Kill, Not Just Control EWM

Big Marine Lake EWM Project

Presented by Mike Blehert

Thank you to project partners:

- The Initiative Foundation, Lessard-Sams Legacy grant program
- Washington County AIS prevention grants
- Carnelian Marine St. Croix Watershed District
- MN DNR
- Blue Water Science
- PLM Lake and Land Management Corp.
- Many others

Big Marine Lake (BML)

- Located in NE Washington County
- BML is a clear and clean 1600 acre lake.
- The native plant population is healthy and diverse.
- The BMLA was formed in 2009.
- First treatment - 9.5 acres of EWM in 2009
- The littoral area is 1152 acres.
- BML can support 150 to 200 acres of EWM according to Blue Water Science sediment analysis

Kill, Not Just Control EWM

- Control: EWM turns brown and sinks in June, and grows back in the late summer.
- Kill: EWM sinks, decomposes and does not return the following spring(s??)
- BMLA initiated a five year program to kill **small** areas of EWM in 2015.
- Goal: Reduce EWM treatment to less than five acres/year by 2019.

Multiple Treatment Protocol

- Increase herbicide Concentration Exposure Time (CET)
- 19 acres located in 8 elongated areas were treated in 2015
- 2.5 ppm DMA4 applied by PLM at 7:00 pm on June 10
- 1.5 ppm Sculpin G applied by PLM at 7:00 am on June 11
- These 8 areas had been treated almost every year since 2009 and 2011.

2,4-D CET Graph

**Concentration and exposure times of 2,4-D required for effective EWM control have been
studied in the laboratory.**

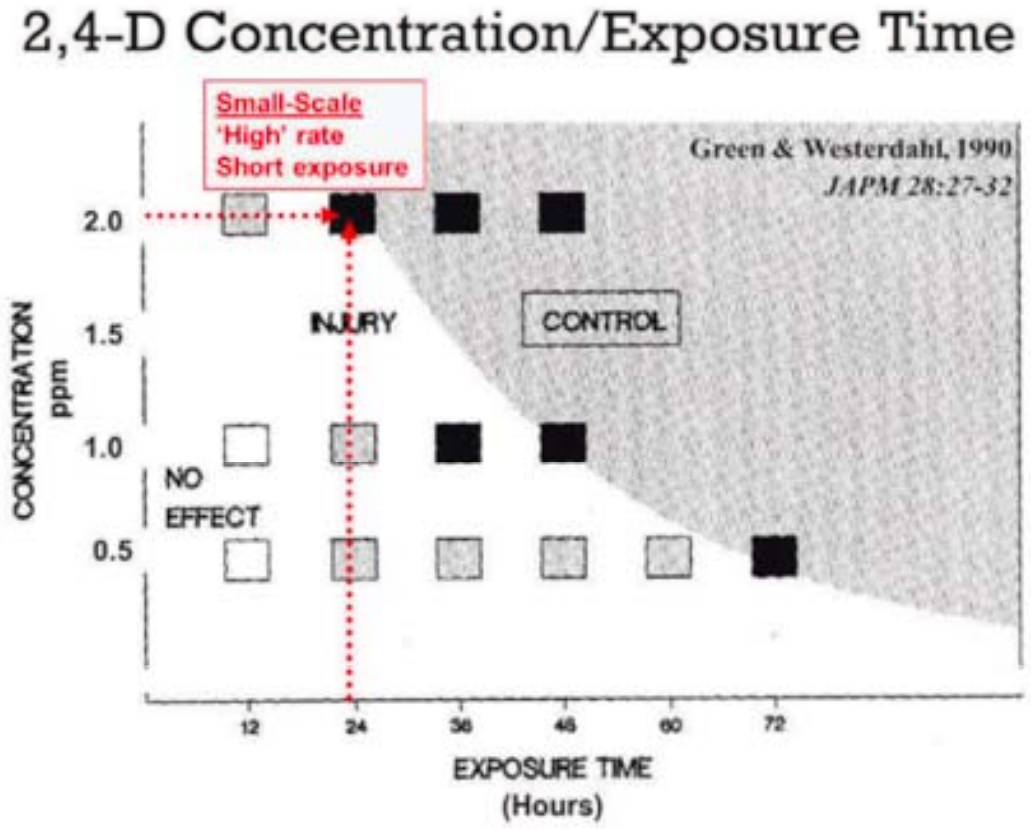
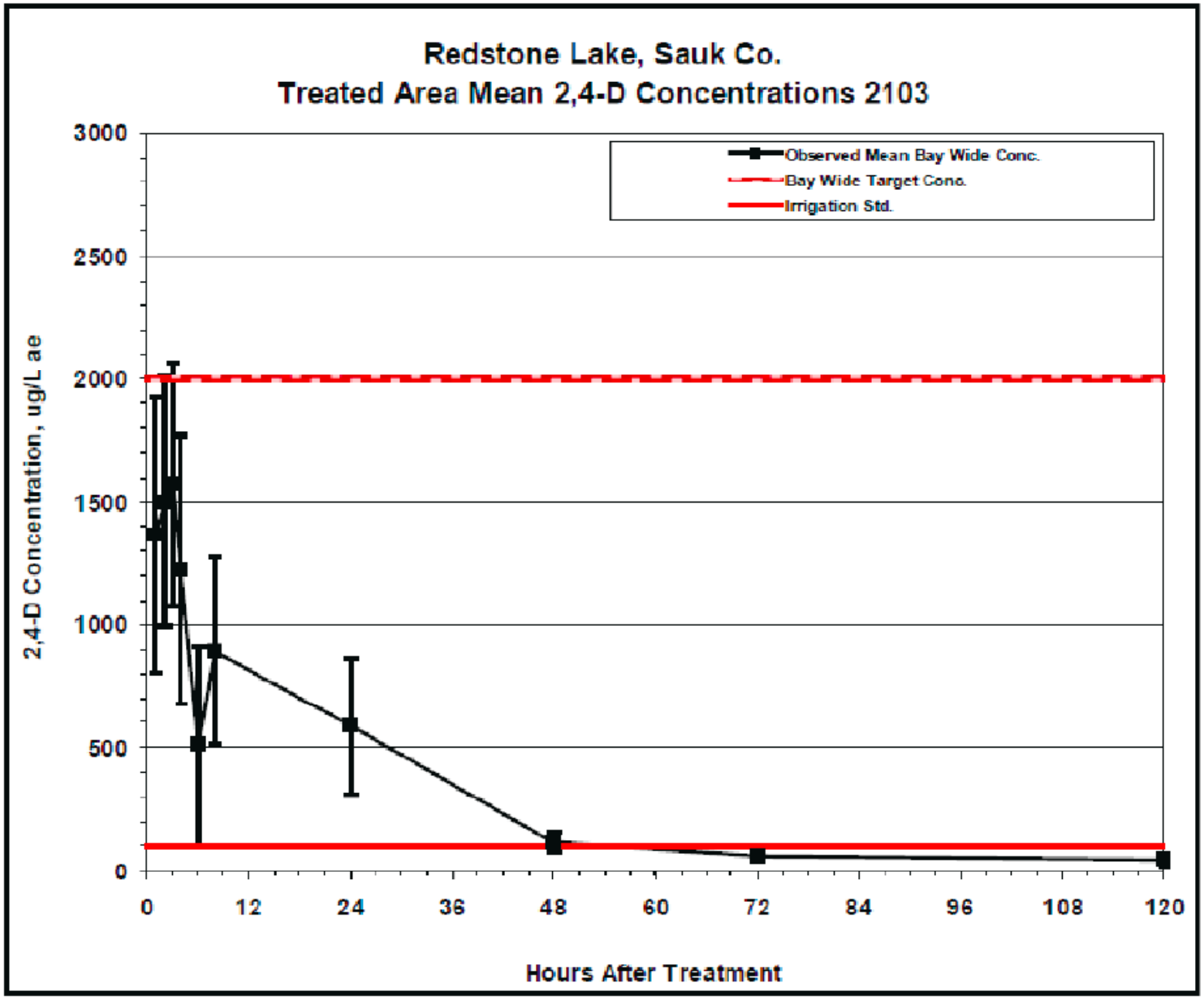
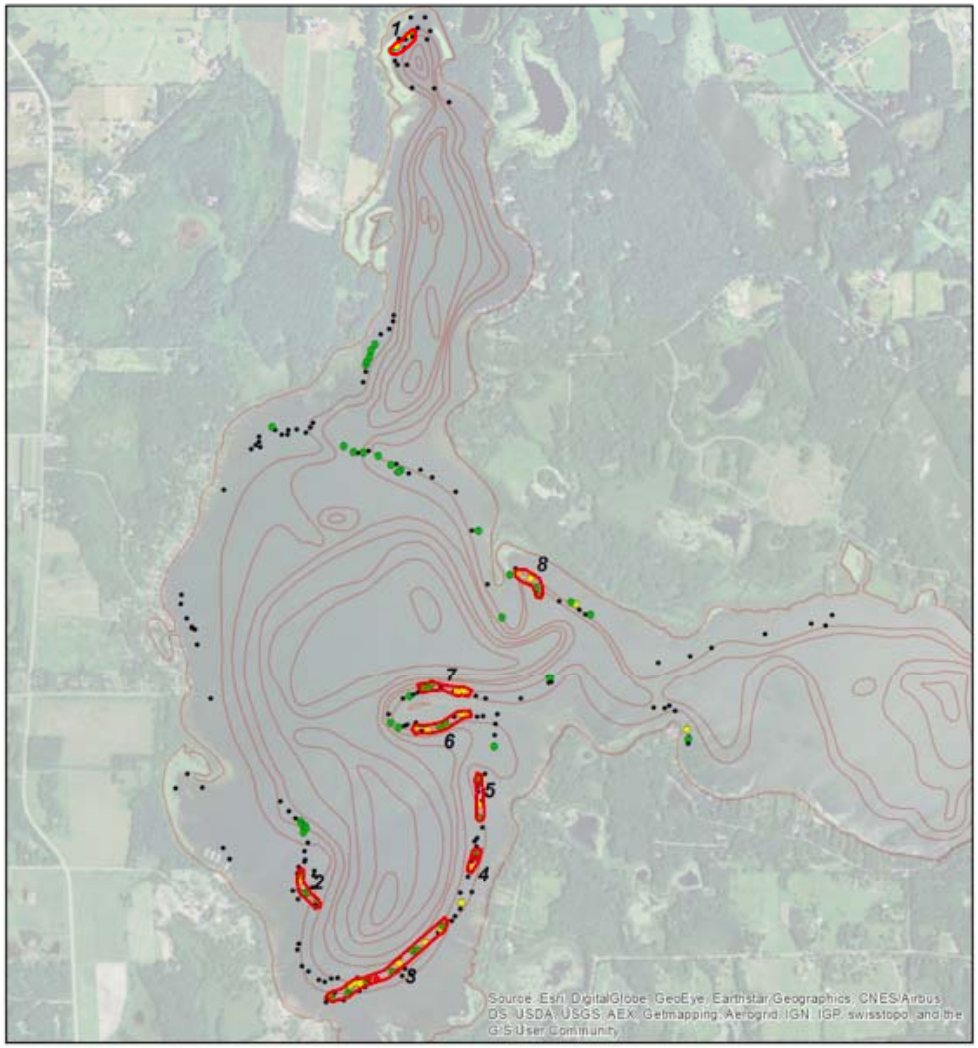


Figure 3


Redstone Lake, Sauk Co.
Treated Area Mean 2,4-D Concentrations 2103
Observed Mean Bay Wide Conc.
Bay Wide Target Conc.
Irrigation Std.
2,4-D Concentration, ug/L ae
3000
2500
2000
1500
1000
500
0
0
12
24
36
48
60
72
84
96
108
120
Hours After Treatment

Big Marine EWM Sample Sites June 1, 2015



Id	CLP_Ac
1	1.43
2	1.63
3	6.93
4	0.95
5	1.6
6	2.57
7	2.02
8	1.88

19 Acres Total

UTM NAD 1983
Blue Water Science

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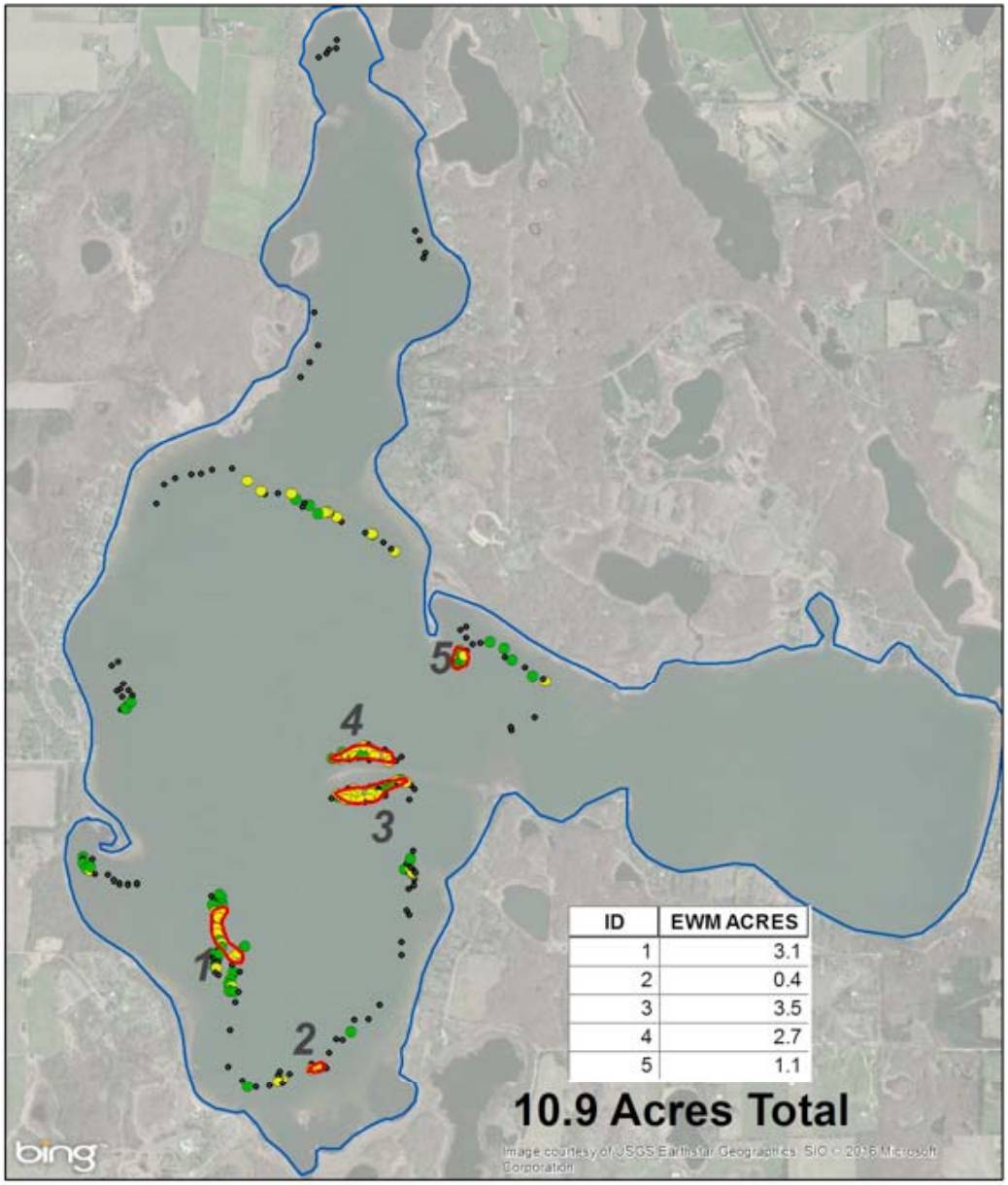
2016 - Changed to Renovate OTF

- Hybrid EWM more resistant to DMA4 than Triclopyr (LaRue 2012)
- In small areas, Renovate OTF is 2 to 4 times more effective than liquid Triclopyr (Koschnick, et al 2010)
- Renovate accumulates in EWM roots 7.5 times more than liquid (J.D. Vassios, 2014)
- Renovate concentrates in the bottom 4 ft. of the water column, so deeper water can be treated as if it is 4 ft. deep (Sepro Corp. and Koschnick, 2006, 2010)
- PLM treated entire 9 ft. deep water column with Renovate, 1.5 ppm in AM and 1.0 ppm in PM

Big Marine EWM Treatment Areas
June 8, 2016



ID	EWM ACRES
1	3.1
2	0.4
3	3.5
4	2.7
5	1.1

10.9 Acres Total

UTM NAD 1983
Blue Water Science
Big Marine ID: 82005200

(Average depth in treatment areas: 10ft)

Data Collected June 8, 2016
Map Made June 13, 2016

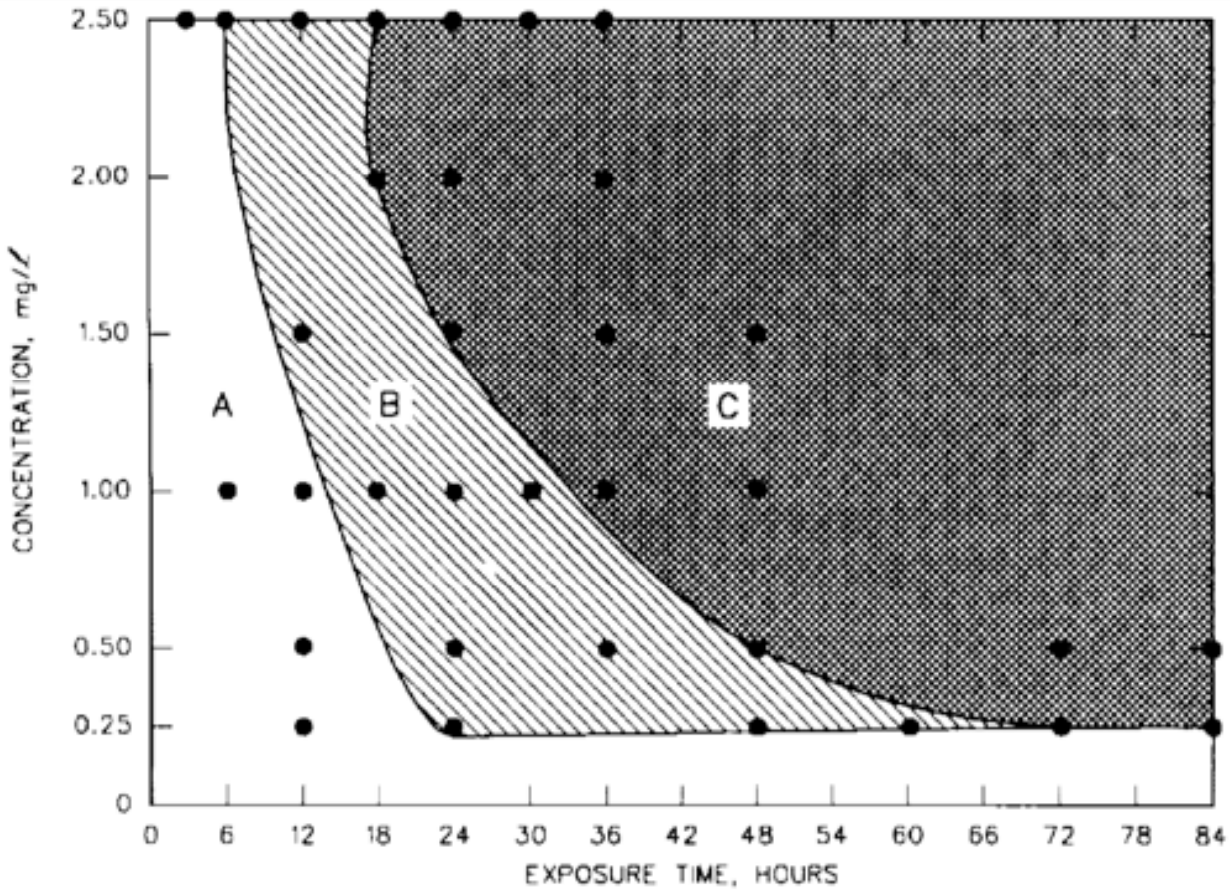


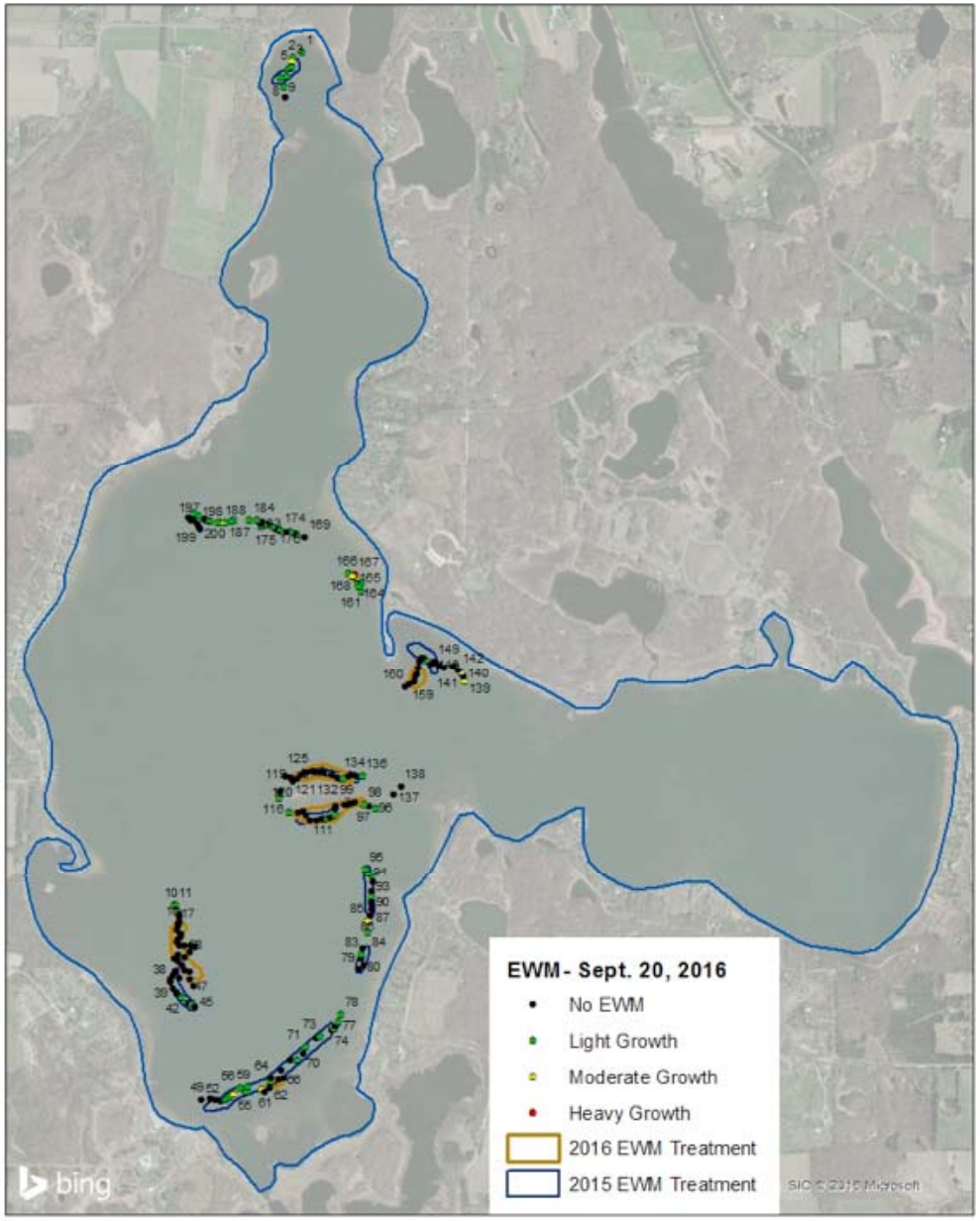
Figure 3. Summary of triclopyr concentration/exposure time (CET) relationships for control of Eurasian watermilfoil. Circles represent actual CET test coordinates. Zones A, B, and C were estimated using these coordinates. Zone A represents CET combinations that should provide < 70% milfoil control, regrowth from injured stems and rootcrowns is likely to occur within 2 weeks posttreatment; Zone B represents CET combinations that should provide 70 to 85% milfoil control with regrowth beginning 3 to 4 weeks posttreatment and; Zone C represents CET combinations that should provide > 85% milfoil control with very limited or no regrowth up to 5 weeks posttreatment.

Tissue Death, Longer CET

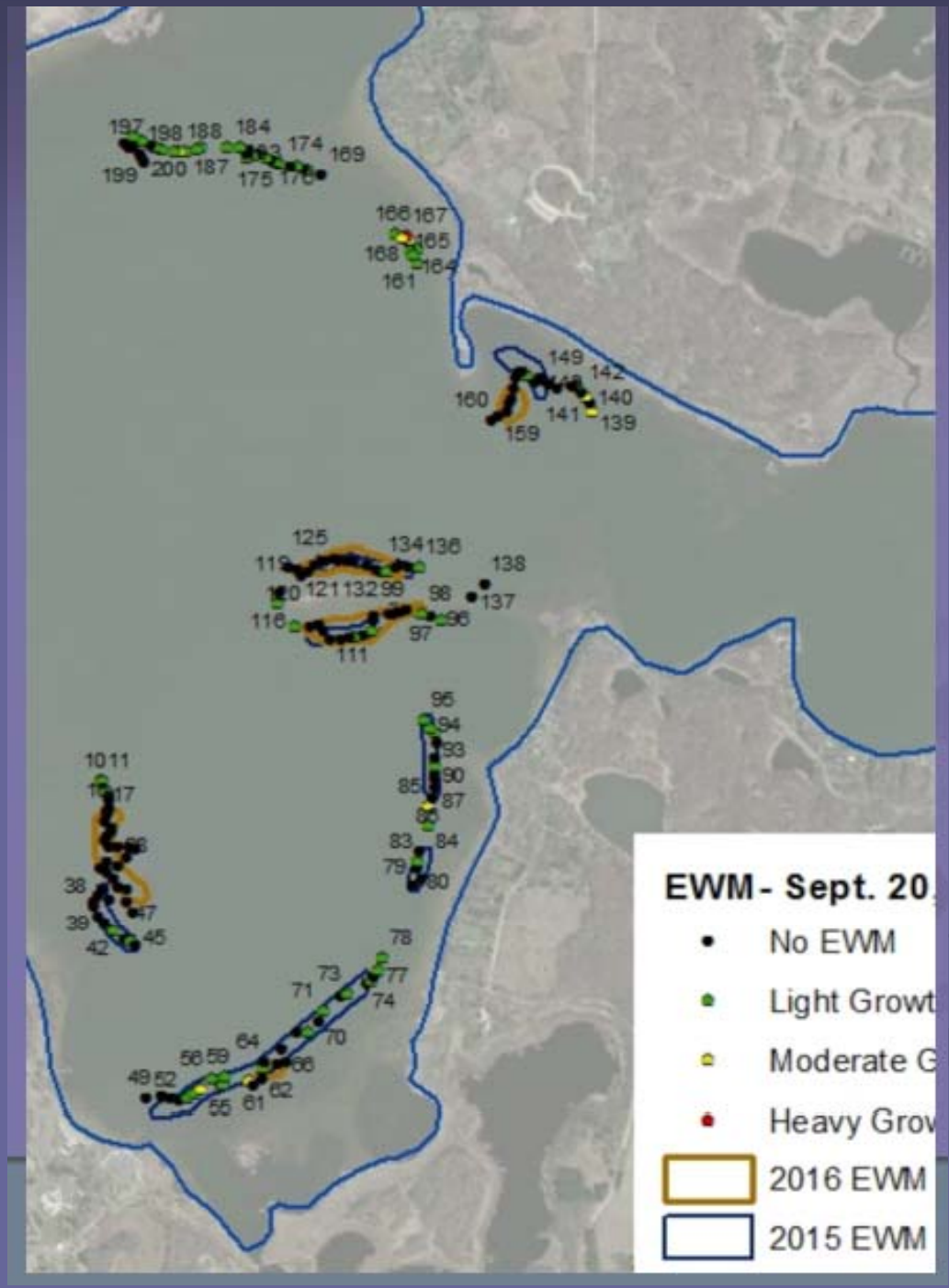
Complete milfoil control was obtained with treatment combinations of 2.5 mg/l at 30 and 36 hr, 2.0 mg/l at 36 hr, 1.5 mg/l at 48 hr, and 0.5 mg/l at 84 hr. No viable shoot or root tissue remained following these treatments. This indicates that sufficient triclopyr uptake occurred, and translocation throughout the plant resulted in the death of all tissue.

Netherland and Getsinger (1992)

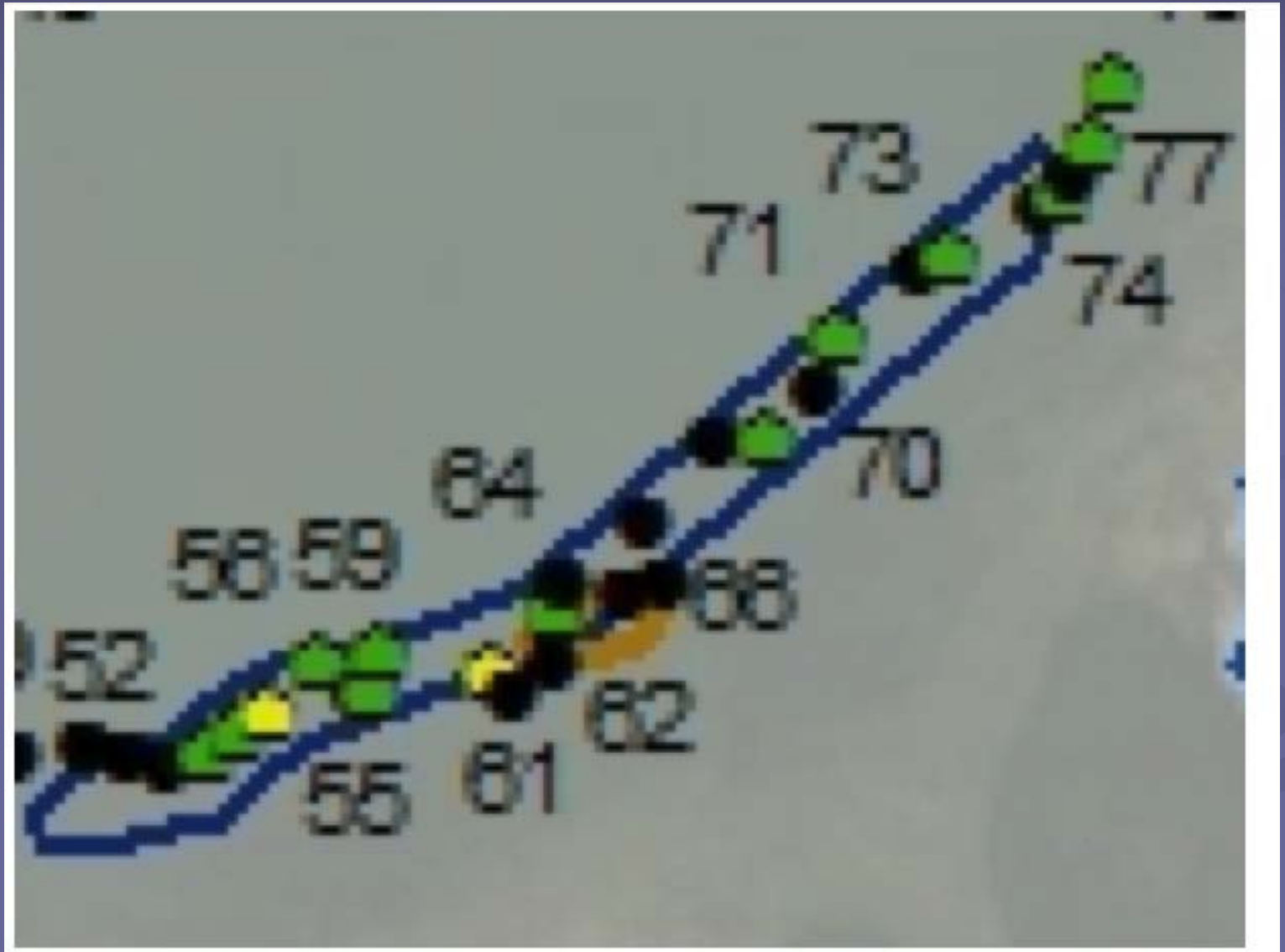
EWM Assessment September 20, 2016
with 2015 and 2016 Treatment Polygons



UTM NAD 1983
Big Marine ID: 82005200


EWM - Sept. 20
No EWM
Light Growt
Moderate G
Heavy Grov
2016 EWM
2015 EWM

Expanded View of Area



SPRING 2017 EXPECTTIONS

- There is 4 to 6 acres of EWM in three other areas.
- Expect 2 to 2.5 acres of EWM in the test plots. That is a 90% reduction of EWM in two years.
- Excellent progress toward achieving goal of less than five acres by 2019.


Sylvan


Sylvan


Silvar