 0.30 | 137.00 |
| Maximum | 0.093 | 1.57 | 2.64 | 0.60 | 1986.00 |
| Minimum | 0.001 | 0.03 | 0.92 | 0.09 | 0.50 |
| Count | 24 | 21 | 23 | 24 | 56.00 |

| S001-436 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.004 | 3.41 | 0.60 | 0.09 | 908.00 |
| Maximum | 0.021 | 8.89 | 2.35 | 0.35 | 2420.00 |
| Minimum | 0.001 | 0.42 | 0.00 | 0.03 | 49.60 |
| Count | 23 | 24 | 22 | 24 | 22.00 |

| S001-785 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|--------|
| Mean | 0.003 | 4.46 | 0.83 | 0.05 | N/A |
| Maximum | 0.010 | 8.55 | 2.07 | 0.19 | N/A |
| Minimum | 0.001 | 2.09 | 0.55 | 0.02 | N/A |
| Count | 25 | 25 | 19 | 25 | N/A |

| S004-845 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.017 | 2.56 | 1.54 | 0.31 | 265.00 |
| Maximum | 0.081 | 6.00 | 2.55 | 0.58 | 2419.00 |
| Minimum | 0.001 | 0.05 | 0.62 | 0.09 | 7.40 |
| Count | 17 | 19 | 19 | 19 | 35.00 |

| S004-847 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.005 | 1.63 | 1.70 | 0.31 | 309.00 |
| Maximum | 0.015 | 5.30 | 2.70 | 0.55 | 1986.00 |
| Minimum | 0.001 | 0.00 | 1.20 | 0.07 | 1.00 |
| Count | 19 | 19 | 19 | 19 | 31.00 |

| S004-846 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.003 | 5.00 | 0.53 | 0.08 | 209.00 |
| Maximum | 0.020 | 14.25 | 0.96 | 0.24 | 2419.00 |
| Minimum | 0.001 | 0.05 | 0.33 | 0.02 | 1.00 |
| Count | 19 | 22 | 13 | 25 | 50.00 |

| S004-848 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.004 | 5.65 | 1.26 | 0.17 | 350.00 |
| Maximum | 0.029 | 13.53 | 7.07 | 0.31 | 1299.70 |
| Minimum | 0.001 | 0.44 | 0.66 | 0.04 | 3.00 |
| Count | 13 | 17 | 17 | 17 | 33.00 |

| S004-878 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.017 | 3.22 | 1.03 | 0.17 | 628.00 |
| Maximum | 0.151 | 13.30 | 3.95 | 0.38 | 2500.00 |
| Minimum | 0.001 | 0.22 | 0.00 | 0.07 | 2.00 |
| Count | 18 | 21 | 20 | 21 | 40.00 |

| S004-917 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|--------|
| Mean | 0.040 | 1.75 | 0.91 | 0.08 | 67.20 |
| Maximum | 0.150 | 4.45 | 1.37 | 0.28 | 574.10 |
| Minimum | 0.007 | 0.27 | 0.58 | 0.04 | 3.10 |
| Count | 26 | 26 | 26 | 26 | 30.00 |

| S005-496 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|--------|
| Mean | 0.003 | 4.35 | 0.66 | 0.06 | N/A |
| Maximum | 0.024 | 10.39 | 1.12 | 0.10 | N/A |
| Minimum | 0.001 | 0.05 | 0.00 | 0.02 | N/A |
| Count | 23 | 24 | 22 | 24 | N/A |

| S005-497 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|--------|
| Mean | 0.006 | 5.83 | 0.77 | 0.07 | N/A |
| Maximum | 0.028 | 12.80 | 2.28 | 0.36 | N/A |
| Minimum | 0.000 | 0.03 | 0.33 | 0.02 | N/A |
| Count | 20 | 24 | 22 | 24 | N/A |

Data Summaries for Stream Monitoring Sites in the Cannon River Watershed

| S001-935 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.143 | 0.11 | 3.04 | 0.40 | 282.00 |
| Maximum | 0.282 | 0.17 | 4.22 | 0.56 | 2419.00 |
| Minimum | 0.052 | 0.04 | 2.32 | 0.28 | 0.50 |
| Count | 10 | 2 | 10 | 10 | 37.00 |

| S004-711 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|--------|
| Mean | 0.006 | 2.77 | 0.71 | 0.15 | n/A |
| Maximum | 0.015 | 8.95 | 1.32 | 0.33 | n/A |
| Minimum | 0.002 | 0.09 | 0.09 | 0.06 | n/A |
| Count | 25 | 25 | 24 | 25 | n/A |

| S001-939 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.004 | 2.72 | 0.86 | 0.11 | 492.00 |
| Maximum | 0.011 | 6.40 | 4.00 | 1.23 | 2420.00 |
| Minimum | 0.001 | 1.44 | 0.35 | 0.02 | 6.30 |
| Count | 25 | 25 | 10 | 25 | 54.00 |

| S004-843 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.004 | 3.37 | 0.96 | 0.10 | 663.00 |
| Maximum | 0.017 | 7.68 | 2.33 | 0.48 | 2419.00 |
| Minimum | 0.001 | 0.26 | 0.38 | 0.03 | 2.00 |
| Count | 19 | 23 | 12 | 23 | 50.00 |

| S002-532 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.003 | 2.86 | 0.67 | 0.05 | 416.00 |
| Maximum | 0.008 | 4.92 | 1.75 | 0.23 | 2420.00 |
| Minimum | 0.001 | 1.83 | 0.03 | 0.02 | 0.50 |
| Count | 25 | 25 | 8 | 25 | 55.00 |

| S004-849 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.014 | 0.43 | 0.95 | 0.26 | 289.00 |
| Maximum | 0.123 | 0.78 | 1.52 | 0.39 | 1986.00 |
| Minimum | 0.001 | 0.03 | 0.58 | 0.07 | 2.00 |
| Count | 25 | 25 | 23 | 25 | 53.00 |

| S003-554 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|--------|
| Mean | 0.004 | 1.11 | 0.79 | 0.12 | N/A |
| Maximum | 0.017 | 4.79 | 1.67 | 0.35 | N/A |
| Minimum | 0.001 | 0.08 | 0.50 | 0.05 | N/A |
| Count | 20 | 24 | 24 | 24 | N/A |

| S004-877 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.008 | 3.27 | 1.31 | 0.29 | 379.00 |
| Maximum | 0.029 | 11.67 | 2.18 | 0.67 | 2500.00 |
| Minimum | 0.001 | 0.00 | 0.67 | 0.05 | 3.10 |
| Count | 23 | 23 | 25 | 25 | 45.00 |

| S004-388 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.005 | 1.77 | 0.72 | 0.11 | 847.00 |
| Maximum | 0.025 | 6.59 | 1.13 | 0.28 | 2420.00 |
| Minimum | 0.001 | 0.09 | 0.42 | 0.05 | 1.00 |
| Count | 22 | 23 | 22 | 23 | 57.00 |

| S005-492 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|--------|
| Mean | 0.030 | 0.47 | 2.21 | 0.38 | N/A |
| Maximum | 0.121 | 1.21 | 6.19 | 1.06 | N/A |
| Minimum | 0.001 | 0.11 | 1.23 | 0.05 | N/A |
| Count | 14 | 11 | 14 | 14 | N/A |

| S004-389 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.009 | 0.69 | 1.28 | 0.39 | 234.00 |
| Maximum | 0.102 | 2.05 | 2.13 | 0.60 | 1986.00 |
| Minimum | 0.001 | 0.09 | 0.68 | 0.11 | 0.50 |
| Count | 23 | 23 | 23 | 24 | 46.00 |

| S001-586 | Chlorophyll-a (mg/L) | Nitrate-Nitrogen (mg/L) | TKN (mg/L) | TP (mg/L) | E coli |
|-----------------|----------------------|-------------------------|------------|-----------|---------|
| Mean | 0.004 | 3.00 | 1.12 | 0.27 | 343.00 |
| Maximum | 0.022 | 8.46 | 1.62 | 0.64 | 1732.00 |
| Minimum | 0.001 | 0.04 | 0.51 | 0.05 | 5.20 |
| Count | 22 | 22 | 24 | 25 | 43.00 |

Cannon River Watershed Stream Nutrient Trends (2007-2010)

| Watershed Lobe | Stream | MPCA STORET ID # | Chlorophyll-A | Nitrogen | TKN | Total phosphorus | E. coli Bacteria |
|----------------|--------------------------------|------------------|---------------|----------|-----|------------------|------------------|
| Lower | Cannon River | S000-003 | ↓ | ↑ | ↑ | ↑ | - |
| Middle | Cannon River | S000-038 | ↑ | ↑ | ↑ | ↓ | ↓ |
| Middle | Cannon River | S000-543 | ↑ | ↑ | ↑ | ↑ | ↓ |
| Middle | Cannon River | S001-782 | ↑ | ↑ | ↑ | ↑ | ↓ |
| Middle | Unnamed Trib. to Prairie Creek | S001-244 | ↑ | ↑ | ↑ | ↓ | - |
| Middle | Unnamed Trib. to Prairie Creek | S001-275 | ↓ | ↑ | ↑ | ↑ | - |
| Middle | Cannon River | S001-396 | ↑ | ↑ | ↑ | ↑ | - |
| Middle | Wolf Creek | S001-397 | ↑ | ↓ | ↑ | ↑ | - |
| Lower | Little Cannon River | S001-436 | ↓ | ↑ | ↓ | ↓ | ↑ |
| Middle | Cannon River | S001-582 | ↑ | ↑ | ↑ | ↑ | - |
| Upper | Waterville Creek | S001-586 | ↓ | ↑ | ↑ | ↑ | ↑ |
| Middle | Cannon River | S001-762 | ↑ | ↑ | ↑ | ↑ | ↓ |
| Lower | Cannon River | S001-766 | ↓ | ↑ | ↑ | ↑ | ↓ |
| Lower | Cannon River | S001-783 | ↑ | ↑ | ↑ | ↑ | ↑ |
| Middle | Prairie Creek | S001-785 | ↑ | ↑ | ↑ | ↑ | - |
| Middle | Heath Creek | S001-935 | ↑ | ↑ | ↑ | ↓ | ↑ |
| Lower | Little Cannon River | S001-939 | ↓ | ↑ | ↑ | ↑ | ↓ |
| Lower | Belle Creek | S002-532 | ↑ | ↑ | ↑ | ↑ | ↓ |
| Middle | Spring Creek | S003-554 | ↓ | ↓ | ↓ | ↑ | - |
| Lower | Belle Creek | S004-388 | ↑ | ↑ | ↓ | ↓ | ↑ |
| Middle | Heath Creek | S004-389 | ↓ | ↑ | ↑ | ↑ | ↑ |
| Upper | Crocker's Creek | S004-843 | ↓ | ↓ | ↑ | ↑ | ↑ |
| Middle | N. Grove Church Creek | S004-849 | ↓ | ↓ | ↑ | ↑ | ↓ |
| Straight | Falls Creek | S004-846 | ↓ | ↑ | ↑ | ↓ | ↑ |
| Straight | Straight River | S004-711 | ↓ | ↑ | ↑ | ↑ | - |
| Upper | Devil's Creek | S004-845 | ↑ | ↑ | ↓ | ↑ | ↑ |
| Upper | Lake Dora Creek | S004-847 | ↓ | ↑ | ↑ | ↑ | ↑ |
| Upper | Mackenzie Creek | S004-848 | ↓ | ↑ | ↑ | ↑ | ↓ |
| Upper | Whitewater Creek | S004-877 | ↓ | ↑ | ↑ | ↓ | ↑ |
| Upper | Riverside Cem. Creek | S004-878 | ↓ | ↑ | ↑ | ↑ | ↑ |
| Middle | Spring Creek | S004-917 | ↓ | ↓ | ↑ | ↑ | ↑ |
| Middle | Wolf Creek | S005-492 | ↑ | ↓ | ↑ | ↑ | - |
| Lower | Little Cannon River | S005-496 | ↓ | ↑ | ↓ | ↑ | - |
| Lower | Little Cannon River | S005-497 | ↓ | ↑ | ↓ | ↑ | - |
| Middle | Rice Creek | S001-445 | - | ↑ | - | ↑ | ↑ |
| Middle | Rice Creek | S001-446 | - | ↑ | - | ↑ | ↑ |

- indicates no data available