

Appendix I. Selected Plots of Datasonde results Collected by Ohio EPA in the Sandusky River Basin During 2001-02

This appendix shows plots of dissolved oxygen (D.O.), temperature, pH and conductivity for most of the Sandusky River basin sites where submersible monitors were deployed by Ohio EPA's Water Quality Modeling staff during the 2002 field season. The monitors measured each parameter once per hour, usually for a 48 hour period during each survey. The data was compared to 2001 datasonde results for a few sites, particularly those that are not attaining their aquatic life use designation (based on the 2001 biological assessment). A list of site names and river miles is also attached, to help users identify the location of the plotted data. The usefulness of looking at hourly data for D.O. and temperature is that it reveals extreme values not always captured when survey crews collect manual measurements during typical business hours. These extreme values can contribute to impairment of a stream segment, depending on the magnitude & duration. Many sites where temperature extremes were recorded also showed poor biological scores compared to adjacent sites (upstream or downstream).

Some highlights:

- The maximum temperature water quality standard (29.4° C) and the minimum D.O. WQS (4 mg/l) were exceeded at a few sites in the mainstem (Figures 1 through 4) and several tributaries. The implications of these exceedances relative to aquatic life use attainment should be considered, because at many of those sites the biological indices are lower than at the upstream or downstream sites. The main reason for the temperature extremes in those sites are lack of upstream flow and little or no riparian shade.
- Hourly plots of dissolved oxygen in the vicinity of the Bucyrus WWTP (shown in Figure 4) illustrate the magnitude and duration of the D.O. violations at those sites. Hourly data is available for all sites where the monitors were deployed.
- Dissolved oxygen and temperature violations were recorded in Broken Sword Creek, specially at the upstream sites (Figures 5 through 7). These sites suffer from habitat impairment (no riparian shade, lack of pooled reaches, low flows due to extensive network of drainage tiles. Temperatures dropped downstream, as more flow entered the stream and riparian shade increased.
- The Little Sandusky showed low D.O. at RM 6.5, but not at RM 1.5 during the September 12 (2002) survey. The streamflows during that survey were extremely low throughout the basin. Higher flows and more riparian shade at the downstream site helped moderate instream temperature.
- Tymochtee Creek (Figure 10) showed very low dissolved oxygen concentrations,

in spite of fairly low stream temperature (low temperatures improve oxygen solubility in water). All the sites shown on this plot are in partial attainment of the WWH use designation. The main reason for the poor biological scores are low water levels, which exacerbate the impact of small nutrient loads from failing septic system inflows and agricultural nonpoint sources.

- Sycamore Creek and Honey Creek (Figures 11 and 12) show wide dissolved oxygen swings indicative of high algal concentrations at the upstream sites. Sites closer to the mouth had a smaller range of D.O. values. The streamflow during September 2002 was near record lows, and Honey Creek historically has among the lowest summer yields (in cfs/square mile) compared to other gages in the Sandusky watershed.

Upper Sandusky River Watershed TMDLs

Figure 1. Sandusky River D.O., pH, Temperature and Conductivity (max/min & average) vs. River Mile During July 1-3, 2002.

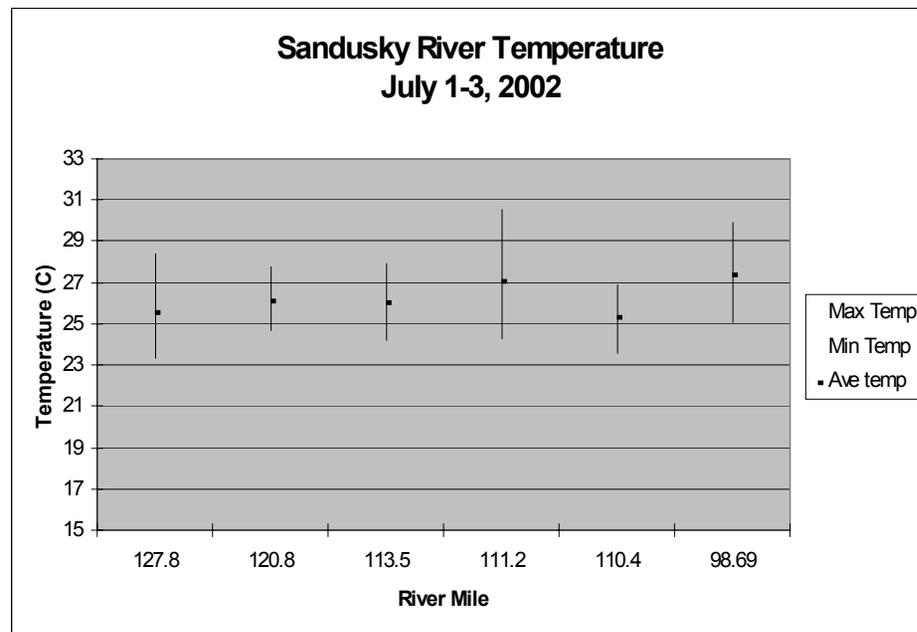
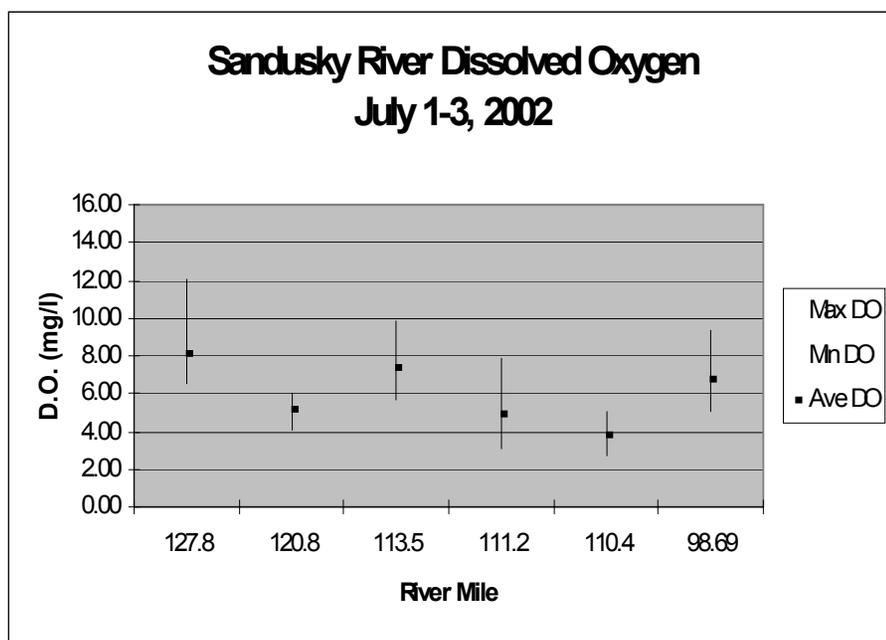
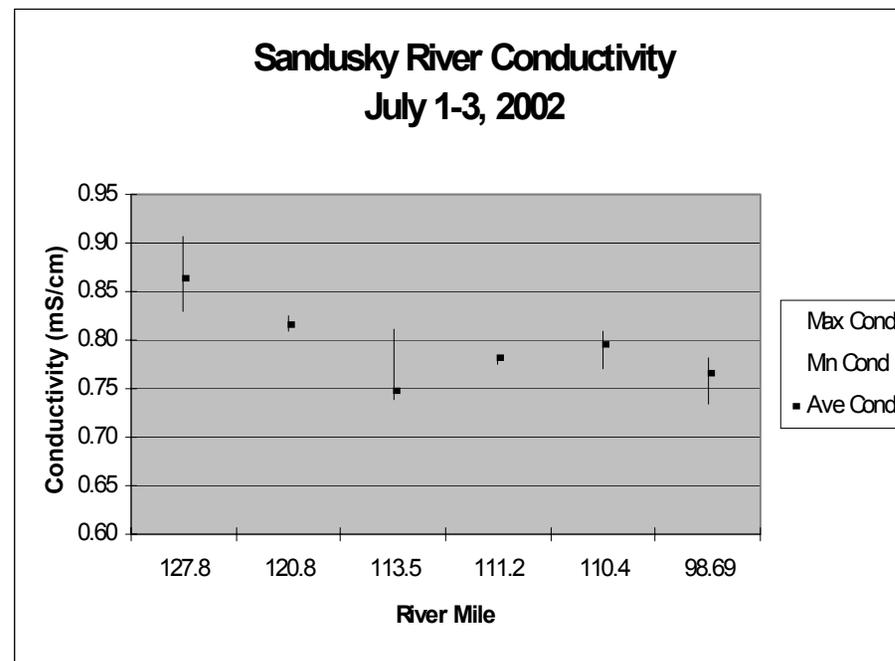
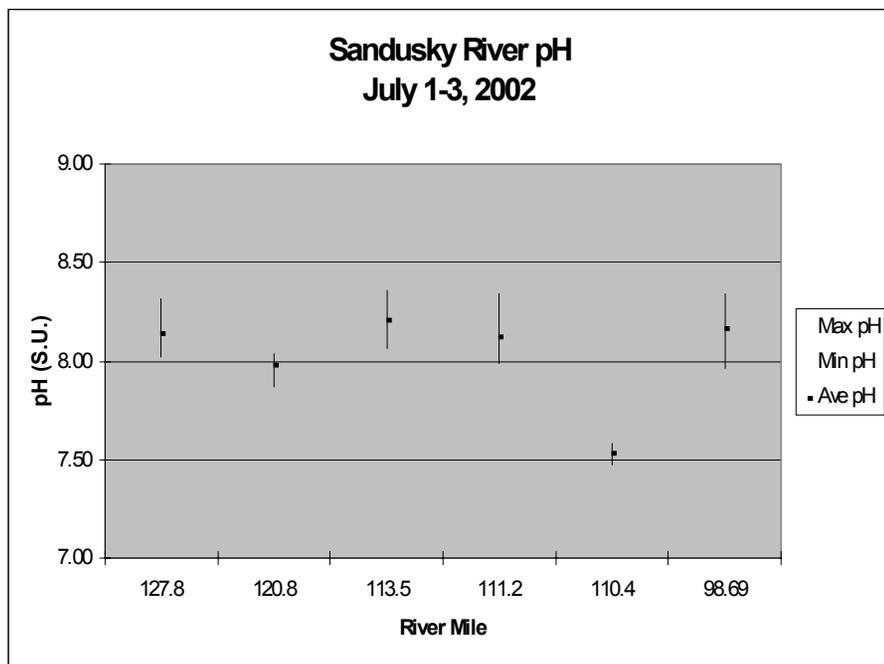


Figure 1. Continued



Upper Sandusky River Watershed TMDLs

Figure 2. Sandusky River D.O., pH, Temperature and Conductivity (max/min & average) vs. River Mile During July 16-18, 2002.

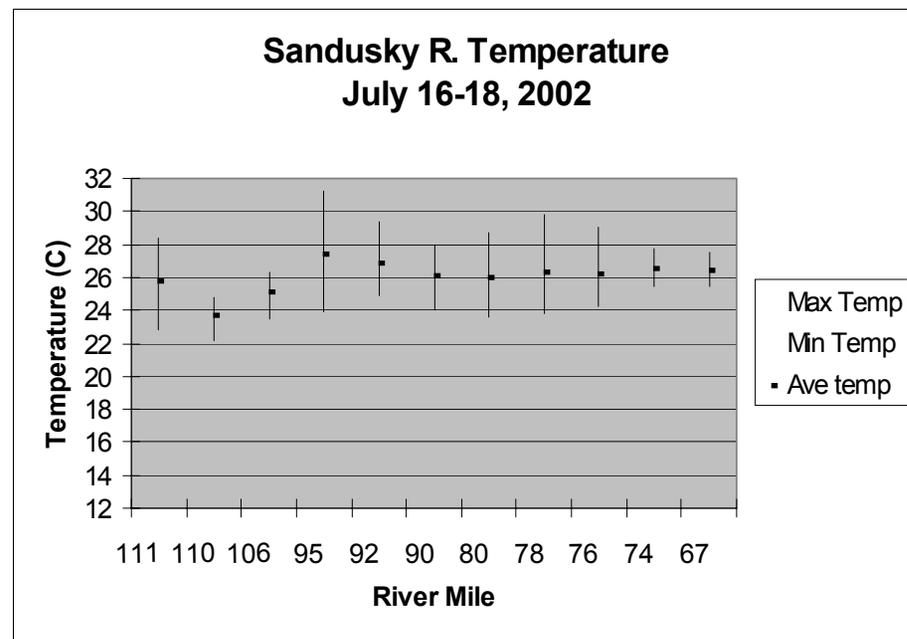
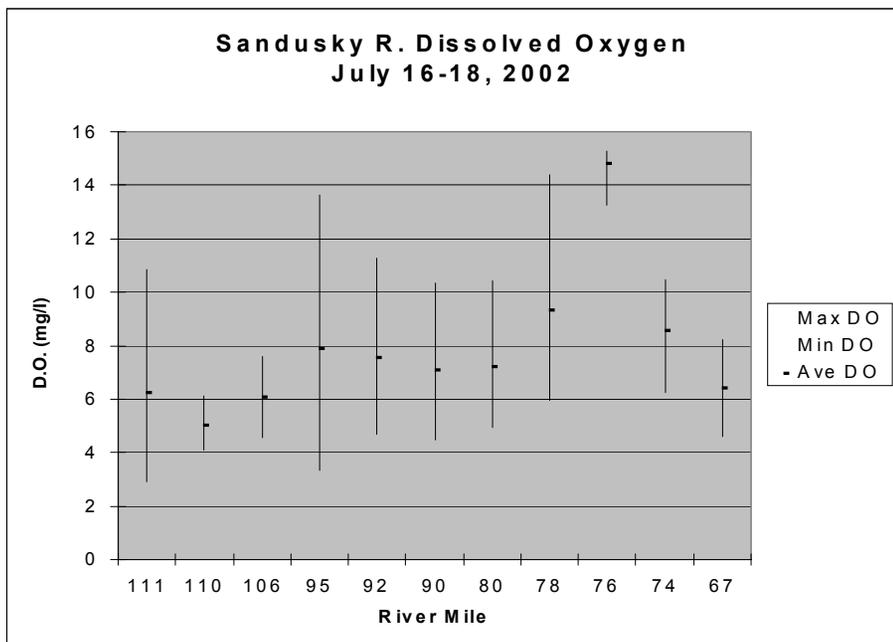
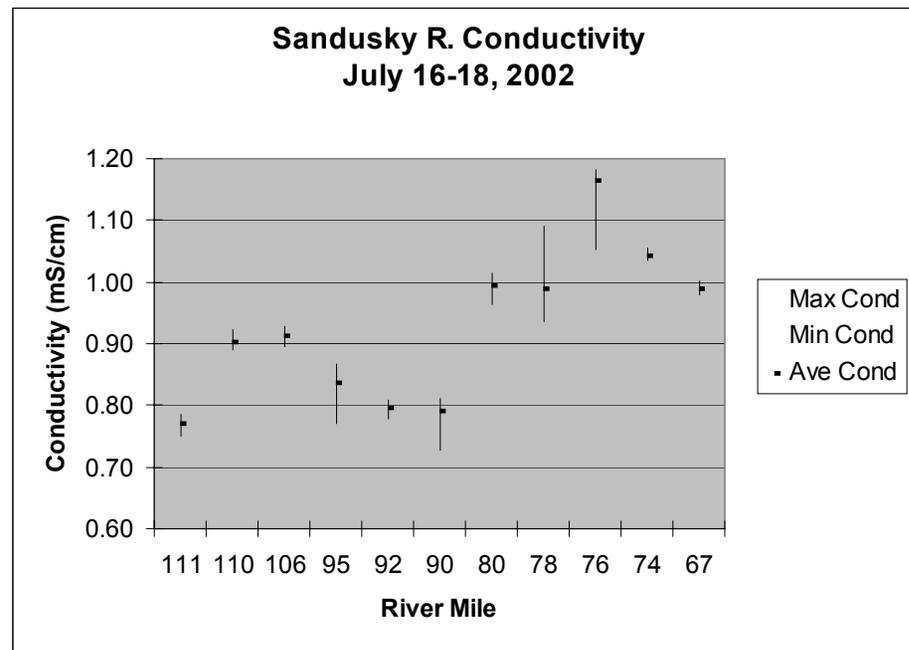
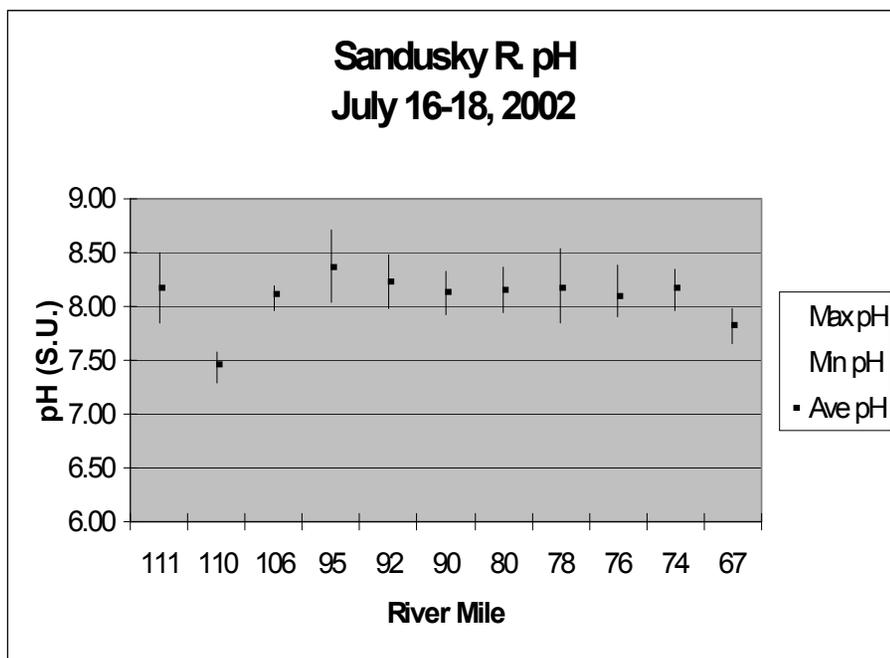


Figure 2. Continued



Upper Sandusky River Watershed TMDLs

Figure 3. Sandusky River D.O., pH, Temperature and Conductivity (max/min & average) vs. River Mile During August 13-15, 2002.

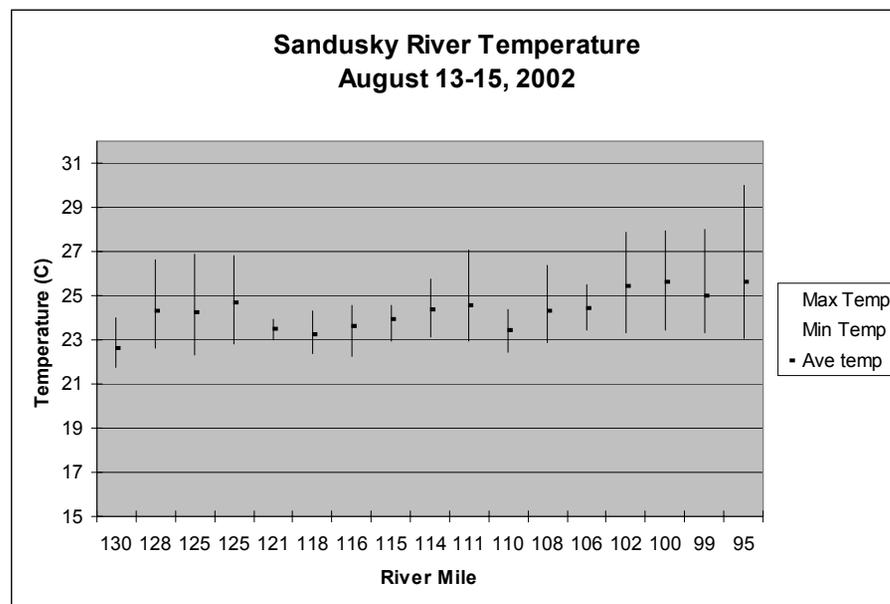
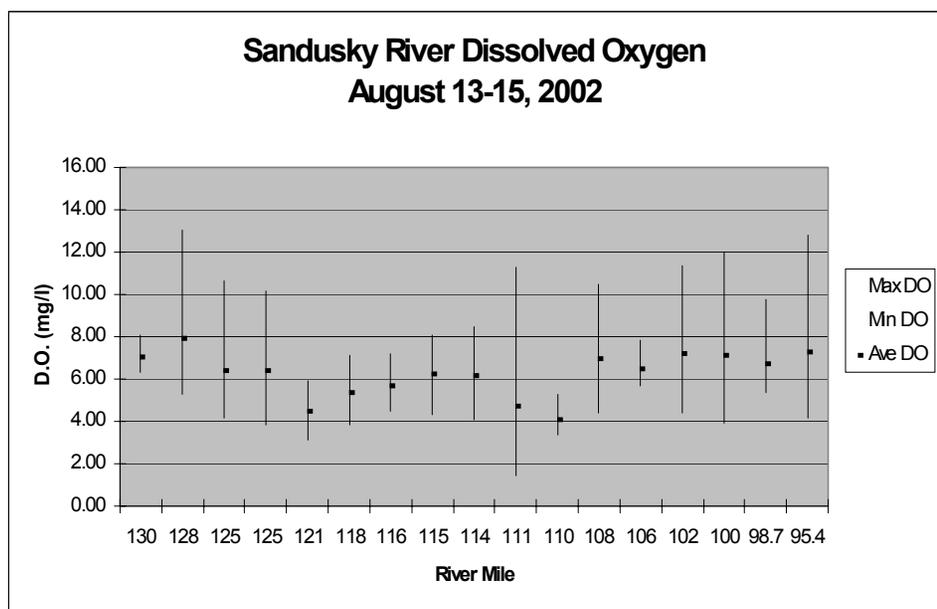
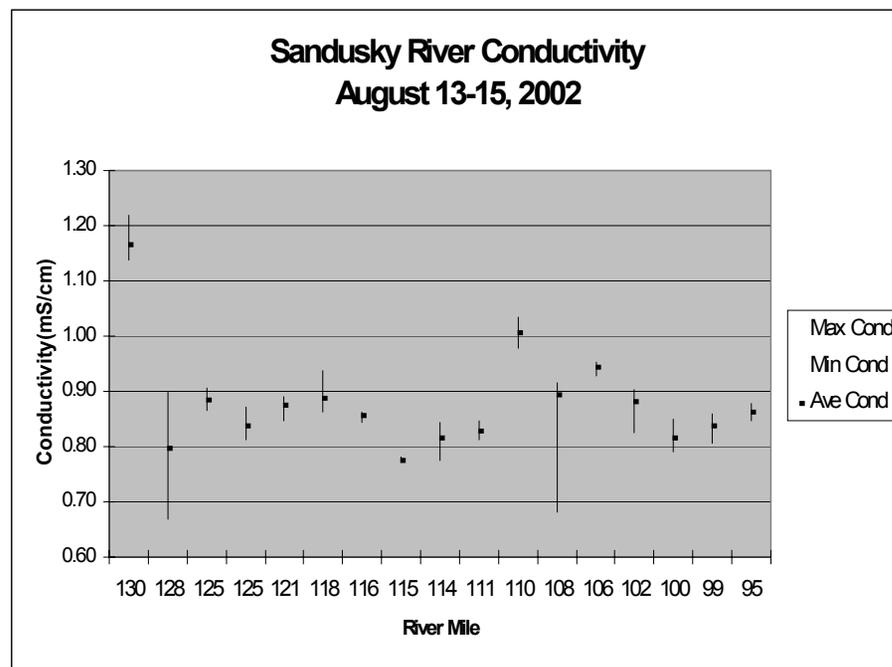
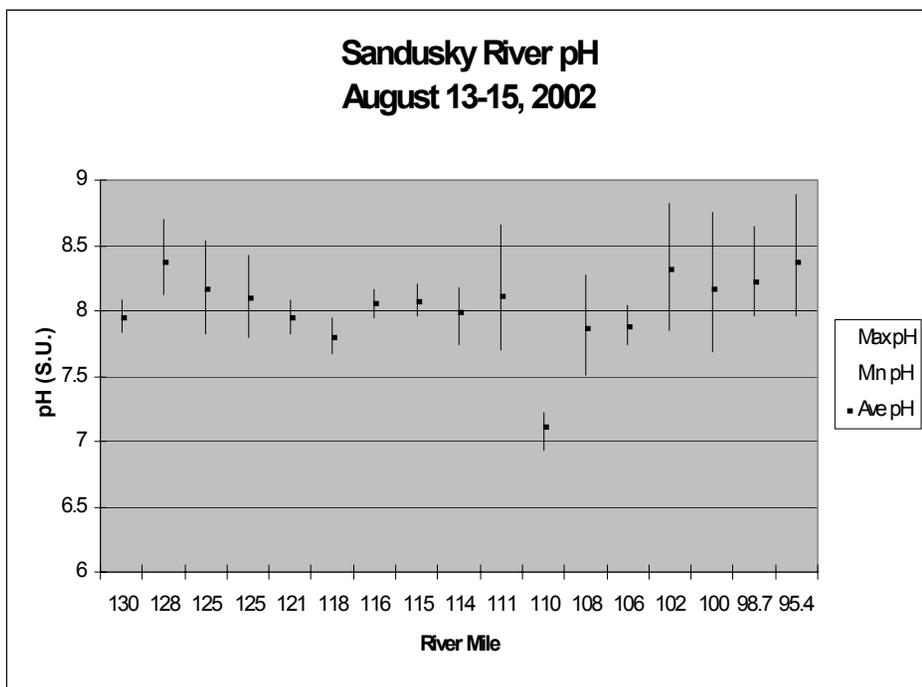
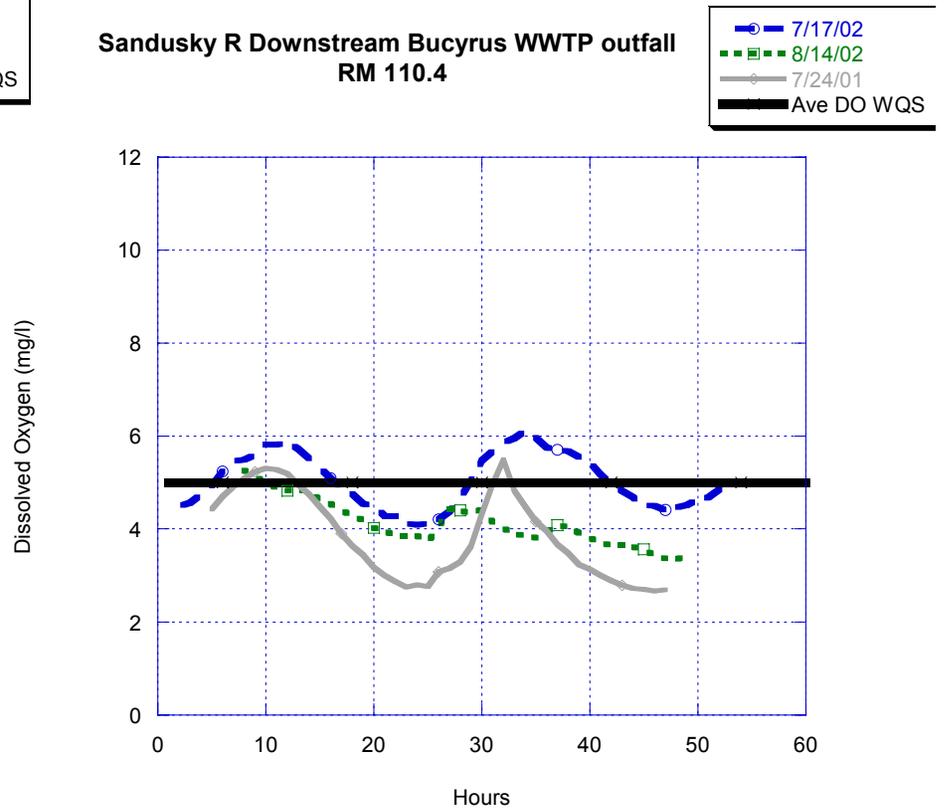
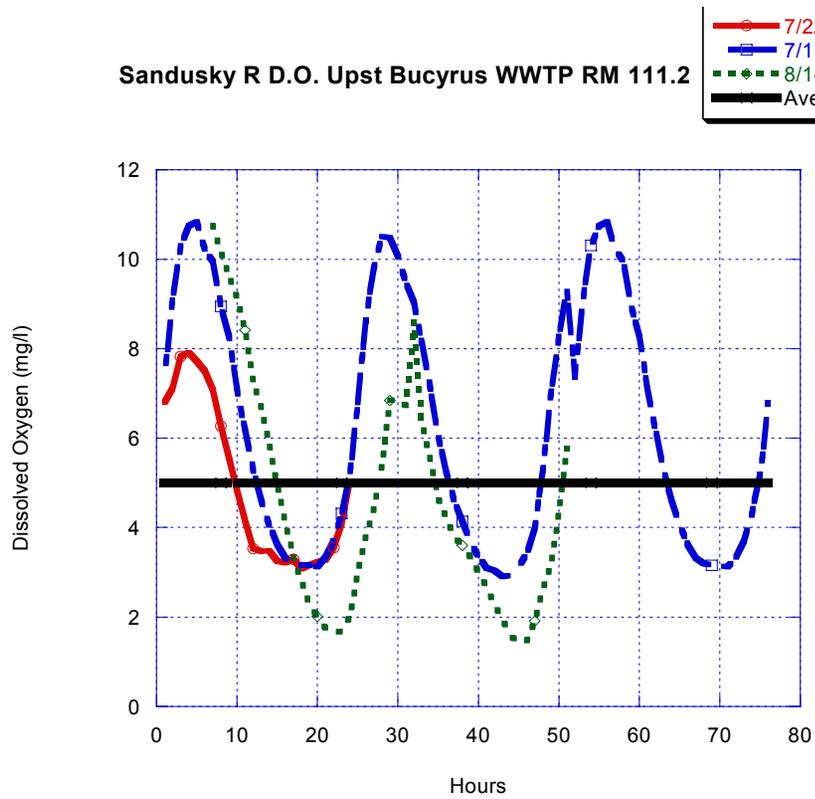


Figure 3. Continued



**Upper Sandusky River Watershed TMDLs**

Figure 4. Sandusky River hourly Dissolved Oxygen concentrations upstream and downstream of the Bucyrus WWTP during Ohio EPA surveys conducted in 2001 and 2002. This reach is not attaining its use designation.



Upper Sandusky River Watershed TMDLs

Figure 5. Broken Sword Creek D.O., pH, Temperature and Conductivity (max/min & average) vs. River Mile During July 16-18, 2002.

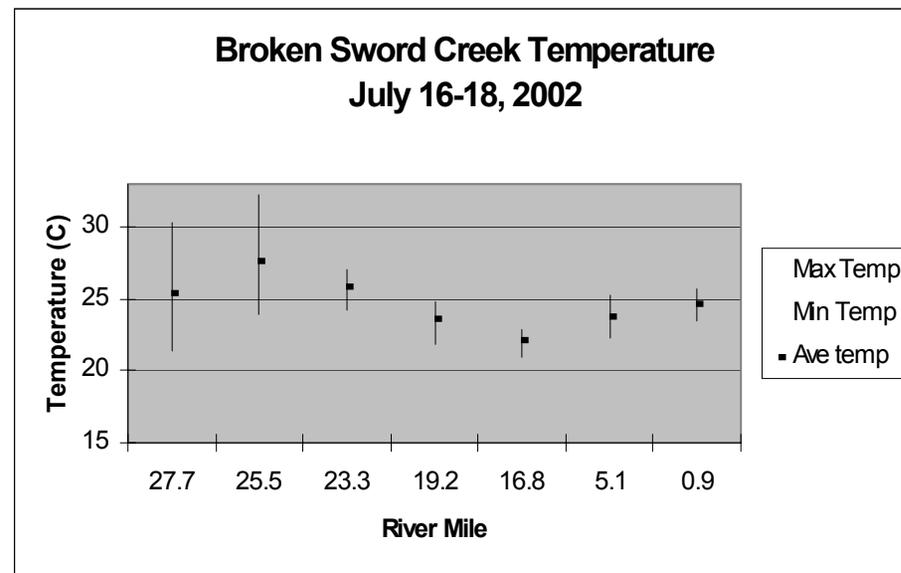
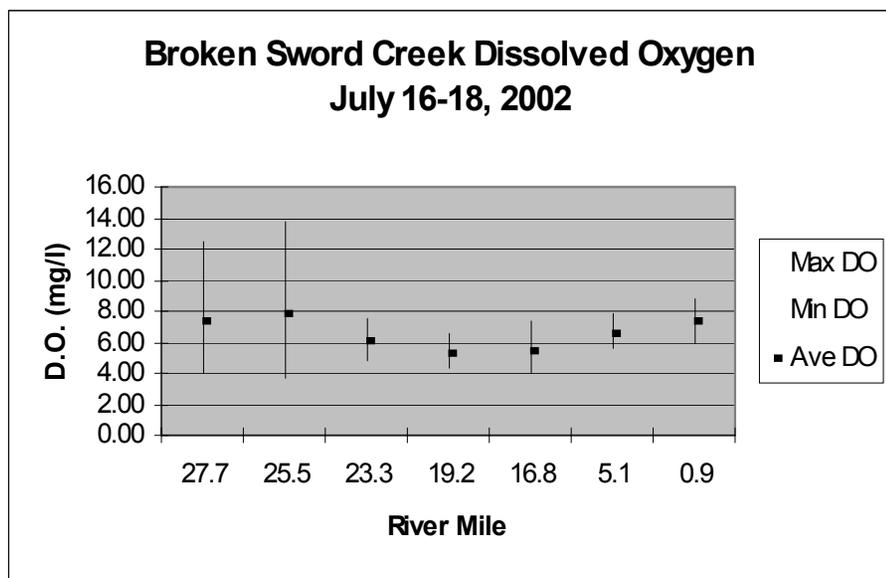


Figure 5. Continued

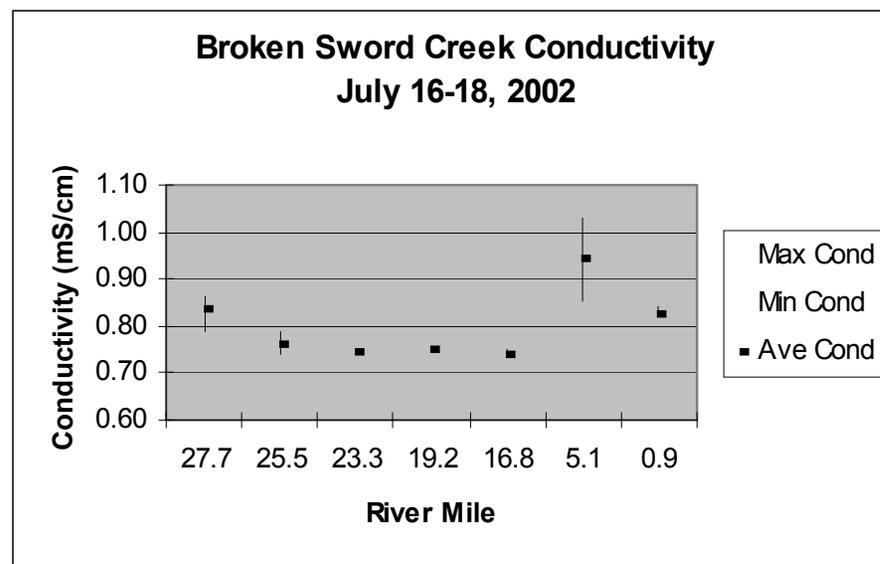
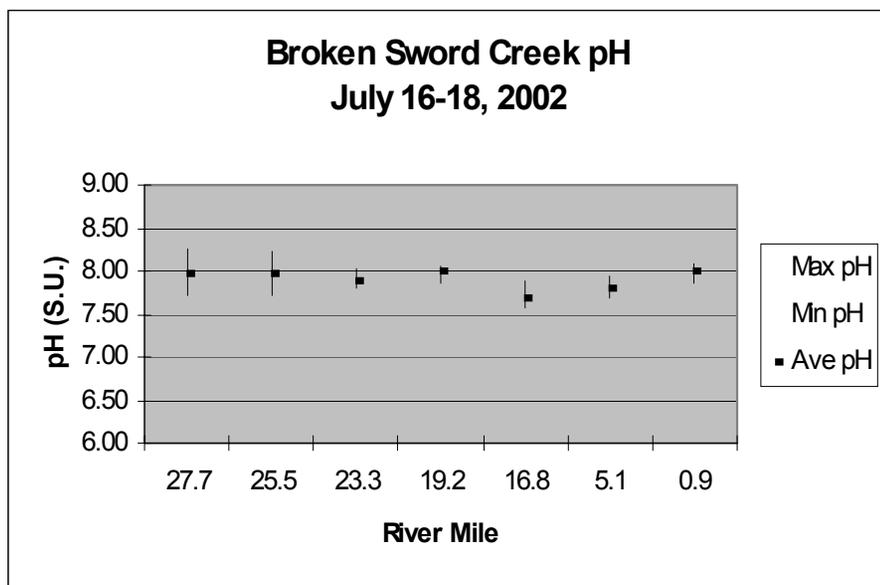


Figure 6. Broken Sword Creek D.O., pH, Temperature and Conductivity (max/min & average) vs. River Mile During September 10-12, 2002.

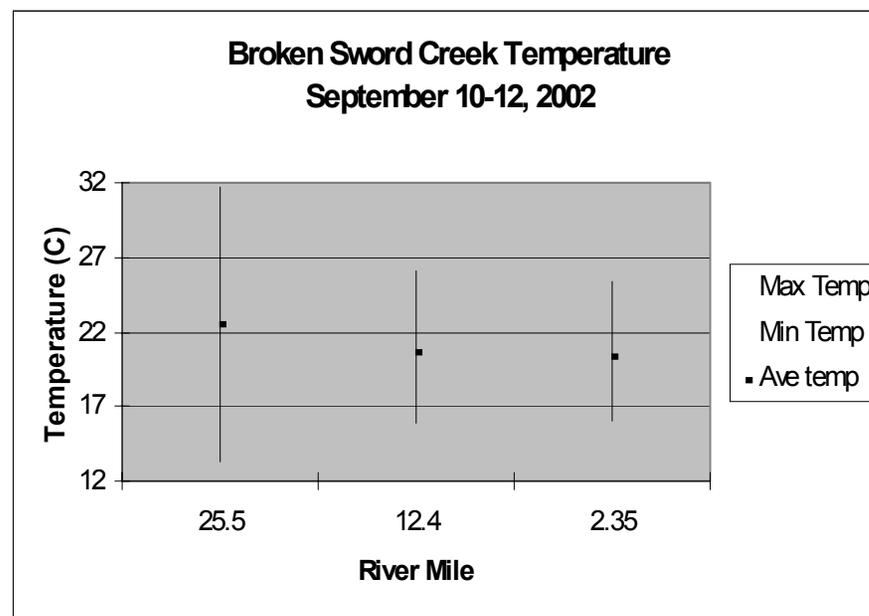
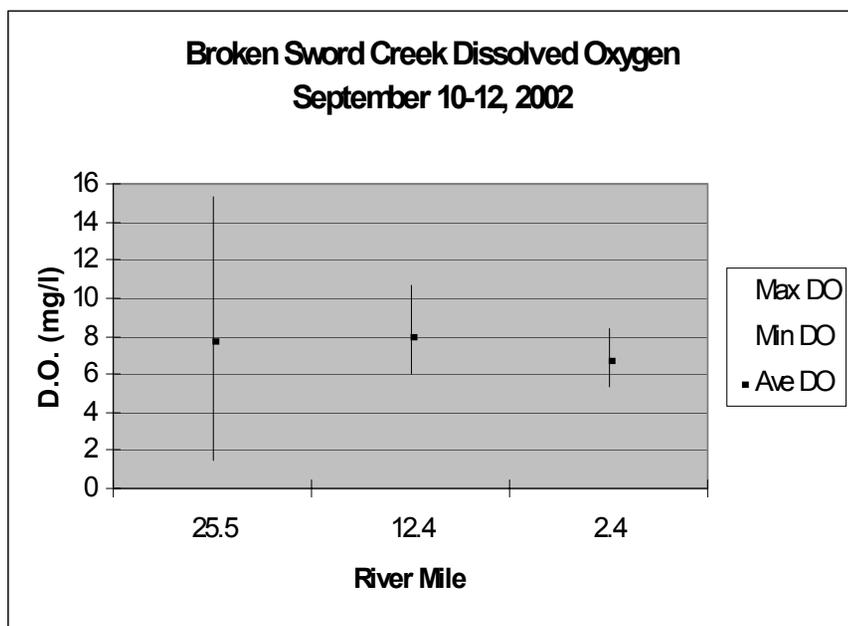


Figure 6. Continued

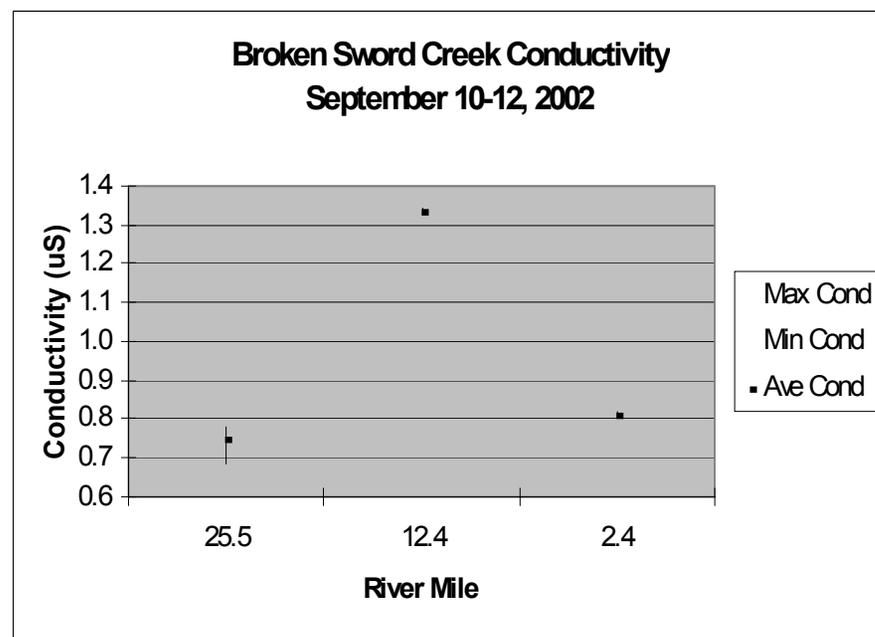
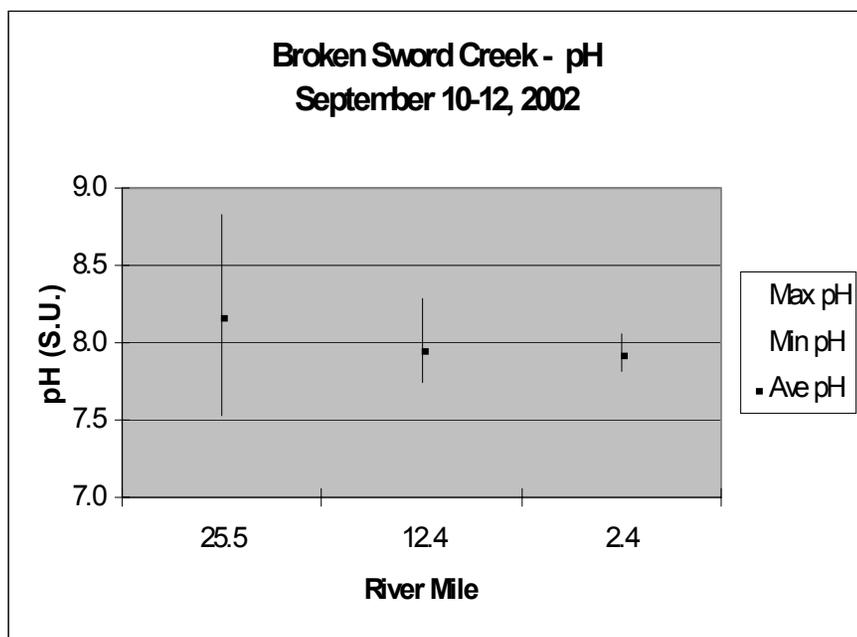


Figure 7. Broken Sword Creek D.O., Temperature and pH (max/min & average) at RM 25.5 During 2001-02.

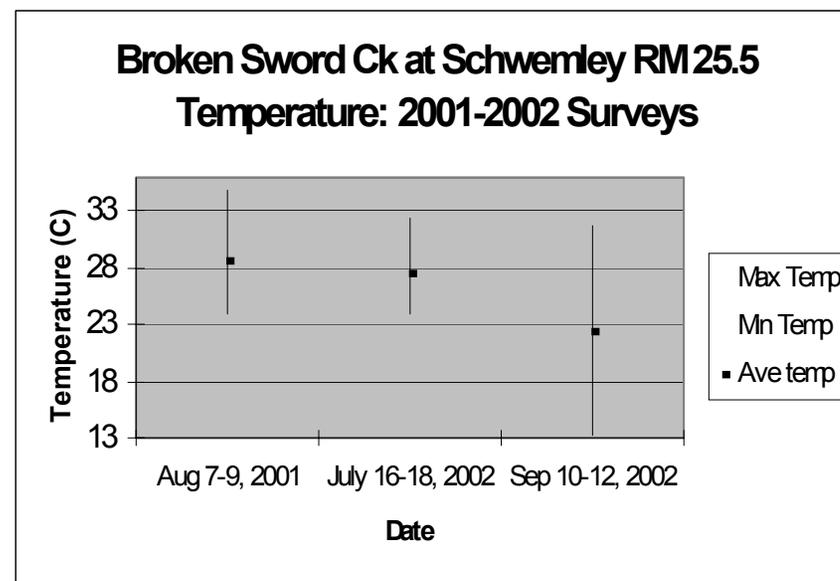
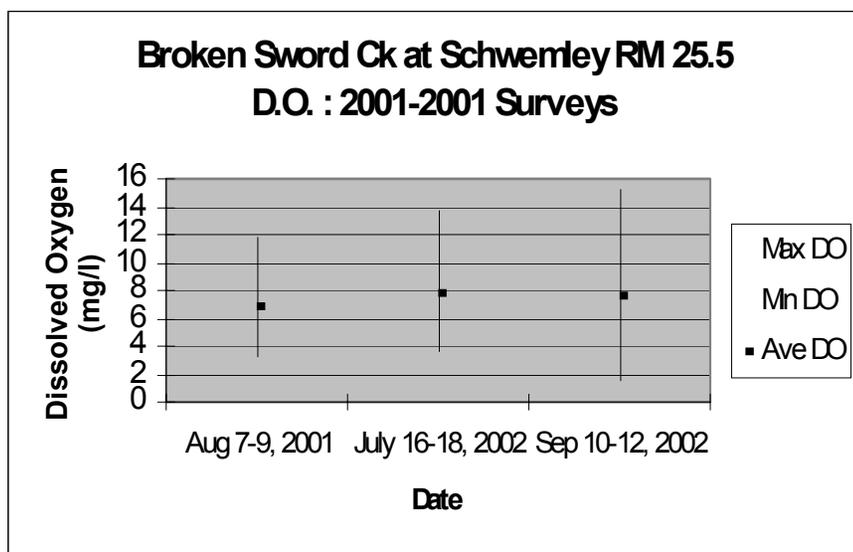


Figure 7. Continued

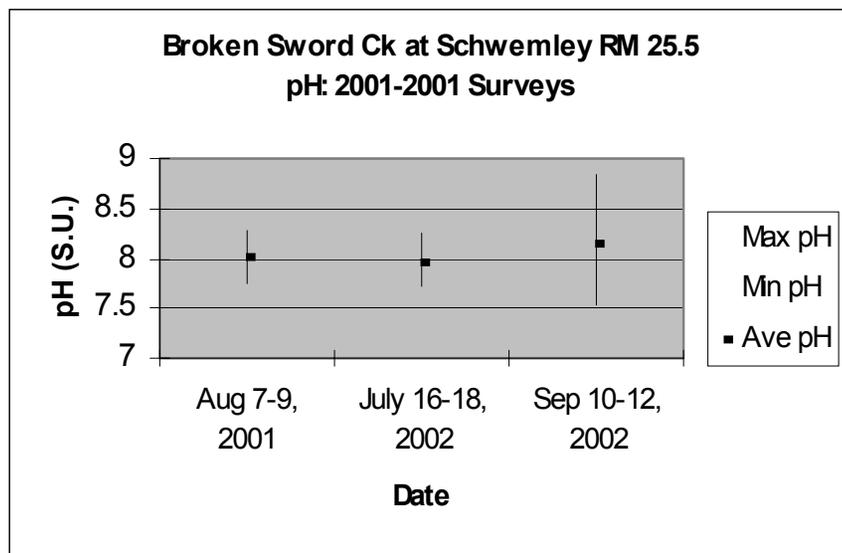


Figure 8. Little Sandusky River D.O., Temperature and pH (max/min & average) During September 10-12, 2002 Survey.

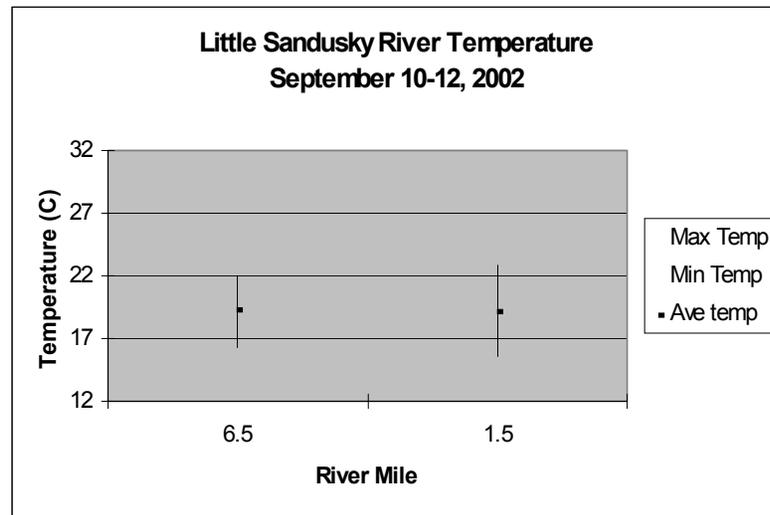
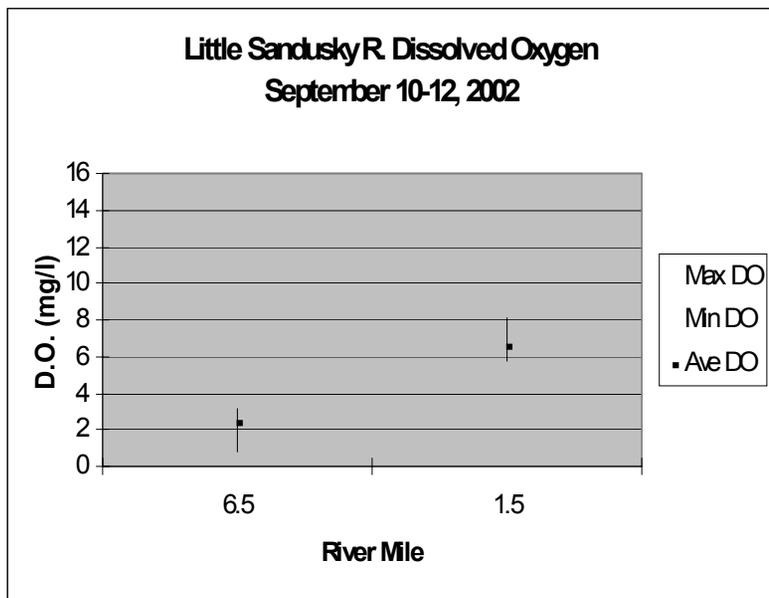


Figure 8. Continued

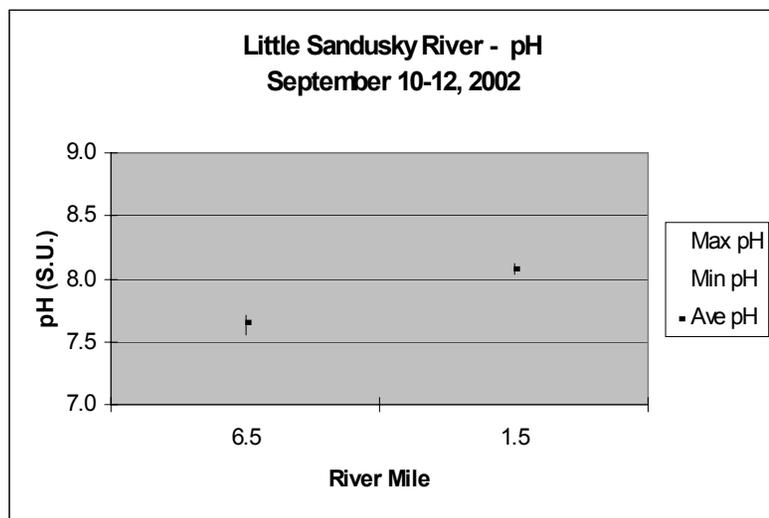


Figure 9. Little Sandusky River D.O., Temperature and pH (max/min & average) at CR 113 (RM 1.5) During 2001-02 Ohio EPA Surveys.

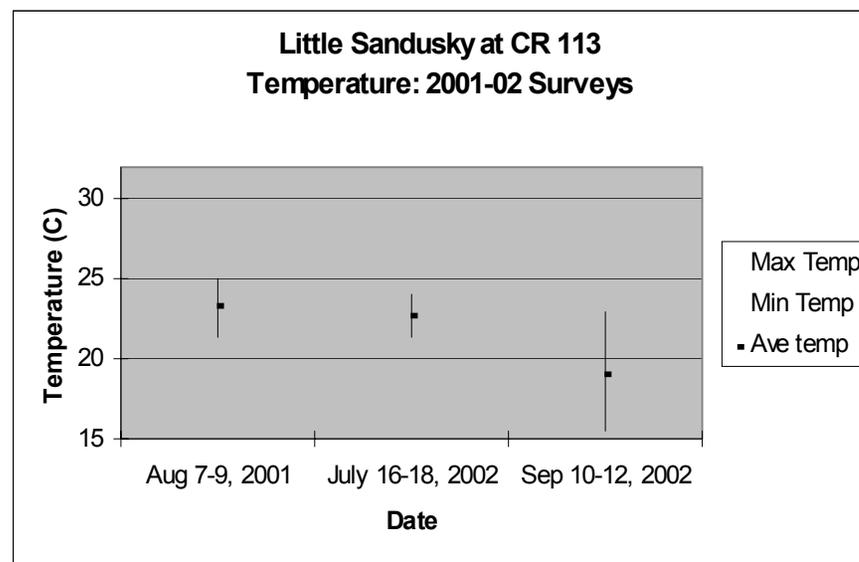
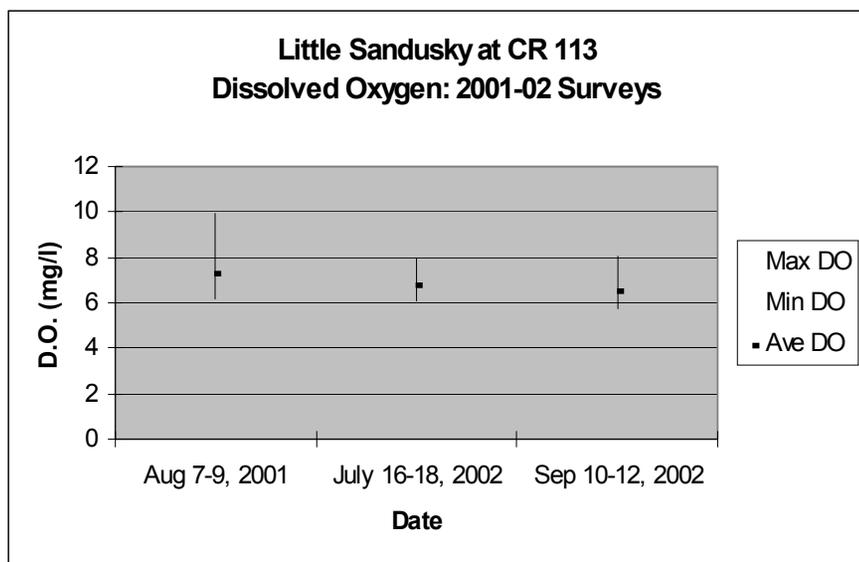
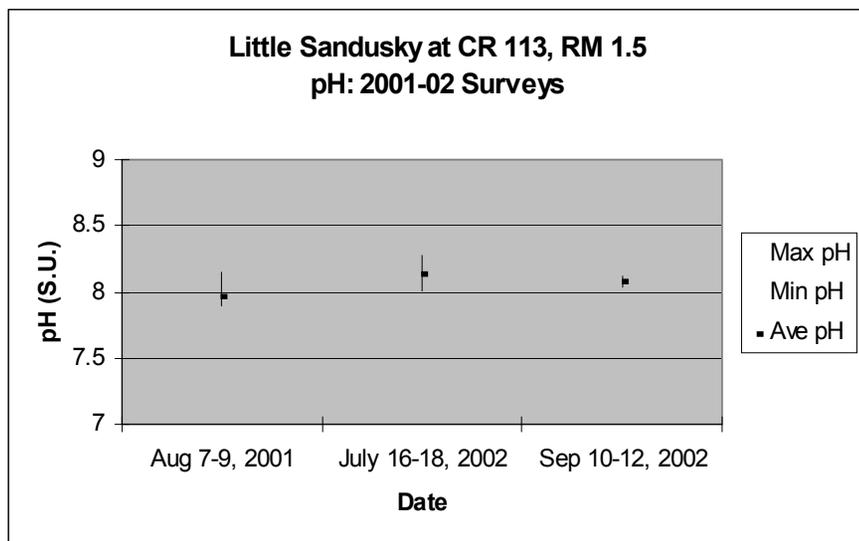


Figure 9. Continued



***Upper Sandusky River Watershed TMDLs***

Figure 10. Tymochtee Creek D.O., Temperature and pH (max/min & average): Sept. 18-2002 Ohio EPA Survey.

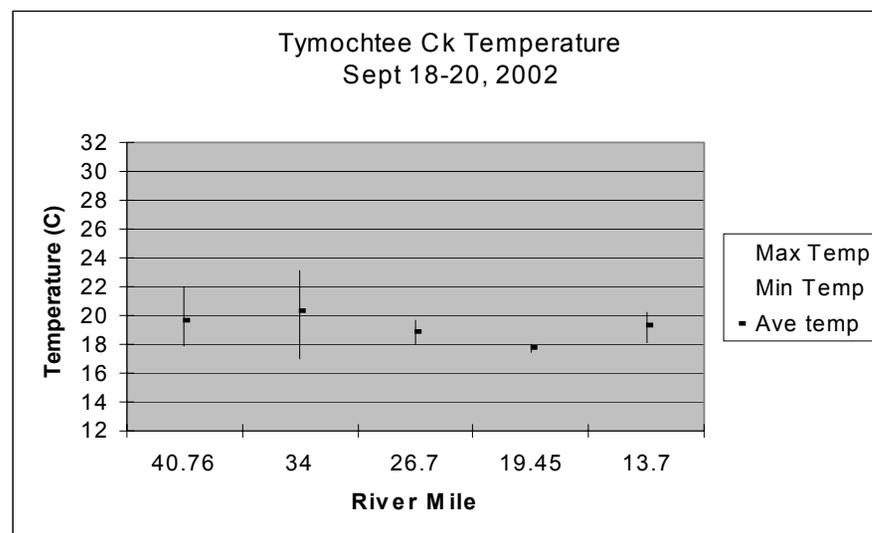
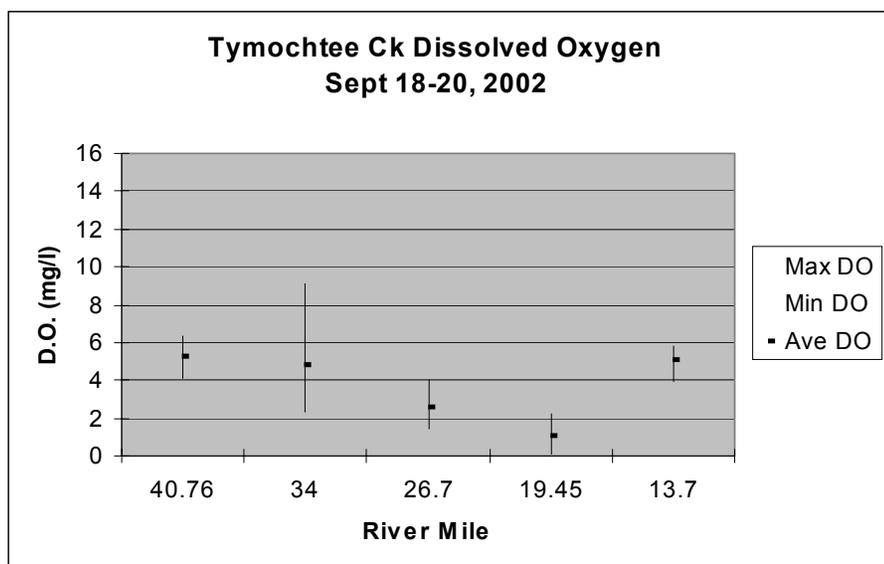
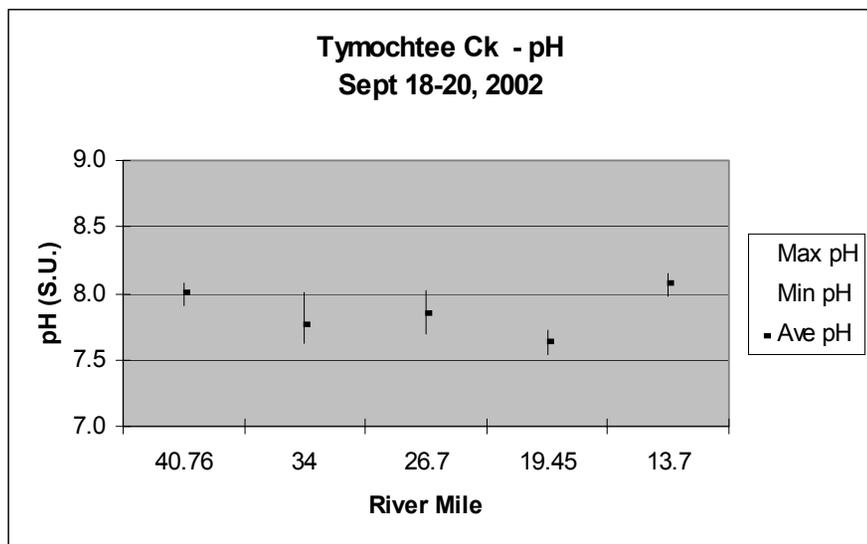


Figure 10. Continued



Upper Sandusky River Watershed TMDLs

Figure 11. Sycamore Creek D.O., Temperature and pH (max/min & average): Sept. 18, 2002 Ohio EPA Survey.

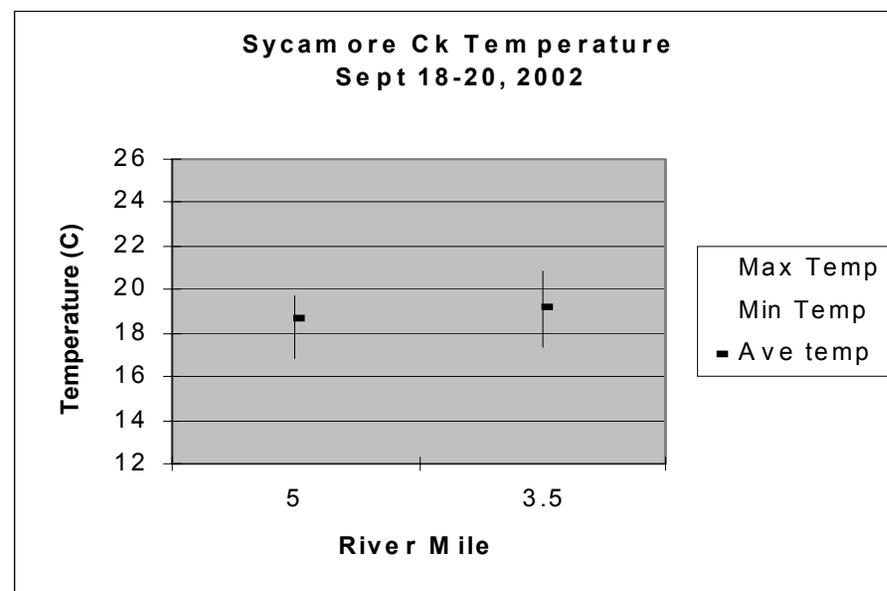
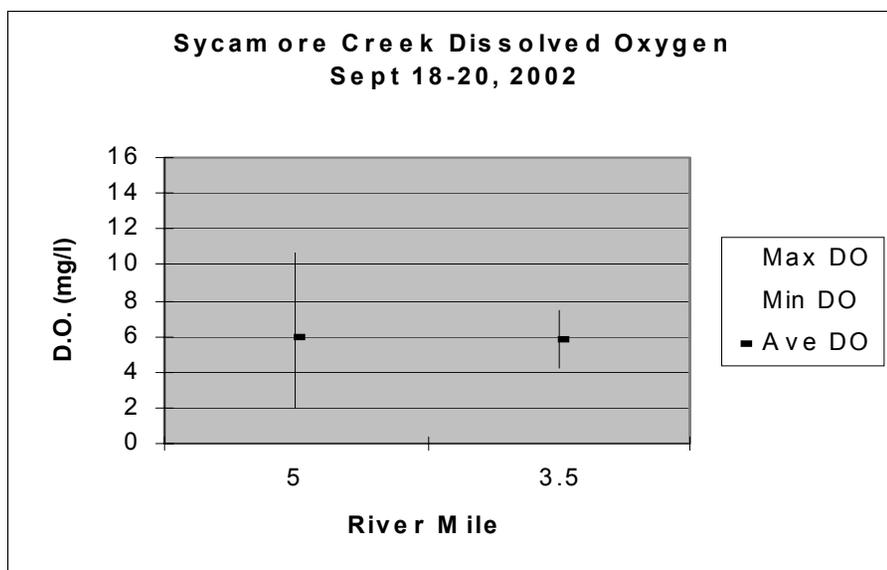
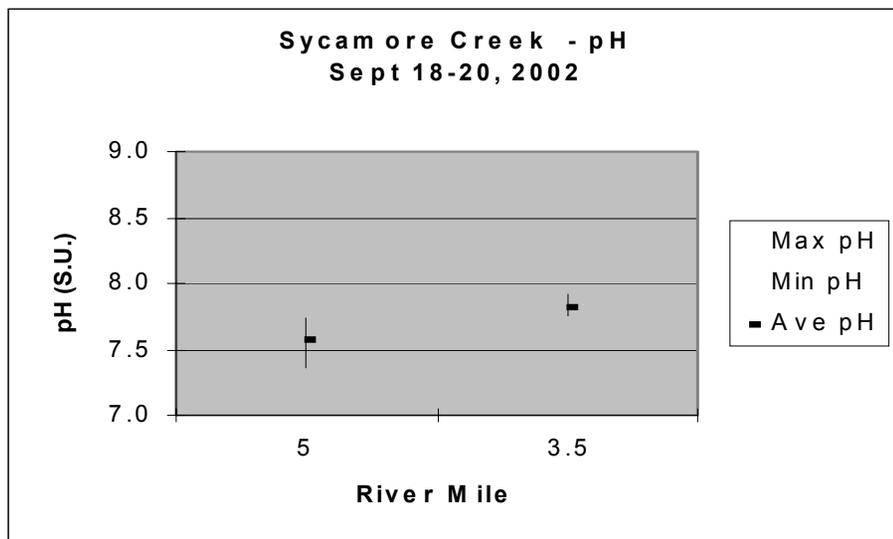


Figure 11. Continued



***Upper Sandusky River Watershed TMDLs***

Figure 12. Honey Creek D.O., Temperature and pH (max/min & average): Sept. 18, 2002 Ohio EPA Survey.

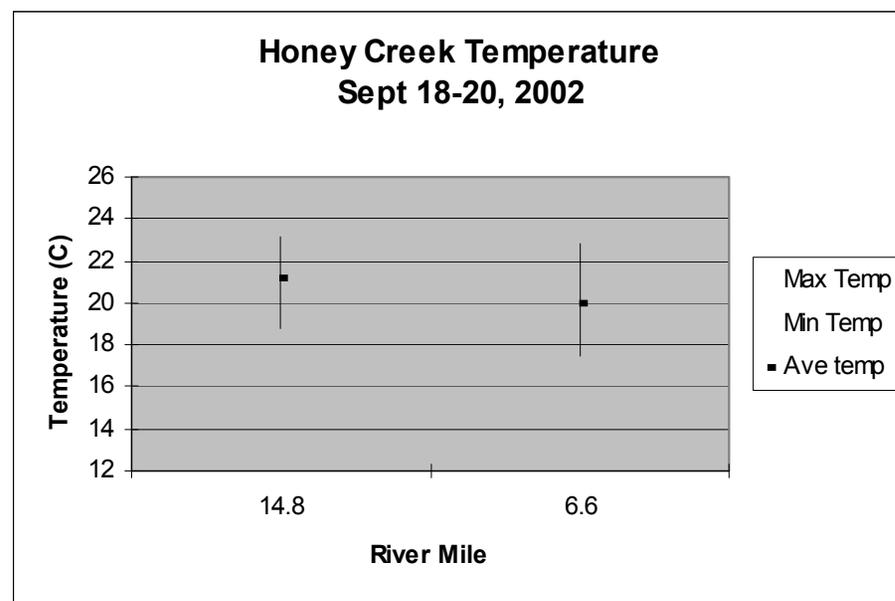
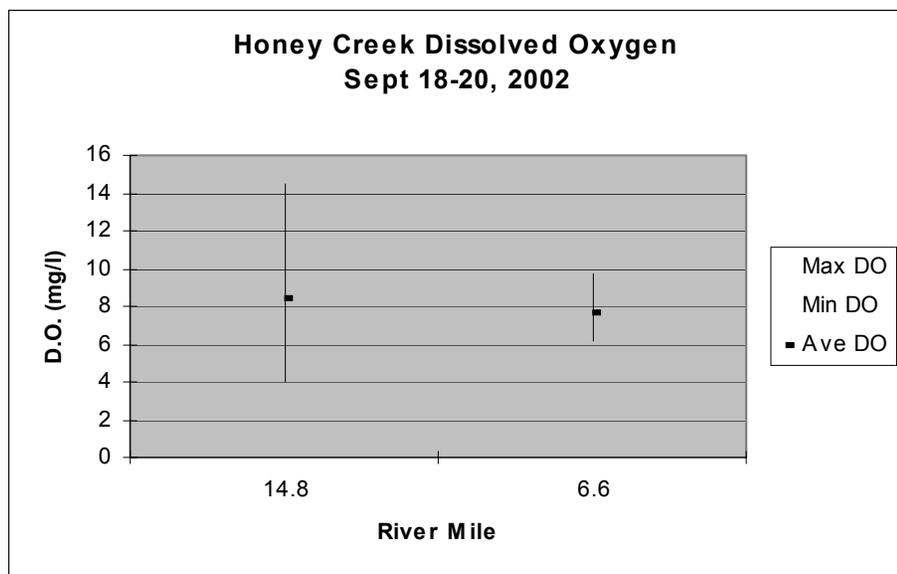
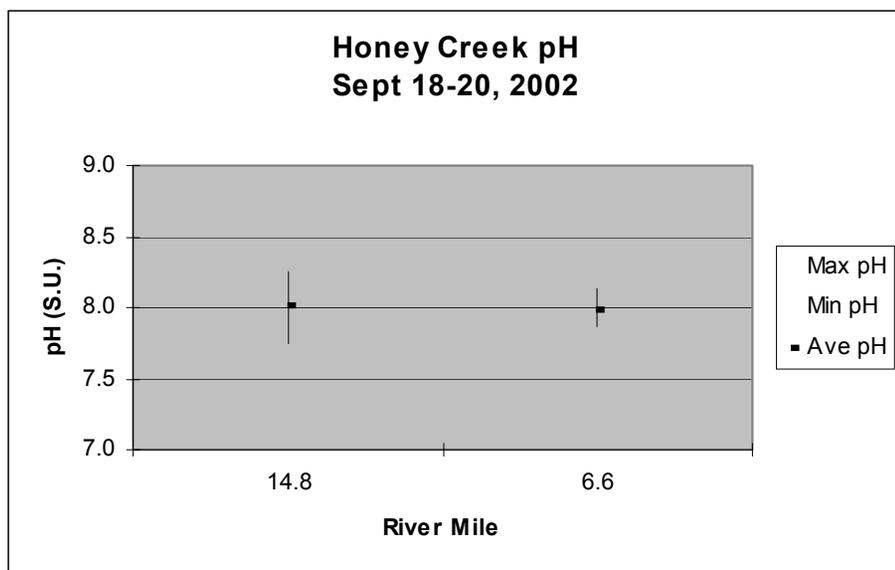


Figure 12. Continued



Upper Sandusky River Watershed TMDLs

Figure 13. Westerly Creek D.O., Temperature and pH (max/min & average): July /August 2002 Ohio EPA Surveys.

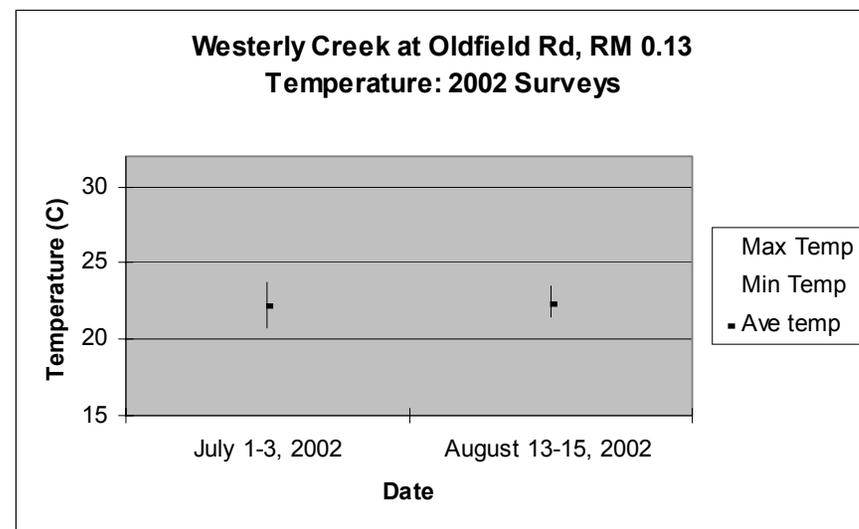
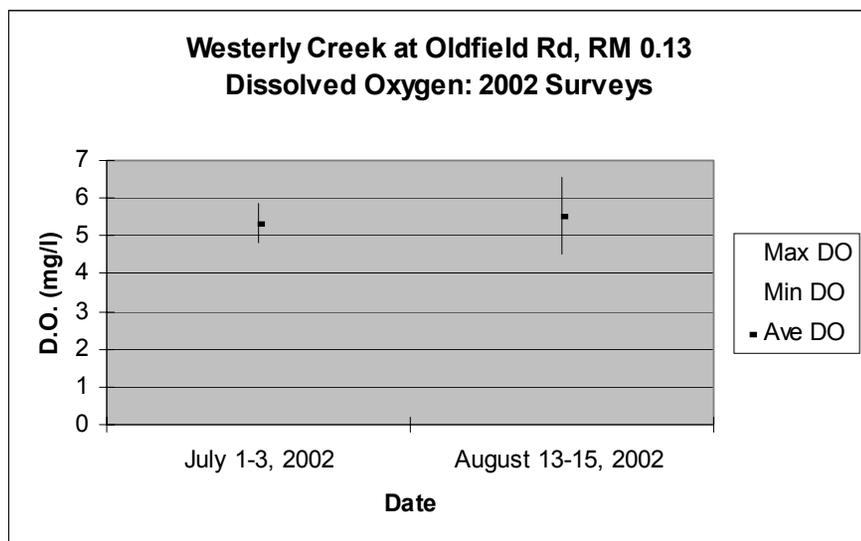
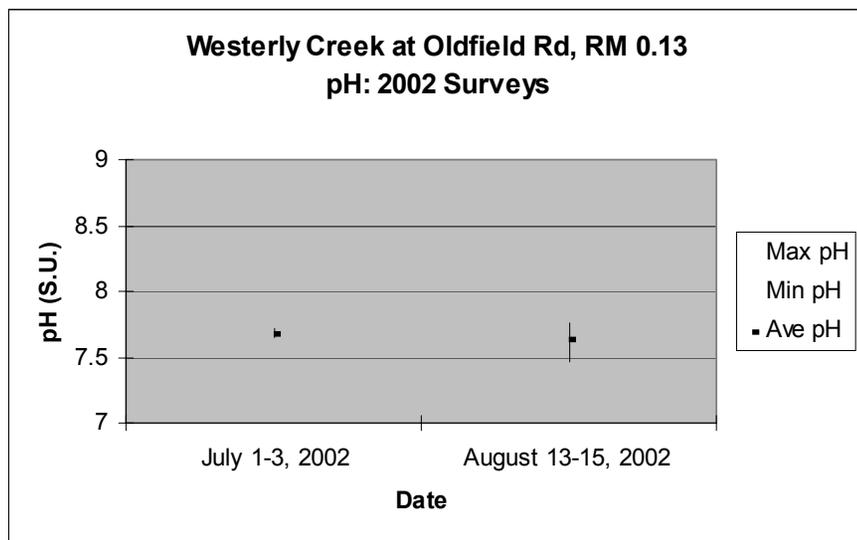


Figure 13. Continued



***Upper Sandusky River Watershed TMDLs***

Figure 14. Paramour Creek D.O., Temperature and pH (max/min & average): July /August 2002 Ohio EPA Surveys.

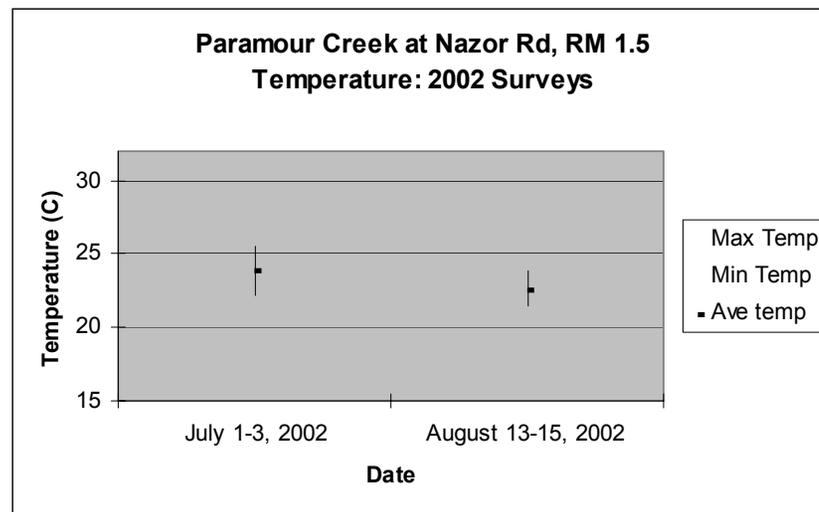
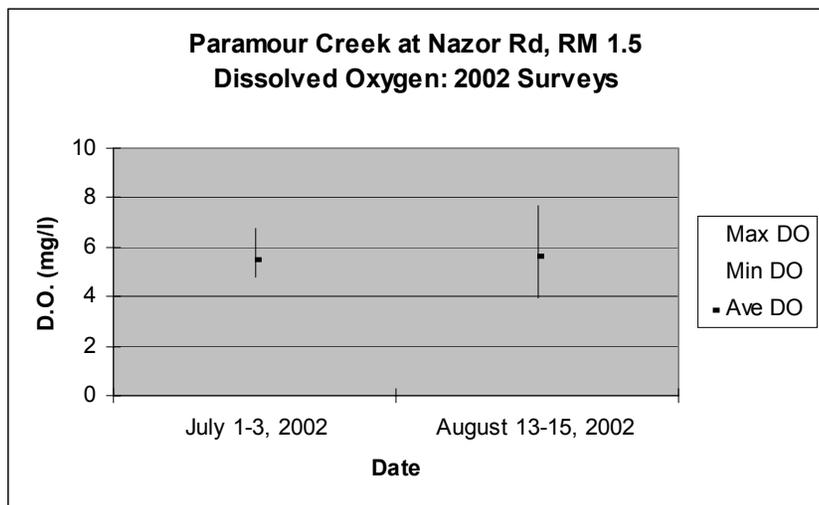


Figure 14. Continued

