Progress toward water quality improvement: Macrophytes. AMP 2011 Annual Report. (Assessment Measure)

AMENDED CONSENT JUDGMENT GOAL

Expansion of the areal coverage and increase in diversity of macrophyte community, where number of species and biomass in the littoral zone (6 m water depth) are comparable to other regional lakes. Increase percent cover of littoral zone to optimal levels (40% – 60%) for largemouth bass habitat, to achieve desired use of the lake for warmwater fish reproduction.

Hypotheses to be tested:	**Status:**
Metro improvements and watershed phosphorus load reductions indirectly result in increased areal coverage of macrophytes in the littoral zone of Onondaga Lake.	• Metro improvements to reduce nutrient loading were implemented in 2004 (BAF) and 2005 (HRFS) • Areal coverage in the littoral zone has increased between 2000 and 2011
Metro improvements and watershed phosphorus load reductions indirectly result in increased number of macrophyte species in Onondaga Lake.	• The number of macrophyte species has increased from 5 in 1991 to 23 in 2010 (not assess in 2011)

Current Conditions with Historical Comparison

Community Composition
(Lakewide)

Year	Number of species present	Dominant species by relative % cover
1991:	5	*no data*
2000:	10	Sago pondweed (52%) Common waterweed (26%)
2005:	17	Common waterweed (62%) Coontail (19%)
2010	23	Coontail (30%) Common waterweed (23%) Water stargrass (17%)

1991 data from John Madsen, Army Corps of Engineers, 1996

Biomass
(Lakewide average)

1991: *no data*
2000: 16 g/m^2 dry weight
2005: 51 g/m^2 dry weight
2010: 40 g/m^2 dry weight

Species Richness
(Transect average)

1991: 1.3 species per transect (Madsen et al 1996)
2000: 3.6 species per transect
2005: 5.6 species per transect
2010: 6.8 species per transect

Percent of Subplots with Macrophytes

1991: 13% (Madsen et al 1996)
2000: 61%
2005: 74%
2010: 83%

Percent Cover in littoral zone
(Lakewide average)

1991: *no data*
2000: 18%
2005: 26%
2010: 65%

Aerial Photographs
(Percent indicates percent coverage of littoral zone. Aerial photographs were obtained in June prior to 2006,in August from 2006 to 2010, and in September in 2011 .)

2000: 85 acres (11%)
2001: 134 acres (17%)
2002: 142 acres (18%)
2003: 267 acres (34%)
2004: No data
2005: 378 acres (49%)
2006: 183 acres (24%)*
2007: 210 acres (27%)*
2008: 314 acres (40%)*
2009: 382 acres (50%)*
2010: 409 acres (54%)
2011: 398 acres (51%)

Factors affecting macrophyte community

- Sediment texture (oncolites are nutrient-poor and unstable), light penetration, salinity, zebra mussels

Progress towards water quality improvement: Macrophytes. AMP 2011 Annual Report. (Assessment Measure) *(continued).*

Monitoring and Assessment Program	
Lake Monitoring	• Survey species composition, percent cover, and biomass every 5 years, from 2000 to 2015. • Annual aerial photographs of littoral zone to estimate acres of macrophytes. *Metrics to track over time* • Number of species (richness) • Percent cover • Biomass
Tools for Decision Making	
Qualitative and Quantitative Analysis	Compare to baseline survey in 2000