Why Dredge at Flax Pond?

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Goal

- Improve pond drainage by dredging inlet

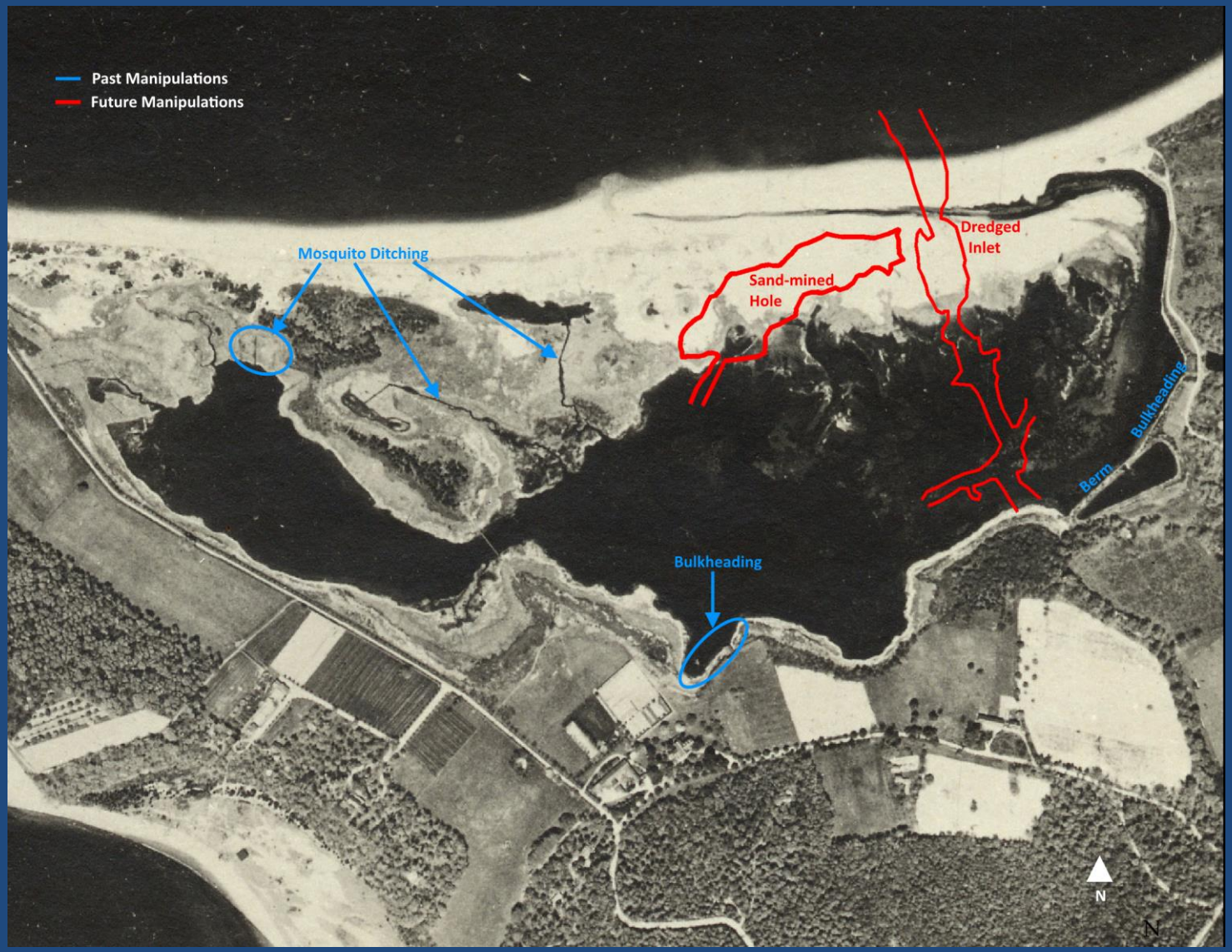
2016 and 2017 Objectives

- Obtain dredging permits from Town, County, State, Corps of Engineers
- Dredge in Fall 2017
- Increase tidal range
- Increase tidal prism hence flushing

Suffolk County

Committed to:

- collect and analyze sediment samples
- dredge (depending on permits) in Fall 2017

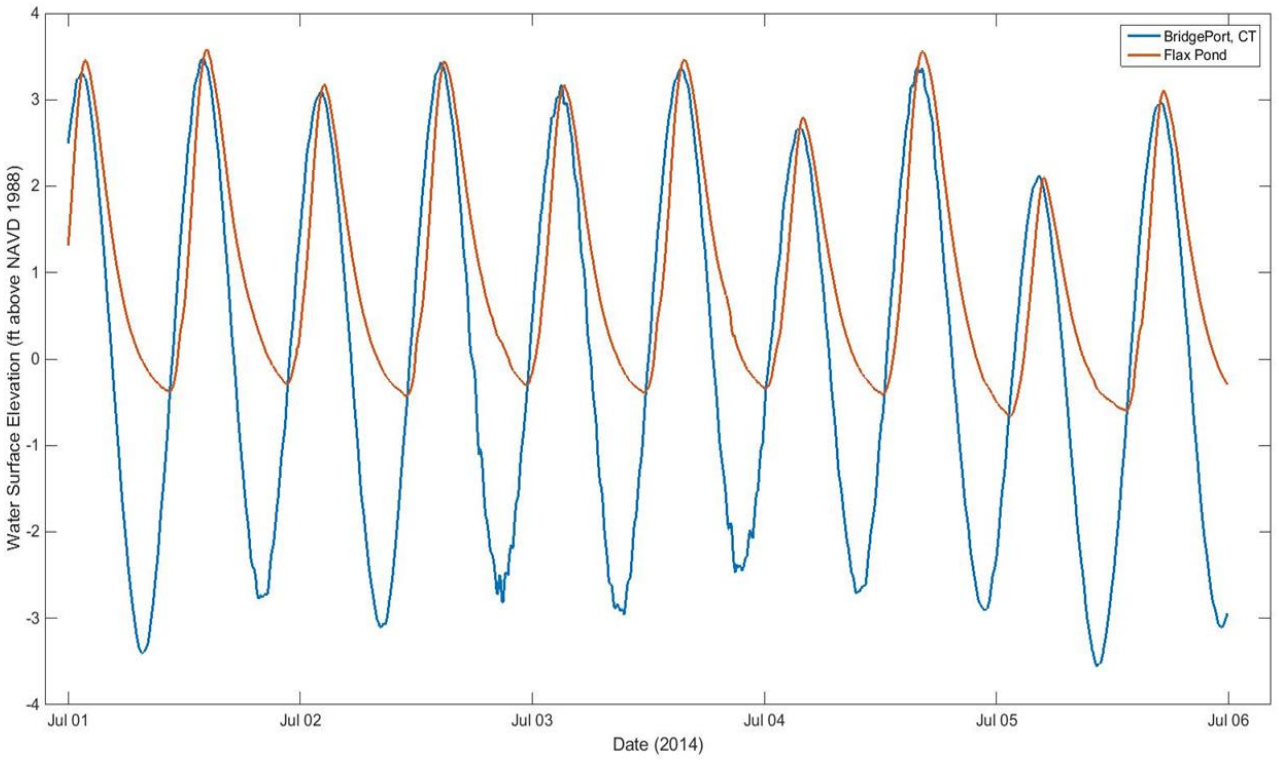

Past Manipulations
Future Manipulations
Mosquito Ditching
Sand-mined Hole
Dredged Inlet
Bulkheading
Berm
Bulkheading
N
N

1938 Aerial Photo and 1947 Coastline Borders

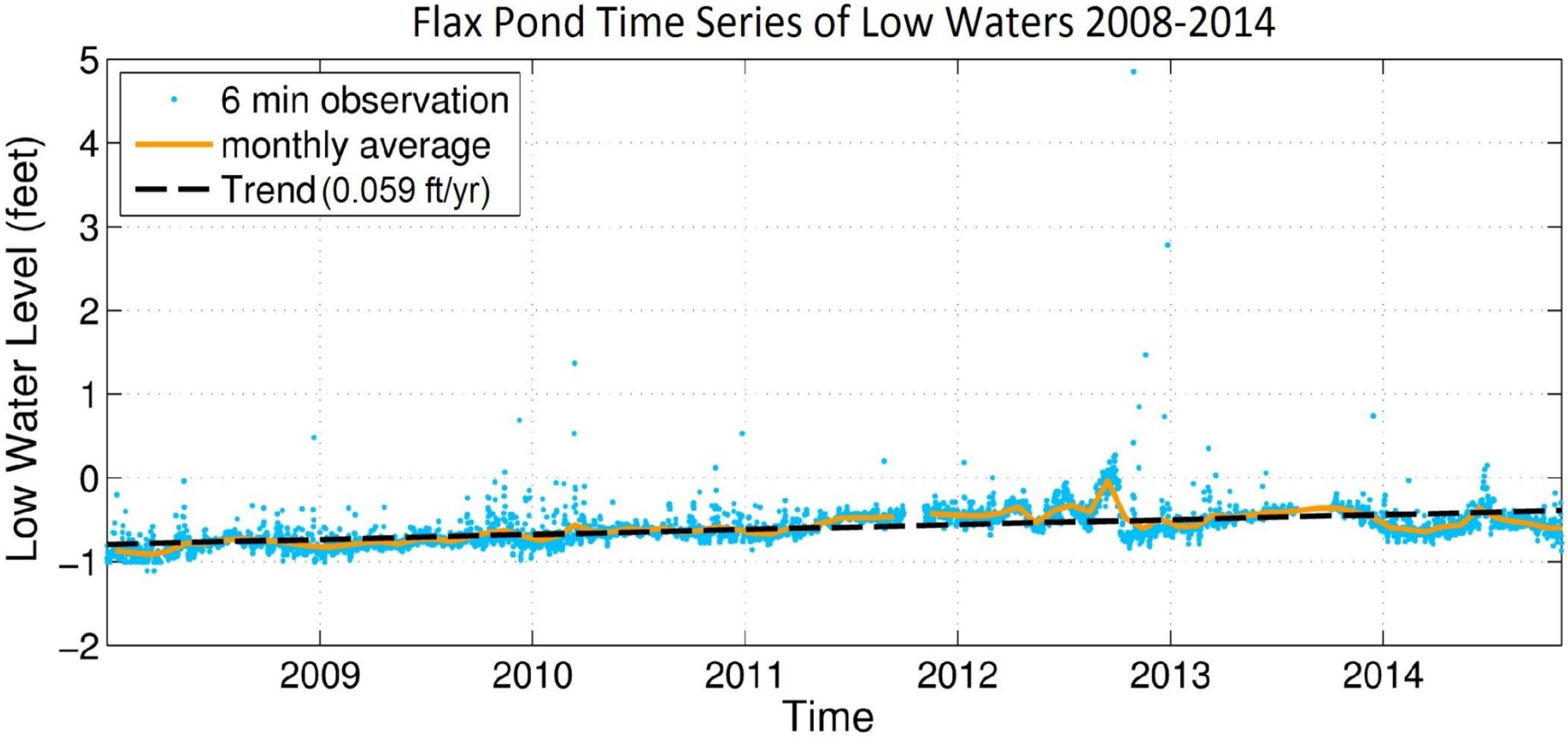
Boathouse and dredged basin near southeast-side of pond
Early 20th century

Observed Tides at Flax Pond and Bridgeport, CT
July 1-6, 2014

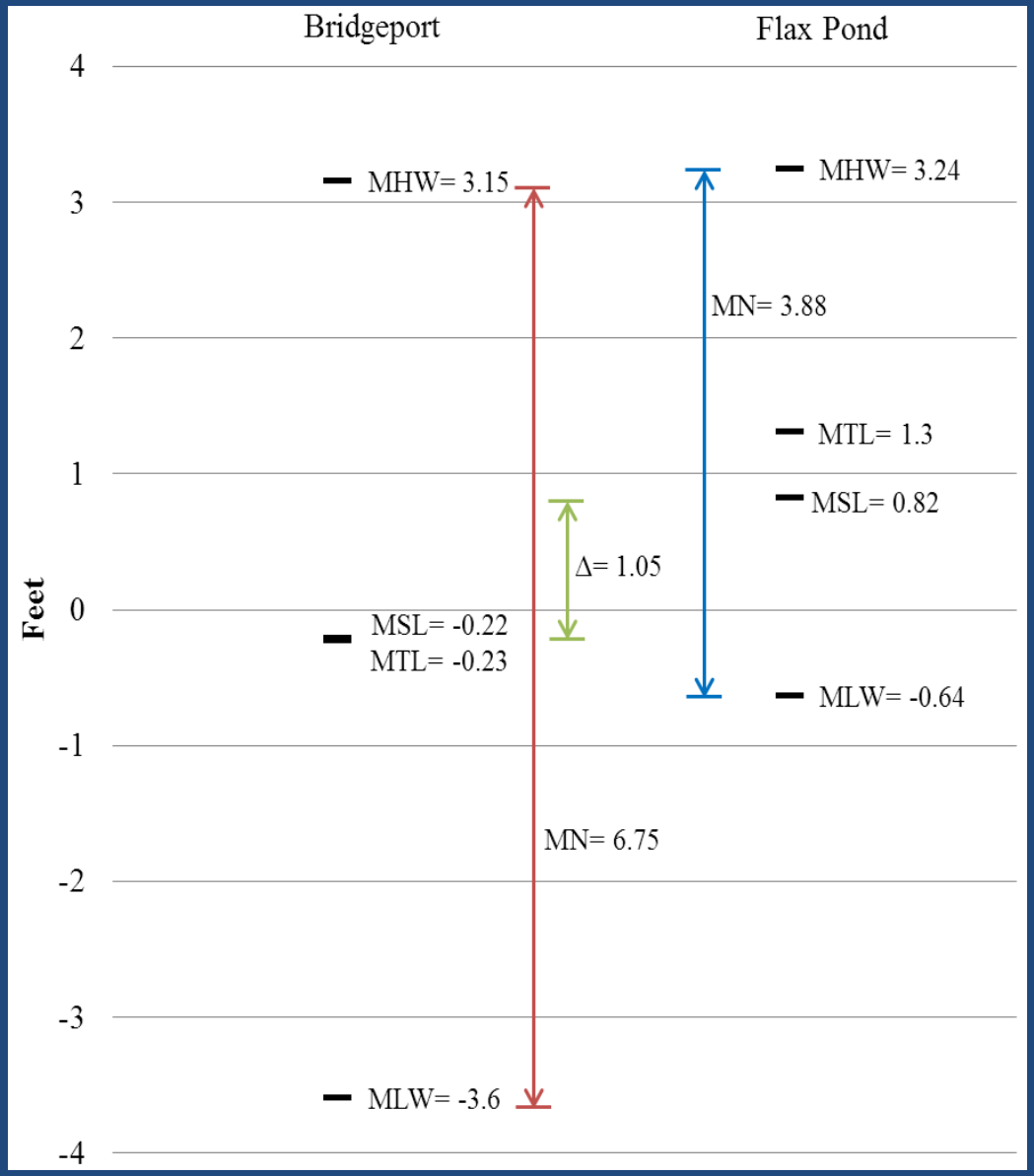
A Flood Dominated Estuary



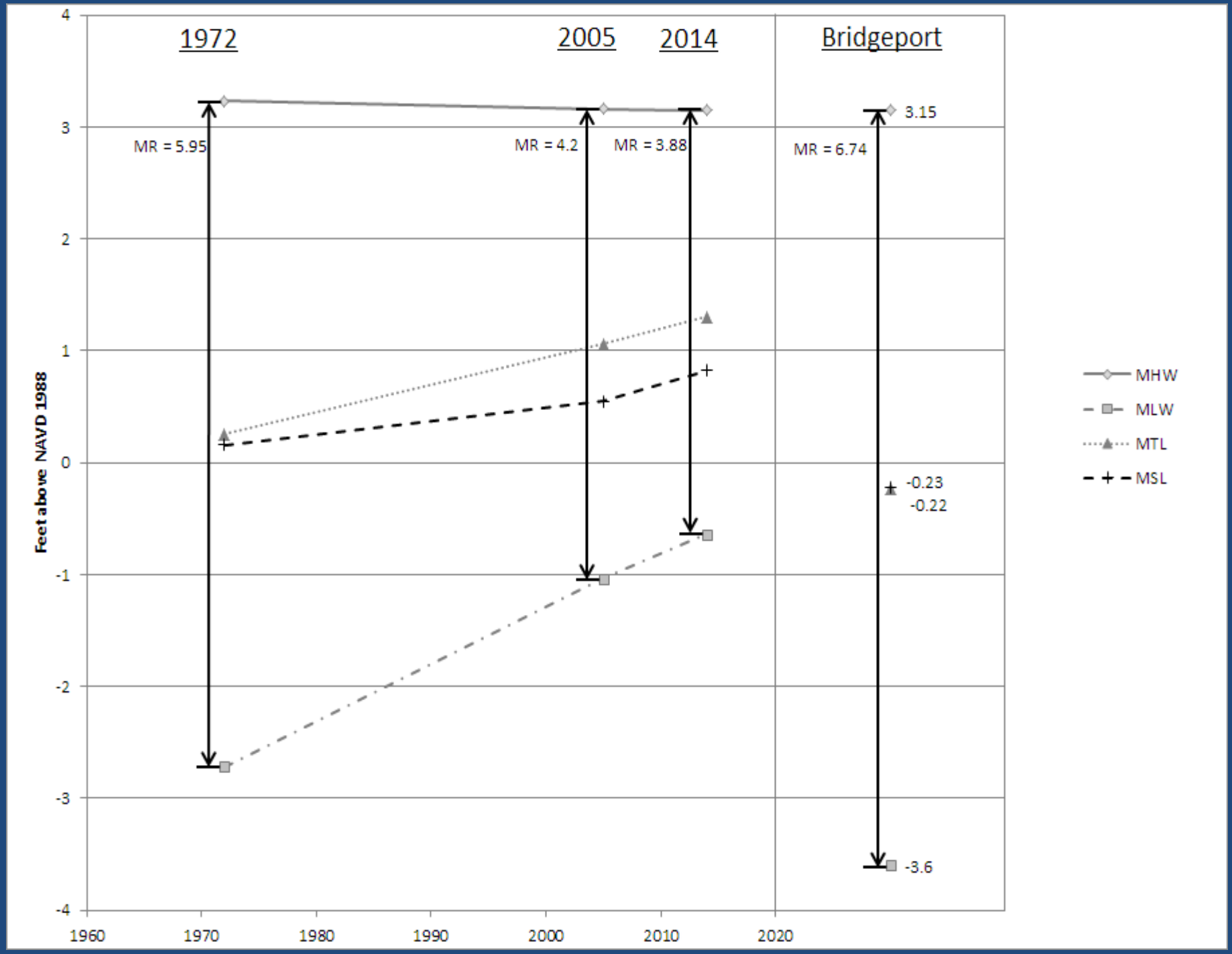
Time of tidal rise
1972 4 h
2014 3.6 h


Flax Pond Time Series of Low Waters 2008-2014
6 min observation
monthly average
Trend (0.059 ft/yr)
Low Water Level (feet)
5
4
3
2
1
0
−1
−2
2009
2010
2011
2012
2013
2014
Time

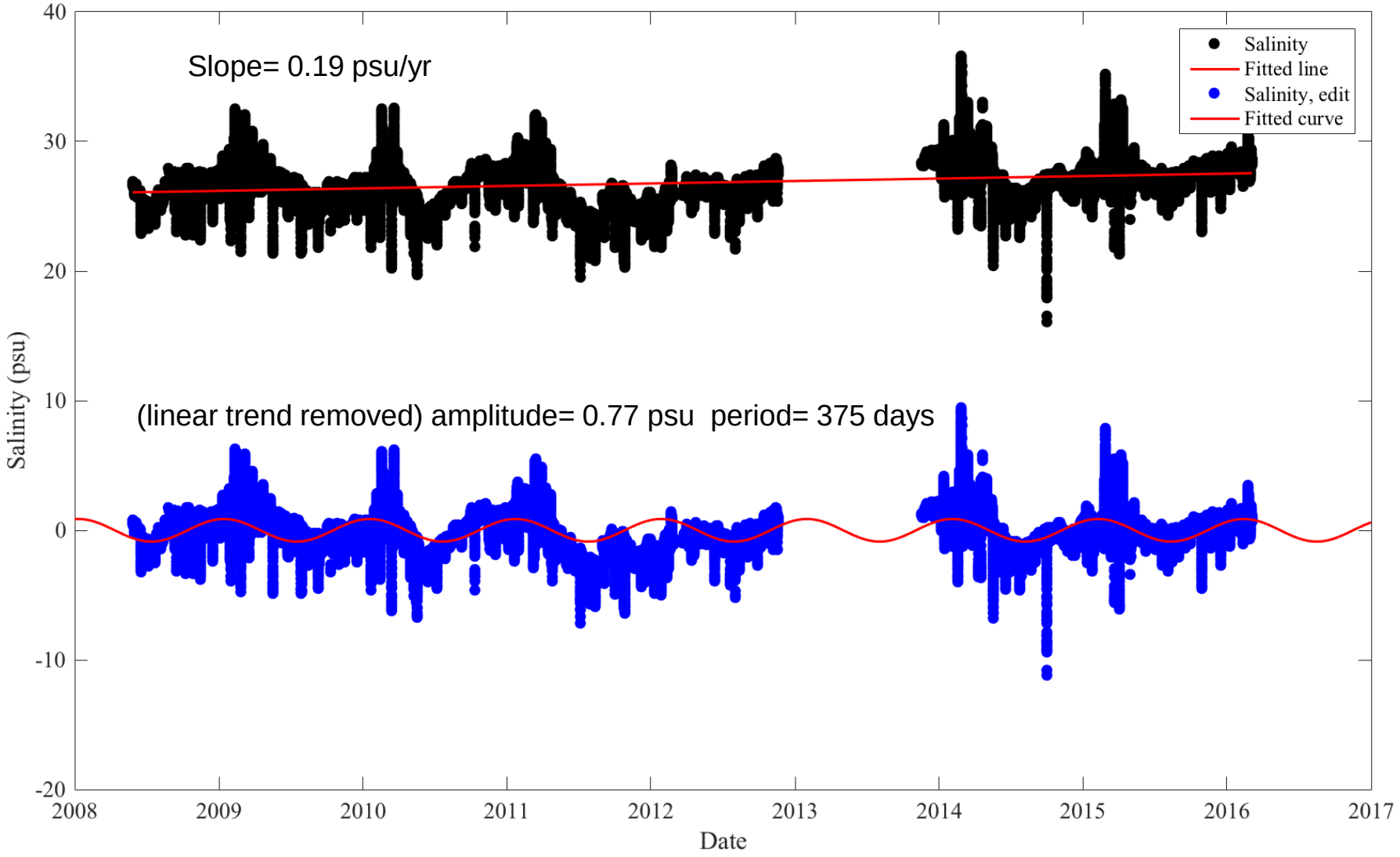
Comparison of Tidal Datums at Bridgeport, CT and Flax Pond, NY
(Elevation is in feet)

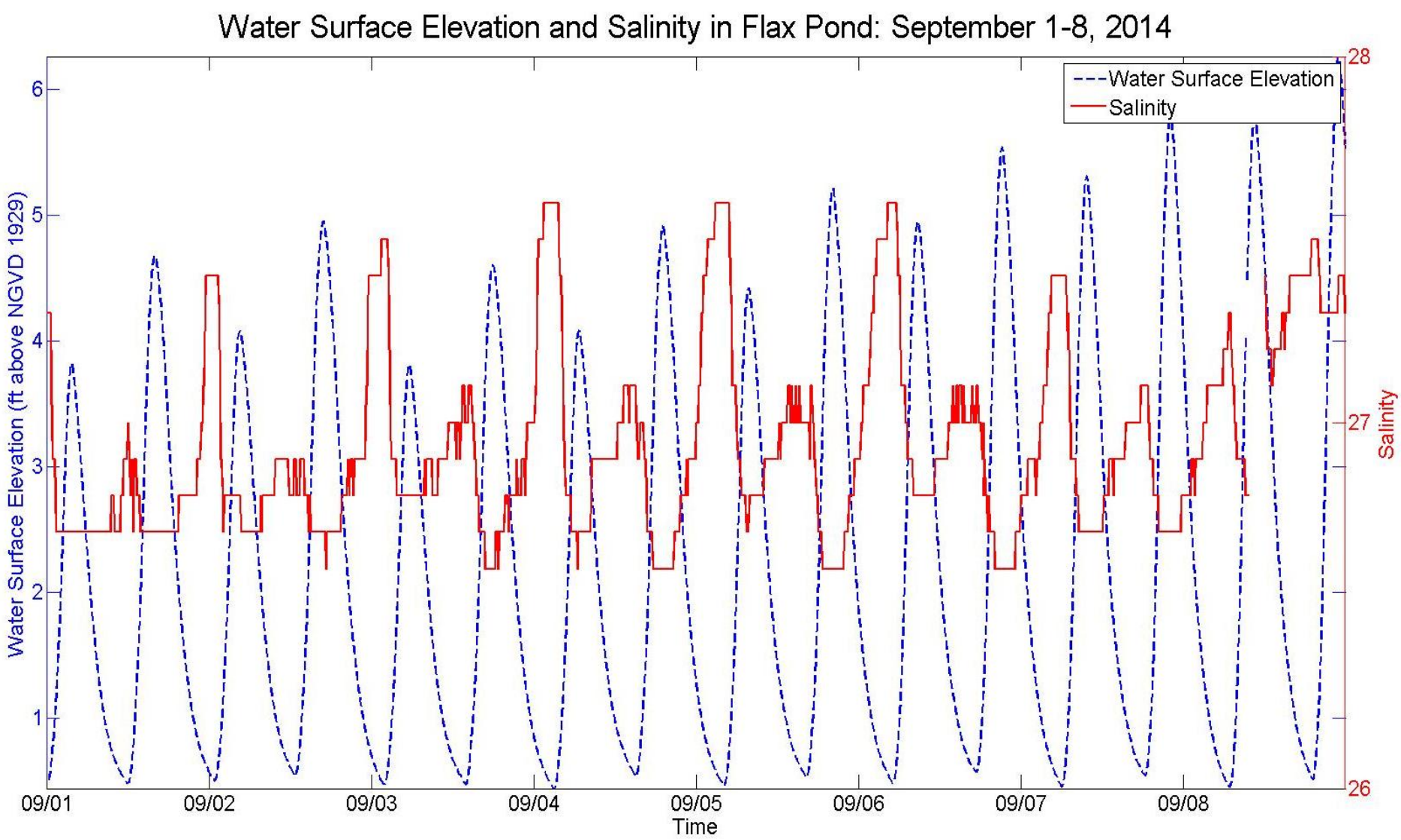


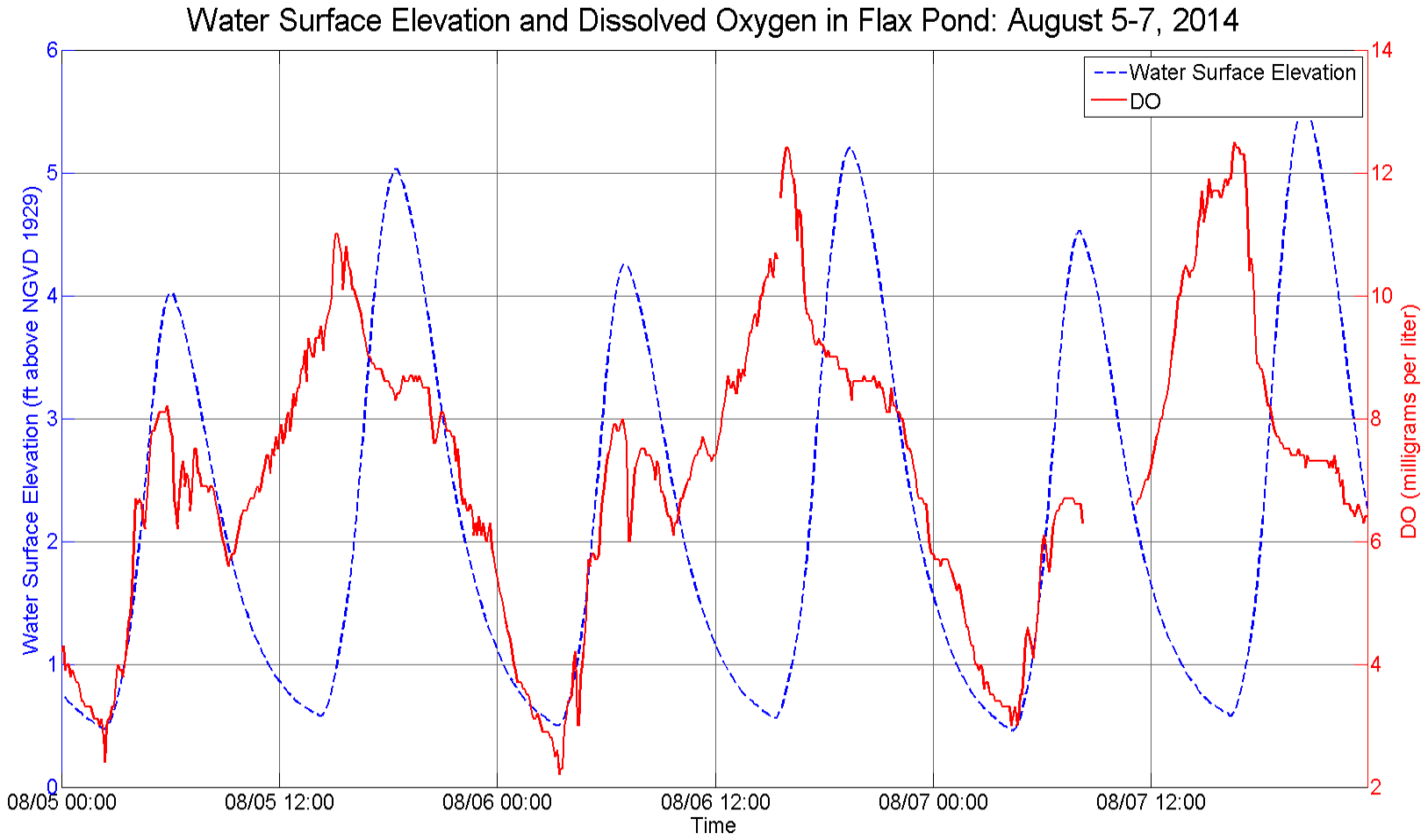
Tidal Epoch = 1983-2001
Tidal Reference Datum = NAVD ‘88


1972
2005
2014
Bridgeport
MR = 5.95
MR = 4.2
MR = 3.88
MR = 6.74
3.15
-0.23
-0.22
-3.6
MHW
MLW
MTL
MSL
Feet above NAVD 1988
4
3
2
1
0
-1
-2
-3
-4
1960
1970
1980
1990
2000
2010
2020

Salinity as a Function of Time: 2008-2015
Flax Pond

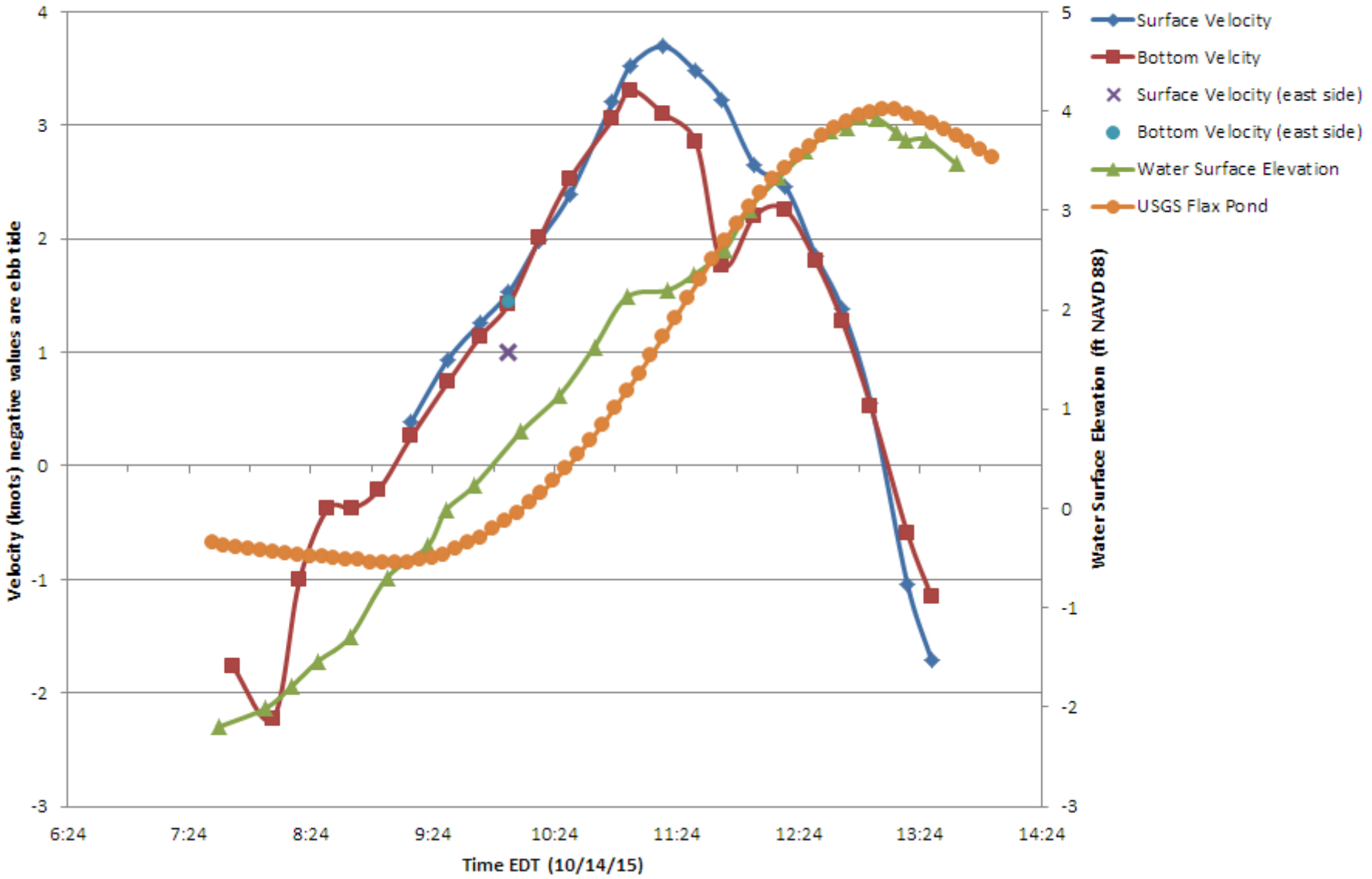


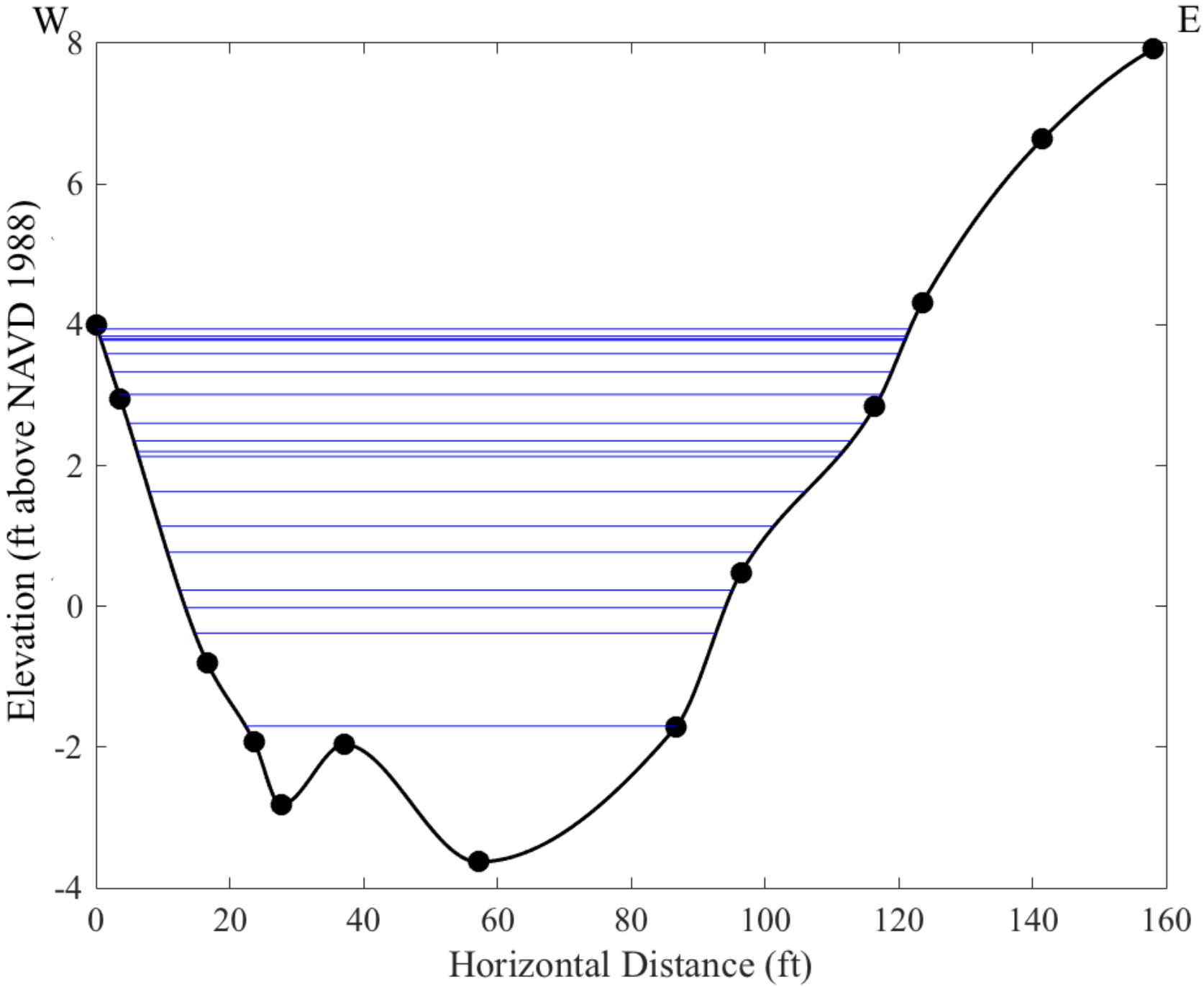

Water Surface Elevation and Salinity in Flax Pond: September 1-8, 2014
Water Surface Elevation
Salinity
Water Surface Elevation (ft above NGVD 1929)
Salinity
Time
09/01
09/02
09/03
09/04
09/05
09/06
09/07
09/08
1
2
3
4
5
6
26
27
28



Flax Pond goes hypoxic ~30 days in July and August at low tide from dawn to dusk.

Current Velocities and Water Surface Elevation: Flax Pond Inlet
October 14, 2015




W
E
8
6
4
2
0
-2
-4
Elevation (ft above NAVD 1988)
0
20
40
60
80
100
120
140
160
Horizontal Distance (ft)

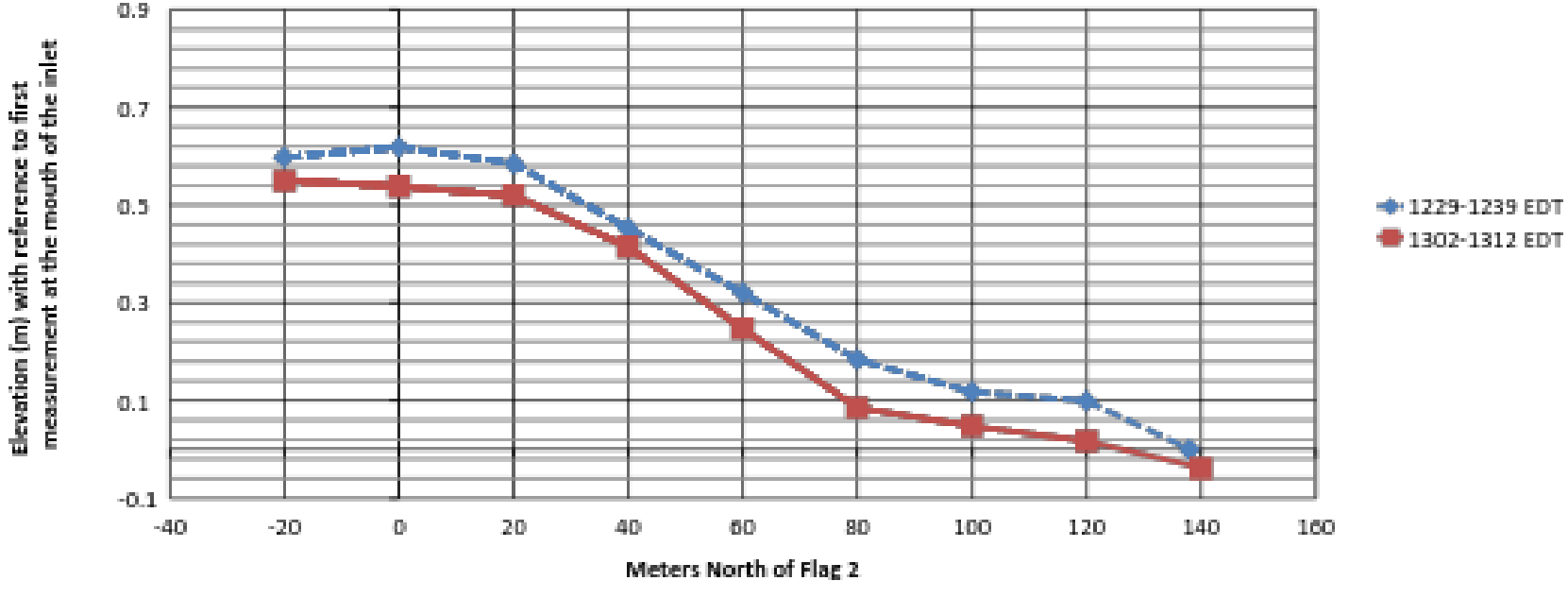
Changes in Flax Pond Tidal Prism

	1972*	2015*	10/14/15*
Low tide volume (m^3)	28,000	1.4×10^5	1.4×10^5
Mean high tide volume (m^3)	5.9×10^5	5.9×10^5	
Highest high tide volume (m^3)	8.8×10^5		7.0×10^5
Mean tidal prism (m^3)	5.62×10^5	4.5×10^5	
10/14/15 tidal prism (m^3)			5.6×10^5

Tidal volume entering Flax from current flow on 10/14/15 = 5.79×10^5 m^3
Mean tidal volume entering estimated from current flow = 4.37×10^5 m^3

* Estimated from Woodwell and Pecan, 1973


Flax Pond Inlet Shoreline Elevation 10/22/15
-20 m
0
20 m
40 m
60 m
80 m
100 m
120 m
140 m
Google earth
Imagery Date: 5/23/2015 40°58'00.02" N 73°08'15.26" W elev 0 ft eye alt 889 ft


Elevation (m) with reference to first measurement at the mouth of the inlet
0.9
0.7
0.5
0.3
0.1
-0.1
-40
-20
0
20
40
60
80
100
120
140
160
Meters North of Flag 2
1229-1239 EDT
1302-1312 EDT

- About 9500-10,000 yd^3 of material have accumulated between the jetties
- Slope of water in the inlet rises 2 ft over 500 ft
- Slope of bottom in the inlet rises 2.5 ft over 500 ft
- Tidal range decreases 2.8 ft between LIS and Flax Pond – mostly within the inlet
- Mean tidal prism decreased $1.4x10^5$ m^3 since 1972
- Low tide volume increased $1.1x10^5$ m^3 since 1972

Sediments on flood tide delta

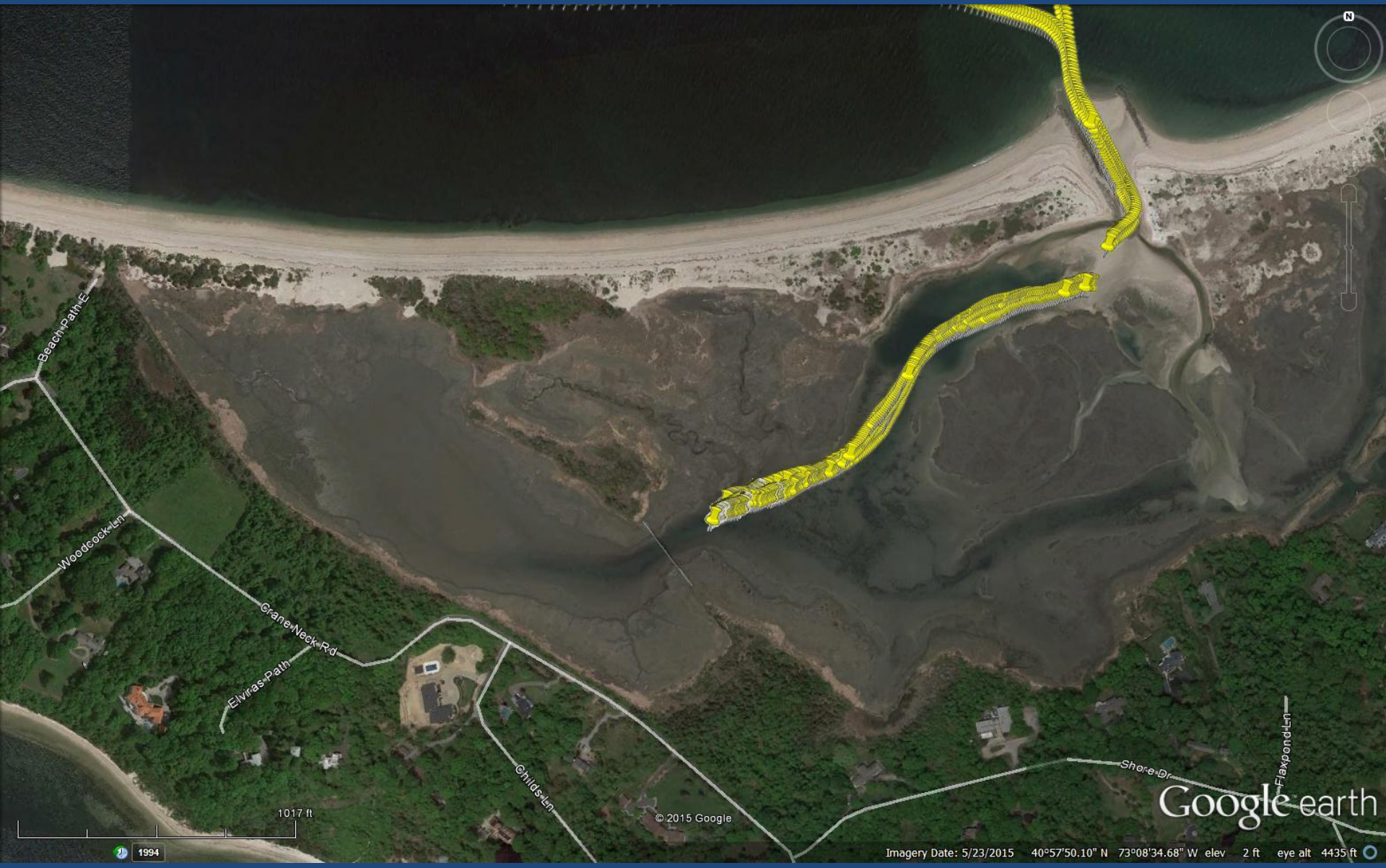
Goal: to increase the tidal prism by 1.5×10^5 m^3

Issues

Where to dredge?

Volume of material to remove?

How many sediment samples?

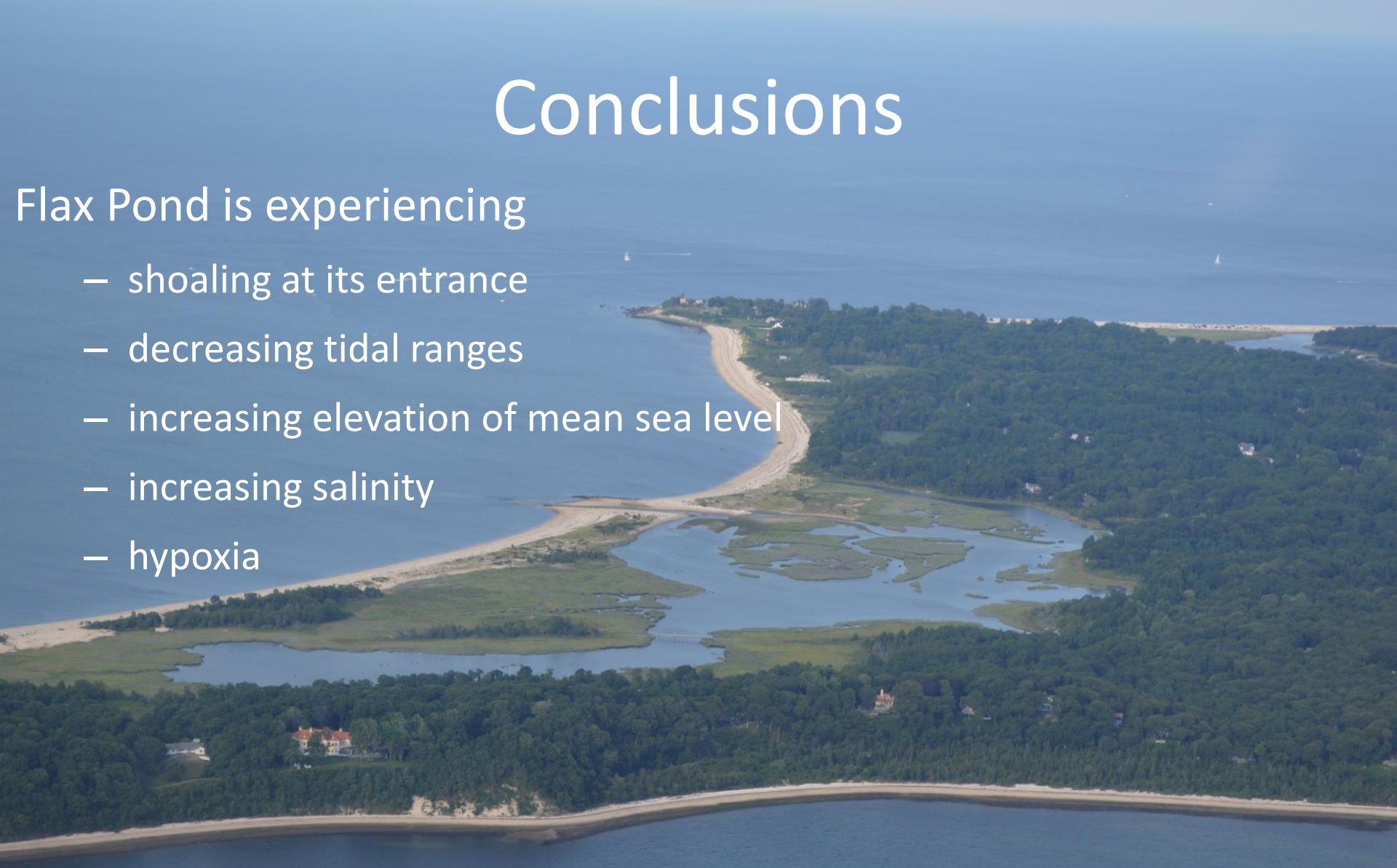

Beach Path E
Woodcock Ln
Crane Neck Rd
Elviras Path
Childs Ln
Shore Dr
Flaxpond Ln
1017 ft
© 2015 Google
Google earth
1994
Imagery Date: 5/23/2015 40°57'50.10" N 73°08'34.68" W elev 2 ft eye alt 4435 ft


Legend
dredging outline
fill sites
core locations
Beach nourishment
Dune building to prevent future overwash events
100 ft
70 ft
70 ft
W 73°08'54.24"
W 73°08'2.4"
N40°57'51.84"
Beach Path E
Woodcock Ln
Crane Neck Rd
Elvira s Path
Childs Ln
Shore Dr
Flaxpond Ln
Flax Pond Woods Rd
©2015 Google
1311 ft
1994
Google earth
Imagery Date: 5/23/2015 40°57'52.18" N 73°08'26.94" W elev 2 ft eye alt 5663 ft

Conclusions

Flax Pond is experiencing

- shoaling at its entrance
- decreasing tidal ranges
- increasing elevation of mean sea level
- increasing salinity
- hypoxia



Recommendation

- dredge approximately 20,000 cubic yards in the entrance channel and the channels to the south and west


NY7539AZ

Acknowledgements

Steve Abrams
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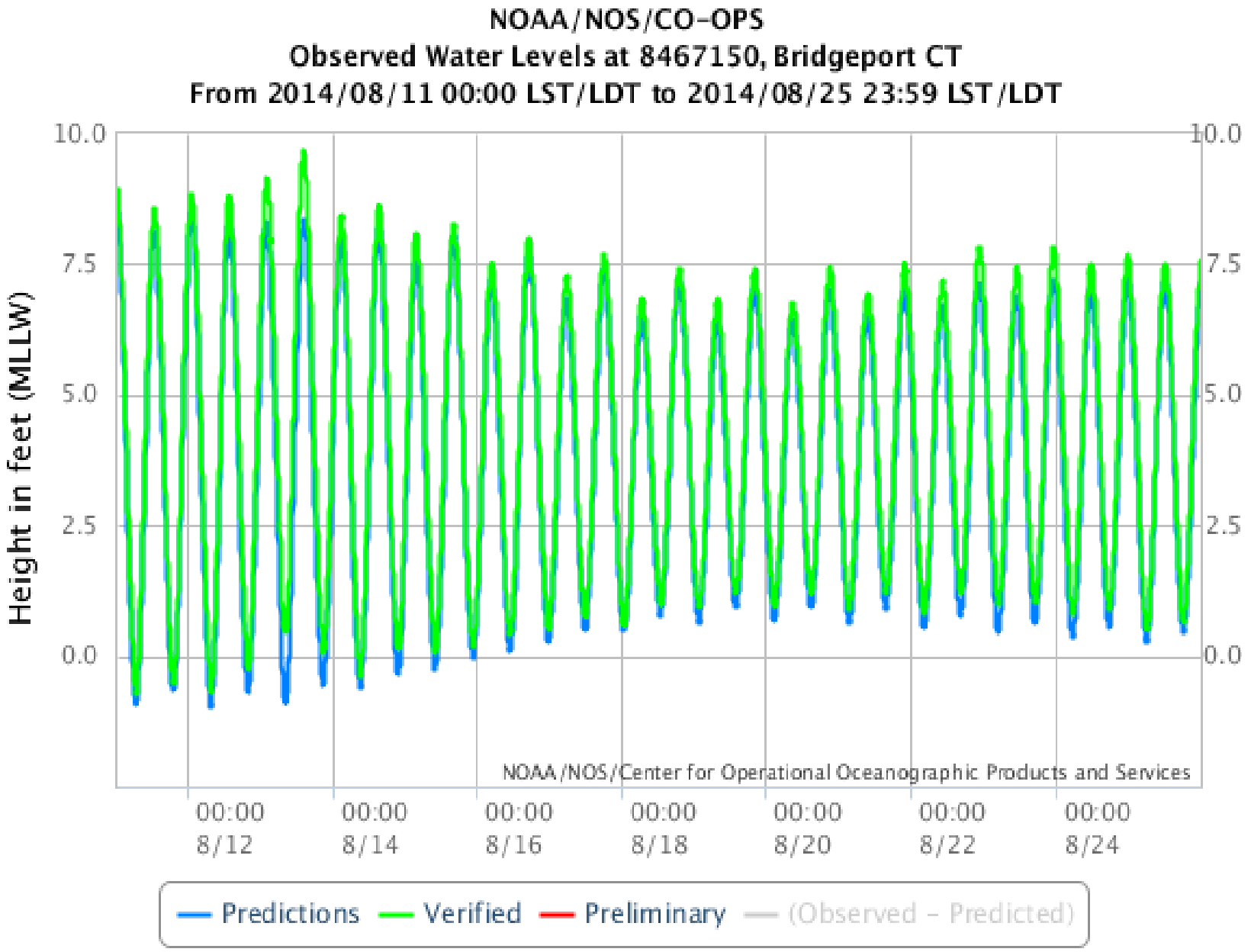
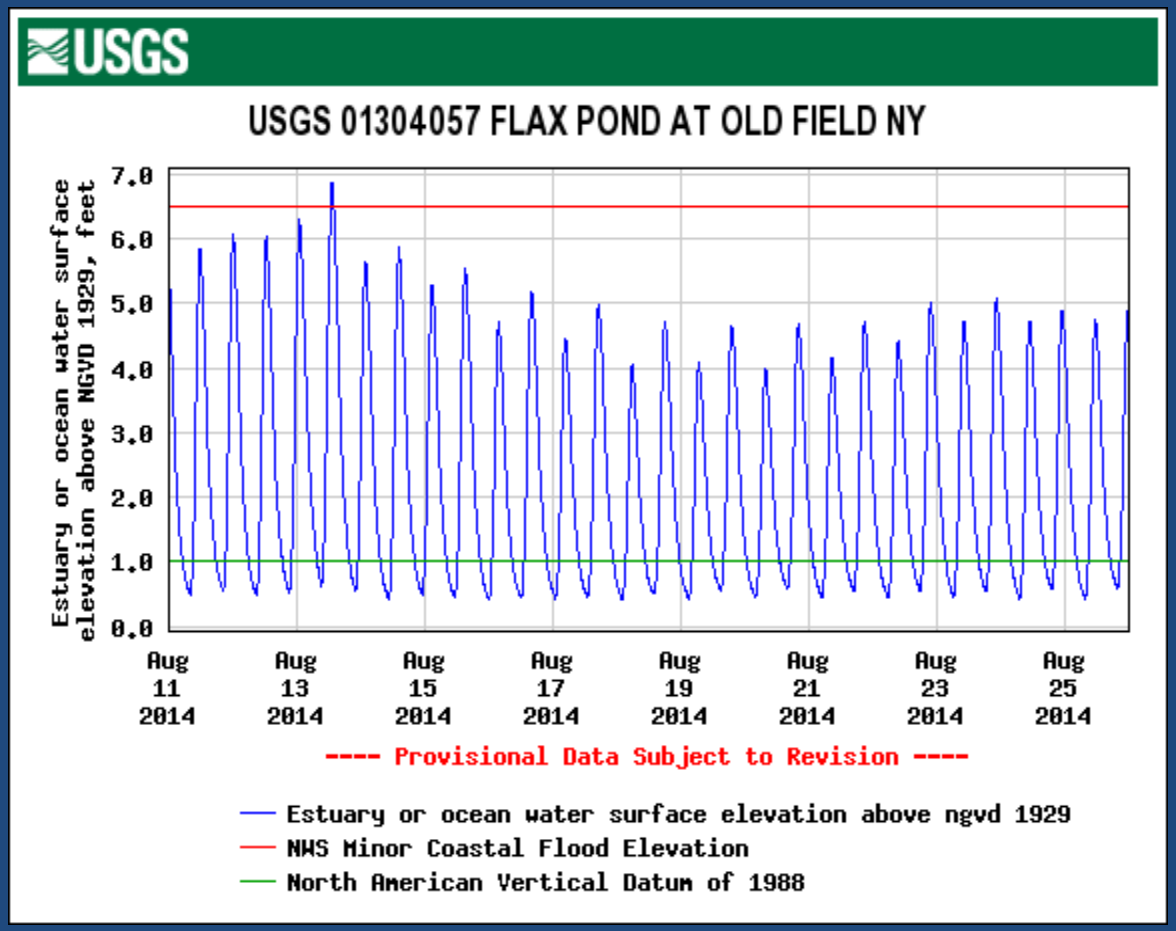
Kelsey Brunner

Observed and Predicted Tides at Bridgeport, CT
August 11-25, 2014



Observed Tides at Flax Pond
August 11-25, 2014



Tidal Comparison: Bridgeport and Flax Pond
Reference Datum: NAVD88
Epoch: 1983-2001
(feet)

	Bridgeport	Flax Pond
MHW	3.15	3.24
MLW	-3.60	-0.64
MN	6.74	3.88
MTL	-0.23	1.30
MSL	-0.22	0.82
MTL-MSL	-0.01	0.48

Flax Pond high tide after Bridgeport 26^{m}

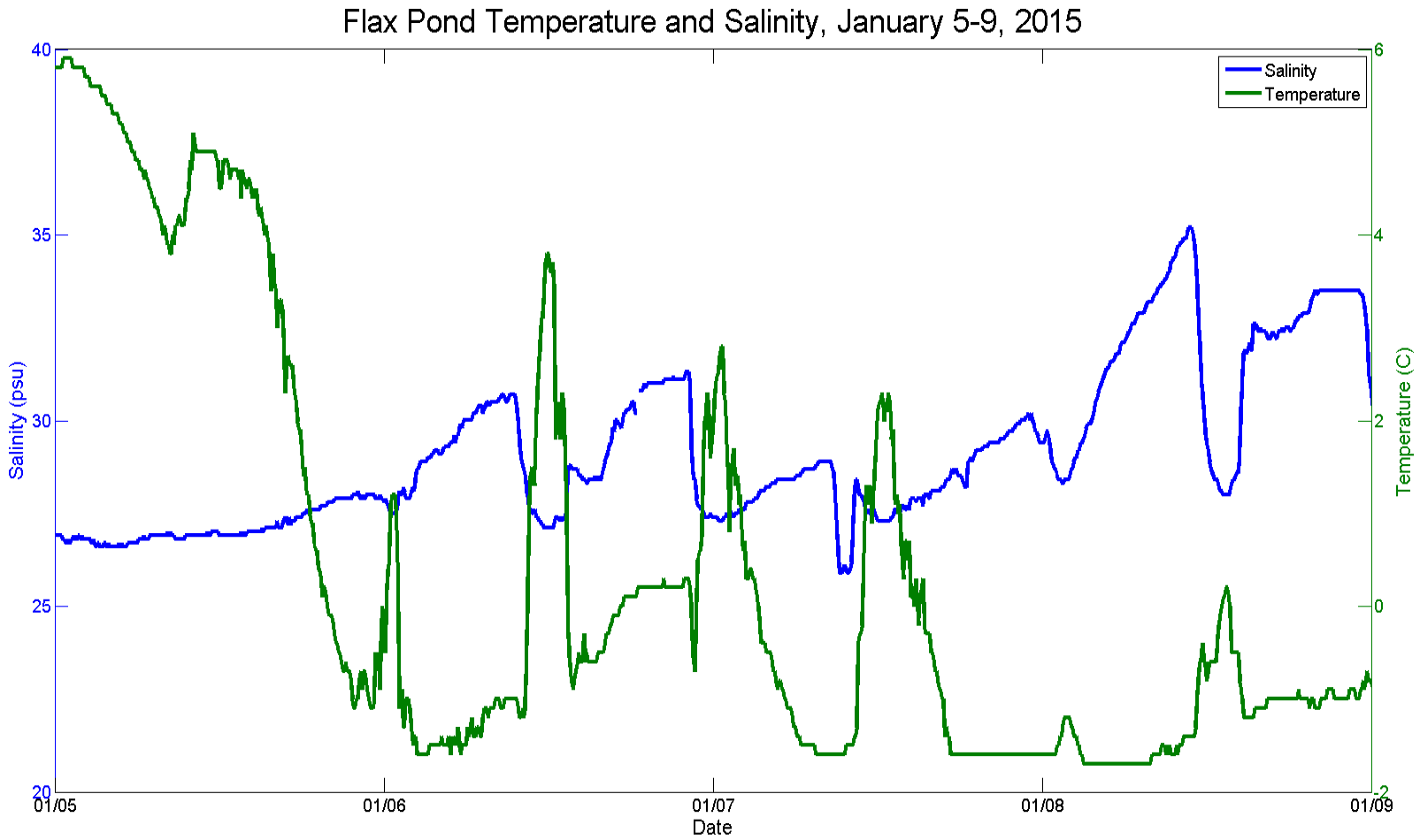
Flax Pond low tide after Bridgeport 2^{h} 44^{m}

Based on simultaneous observations:

4-1-2013 to 5-26-2013

4-30-2014 to 6-25-2014

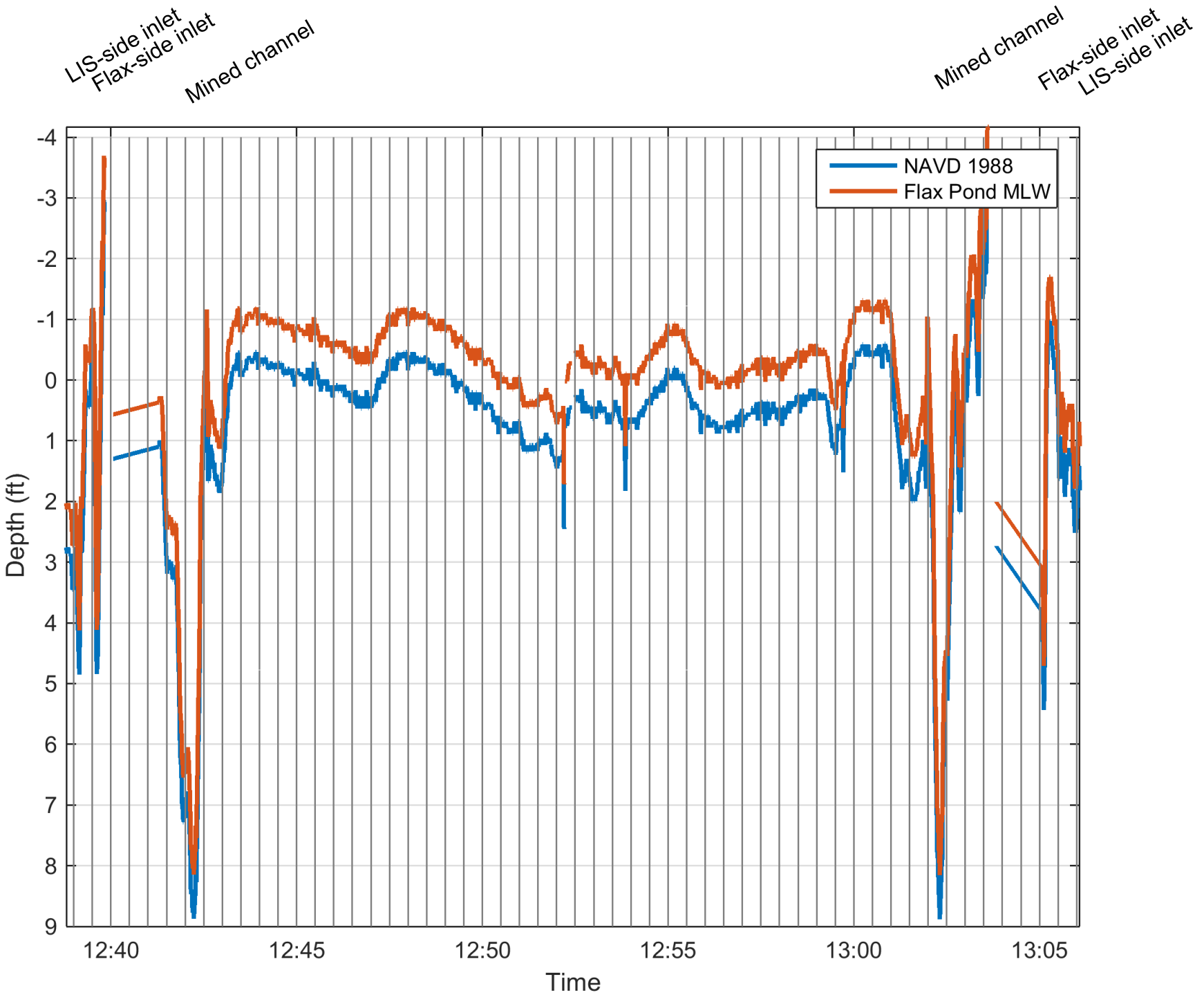
The tidal range at Flax Pond was ~ 6ft in the 1970s.

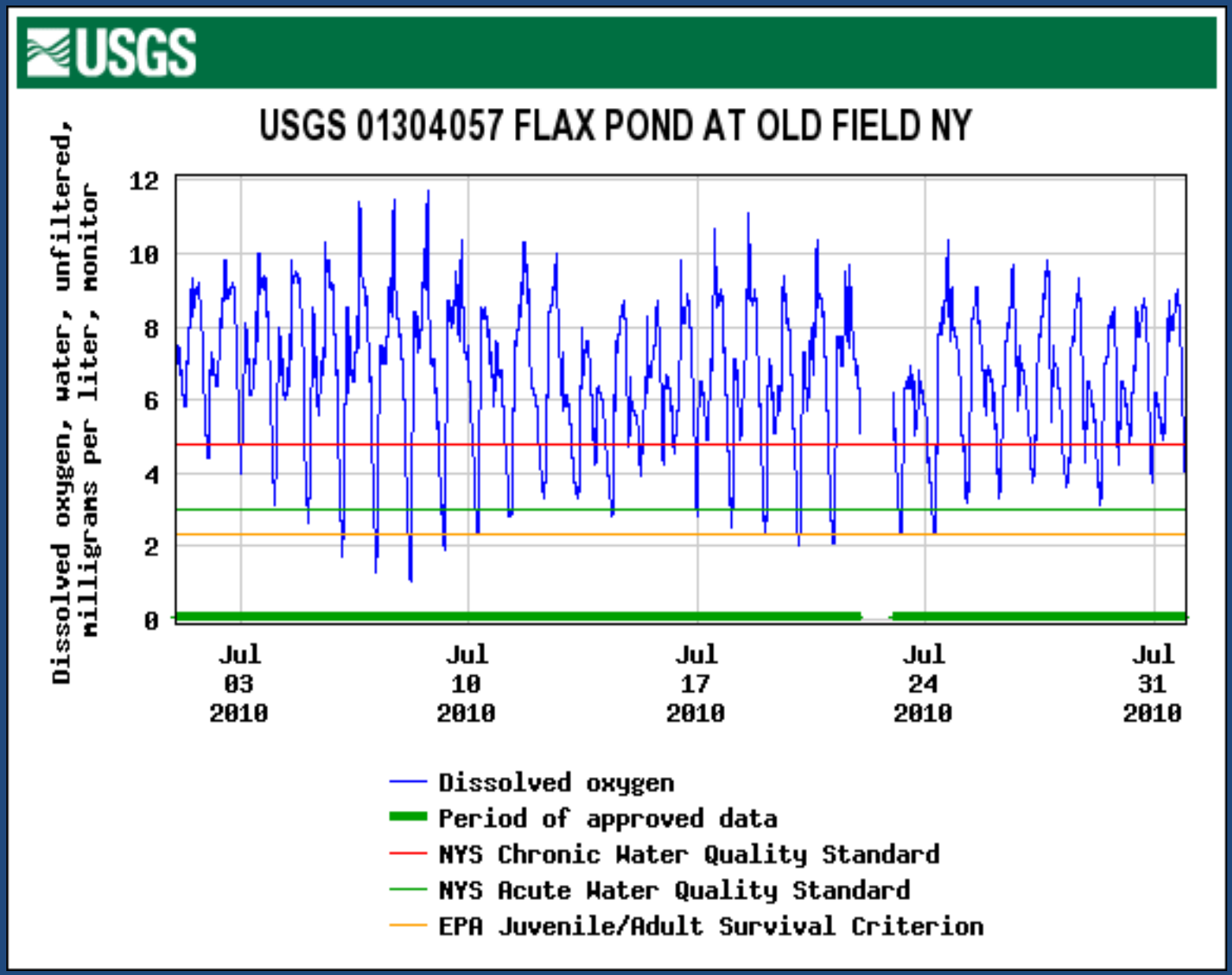

Flax Pond Temperature and Salinity, January 5-9, 2015
Salinity
Temperature
Salinity (psu)
Temperature (C)
Date
40
35
30
25
20
6
4
2
0
-2
01/05
01/06
01/07
01/08
01/09

T_{start} (EDT)	ΔT (sec)	Area (ft^2)	Velocity (ft/s)	Tidal Flux (10/14/15) (ft^3)
912	900	163.3	0.65	95530.5
927	660	191.9	1.56	197580.24
938	1080	212.3	2.1	481496.4
956	1320	258.2	2.55	869101.2
1018	1020	291.4	4	1188912
1035	1020	338	5.35	1844466
1052	1080	388.7	5.89	2472598.44
1110	1020	396.1	6.17	2492815.74
1127	780	412	5.8	1863888
1140	840	439.2	5.38	1984832.64
1154	780	485.2	4.42	1672775.52
1207	1260	522.1	4.11	2703747.06
1228	960	577.8	3.09	1713985.92
1244	480	582.6	2.29	640393.92
1252	420	594.7	0.93	232289.82
1259	540	575.4	0	0
Total				20,454,413 ft^3
Total (metric)				579,269 m^3

MHW occurred at 1209

Mean Tidal Flux= 15,420,853 ft^3 (436,718 m^3)


LIS-side inlet
Flax-side inlet
Mined channel
Mined channel
Flax-side inlet
LIS-side inlet
NAVD 1988
Flax Pond MLW
Depth (ft)
-4
-3
-2
-1
0
1
2
3
4
5
6
7
8
9
12:40
12:45
12:50
12:55
13:00
13:05
Time


USGS
USGS 01304057 FLAX POND AT OLD FIELD NY
Dissolved oxygen, water, unfiltered, milligrams per liter, monitor
12
10
8
6
4
2
0
Jul 03 2010
Jul 10 2010
Jul 17 2010
Jul 24 2010
Jul 31 2010
Dissolved oxygen
Period of approved data
NYS Chronic Water Quality Standard
NYS Acute Water Quality Standard
EPA Juvenile/Adult Survival Criterion