

**Draft: Balsam, Polk County
Endothall Concentration Monitoring Summary, 2013**

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Balsam Lake has an area of 2054 acres, and a maximum depth of 37 ft. On 3 June 2013, two areas totaling 13.4 acres were treated with a liquid formulation of endothall (Aquathol K) to control curly-leaf pondweed (*Potamogeton crispus*). Water temperatures were reported to be 65.4°F (18.6°C) at the time of treatment.

The endothall was applied at a target concentration of 1500 ug/L (1.5 mg/L) active ingredient (ai). Endothall application rates are specified as active ingredient (ai) in the product label, while endothall chemical analysis is specified as acid equivalent (ae). A concentration of 1500 ug/L ai is equal to 1060 ug/L ae. Two water sample sites were established in each treatment area (B11 and B15) to monitor endothall concentrations and exposure times (Figure 1). Additional sample sites (B1 and B2) were located between treatment areas and wild rice beds located near sample site B2. A third proposed treatment area (B19) was not treated.

Water samples were collected from each sample site using an integrated water sampler which collects water from most of the water column. Water samples were collected at intervals of approximately 1, 2, 4, 6, 8, 24 and 48 hours after treatment (HAT) at sample sites in treatment areas. Water samples were collected at intervals of approximately 1, 3, 5, 7, 10, and 14 days after treatment (DAT) at sample sites in untreated areas. 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 endothall 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 endothall.

Maximum endothall concentrations in treatment area B11 ranged from 618 to 1009 ug/L ae at 1 HAT compared to the target concentration of 1060 ug/L ae (Figure 2). Endothall concentrations in samples from treatment area B11 ranged from 173 to 253 ug/L ae by 8 HAT and were near a base line concentration of 100 ug/L ae by 24 HAT.

Maximum endothall concentrations in treatment area B15 ranged from 506 to 659 ug/L ae at 2 to 4 HAT compared to the target concentration of 1060 ug/L ae (Figure 3). Endothall concentrations in samples from treatment area B15 ranged from 189 to 461 ug/L ae by 8 HAT and were near a base line concentration of 100 ug/L ae by 24 HAT.

Mean endothall concentrations from treatment area B11 were initially greater at 1 HAT compared to treatment area B15, but were similar at 2 HAT (Figure 4). All concentrations were approximately equal to 100 ug/L ae by 24 HAT.

Endothall concentrations in water samples from the untreated areas, B1 and B2 exceeded the base line concentration of 100 ug/L ae at 1 to 3 DAT. Concentrations in all samples collected from 5 to 14 DAT were less than the detection limit of 10 ug/L ae.

Figure 1. Balsam Lake Endothall Treatment Areas Herbicide Concentration Sample Sites, 2013

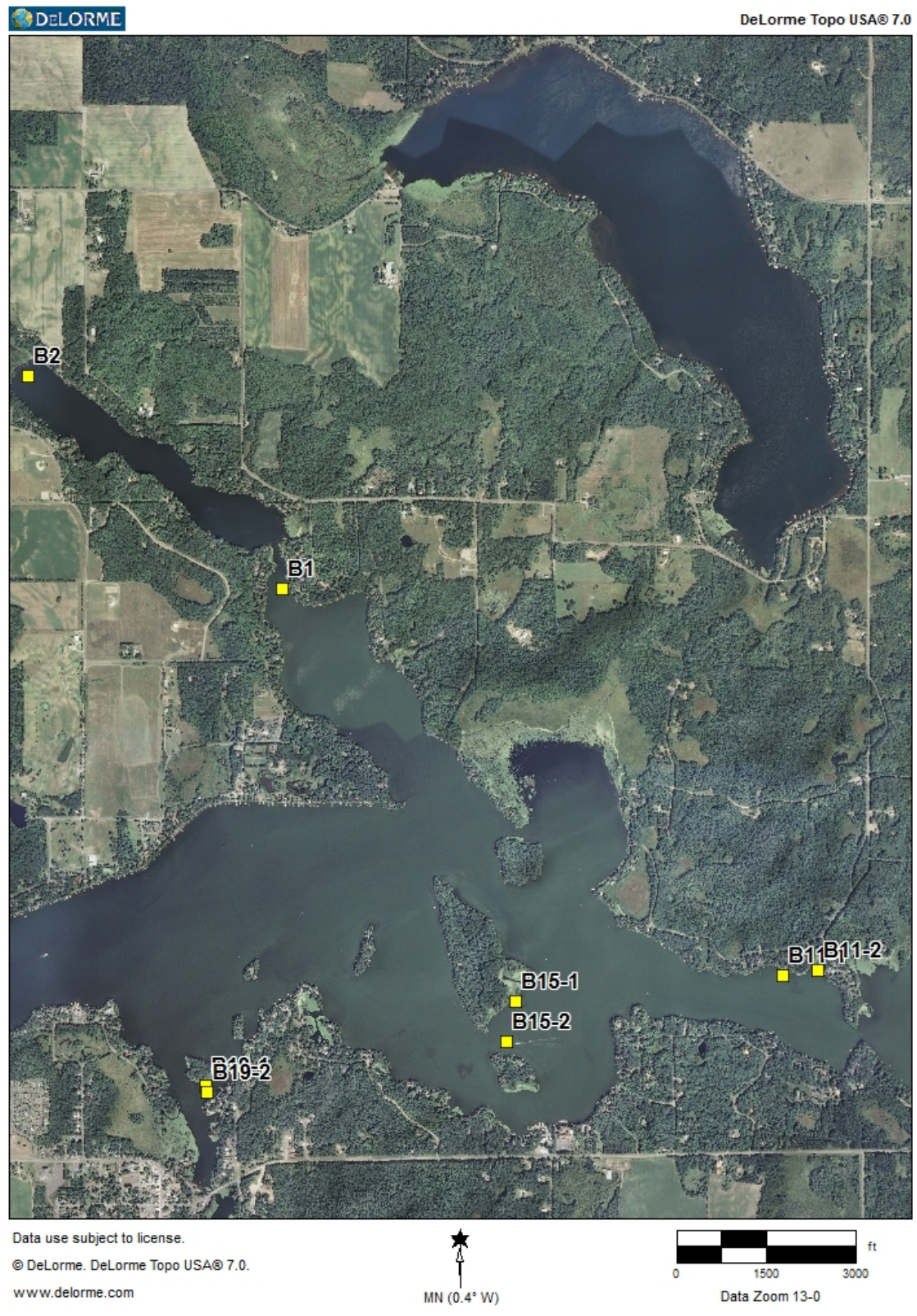


Figure 2

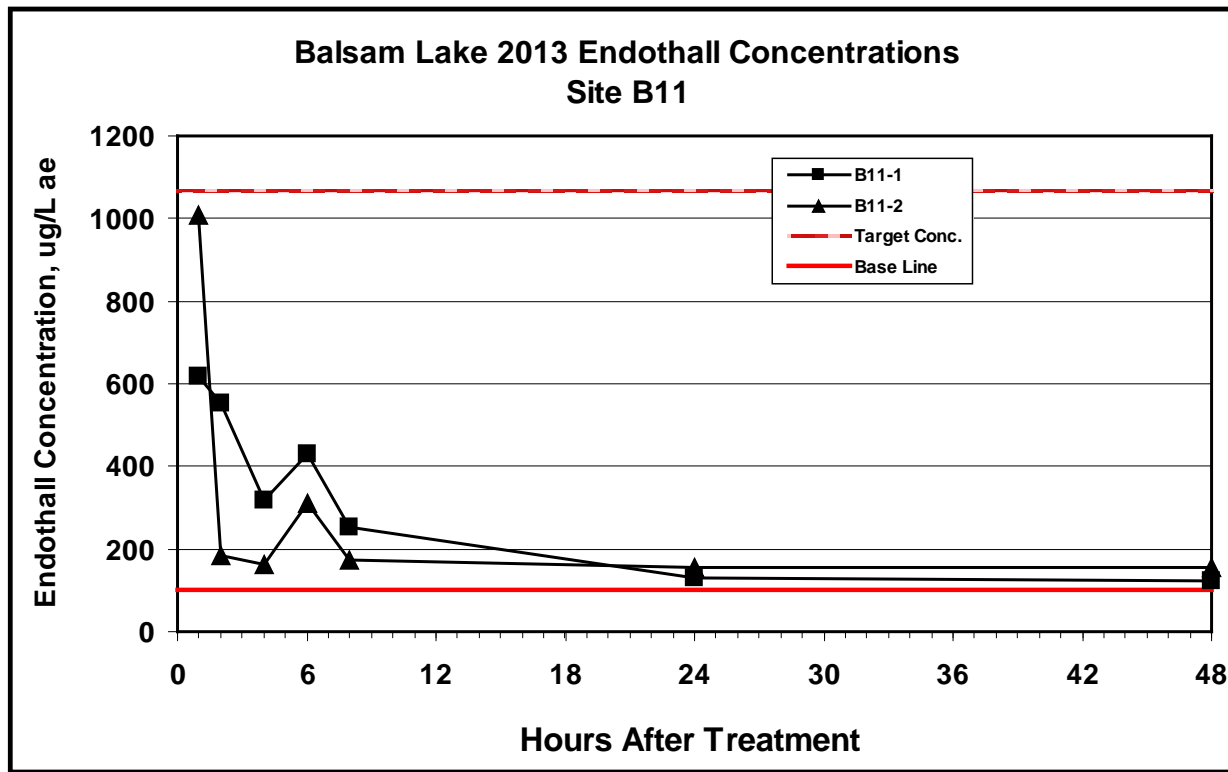


Figure 3

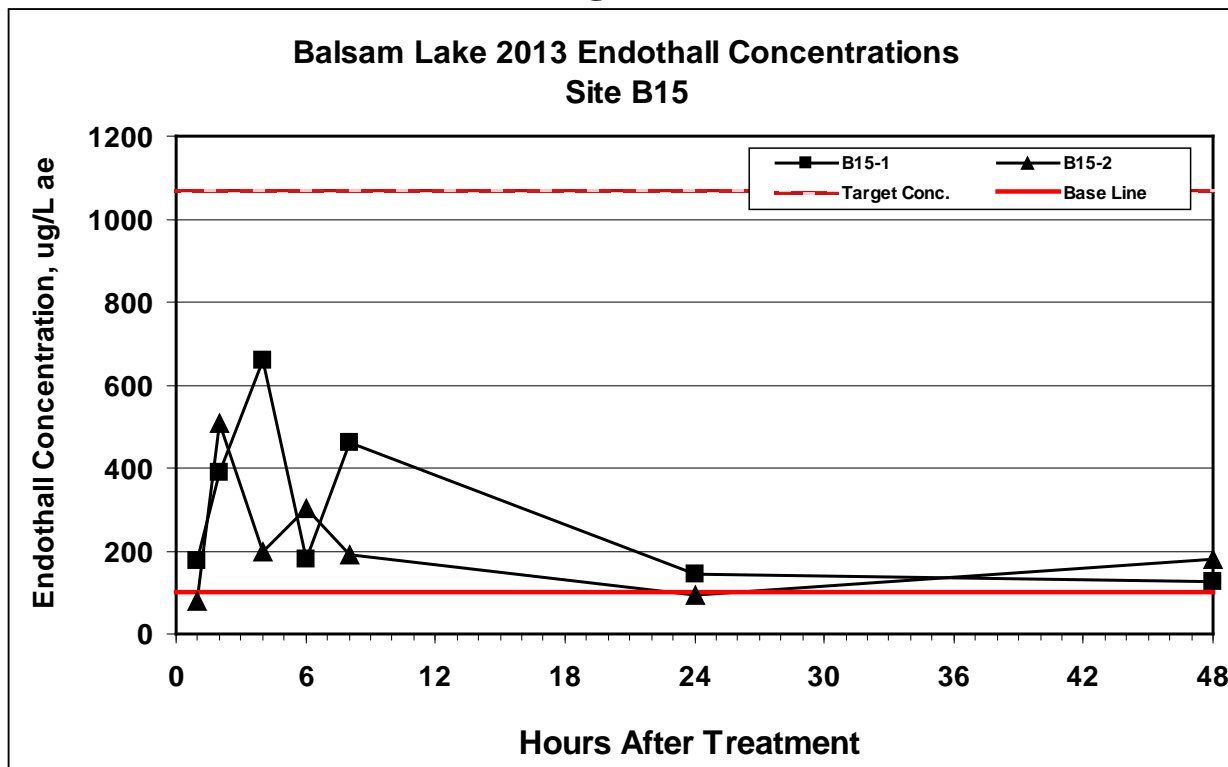


Figure 4

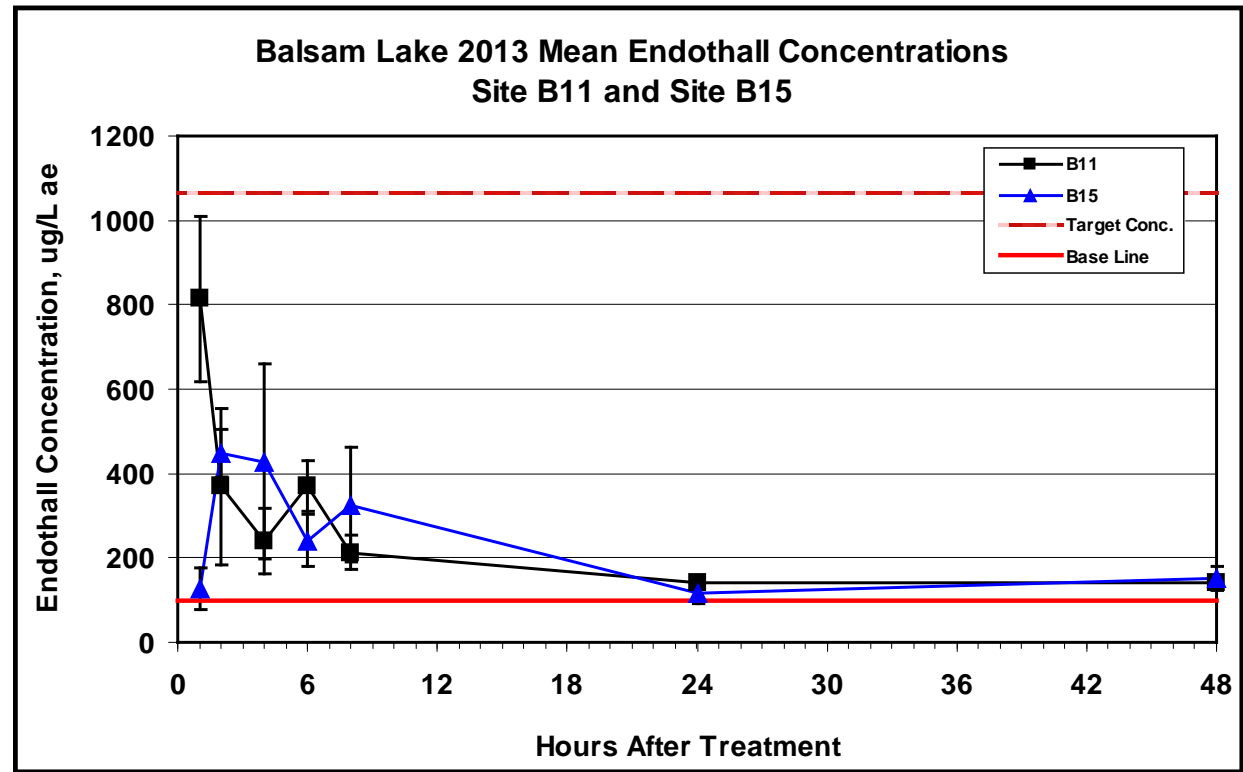


Figure 5

