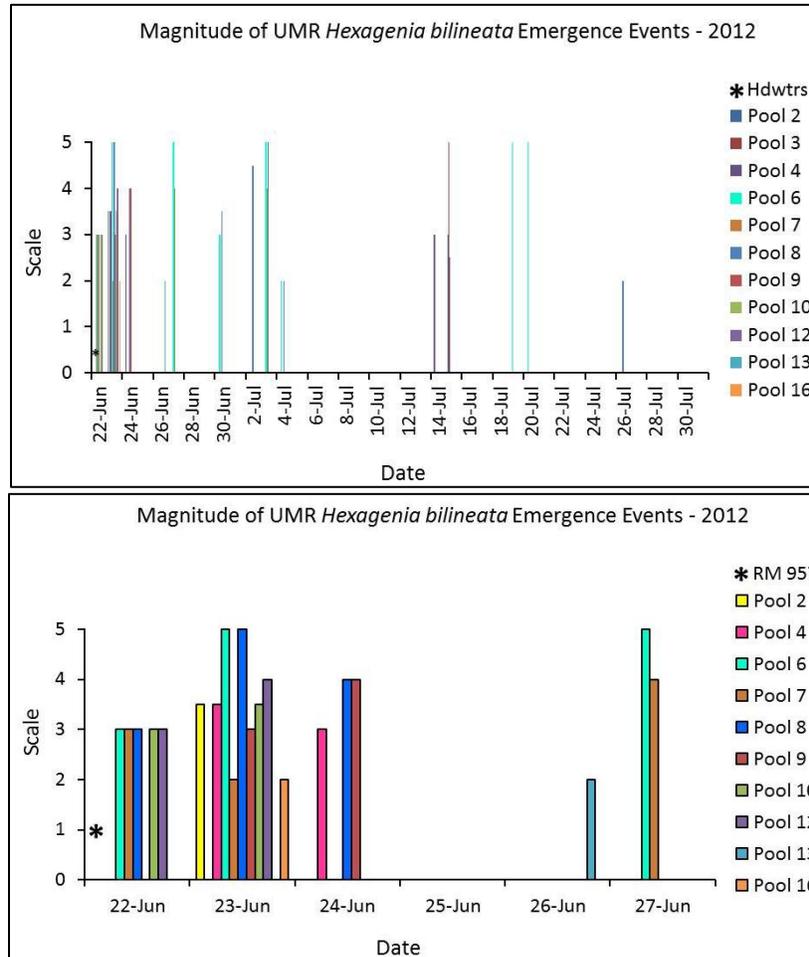


2012-13 UMR Mayfly Emergence and Development Synopses

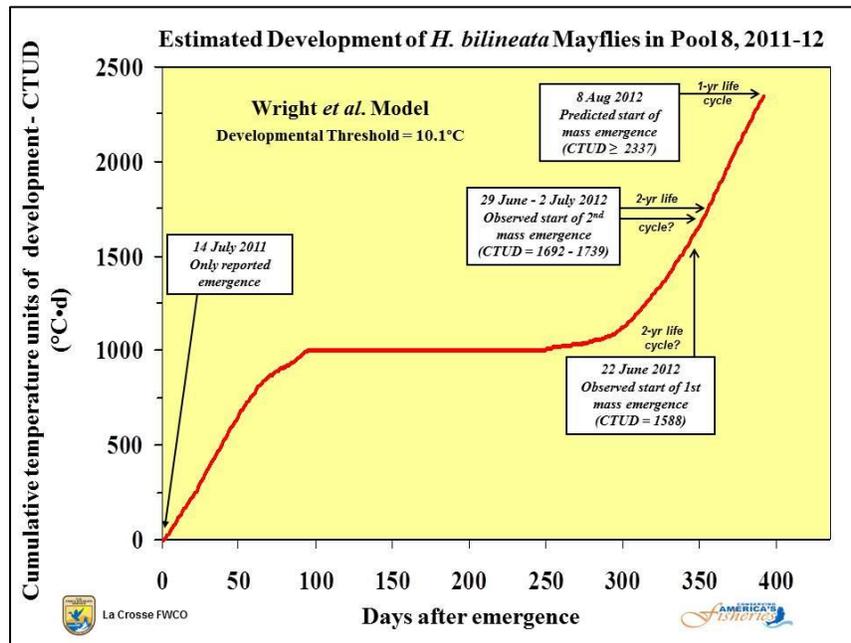
Based on reported observations from a network of 18 individuals who work, reside, commute, or recreate near the Upper Mississippi River, it appears that the most widespread and synchronous mayfly emergence of 2012 took place June 22-24, with peak activity occurring June 23. I received a total of 17 reports from observers in 9 distinct river reaches that extended from St. Paul, Minnesota, to near Muscatine, Iowa, during this three day event. I also received



one emergence report from the headwaters region (river mile 957) near Little Falls, Minnesota, at this time. Reports from 15 of the 18 observers characterized the local emergence intensity at these sites as \geq level #3 (moderate) on the Johnson intensity scale. The most intense emergence activity reported at this time (level #5 – very heavy) came from Pool 6 and Pool 8.

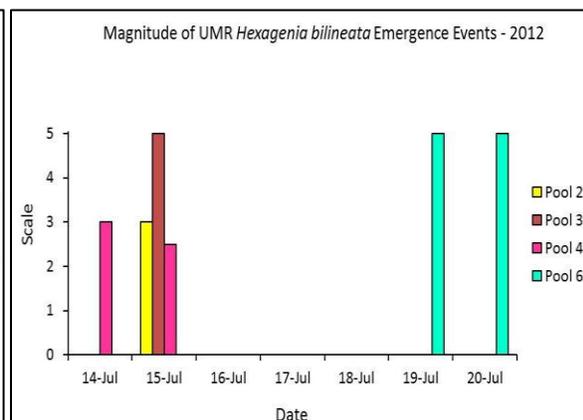
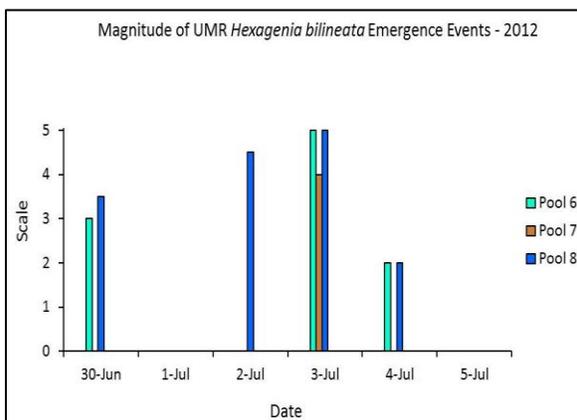
The science-based models that I am using to help estimate when the first annual mass emergence of mayflies is likely to occur in a particular reach of the river are based on local daily water temperature observations and assume a 1-year life cycle, provided that all other conditions for growth and development are optimal.

The fact that the 2012 models for Pool 8 did not anticipate the mass emergence that occurred here during the fourth week of June suggests these individuals likely developed over a life cycle of two (or more) years during which conditions for growth and development were periodically less than optimal.

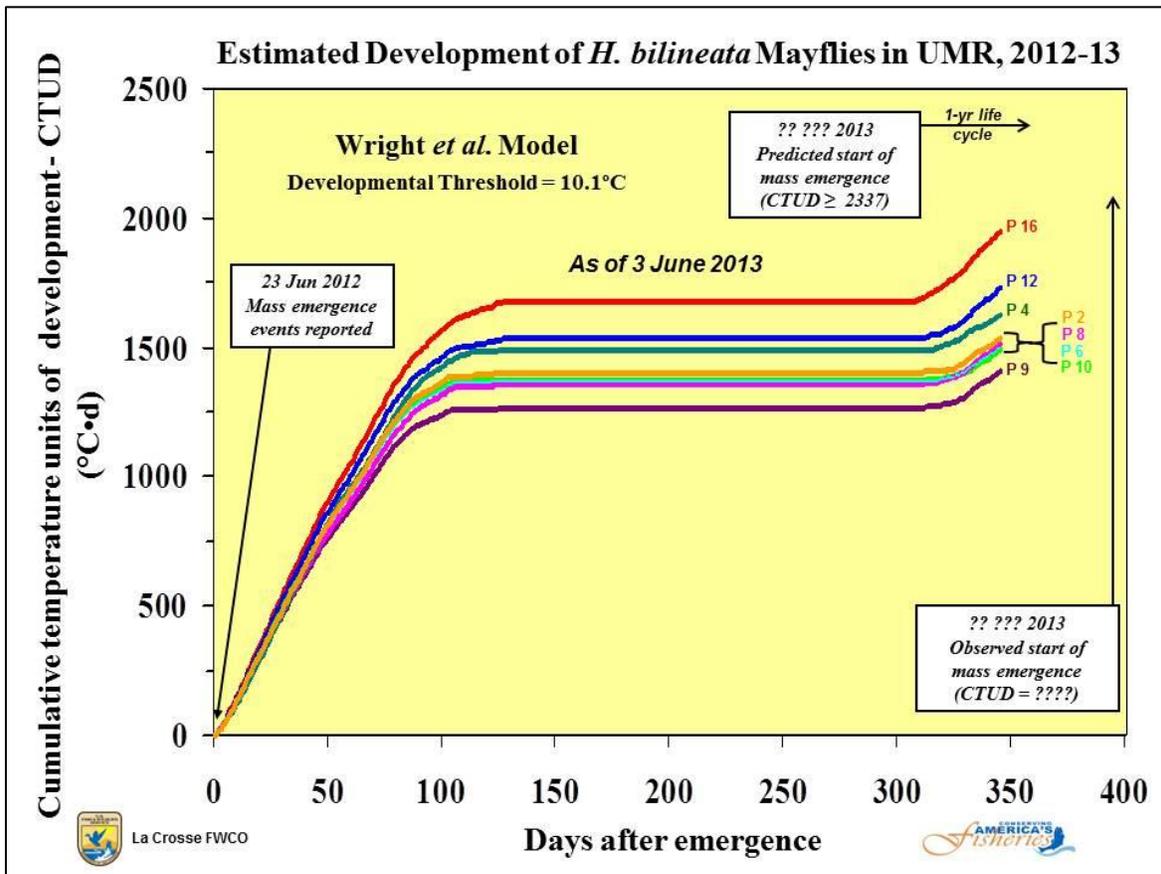


The environmental/biological cue(s) that triggered these and many other nymphs to synchronously emerge over the better part of a nearly 400-mile longitudinal reach of the river remains a mystery of nature and continued source of great fascination!

Noteworthy emergence events in 2012 were also reported over smaller spatial scales on: July 2-4 (Pools 6, 7, and 8); July 14-15 (Pools 2, 3, and 4); and July 19-20 (Pool 6). In fact, the emergence reported July 15 in the lower reaches of Pool 2 and upper reaches of Pool 3 was responsible for one vehicular accident on the bridge over the river in Hastings, Minnesota, where snowplows were later used to clear the hazardous roadway.



Given the robust and widespread emergence events reported to me last year, I have been able to model the temperature-driven growth and development of surviving progeny from the 2012 emergence events in Pools 2, 4, 6, 8, 9, 10, 12, and 16. River water temperatures were quite warm throughout most of last summer and well into the fall. Thus, temperature dependent



growth of nymphs should have been exceptional in all reaches of the river last year, ranging from an estimated 1263 (Pool 9) to 1678 (Pool 16) cumulative temperature units of development by the time water temperatures remained consistently below the reported 10.1°C (50°F) growth threshold. With a reported 2337 cumulative temperature units of development required to initiate a mass emergence, thermal development ranged 54-71% complete by the on-set of winter like temperatures in fall 2012.

As we know all too well however, spring 2013 temperatures have been running below normal and much below the abnormally warm spring temperatures of 2012. Consequently, current models indicate that thermal development ranged 60-83% complete as recently as June 3 for the anticipated 2013 cohort of emergent mayflies.