Village Creek Harbor & Estuary

A Study on the Feasibility of Restoring Degraded Saltmarsh with Dredged Material

Public Presentation

September 7th and 9th 2017

AGENDA

Background/Historical Perspective

Dredging History and Needs

NFWF/ CIRCA Grant Objectives

Existing & Historical Tidal Marsh Conditions

Topographic & Bathymetric Survey

Biobenchmarking (Vegetation Assessment)

Sediment Quality: Marina v. Salt Marshes

Sediment Repositioning Options

Permitting

Questions & Answers

AGENDA

Background/Historical Perspective

Dredging History and Needs

NFWF/ CIRCA Grant Objectives

Existing & Historical Tidal Marsh Conditions

Topographic & Bathymetric Survey

Biobenchmarking (Vegetation Assessment)

Sediment Quality: Marina v. Salt Marshes

Sediment Repositioning Options

Permitting

Questions & Answers

Village Creek Community Harbor

- Small, pleasure boat harbor in Village Creek Estuary.
- Established in 1957. Maintenance dredging on the harbor and/or channel in 1969, 1984, 1992, 1996, 2003, 2010, 2017.
- Funded by Village Creek Community
  - Open to residents and non-residents
- Complete dock renovation in 2010 – Power, water, lights, 49 slips.

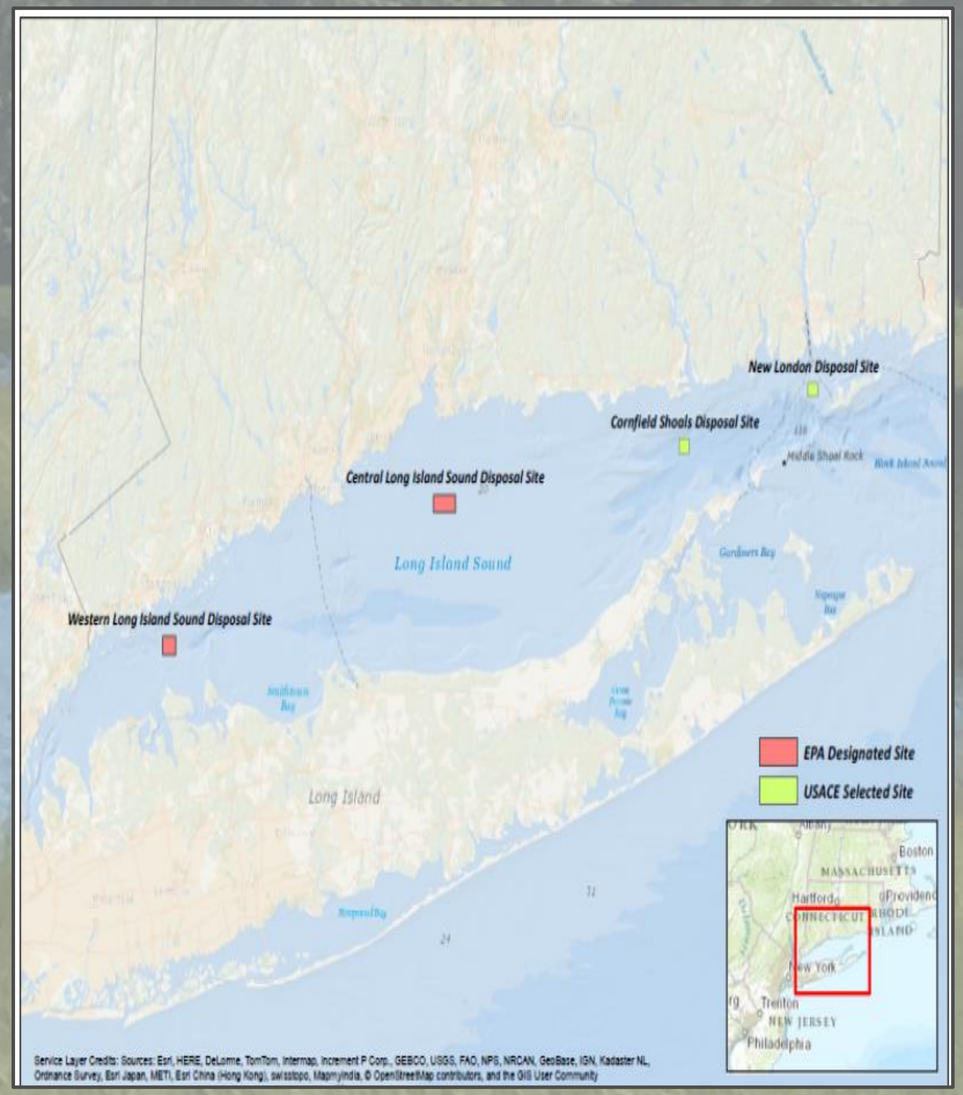
Harbor and Channel maintained by conventional dredging since 1957.

Village Creek is part of the Long Island Sound Dredge Management Plan (DMMP)

Maintenance dredging on the harbor and/or channel in: 1969, 1984, 1992, 1996, 2003, 2010, 2017

We share the Sound with New York State

- In April 2016, NYS Conditionally concurred with the U.S. EPA approval of the continuation of open water disposal at WLIS and CLIS.
- With the understanding that ***"A goal of the regulation was to reduce or eliminate open-water disposal of dredged material into Long Island Sound".***



New York State Opposes Open Water Disposal in Long Island Sound

On August 18th, New York State filed suit against the U.S. EPA to stop the approval of the Eastern Long Island Sound Disposal Site. (ELDS)

This lawsuit is in response to the April 2016 EPA approval of the LI Sound Dredged Materials Management Plan (DMMP)

This disposal site is similar to the Western Long Island Sound Site that serves Connecticut dredging projects at our end of the sound.

NYS and environmental groups claim that open-water disposal of dredging materials introduces contaminants, harms shellfish and reduces water quality in the Sound.

The Future of Dredging in Long Island Sound

- An agreement made in 2005 between the EPA, the Army Corps, and the states of Connecticut and New York was supposed to create a plan that would reduce and phase out open-water dumping sites.
- "The proposed amendment was intended to support the overarching goal of reducing or eliminating open water disposal by establishing standards and procedures that will encourage practicable alternatives to open water disposal." Those standards and procedures include a permanent "dredging team" that would look for alternatives to dumping as each project comes up. **Alternatives like using the silt and sand to restore beaches or marshlands.**

From Recommendation to Investigation

- Permit discussions with CTDEEP offices in Sept 2015
- Recommended Saltmarsh Restoration
  - Previous effort on our part (2004)
- Encouraged to investigate “local disposal”
- Sources of Funding:
  - NFWF - Long Island Sound Futures Fund
  - CIRCA - CT Institute for Resilience and Climate Adaptation
- Norwalk Land Trust – Agreed to sponsor grant application
- Awarded NFWF and CIRCA Grant
- Fuss and O’Neil chosen as an engineering contractor

Sponsors and Supporters

Project Management

- Nominal Grant Applicant - Norwalk Land Trust
- Principal Investigators – Village Creek Harbor Corporation
- Contractor – Fuss & O'Neil, Manchester, CT
  - Josh Wilson – Project manager

Funding

- NFWF – National Fish and Wildlife Foundation – Long Island Sound Futures Fund
- CIRCA – Connecticut Institute for Resilience and Climate Adaptation
- Matching funds provided by local business and community members

Project Objectives: "Village Creek Salt Marsh Restoration Demonstration"

Preliminary Site Assessment - An analysis of existing vegetation in the surrounding marsh compared to historical photos of the site.

Topographic and Bathymetric Survey - A topographic and bathymetric survey will be performed on the subject areas to determine the plant communities, the topography and likely areas for restoration.

Sediment Characterization - The characteristics of the sediment for particle size and contaminants will be determined.

Sediment Settling and Compaction Properties - Conceptual modeling will be performed to determine area and volume calculations.

Design - The design of a saltmarsh restoration approach for the proposed target areas.

Site Monitoring Baseline - A monitoring program baseline will be established to track the changes in the affected area.

AGENDA

Background/Historical Perspective

Dredging History and Needs

NFWF/ CIRCA Grant Objectives

Existing & Historical Tidal Marsh Conditions

Topographic & Bathymetric Survey

Bio-benchmarking (Vegetation Assessment)

Sediment Quality: Marina v. Salt Marshes

Sediment Repositioning Options

Permitting

Questions & Answers

Sediment Repositioning Options

Western Long Island Sound Disposal Site

- Opposition by NYS
- Planned “phase out”

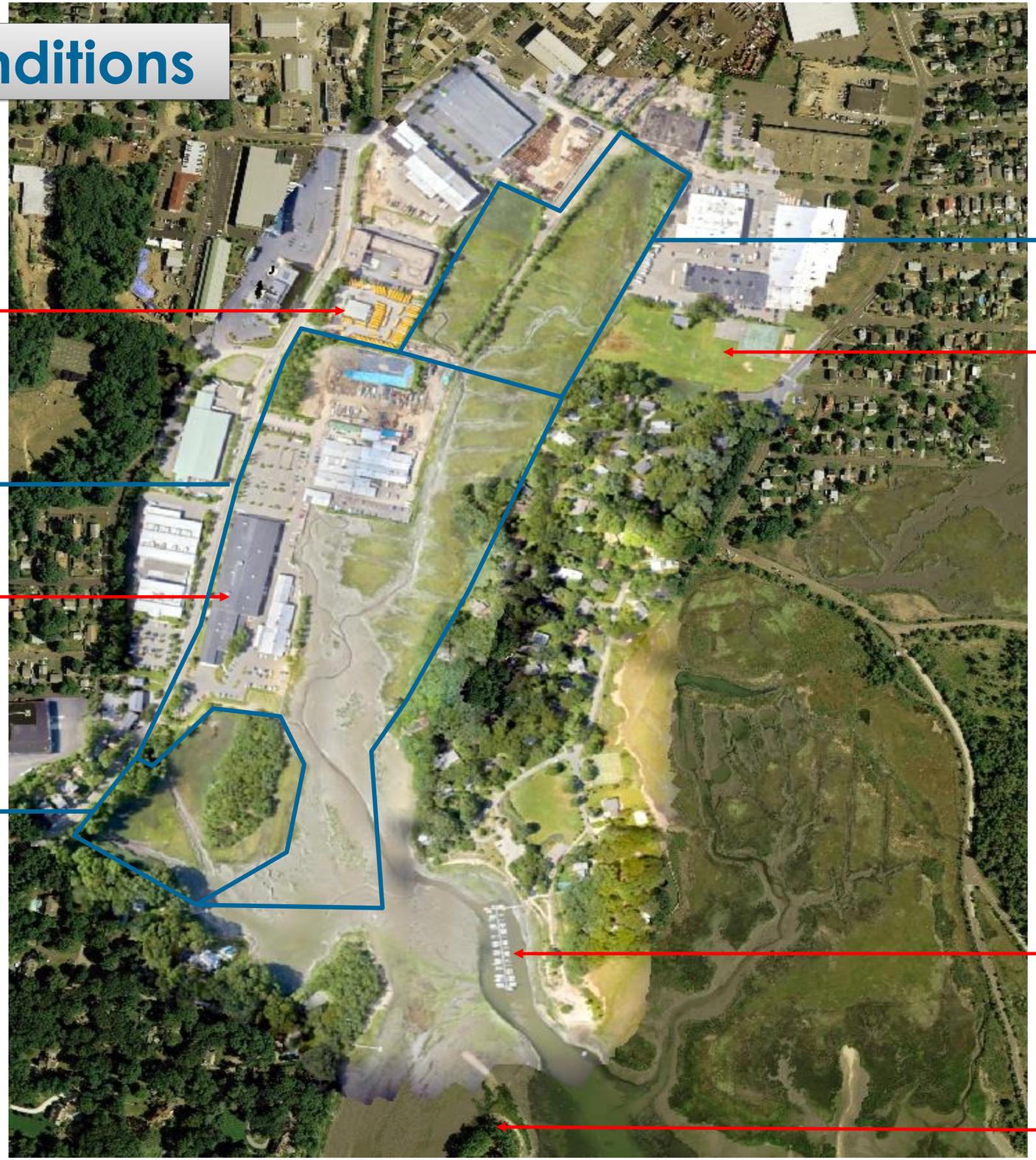
Salt Marsh Creation

- Discouraged by DEEP in areas where salt marshes haven’t existed (new)
- Would consider if historical salt marshes are documented as lost

Thin Layer Deposition

- Economic and ecological beneficial re-use of material
- Presents unique “first-time” challenges

Existing Conditions



First Student

B. Beinfield
(280 Wilson Ave)

SoNo Ice House

Norwalk Land Trust
(250 Wilson Ave)

Crystal LLC
(314 Wilson Ave)

Woodward Ave Park

Village Creek
Harbor Marina

Hoyt Island

Existing v. Historical Conditions

2016 CT State-wide Imagery & 2017 UAV Imagery

1934 CT Areial Photos

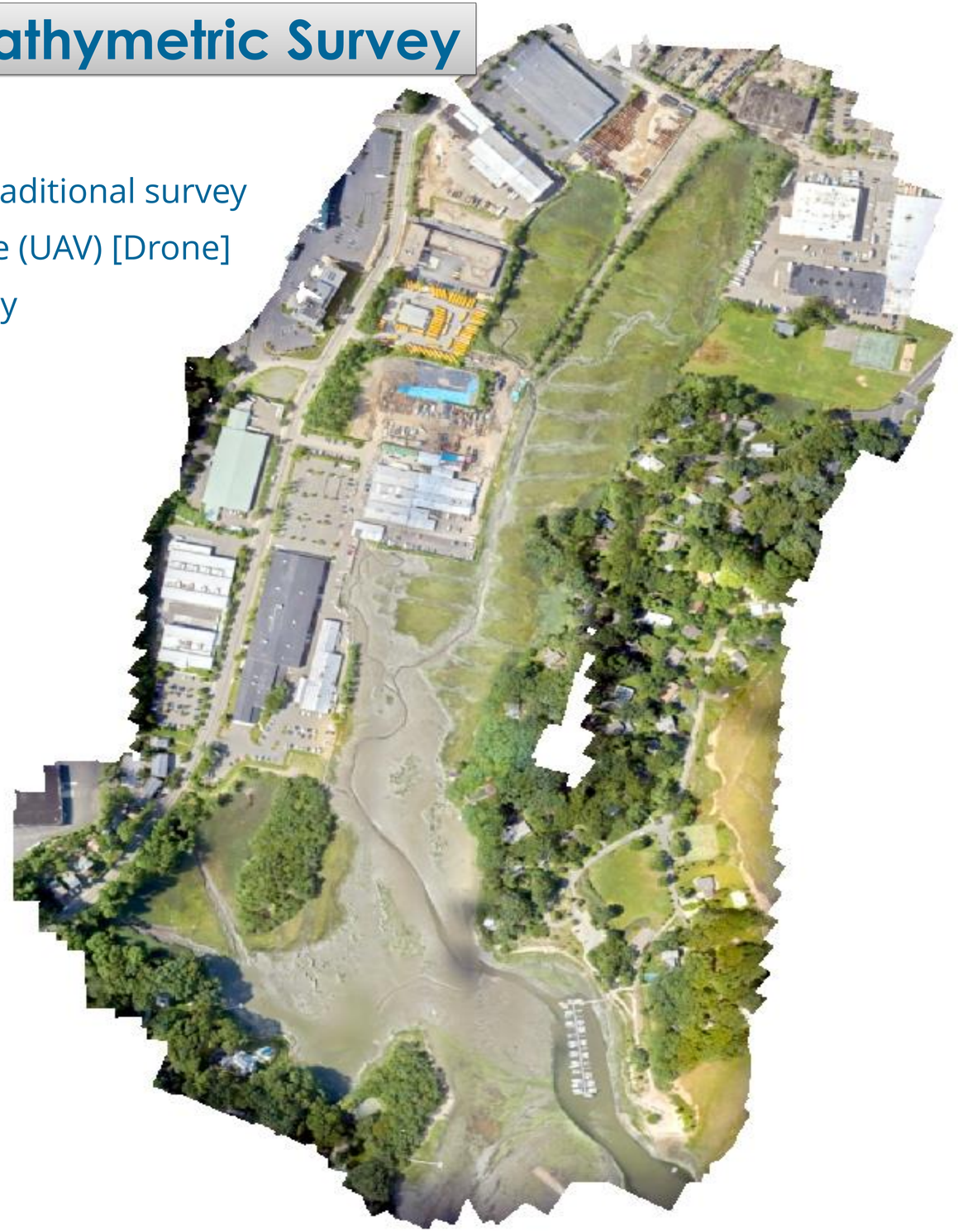
Existing v. Historical Conditions

- Village Creek salt marsh exhibits typical conditions for a marsh located in a developed area:
  - *S. alterniflora* dominated
  - Mosquito ditches from 1930s
  - Limited high marsh vegetation communities (*S. patens*)
  - Development of *Phragmites* stands along disturbed edges
- Salt marsh showing signs of degradation including:
  - Extensive areas of stunted *S. alterniflora* on open marsh
  - Development of *Phragmites* stands along disturbed edges
  - Loss of peat density and erosion below the active root zone
  - Increased areas of mudflats (as exhibited by *S. alterniflora* islands)

2016 CT State-wide Imagery & 2017 UAV Imagery

Topographic & Bathymetric Survey

- Control established by traditional survey
- Unmanned Aerial Vehicle (UAV) [Drone]
- Sub-foot vertical accuracy
- +/- 32 acres in one day



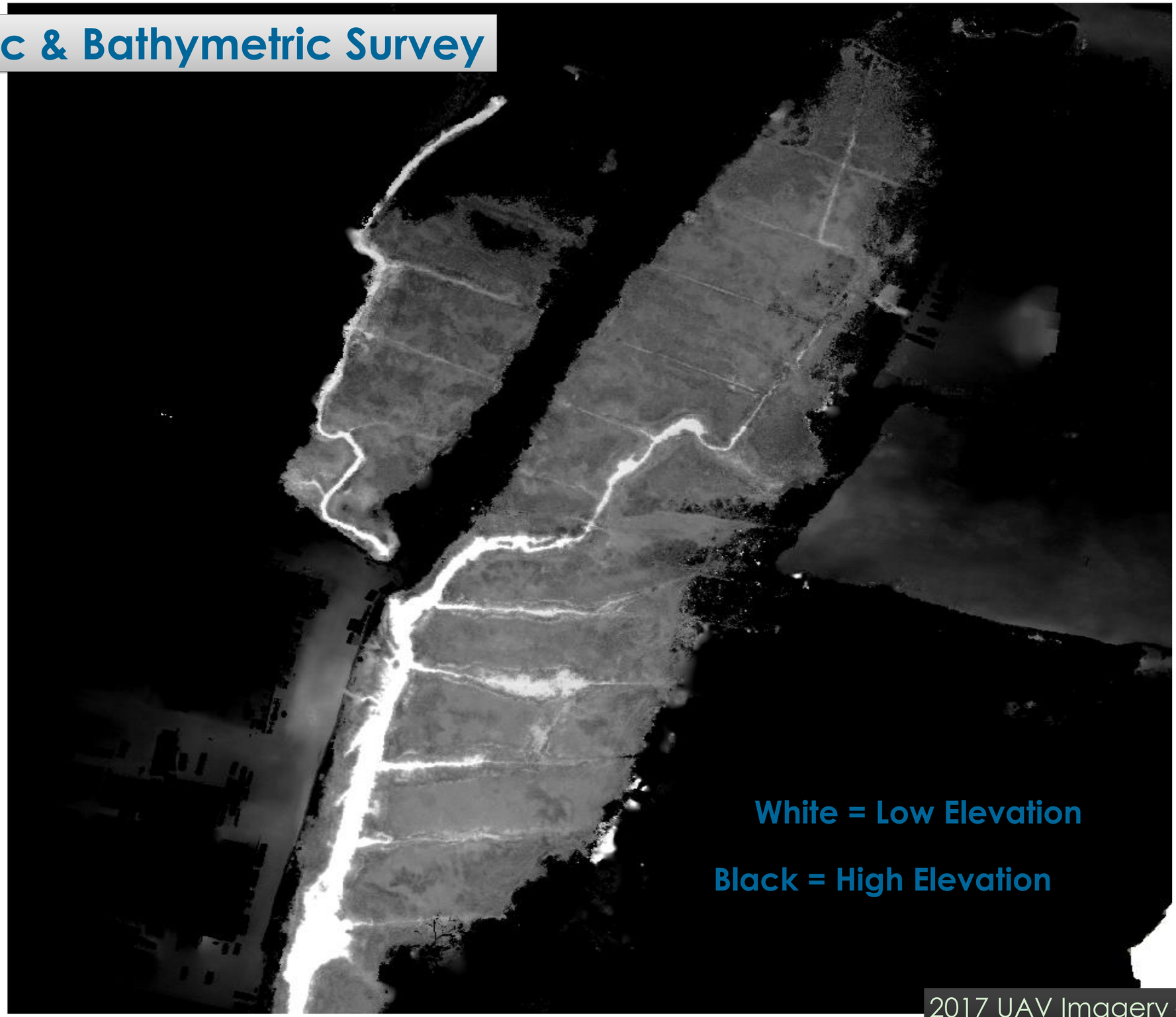
2017 UAV Imagery

Topographic & Bathymetric Survey

2017 UAV Imagery

2017 UAV Imagery – Derived DEM

Topographic & Bathymetric Survey



2017 UAV Imagery –Derived DEM

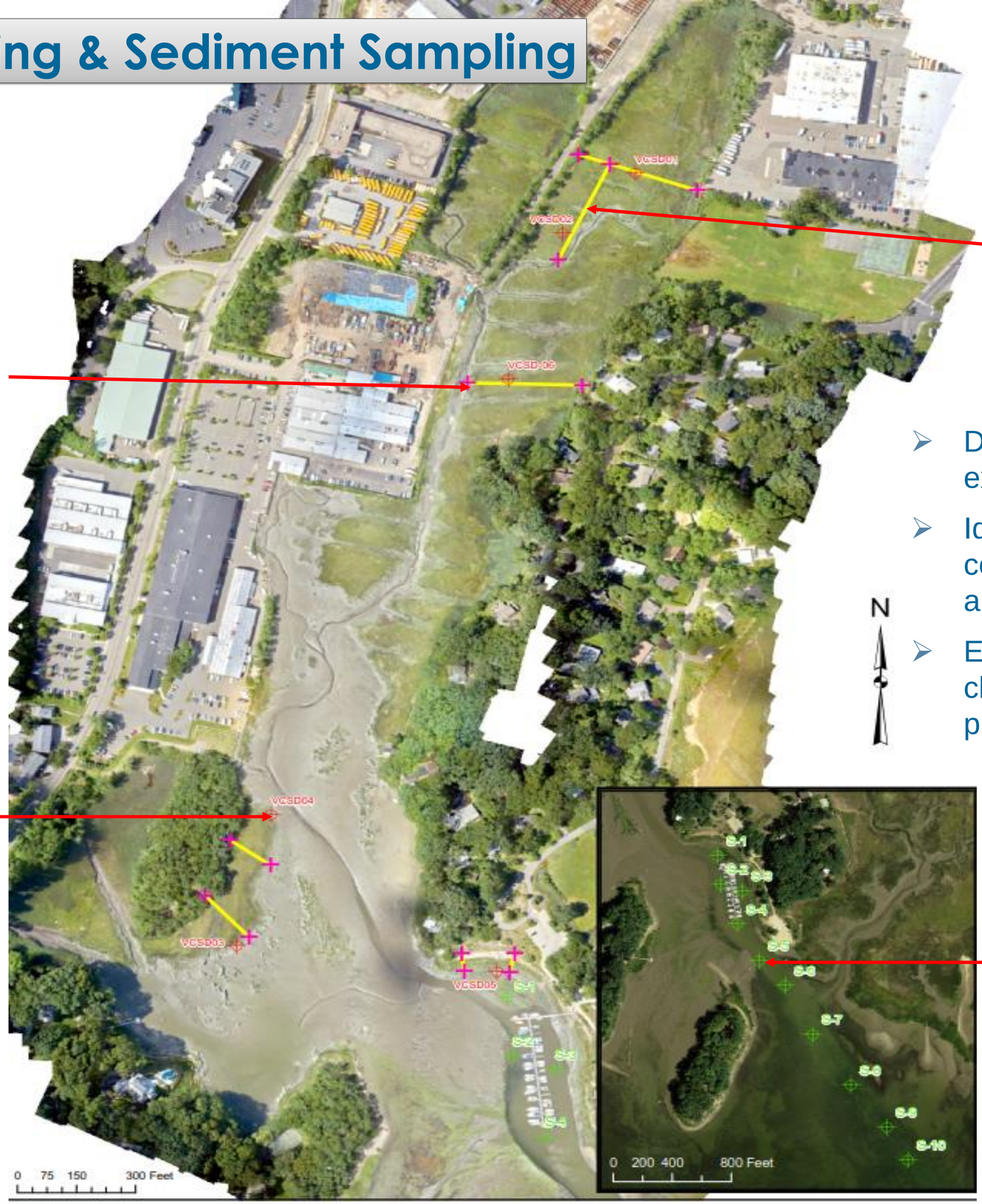
Bio-benchmarking & Sediment Sampling

Biobenchmark Terminus (staked)

Biobenchmark Transect

Marsh Soil Sample Location

Dredge Area Sample Location



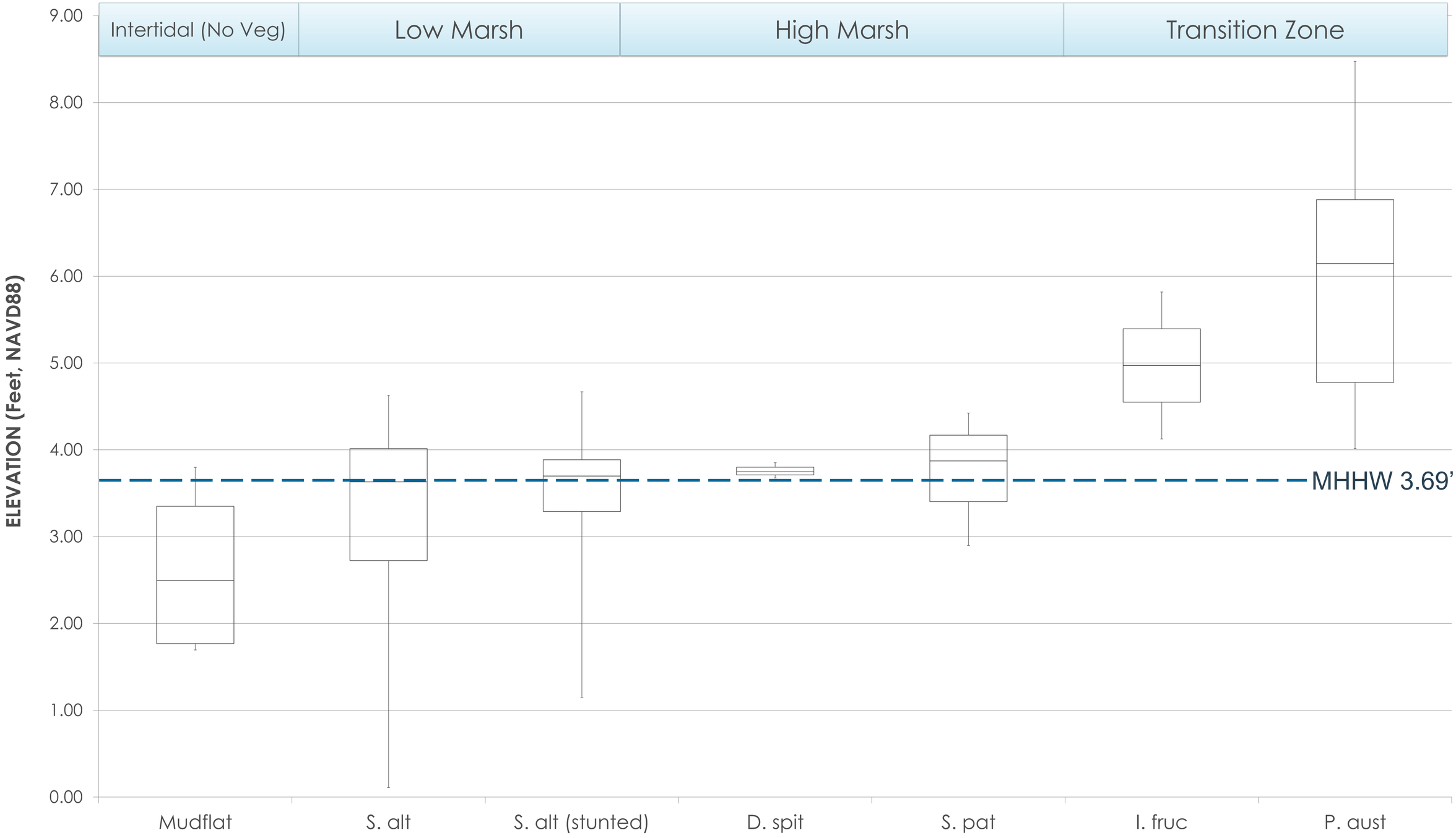
- Derive zones (elevation ranges) of existing vegetation communities
- Identify dominant plant communities every 3 feet along each transect
- Evaluate marsh soil for ambient chemical (pollutant) quality and physical characteristics

Bio-benchmarking

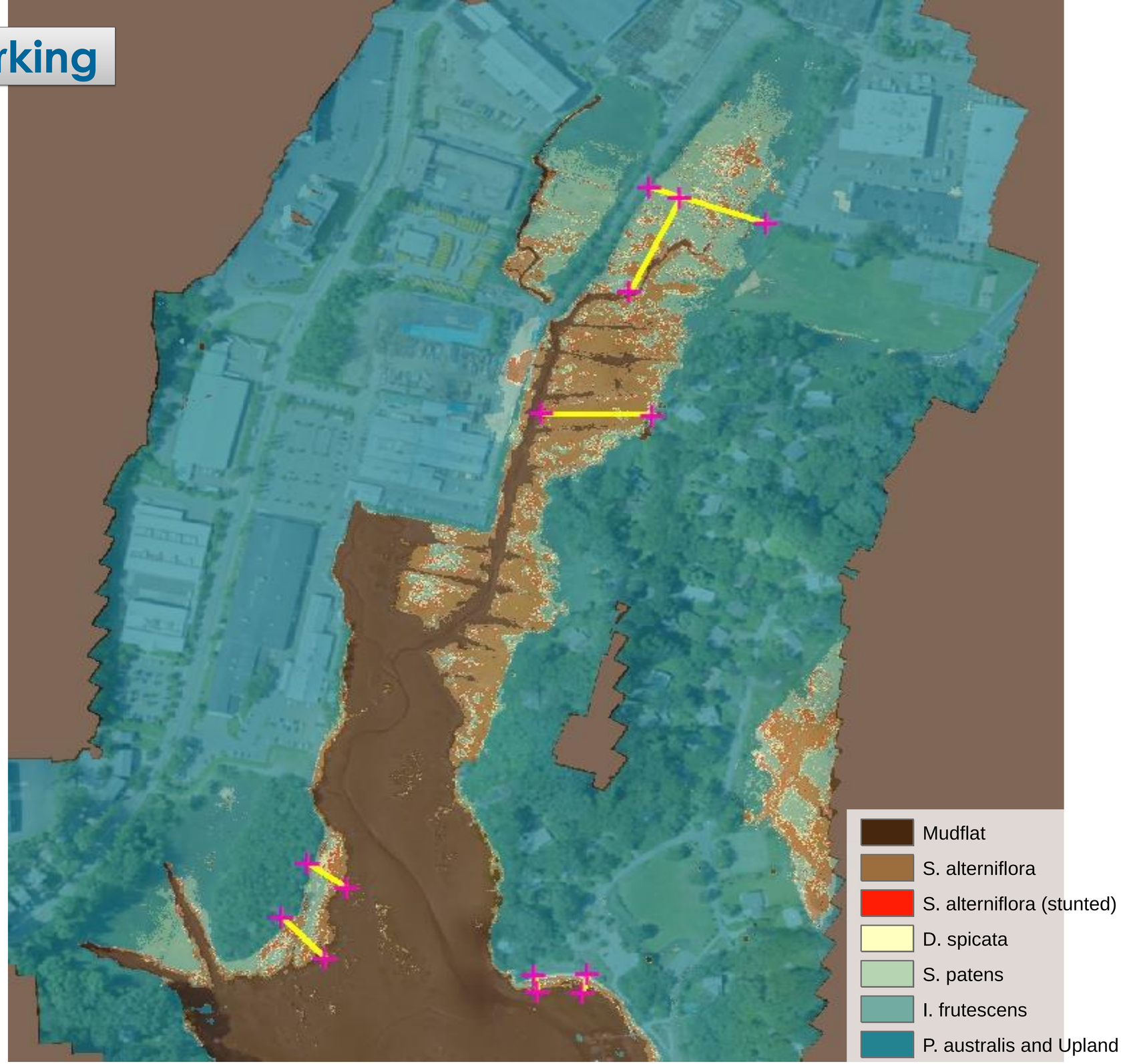
Bio-benchmarking

Vegetation Distribution by Elevation

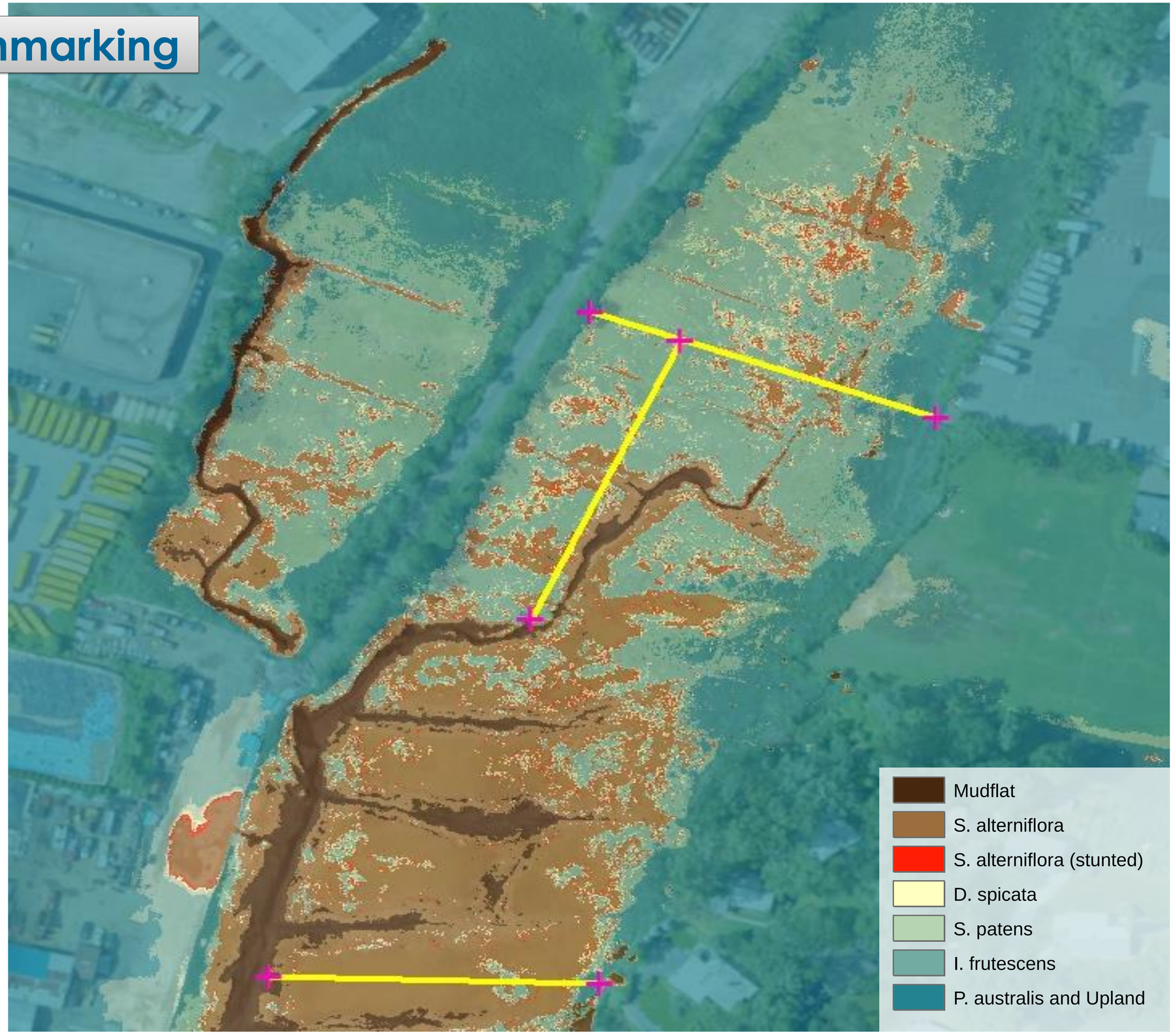
Village Creek Salt Marsh, Norwalk, CT



Bio-benchmarking



Bio-benchmarking

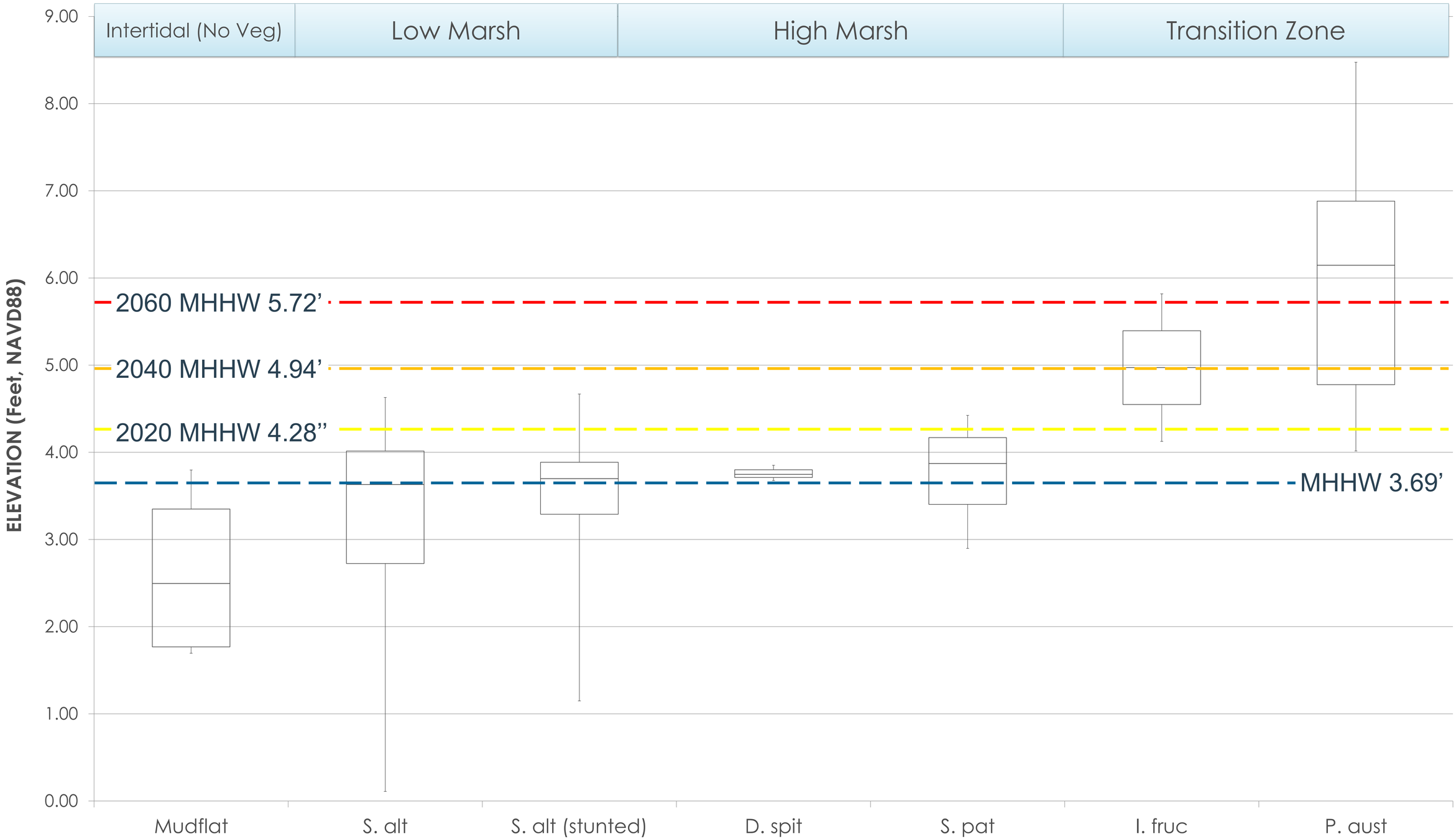


Bio-benchmarking

Vegetation Distribution Relative to Sea Level Rise

(Intermediate Scenario by NOAA @ Bridgeport Harbor)

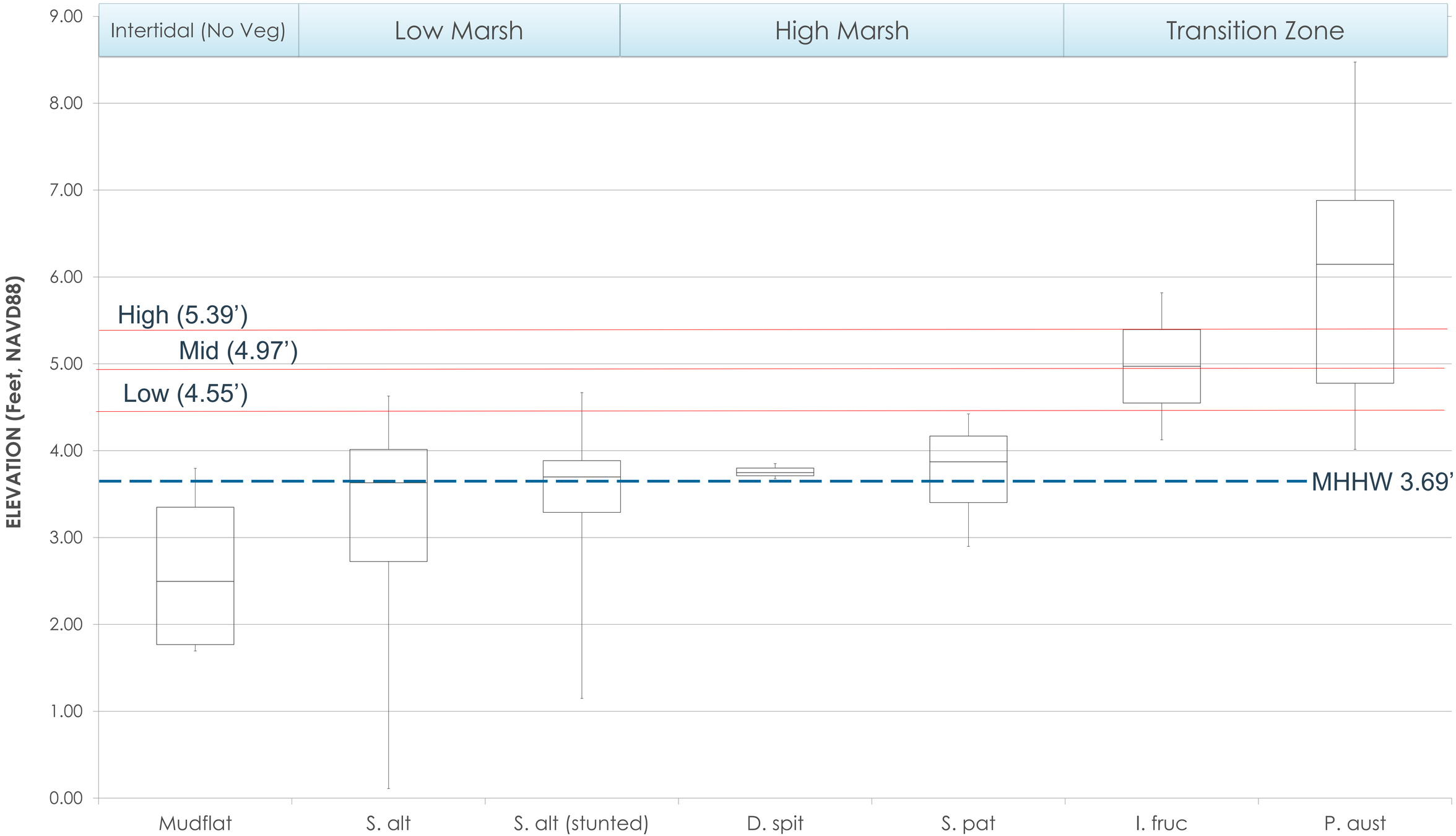
Village Creek Salt Marsh, Norwalk, CT



Bio-benchmarking

Target Elevations Based on Vegetation

Village Creek Salt Marsh, Norwalk, CT



Sediment Sampling & Analysis

FUSS & O'NEILL

Summary of Sediment Sampling Results

Village Creek Tidal Marsh, Norwalk, CT
July 2017

			Upper Village Creek Tidal Marsh			Norwalk Land Trust (250 Wilson Ave)		Village Creek Harbor (Yacht Basin)	Outer Marina	Inner Channel	Outer Channel	Inner Marina	
	ResDEC	**IC DEC**	**VCSD-01**	**VCSD-02**	**VCSD-06**	**VCSD-03**	**VCSD-04**	**VCSD-05**	**DR-S1S2S4**	**DR-S5S6S7S8**	**DR-S9S10S11**	**DR-S3**	**Average**
			699063017-01	699063017-02	699063017-06	699063017-03	699063017-04	699063017-05	Comp-5988	Comp-5989	Comp-5990	Comp-5991	
Miscellaneous Parameters													
pH	NE	NE	6.79	6.93	6.90	7.05	6.88	7.70					
Total Organic Carbon (mg/kg)	3.00	NE	29,000.00	48,000.00	51,000.00	44,000.00	46,000.00	15000.00	45,100.00	33,300.00	32,000.00	15,300.00	
Particle Size Description	NE	NE	Fine Sanday	Fine Sandy	Fine Sandy	Fine Sandy	Fine Sandy	Fine Sandy	Silt	Silt	Silt	Silt	
Metals (mg/kg)													
Silver	340	10,000	ND	2.0	ND	ND	ND	ND	ND	NA	NA	NA	
Arsenic	10	10	**11.0**	**20.1**	**8.3**	5.5	9.2	1.99	**10.8**	**10.1**	**11.5**		
Barium	4,700	140,000	67.9	68.7	46.9	44.8	69.0	22.4	NA	NA	NA		
Cadmium	34	1,000	ND	7.7	ND	ND	ND	ND	ND	0.36	ND	ND	
Chromium	100	100	95.8	**141.0**	**53.5**	41.2	67.5	17.5	49.3	46.0	49.3		
Copper	2,500	76,000	NA	NA	NA	NA	NA	NA	NA	113.0	94.9	108.0	
Mercury	20	610	0.43	0.81	0.43	ND	ND	ND	0.27	0.19	0.19		
Lead	400	1,000	177	271	1160	24.1	71.4	12.5	48.3	35.8	35.9	26.8	36.7
Selenium	340	10,000	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	
Zinc	20,000	61,000	NA	NA	NA	NA	NA	NA	134	111	114	111	117.5
Semivolatile Organic Compounds (ug/kg)													
Acenaphthene	1,000,000	2,500,000	ND	ND	ND	ND	ND	ND	10	ND	9	ND	9.5
Anthracene	1,000,000	2,500,000	ND	ND	ND	ND	ND	ND	38	26	31	17	28
Benz(a)anthracene	1,000	7,800	ND	ND	ND	ND	ND	ND	118	85	93	57	88
Benzo(a)pyrene	1,000	1,000	ND	ND	ND	ND	ND	ND	146	100	105	72	106
Benzo(b)fluoranthene	1,000	7,800	ND	ND	ND	ND	ND	ND	226	152	151	109	160
Benzo(g,h,i)perylene	1,000,000	2,500,000	ND	ND	ND	ND	ND	ND	135	102	82	53	93
Benzo(k)fluoranthene	8,400	78,000	ND	ND	ND	ND	ND	ND	97	50	77	44	67
Chrysene	8,400	78,000	ND	ND	ND	ND	ND	ND	208	137	1630	94	517
Dibenz(a,h)anthracene	1,000	1,000	ND	ND	ND	ND	ND	ND	20	ND	13	ND	17
Fluoranthene	1,000,000	2,500,000	ND	ND	ND	ND	ND	ND	389	251	282	170	273
Fluorene	1,000,000	2,500,000	ND	ND	ND	ND	ND	ND	16	12	17	7	13
Indeno(1,2,3-cd)pyrene	1,000	7,800	ND	ND	ND	ND	ND	ND	110	76	88	45	80
Phenanthrene	1,000,000	2,500,000	ND	ND	ND	ND	ND	ND	126	93	105	44	92
Pyrene	1,000,000	2,500,000	ND	ND	ND	ND	ND	ND	347	233	259	166	251
CT ETPH (mg/kg)	500	2,500	ND	190	ND	ND	ND	ND	NA	NA	NA	NA	
Polychlorinated Biphenyls (ug/kg)	1,000	10,000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

Notes:
NE = No Established criteria
NA = Not Analyzed
ND = Not Detected
Bolded values exceed ResDEC
Bolded and highlighted values exceed ResDEC and IC DEC

- Elevated concentrations of metals in salt marsh soils. Concentrations consistent with Harbor samples
- Low levels of PAHs in Harbor samples. Concentrations consistent with urban runoff
- Concentrations of parameters at the NLT and Village Creek Harbor shoreline consistently lower
- Repositioning of material from Harbor to salt marsh consistent with beneficial reuse and anti-degradation policies . This would need approval from DEEP Remediation Division

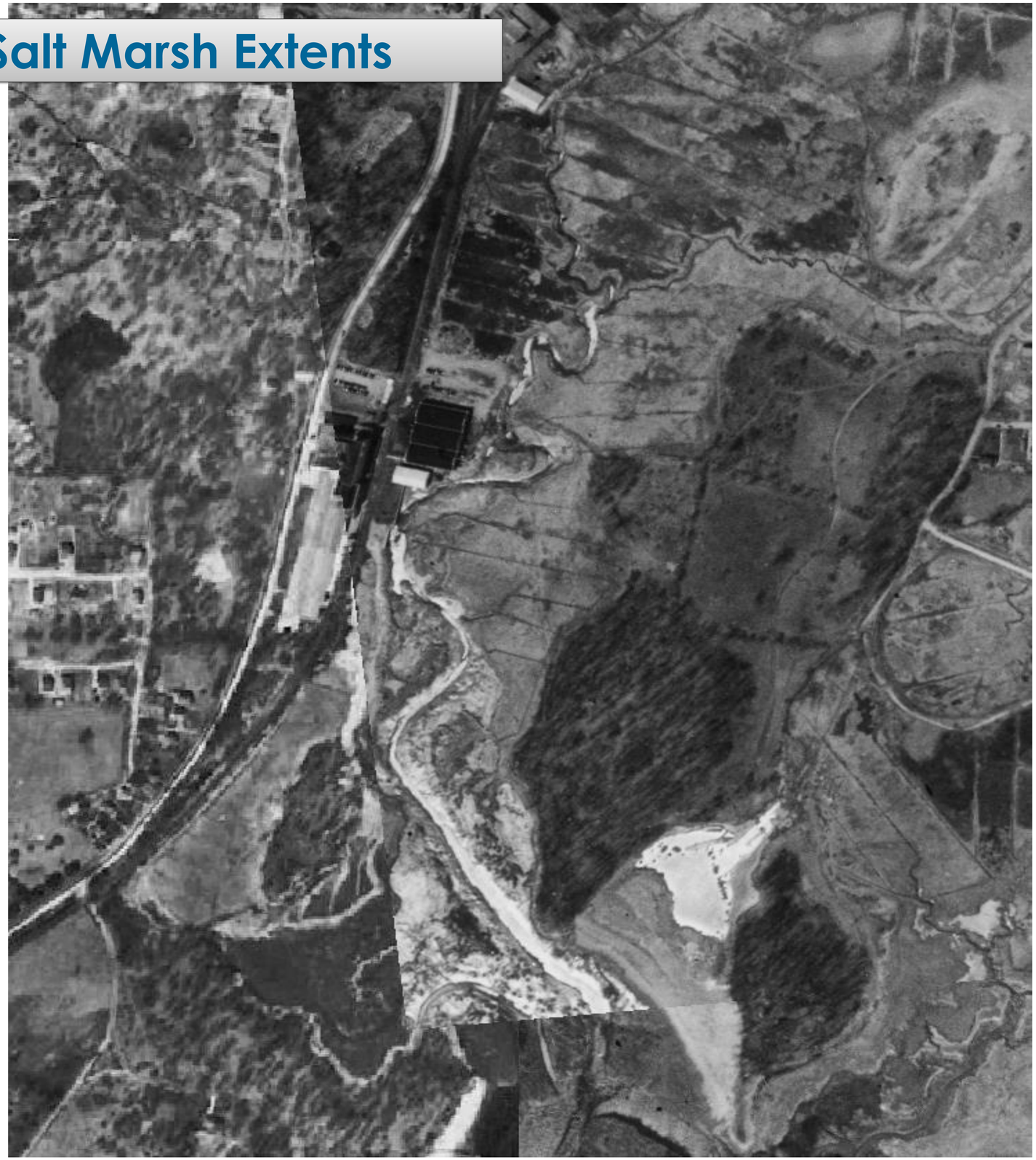
Challenges Associated with Thin Layer Deposition

Innovation: This type of project, while understood by DEEP in concept, has never been permitted (approved) and constructed in the state. Several departments within DEEP would need to review and approve of this plan.

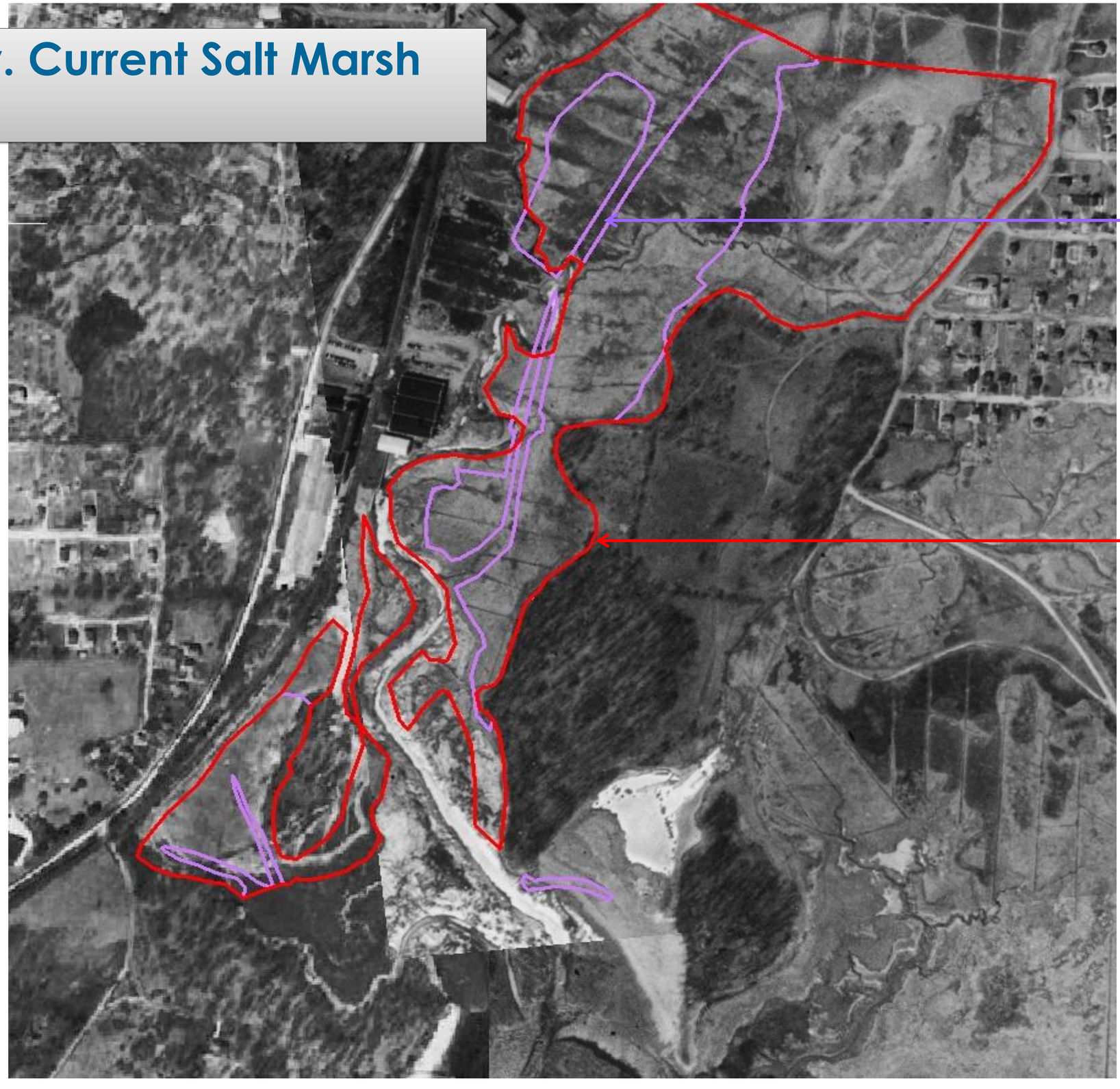
Regulatory Jurisdiction: Project will require permits from:
DEEP (former) Office of Long Island Sound
DEEP Remediation Division
U.S. Army Corps of Engineers
Norwalk Planning & Zoning Agency

Ownership: Actual ownership of the salt marshes need to be established and coordination with abutting landowners will be required

Historical Salt Marsh Extents

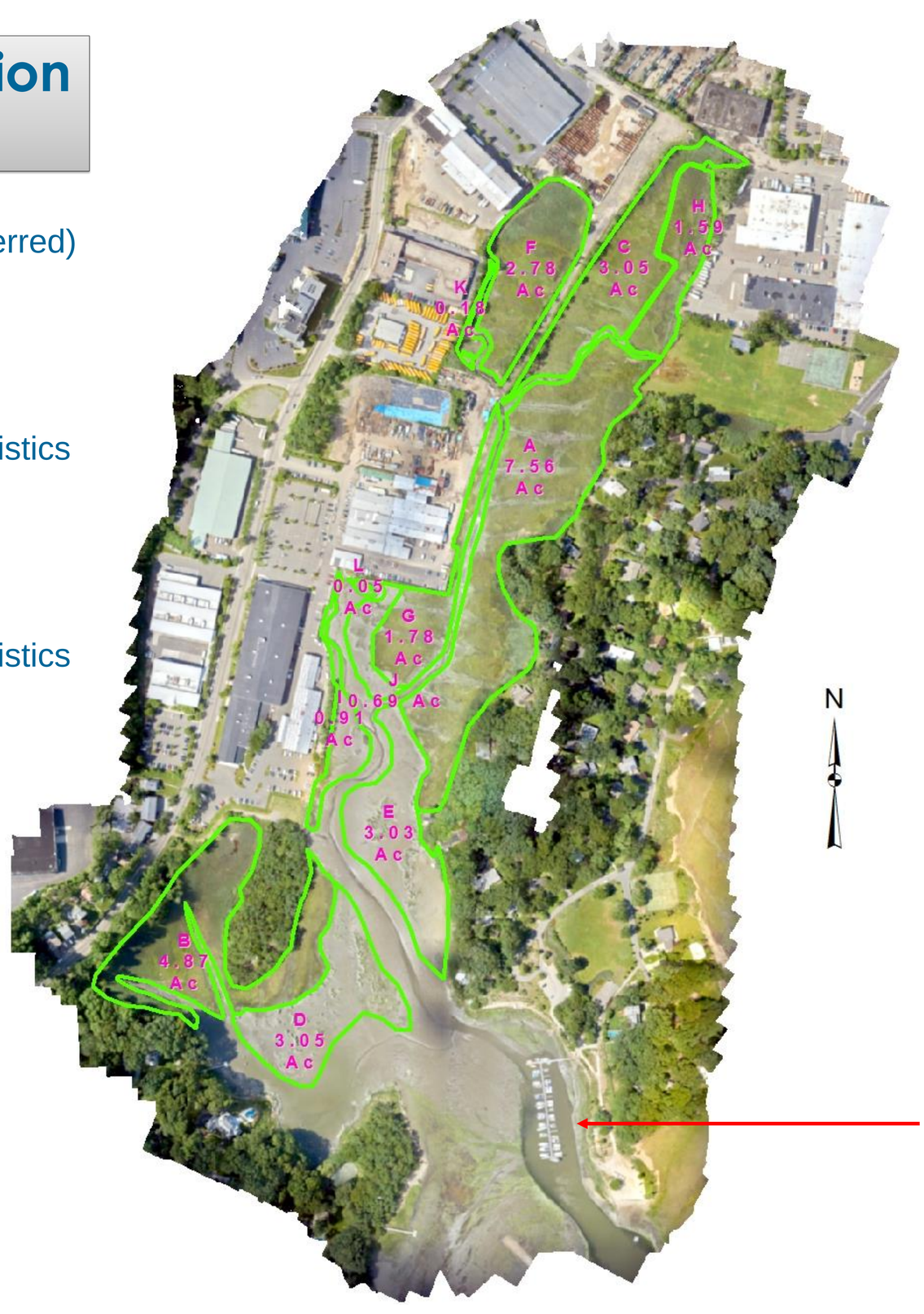


Historical v. Current Salt Marsh Extents



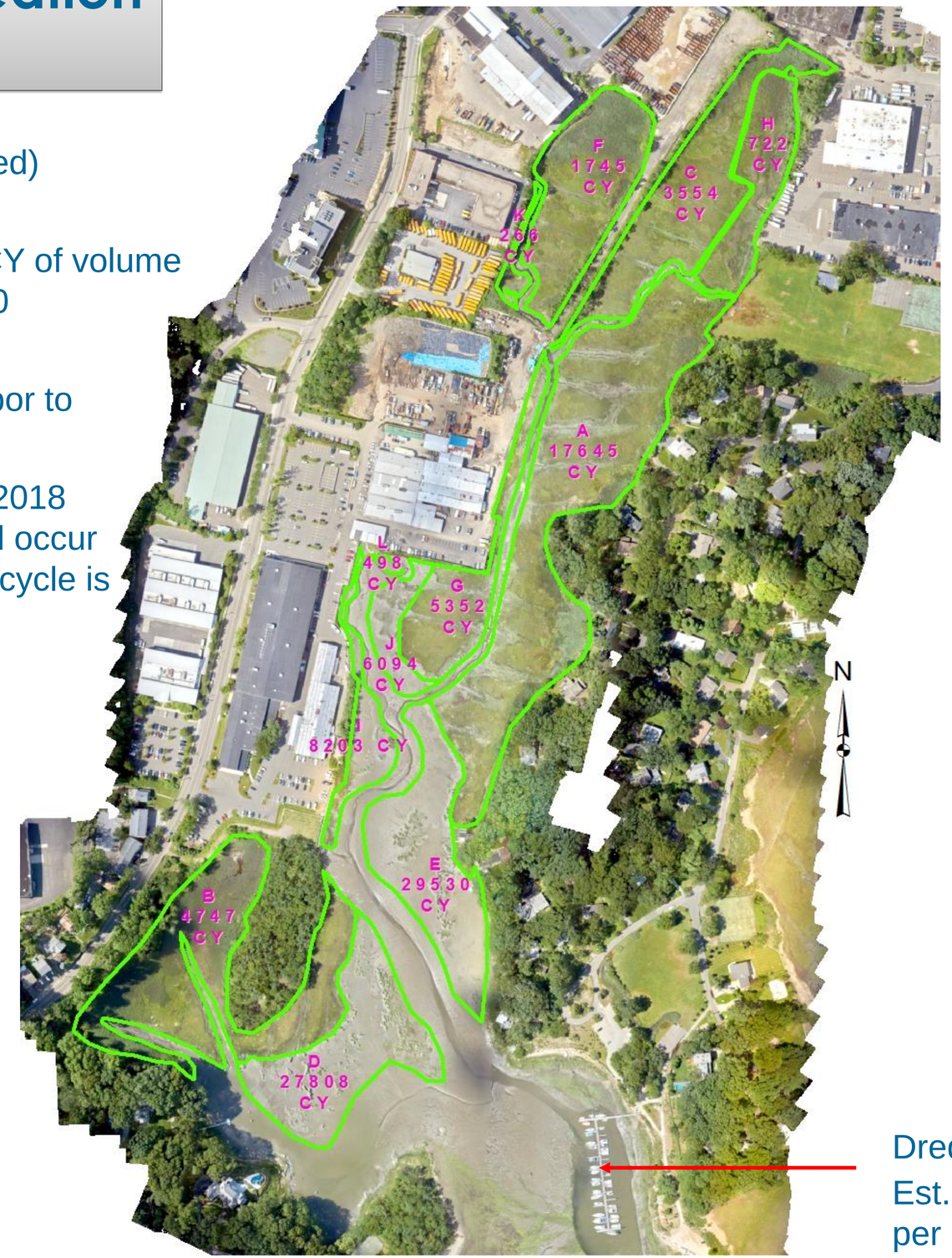
Salt Marsh Restoration/Creation Areas

- Identified 12 areas (A – L) for restoration (preferred) and/or creation
- Areas A, C, F, G, H & K
  - Offer +/- 17 acres for restoration
  - Sediment chemical and physical characteristics most similar to Harbor dredge material
- Areas E, J, L & I
  - Offer +/- 5 acres for creation
  - Sediment chemical and physical characteristics similar to Harbor dredge material
- Areas B & D
  - Offer +/- 8 acres for restoration or creation
  - Sediment chemical characteristics most dissimilar from to Harbor dredge material



Salt Marsh Restoration/Creation Areas

- Identified 12 areas for restoration (preferred) or creation (A – L)
- Areas A, C, F, G, H & K have +/- 29,000 CY of volume to the “Mid” elevation or approximate 2040 Sea Level Rise elevation (4.97’)
- Difficulty will be getting material from Harbor to salt marshes
- Conventional dredging will occur in 2017/2018 season. The next cycle of dredging would occur in 6 to 8 years (2024 to 2026) . This next cycle is the project timeframe for conducting the proposed salt marsh restoration.



Dredge Area:
Est. Volume = 15,000 CY per 5 years

Thin Layer Deposition Methodologies

Spray Application

- Larger volumes/areas
- Finer sediment
- Single process
- Common in South and Mid-Atlantic

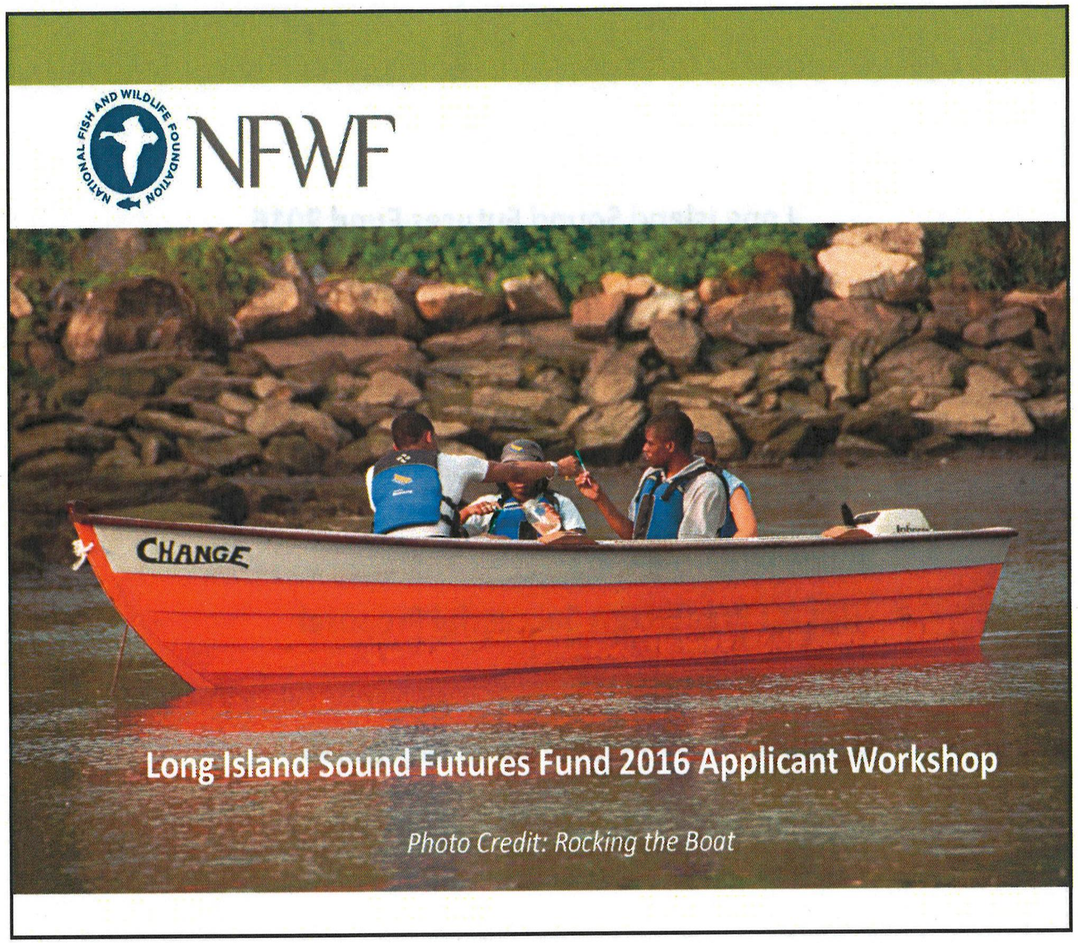
Mechanical Spread Application

- Smaller volumes/areas
- Coarser sediment
- Multi-step process
- Used in Rhode Island

Thin Layer Deposition Results (Post-Construction)

Thin Layer Deposition Results (Year 1)

We would like to acknowledge contributions from Norwalk residents and business owners.



The Maritime Aquarium AT NORWALK

NORWALK LAND TRUST
Preserving Our Open Space

CIRCA
Connecticut Institute for Resilience and Climate Adaptation

FUSS & O'NEILL

AIRSHARK

QUESTION & COMMENTS