Water Quality Survey of Clark Creek, Sauk County Wisconsin

July 25, 2011

Prepared by

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An environmental assessment of Clark Creek along Highway 113 was conducted from July 22 to July 25, 2011. Aspects of the survey included macroinvertebrate sampling, temperature data logger deployment, flow measurements, dissolved oxygen measurements, pH measurements, specific conductance measurements, transparency tube measurements, and turbidity measurements. Equipment used for this survey included a kick net for macroinvertebrate collection, Onset Hobo temperature logger, Yellow Springs Instrument Co. Model 52 dissolved oxygen meter, Yellow Springs Instrument Co. Model 63 pH/conductivity meter, 120 cm transparency tube, Hach Model 2100P turbidity meter, and Swoffer Model 2100 flow meter.

Water Clarity: The high gradient stream displayed aesthetically pleasing conditions as clear water cascaded over boulders and gravel. The transparency exceeded the 120 cm maximum on both July 22 and 25. Turbidity was nearly non-existent and reached only 1.9 NTU on July 22 and 1.4 NTU on July 25. The flow rate was measured at 3.83 cfs on July 22 and 3.49 cfs on July 25.

Water chemistry: The dissolved oxygen was measured above minimum criterion on both dates; 9.1 mg/l on July 22 and 8.4 mg/l on July 25. Minimal primary production, in either the form of periphytic growths or filamentous algae, was found in the stream and therefore significant diurnal dissolved oxygen fluctuations are unlikely. The dearth of primary production also reflected modest organic or nutrient loading to the stream. The pH and specific conductance measurements were typical for Driftless Area streams; pH = 8.59 and 8.61 s.u. and specific conductance = 498 and 488 uS/cm. These values indicated that the stream displayed alkaline conditions with a modest amount of dissolved minerals.

Temperature: Figure 1 displays three days of water temperatures that ranged from a minimum of 14.9 C (57 F) to 26.9 C (81 F). The daily fluctuations of up to 12 C reflected diurnal effects of strong sunlight coupled with near record air temperatures. The average water temperature was 19.9 C. The complete dataset is presented in Table 1.

Macroinvertebrates: Clark Creek supported a diverse benthic macroinvertebrate community that included 11 family groups. Most of the aquatic insect taxa collected were early instars or immature larval forms as expected are during the summer months. More families would likely be found during Spring or Fall collections when more mature instars exist. Regardless, the

Family-level Biotic Index (FBI) for the stream was calculated at 4.06 or "Very Good Water Quality" (Hilsenhoff 1988). The Ephemeroptera-Plecoptera-Tricoptera (EPT) family index was 5. Figure 2 displays the taxonomic groups that were identified including the numbers found.

Figure 1: Clark Creek Temperature Data

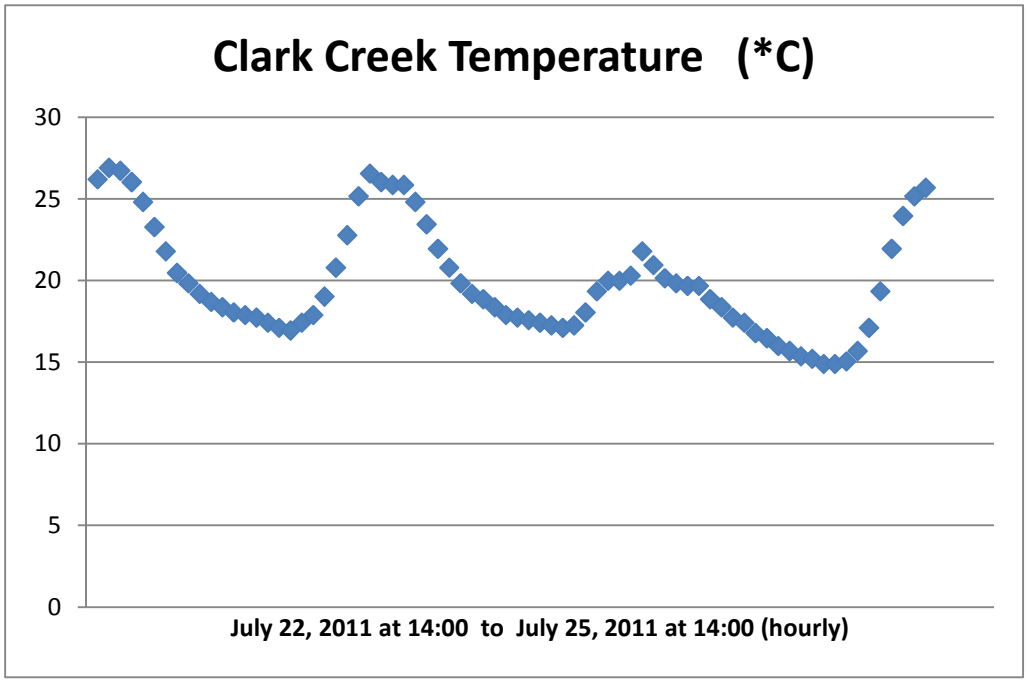


Figure 2: Clark Creek Macroinvertebrate Data

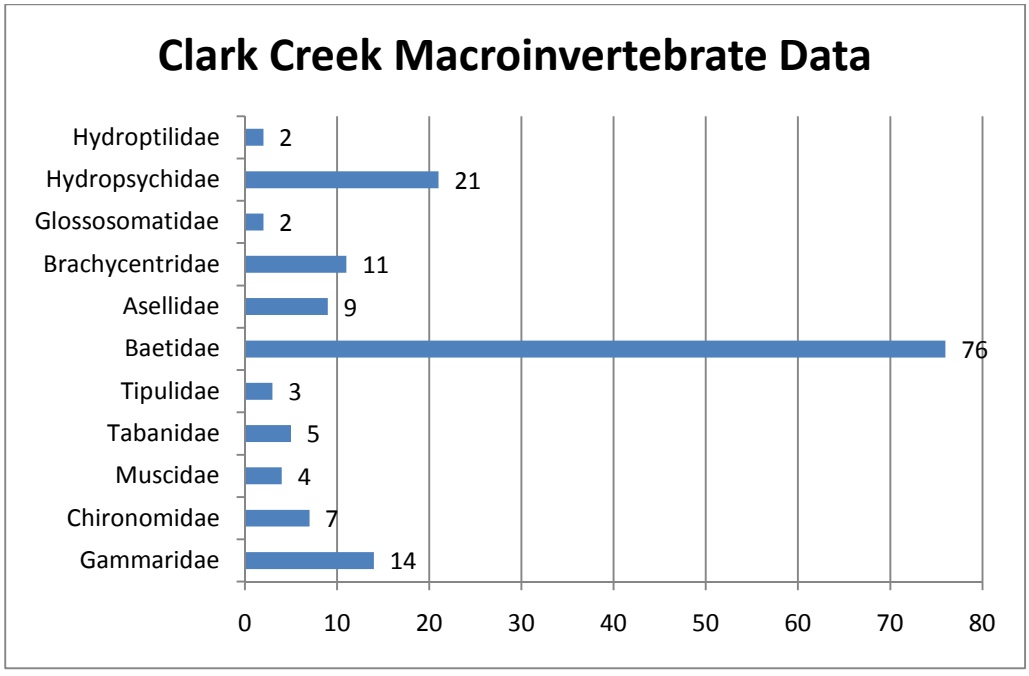

Table 1: Onset Hobo temperature data from July 22, 2011 to July 25, 2011

| Date/Time | Temp (*C) | Date/Time | Temp (*C) | | |
|---|---|---|---|---|---|
| 07/22/11 14:00:00.0 | 26.2 | 07/24/11 09:00:00.0 | 18.04 | Information specific to the logger | |
| 07/22/11 15:00:00.0 | 26.9 | 07/24/11 10:00:00.0 | 19.33 | StowAway-TEMP(C) - 4C TO 37C | |
| 07/22/11 16:00:00.0 | 26.72 | 07/24/11 11:00:00.0 | 19.98 | Points Used | 74 |
| 07/22/11 17:00:00.0 | 26.03 | 07/24/11 12:00:00.0 | 19.98 | First Point | 07/22/11 14:00:00.0 |
| 07/22/11 18:00:00.0 | 24.81 | 07/24/11 13:00:00.0 | 20.29 | Last Point | 07/25/11 15:00:00.0 |
| 07/22/11 19:00:00.0 | 23.27 | 07/24/11 14:00:00.0 | 21.78 | Duration | 3 Days 01:00:00.0 |
| 07/22/11 20:00:00.0 | 21.78 | 07/24/11 15:00:00.0 | 20.94 | Max Value | 26.90 |
| 07/22/11 21:00:00.0 | 20.46 | 07/24/11 16:00:00.0 | 20.13 | Min Value | 14.88 |
| 07/22/11 22:00:00.0 | 19.82 | 07/24/11 17:00:00.0 | 19.82 | Avg Value | 19.93 |
| 07/22/11 23:00:00.0 | 19.17 | 07/24/11 18:00:00.0 | 19.66 | | |
| 07/23/11 00:00:00.0 | 18.68 | 07/24/11 19:00:00.0 | 19.66 | | |
| 07/23/11 01:00:00.0 | 18.36 | 07/24/11 20:00:00.0 | 18.85 | | |
| 07/23/11 02:00:00.0 | 18.04 | 07/24/11 21:00:00.0 | 18.36 | | |
| 07/23/11 03:00:00.0 | 17.88 | 07/24/11 22:00:00.0 | 17.72 | | |
| 07/23/11 04:00:00.0 | 17.72 | 07/24/11 23:00:00.0 | 17.41 | | |
| 07/23/11 05:00:00.0 | 17.41 | 07/25/11 00:00:00.0 | 16.77 | | |
| 07/23/11 06:00:00.0 | 17.09 | 07/25/11 01:00:00.0 | 16.46 | | |
| 07/23/11 07:00:00.0 | 16.93 | 07/25/11 02:00:00.0 | 15.98 | | |
| 07/23/11 08:00:00.0 | 17.41 | 07/25/11 03:00:00.0 | 15.67 | | |
| 07/23/11 09:00:00.0 | 17.88 | 07/25/11 04:00:00.0 | 15.35 | | |
| 07/23/11 10:00:00.0 | 19.01 | 07/25/11 05:00:00.0 | 15.19 | | |
| 07/23/11 11:00:00.0 | 20.78 | 07/25/11 06:00:00.0 | 14.88 | | |

| | | | |
|---|---|---|---|
| 07/23/11 | | 07/25/11 | |
| 12:00:00.0 | 22.77 | 07:00:00.0 | 14.88 |
| 07/23/11 | | 07/25/11 | |
| 13:00:00.0 | 25.16 | 08:00:00.0 | 15.03 |
| 07/23/11 | | 07/25/11 | |
| 14:00:00.0 | 26.55 | 09:00:00.0 | 15.67 |
| 07/23/11 | | 07/25/11 | |
| 15:00:00.0 | 26.03 | 10:00:00.0 | 17.09 |
| 07/23/11 | | 07/25/11 | |
| 16:00:00.0 | 25.85 | 11:00:00.0 | 19.33 |
| 07/23/11 | | 07/25/11 | |
| 17:00:00.0 | 25.85 | 12:00:00.0 | 21.94 |
| 07/23/11 | | 07/25/11 | |
| 18:00:00.0 | 24.81 | 13:00:00.0 | 23.95 |
| 07/23/11 | | 07/25/11 | |
| 19:00:00.0 | 23.44 | 14:00:00.0 | 25.16 |
| 07/23/11 | | 07/25/11 | |
| 20:00:00.0 | 21.94 | 15:00:00.0 | 25.68 |
| 07/23/11 | | | |
| 21:00:00.0 | 20.78 | | |
| 07/23/11 | | | |
| 22:00:00.0 | 19.82 | | |
| 07/23/11 | | | |
| 23:00:00.0 | 19.17 | | |
| 07/24/11 | | | |
| 00:00:00.0 | 18.85 | | |
| 07/24/11 | | | |
| 01:00:00.0 | 18.36 | | |
| 07/24/11 | | | |
| 02:00:00.0 | 17.88 | | |
| 07/24/11 | | | |
| 03:00:00.0 | 17.72 | | |
| 07/24/11 | | | |
| 04:00:00.0 | 17.56 | | |
| 07/24/11 | | | |
| 05:00:00.0 | 17.41 | | |
| 07/24/11 | | | |
| 06:00:00.0 | 17.24 | | |
| 07/24/11 | | | |
| 07:00:00.0 | 17.09 | | |
| 07/24/11 | | | |
| 08:00:00.0 | 17.24 | | |

Table 2: Field and Lab Data

| Parameter | July 22 at 10:30 | July 22 at 14:10 |
|---|---|---|
| Dissolved oxygen (mg/l) | 9.1 | 8.4 |
| Grab water temp (C – F) | 19 - 67 | 25 - 78 |
| pH (s.u.) | 8.59 | 8.61 |
| Specific conductance (uS/cm) | 498 | 488 |
| Transparency (cm) | 120 | 120 |
| Turbidity (NTU) | 1.9 | 1.4 |
| Flow (cfs) | 3.83 | 3.49 |

Hilsenhoff, W.L. 1988. Rapid field assessment of organic pollution with a family-level biotic index. Journal of the North American Benthological Society 7:65-68.