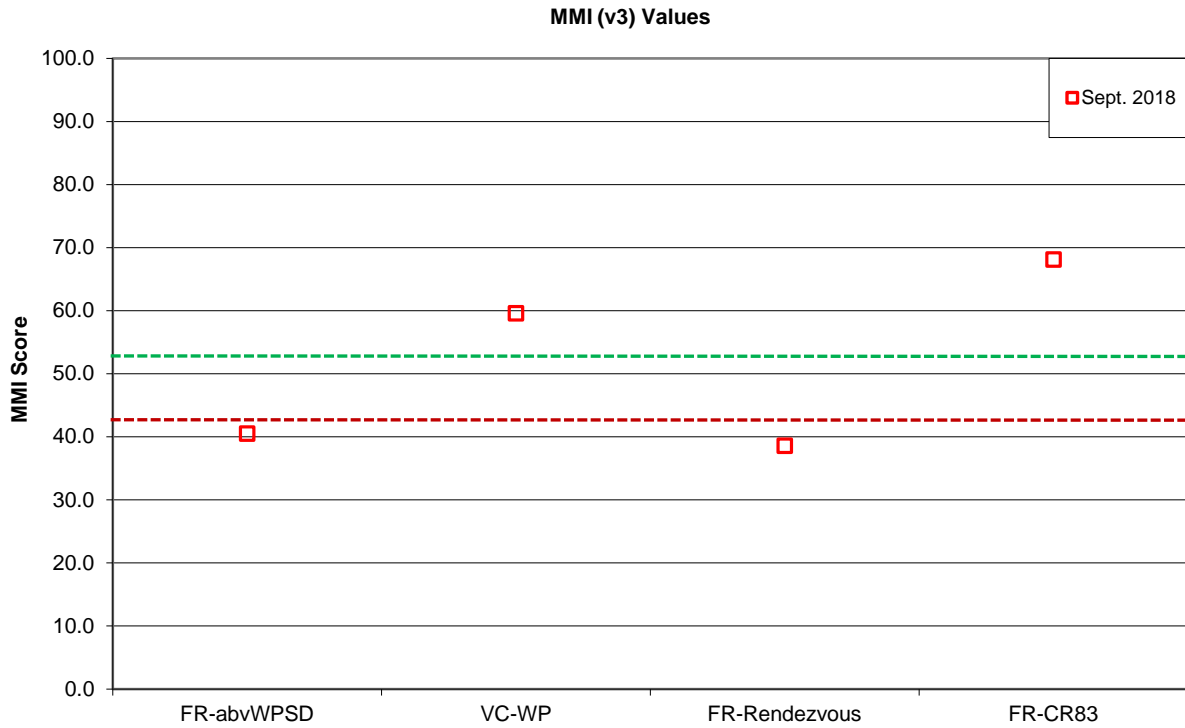


**Table 1. Study sites in the Denver Water study area sampled during September 2018.**

| Station ID    | Location   | Latitude | Longitude  | Elevation (m) |
|---------------|--|----------|------------|---------------|
| FR-abvWPSD    | Fraser River abv Winter Park Sanitation District | 39.89445 | -105.76821 | 2878          |
| VC-WP         | Vasquez Creek at Winter Park                     | 39.9203  | -105.78498 | 2706          |
| FR-Rendezvous | Fraser River at Rendezvous Bridge                | 39.93412 | -105.7896  | 2678          |
| FR-CR83       | Fraser River at Tabernash below bridge on CR83   | 39.99053 | -105.8299  | 2558          |

**Table 2. Individual metrics and MMI (v3) scores from benthic macroinvertebrate samples collected in the Denver Water study area (Fraser River and Vasquez Creek) in September 2018. MMI (v3) scores indicating ‘impairment’ are provided in red.**

| Metric                 | Station ID        |             |               |             |
|------------------------|-------------------|-------------|---------------|-------------|
|                        | FR-abvWPSD        | VC-WP       | FR-Rendezvous | FR-CR83     |
| EP Taxa                | 37.3              | 80.2        | 17.7          | 68.0        |
| Percent Chironomidae   | 69.6              | 80.8        | 63.5          | 86.2        |
| Sens. Plains Families  | 28.6              | 34.7        | 18.5          | 65.1        |
| Predator-Shredder Taxa | 64.3              | 71.4        | 85.7          | 64.3        |
| Clinger Taxa           | 0.0               | 34.9        | 19.6          | 77.7        |
| Non-Insect Percent     | 43.0              | 55.5        | 26.4          | 47.3        |
| <b>MMI</b>             | <b>40.5</b>       | <b>59.6</b> | <b>38.6</b>   | <b>68.1</b> |
|                        | Auxiliary Metrics |             |               |             |
| <b>Diversity</b>       | 3.53              | 3.78        | 3.43          | 3.26        |
| <b>HBI</b>             | 4.33              | 4.82        | 4.87          | 3.10        |



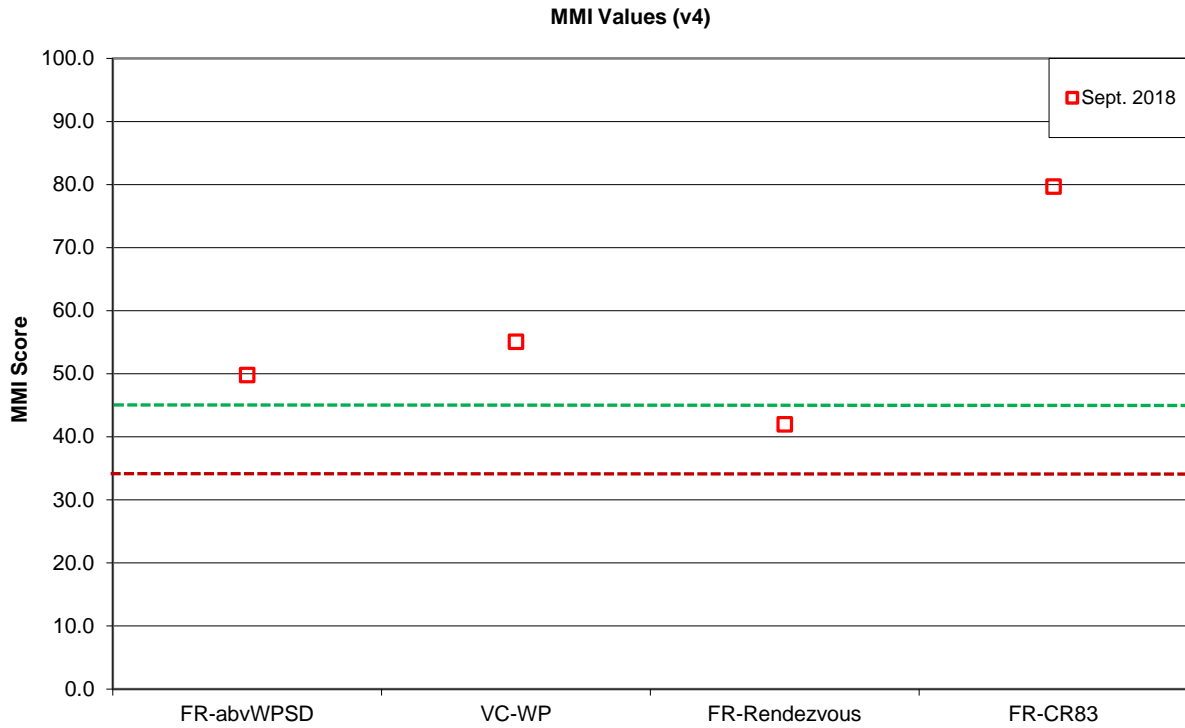
**Figure 1. MMI (v3) scores from study sites in the Denver Water study area (Fraser River and Vasquez Creek) during September 2018.**

**Table 3. Aquatic life use designations based on MMI (v3) scores from samples at sites in the Denver Water study area during September 2018.**

| Aquatic Life Use Designations in 2018 |            |
|---------------------------------------|------------|
| Site                                  |            |
| FR-abvWPSD                            | Impairment |
| VC-WP                                 | Attainment |
| FR-Rendezvous                         | Impairment |
| FR-CR83                               | Attainment |

**Table 4. Individual metrics and MMI (v4) scores from benthic macroinvertebrate samples collected in the Denver Water study area (Fraser River and Vasquez Creek) during September 2018. MMI (v4) scores indicating ‘impairment’ are provided in red.**

| Metric                         | Station ID        |             |               |             |
|--------------------------------|-------------------|-------------|---------------|-------------|
|                                | FR-abvWPSD        | VC-WP       | FR-Rendezvous | FR-CR83     |
| EPT Taxa                       | 54.2              | 78.3        | 37.5          | 79.2        |
| % Non-Insect Individuals       | 49.8              | 22.9        | 28.5          | 95.9        |
| % EPT Individuals, no Baetidae | 19.3              | 19.6        | 22.7          | 85.3        |
| % Coleoptera Individuals       | 38.2              | 49.9        | 21.9          | 42.5        |
| % Intolerant Taxa              | 75.7              | 97.0        | 56.5          | 90.4        |
| % Increasers Mid-Elevation     | 58.7              | 32.4        | 42.2          | 98.3        |
| Clinger Taxa                   | 38.5              | 69.4        | 48.1          | 81.7        |
| Predator/Shredder Taxa         | 64.3              | 71.4        | 78.6          | 64.3        |
| <b>MMI</b>                     | <b>49.8</b>       | <b>55.1</b> | <b>42.0</b>   | <b>79.7</b> |
|                                | Auxiliary Metrics |             |               |             |
| <b>Diversity</b>               | 3.57              | 3.80        | 3.43          | 3.42        |
| <b>HBI</b>                     | 4.19              | 4.05        | 3.62          | 2.90        |
| <b>TIV (Sediment Region 2)</b> | 5.76              | 5.51        | 5.47          | 4.96        |



**Figure 2. MMI (v4) scores from study sites in the Denver Water study area during September 2018.**

**Table 5. Aquatic life use designations based on MMI (v4) scores from samples collected in the Denver Water study area (Fraser River and Vasquez Creek) during September 2018.**

| Aquatic Life Use Designations in 2018 |            |
|---------------------------------------|------------|
| Site                                  |            |
| FR-abvWPSD                            | Attainment |
| VC-WP                                 | Attainment |
| FR-Rendezvous                         | Attainment |
| FR-CR83                               | Attainment |

**Table 6. Additional metrics and comparative values for macroinvertebrate samples collected from the Denver Water study area (Fraser River and Vasquez Creek) in September 2018. All additional metrics based on full count Hess samples.**

| Metric  | FR-abvWPSD | VC-WP  | FR-Rendezvous | FR-CR83 |
|---|------------|--------|---------------|---------|
| Density (#/m <sup>2</sup> )                                   | 5,236      | 3,228  | 8,449         | 8,672   |
| Taxa Richness   | 35         | 43     | 39            | 44      |
| EPT   | 19         | 26     | 14            | 23      |
| Density of <i>Pteronarcys californica</i> (#/m <sup>2</sup> ) | 0          | 0      | 0             | 0       |
| Percent EPT excluding Baetidae                                | 11.72%     | 13.51% | 16.27%        | 62.38%  |
| Percent Chironomidae  | 20.25%     | 12.42% | 24.59%        | 10.79%  |

# Colorado Department of Public Health and Environment

## Water Quality Control Division

### Benthic Macroinvertebrate Bioassessment Report

|                      |                                     |                   |                           |            |     |
|----------------------|-------------------------------------|-------------------|---------------------------|------------|-----|
| StationID:           | <b>FR-abvWPSD</b>                   | Sample Date:      | 9/21/2018                 |            |     |
| Waterbody Name:      | <b>Fraser River</b>                 |                   |                           |            |     |
| Location:            | abv Winter Park Sanitation District |                   |                           |            |     |
| Latitude:            | 39.89445                            | Reference Status: | Not Reference or Degraded |            |     |
| Longitude:           | -105.76821                          | BenSampID:        | 1                         | RepNum:    | 1   |
| Site Classification: | 1                                   | Summer Temp:      | 10.99                     | JulianDay: | 263 |

#### Predictive Model Results

O/E (p>half):

Model Test:

#### Multimetric Index Model Results

MMI: 49.8

| Metric Name   | Metric Value | Metric Score |
|---|--------------|--------------|
| Ephemeroptera + Plecoptera + Trichoptera taxa *:                            | 13           | 54.2         |
| Non-Insect, percent individuals:  | 24.3         | 49.8         |
| Ephemeroptera + Plecoptera + Trichoptera, no Baetidae, percent individuals: | 14.1         | 19.3         |
| Coleoptera, percent individuals:  | 14.7         | 38.2         |
| Intolerant, percent taxa *:   | 46.2         | 75.7         |
| Increasers, Mid-Elevation, percent individuals:                             | 9.9          | 58.7         |
| Clinger taxa *:   | 8            | 38.5         |
| Predator + Shredder taxa:   | 9            | 64.3         |
| Total taxa:   | 26           | 0            |
| Intolerant taxa:  | 12           | 0            |
| Increasers, Mountain Trn, percent individuals:                              | 23.1         | 0            |
| Predator taxa:  | 7            | 0            |
| Scraper, percent individuals:   | 2.4          | 0            |
| Non-Insect, percent taxa:   | 15.4         | 0            |
| Sprawler taxa *:  | 6            | 0            |
| Increasers, plains, percent individuals:                                    | 0            | 0            |
| Total individuals:  | 334          | LARGE        |

\* = score (not value) adjusted by Summer temperature or Julian day

# Colorado Department of Public Health and Environment

## Water Quality Control Division

### Benthic Macroinvertebrate Bioassessment Report

|                      |                                   |                   |                           |            |     |
|----------------------|-----------------------------------|-------------------|---------------------------|------------|-----|
| StationID:           | <b>FR-CR83</b>                    | Sample Date:      | 9/20/2018                 |            |     |
| Waterbody Name:      | <b>Fraser River</b>               |                   |                           |            |     |
| Location:            | at Tabernash below bridge on CR83 |                   |                           |            |     |
| Latitude:            | 39.99053                          | Reference Status: | Not Reference or Degraded |            |     |
| Longitude:           | -105.8299                         | BenSampID:        | 2                         | RepNum:    | 1   |
| Site Classification: | 1                                 | Summer Temp:      | 12.21                     | JulianDay: | 262 |

#### Predictive Model Results

O/E (p>half):

Model Test:

#### Multimetric Index Model Results

MMI: 79.7

| Metric Name   | Metric Value | Metric Score |
|---|--------------|--------------|
| Ephemeroptera + Plecoptera + Trichoptera taxa *:                            | 19           | 79.2         |
| Non-Insect, percent individuals:  | 2            | 95.9         |
| Ephemeroptera + Plecoptera + Trichoptera, no Baetidae, percent individuals: | 62.2         | 85.3         |
| Coleoptera, percent individuals:  | 16.3         | 42.5         |
| Intolerant, percent taxa *:   | 55.2         | 90.4         |
| Increasers, Mid-Elevation, percent individuals:                             | 0.4          | 98.3         |
| Clinger taxa *:   | 17           | 81.7         |
| Predator + Shredder taxa:   | 9            | 64.3         |
| Total taxa:   | 29           | 0            |
| Intolerant taxa:  | 16           | 0            |
| Increasers, Mountain Trn, percent individuals:                              | 49.4         | 0            |
| Predator taxa:  | 9            | 0            |
| Scraper, percent individuals:   | 19.1         | 0            |
| Non-Insect, percent taxa:   | 13.8         | 0            |
| Sprawler taxa *:  | 2            | 0            |
| Increasers, plains, percent individuals:                                    | 0            | 0            |
| Total individuals:  | 251          | ok           |

\* = score (not value) adjusted by Summer temperature or Julian day

# Colorado Department of Public Health and Environment

## Water Quality Control Division

### Benthic Macroinvertebrate Bioassessment Report

|                      |                      |                   |                           |            |     |
|----------------------|----------------------|-------------------|---------------------------|------------|-----|
| StationID:           | <b>FR-Rendezvous</b> | Sample Date:      | 9/21/2018                 |            |     |
| Waterbody Name:      | <b>Fraser River</b>  |                   |                           |            |     |
| Location:            | at Rendezvous Bridge |                   |                           |            |     |
| Latitude:            | 39.93412             | Reference Status: | Not Reference or Degraded |            |     |
| Longitude:           | -105.7896            | BenSampID:        | 3                         | RepNum:    | 1   |
| Site Classification: | 1                    | Summer Temp:      | 11.48                     | JulianDay: | 263 |

#### Predictive Model Results

O/E (p>half):

Model Test:

#### Multimetric Index Model Results

MMI: 42.0

| Metric Name   | Metric Value | Metric Score |
|---|--------------|--------------|
| Ephemeroptera + Plecoptera + Trichoptera taxa *:                            | 9            | 37.5         |
| Non-Insect, percent individuals:  | 34.5         | 28.5         |
| Ephemeroptera + Plecoptera + Trichoptera, no Baetidae, percent individuals: | 16.5         | 22.7         |
| Coleoptera, percent individuals:  | 8.4          | 21.9         |
| Intolerant, percent taxa *:   | 34.5         | 56.5         |
| Increasers, Mid-Elevation, percent individuals:                             | 13.8         | 42.2         |
| Clinger taxa *:   | 10           | 48.1         |
| Predator + Shredder taxa:   | 11           | 78.6         |
| Total taxa:   | 29           | 0            |
| Intolerant taxa:  | 10           | 0            |
| Increasers, Mountain Trn, percent individuals:                              | 11.1         | 0            |
| Predator taxa:  | 9            | 0            |
| Scraper, percent individuals:   | 1.2          | 0            |
| Non-Insect, percent taxa:   | 20.7         | 0            |
| Sprawler taxa *:  | 5            | 0            |
| Increasers, plains, percent individuals:                                    | 0            | 0            |
| Total individuals:  | 333          | LARGE        |

\* = score (not value) adjusted by Summer temperature or Julian day



# Colorado Department of Public Health and Environment

## Water Quality Control Division

### Benthic Macroinvertebrate Bioassessment Report

|                      |                      |                   |                           |            |     |
|----------------------|----------------------|-------------------|---------------------------|------------|-----|
| StationID:           | <b>VC-WP</b>         | Sample Date:      | 9/21/2018                 |            |     |
| Waterbody Name:      | <b>Vasquez River</b> |                   |                           |            |     |
| Location:            | at Winter Park       |                   |                           |            |     |
| Latitude:            | 39.9203              | Reference Status: | Not Reference or Degraded |            |     |
| Longitude:           | -105.78498           | BenSampID:        | 4                         | RepNum:    | 1   |
| Site Classification: | 1                    | Summer Temp:      | 13.78                     | JulianDay: | 263 |

#### Predictive Model Results

O/E (p>half):

Model Test:

#### Multimetric Index Model Results

MMI: 55.1

| Metric Name   | Metric Value | Metric Score |
|---|--------------|--------------|
| Ephemeroptera + Plecoptera + Trichoptera taxa *:                            | 18           | 78.3         |
| Non-Insect, percent individuals:  | 37.2         | 22.9         |
| Ephemeroptera + Plecoptera + Trichoptera, no Baetidae, percent individuals: | 14.3         | 19.6         |
| Coleoptera, percent individuals:  | 19.2         | 49.9         |
| Intolerant, percent taxa *:   | 57.6         | 97           |
| Increasers, Mid-Elevation, percent individuals:                             | 16.2         | 32.4         |
| Clinger taxa *:   | 14           | 69.4         |
| Predator + Shredder taxa:   | 10           | 71.4         |
| Total taxa:   | 33           | 0            |
| Intolerant taxa:  | 19           | 0            |
| Increasers, Mountain Trn, percent individuals:                              | 28.6         | 0            |
| Predator taxa:  | 9            | 0            |
| Scraper, percent individuals:   | 4.5          | 0            |
| Non-Insect, percent taxa:   | 12.1         | 0            |
| Sprawler taxa *:  | 5            | 0            |
| Increasers, plains, percent individuals:                                    | 0            | 0            |
| Total individuals:  | 266          | ok           |

\* = score (not value) adjusted by Summer temperature or Julian day