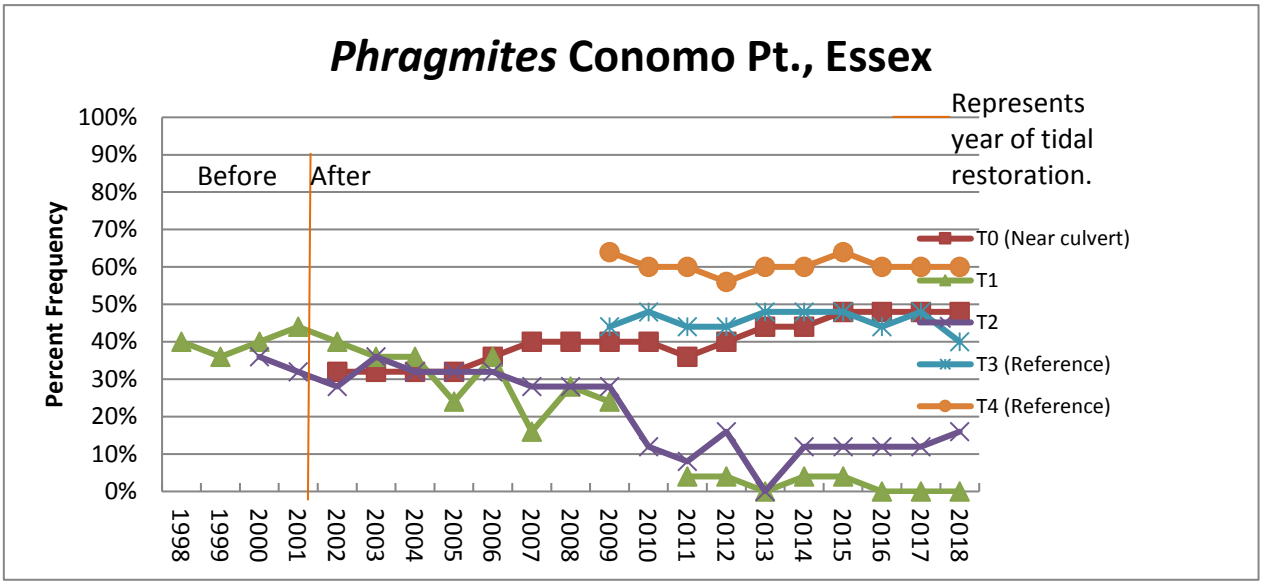
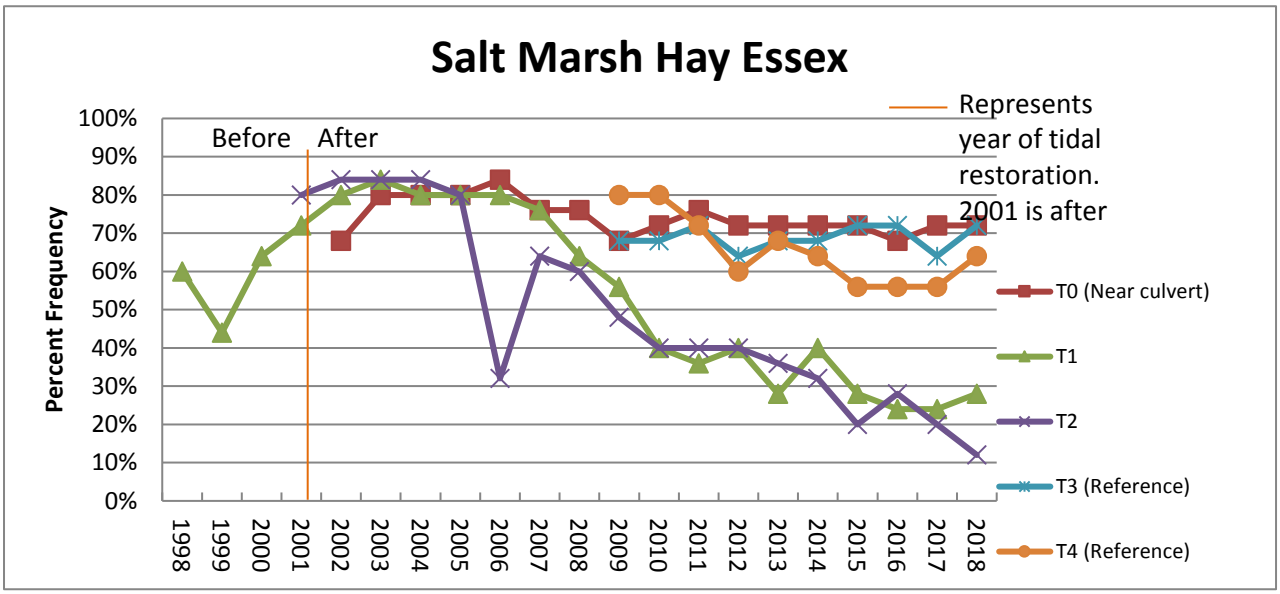
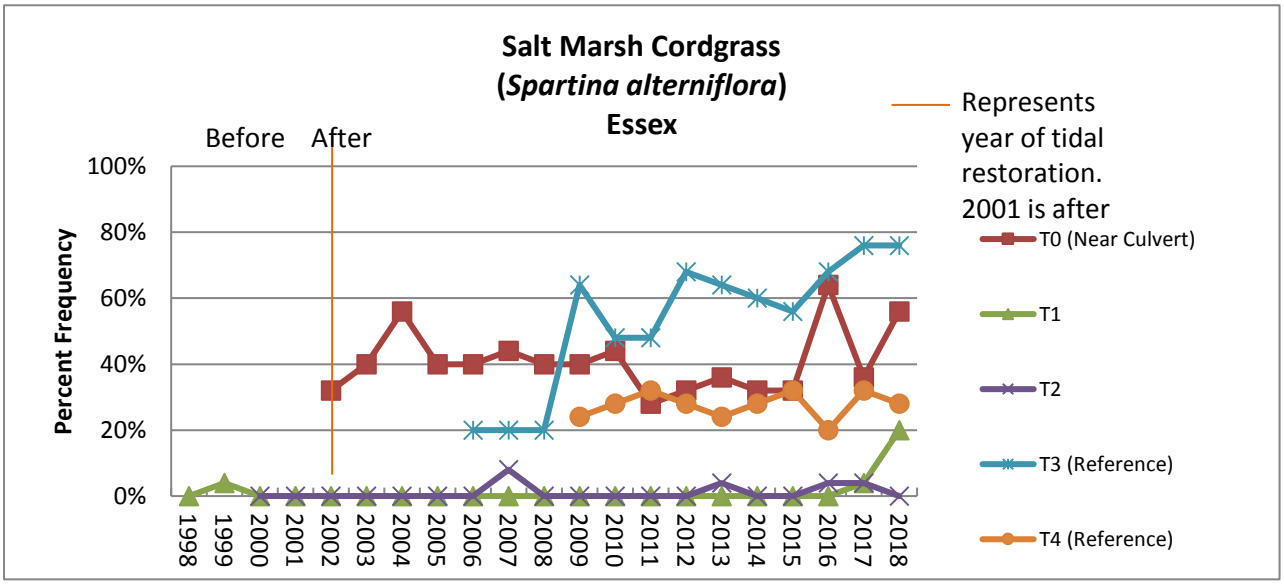
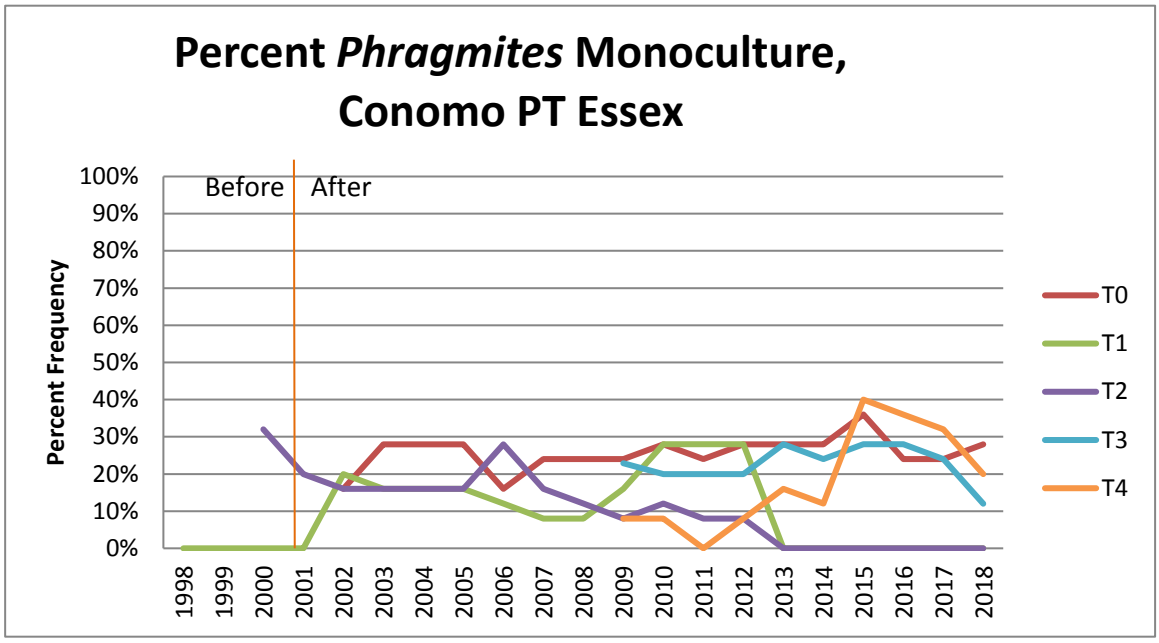
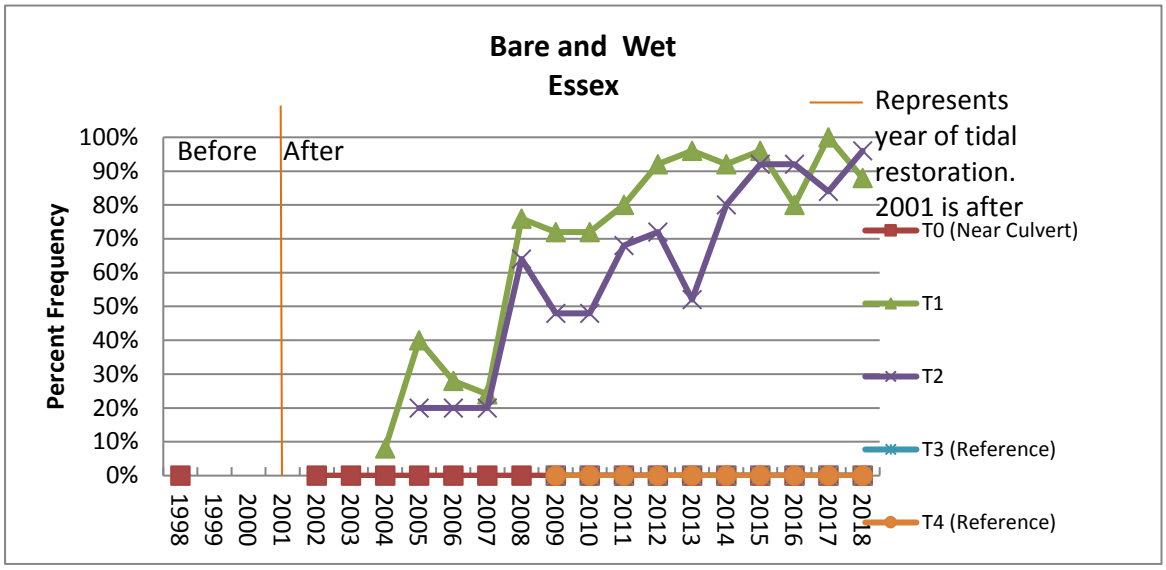
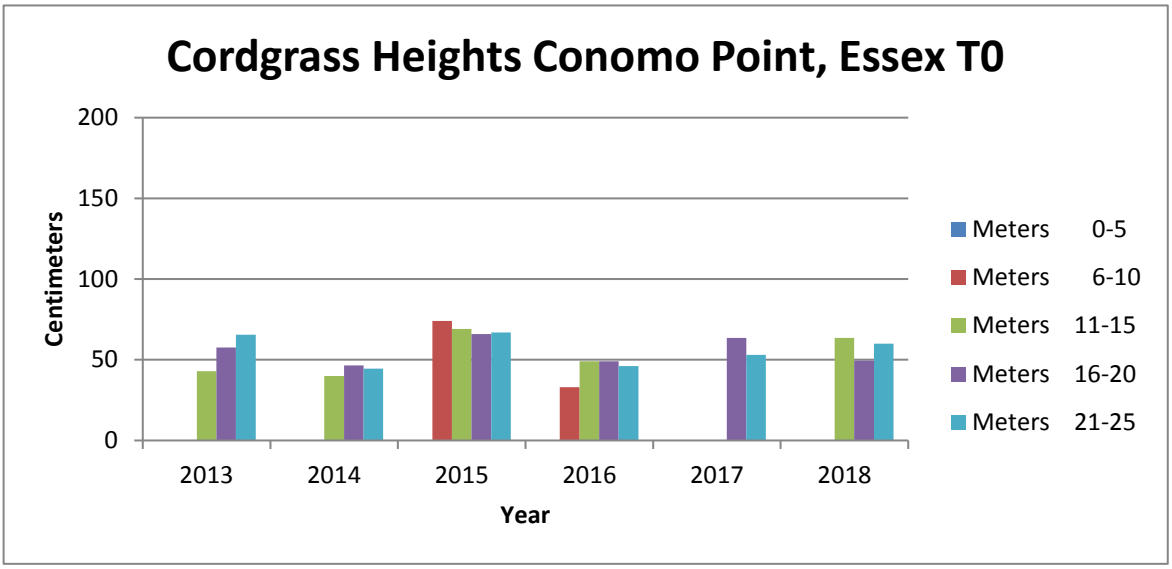

Phragmites Conomo Pt., Essex
Percent Frequency
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Before
After
Represents year of tidal restoration.
T0 (Near culvert)
T1
T2
T3 (Reference)
T4 (Reference)
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

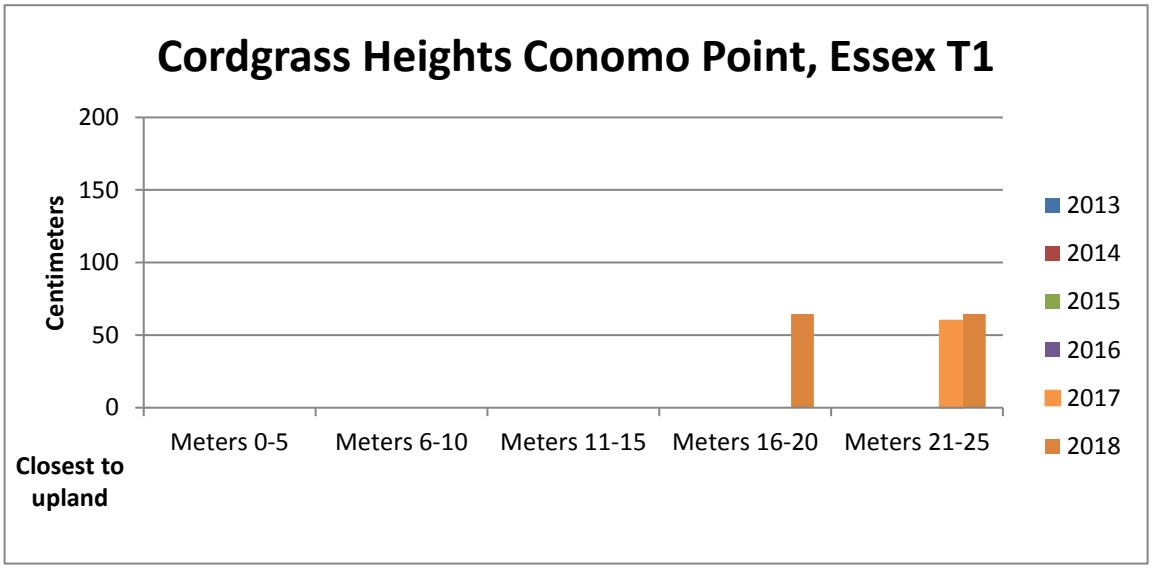

Salt Marsh Hay Essex
Percent Frequency
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Before
After
Represents year of tidal restoration. 2001 is after
T0 (Near culvert)
T1
T2
T3 (Reference)
T4 (Reference)
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

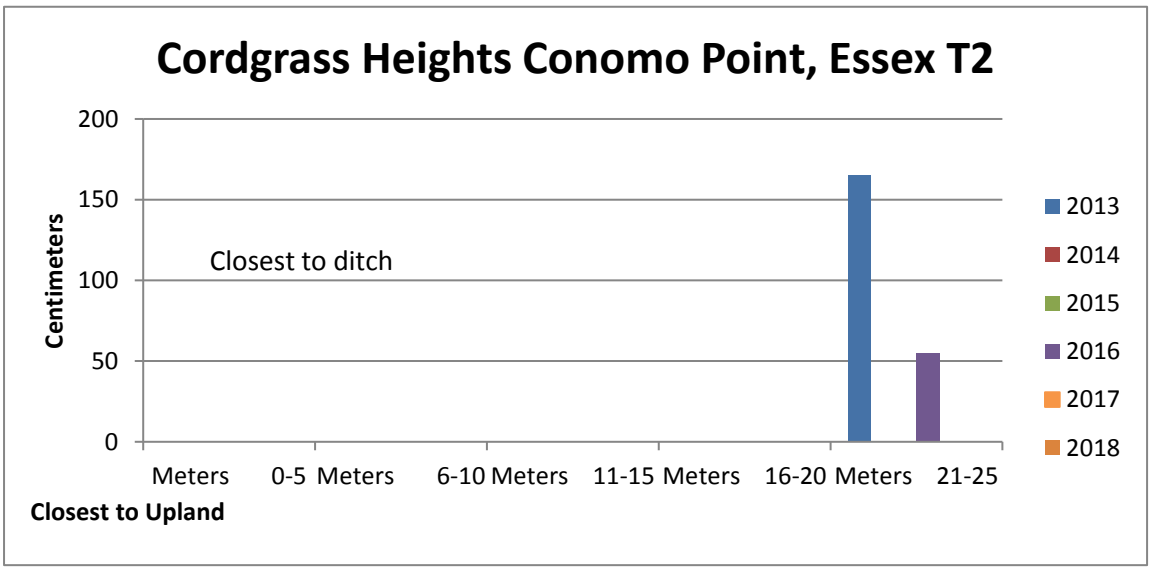

Salt Marsh Cordgrass
(*Spartina alterniflora*)
Essex
Percent Frequency
100%
80%
60%
40%
20%
0%
Before
After
Represents year of tidal restoration. 2001 is after
T0 (Near Culvert)
T1
T2
T3 (Reference)
T4 (Reference)
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

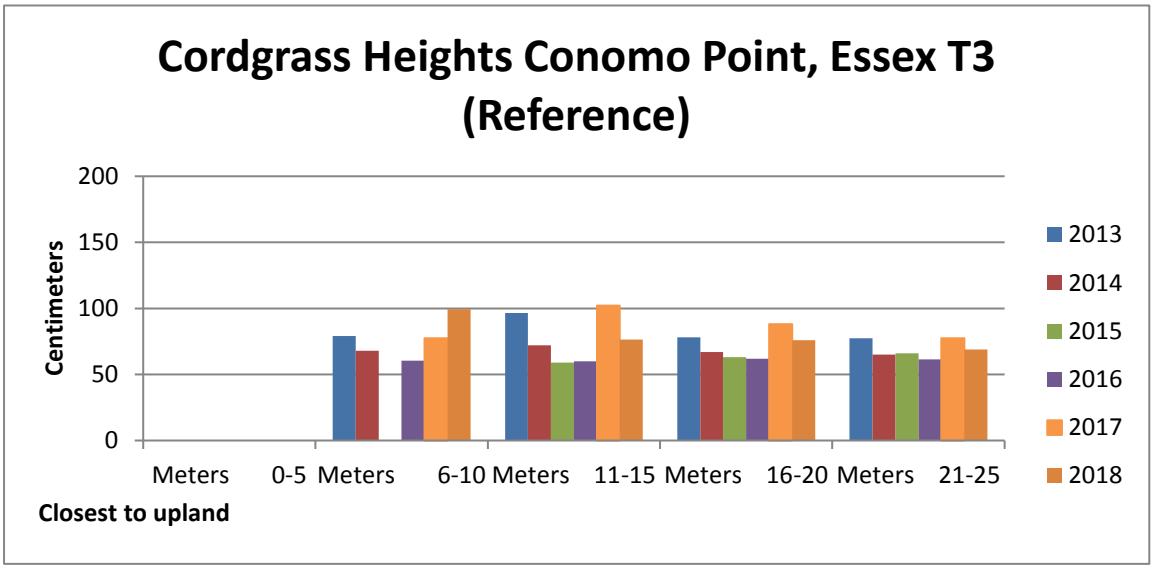

Percent *Phragmites* Monoculture, Conomo PT Essex
Before
After
Percent Frequency
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
T0
T1
T2
T3
T4

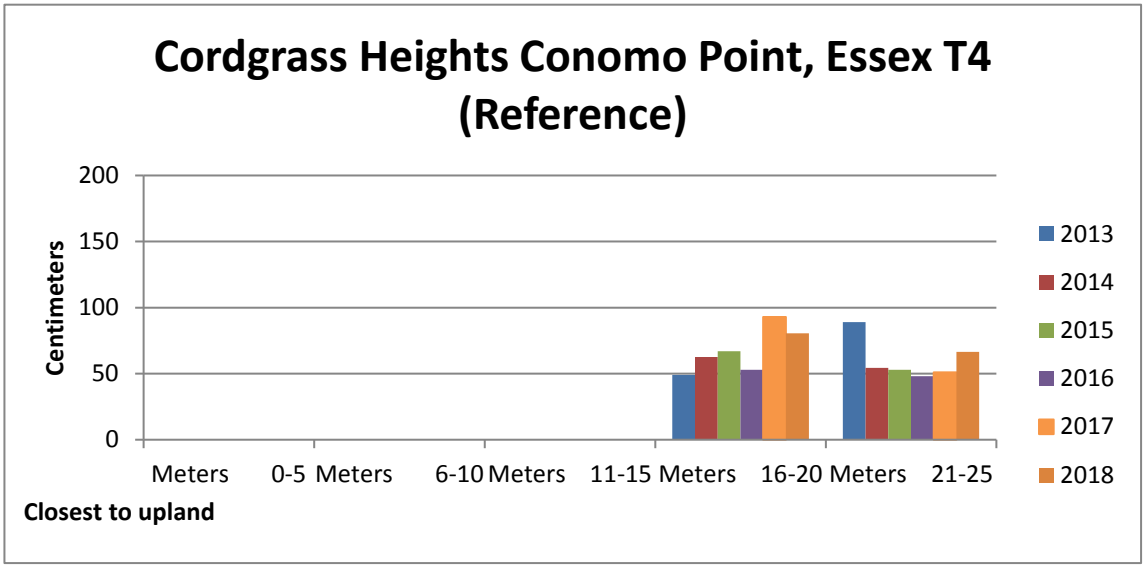

Bare and Wet Essex
Represents year of tidal restoration. 2001 is after
Before
After
Percent Frequency
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
T0 (Near Culvert)
T1
T2
T3 (Reference)
T4 (Reference)

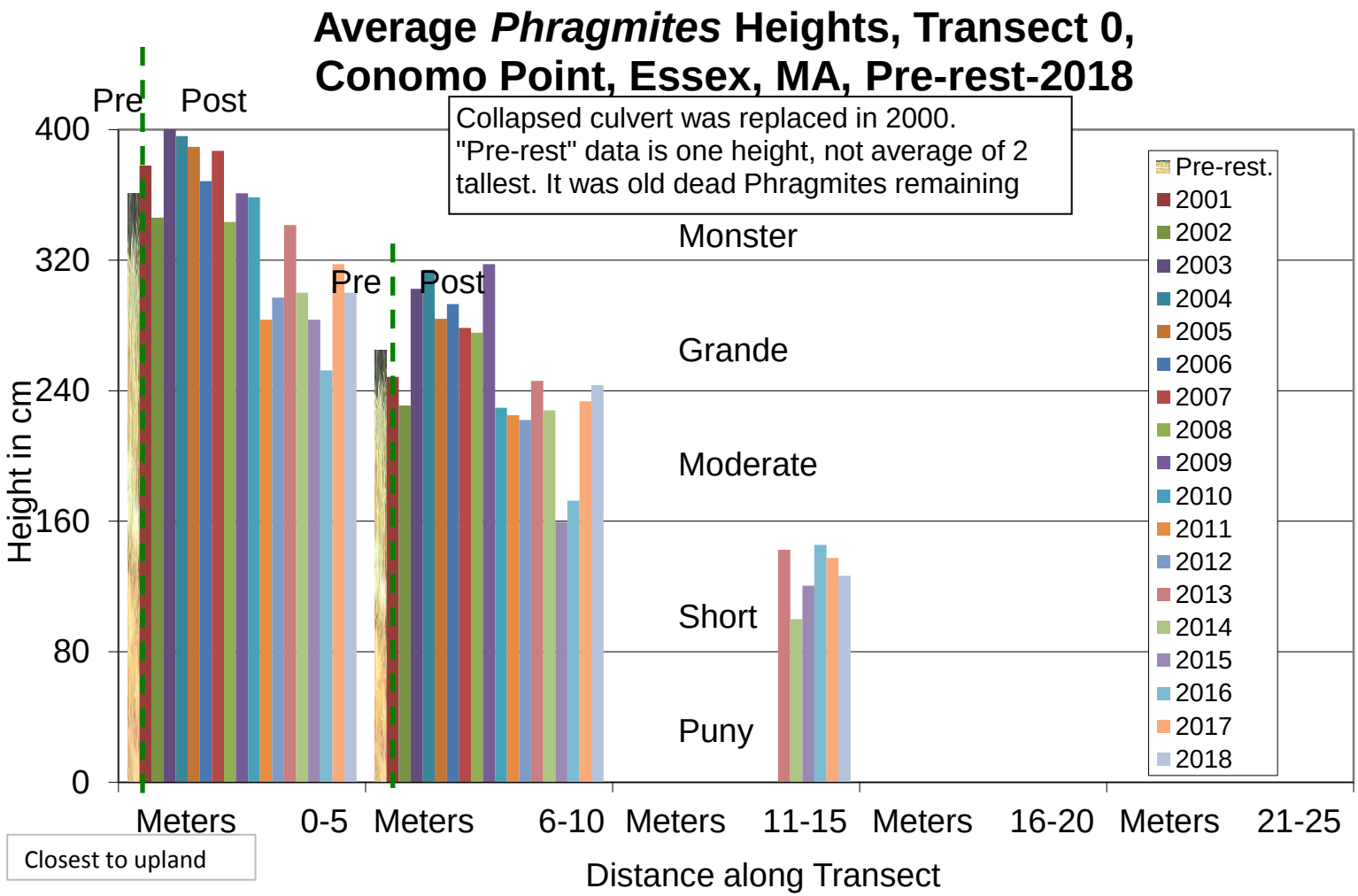

Cordgrass Heights Conomo Point, Essex T0
200
150
100
50
0
Centimeters
2013
2014
2015
2016
2017
2018
Year
Meters 0-5
Meters 6-10
Meters 11-15
Meters 16-20
Meters 21-25

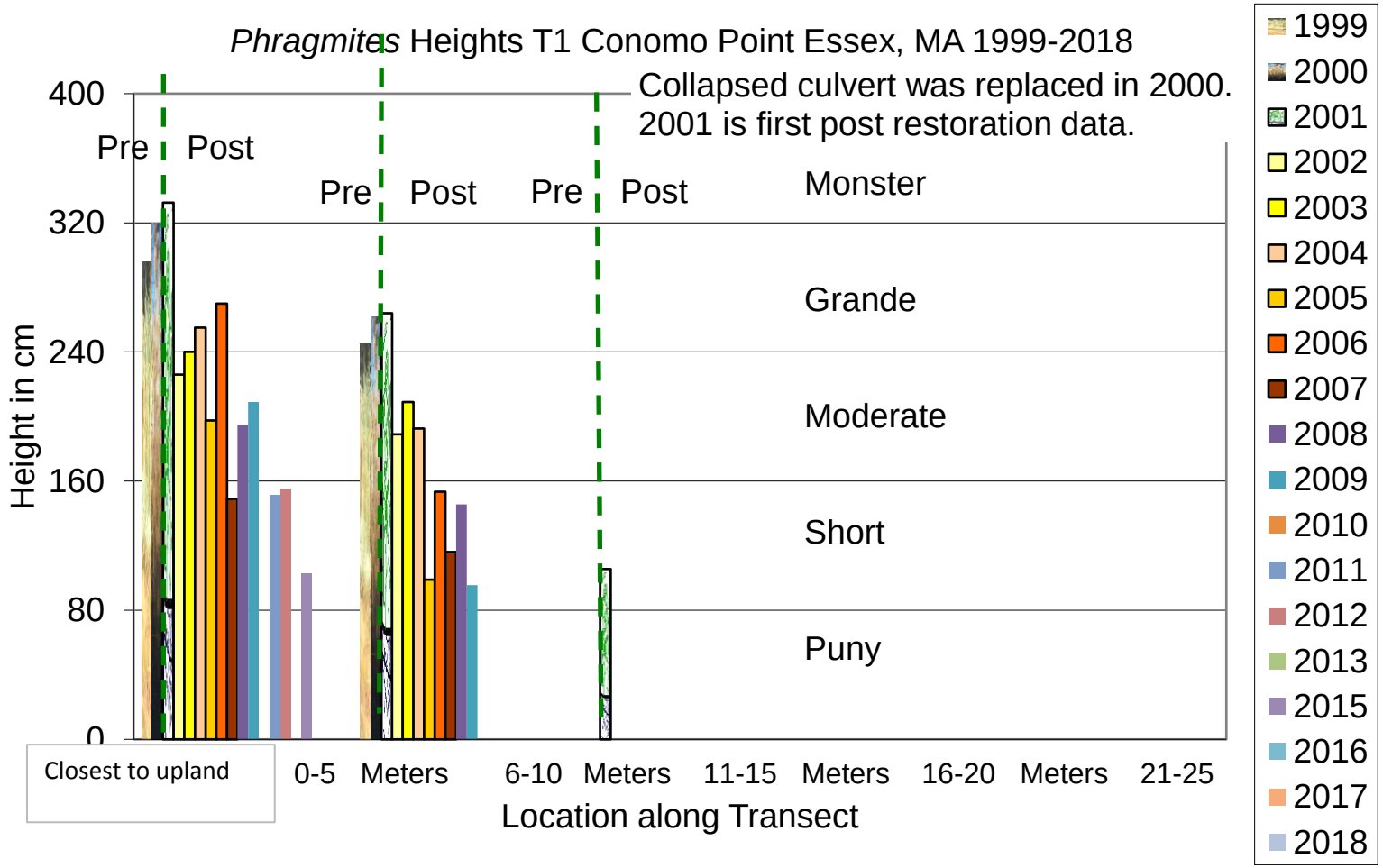

Cordgrass Heights Conomo Point, Essex T1
200
150
100
50
0
Centimeters
Meters 0-5
Meters 6-10
Meters 11-15
Meters 16-20
Meters 21-25
Closest to upland
2013
2014
2015
2016
2017
2018

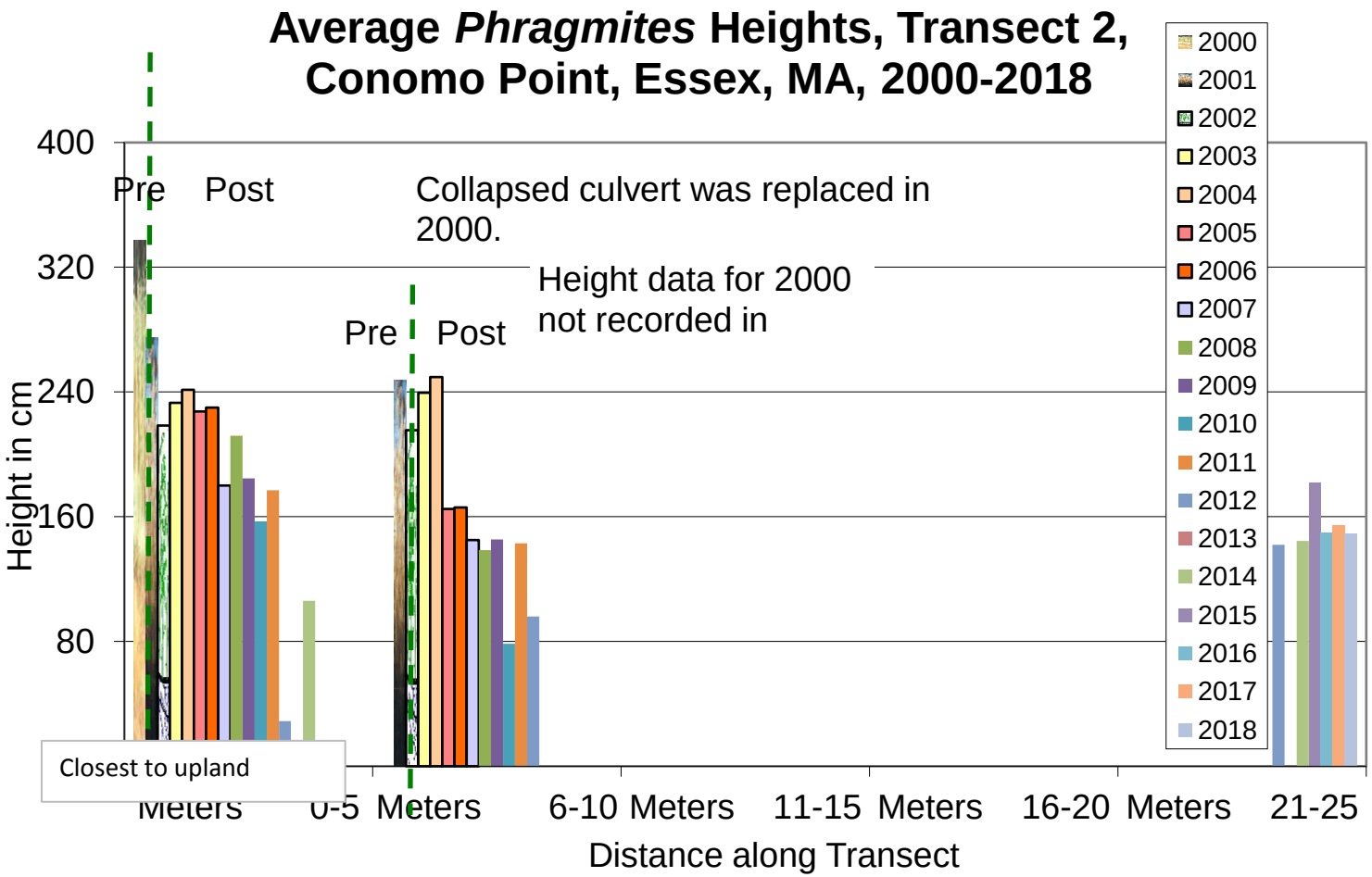

Cordgrass Heights Conomo Point, Essex T2
200
150
100
50
0
Centimeters
Closest to ditch
Meters 0-5
Meters 6-10
Meters 11-15
Meters 16-20
Meters 21-25
Closest to Upland
2013
2014
2015
2016
2017
2018

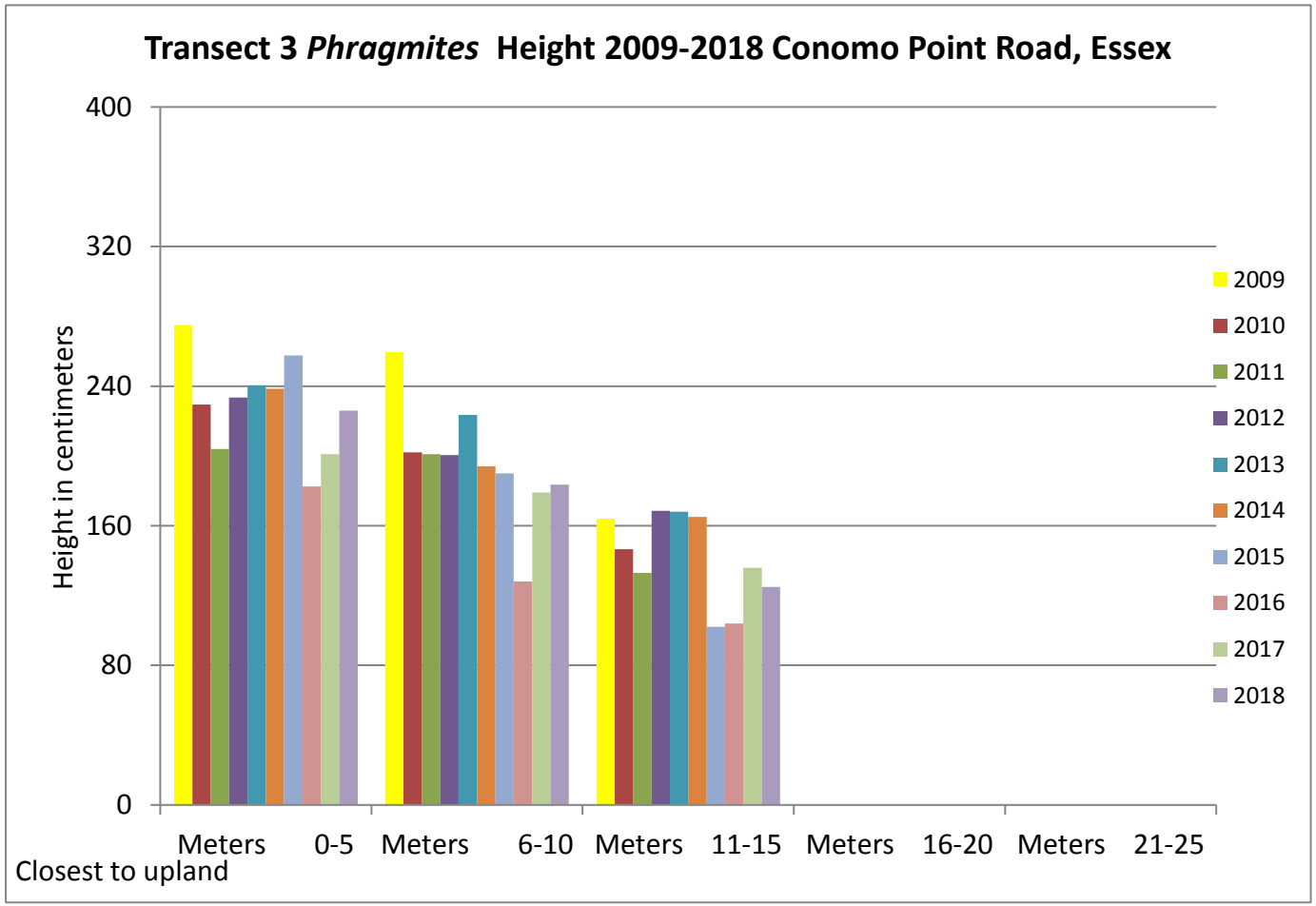

Cordgrass Heights Conomo Point, Essex T3 (Reference)
Centimeters
200
150
100
50
0
Meters
0-5 Meters
6-10 Meters
11-15 Meters
16-20 Meters
21-25
Closest to upland
2013
2014
2015
2016
2017
2018

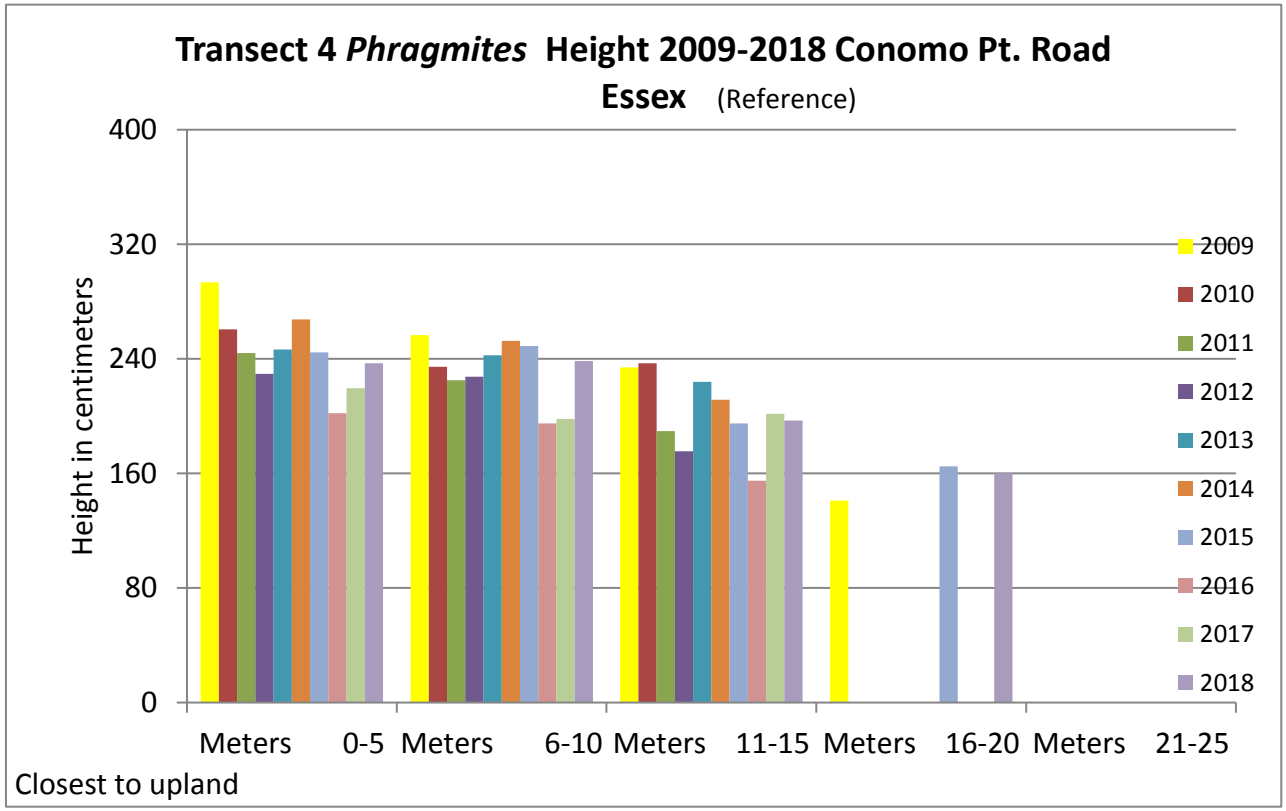

Cordgrass Heights Conomo Point, Essex T4 (Reference)
Centimeters
200
150
100
50
0
Meters
0-5 Meters
6-10 Meters
11-15 Meters
16-20 Meters
21-25
Closest to upland
2013
2014
2015
2016
2017
2018


Average *Phragmites* Heights, Transect 0, Conomo Point, Essex, MA, Pre-rest-2018
Collapsed culvert was replaced in 2000. "Pre-rest" data is one height, not average of 2 tallest. It was old dead Phragmites remaining
Pre
Post
Pre
Post
Monster
Grande
Moderate
Short
Puny
Height in cm
400
320
240
160
80
0
Meters
0-5
Meters
6-10
Meters
11-15
Meters
16-20
Meters
21-25
Closest to upland
Distance along Transect
Pre-rest.
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018


Phragmites Heights T1 Conomo Point Essex, MA 1999-2018
Collapsed culvert was replaced in 2000.
2001 is first post restoration data.
Pre
Post
Pre
Post
Pre
Post
Monster
Grande
Moderate
Short
Puny
400
320
240
160
80
0
Height in cm
Closest to upland
0-5 Meters
6-10 Meters
11-15 Meters
16-20 Meters
21-25
Location along Transect
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2015
2016
2017
2018


Average *Phragmites* Heights, Transect 2, Conomo Point, Essex, MA, 2000-2018
Pre
Post
Collapsed culvert was replaced in 2000.
Height data for 2000 not recorded in
Pre
Post
Height in cm
400
320
240
160
80
Closest to upland
Meters
0-5 Meters
6-10 Meters
11-15 Meters
16-20 Meters
21-25
Distance along Transect
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018


Transect 3 *Phragmites* Height 2009-2018 Conomo Point Road, Essex
Height in centimeters
400
320
240
160
80
0
Meters 0-5
Meters 6-10
Meters 11-15
Meters 16-20
Meters 21-25
Closest to upland
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018


Transect 4 *Phragmites* Height 2009-2018 Conomo Pt. Road
Essex (Reference)
Height in centimeters
400
320
240
160
80
0
Meters
0-5 Meters
6-10 Meters
11-15 Meters
16-20 Meters
21-25
Closest to upland
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

Mass Audubon Salt Marsh Science Project
Long Range Phragmites Study
Location: CONOMO POINT, ESSEX

Transect 0, Conomo Point
Observers

	Pre rest	06	Post rest	07
		5		8
	ave	06		6

2001 is first year post restoration
2004 Duff and gr 6 11/4/04
2005 Duff & Gr. 6
2006 Duff and Gr. 6
2007 Duff and Gr. 6
2009 Duff 9/23/09
2010 Duff and Kailegh
2011 Duff
2012 Duff/Bannister Man. Essex
2013 Duff & Lehrman
2014 Duff & Louisa
2015 Pomeroy St. John's Gr. 6
2016 Duff, Parents & Saints Academy
2017 Duff, parents, and saint academy G6
2018 Duff, parents, and saint academy G6
ave 03 07

SPECIES

Ditch 1 METER SEGMENTS
upland end — marsh end

is immature

Species	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	**# of int pres**
Phragmites	2002	1	1	1	1	1	1	1	1																		8
Phragmites australis	2003	1	1	1	1	1	1	1	1																		8
	2004	1	1	1	1	1	1	1	1																		8
	2005	1	1	1	1	1	1	1	1																		8
	2006	1	1	1	1	1	1	1	1	1																	9
	2007	1	1	1	1	1	1	1	1	1	1																10
	2008	1	1	1	1	1	1	1	1	1	1																10
	2009	1	1	1	1	1	1	1	1	1	1																10
	2010	1	1	1	1	1	1	1	1	1	1																10
	2011	1	1	1	1	1	1	1	1	1																	9
	2012	1	1	1	1	1	1	1	1	1	1																10
	2013	1	1	1	1	1	1	1	1	1	1	1															11
	2014	1	1	1	1	1	1	1	1	1	1	1															11
	2015	1	1	1	1	1	1	1	1	1	1	1	1														12
	2016	1	1	1	1	1	1	1	1	1	1	1	1														12
	2017	1	1	1	1	1	1	1	1	1	1	1	1														12
	2018	1	1	1	1	1	1	1	1	1	1	1	1														12
	2019																										0
Salt Marsh Hay	2002					1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1				17
Spartina patens	2003						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
	2004						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
	2005						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
	2006					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
	2007							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
	2008							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
	2009							1	1	1	1	1	1	1	1	1	1	1	1	1	1			1	1	1	17
T0, Conomo Point	2010								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
	2011							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
	2012								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
	2013								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
	2014								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
	2015										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	2016									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
	2017								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
	2018								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
	2019																										0
Spike Grass	2002					1	1	1	1									1	1	1	1	1	1	1	1	1	13
Distichlis spicata	2003						1	1	1						1			1	1	1	1	1	1	1	1	1	13
	2004							1	1									1	1	1	1	1	1	1	1	1	11
	2005																	1	1	1	1	1	1	1	1	1	9
	2006																			1	1	1	1	1	1	1	7
	2007																		1	1	1	1	1	1	1	1	8
	2008																						1	1	1	1	4
	2009															1	1	1	1	1	1	1	1	1	1	1	11
	2010															1	1	1	1	1	1	1	1	1	1	1	11
	2011								1					1	1	1	1	1	1	1	1	1	1	1	1	1	14
	2012															1			1	1	1	1	1	1	1	1	9
	2013																	1	1		1	1	1	1	1	1	8
	2014														1	1	1	1	1	1	1	1	1	1	1	1	12
	2015												1		1	1	1	1	1	1	1	1	1	1	1	1	13
	2016													1	1	1	1	1	1	1	1	1	1	1	1	1	13
	2017										1		1	1	1	1		1	1	1	1	1	1	1	1	1	14
	2018													1	1	1	1	1	1	1	1	1	1	1	1	1	13
	2019																										0

Seaside Goldenrod	2002																					1	1		2
Solidago sempervirens	2003																					1	1	1	3
	2004																				1	1	1	1	4
	2005																						1	1	2
	2006																				1	1	1	1	4
	2007																							1	1
	2008																							1	1
	2009																			1	1	1		1	4
	2010																							1	1
	2011																							1	1
	2012																							1	1
	2013																						1	1	2
	2014																						1		1
	2015																						1		1
	2016																								0
	2018																								0
	2019																								0
Orach	2002																								0
Atriplex patula	2003					1	1								1										3
	2004																								0
	2005																								0
	2006	1																							1
	2007							1	1																2
	2008																								0
	2009																								0
	2010																								0
	2011																								0
	2012																								0
	2013																								0
	2014																								0
	2015																								0
	2016																								0
	2017																								0
	2018																								0
	2019																								0
Black Grass	2002																								2
Juncus gerardi	2003																								4
	2004																								0
	2005																								0
	2006																								1
	2007																								0
	2008																								0
	2009																								0
T0, Conomo Point	2010																								0
	2011																								0
	2012																								0
	2013																								0
	2014																								0
	2015																								0
	2016																								1
	2017																								0
	2018																								0
	2019																								0
Saltmarsh cordgrass	2002												1		1	1	1	1	1	1	1				8
Spartina alterniflora	2003											1	1	1	1	1	1	1	1	1	1				10
	2004											1	1	1	1	1	1	1	1	1	1	1	1	1	14
	2005												1	1	1	1	1	1	1	1	1	1			10
	2006												1	1	1	1	1	1	1	1	1	1			10
	2007											1	1	1	1	1	1	1	1	1	1	1			11
	2008											1		1	1	1	1	1	1	1	1	1			10
	2009											1	1	1	1	1	1	1	1	1	1				10
	2010											1	1	1	1	1	1	1	1	1	1	1			11
	2011															1	1	1	1	1	1	1			7
	2012										1	1						1	1	1	1	1	1		8
	2013											1			1	1			1	1	1	1	1	1	9
	2014												1					1	1	1	1	1	1	1	8
	2015								1	1	1	1	1	1			1	1	1	1	1	1	1	1	13
	2016								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	2017															1	1	1	1	1	1	1	1	1	9
	2018										1	1	1	1	1	1	1	1	1	1	1	1	1	1	14
	2019																								0

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Glasswort	2002									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			15
Salicornia europaea	2003												1	1	1	1	1	1	1		1	1					9
	2004																										0
	2005																										0
	2006																										0
	2007																										0
	2008									1				1		1				1	1						5
	2009										1			1		1	1	1	1	1	1	1					9
	2010															1	1	1	1	1	1	1					7
	2011								1	1	1					1		1	1	1	1	1					9
	2012														1	1	1	1	1	1	1						7
	2013								1							1	1	1	1	1	1	1					8
	2014									1	1	1	1	1	1	1	1	1	1	1				1			12
	2015										1	1	1			1			1		1	1	1		1	1	10
	2016							1	1	1		1	1	1					1	1		1	1	1	1		12
	2017								1	1	1							1	1	1	1	1	1	1	1	1	12
	2018									1			1	1	1	1	1	1	1	1	1	1	1	1			13
	2019																										0
Marsh Elder	2009																						1				1
Iva frutescens	2010																										0
	2011																										0
T0, Conomo point	2012																										0
	2013																										0
	2014																										0
	2015																										0
	2016																										0

upland end — 1 METER SEGMENTS — marsh end

Mass Audubon Salt Marsh Science Project **Transect 1: Conomo Point, Essex**
Long Range Phragmites Study SIXTH GRADE
Location: Conomo Point, Essex 2001 is first year post restoration
Clay soil under peat
2004 Duff & Gr. 6 11/5/04 2007 Duff and gr. 6 9/24
2005 Duff & Gr. 6 11/4/05 2008 Duff & Gr. 6
2006 Duff and Macneil 2009 Duff 9/23/2009
upland end 2010 Duff

Observers and dates
11/10 , 11/12
Cindy Mowry
2011 Duff
2012 Duff & Duff
2013 Duff & Lehrman
2014 Duff & Louisa
2015 Parent and
2016 Duff, Parents & St. John's Gr. 6
2017 Duff and Saints Academy
2018 Duff and Saints Academy

1 is immature

SPECIES	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		# of int pres
Phragmites	1998	1	1	1	1	1	1	1	1	1	1																	10
Phragmites australis	1999	1	1	1	1	1	1	1	1	1																		9
	2000	1	1	1	1	1	1	1	1	1	1																Pre	10
	2001	1	1	1	1	1	1	1	1	1	1	1															Post	11
	2002	1	1	1	1	1	1	1	1	1	1																	10
	2003	1	1	1	1	1	1	1	1	1																		9
	2004	1	1	1	1	1	1	1	1	1																		9
	2005	1	1	1				1	1	1																		6
	2006	1	1	1	1	1	1	1	1	1																		9
	2007	1					1		1		1																	4
	2008	1	1				1	1	1	1	1																	7
	2009	1	1					1	1	1	1																	6
	2010																											0
	2011	1																										1
	2012	1																										1
	2013																											0
	2014	1																										1
	2015	1																										1
	2016																											0
	2017																											0
	2018																											0
	2019																											0
Salt Marsh Hay	1998							1	1		1	1	1	1	1	1	1	1			1		1	1	1	1		15
Spartina patens	1999						1	1	1	1	1	1	1	1	1	1	1											11
	2000							1	1	1	1	1	1	1	1	1	1	1	1			1	1		1	1	Pre	16
	2001						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			Post	18
	2002						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		20
	2003					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		21
	2004						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		20
	2005						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		20
	2006					1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1		20
	2007					1	1	1	1	1	1	1	1			1	1	1	1	1	1	1	1	1	1	1		19
T1 Conomo Point	2008					1	1	1	1	1	1					1	1	1	1	1	1	1		1	1	1		16
	2009					1	1			1	1					1	1	1	1	1	1	1		1	1	1		14
	2010								1	1	1					1	1	1	1	1	1	1						10
	2011								1	1					1	1	1		1	1	1	1						9
	2012								1	1						1	1		1	1	1	1			1	1		10
	2013									1	1	1			1	1						1	1				Post	7
	2014									1	1	1	1	1	1	1	1	1	1									10
	2015									1					1	1	1	1	1		1							7
	2016									1						1	1	1	1	1								6
	2017								1							1	1		1		1					1		6
	2018									1						1	1		1	1	1	1						7
	2019																											0
Spike Grass	1998						1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1		19
Distichlis spicata	1999						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		20
	2000							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Pre	19
	2001						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Post	20
	2002						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		20
	2003					1	1	1	1		1	1		1	1		1	1	1	1	1	1	1	1	1	1		18
	2004					1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1		1	1			18
	2005							1	1	1	1		1			1	1	1				1	1	1	1	1		13
	2006				1	1	1	1	1									1		1	1		1		1	1		11
	2007						1	1	1	1	1						1					1		1	1	1		10
	2008					1				1																1		3
	2009								1							1	1				1			1	1	1		7
	2010								1	1	1					1	1	1	1		1	1		1	1	1		12
	2011															1	1			1	1	1		1	1	1		8
	2012															1	1	1	1	1	1	1			1	1		9
	2013																					1	1					2
	2014															1	1					1	1					4
	2015															1	1		1		1	1						5
	2016															1	1	1	1	1	1	1						7
	2017																		1		1					1		3
	2018															1			1	1	1							4
	2019																											0
Black Grass	1998																											13
Juncus gerardii	1999																											6
	2000																										Pre	5
	2001																										Post	3
	2002																											0
	2003																											1
	2004																											2
	2005																											0
	2006																											0
	2007																											0
	2008																											0
	2009																											0
	2010																											0
	2011																											0
	2012																											0
	2013																											0
	2014																											0
	2015																											0

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		
		upland end								1 METER SEGMENTS									DITCH					marsh end				
Seaside Goldenrod	1998																											0
Solidago sempervirens	1999															1											Pre	1
	2000																										Post	0
	2001																1						1					2
	2002																											0
	2003																											0
	2004																											0
	2005																											0
	2006																											0
	2007																											0
	2008																											0
	2009																											0
	2010																											0
	2011																											0
	2012																											0
	2013																											0
	2014																											0
	2015																											0
	2016																											0
Glasswort	2001																											0
Salicornia europaea	2002																				1	1	1					3
	2003																					1	1	1	1	1		5
	2004																	1							1	1		3
	2005																							1	1			2
	2006				1																			1	1			3
	2007																											0
	2008															1	1											2
	2009															1	1				1							3
T1 Conomo Point	2010																			1	1							2
	2011								1	1															1	1		4
	2012																											0
	2013																											0
	2014											1																1
	2015																		1		1	1						3
	2016																											0
	2017																											0
	2018																1				1	1						3
	2019																											
Saltmarsh Cordgrass	2017																					1						1
(*Spartina alterniflora*)	2018																		1	1	1	1	1					5
	2019																											0
Orach	2007																		1	1		1						3
(*Atriplex patula*)	2008																					1						1
	2009																			1								1
	2010																											0
	2011																											0
	2012																											0
	2013																											0
	2014																					1						1
	2015																											0
	2016																											0
Algae	2012																								1	1		2
	2013																											0
	2014																											0
Seaside Arrowgrass	2003																		1									1
Triglochin maritima	2004																											0
Freshwater Cordgrass	1998																											0
Spartina pectinata	1999																	1										1
	2003																											0
Bare Patch / water/mud	2004													1	1													2
	2005											30%	50%	90%	80%			40%	60%		70%	40%	80%			70%		10
Percent cover	2006										30	60%	50	100	95							30	70%					7
	2007											99%	95	100	100							20	90					6
	2008	20	99	100	99	10				15	30	100	100	100	100	60		70	80			50	100	90	70	40		19
	2009		100	100	100		90	90				100	100	100	100			90	30	40	25	20	100	20		60		18
	2010	100	100	100	100	100	100	100			80	100	100	100	100			70	40				100	100	100	100		18
	2011	80	100	100	100	100	100	100	80	10	100	100	100	100	50		80	30		10		10	100		60	80		20
	2012	100	100	100	100	100	100	100	40	70	100	100	100	100	100	30		80	40	70	30		30	100	60	90		23
	2013	100	100	100	100	100	100	100	100	30	60	30	100	100	60		100	50	100	100	30	20	60	100	100	100		24
	2014	100	100	100	100	100	100	100	100	90	900		80	100	70	10	10	10		100	100	40	50	100	100	100		23
	2015	100	100	100	100	100	100	100	100	100	100	100	100	100	100	20	70			100	50	100	100	100	100	100		24
	2016	100	100	100	100	100	100	100	100	60	100	100	100	100	100					50	50		100	100	100	100		20
	2017	100	100	100	100	100	100	100	40	100	100	100	100	100	100	40	20	100	20	100	50	50	100	100	100	100		
	2018	100	100	100	100	100	100	100	100	80	100	100	100	100	100	100	100	100	50				50	100	100	100		22
	2019																											0

Mass Audubon Salt Marsh Science Project

Long Range *Phragmites* Study

Location: CONOMO POINT, ESSEX

Transect 2 Conomo Point

2001 is first year post restoration

Observers and dates

2014 Duff & Louisa
2015 Duff & St. John's Gr. 6
2016 Duff, Parents & Saints Academ SIXTH GRADE
2017 Duff, Parents & Saints Academy
2018 Duff, Parents & Saints Academy

2004 Duff and rg 6 Essex
2005 Duff & gr 6 Essex
06 Duff and gr 6.
upland end

09 Duff
10 Duff
11 Duff
2012 Duff & Duff
2013 Duff & Lehrman

Saints Academy G

# of intervals present in

SPECIES	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Phragmites	2000	1	1	1	1	1	1	1	1			1															Pre 9
Phragmites australis	2001	1	1	1	1	1	1	1	1																		Post 8
	2002	1	1	1	1	1	1	1																			7
	2003	1	1	1	1	1	1	1	1	1																	9
	2004	1	1	1	1	1	1	1	1																		8
1 ia immature	2005	1	1	1	1	1	1	1	1																		8
	2006	1	1	1	1	1	1	1	1																		8
	2007	1	1	1	1	1	1	1																			7
	2008	1	1	1	1	1	1		1																		7
	2009	1	1		1	1	1		1	1																	7
	2010	1						1		1																	3
	2011	1					1																				2
	2012	1						1		1															1		4
	2013																								1		1
	2014								1																1	1	3
	2015																							1	1	1	3
	2016																							1	1	1	3
	2017																							1	1	1	3
	2018																						1	1	1	1	4
	2019																										0
Salt Marsh Hay	2000							Not recorded																			0
Spartina patens	2001						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
	2002					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
	2003					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
	2004					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
	2005					1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
	2006								1	1											1	1	1	1	1	1	8
	2007						1	1	1	1					1	1	1	1	1	1	1	1	1	1	1	1	16
	2008					1	1		1	1	1				1	1		1	1		1	1	1	1	1	1	15
	2009					1	1		1							1	1	1			1	1	1	1	1	1	12
	2010					1	1		1	1									1			1	1	1	1	1	10
	2011					1	1		1	1									1			1	1	1	1	1	10
	2012						1		1	1									1	1		1	1	1	1	1	10
	2013					1	1		1	1								1	1					1	1	1	9
	2014						1	1	1	1									1			1	1	1			8
	2015						1			1						1			1				1	1	1	1	8
	2016						1		1	1									1					1	1	1	7
	2017								1	1														1	1	1	5
	2018																							1	1	1	3
	2019																										0
Bare (Water)	2004																										0
Percent cover	2005										90	100	90	60	30												5
	2006										100	100	100	100	100												5
	2007										100	100	100	100						90							5
	2008			99				100	50		100	100	100	100	40	100	100	95	30	100	100	40	20				16
	2009		40	100				100			100	100	100	100		50	50	90		100	80						12
	2010									30	100	100	100	100	100	100	100	100	100	100	100						12
	2011		100	100	100	60			80	30	100	100	100	100	100	100	100	100		100	100	30					17
	2012		100	100	100	100		100	100	100	100	100	100	100	100	100	100			80	100	95			50		18
	2013	100	100	100	100	70	30	100	60		100	100	100	100	100	100	100	70		90	100	100	100	30	60		22
	2014	100	100	100	100	100	10	100	70		100	100	100	100	100	100	100	70		40	100	100			40		20
	2015	100	100	100	100	100	40	100	100		100	100	100	100	100	100	100	80	20	100	100	100	50	20	70		23
	2016	100	100	100	100	100		100	50	50	100	100	100	100	100	100	100	100	100	100	100	100	100	25	75		23
	2017	100	100	100	100		50	100		30	100	100	100	100	100	100	100	100	60	100	100	100	100	50			21
	2018	100	100	100	100	100	##	100	40	60	100	100	100	100	100	100	100	100	100	100	100	90	90	100	80		###
	2019																										0
Bare (Dry)	2016																										
% cover	2017					100	50												40								3
	2018																										

Spike Grass	2000								1	1	1	1	1	1	1	1	1	1	1	1		1		1				14
Distichlis spicata	2001					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			20
	2002				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			21
	2003						1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1			18
	2004					1	1	1	1	1			1	1	1	1	1	1	1	1	1	1	1	1	1			18
	2005					1	1	1	1				1	1	1	1	1	1	1	1	1	1	1	1	1			17
	2006														1	1	1	1	1	1	1	1	1	1	1			11
	2007																	1		1			1	1	1			5
	2008													1	1			1					1	1	1			6
	2009							1													1	1	1	1	1			6
	2010					1		1	1									1			1	1	1	1	1			9
	2011					1												1	1			1	1	1	1			7
	2012																1	1	1		1			1	1			6
	2013																1	1	1						1			4
	2014																1	1					1					3
	2015														1		1		1									3
	2016																											0
	2017																											0
	2018							1																				1
	2019																											
Seaside Goldenrod	2000															1					1				1			3
Solidago sempervirens	2001																						1					1
	2002								1												1				1			3
	2003								1																			1
	2004								1												1				1			3
	2005																											0
	2006																					1	1	1	1			4
	2007																				1	1						2
	2008																						1	1	1			3
	2009																											0
	2010																											0
	2011																								1			1
	2012																											0
	2013																											0
	2014																											0
	2015																											0
	2016																											0
Salt marsh cordgrass	2007						1	1																				2
	2008																											0
	2009																											0
	2010																											0
	2011																											0
	2012																											0
	2013																							1				1
	2014																											0
	2015																											0
	2016																									1		1
	2017																											0

T2: Conomo Point

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	
Orach	2002						1	1																			2
Atriplex patula	2003						1																				1
	2004						1																				1
	2005																										0
	2006																										0
	2007					1	1								1												3
	2008																										0
	2009																										0
	2010																										0
	2011																										0
	2012																										0
	2013																										0
	2014																									1	1
	2015																										0
	2016																										0
Black grass	2000																										0
Juncus gerardii	2001																										0
	2002																										8
	2003																										6
	2004																										9
	2005																										1
	2006																										0
	2007																										0
	2008																										1
	2009																										0
	2010																										0
Sea Lavender	2000									1							1								1	1	4
Limonium nashii	2001																										0
	2002																										0
	2003																										0
Purple Loostrife	2000																									1	1
Lythrum salicaria	2001																										0
	2002																										0
Glass wort	2009								1																		1
Salicornia europaea	2010																										0
	2011							1																			1
	2012																										0
	2013																										0
	2014						1																				1
	2015						1			1																	2
	2016						1																				1
	2017																										0
	2018							1																			1
	2019																										0
Bulrush	2009																		1					1			2
	2010																										0
	2011																		1								1
	2012																										0
	2013																	1	1	1							3
	2014																	1		1							2
	2015																										0
Algae	2015											1	1	1	1	1					1	1					7
	2016	1	1	1	1	1					1	1	1	1	1	1	1	1	1	1	1	1	1		1		19
	2017																										0

upland end — 1 METER SEGMENTS — marsh end

Massachusetts Audubon Society
Long Range Phragmites Study
Location: CONOMO POINT, ESSEX

Transect 3, Conomo Point (Reference Transect) Closer to Road

Observers:
2009 Duff
2010 Duff
2011 Duff & Capezio
2012 L. Duff & P. Duff
2013 Duff & Lehrman
2014 Duff & Louisa
2015 Parent and St. John's Gr. 6
2016 Duff, Parents & Saints Academy
2017 Duff and Saints Academy G6
2018 Duff, Heather and Ryan

SPECIES

upland end — **Ditch** — 1 METER SEGMENTS — marsh end

Species	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	# of intervals present in	
Phragmites	2009	1	1	1	1	1	1	1	1	1	1	1															11	44%
Phragmites australis	2010	1	1	1	1	1	1	1	1	1	1	1	1														12	48%
▦ is immature	2011	1	1	1	1	1	1	1	1	1	1	1															11	44%
	2012	1	1	1	1	1	1	1	1	1	1	1															11	44%
	2013	1	1	1	1	1	1	1	1	1	1	1	1														12	48%
	2014	1	1	1	1	1	1	1	1	1	1	1	1														12	48%
	2015	1	1	1	1	1	1	1	1	1	1	▦	1														12	48%
	2016	1	1	1	1	1	1	1	1	1	1	1															11	44%
	2017	1	1	▦	1	1	1	1	1	▦	▦	▦	▦														12	48%
	2018	1	1	1	1	1	1	1	1		1		1														10	40%
	2019																										0	0%
Spike Grass	2009																			1							1	4%
Distichlis spicata	2010														1		1	1	1	1							5	20%
	2011																1	1	1	1	1	1	1	1			8	32%
	2012														1		1	1	1	1	1	1	1	1		1	10	40%
	2013														1	1	1	1	1	1	1						7	28%
	2014															1	1	1	1	1	1	1		1		1	9	36%
	2015														1			1	1	1	1	1	1	1		1	9	36%
	2016											1		1	1	1	1	1	1	1	1	1		1			11	44%
	2017															1	1	1	1	1	1	1	1	1			9	36%
	2018									1				1	1	1	1	1	1	1	1	1	1	1	1		13	52%
	2019																										0	0%
Salt Marsh Hay	2009									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17	68%
Spartina patens	2010									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17	68%
	2011								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18	72%
	2012										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	64%
	2013									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17	68%
T3 Conomo Point	2014								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		17	68%
	2015								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18	72%
	2016								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18	72%
	2017										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	64%
	2018								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18	72%
	2019																										0	0%
Orach	2009																										0	0%
Atriplex patula	2010												1														1	4%
	2011																										0	0%
	2012																1										1	4%
	2013												1														1	4%
	2014																										0	0%
	2015																										0	0%
	2016										1																1	4%
	2017																										0	0%
	2018				1	1	1	1																			4	16%
	2019																										0	0%
Saltmarsh Bulrush	2018																											
(*Scirpus robustus*)	2019																											
Saltmarsh cordgrass	2009									1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	16	64%
Spartina alterniflora	2010								1	1	1	1	1	1	1	1	1										9	36%
	2011									1	1	1	1	1	1	1				1	1	1	1	1	1	1	14	56%
Transect 3,	2012								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18	72%
Conomo Point	2013								1	1	1	1	1	1		1	1	1	1		1	1	1	1	1	1	16	64%
	2014								1	1	1	1	1		1	1	1	1	1			1	1	1	1	1	15	60%
	2015												1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	56%
	2016								1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	17	68%
	2017							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19	76%
	2018							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19	76%
	2019																										0	0%
Glasswort	2009																									1	1	4%
Salicornia europaea	2010										1	1				1											3	12%
	2011																										0	0%
	2012																										0	0%
	2013																				1		1		1	1	4	16%
	2014																		1	1	1	1	1	1	1	1	8	32%
	2015																	1	1	1				1	1		5	20%
	2016								1	1	1																3	12%
	2017										1	1				1	1	1	1	1			1	1	1	1	11	44%
	2018							1	1	1	1	1	1														6	24%
	2019																										0	0%

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		
		upland end										1 METER SEGMENTS												marsh end				
Sea Blite	2010																										0	0%
	2011																										0	0%
	2012																							1			1	4%
	2013																										0	0%
	2014																										0	0%
	2015																										0	0%
	2016																										0	0%
Marsh Elder	2010								1			1															2	8%
	2011																										0	0%
	2012																										0	0%
T3 Conomo Point	2013																										0	0%
	2014																										0	0%
	2015											1															1	4%
	2016																										0	0%
Wrack	2009											1															1	4%
	2010									1			1	1	1	1	1	1									7	28%
	2011																										0	0%
	2012																										0	0%
	2013														1	1	1	1	1	1	1						7	28%
	2014																	1									1	4%
	2015																								1		1	4%
	2016									1	1		1	1	1	1		1	1	1	1	1	1	1	1	1	15	60%
	2017									1	1																2	8%
	2018																										0	0%

Massachusetts Audubon Society
Long Range Phragmites Study
Location: CONOMO POINT, ESSEX

(Reference Transect)

Observers:
2009 Duff
2010 Duff
2011 Duff & Capezio

Farther From Road
2012 L. Duff & P. Duff
2013 Duff & Lehrman
2014 Duff & Louisa
2015 Parent and St. John's Gr. 6

2016 Duff, Parents & Saints Academy
2017 Duff and : Heather/ Ryan
2018 Duff, Parents & Saints Acade

SPECIES

Ditch 1 METER SEGMENTS

upland end — marsh end

Species	Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	# of intervals present in	
Phragmites	2009	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										16	64%
Phragmites australis	2010	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											15	60%
1 is immature	2011	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											15	60%
	2012	1	1	1	1	1	1	1	1	1	1	1	1	1	1												14	56%
	2013	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											15	60%
	2014	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											15	60%
	2015	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										16	64%
	2016	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											15	60%
	2017	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											15	60%
	2018	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1									17	68%
	2019																										0	0%
Spike Grass	2009											1	1	1	1	1	1	1	1	1	1						10	40%
Distichlis spicata	2010										1	1	1	1	1	1	1	1	1						1		10	40%
	2011										1	1	1	1	1	1	1	1	1								9	36%
	2012												1	1	1	1	1	1	1	1	1			1			10	40%
T4 Conomo Point	2013												1	1	1	1	1	1	1	1	1						9	36%
	2014											1	1	1	1	1	1	1	1		1		1				10	40%
	2015												1	1	1	1	1	1									6	24%
	2016													1	1	1	1	1	1	1	1			1			9	36%
	2017													1	1	1	1	1	1		1	1	1	1	1		11	44%
	2018											1	1	1	1	1	1	1	1		1	1		1	1		12	48%
	2019																										0	0%
Salt Marsh Hay	2009						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20	80%
Spartina patens	2010						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20	80%
	2011								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18	72%
	2012											1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	60%
	2013									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17	68%
	2014									1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	64%
	2015												1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	56%
	2016												1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	56%
	2017											1	1	1	1	1	1	1	1	1	1	1	1	1	1		14	56%
	2018										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16	64%
	2019																										0	0%
Seaside Goldenrod	2009											1															1	4%
Solidago sempervirens	2010									1	1	1	1	1	1	1											7	28%
	2011												1	1													2	8%
	2012																										0	0%
	2013														1												1	4%
	2014													1	1												2	8%
	2015												1														1	4%
	2016																										0	0%
	2017																										0	0%
Orach	2009																										0	0%
Atriplex patula	2010					1	1	1	1	1																	5	20%
	2011																										0	0%
	2012																										0	0%
	2013																										0	0%
	2014										1																1	4%
	2015																										0	0%
	2016																										0	0%
	2017																		1								1	4%
	2018				1		1	1			1	1	1														6	24%
	2019																										0	0%
Black Grass	2009										1	1	1	1													4	16%
Juncus gerardi	2010														1												1	4%
	2011												1														1	4%
	2012																										0	0%
	2013																										0	0%
	2014																										0	0%
	2015																										0	0%
	2016																										0	0%
	2017																										0	0%

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25		
Saltmarsh cordgrass	2009																				1	1	1	1	1	1	6	24%
Spartina alterniflora	2010																			1	1	1	1	1	1	1	7	28%
	2011																		1	1	1	1	1	1	1	1	8	32%
T4 Conomo Point	2012																			1	1	1	1	1	1	1	7	28%
	2013																			1	1	1	1		1	1	6	24%
	2014																			1	1	1	1	1	1	1	7	28%
	2015																		1	1	1	1	1	1	1	1	8	32%
	2016																		1	1	1		1	1			5	20%
	2017																	1	1	1	1	1	1	1		1	8	32%
	2018																	1	1	1	1	1	1			1	7	28%
	2019																										0	0%
Sea Blite	2010															1											1	4%
	2011																										0	0%
	2012																										0	0%
	2013																										0	0%
	2014																										0	0%
	2015																										0	0%
	2016																										0	0%
	2017																										0	0%
Glasswort	2009												1														1	4%
Salicornia europaea	2010															1	1	1	1	1							5	20%
	2011																										0	0%
	2012																										0	0%
	2013													1	1												2	8%
	2014																1	1		1							3	12%
	2015																			1	1	1	1	1			5	20%
	2016																										0	0%
	2017												1							1	1	1	1	1	1	1	8	32%
	2018										1	1		1	1	1		1	1		1						8	32%
	2019																										0	0%
Wrack	2009														1	1			1								3	12%
	2010																	1	1	1	1	1	1	1	1	1	9	36%
	2011																										0	0%
	2012																										0	0%
	2013															1	1	1	1	1	1	1	1	1	1	1	11	44%
	2014																			1	1	1	1	1	1	1	7	28%
	2015											1															1	4%
	2016											1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	60%
	2017																										0	0%
	2018																										0	0%
Marsh Elder	2009		1		1	1	1	1	1	1	1	1	1														10	40%
Iva frutescens	2010			1	1	1	1		1	1	1	1		1	1												10	40%
	2011	1	1	1	1	1	1	1	1	1	1	1	1	1	1												14	56%
	2012		1	1	1	1	1		1	1	1	1	1		1												11	44%
	2013	1			1			1		1	1	1	1														7	28%
	2014	1	1	1	1	1				1	1	1															8	32%
	2015												1														1	4%
	2016			1																							1	4%
	2017			1							1	1	1	1													5	20%
	2018							1	1			1															3	12%
	2019																										0	0%
Purple Loosestrife	2014		1																								1	4%
(*Lythrum salicaria*)	2015																										0	0%

upland end — 1 METER SEGMENTS — marsh end