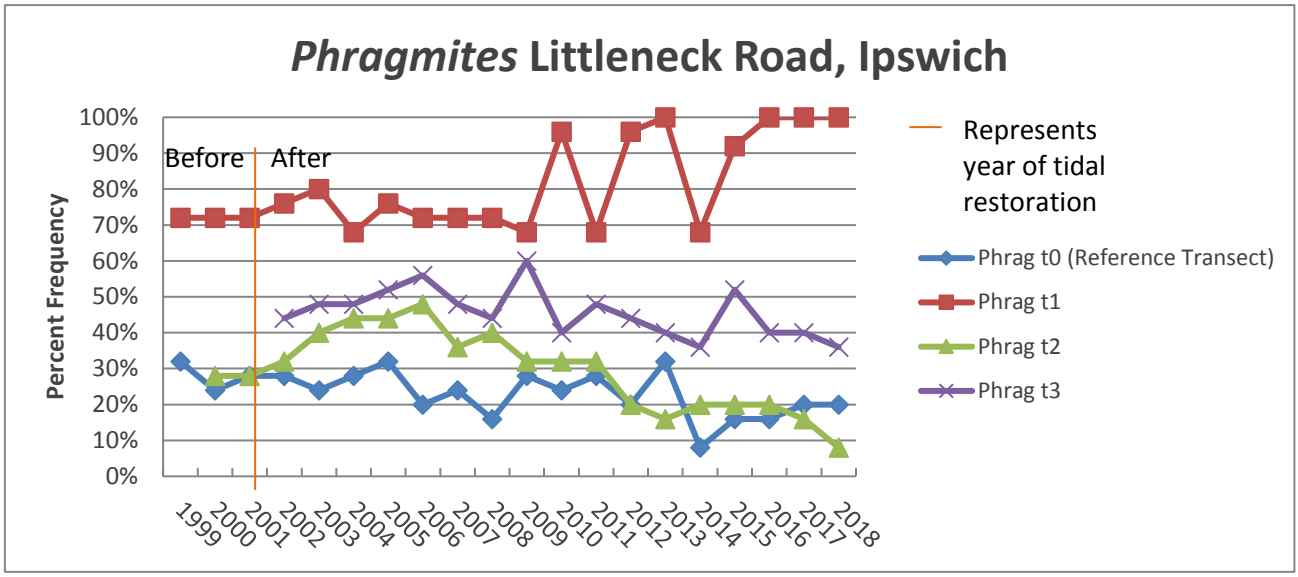
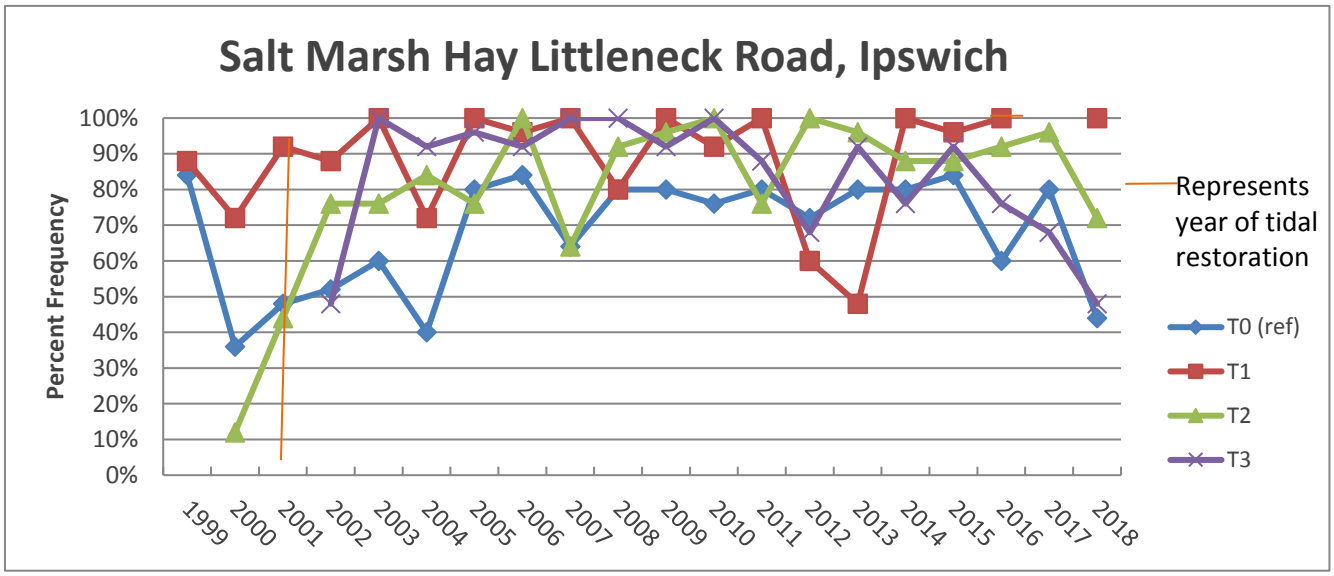
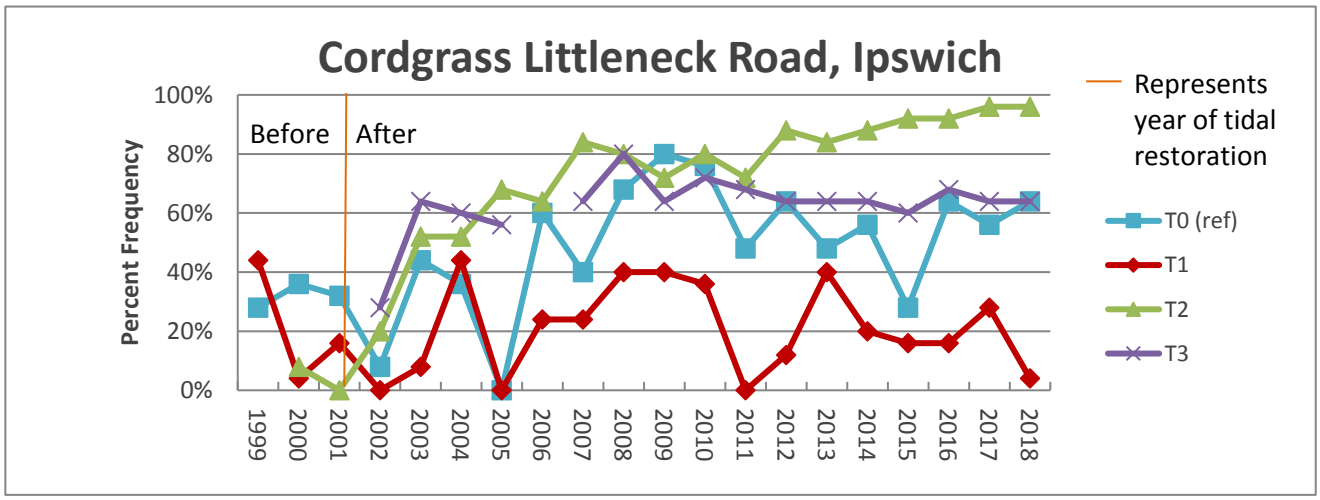
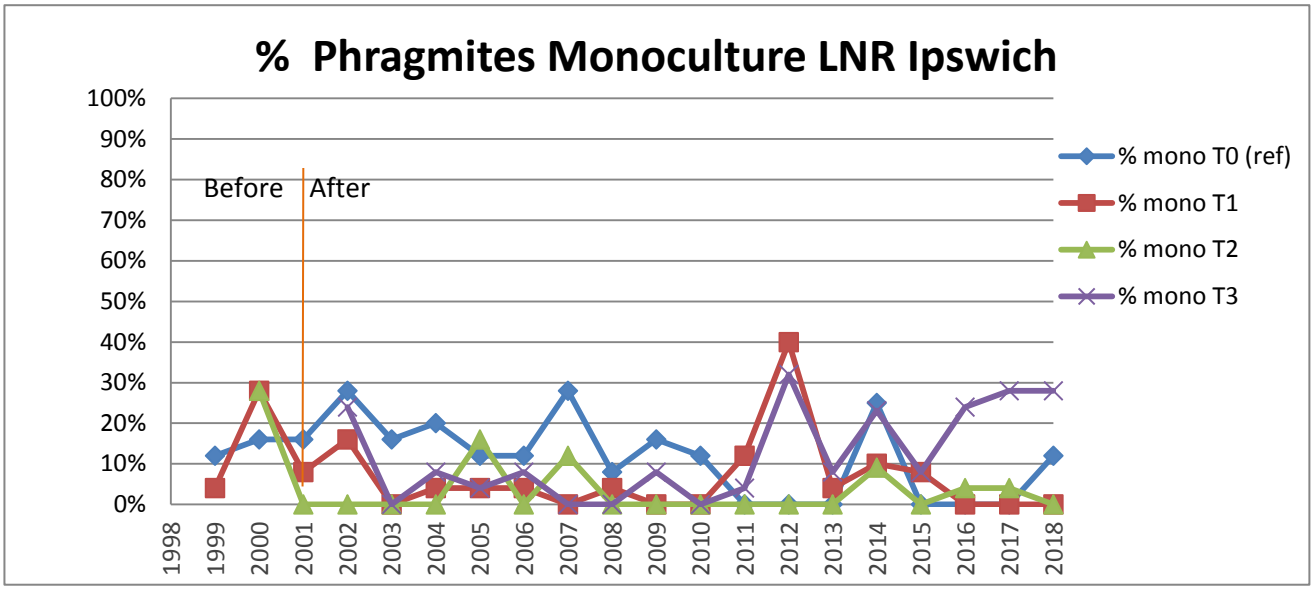
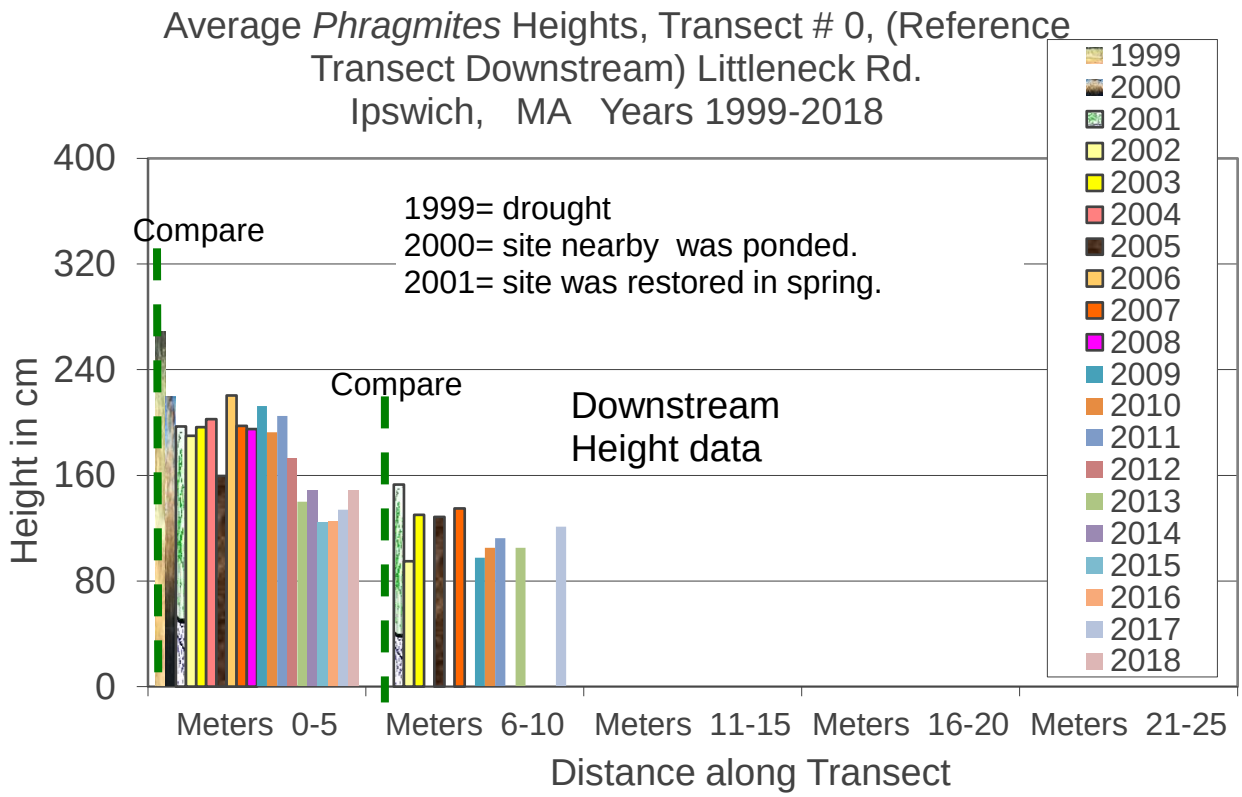
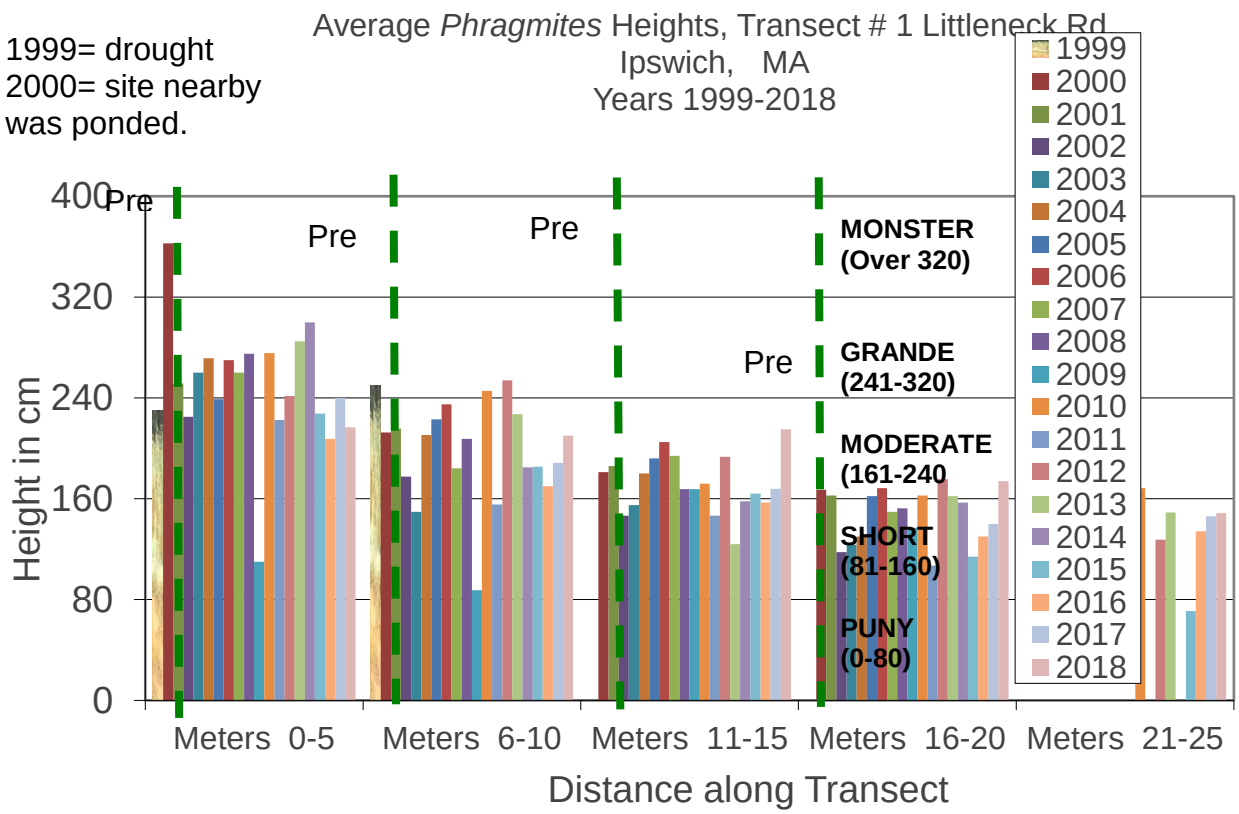

Phragmites Littleneck Road, Ipswich
Percent Frequency
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Before
After
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Represents year of tidal restoration
Phrag t0 (Reference Transect)
Phrag t1
Phrag t2
Phrag t3

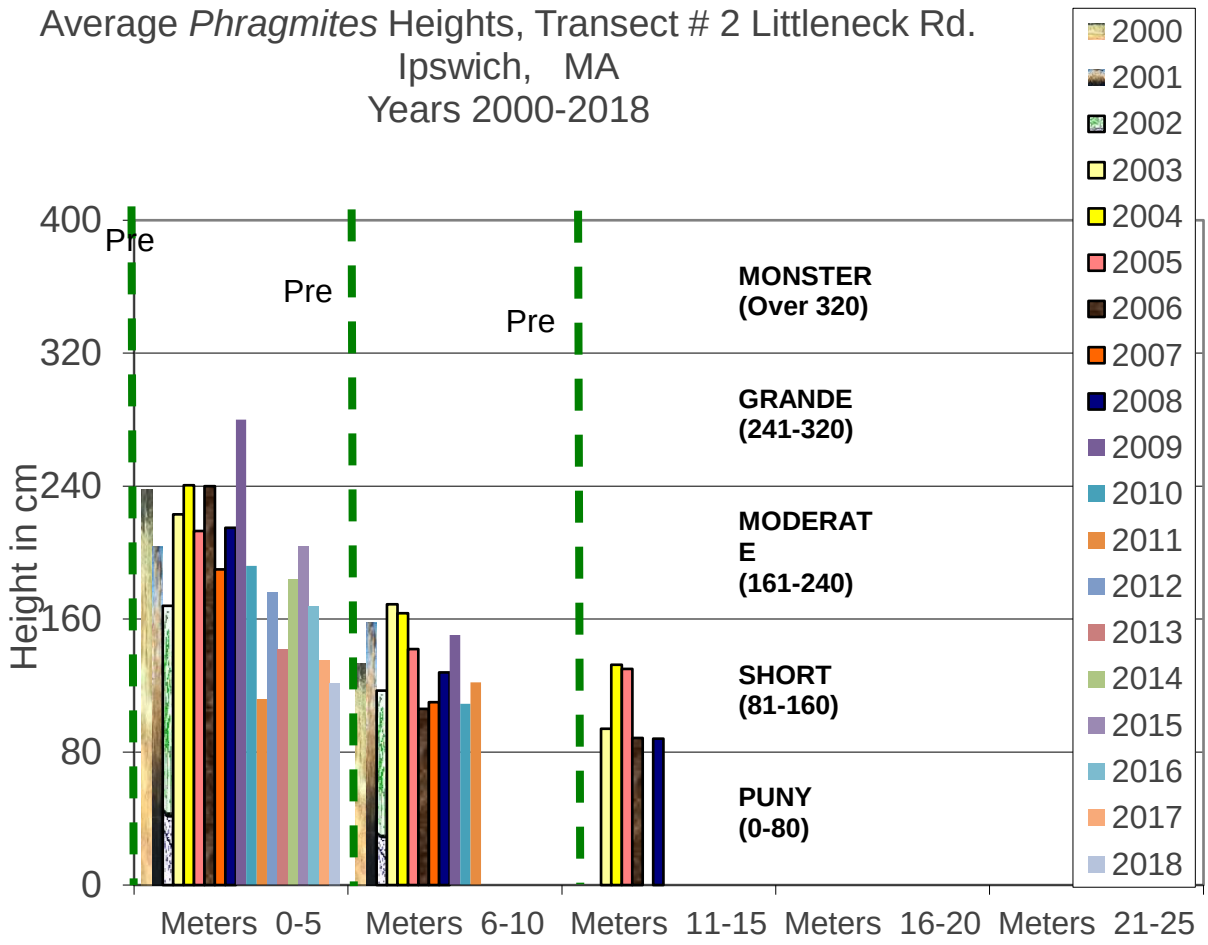

Salt Marsh Hay Littleneck Road, Ipswich
Percent Frequency
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Represents year of tidal restoration
T0 (ref)
T1
T2
T3

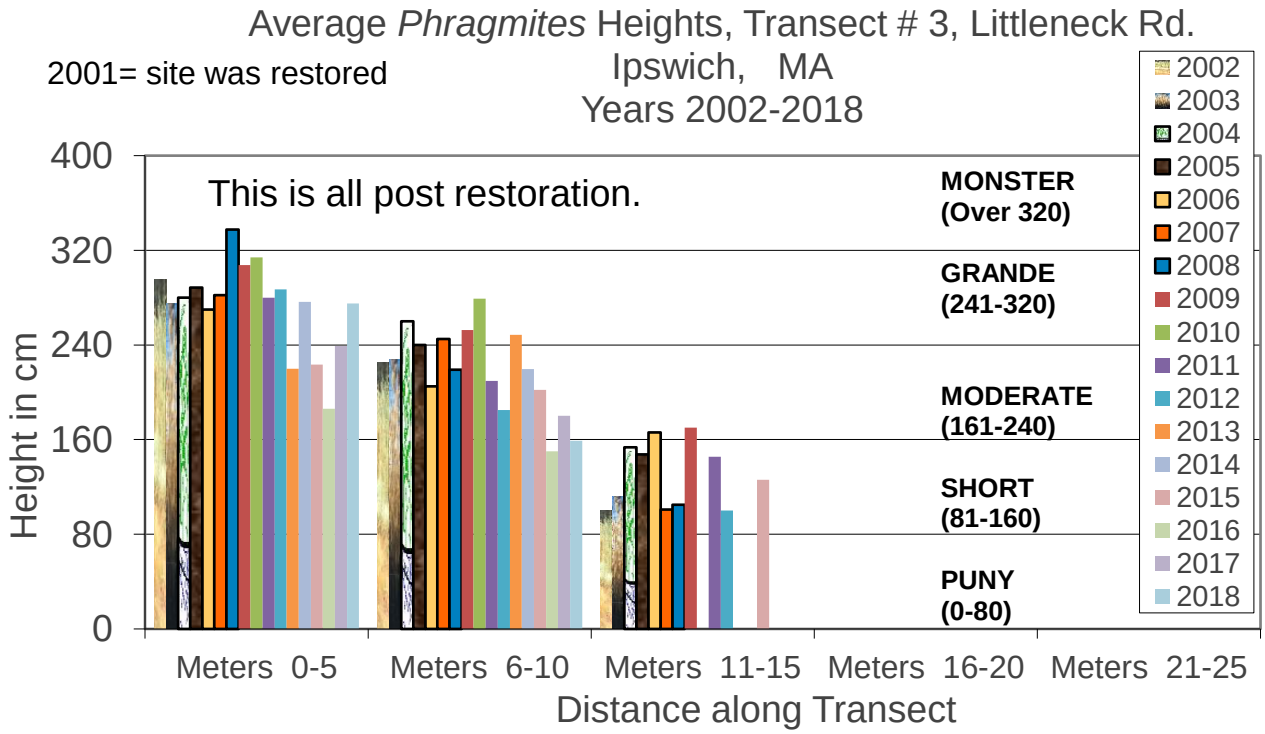

Cordgrass Littleneck Road, Ipswich
Percent Frequency
100%
80%
60%
40%
20%
0%
Before
After
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Represents year of tidal restoration
T0 (ref)
T1
T2
T3

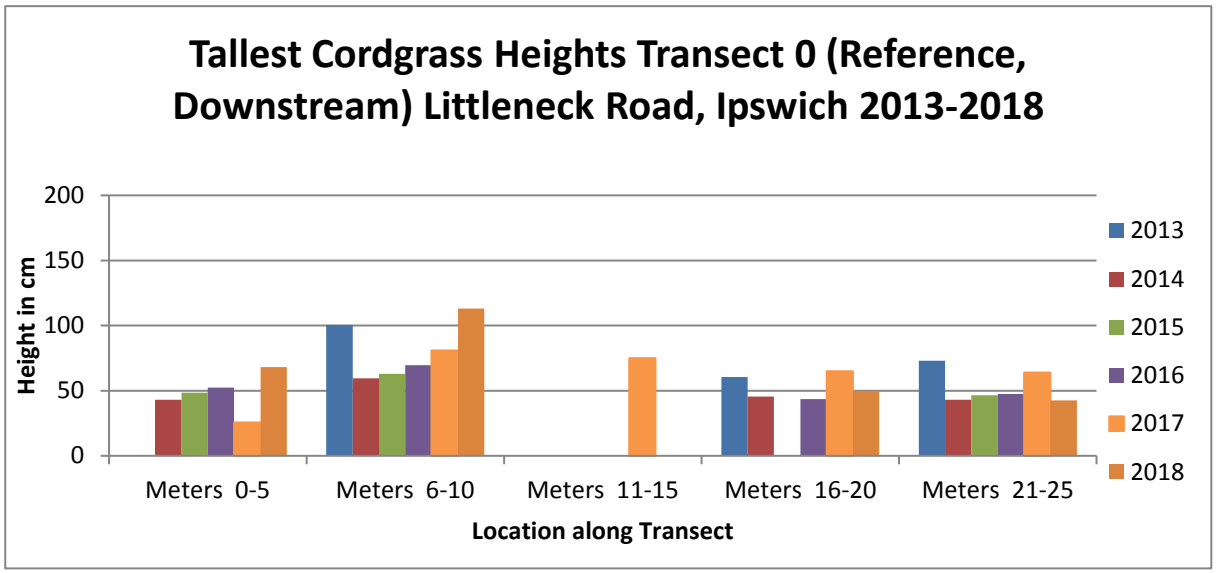

% Phragmites Monoculture LNR Ipswich
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Before
After
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
% mono T0 (ref)
% mono T1
% mono T2
% mono T3

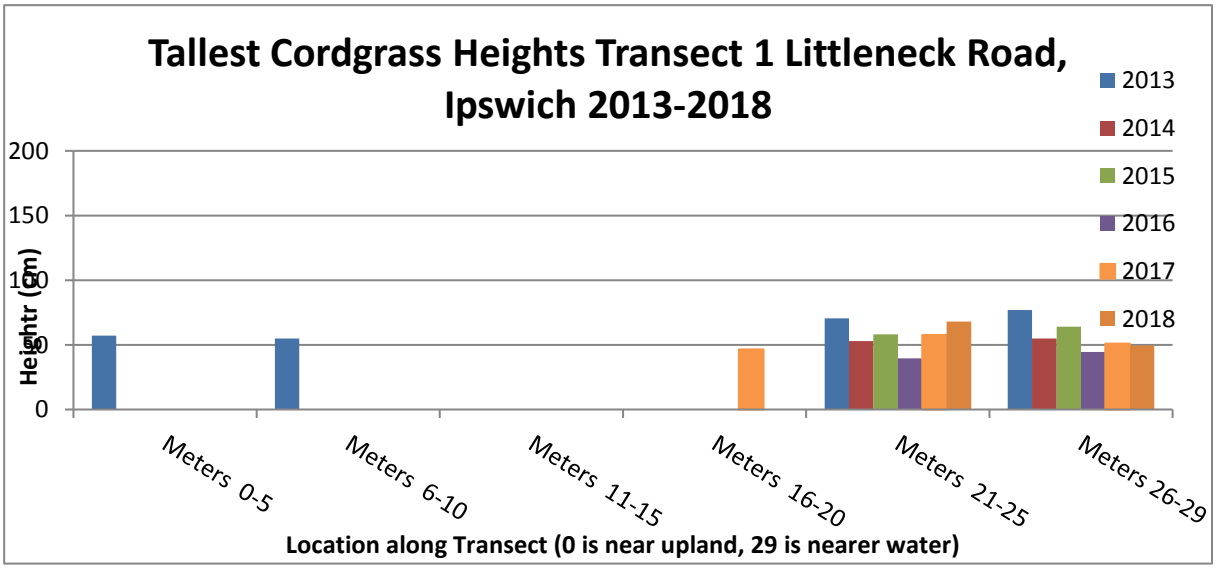

Average *Phragmites* Heights, Transect # 0, (Reference Transect Downstream) Littleneck Rd.
Ipswich, MA Years 1999-2018
1999= drought
2000= site nearby was ponded.
2001= site was restored in spring.
Compare
Compare
Downstream Height data
Height in cm
400
320
240
160
80
0
Meters 0-5
Meters 6-10
Meters 11-15
Meters 16-20
Meters 21-25
Distance along Transect
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

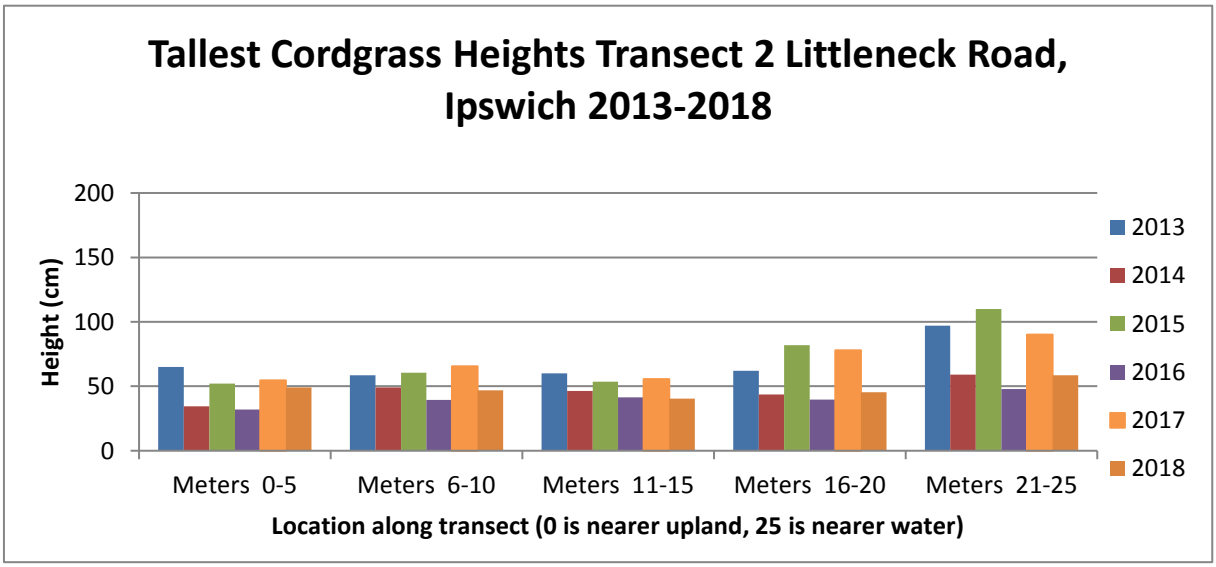

Average *Phragmites* Heights, Transect # 1 Littleneck Rd
Ipswich, MA
Years 1999-2018
1999= drought
2000= site nearby was ponded.
Pre
Pre
Pre
Pre
MONSTER (Over 320)
GRANDE (241-320)
MODERATE (161-240
SHORT (81-160)
PUNY (0-80)
Height in cm
400
320
240
160
80
0
Meters 0-5
Meters 6-10
Meters 11-15
Meters 16-20
Meters 21-25
Distance along Transect
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

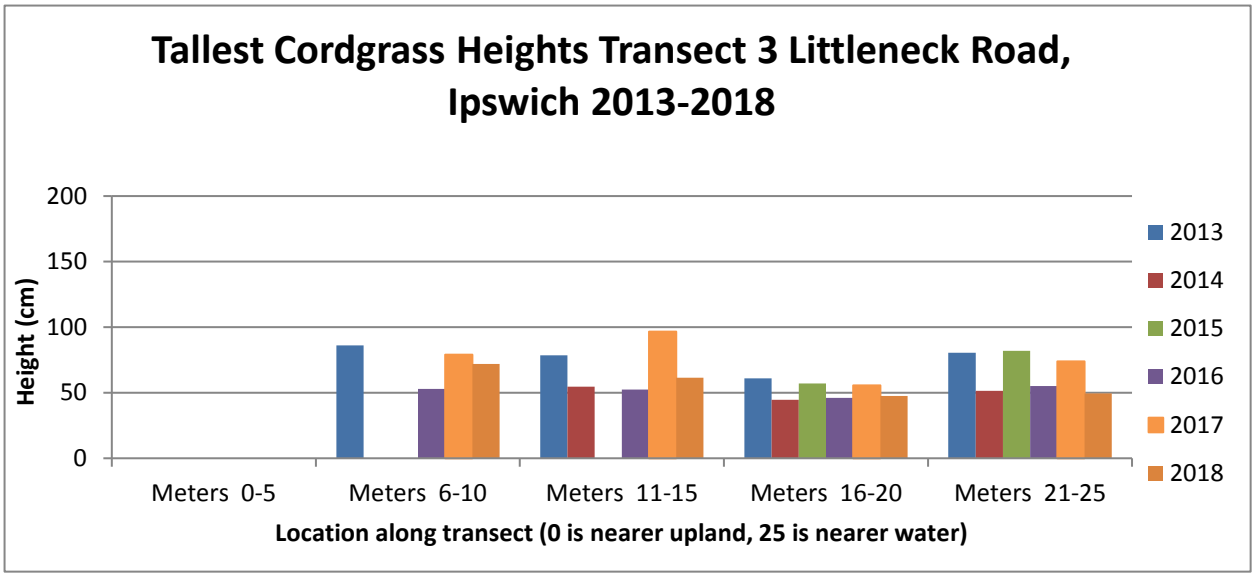

Average *Phragmites* Heights, Transect # 2 Littleneck Rd.
Ipswich, MA
Years 2000-2018
Pre
Pre
Pre
MONSTER
(Over 320)
GRANDE
(241-320)
MODERAT
E
(161-240)
SHORT
(81-160)
PUNY
(0-80)
Height in cm
400
320
240
160
80
0
Meters 0-5
Meters 6-10
Meters 11-15
Meters 16-20
Meters 21-25
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018


Average *Phragmites* Heights, Transect # 3, Littleneck Rd.
Ipswich, MA
Years 2002-2018
2001= site was restored
This is all post restoration.
MONSTER
(Over 320)
GRANDE
(241-320)
MODERATE
(161-240)
SHORT
(81-160)
PUNY
(0-80)
Height in cm
400
320
240
160
80
0
Meters 0-5
Meters 6-10
Meters 11-15
Meters 16-20
Meters 21-25
Distance along Transect
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018


Tallest Cordgrass Heights Transect 0 (Reference, Downstream) Littleneck Road, Ipswich 2013-2018
Height in cm
200
150
100
50
0
Meters 0-5
Meters 6-10
Meters 11-15
Meters 16-20
Meters 21-25
Location along Transect
2013
2014
2015
2016
2017
2018


Tallest Cordgrass Heights Transect 1 Littleneck Road, Ipswich 2013-2018
Heightr (cm)
200
150
100
50
0
Meters 0-5
Meters 6-10
Meters 11-15
Meters 16-20
Meters 21-25
Meters 26-29
Location along Transect (0 is near upland, 29 is nearer water)
2013
2014
2015
2016
2017
2018


Tallest Cordgrass Heights Transect 2 Littleneck Road, Ipswich 2013-2018
Height (cm)
200
150
100
50
0
Meters 0-5
Meters 6-10
Meters 11-15
Meters 16-20
Meters 21-25
Location along transect (0 is nearer upland, 25 is nearer water)
2013
2014
2015
2016
2017
2018


Tallest Cordgrass Heights Transect 3 Littleneck Road, Ipswich 2013-2018
Height (cm)
200
150
100
50
0
Meters 0-5
Meters 6-10
Meters 11-15
Meters 16-20
Meters 21-25
Location along transect (0 is nearer upland, 25 is nearer water)
2013
2014
2015
2016
2017
2018

Mass Audubon Salt Marsh Science Project

Transect 0: Downstream REFERENCE

Long Range Phragmites Study

Location: Ipswich, Littleneck Rd.
Wells 1 at 0m, Well 2 at 5m Well 3

Observers and dates

1999 2005 Chmura & students
2000 L. Duff 10/5/99 2006-2018 La France HS
2001 Nancy,G. Chmura 10/18/00
2002 Chmı LD, ADR, 10/25/01
2003 Duff, Magnuson, Chase, Romona M.
2004 Chmura and students 10/30

SPECIES

1 = immature

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	1999	1	1	1	1	1	1	1	1																		8
Phragmites australis	2000	1	1	1	1	1	1																				6
	2001	1	1	1	1	1	1	1																			7
	2002	1	1	1	1	1	1	1																			7
1 = immature	2003	1	1	1	1	1	1																				6
	2004	1	1	1	1	1	1	1																			7
	2005	1	1	1	1	1	1	1	1																		8
	2006	1	1	1	1	1																					5
	2007	1	1	1	1	1	1																				6
	2008	1	1	1	1																						4
	2009	1	1	1	1	1	1		1																		7
	2010	1	1	1	1	1	1																				6
	2011	1	1	1	1	1	1	1	1																		8
	2012	1	1	1	1	1																					5
	2013	1	1	1	1	1	1	1	1																		8
	2014	1	1																								2
	2015	1	1	1	1																						4
	2016	1	1	1	1																						4
	2017	1	1	1	1				1																		5
	2018	1	1	1	1	1																					5
Spikegrass	1999								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
Distichlis spicata	2000						1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
	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	18
	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	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	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
	2008																	1	1	1	1	1	1	1	1	1	9
	2009						1	1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
	2010									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
	2011						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
	2012						1	1	1			1	1						1	1	1	1	1	1	1	1	13
	2013									1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	16
	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	1	1	18
	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	1	1	1	21
	2018								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		17

Saltmarsh Hay	1999					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
na patens	2000							1	1	1	1	1	1	1	1	1											9
	2001							1	1		1	1	1	1	1	1	1	1	1	1							12
	2002								1	1	1	1	1	1	1	1	1	1	1	1	1						13
	2003						1	1	1	1	1	1	1	1	1	1	1	1			1				1	1	15
	2004										1	1	1	1	1	1	1	1					1	1			10
	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	16
	2008					1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
	2009						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
	2010						1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
	2011						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
	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	1	1	20
	2014					1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
	2015			1	1	1	1	1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
	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	1	1	1	21
	2018							1	1	1	1	1	1	1	1	1	1	1									11
Saltmarsh Cordgrass	1999					1	1	1	1	1		1	1														7
Spartina alterniflora	2000					1	1	1	1	1		1	1	1	1												9
	2001					1	1	1	1	1	1								1	1							8
	2002																1			1							2
	2003					1	1	1	1		1	1						1	1	1					1	1	11
Transect 0 LNR	2004					1			1	1	1						1	1	1	1				1			9
	2005																										0
	2006				1	1	1	1	1				1				1	1	1	1	1	1	1		1	1	15
	2007											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	17
	2009						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
	2010						1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
	2011						1	1	1	1	1						1				1	1	1	1	1	1	12
	2012								1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	2013									1	1						1	1	1	1	1	1	1	1	1	1	12
	2014			1		1	1	1			1							1	1	1	1	1	1	1	1	1	14
	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	16
	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	1	1	1	16
Marsh Elder	1999				1	1																					2
Iva frutescens	2000										1																1
	2001																										0
	2002																										0
	2003																										0
	2004					1	1						1	1				1	1	1		1		1	1		10
	2005				1	1																	1				3
	2006				1																				1		2
	2007												1			1			1	1					1		5
	2008			1	1	1		1										1			1	1		1	1	1	10
	2009					1	1													1		1			1		5
	2010				1	1													1	1	1						5
	2011	1	1	1	1	1	1																				6
	2012	1	1	1	1	1																					5
	2013	1	1	1	1	1																					5
	2014	1	1																								2
	2015	1	1	1	1																						4
	2016	1	1	1																							3
	2017	1	1	1																							3
	2018																										0

Orach	1999				1	1																			2
Atriplex patula	2000										1														1
	2001																								0
	2002																								0
	2003																								0
	2004													1	1		1	1							4
	2005																								0
	2006											1													1
	2007												1	1											2
	2008												1								1				2
	2009													1											1
	2010																								0
	2011																								0
	2012																								0
	2013																								0
	2014																								0
	2015																								0
	2016																								0
	2017				1																				1
	2018																								0
Black Grass	1999																								0
Juncus gerardii	2000																								0
	2001																								0
Transect 0 LNR	2002																								2
	2003											1													3
	2004																								0
	2005																								0
	2006																								9
	2007																								0
	2008																								0
	2009																								0
	2010																								0
	2011																								0
	2012																								0
	2013																								0
	2014						1																		1
	2015																								0
	2016																								0
	2017																								0
	2018																								0
Salicornia europaea	2000																								0
	2001																								0
	2002																								0
	2003																					1			1
	2004												1	1											2
	2005						1																		1
	2006																								0
	2007																								0
	2008																								0
	2009																	1	1						2
	2010																	1	1						2
	2011																								0
	2012																1	1							2
	2013										1		1	1	1			1	1	1	1	1		1	1	12
	2014																								0
	2015																							1	1	2
	2016																					1			1
	2017					1	1											1							3
	2018																								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	
Goldenrod	2006																			1							1
Solidago sempervirens	2007																										0
	2008							1									1										2
	2009																										0
	2010															1					1	1					3
	2011																										0
	2012																										0
	2013																										0
	2014																										0
	2015																										0
	2016																										0
	2017																										0
	2018																										0
Wrack	2011	1	1	1	1	1	1	1																			7
	2012						1	1																			2
	2013																										0
	2014			1																							1
	2015																										0
	2016				1									1	1			1	1								5
	2017																										0
	2018																										0
Sea Blite	1999																										0
Suaeda linearis	2000																										0
	2001																										0
	2002																										0
	2003																										0
	2004																1				1	1	1				4
	2005																										0
	2006																										0
	2007																										0
	2008																										0
	2009																										0
	2010																										0
	2011																										0
	2012																										0
	2013																										0
	2014																										0
	2015																										0
	2016																										0
	2017																										0

upland end — 1 METER SEGMENTS — marsh end

T0 downstream
Little Neck Road

Mass Audubon Salt Marsh Science Project
Long Range Phragmites Study
Location: Ipswich, Littleneck Rd.

This site was flooded because of a fallen in culvert spring 2000.
This transect was outside of the area that was killed by the flooding.
A new culvert was put in spring of 2001. 2001 is first year post restoration.

2018 Lafrance, HIS

Transect 1 Upstream Well 1= -1m, Well 2= 8 M, Well 25m

Rock ledge under peat

Observers and dates

1999	10/4/1995	2004 Chmura & HS Std.	2008 La France HS
2000	Liz, Ips High, 10/18/00	2005 Chmura &	2009 La France HS (Duff)
2001	LD, ADR 10/25/01	2006 La France HS	2010 La France (HS)
2002	Duff/Students	2007 Duff	2011 La France (HS)
##	Duff/Magnuson in April 2004 for Fall 2003		2012 La France

Blue= collapsed spring 2000
Green=restored spring 2001

2013 La France & HS
2014 La France & HS
2015 La France & HS
2016 Duff

LaFrance amd **# of interval** present in

SPECIES

= immature

1 METER SEGMENTS (upland end: 1–4; marsh end: 23–25)

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	26	27	28	29	30	# of intervals present in
Phragmites	1999	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1													18
Phragmites australis	2000	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1													18
	2001	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1													18
	2002	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1												19
= immature	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											17
	2005	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1											19
	2006	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1													18
	2007	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1													18
	2008	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1													18
	2009	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1													17
	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							24
	2011	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1														17
	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							24
	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	1	1	1	1	1	25
	2014		1	1	1	1	1	1	1	1	1	1		1		1	1	1	1	1	1											17
	2015	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1								22
	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							25
	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							25
	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							25
Seaside goldenrod	1999							1							1	1	1															4
Solidago sempervirens	2000																1															1
Upland species	2001	none recorded																														0
(>=1 plant/5 meters)	2002																															0
	2003																															0
	2004																															0
	2005							1			1	1	1																			4
	2006			1								1	1	1																		4
	2007	1	1																													2
	2008													1																		1
	2009						1																									1
	2010		1		1	1	1				1																					5
	2011	1		1	1	1	1																									5
	2012																															0
	2013			1	1		1	1	1																							5
	2014	1		1				1																								3
	2015				1	1	1																									3
	2016	1	1	1	1	1	1																									6
	2017		1	1	1																											3
	2018	1						1																								2
Spikegrass	1999																															0
Distichlis spicata	2000																				1	1	1	1	1	1						6
	2001	none recorded																														0
	2002																															0
	2003						1	1	1	1	1	1	1	1	1	1	1	1	1													13
	2004																															0
	2005																															0
	2006																															0
	2007																															0
	2008																															0
	2009																															0
	2010	1	1	1	1	1	1	1	1	1	1			1	1	1	1	1	1	1	1	1	1									20
	2011																															0
	2012											1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
	2013													1		1		1	1	1	1	1	1	1	1	1	1	1	1	1		11
	2014																															0
	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	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	25
	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	25
	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	25

Black grass	1999																1	1													2
Juncus gerardii	2000								1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1					17
	2001			1	1	1	1	1	1	1	1		1	1	1	1	1		1												14
	2002									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										16
	2004	1		1	1	1	1			1	1	1	1	1	1			1	1												13
	2005					1	1	1	1	1	1	1	1	1	1	1	1	1	1												14
	2006				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												18
	2008																														0
	2009		1	1	1	1	1	1	1	1	1	1	1	1	1	1							1		1						16
	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					24
	2011											1	1	1	1	1	1	1													7
	2012											1	1	1	1				1		1		1	1							8
	2013																														0
	2014						1	1	1	1	1	1																			6
	2015													1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	13
	2016		1	1																											2
	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	25
	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						24
Glasswort	1999							1	1	1	1	1	1	1	1			1	1	1	1	1	1	1							15
Salicornia europaea	2000																														0
	2001																			1	1										2
	2002																					1									1
	2003																				1	1									2
	2004								1			1	1									1									4
	2005																														0
	2006																														0
	2007												1									1	1								3
	2008																					1	1	1	1	1					5
	2009																														0
	2010											1	1					1								1					4
	2011																														0
	2012																				1	1	1	1	1						5
	2013																	1		1	1	1	1	1	1	1	1	1	1	1	8
	2014																														0
	2015																														0
	2016																													1	0
	2017								1					1		1					1	1	1	1	1	1	1	1	1	1	9
	2018																					1	1	1	1	1	1	1	1		5
Saltmarsh Hay	1999				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						22
Spartina patens	2000								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						18
	2001			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						23
	2002				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						22
Transect 1 LNR	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						25
	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	1	1	1	1	1	1	1	1					25
	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					24
	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					25
	2008	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						1	1	1	1	1					20
	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					25
	2010		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1					23
	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					25
	2012											1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
	2013	1	1	1	1	1	1	1	1	1					1	1	1														12
	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	1	1	1	1	25
	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	1	1	1	24
	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	1	1	1	1	25
	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	30
	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	25
Saltmarsh Cordgrass	1999														1	1	1	1	1	1	1	1	1	1	1						11
Spartina alterniflora	2000																			1											1
	2001															1	1	1	1												4
	2002																														0
	2003																	1	1												2
	2004					1	1	1	1							1		1	1	1		1	1	1							11
	2005																														0
	2006																1	1	1	1	1	1	1		1	1					6
	2007																1	1	1	1	1		1								6
	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					9
	2011																														0
	2012																							1	1	1	1	1	1	1	3
	2013		1	1	1	1	1															1	1	1	1	1	1	1	1		10
	2014																					1	1	1	1	1	1	1	1	1	5
	2015																						1	1	1	1	1	1	1	1	4
	2016																						1	1	1	1	1	1	1	1	4
	2017																									1	1	1	1	1	1
	2018																														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	26	27	28	29	30	
Marsh Elder	1999		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1													17
Iva frutescens	2000																															0
	2001					1		1	1	1	1	1	1	1																		8
	2002						1	1	1	1	1			1																		6
	2003																															0
	2004								1																							1
	2005												1																			1
	2006													1			1															2
	2007		1				1						1	1																		4
	2008												1																			1
	2009							1		1				1	1																	4
	2010		1	1	1	1	1	1	1															1	1	1						10
	2011																															0
	2012														1				1	1	1	1										5
	2013						1	1	1																							3
	2014																															0
	2015																															0
	2016																															0
	2017	1																														1
	2018																									1	1	1	1	1	1	1
Sea Lavender	1999																						1									1
Limonium nashii	2000																															0
	2001																															0
Transect 1 LNR	2002																															0
	2003																															0
	2004																															0
	2005																															0
	2006																															0
	2007																															0
	2008																															0
	2009																															0
	2010																															0
Orach	1999																															0
Atriplex patula	2000																															0
	2001								1	1		1																				3
	2002																							1								1
	2003																															0
	2004			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																		12
	2006																															0
	2007		1		1		1	1	1	1		1	1	1																		9
	2008													1	1																	2
	2009															1																1
	2010			1		1		1	1	1																						5
	2011																															0
	2012																															0
	2013																															0
	2014																															0
	2015																															0
	2016				1	1	1	1	1	1	1	1	1																			9
	2017																															0
	2018																															0
Sea Milkwort	2012												1																			1
Glaux maritima	2013												1		1	1	1															4
	2014																															0
	2015																															0
	2016																															0
	2017																															0
	2018																															0
Aster	1999																															0
Aster sp?	2000																															0
	2001									1																						1
	2002																															0
	2003																															0
	2004																															0
	2005																															0
	2006																															0
	2007																															0
	2008																															0
	2009																															0
	2010																															0
Mystery Leaf	1999																															0
sp?	2000																															0
	2001					1																										1
	2002																															0
	2003																															0
Wrack	2012																															0
	2013											1	1	1	1	1	1	1														7
	2014																															0
	2015																															0
	2016																															0
	2017																															0
	2018																															0

upland end — 1 METER SEGMENTS — marsh

Location: Ipswich, Little Neck Rd.

Transect 1 Upstream

Mass Audubon Salt Marsh Science Project
Long Range Phragmites Study
Location: Ipswich Littleneck Road
Rock ledge under peat

This site was flooded during the spring of 2000 due to a collapsed culvert.
Much of the vegetation was killed as a result.

Transect 2 - Upstream

Observers and dates

2000	Duff, Ips High 10/18/00	###	Duff/Magnuson collected 4/9/04	2015 Duff/HS
2001	LD, ADR, 10/25/01	2004-2013	Duff, Ips High	2016 Duff
2002	Duff/Students	2014	Duff, Ips High	2017 Duff and Ips High
				2018 Duff & HIS

01 note:Between M 11-25 whispy unid. grasses may have been from last year-unable to ID, too late in season?

SPECIES

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	2000	1	1	1	1	1	1	1																			7
Phragmites australis	2001	1	1	1	1	1	1	1																			7
	2002	1	1	1	1	1	1	1	1																		8
	2003	1	1	1	1	1	1	1	1		1	1															10
= immature	2004	1	1	1	1	1	1	1	1	1	1	1															11
	2005	1	1	1	1	1	1	1	1	1	1	1															11
	2006	1	1	1	1	1	1	1	1	1	1	1	1														12
	2007	1	1	1	1	1	1	1	1		1																9
	2008	1	1	1	1	1	1	1	1	1		1															10
	2009	1	1	1	1	1	1	1	1																		8
	2010	1	1	1	1	1	1	1	1																		8
	2011	1	1	1	1	1	1	1																			7
	2012	1	1	1	1	1																					5
	2013	1	1	1	1	1																					5
	2014	1	1	1	1	1																					5
	2015	1	1	1	1	1																					5
	2016	1	1	1	1	1																					5
	2017	1	1	1	1																						4
	2018		1	1																							2
Spikegrass	2000																			1							1
Distichlis spicata	2001	1	1	1	1	1	1	1																			7
	2002	1	1	1	1	1	1											1									7
	2003		1	1	1	1	1	1	1	1	1	1															10
	2004							1	1	1	1	1	1														6
	2005																										0
	2006	1	1	1	1	1	1	1	1	1	1																10
	2007			1	1	1																					3
	2008	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1			22
	2009	1	1	1							1																4
	2010																										0
	2011			1	1			1	1																1	1	6
	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	25
	2013	1	1	1	1	1	1			1	1	1															9
	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															11
	2016		1	1	1	1	1	1	1	1	1	1	1														11
	2017		1	1	1	1	1	1	1																		7
	2018		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						19
Black grass	2000								1	1																	2
Juncus gerardii	2001																										0
	2002			1	1																						2
	2003				1				1		1																3
	2004				1	1	1	1		1	1																6
	2005																										0
	2006					1																					1
	2007																										0
	2008																										0
	2009																										0
	2010	1	1																								2
	2011																										0
	2012																										0
	2013													1		1											2
	2014																										0
	2015																										0
	2016																										0
	2017																										0
	2018																										0
DEAD GRASS	2000									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
"algae, flattened grass"	2001								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
	2002																										0
	2003																										0
	2004																										0
	2005																										0
Muck	2003														1	1		1	1	1	1	1	1	1	1	1	11
	2004																				1	1					2
	2005																					1	0.2	0.4			3
	2006																										0
	2007																										0
	2008																										0
	2009																										0
	2010																										0
	2011														##												1
	2012																			20	20				15	15	4
	2013																										0
	2014																			30							1
	2015																			10	5	10					3
	2016																										0
	2017																										0
	2018																										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 Hay	2000								1	1		1															3
Spartina patens	2001		1	1	1	1	1	1	1	1	1	1	1														11
	2002							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
	2003	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							19
	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		19
Transect 2 LNR	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	25
	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	1	1	1			1	1	1	1	1	23
	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	24
	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	25
	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	1	1	1	1	1	1	1	25
	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	24
	2014				1	1	1	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	1	1	1	22
	2016			1	1	1	1	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	24
	2018		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							1	18
Glasswort	2002							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
Salicornia europaea	2003												1	1	1	1	1	1	1	1	1	1	1	1	1	1	14
	2004											1	1	1	1	1	1	1	1	1			1	1	1	1	13
	2005													1	1	1	1	1		1			1				7
	2006																										0
	2007																										0
	2008																					1			1		2
	2009										1																1
	2010												1			1											2
	2011																										0
	2012									1		1	1	1			1	1	1			1	1	1			10
	2013																										0
	2014										1		1														2
	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	1	1			19
	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	17
Saltmarsh Cordgrass	2000										1	1															2
Spartina alterniflora	2001	none recorded (could be in with dead, flattened grass & algae)																									0
	2002										1	1				1					1					1	5
	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	1	1	13
	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	1	1	1	1	1						16
	2007					1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	21
	2008				1	1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
	2009								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	18
	2010						1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
	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	1	1	1	1	22
	2013					1	1	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	1	1	1	22
	2015			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23
	2016			1	1	1	1	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	24
	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	24
Saltmarsh Bulrush	2006																	1									1
Scirpus robustus	2007																										0
Marsh Elder	2003																								1	1	2
Iva frutescens	2004																										0
	2005																										0
	2006																										0
	2007																										0
	2008																										0
	2009																										0
	2010																										0
Orach	2003																										0
Atriplex patula	2004								1		1							1									3
	2005																										0
	2006																										0
	2007						1																				1
	2008																										0
	2009										1																1
	2010																										0
Wrack	2014		1																								1
	2015																										0
	2016																										0
	2017																										0

upland end — 1 METER SEGMENTS — marsh end

Ipswich Little Neck Rd. Transect 2- Upstream

Mass Audubon Salt Marsh Science Project
Long Range Phragmites Study
Location: Ipswich Littleneck Road
Rock ledge under peat

This site was flooded during the spring of 2000 due to a collapsed culvert.
Much of the vegetation was killed as a result.
Transect 3

Observers and dates

2000	Duff, Ips High 10/18/00	2003	Duff, Magnuson (data collected 4/8/04)	2014 Mac	2017 Duff and Ips High
2001	LD, ADR, 10/25/01	2005 Duff and HS students		2015 Duff/HS	2018 Duff and HIS
2002	Duff,Chmura, students	2006-2013 Duff HS		2016 Duff	

01 note:Between M 11-25 whispy unid. grasses may have been from last year-unable to ID, too late in season?

All Post Restoration Site Restored in 2001

SPECIES

1 METER SEGMENTS (upland end: 1–2; marsh end: 23–25)

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	2002	1	1	1	1	1	1	1	1	1	1	1															11
Phragmites australis	2003	1	1	1	1	1	1	1	1	1	1	1	1														12
	2004	1	1	1	1	1	1	1	1	1	1	1	1														12
1 = immature	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	1	1	1												14
	2007	1	1	1	1	1	1	1	1	1	1	1		1													12
	2008	1	1	1	1	1	1	1	1	1		1		1													11
	2009	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											15
	2010	1	1	1	1	1	1	1	1	1	1																10
	2011	1	1	1	1	1	1	1	1	1	1	1	1														12
	2012	1	1	1	1	1	1	1	1	1	1	1															11
	2013	1	1	1	1	1	1	1	1	1	1																10
	2014	1	1	1	1	1	1	1	1	1																	9
	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																10
	2017	1	1	1	1	1	1	1	1	1	1																10
	2018	1	1	1	1	1	1	1	1	1																	9
Spikegrass	2002																		1	1	1	1	1	1	1	1	8
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	9
	2005								1	1	1	1							1	1	1	1	1	1	1	1	12
	2006								1	1	1																3
	2007								1	1	1											1	1	1	1	1	8
	2008										1	1						1		1	1	1	1	1	1	1	10
	2009									1					1								1	1	1	1	6
	2010								1	1	1	1	1							1		1	1	1	1	1	11
	2011								1	1	1	1	1	1							1	1	1	1			10
	2012									1	1	1			1	1											5
	2013								1	1	1																3
	2014							1	1	1	1	1	1														6
	2015								1	1	1		1														4
	2016								1	1	1	1								1	1	1	1	1	1	1	11
	2017																		1			1					2
	2018								1	1		1	1				1			1	1	1	1	1	1	1	12
Black grass	2002																			1	1	1	1	1	1	1	7
Juncus gerardii	2003																						1	1	1	1	4
	2004		1	1	1	1	1														1					1	7
	2005																				1	1	1	1	1	1	6
	2006																1		1			1	1				4
	2007																							1	1	1	3
	2008																										0
	2009																										0
	2010																										0
	2011																										0
	2012																										0
	2013																										0
	2014																										0
	2015																										0
	2016																										0
	2017																										0
	2018																										0
Saltmarsh Hay	2002							1	1	1	1	1	1	1	1	1	1	1	1								12
Spartina patens	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	25
	2004	1	1	1	1	1	1			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23
	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	24
	2006			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23
	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	25
	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	25
	2009			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23
	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	25
	2011			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	22
	2012									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
	2013			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23
	2014							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
	2015			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23
	2016							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	19
	2017									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
	2018													1	1	1		1	1	1	1	1	1	1	1	1	12

		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	13
Salicornia europaea	2003															1	1	1									3
	2004												1	1		1	1		1			1					6
	2005																										0
	2006																										0
	2007																			1		1					2
	2008																		1	1							2
	2009																				1	1					2
	2010												1		1						1	1					4
	2011																										0
	2012																		1	1	1						3
	2013												1				1	1	1	1	1	1	1	1	1	1	11
	2014													1													1
	2015															1				1	1	1	1				5
	2016															1		1	1	1	1	1	1	1	1	1	10
	2017											1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
	2018										1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	15
Marsh Elder	2002																										0
Iva frutescens	2003																										0
	2004																1		1								2
	2005																										0
	2006																										0
Transect 3 LNR	2007																					1					1
	2008																										0
	2009																			1							1
	2010																										0
	2011																										0
	2012												1														1
	2013																										0
	2014																										0
	2015																										0
	2016																										0
	2017																										0
Scirpus americanus	2003																										0
	2004																										0
	2005																1										1
	2006																										0
	2007																										0
	2008																										0
	2009																										0
	2010																										0
Saltmarsh Bulrush	2006																1										1
Scirpus robustus	2007																										0
	2008																										0
	2009																										0
	2010																										0
Orach	2002																										0
Atriplex patula	2003																										0
	2004					1								1													2
	2005																										0
	2006																										0
	2007					1	1																				2
	2008		1		1	1			1																		4
	2009																										0
	2010																										0
Saltmarsh Cordgrass	2002																		1		1	1	1	1	1	1	7
Spartina alterniflora	2003										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	2004											1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	15
	2005											1	1	1	1		1	1	1	1	1	1	1	1	1	1	14
	2006										Not recorded																0
	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	1	1	1	1	1	20
	2009										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	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	17
	2012										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	2013										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	2014										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16
	2015															1	1	1	1	1	1	1	1	1	1	1	11
	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	16
	2018										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	16

Transect 3 LNR

upland end — 1 METER SEGMENTS — marsh end