2017 Update on the Management of Morses Pond

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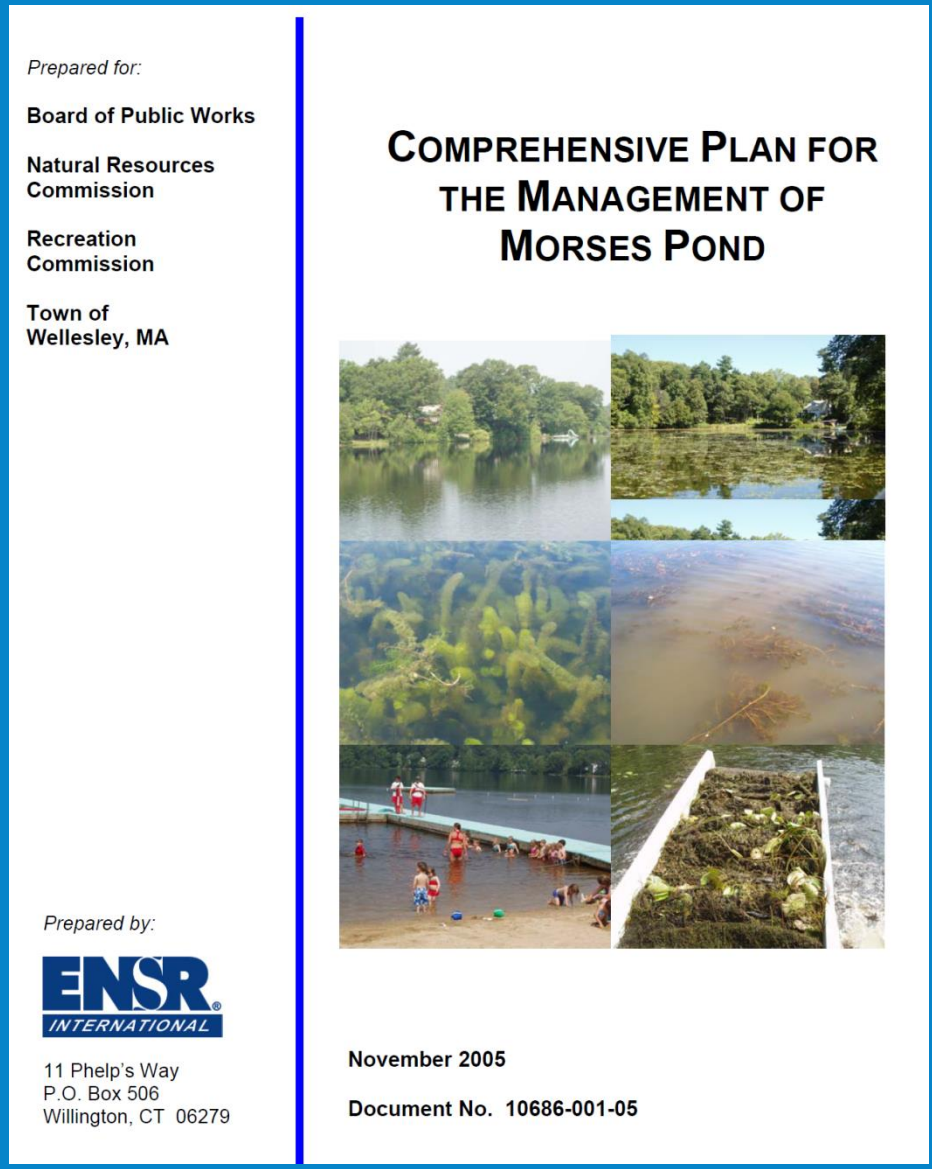
Background on Morses Pond

- 105 acre (42 ha) manmade pond (1600s) in Wellesley, MA
- About 72 acres (29 ha) of littoral zone, 50 ac (20 ha) targeted for plant control
- Dense Eurasian and variable water milfoil plus fanwort
- Less dense curlyleaf pondweed and spiny naiad
- Occasional water chestnut, some emergent invasives too!
- Native community of several pondweeds, waterweed, common naiad, coontail, water lilies (white and yellow)
- Major beach complex; swimming and non-motorized boating
- Adjacent town wells for water supply
- Homes on much of shoreline, access desired

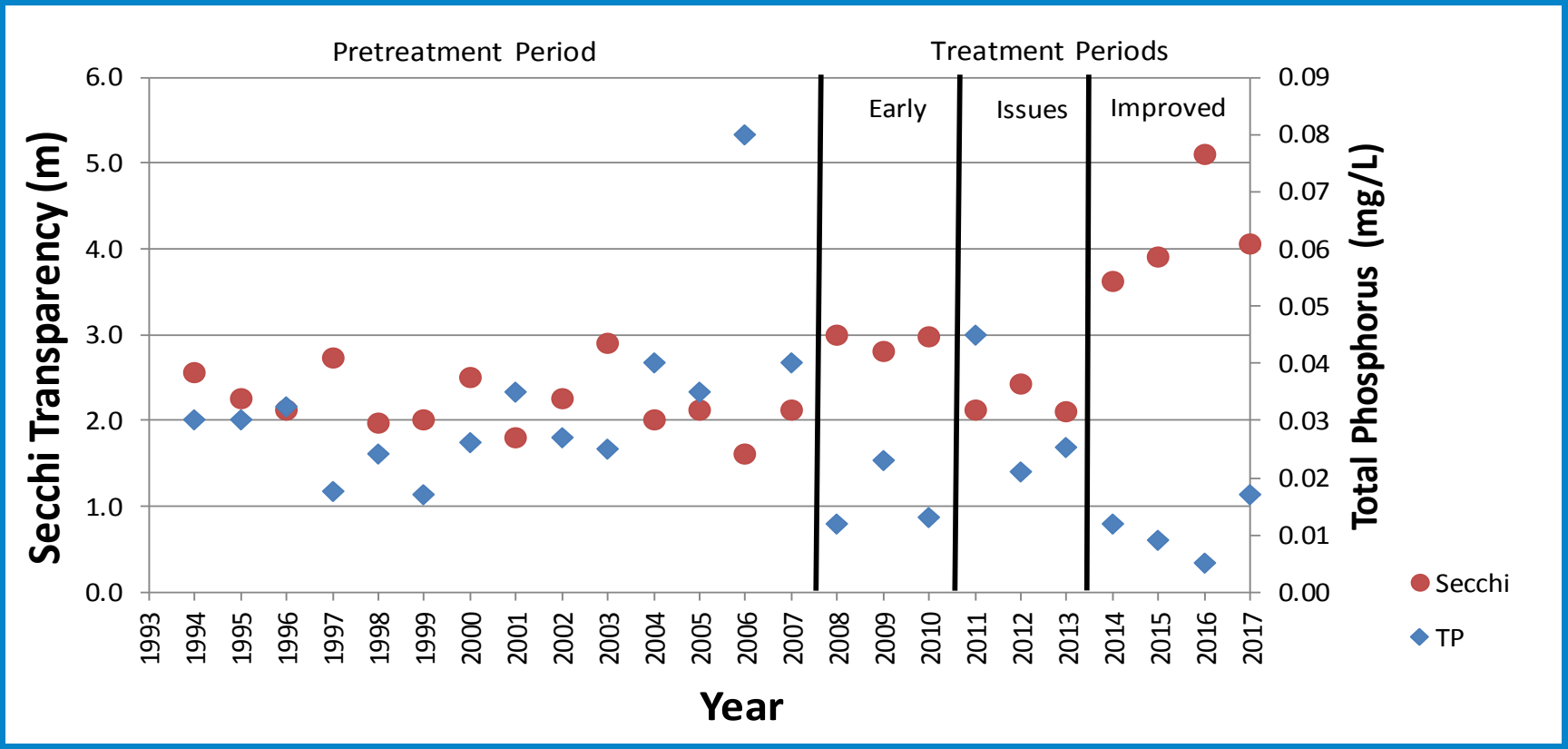
Morses Pond Comprehensive Plan

- 2005, result of much collaboration
- Education and watershed actions to reduce contaminant loading
- P inactivation system to clean incoming storm water
- Dredging in north basin to increase detention time
- Mechanical harvesting to control rooted plants
- Hand harvesting to limit invading water chestnut



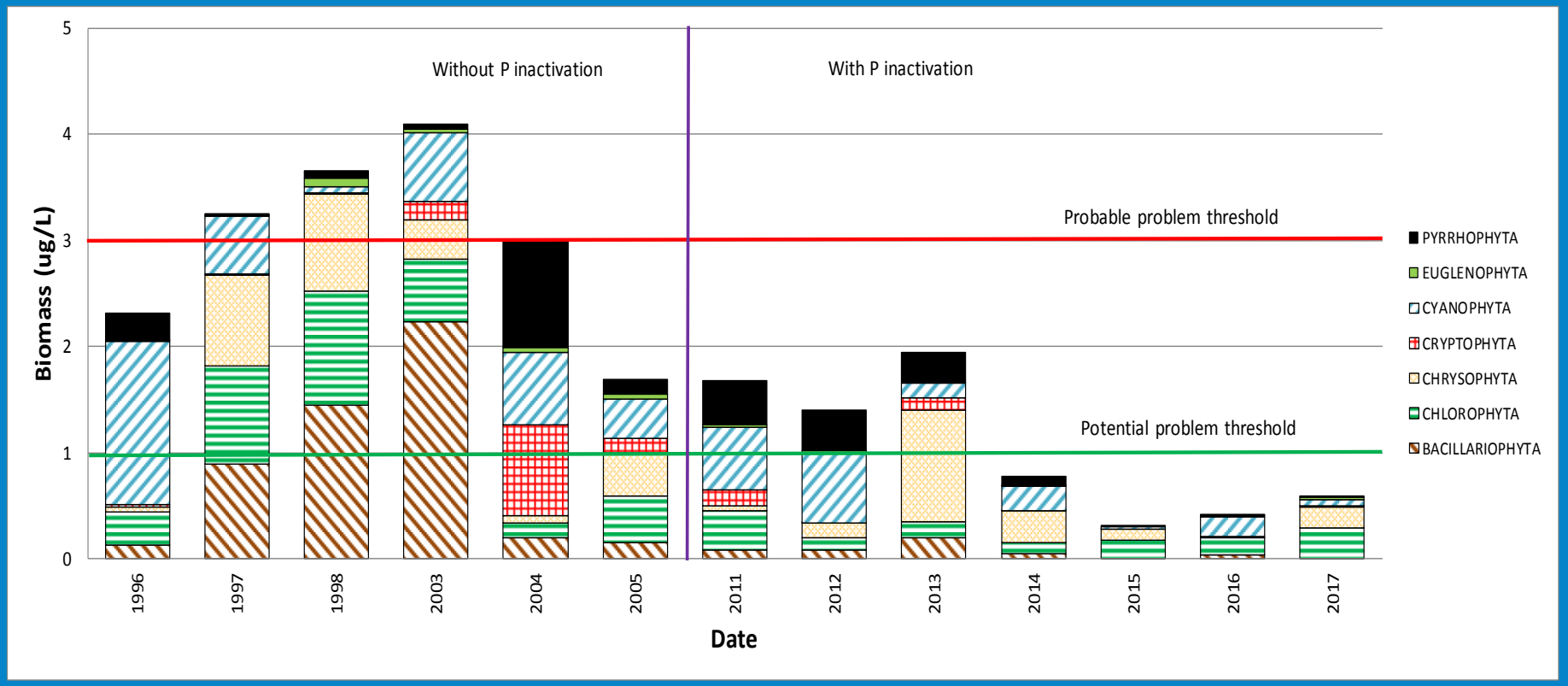
Phosphorus and Algae Control

- P inactivation system installed in 2008
- Adjustments over time in response to performance and opportunities
- System in place since 2014 has worked very well



Phosphorus and Algae Control

- Algae composition altered somewhat, but major change is just a reduction in abundance
- Zooplankton community is very desirable, fuels fish production



Swim Area Improvements

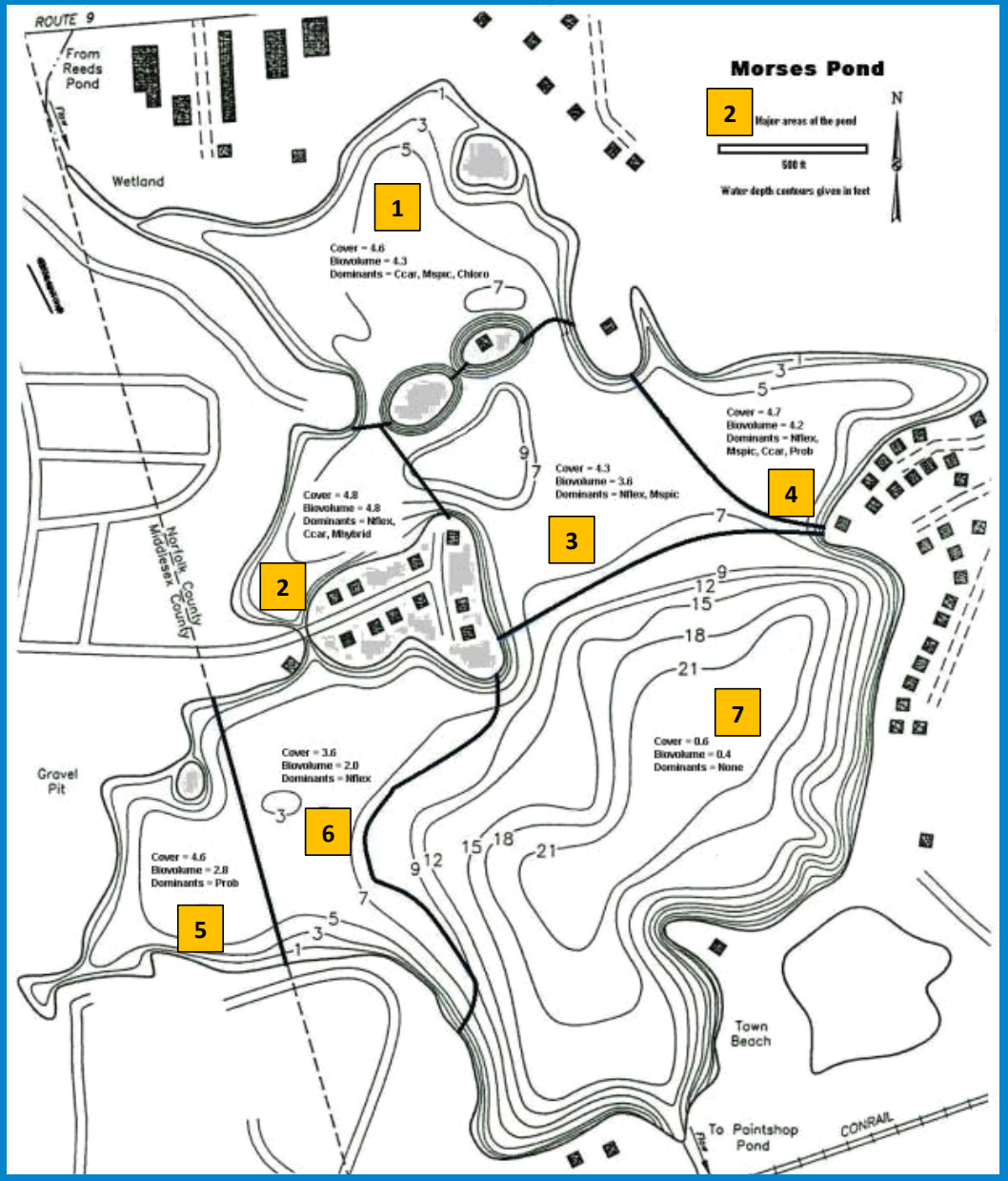
- Swim area regraded in May to limit slope in shallow area and improve safety
- Docks repositioned to improve control and safety
- Benthic barrier used in deeper part to control rooted plants, eliminating hydroraking and extending control later in swim season

Mechanical Harvesting in Wellesley MA

- Bought a harvester in 1983 after dredging part of Morses Pond, wanting to control plant growths elsewhere; multiple invasive species involved, provided some relief
- 1993 management plan done with limited public input, never properly implemented
- Conditions considered unacceptable to lake users for a number of years; 2004-2005 comprehensive management plan developed with extensive involvement by town boards and public
- Town policy against use of herbicides on public property lead to mechanical harvesting program as mainstay of plant control
- New, larger harvester purchased in 2007, detailed operation plan adopted and adjusted over time

Mechanical Harvesting in Wellesley MA

- 7 areas: 2, 3, 4 and 6 as priorities
- Edge of 7 done, but most of 7 is deeper
- 5 is in Natick, limited activity in this area
- 1 is north basin, used as treatment area for incoming water, cut in preparation for 2012-2013 dredging, recent channel for access
- Two cuts per year, plus maintenance as needed



Harvesting Program Data

- Harvester(s) run by DPW; operator keeps daily record (older harvester functional until end of 2016)
- Spring training for operator as needed, survey of plant community, any adjustment of priorities
- Annual review of results

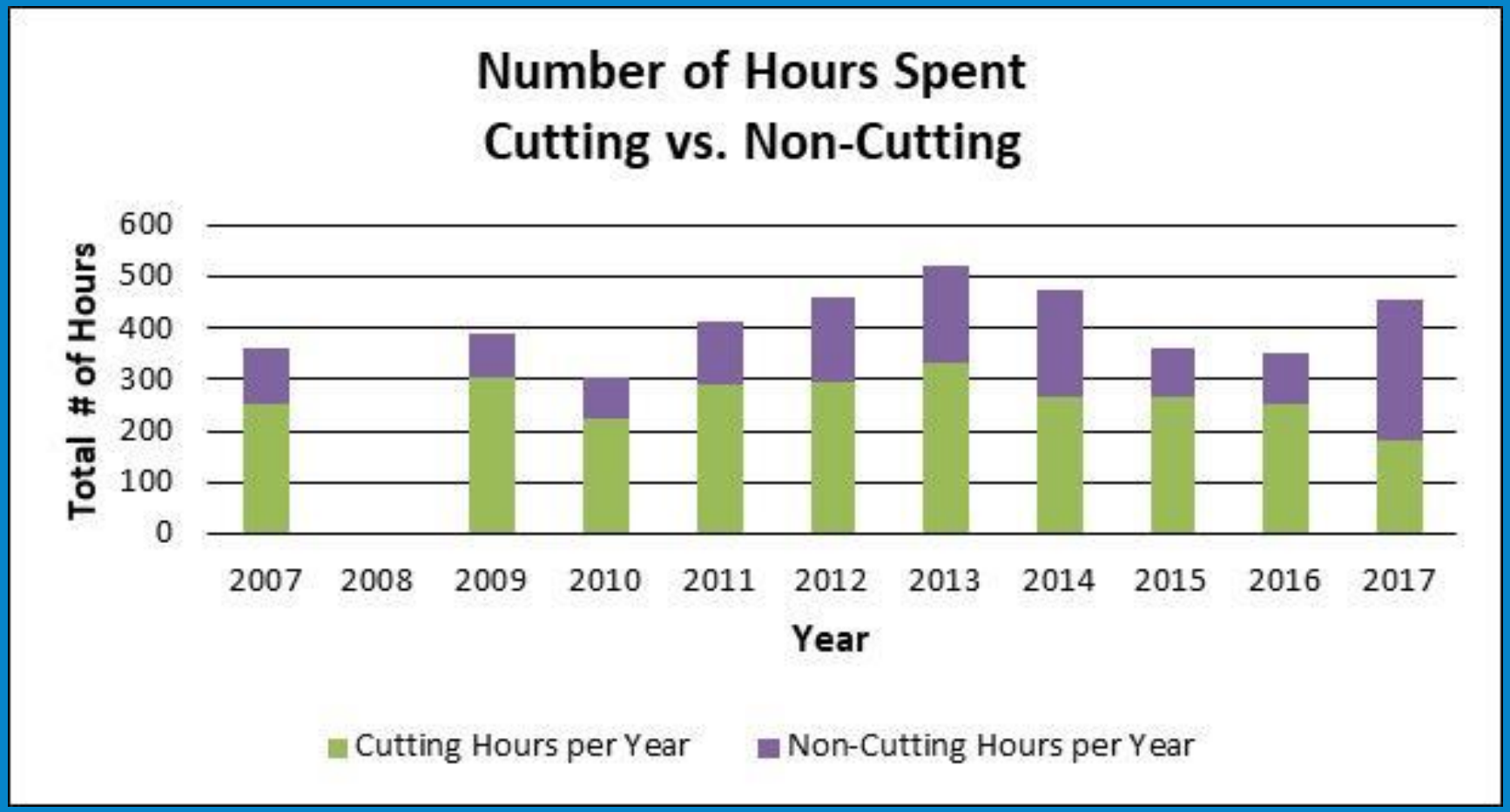
Harvesting Program Data

- Master table of effort and plant mass removed is derived from daily logs
- Derivation of key operational metrics for comparison

Year	Days of Harvesting per Year	Total Hours per Year	Cutting Hours per Year	Total Hr/Day	Cutting Hr/Day	Total Loads	Total Weight	Weight/ Day	Weight/ Load	Weight/ Total Hr	Weight/ Cutting Hr
	(Days)	(Hr)	(Hr)	(Hr)	(Hr)	(Load)	(Pounds)	(Pounds)	(Pounds)	(Pounds)	(Pounds)
2007	49	359	255	7.3	5.2	109	NA	NA	NA	NA	NA
2008	43	NA	NA	NA	NA	NA	270320	6287	NA	NA	NA
2009	57	390	304	6.8	5.3	78	224060	3931	2891	575	738
2010	44	303	223	6.9	5.1	78	226960	5278	2900	749	1017
2011	54	414	291	7.7	5.4	102	292000	5407	2863	706	1003
2012	70	460	296	6.6	4.2	124.5	807760	11539	6488	1756	2729
2013	76	519.5	335	6.8	4.4	119.5	595277	7833	4981	1146	1777
2014	75	476.5	265.5	6.4	3.5	110	455220	6070	4138	955	1715
2015	57	363	268	6.4	4.7	90	607710	10662	6752	1674	2268
2016	48	350	252	7.3	5.3	85	521000	10854	6129	1489	2067
2017	43	454.5	183.5	10.6	4.3	54	348200	8098	6448	766	1898
For 2009 total hours, assumes 1.5 hr/harvesting day of non-cutting time, based on values for those days with total and cutting hours.											
For 2010 total weight, assumes 202,000 pounds resulting from hydroraking, based on values for days when hydroraking occurred.											
For 2012 and 2013, harvesting includes Area 1, which had very dense plant growths and accounts for additional weight removed.											

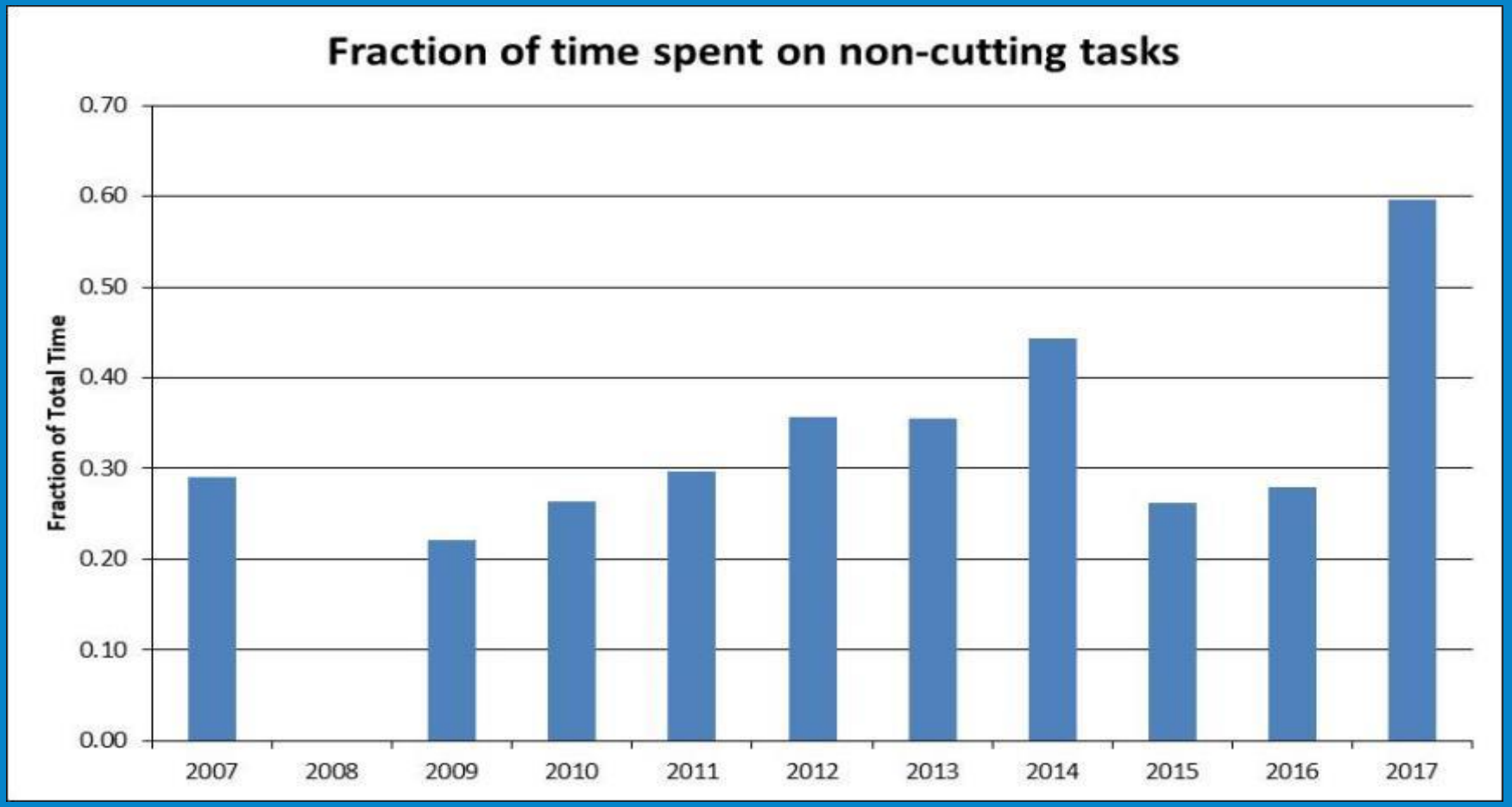
Harvesting Program Operations

- No one metric tells the whole story
- Efficiency evaluated as portion of time charged to harvesting program actually spent cutting weeds



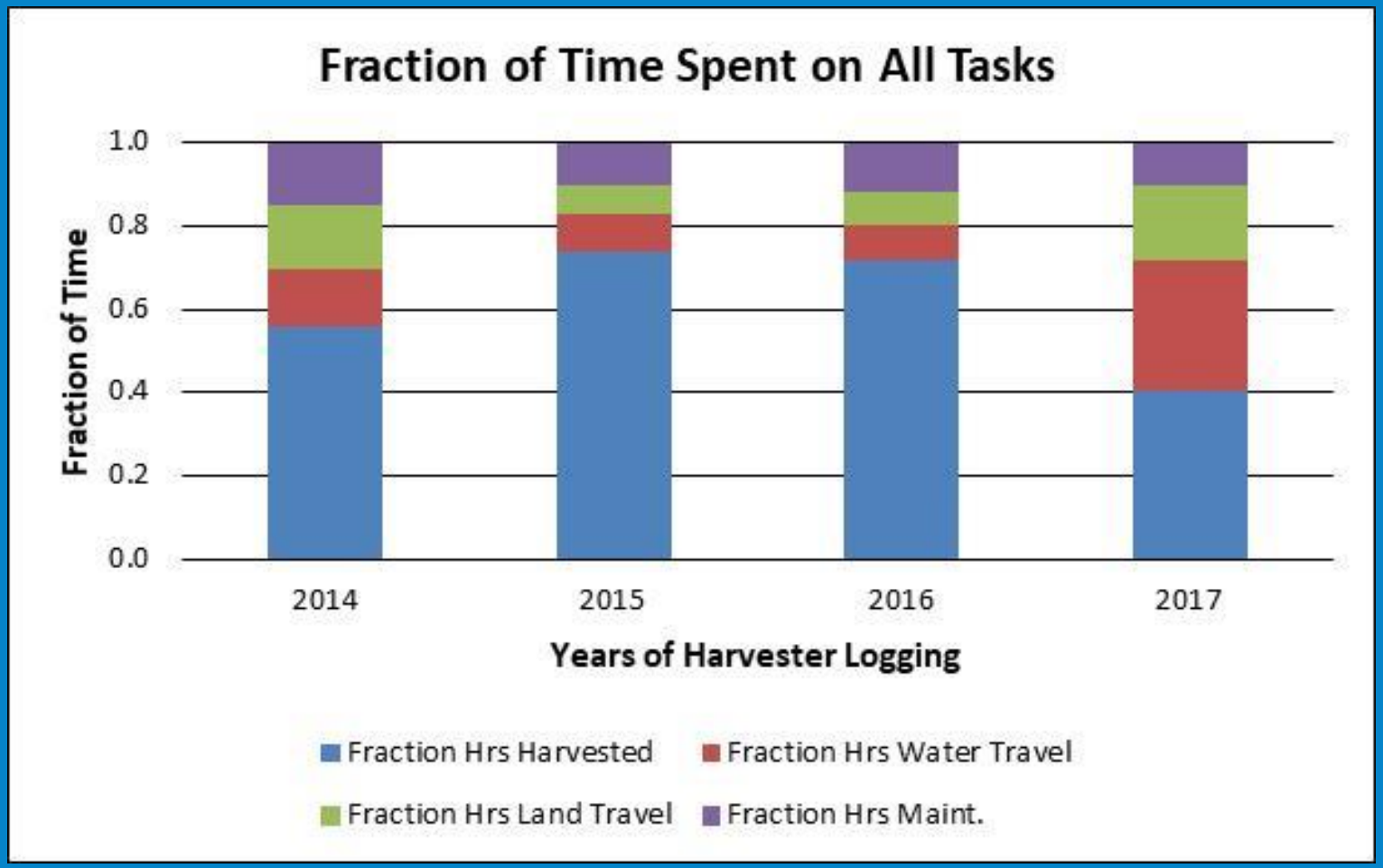
Harvesting Program Operations

- Time lost to non-cutting tasks increased for years, improved in 2015-16, lapsed again in 2017
- Does not include downtime waiting for parts



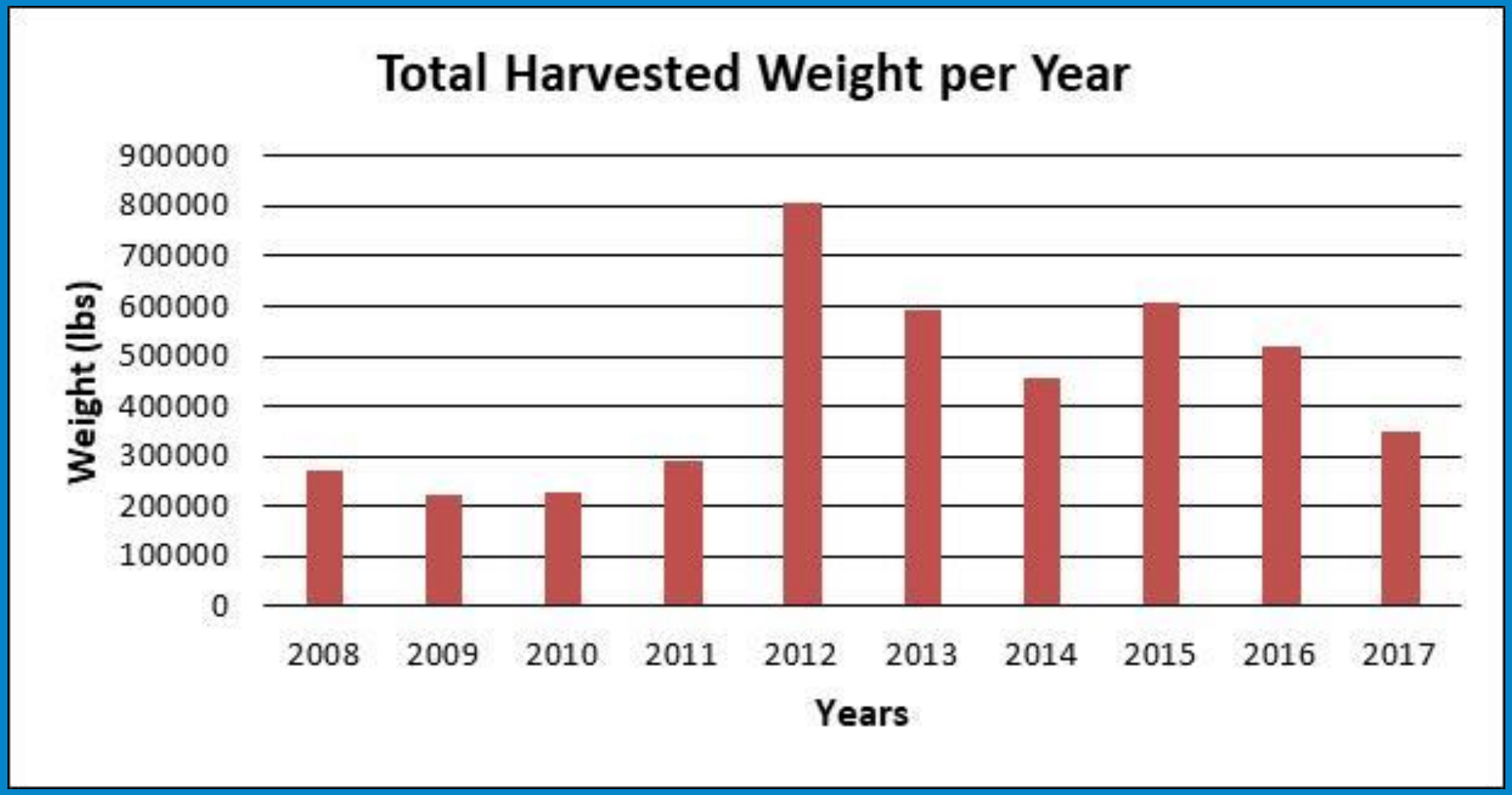
Harvesting Program Operations

– Division of non-cutting time among main categories suggests that travel time was biggest influence in 2017 (related to hydraulic problems)



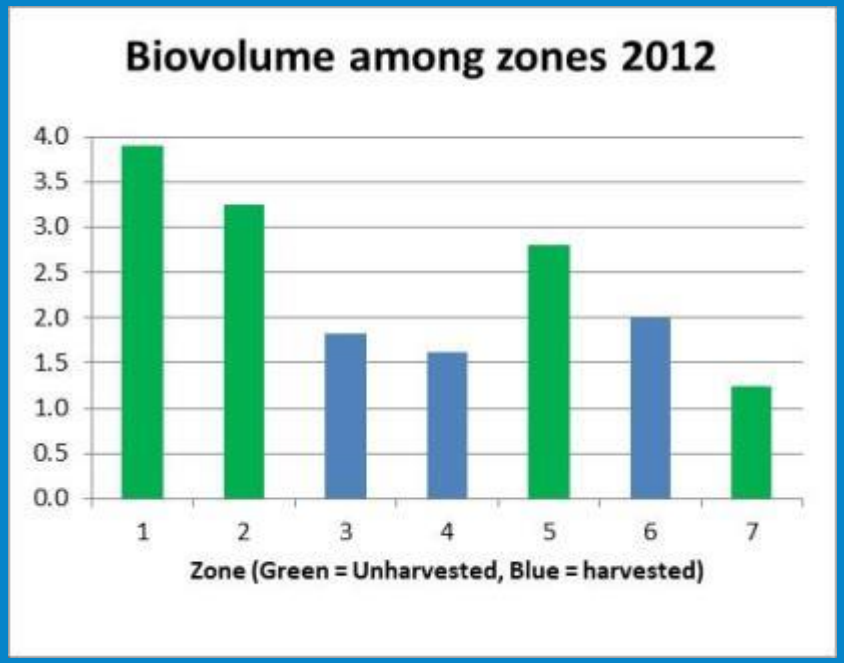
Harvesting Program Operations

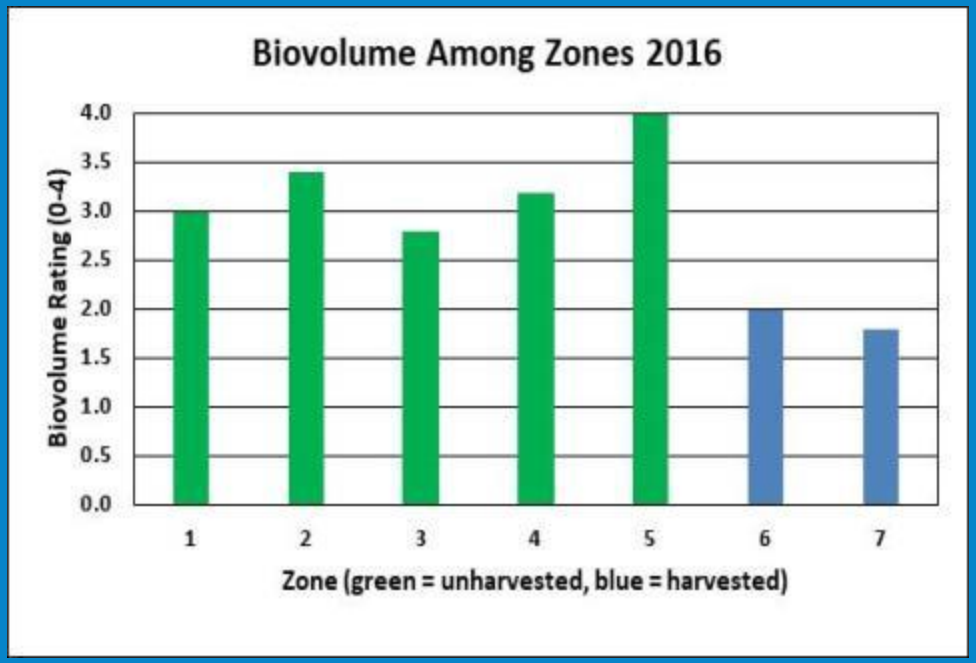
- Wide variation in harvested weight (drained wet)
- 2012-2013 anomalous due to harvesting for dredging
- 2014-2015 best brackets optimal performance



Plant Results

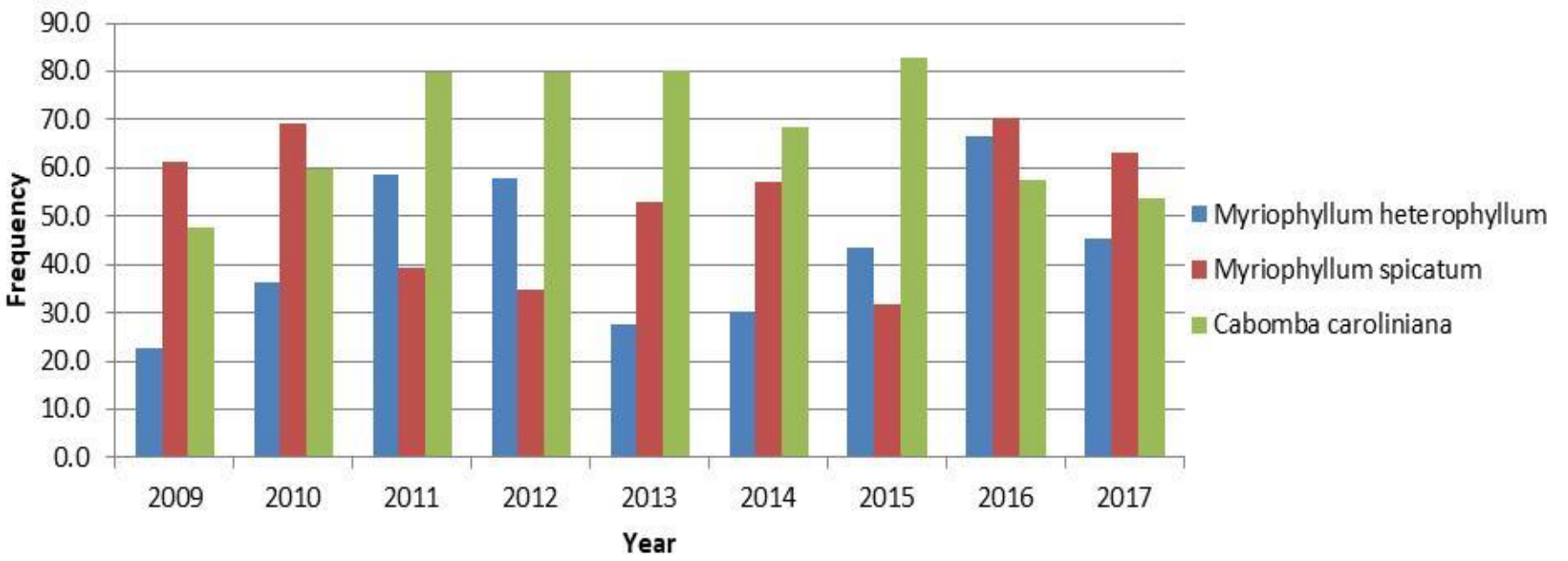
- Harvesting lowers biovolume to 25-50% of the water column being filled (2 on scale), good for habitat while not interfering with recreation
- Excessive growth without harvesting
- Pattern varies by year with ice-out date, rate of plant growth, start date for cutting, order of areas cut – data require explanation to make complete sense





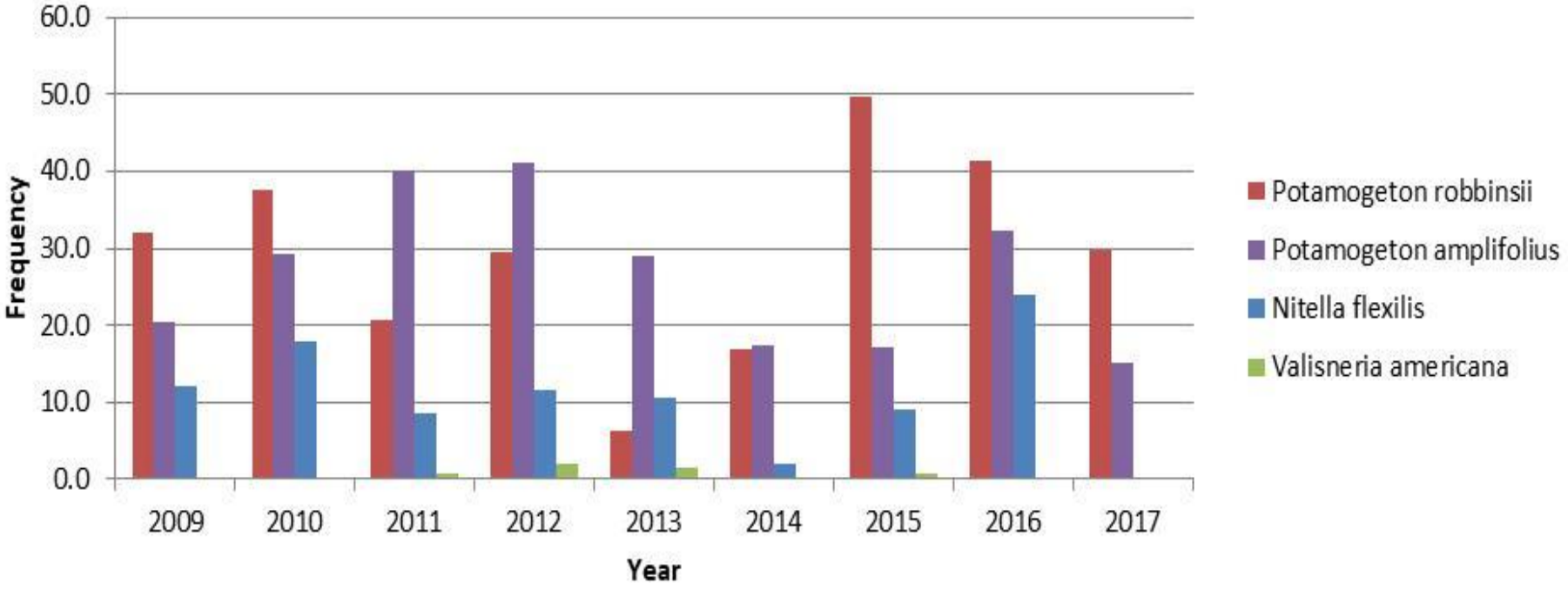
Invasive Plant Results

- No clear decrease in invasive species frequency
- Frequencies very high in many years, although actual biomass can be limited by harvesting
- Milfoil vs fanwort ecology affects results



Native Plant Results

- No clear pattern of increase for desirable species through harvesting
- Harvesting may help keep some lower growing native species from being eliminated
- No indication that harvesting need will lessen over time



Where do we go from here with harvesting?

- Manpower vs. mechanical function – having more staff devoted to harvesting cannot overcome breakdowns
- Increased focus on maintenance to minimize down time, but predictability is limited
- New smaller harvester in 2018
- New larger harvester in 2021 or 2022? Overhaul existing large harvester?
- Reduce target area and cut access channels?
- Supplemental contract harvesting?
- Budget is a factor