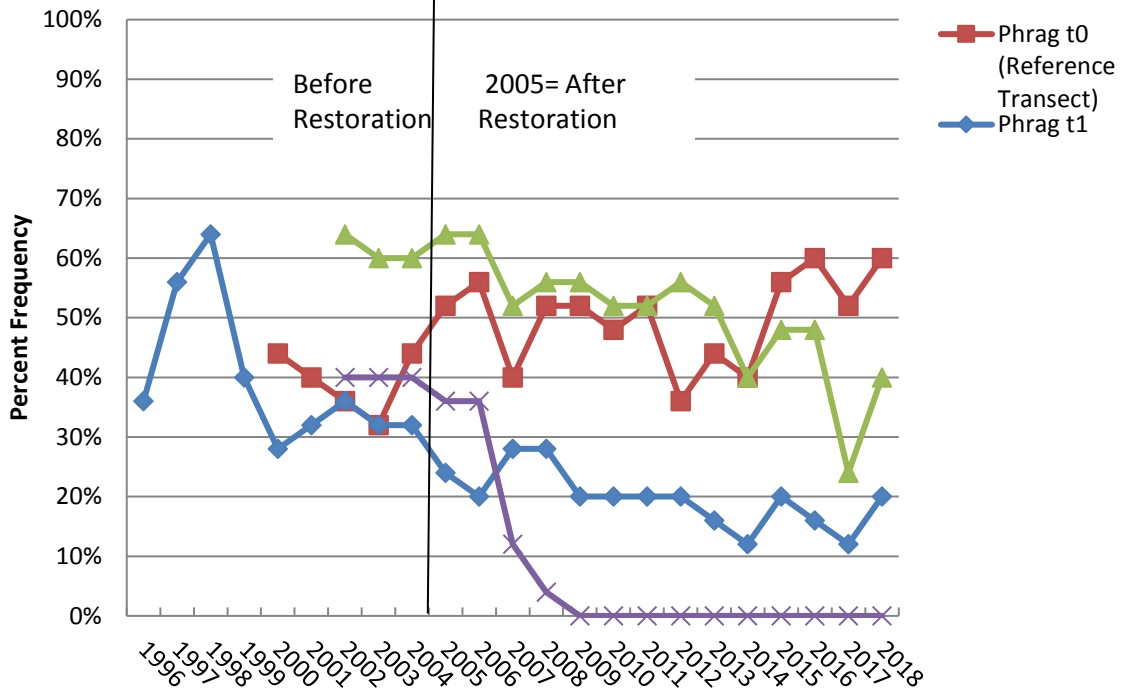
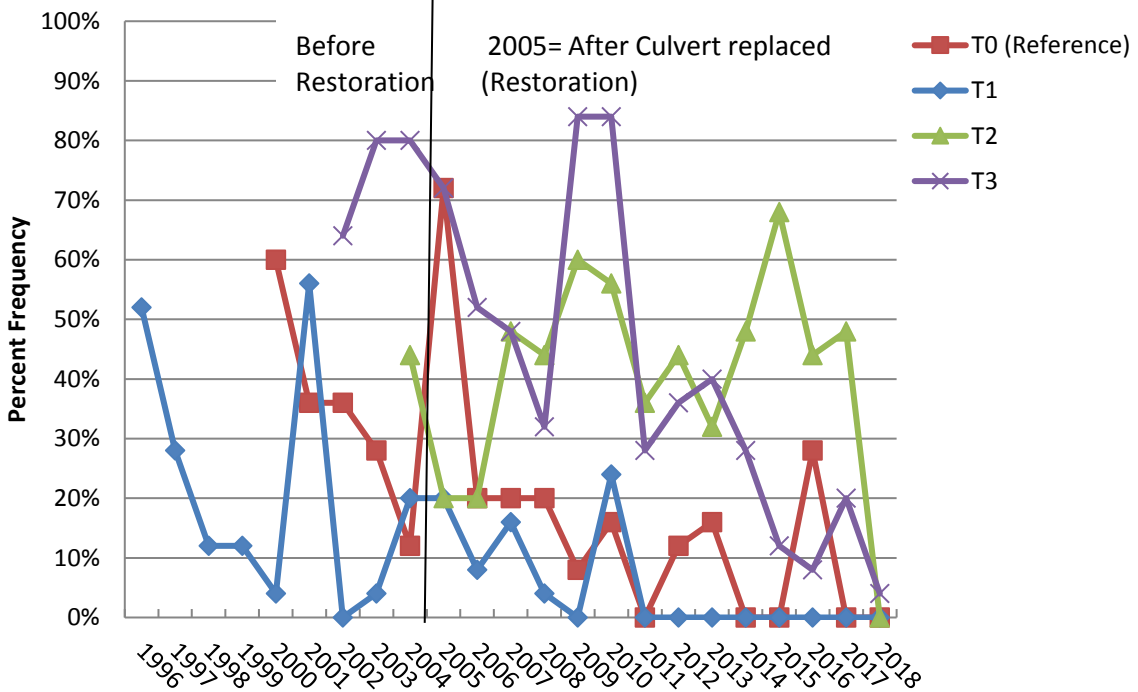


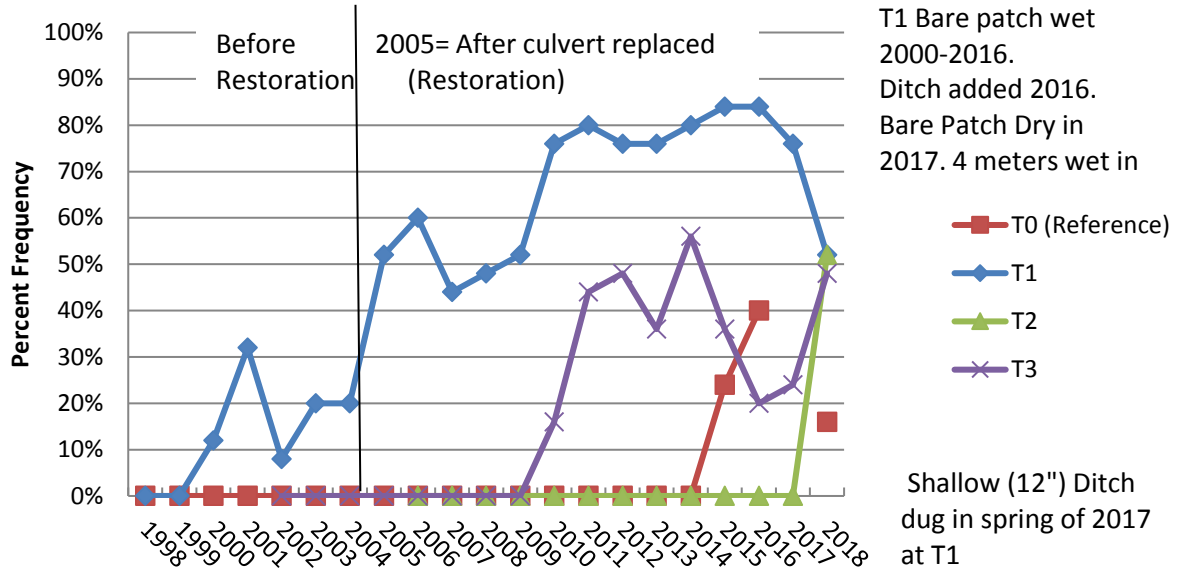
Phragmites Town Farm Road Ipswich



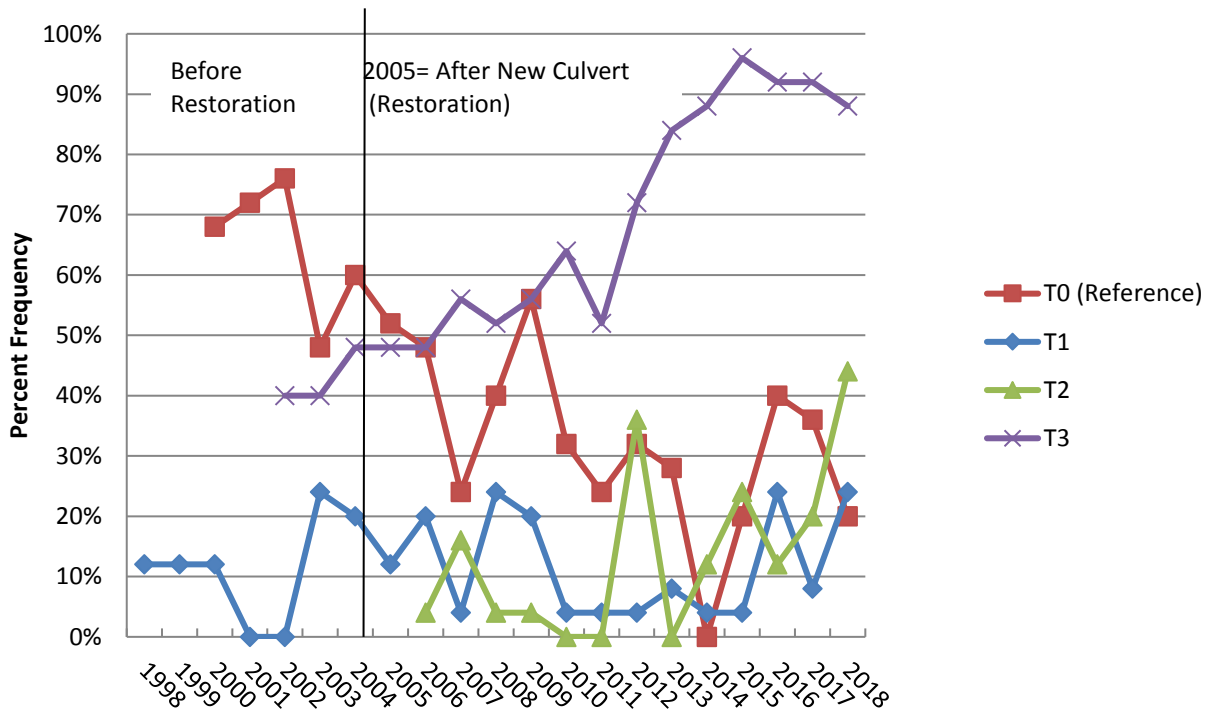
Salt Marsh Hay Town Farm Road Ipswich



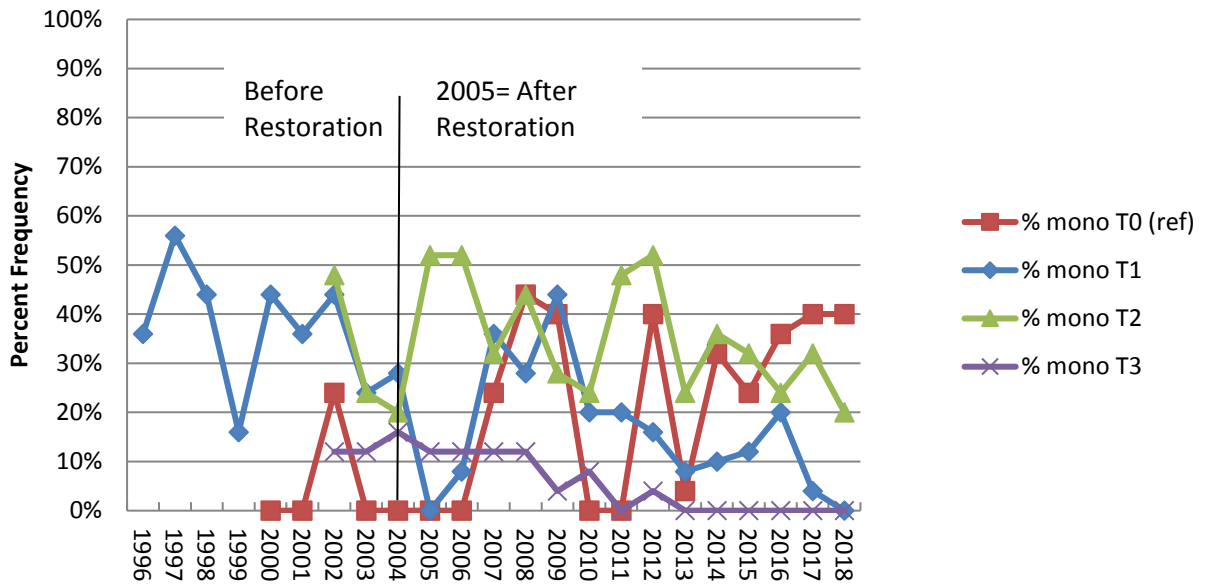
Bare Patch Town Farm Road, Ipswich



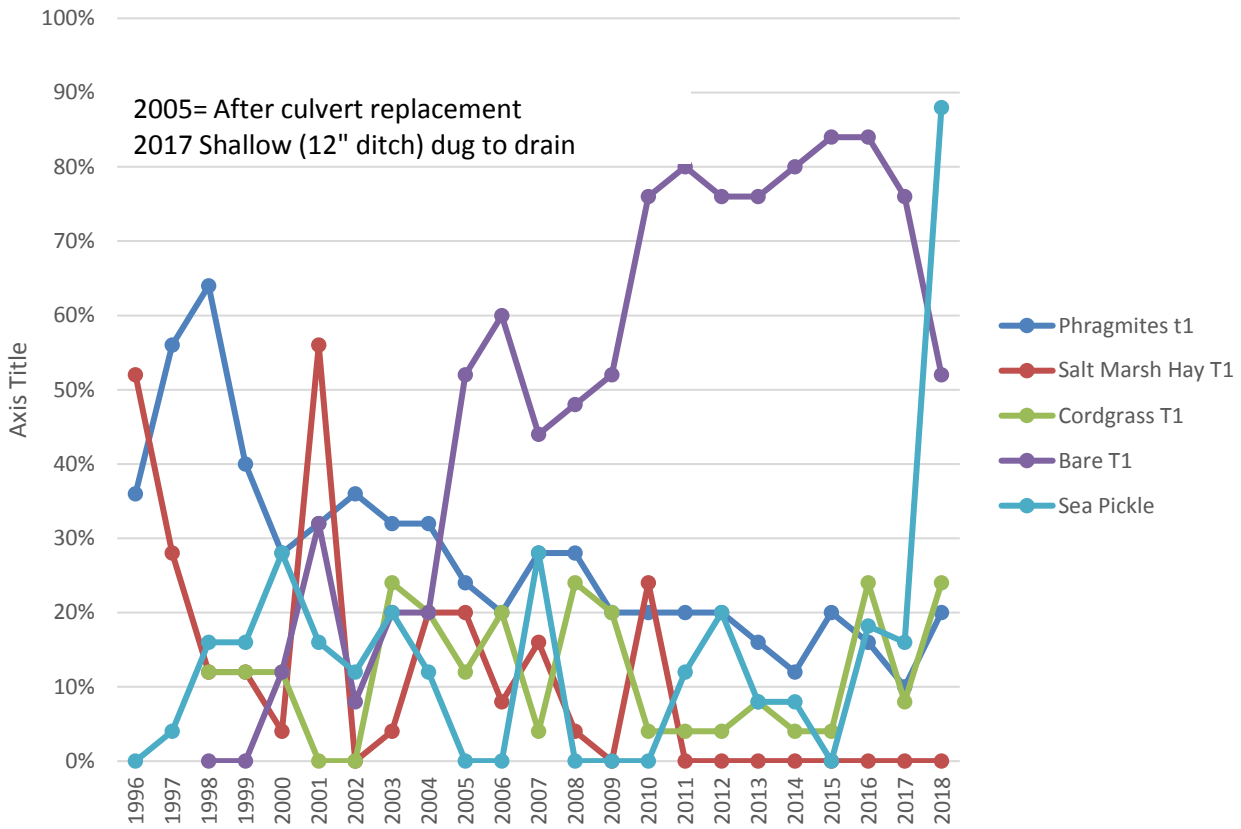
Cordgrass Town Farm Road, Ipswich



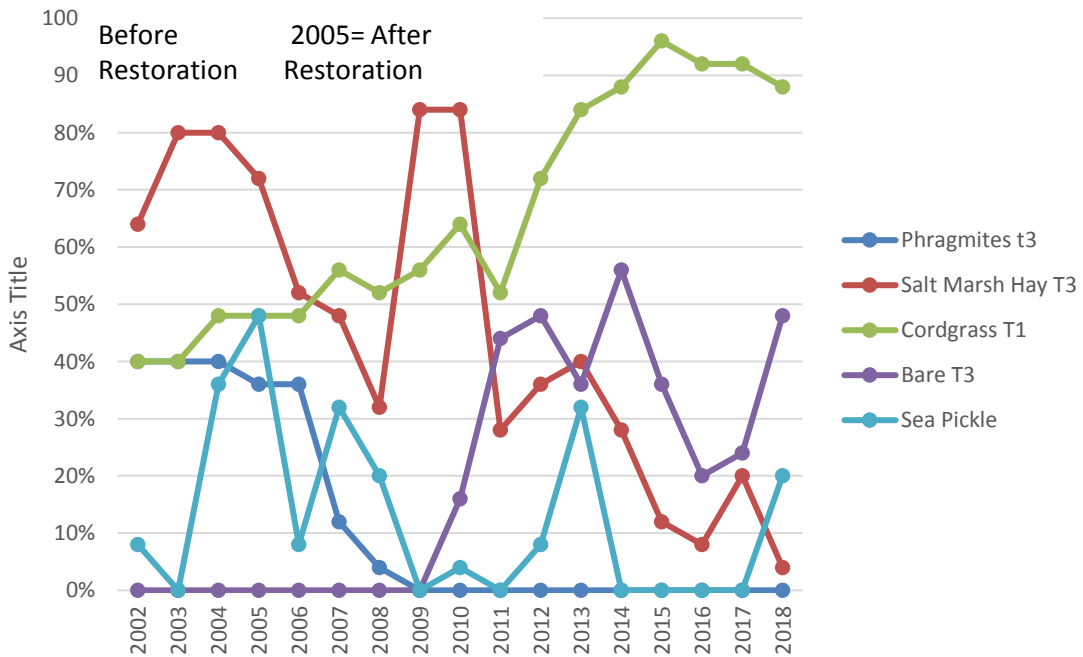
% *Phragmites* Monoculture Town Farm Road, Ipswich



Vegetation & Bare Patch Changes at T1 TFR Ips. (25 meters)



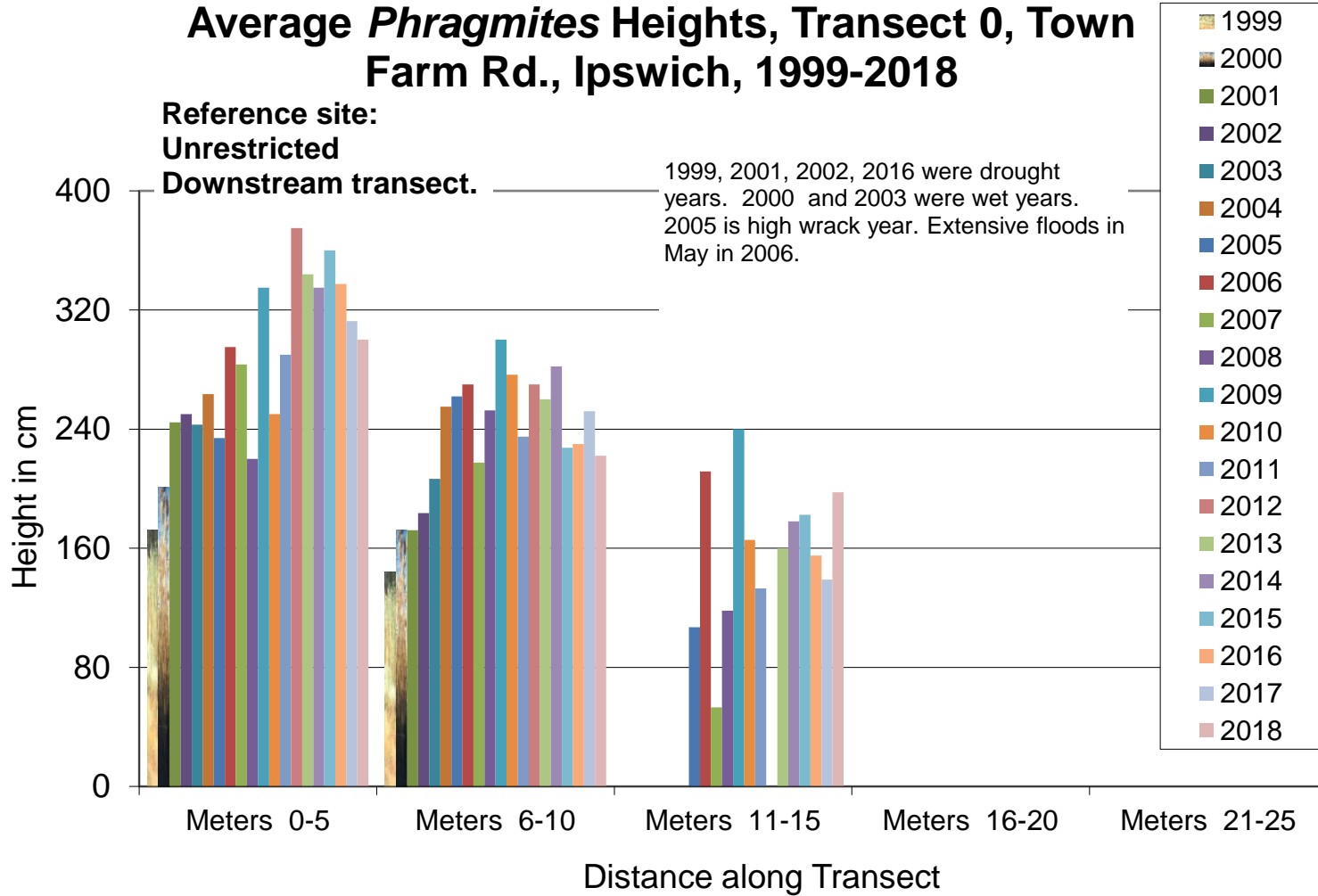
Vegetation and Bare Patch Changes T3 at TFR Ips



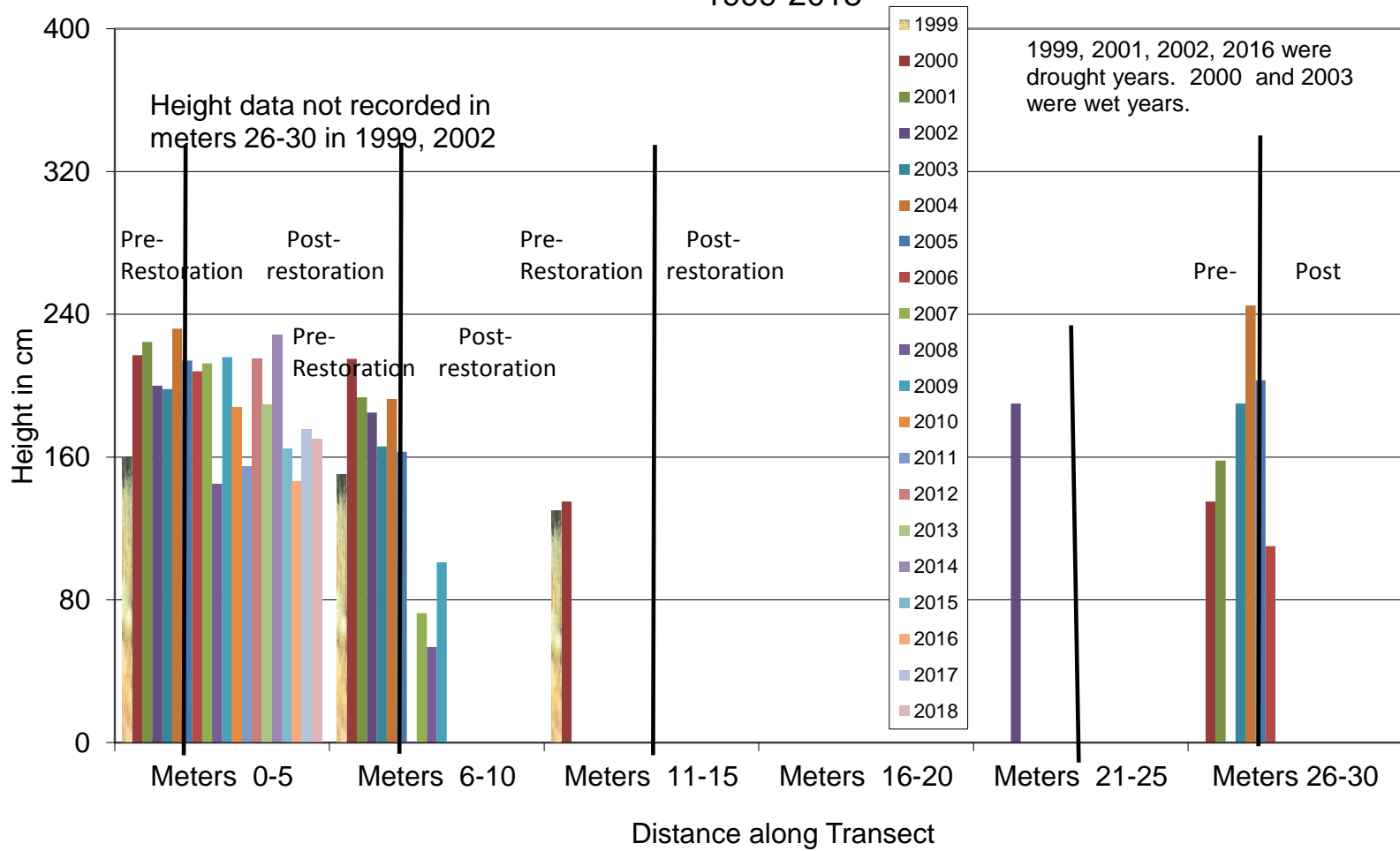
Average *Phragmites* Heights, Transect 0, Town Farm Rd., Ipswich, 1999-2018

Reference site:
Unrestricted
Downstream transect.

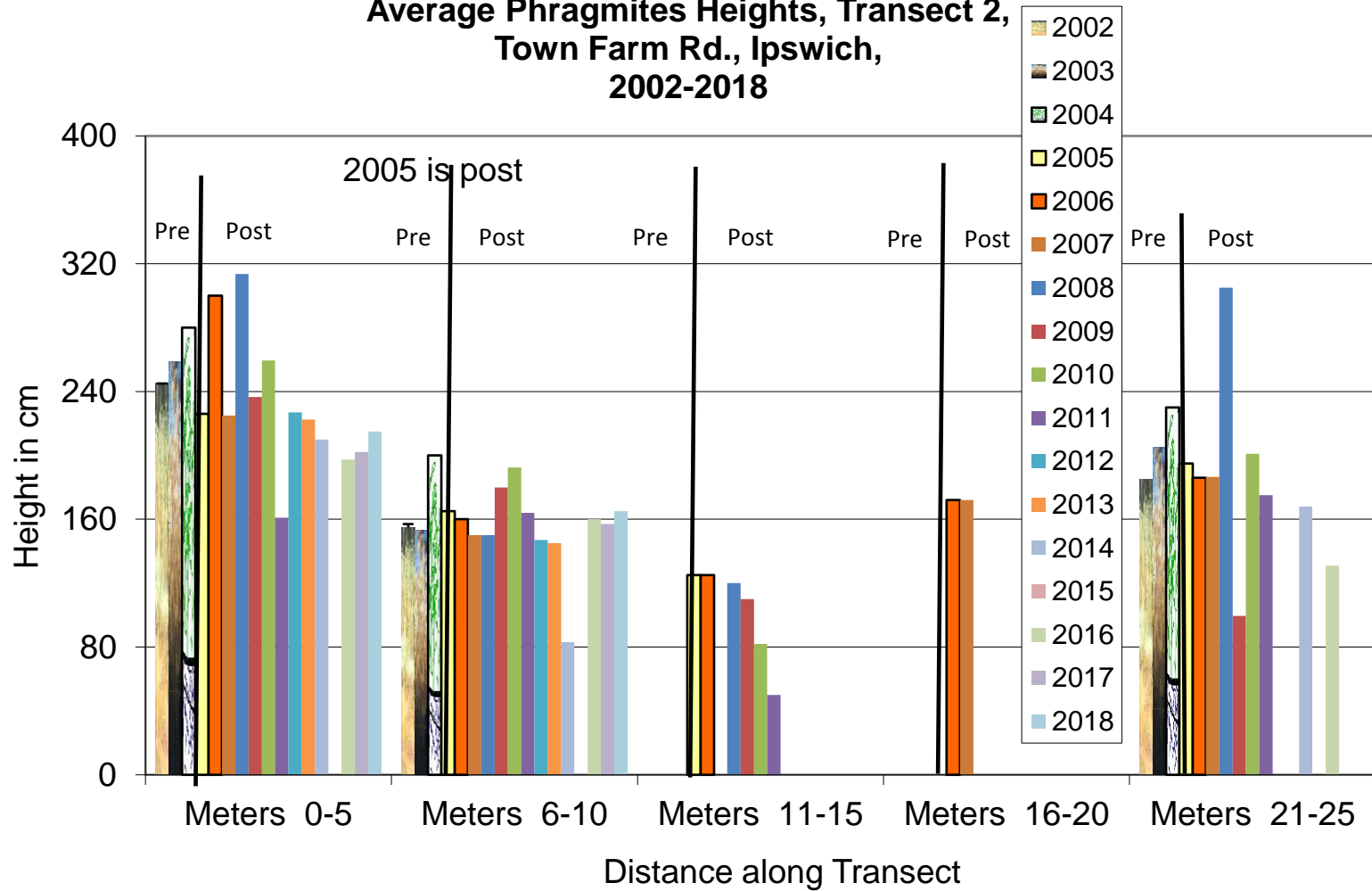
1999, 2001, 2002, 2016 were drought years. 2000 and 2003 were wet years. 2005 is high wrack year. Extensive floods in May in 2006.



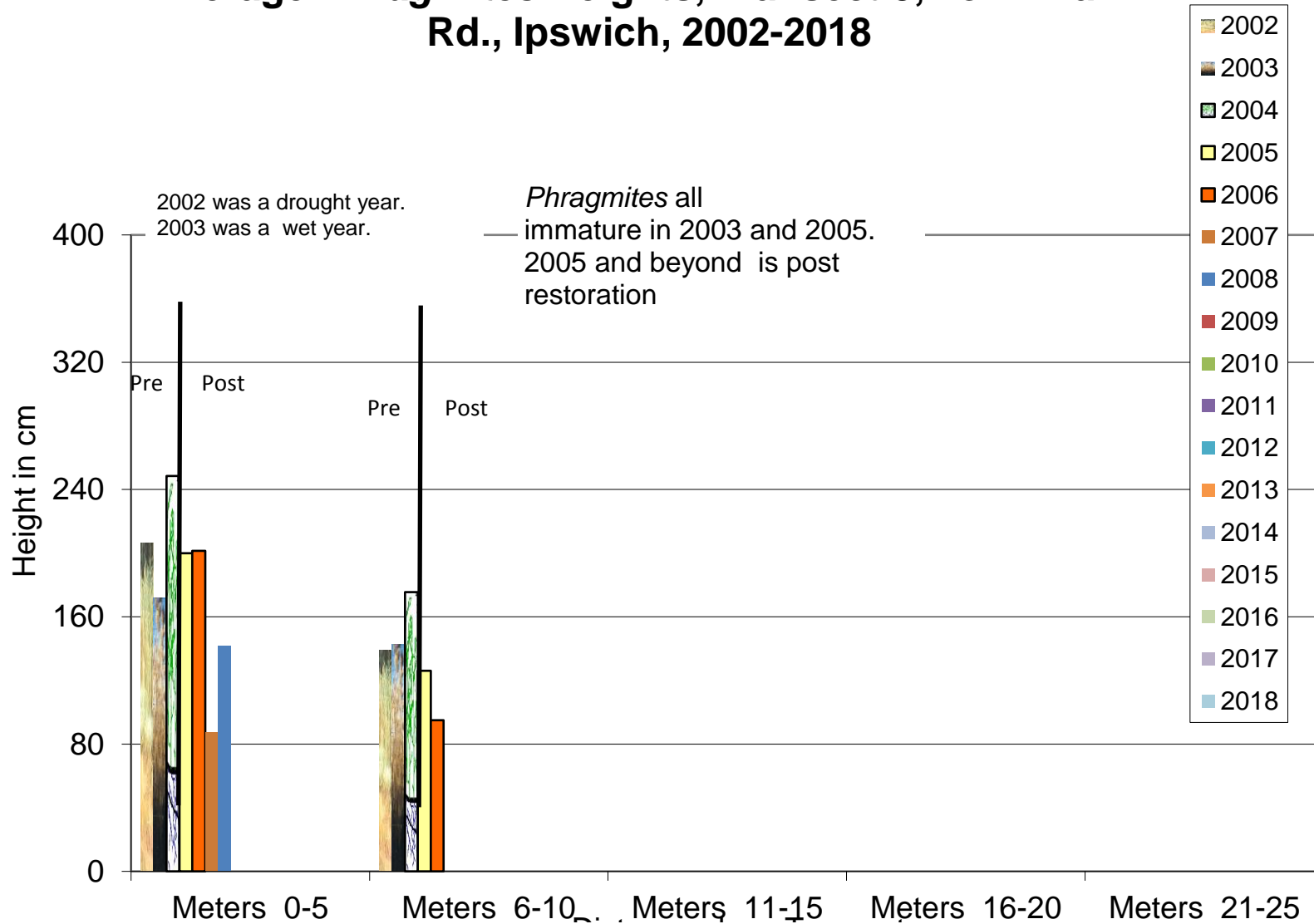
Average *Phragmites* Heights, Transect 1, Town Farm Rd., Ipswich, 1999-2018



Average Phragmites Heights, Transect 2, Town Farm Rd., Ipswich, 2002-2018

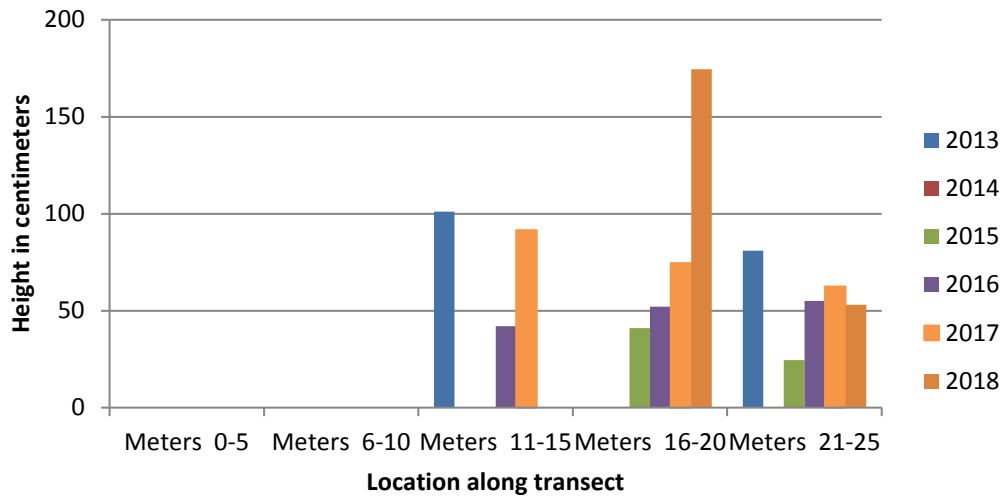


Average *Phragmites* Heights, Transect 3, Town Farm Rd., Ipswich, 2002-2018

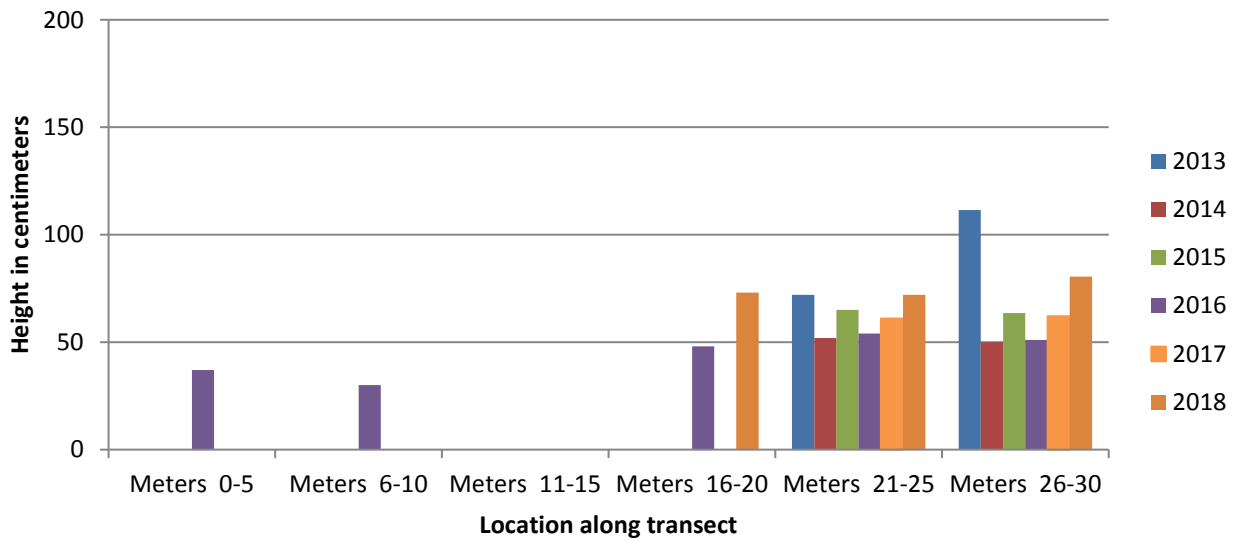


Distance along Transect

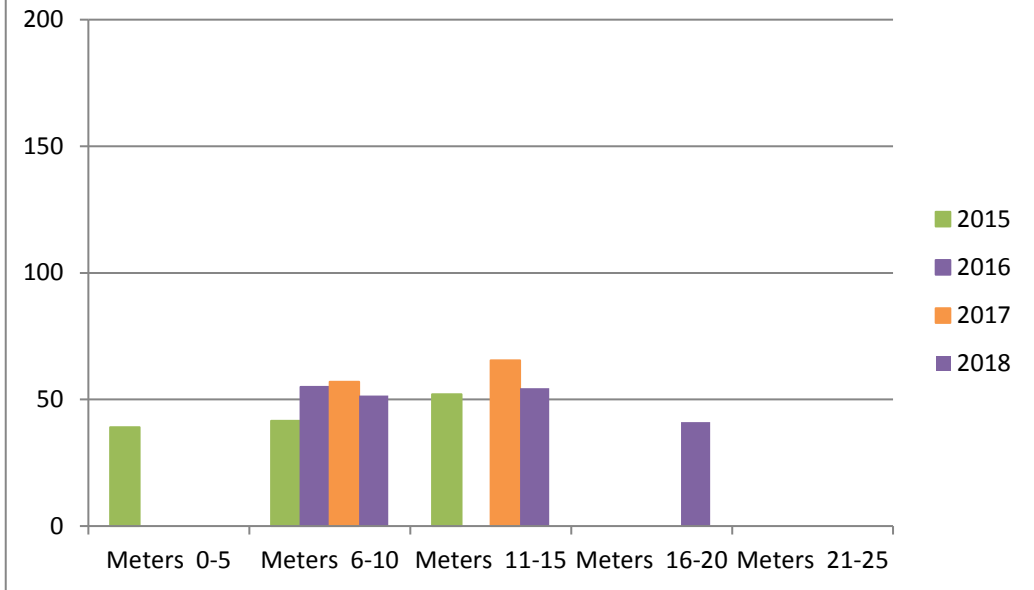
Cordgrass Heights Town Farm Road, Ipswich Transect 0



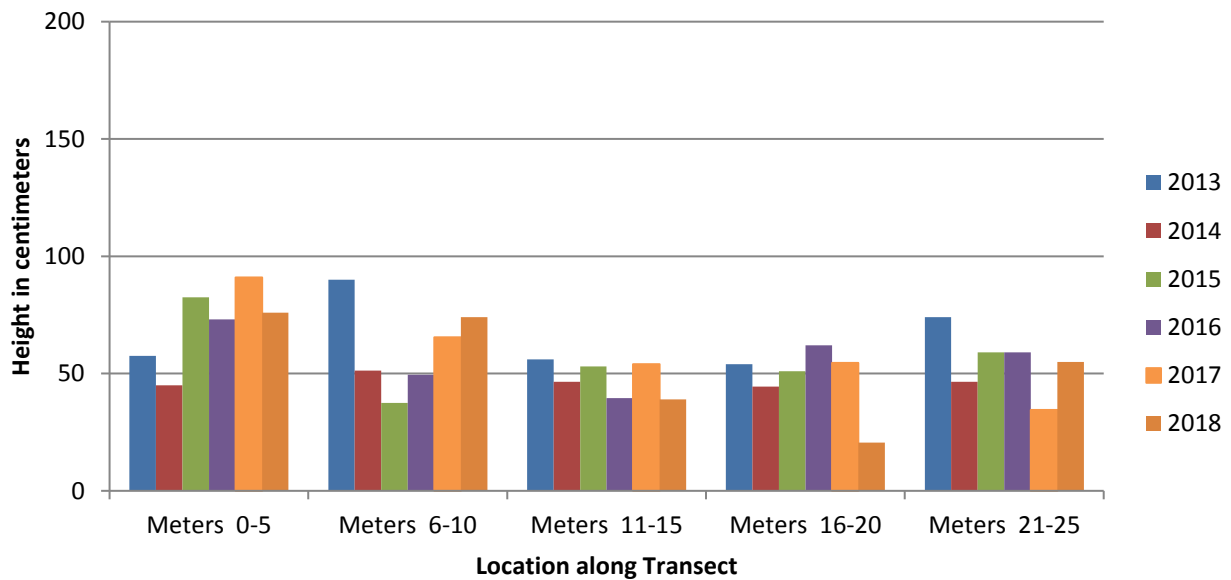
Cordgrass Heights Town Farm Road, Ipswich Transect 1



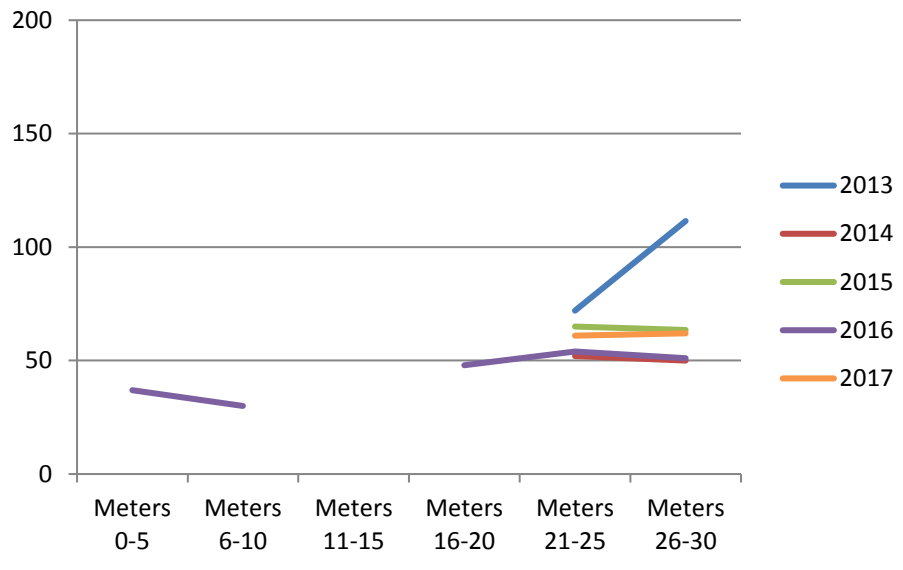
Cordgrass Heights Town Farm Road, Ipswich Transect 2



Cordgrass Heights Town Farm Road, Ipswich Transect 3




Cordgrass Heights Town Farm Road, Ipswich Transect 1



Mass Audubon Salt Marsh Science Project Transect 0 Town Farm Road Downstream Observers and dates
 Long Range Phragmites Study Reference 2003 Chmura & Students 2009 La France 2014 La France & HS
 Location: Ipswich, Town Farm Rd 1 METER SEGMENTS 2004 Chmura & Ips HS 2010 La France and Chmura & HS
Transect 0 S 2000 **Duff and Env. Sci. Class Ips. High** 2005 Chmura & Ips HS 2011 La France & HS 2015 La France & HS
 F 2000 Nancy, Greg and Ips High 06 Duff & HS 07 LaFrance 2012 La France & HS 2016 LaFrance
 2001 10/25/01, LD, ADR 2008 La France 2013 La France & HS 2017 LaFrance & HS
 2018 LaFrance & HS

SPECIES	Year	upland end																									marsh end	# of intervals present
		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 s	2000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6	
Phragmites australis f	2000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11	
	2001	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10	
	2002	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9	
	2003	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	8	
	2004	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11	
	2005	1	1	1	1	1	1	1	1	1	1	1	1	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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	
	2007	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10	
	2008	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	13	
	2009	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	13	
	2010	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	12	
	2011	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	13	
	2012	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	9	
	2013	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	11	
	2014	1	1	1	1	1	1	1	1	1	1	1	1	1	1	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	1	1	1	1	1	1	1	1	1	1	1	1	1	14	
	2016	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14	
	2017	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	13	
	2018	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	
Spikegrass s	2000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20	
Distichlis spicata f	2000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	
	2001	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17	
	2002																										0	
	2003		1	1	1	1	1	1																			5	
	2004			1	1	1	1																				4	
	2005											1	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	1	1	1	6	
	2007																					1	1	1	1	1	4	
	2008																										0	
	2009																										0	
	2010																					1	1	1	1	1	5	
	2011																										0	
	2012																										0	
	2013																										0	
	2014																						1				1	
	2015																										0	
	2016																					1	1	1	1	1	8	
	2017																										0	
	2018																										0	
Salt Marsh Hay s	2000																										10	
Spartina patens f	2000											1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15	
	2001							1	1	1													1	1	1	1	9	
	2002																						1	1	1	1	9	
	2003																										7	
	2004																										3	
	2005	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18	
	2006																										5	
	2007																										5	
	2008																										5	
	2009																										2	
	2010																										4	
	2011																										0	
	2012																										3	
	2013																										0	
	2014																										0	
	2015																										0	
	2016																										7	
	2017																										0	
	2018																										0	

 = 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	Total		
Glasswort <i>Salicornia europaea</i>	2000						1	1	1					1	1	1	1	1	1	1	1	1	1	1	1	1	15		
	2001																							1	1		2		
	2002																						1	1			2		
	2003																										0		
	2004											1											1	1	1	1	1	9	
	2005												1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	12	
	2006																									1	1	2	
	2007																						1	1	1	1	1	8	
	2008												1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	
	2009																											0	
	2010												1														1		
	2011																										0		
	2012																									1	1	2	
	2013	1	1				1					1				1	1									1	1	8	
	2014																											0	
	2015																											0	
	2016																											0	
	2017																											0	
	2018											1	1	1	1	1												5	
Marsh Elder <i>Tiva frutescens</i>	2004										1	1	1	1	1												5		
	2005																											0	
	2006	1				1	1	1	1																		5		
	2007																											0	
	2008																											0	
	2009																											0	
	2010																											0	
	2011				1	1	1																					3	
	2012																											0	
	2013																											0	
Mystery Leaf	2001	1	1	1	1	1																					5		
	2002																											0	
	2003																											0	
	2004																											0	
	2005																											0	
	2006																											0	
	2007																											0	
	2008																											0	
	2009																												0
	2010																												0
Mystery Plant	2008																											0	
	2009																											0	
	2010																											0	
	2011																											0	
	2012																											0	
	2013																											0	
	2014																											0	
	2015																											0	
	2016																												0
	2017																												0
2018																												0	
Sea Blite <i>Suaeda linearis</i>	2002																							1			1		
	2003																											0	
	2004											1	1															2	
	2005																											0	
	2006																											0	
	2007																											0	
	2008																											0	
	2009																											0	
	2010																											0	
	2011																											0	
Transect 0 TFR	2012																										0		
	2013	1	1				1				1				1	1										1	1	8	
	2014																											0	
	2015																											0	
	2016																											0	
	2017																											0	
	2018																											0	
	2019																											0	

upland end 1 METER SEGMENTS marsh end
 Transect 0 Town Farm Road Downstream

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	Total	
Marsh Elder <i>Iva frutescens</i>	2002																					1				1		
	2003																							1	1	1	3	
	2004											1															1	
	2005																						1	1	1	1	2	
Transect 2 TFR	2006																				1						1	
	2007																										0	
	2008																										0	
	2009																										0	
	2010																										0	
	2011																										0	
	2012																										0	
	2013																							1			1	
	2014																										0	
	2015																							1			1	
	2016																							1			1	
	2017																										0	
	2018																										0	
	Orach <i>Atriplex patula</i>	2002																										0
		2003																										0
2004																											0	
2005																							1				1	
2006													1	1	1	1	1	1	1	1	1	1					4	
2007												1	1	1	1	1	1	1	1	1	1	1					6	
2008																											2	
2009																											0	
2010																							1				1	
2011																											0	
Sea blite <i>Suaeda linearis</i>	2002																						1			1		
	2003																										0	
	2004																										0	
	2005																										0	
	2006																										0	
	2007																										0	
	2008																										0	
	2009																										0	
	2010																										0	
	Wrack	2009																				1		1	1	1	1	6
2010																						1		1	1	1	4	
2011																											0	
2012																											0	
2012																											0	
2013																							1				1	
2014																											0	
2015																											0	
2016																											0	
2017																											0	
Water	2014								100	100	100	100	50														5	
	2015								Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	0	
	2016								80	100	100	##	40	100													6	
	2017								Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	0	
	2018								Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	Not recorded	0	
Unknown	2013																						1			1		
	2014																									0		
	2015																									0		
Black Grass <i>Juncus gerardii</i>	2003										1	1	1	1	1	1	1	1	1	1	1					9		
	2003										1	1	1	1	1	1	1	1	1	1	1	1	1			10		
	2004										1	1	1													3		
	2005																					1	1	1		4		
	2006													1												0		
	2007																									0		
	2008																									0		
	2009																										0	
	2010																										0	

Transect 2 Town Farm Road Upstream

upland end

1 METER SEGMENTS

marsh end

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	2002	1	1	1	1	1	1	1	1	1	1															
<i>Phragmites australis</i>	2003	1	1	1	1	1	1	1	1	1	1															
05 is first post rest. yr.	2004	1	1	1	1	1	1	1	1	1	1															
	2005																									
	2006																									
	2007																									
	2008																									
	2009																									
	2010																									
	2011																									
	2012																									
	2013																									
	2014																									
	2015																									
	2016																									
	2017																									
	2018																									
Spikegrass	2002								1		1	1	1	1	1	1	1	1	1	1	1	1	1			
<i>Distichlis spicata</i>	2003								1		1	1	1		1	1		1	1	1	1	1				
	2004							1	1	1	1	1		1	1	1		1	1	1	1	1		1		
	2005						1	1	1	1	1	1	1	1	1	1		1	1	1	1	1				
	2006					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				
	2007			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				
	2008				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				
	2009				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				
	2010						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2011						1			1																
	2012																									
	2013						1		1	1	1		1	1			1									
	2014					1				1	1															
	2015										1															
	2016										1															
	2017		1	1		1				1	1	1														
	2018															1	1									
Seaside Goldenrod	2002																									
<i>Solidago sempervirens</i>	2003																									
	2004																								1	
	2005																									
	2006																									
	2007																									
	2008																									
	2009																									
	2010																									
	2011																									
	2012																									
	2013																									
	2014																									
	2015																									
	2016																									
	2017																									
	2018																									
Glasswort	2002				1	1		1		1	1	1		1	1		1	1	1	1		1		1	1	1
<i>Salicornia europaea</i>	2003									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2004									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2005									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2006									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2007				1	1	1		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2008	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2009			1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2010						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2011				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2012				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2013				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2014									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2015					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	2016																									
	2017																									
	2018	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

is immature

Saltmarsh Cordgrass <i>Spartina alterniflora</i>	2002														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	10																																											
	2003														1	1	1	1	1	1	1	1	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	1	1	1	1	1	12																																											
	2005														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	12																																											
	2006														1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	12																																											
	2007				1										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14																																											
	2008				1										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	13																																											
	2009				1										1	1	1	1	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	1	1	1	1	1	1	1	1	1	16																																											
	2011				1										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	13																																											
	2012				1										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	1	21																																											
	2014				1										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	22																																											
	2015				1										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	24																																											
	2016				1										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23																																											
	2017	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23																																											
	2018	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	22																																											
	Saltmarsh Hay <i>Spartina patens</i>	2002																																16																																										
2003																																		20																																										
2004																																		20																																										
2005																																		18																																										
2006																																		13																																										
2007																																		12																																										
2008																																		8																																										
2009																																		21																																										
2010																																		21																																										
2011																																		8																																										
2012																																		9																																										
2013																																		10																																										
2014																																		7																																										
2015																																		3																																										
2016																																		2																																										
2017																																		5																																										
2018																																		1																																										
Orach <i>Atriplex patula</i>		2006																																1																																										
	2007																																	0																																										
	2008																																	0																																										
	2009																																	0																																										
	2010																																	0																																										
	2011																																	0																																										
	2012																																	0																																										
	2013																																	0																																										
	2014																																	0																																										
	2015																																	0																																										
2016																																	0																																											
2017																																	0																																											
2018																																	0																																											
Black Grass <i>Juncus gerardii</i>	2002																																5																																											
	2003																																	5																																										
	2004																																	2																																										
	2005																																	0																																										
	2006																																	0																																										
	2007																																	0																																										
	2008																																	0																																										
	2009																																	1																																										
	2010																																	0																																										
	Bare Water	2010	100	100	100	80																												4																																										
2011		100	100	100	50	50			90		10	55	100																				11																																											
2012		100	100	100	50	50	30				25	70																						12																																										
2013		100	100	66							20	20																						9																																										
2014		100	100	100							30	60	10						30															14																																										
2015			100	95	45		10																											9																																										
2016		100	90										50																					5																																										
2017		75	50	30	10																													6																																										
2018		30									25	100	100	70	60																			14																																										
		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																								

Transect 3 Town Farm Road upstream