Wetland Monitoring & Assessment Demonstration Project: Assessment of Wetland Mitigation Success

MassDEP Wetlands Program & UMass Amherst

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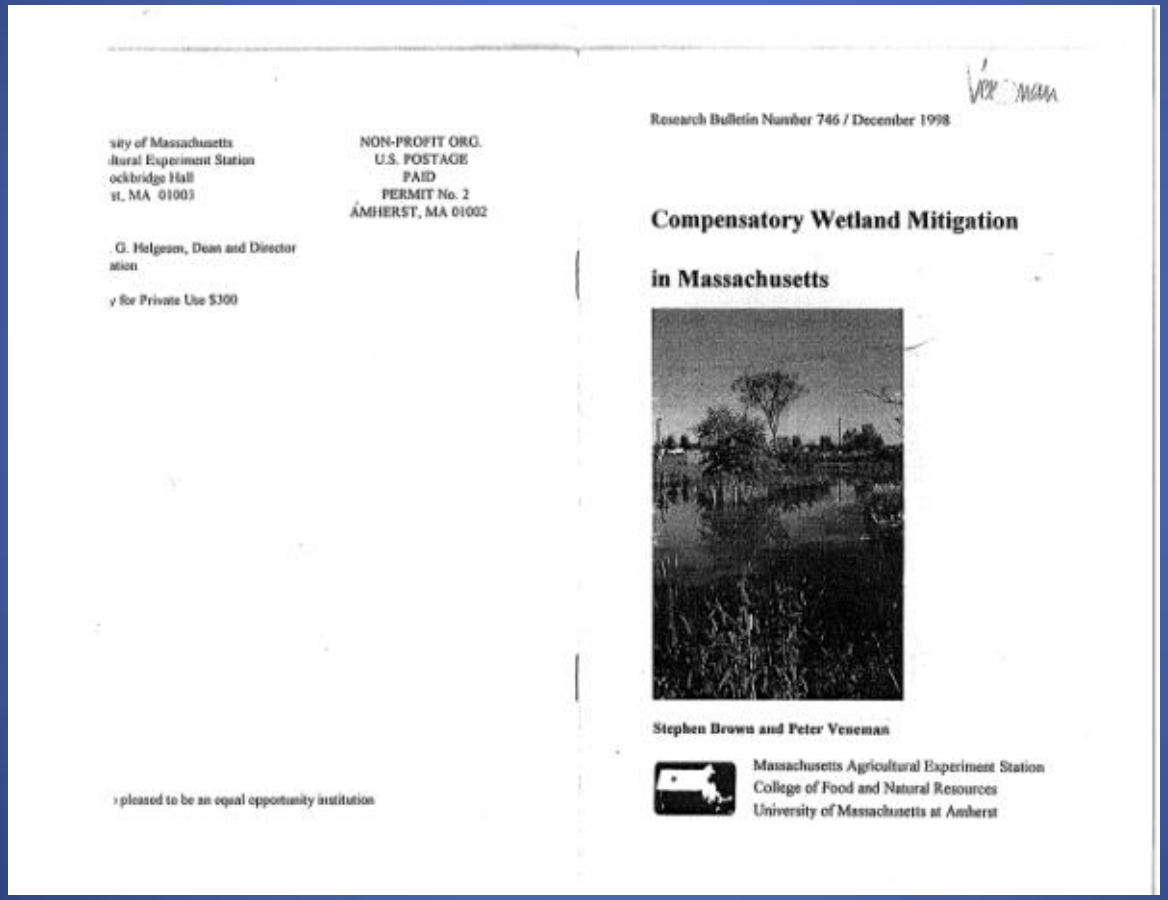
Compensatory Wetland Mitigation in Massachusetts

Stephen Brown and Peter Veneman

December 1998



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Compensatory Wetland Mitigation

in Massachusetts

Stephen Brown and Peter Veneman

Massachusetts Agricultural Experiment Station
College of Food and Natural Resources
University of Massachusetts at Amherst

http://www.mass.gov/eea/docs/dep/water/resources/a-thru-m/cwm.pdf

2014 Mitigation Study Notes:

1. Study evaluated BVW replacement (310 CMR 10.55 (4)).

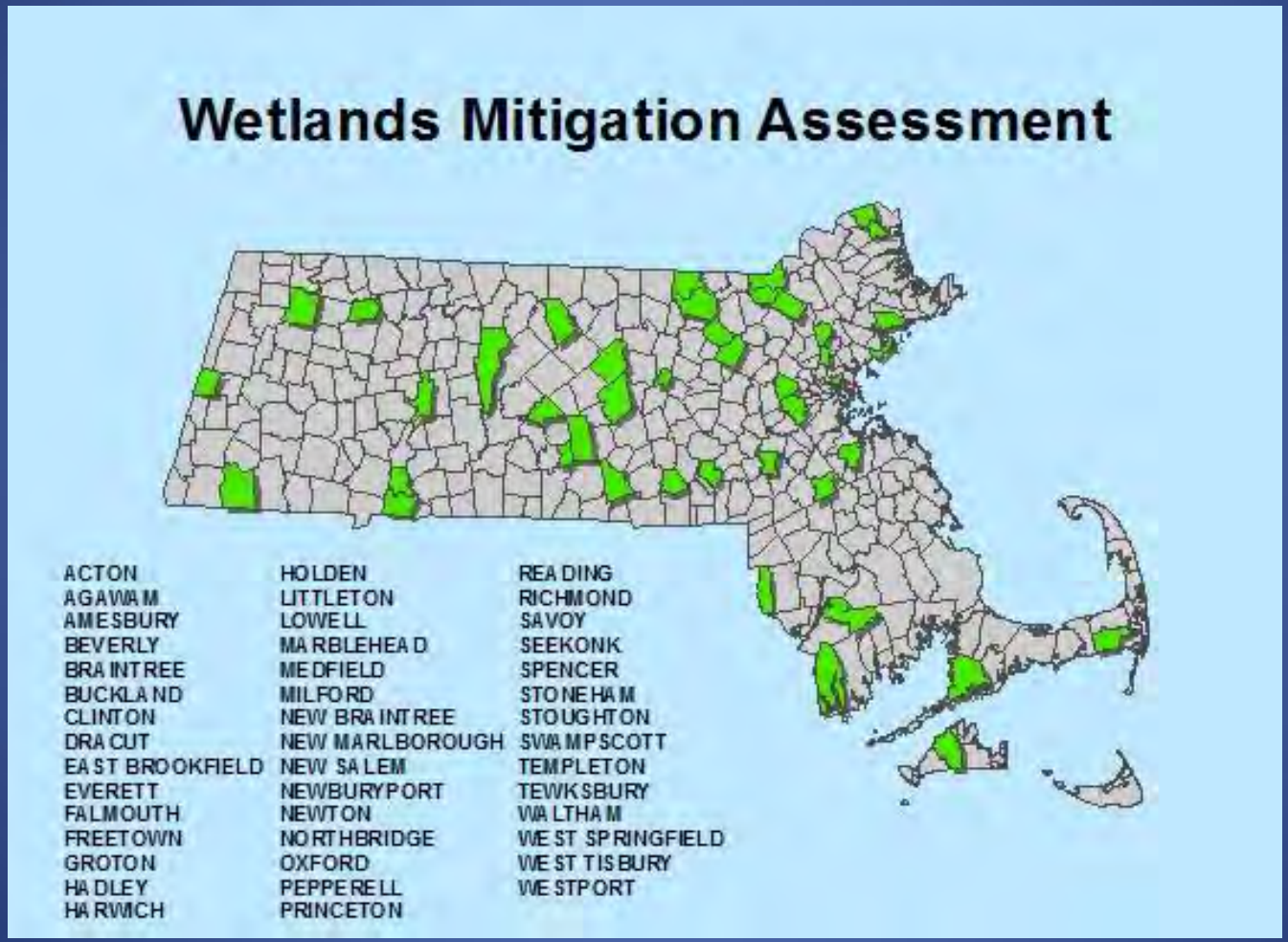
2. BVW Replacement areas studied are those that are:

- **created from current upland/historic upland**
- **created from current upland/historic wetland.**

3. TERM: Replacement Area: Area built, whether or not it is determined to be a wetland

4. TERM: Wetland created: area with ≥ 50% hydrophytes and hydric soils and/or hydrologic indicators

2014 Study: 44 Towns Studied



Selection of Towns

- Random selection of 40 communities
- Checked for adequate representation by:
  - DEP Region
  - Ecoregion
  - Population
  - Numbers of NOIs 2004-2008
- 4 towns added to ensure representativeness
- Total # towns in study: 44

Municipal File Reviews

	MassDEP/UMass Study	Brown & Veneman Study
Files Investigated	**5,090** (4-year span: 2004-2008)	**3,519** (11-year span: 1983-1994)
Replacement Sites Found	**201** (3.9% of 5,090)	**319** (9.1% of 3,519)
Replacement Sites Eliminated (Did not meet study criteria)	**21** (10% of 201)	**205** (64% of 319)
Replacement Areas Assessed	**180** (89.6% of 201)	**114** (35.7% of 319)

Note: Study evaluates individual replacement areas. 14 projects had 2-5 replacement areas.

Landowner Permission

Over 500 letters, phone calls, emails & faxes to applicants, property owners, assessors, conservation commissions/agents and others

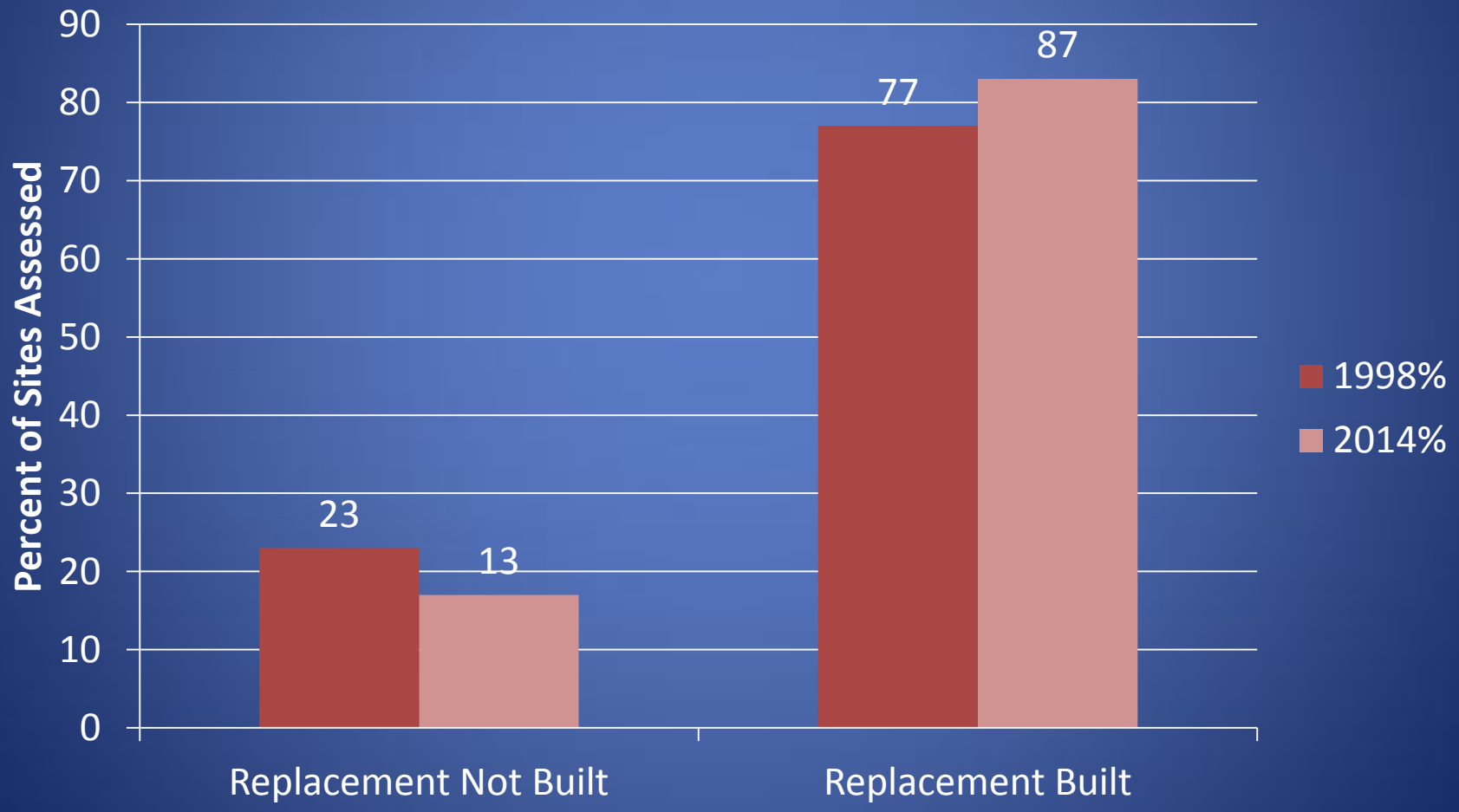
- Full Field Assessments
  - Transects (100 points total) for 75% cover
  - Visual percent cover estimate of plants > 1%
  - Soil boring to ID hydric characteristics
  - Other hydrologic indicators
  - Size measured
  - Reference sites same assessment

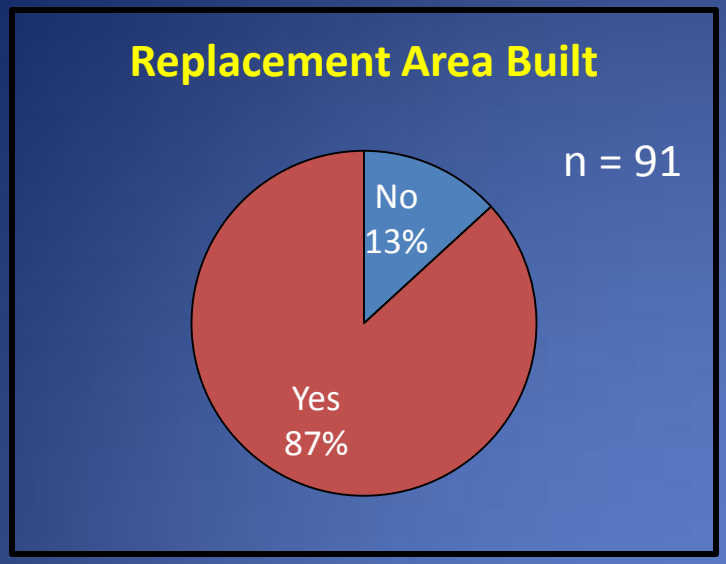
Public Road/Private Way Assessments (if visible)

Was replacement area built? Was wetland built? what plants?

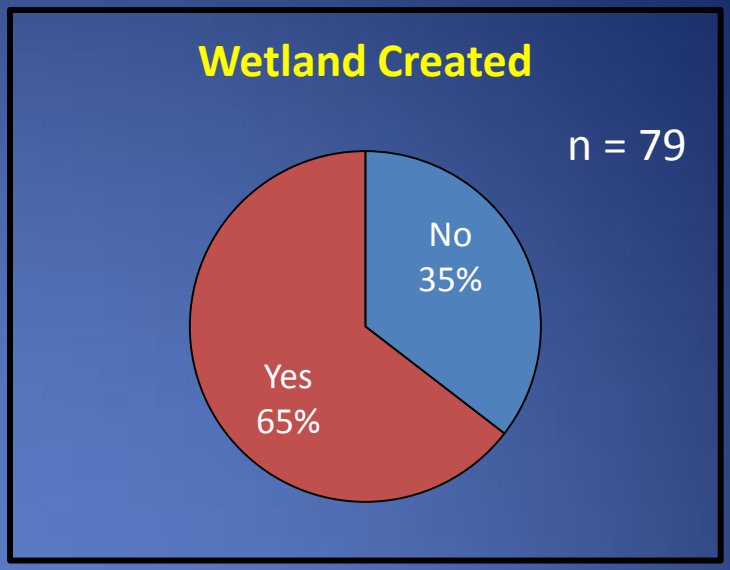
Replacement Areas Built?

1998: Sites Assessed = 109 (excludes 5 = project not built)
2014: Sites Assessed = 121 (excludes 46=project not built; 11 Unclear)

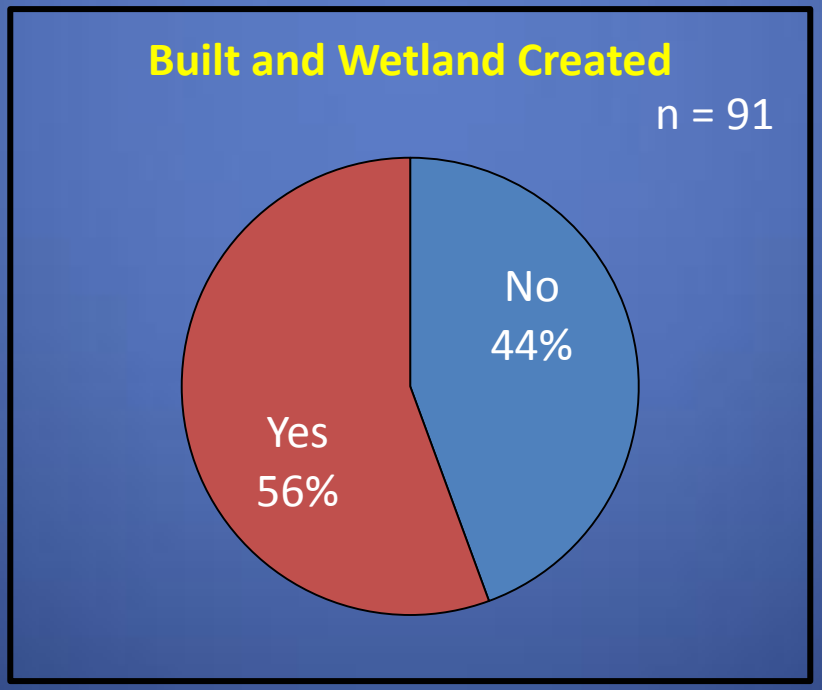




Brown & Veneman: 77.1%

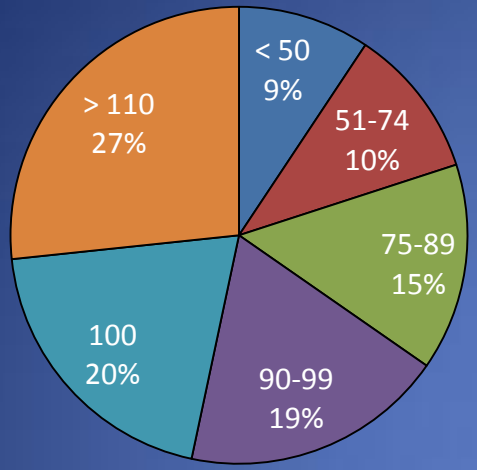


Brown & Veneman: 87.0%
Adjusted: 57.2%



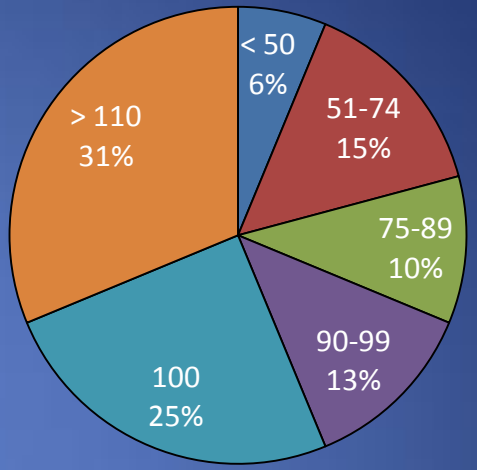
Brown & Veneman: 67.0%
Adjusted: 44.1%

Replacement Area Size (all built)



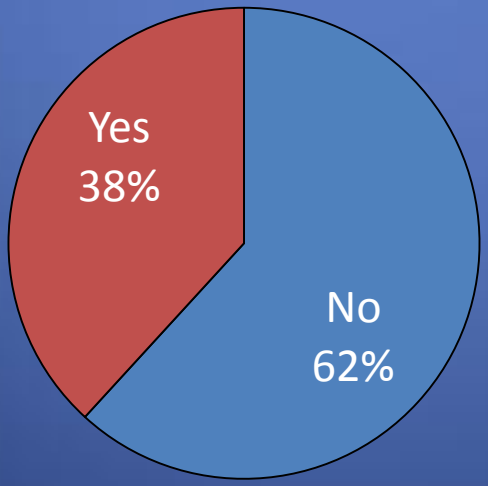
n = 91

Replacement Area Size (wetland)



n = 79

Built + Wetland Appropriately Sized



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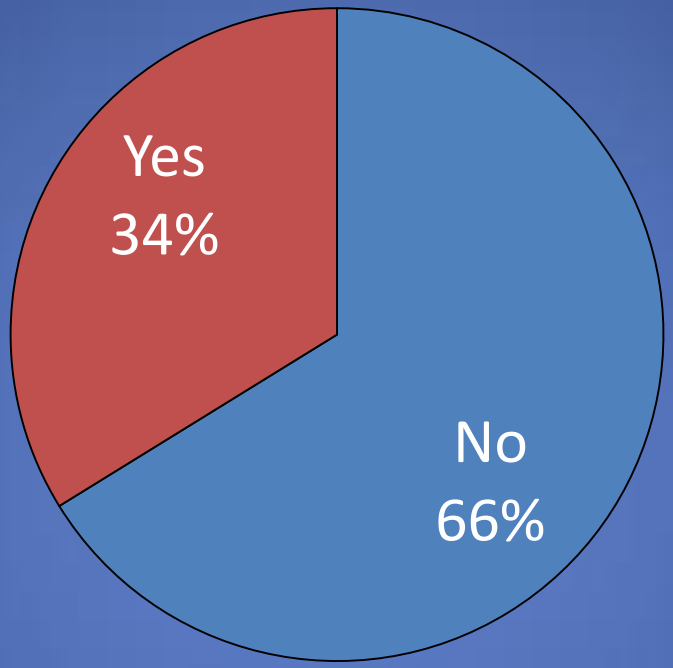
Brown & Veneman: 45.9%
Adjusted: 30.2%

Built + Regulatory Compliance



n = 91

Brown & Veneman: 43.1%
Adjusted: 28.4%

Certificates of Compliance

16.6 % of replication areas that were never built (2 of 12) received CoCs

32.1 % of replication areas that failed to produce wetlands (9 of 28) received CoCs

32.6 % of replication areas that failed to produce wetland that were at least 90% of required size (14 of 43) received CoCs

31.2 % of replication areas that failed to meet all regulatory requirements (15 of 48) received CoCs

Success by Wetland Type

Wetland Type	Success wetland	Success wetland + size	Success wetland + compliance
Marsh			
Shrub Swamp			
Wooded Swamp			
Overall			

Success by Wetland Type

Wetland Type	Success wetland	Success wetland + size	Success wetland + compliance
Marsh	66.6 %	45.8 %	41.7 %
Shrub Swamp	36.4 %	36.4 %	36.4 %
Wooded Swamp	69.8 %	46.5 %	39.5 %
Overall	64.6 %	45.6 %	39.2 %

Success: Limited Project

Limited Project	Success wetland	Success wetland + size	Success wetland + compliance
Yes			
No			
Overall			

Success: Limited Project

Limited Project	Success wetland	Success wetland + size	Success wetland + compliance
Yes	67.8 %	49.2 %	39.0 %
No	55.0 %	35.0 %	40.0 %
Overall	64.6 %	45.6 %	39.2 %

Success: MassDEP Region

Region	Success built	Success wetland	Success wetland + size	Success wetland + compliance
CERO				
NERO				
SERO				
WERO				
Overall				

Success: MassDEP Region

Region	Success built	Success wetland	Success wetland + size	Success wetland + compliance
CERO	88.6 %	67.7 %	51.6 %	48.4 %
NERO	86.2 %	56.0 %	40.0 %	28.0 %
SERO	84.2 %	62.5 %	37.5 %	25.0 %
WERO	87.5 %	85.7 %	57.1 %	71.4 %
Overall	86.8 %	64.6 %	45.6 %	39.2 %

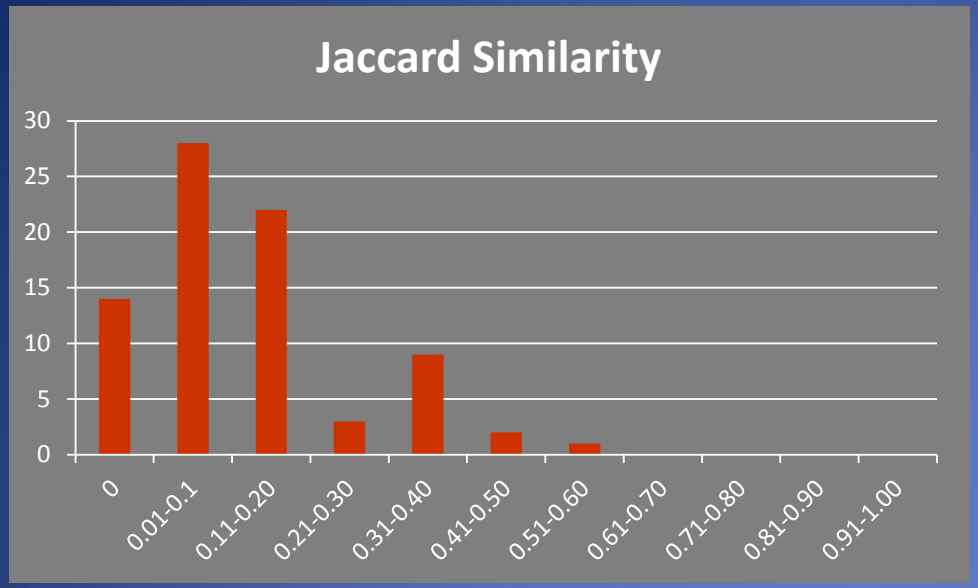
Success: SOC vs. OOC

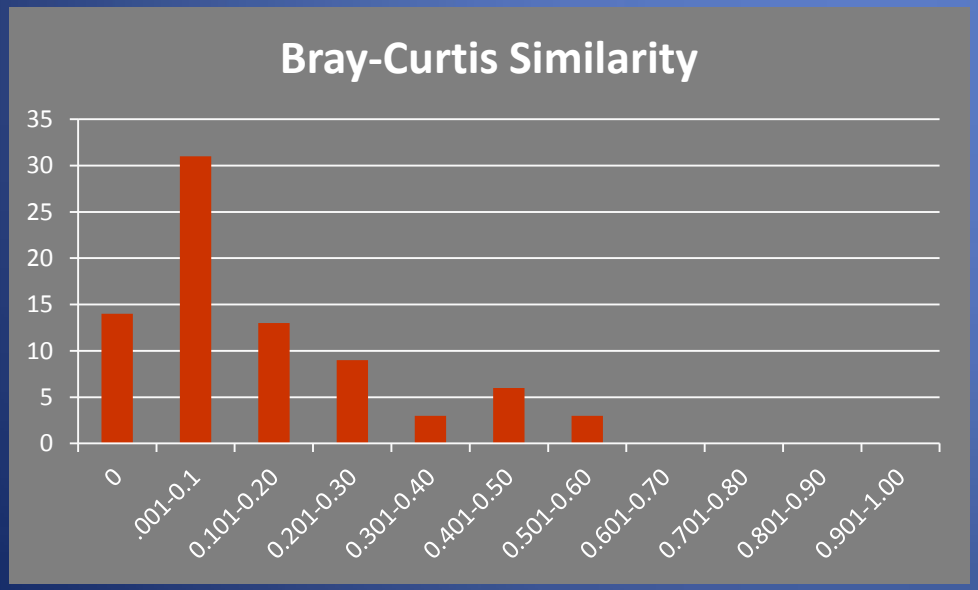
	Success built	Success wetland	Success wetland + size	Success wetland + compliance
OOC				
SOC				
Overall				

Success: SOC vs. OOC

	Success built	Success wetland	Success wetland + size	Success wetland + compliance
OOC	85.5 %	69.5 %	49.2 %	45.8 %
SOC*	87.5 %	42.9 %	28.6 %	14.3 %
Overall	86.8 %	64.6 %	45.6 %	39.2 %

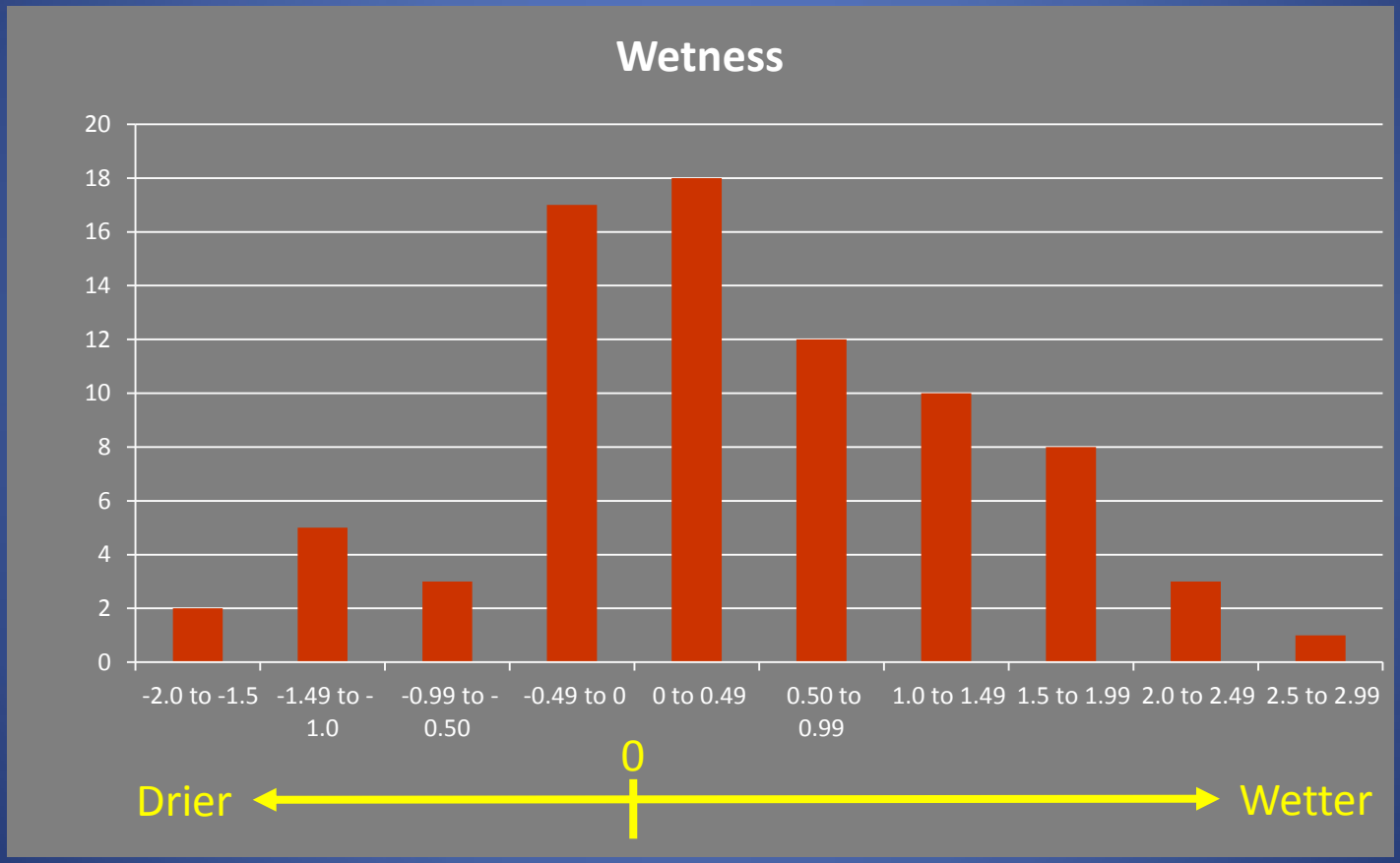
* Sample size was very low; n = 8





Vegetation Similarity Replacement vs. Reference Site

Vegetation Wetness Index Replacement vs. Reference Site



What factors are significantly correlated with mitigation success?

Predictor Variables Tested

- Population
- # of NOIs
- Date permitted
- Replacement area size
- Wetland type
- Limited project status
- Quality of NOI
- Quality of OOC
- Quality of Permitting
- Quality of Monitoring

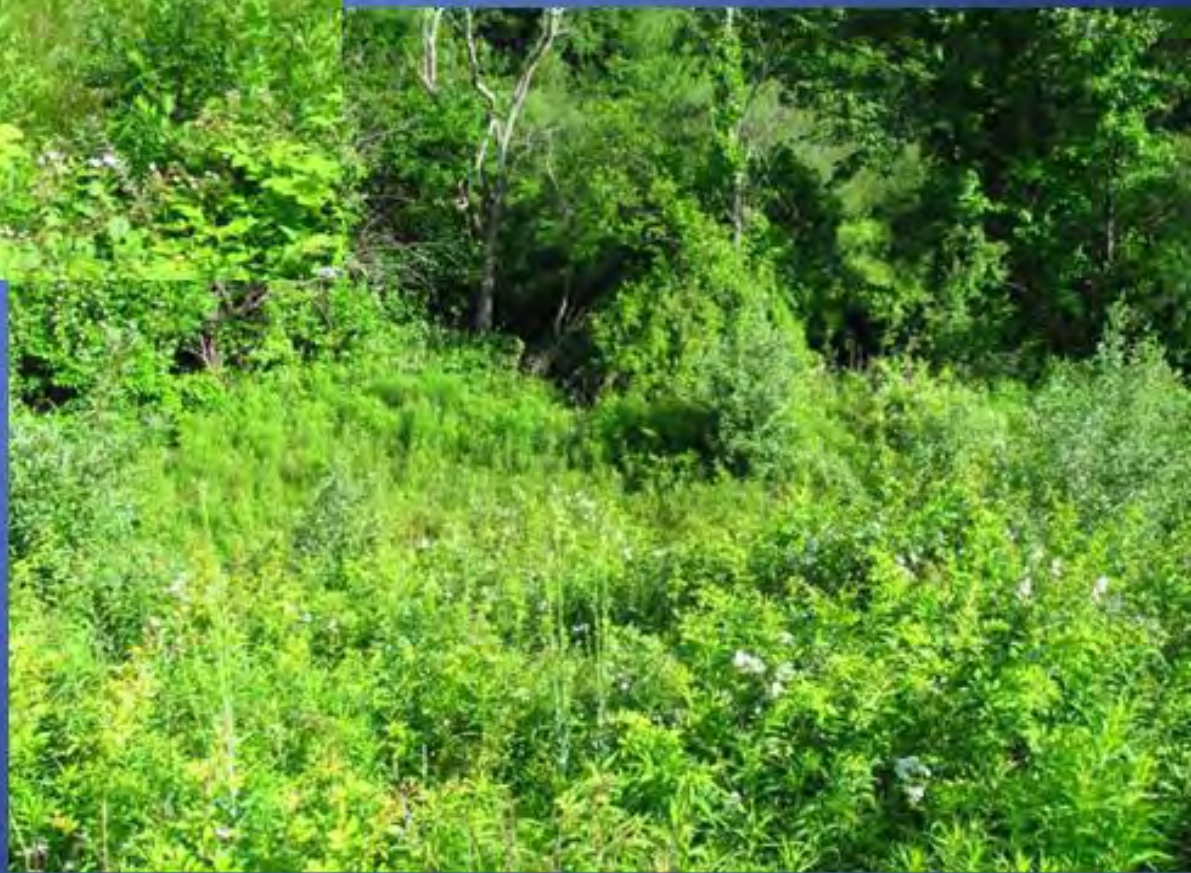
No significant relationships found

Many good wetland replacement areas were built

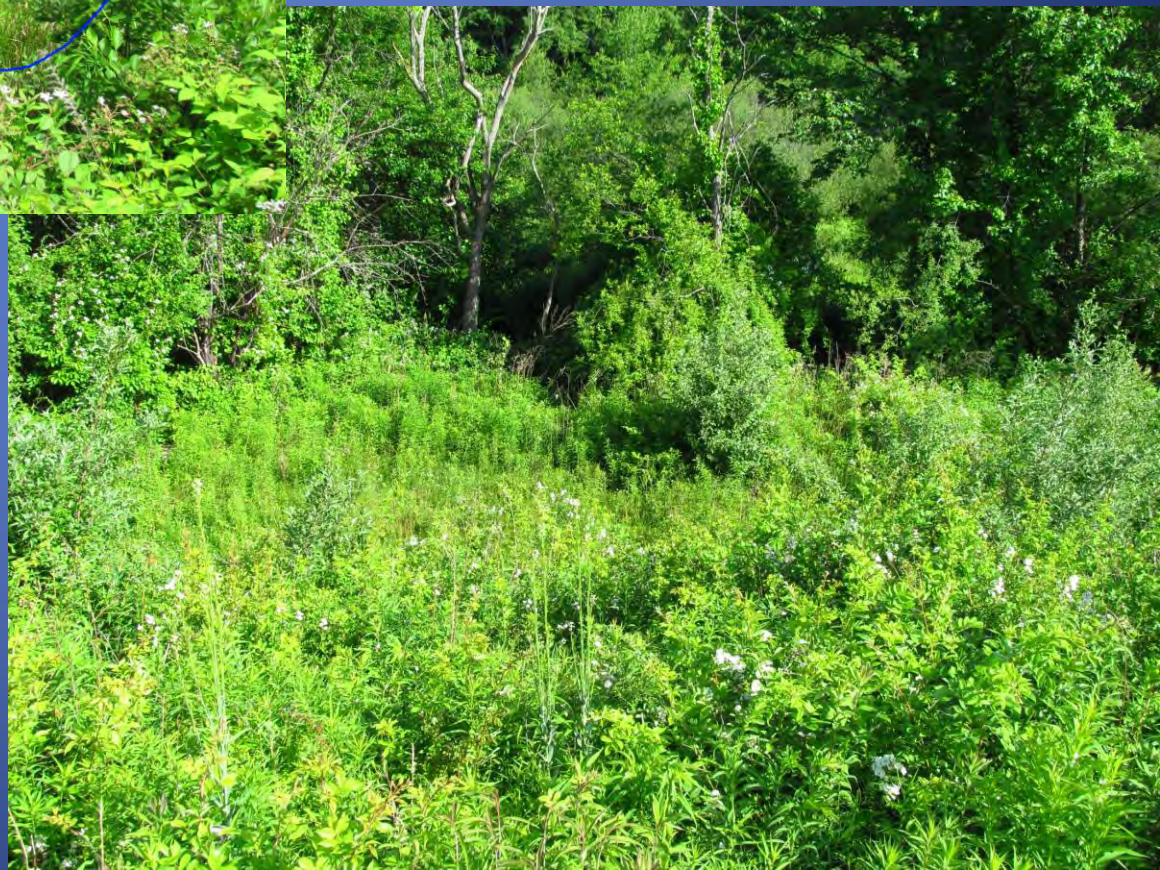

Where does the natural wetland end
and the replacement area begin?


Natural Wetland
Replacement Wetland

Which is natural and
which is the replacement?



Which is natural and which is the replacement?



Potential Succession?

Variance Replacement Area after 16 years

Variance Replacement Area after 18 years

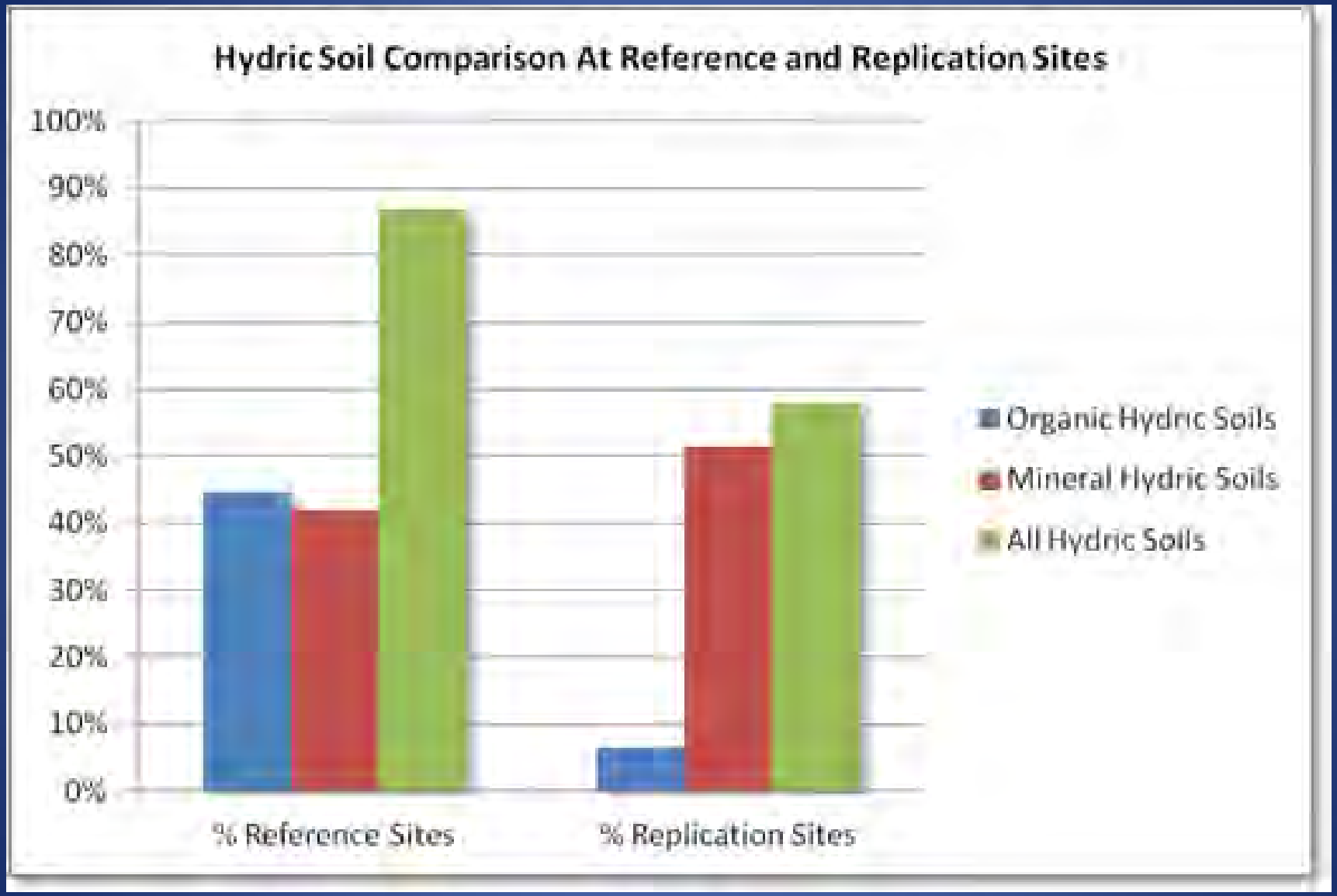
Some Common Problems and Lessons Learned…

Hydric Soils and Hydrology

- 100% of sites where wetland not created had no wetland soils or hydrology (28/79)

- All but 3 of those without hydrology met wetland plant criteria

Wetland Boundaries Too Aggressive


Hydric Soil Comparison At Reference and Replication Sites
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
% Reference Sites
% Replication Sites
Organic Hydric Soils
Mineral Hydric Soils
All Hydric Soils


Many sites had invasive species which can be difficult to remove if not caught early


Erosion Controls not maintained and/or left in place


Planted species should be native
not ornamental varieties.

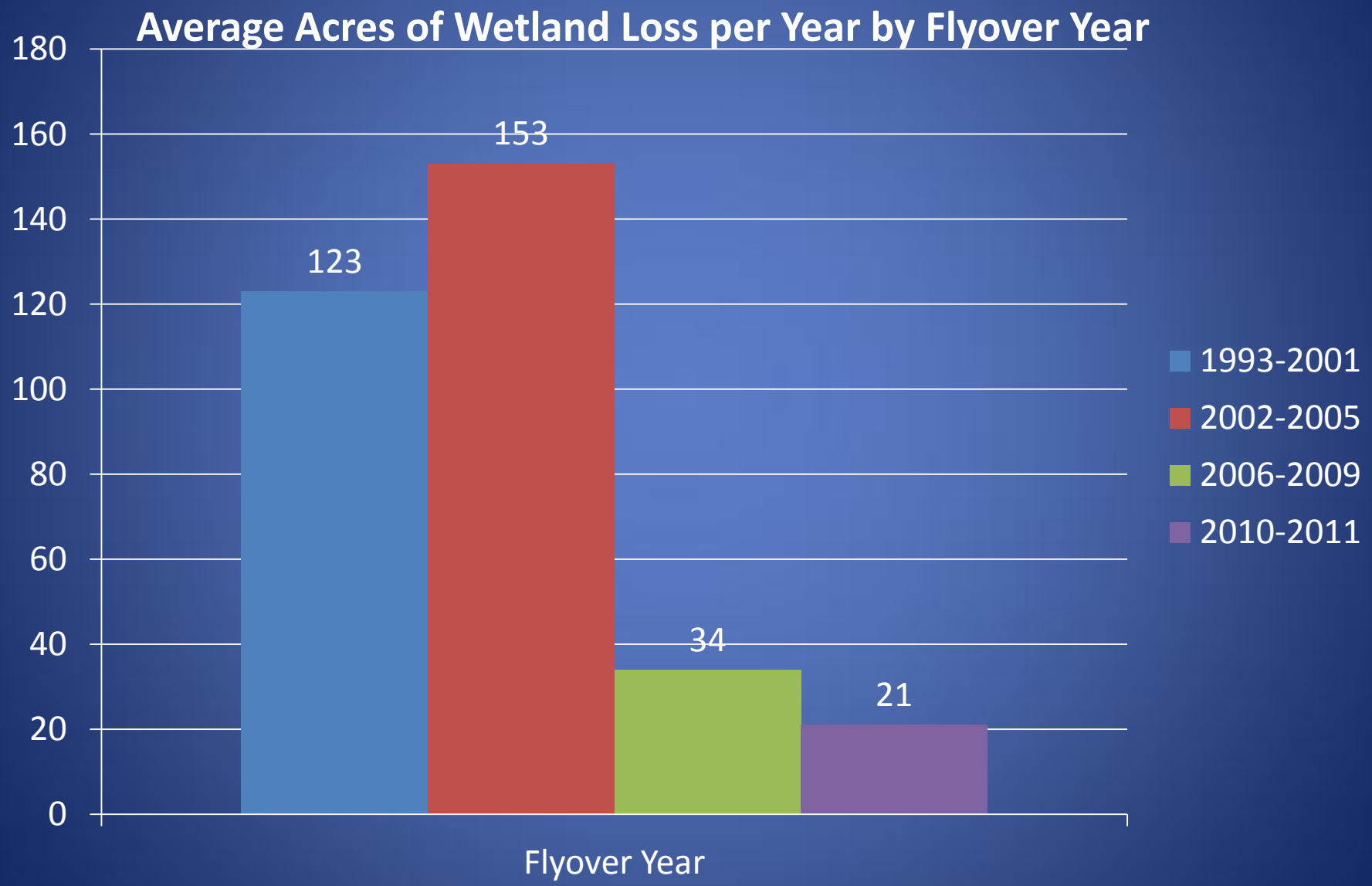

If the proposed replacement area is spray-painted,
does that mean it's under construction?

Overall Statewide No Net Loss

Sites	Wetland Created (acres)	Wetland Created w/6-7 Performance Standards (acres)
50 sites	3.46	2.71
Outlier Site	2.29	2.29
4 Variance Sites (above 1:1)	4.5	4.5
	10.25	**9.5**

TOTAL acres required by OOC (91 sites): 7.24
TOTAL acres impact proposed (91 sites): 5.26

Avoidance, Minimization



POLICY/REGULATORY OPTIONS

1. Guidance and/or Regulation Revision to improve in-kind replacement. Possible Targets:

- BVW boundary requirement for replacement areas (10.55(2)(c)2.)
- Soils/groundwater performance standard
- Size criteria (increased ratio?)
- Increased flexibility in location
- Limited project replacement criteria similar to other projects

2. Limited fee option for very small alterations/single family homes with sliding scale replacement to impact ratio for larger alterations

3. Hybrid In-lieu fee or banking: replace flood control and prevention of pollution on site; PLUS pay fee/bank for other functions

4. WHAT DO YOU THINK?

Send Your Comments to:
Lisa.Rhodes@Massmail.state.ma.us