Draft: Kentuck Lake, Forest and Vilas County,
2,4-D Concentration Monitoring Summary, 2013

21 October 2013

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Kentuck Lake has an area of 957 acres, maximum depth of 40 ft, and a mean depth of 9.2 ft. On 3 June 2013, two areas (A-13 and B-13) totaling 17 acres (Figure 1) were treated with a liquid formulation of 2,4-D to control Eurasian watermilfoil (*Myriophyllum spicatum*). On 5 June 2013, one area (C-13) totaling 1.6 acres was treated with a granular formulation of 2,4-D to control Eurasian watermilfoil (*Myriophyllum spicatum*).

The 2,4-D was applied to areas A-13 and B-13 at a target concentration (application rate) of 3000 ug/L (3 mg/L) acid equivalent (ae). The 2,4-D was applied to area C-13 at a target concentration (application rate) of 4000 ug/L (4 mg/L) acid equivalent (ae). Two water sample sites were established in treatment area A-13 (KA1 and KA2), two in treatment area B-13 (KB1 and KB-2), and one in treatment area C-13 (KC1) to quantify 2,4-D dissipation from the treatment areas (Figure 2). Another water sample site (K1) was established approximately half the distance between treatment areas A-13 and B-13.

Water samples were collected from each sample site using an integrated water sample which collects water from most of the water column. Water samples were collected at intervals of approximately 1, 2, 4, 6, 8, 24, 48, 72, and 120 hours after treatment (HAT). Samples were taken to shore after completion of each sample interval, and 3 drops of muriatic acid were added to each sample bottle to fix the 2,4-D and prevent degradation. Samples were then stored in a refrigerator, until shipped to the US Army Engineer Research and Development Center (ERDC) laboratory in Gainesville, FL for analysis of 2,4-D.

Concentrations of 2,4-D in samples from sites KA1 and KA2 ranged from 560 to 1836 ug/L ae through 8 HAT compared to the target concentration of 3000 ug/L ae (Figure 3). Concentrations of 2,4-D in samples from sites KB1 and KB2 ranged from 499 to 1866 ug/L ae through 8 HAT compared to the target concentration of 3000 ug/L ae. Concentrations of 2,4-D at the sample site (K1) between treatment areas A-13 and B-13 remained at or near the detection limit (10 ug/L ae) through 4 HAT and then increased to 1639 ug/L ae at 6 HAT and 1547 ug/L ae at 8 HAT. Concentrations at these sites were mostly greater than the irrigation standard (100 ug/L ae) through 48 HAT, and some sites through 72 HAT. Based on the herbicide concentration data, the herbicide from treatment areas A-13 and B-13 appear to have merged into a larger treatment probably throughout most of the bay that the areas were located in. The large treatment area plus the protected location of the bay may have caused exposure times (concentrations > 100 ug/L ae) to equal or exceed 48 HAT in much of the area .

Concentrations of 2,4-D in samples from site KC ranged from 312 to 560 ug/L ae through 8 HAT compared to the target concentration of 4000 ug/L ae (Figure 4). Concentrations were less than 100 ug/L ae by 24 HAT. Herbicide Concentration data indicated that herbicide dissipated rapidly from the target site (< 24 HAT). Exposure times in the treated area appeared to be longer than is typically observed in other small scale (< 5 acres) herbicide treatments (< 6 HAT). Based on an aerial photo there appears to be sand or rock bar between the treatment area and the remainder of the lake which may have slowed dissipation from the treatment area.

Concentration exposure times in the treatment areas A-10 and B-10 exceeded exposure times in the smaller treatment area C-10 and was likely the result of the larger size of the treatment area and location (Figure 5).

Figure 1. Kentuck Lake 2,4-D Treatment Areas 2013

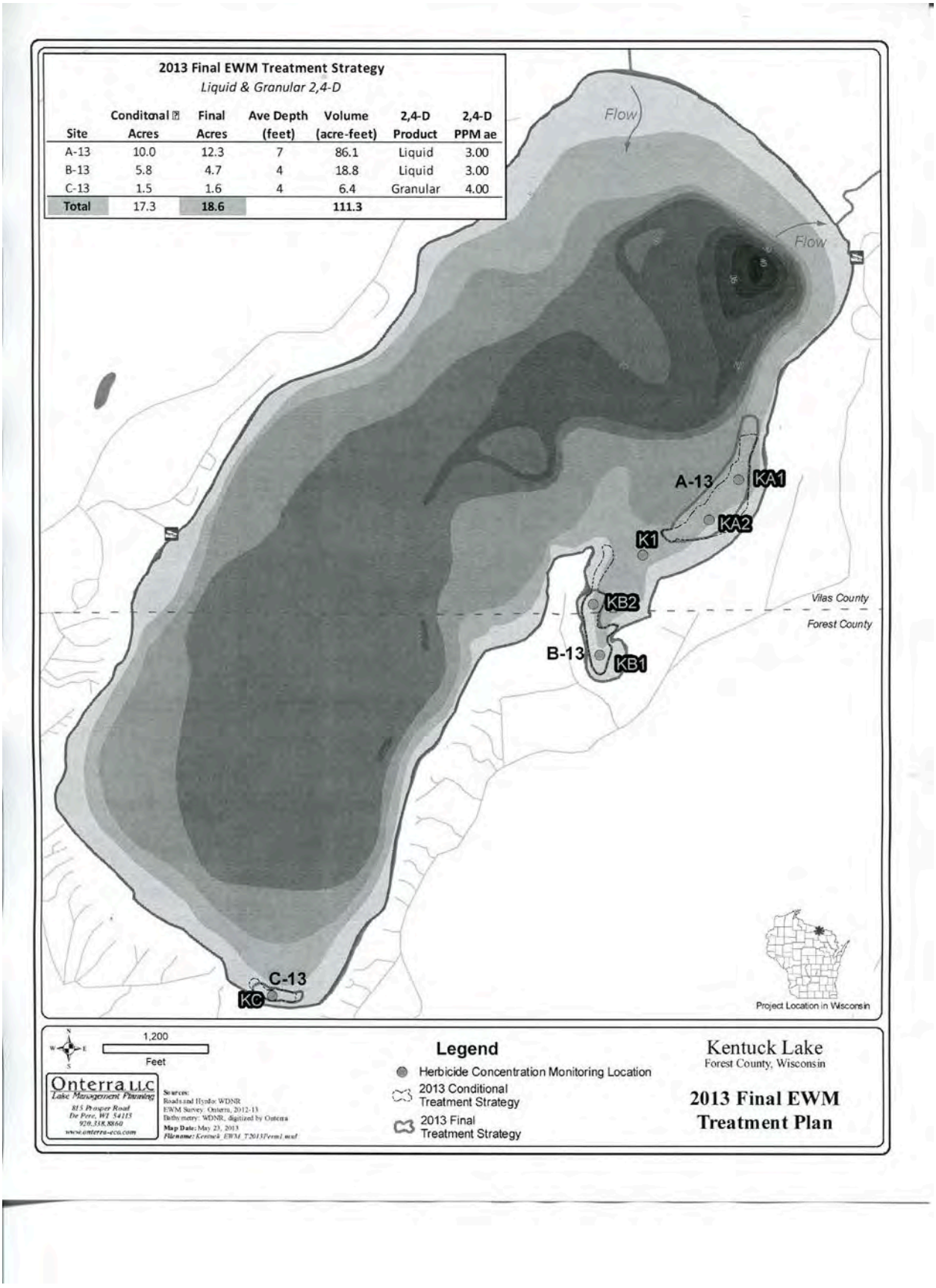


Figure 2. Kentuck Lake 2,4-D Sample Locations
2013

Figure 3

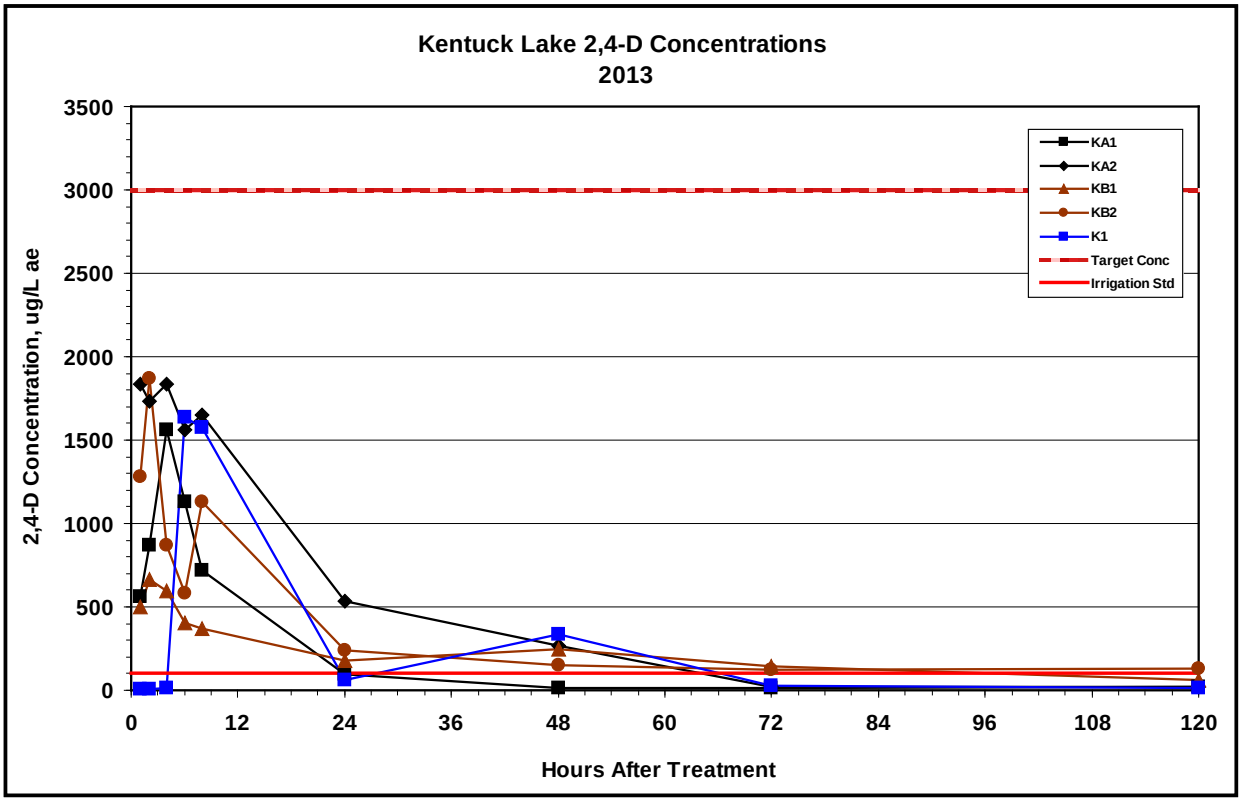


Figure 4

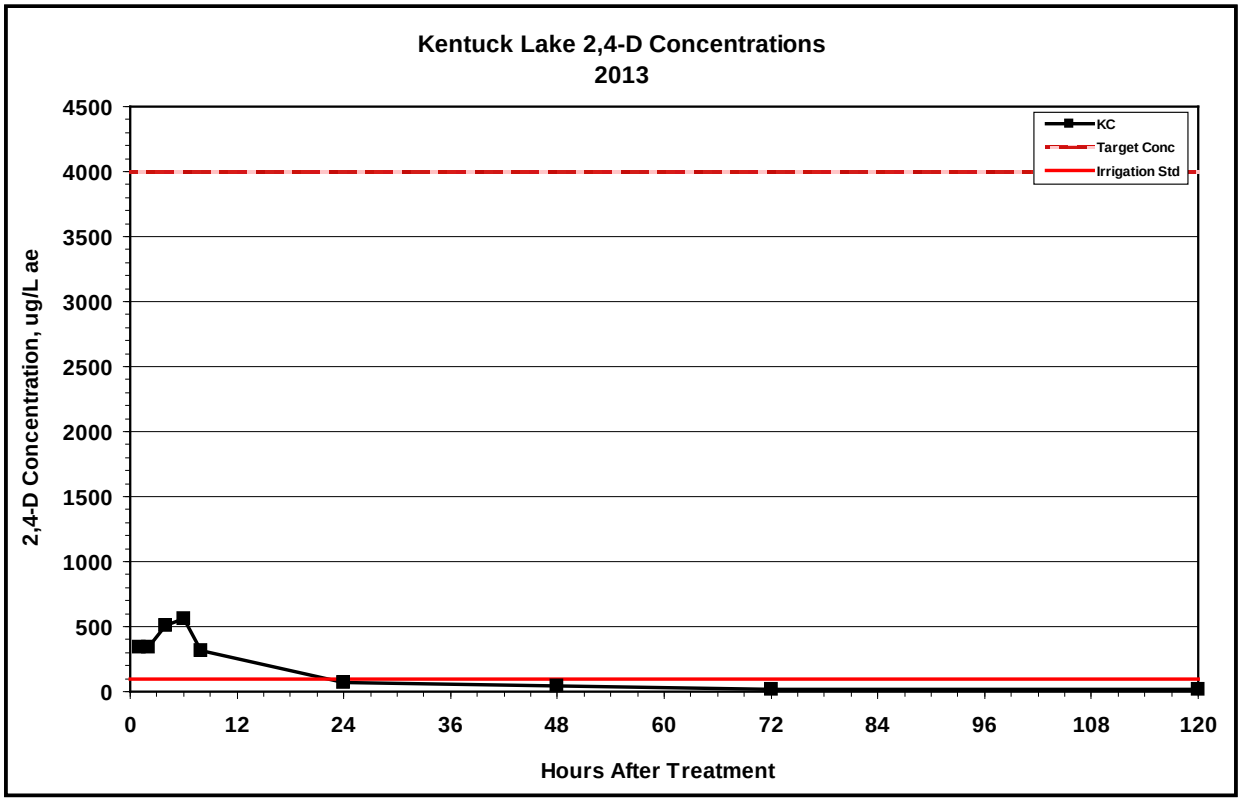
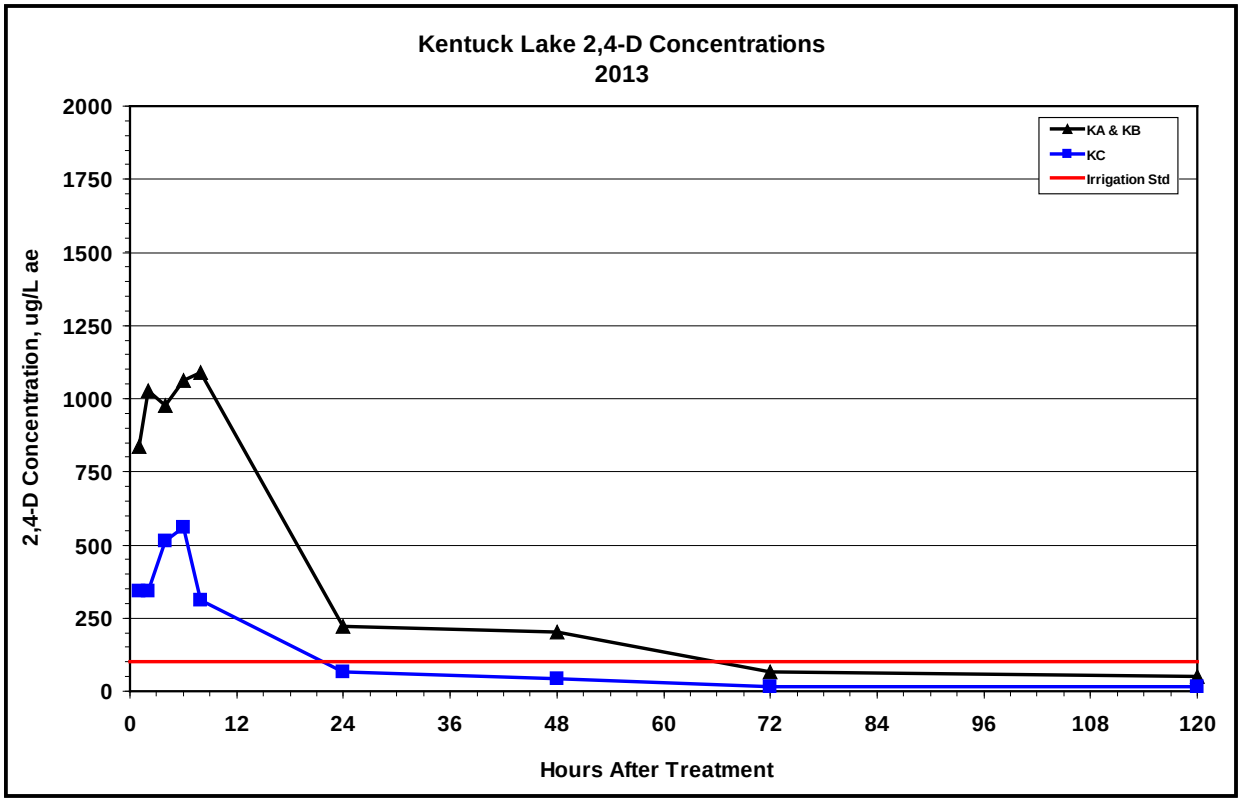


Figure 5


Kentuck Lake 2,4-D Concentrations
2013
2,4-D Concentration, ug/L ae
2000
1750
1500
1250
1000
750
500
250
0
0
12
24
36
48
60
72
84
96
108
120
Hours After Treatment
KA & KB
KC
Irrigation Std