Community Patterns after 5 Years of Salt Marsh Restoration in the Upper Bay of Fundy

By: **Allen Beck**[1], Laura Boone[1], Myriam Barbeau[1] and Nic McLellan[2]

[1]University of New Brunswick

[2] Ducks Unlimited Canada

Salt marshes

- Land that borders the Ocean

- Along sheltered shores

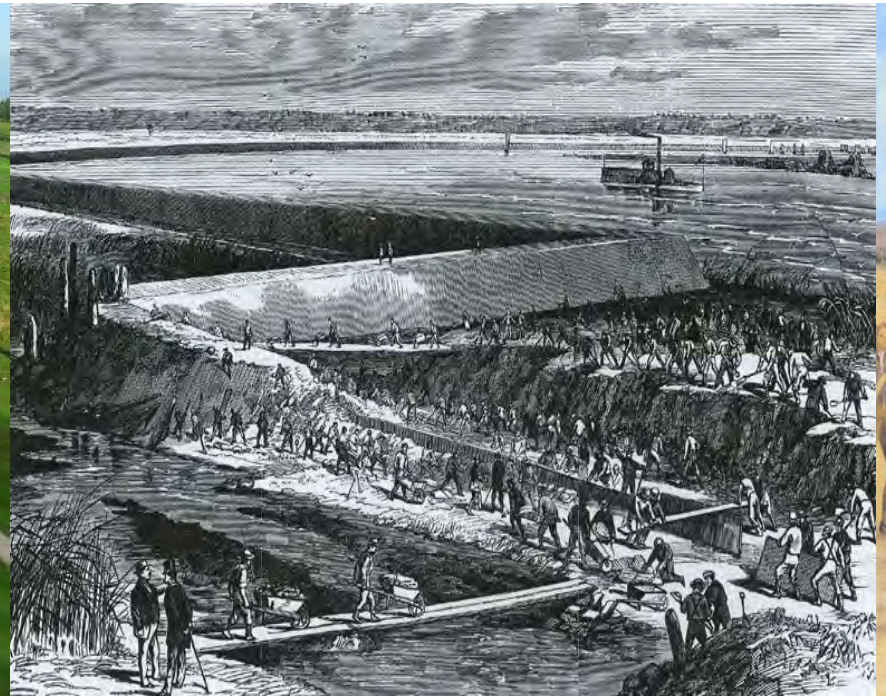
- Dense plant growth → slow moving water

History

- Long history in Maritimes because of highly productive soils

- Estimated 65% Atlantic Canadian marshes have been lost
    - Bay of Fundy → 85%


Golfnovascotia.com



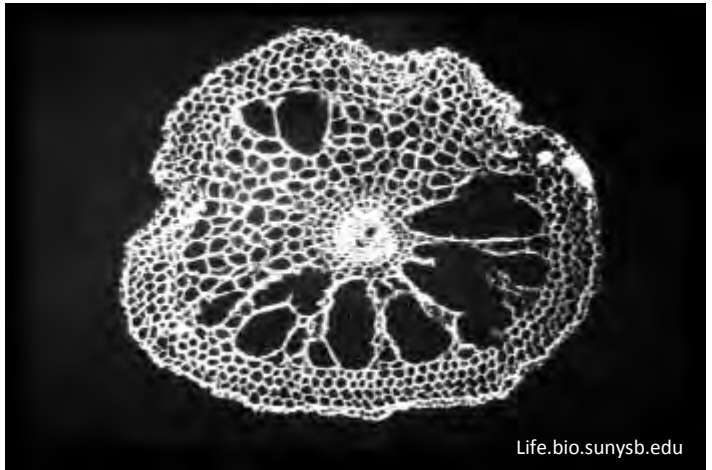

madawaskahistorical.org

Salt marsh benefits

- Carbon sink
- Storm buffering
- Erosion control
- Nutrient loading
- Habitat for various species

Spartina alterniflora – the engineer

High tolerance to salinity
<u>+ High tolerance to anoxic soil conditions</u>
= Great colonizing species

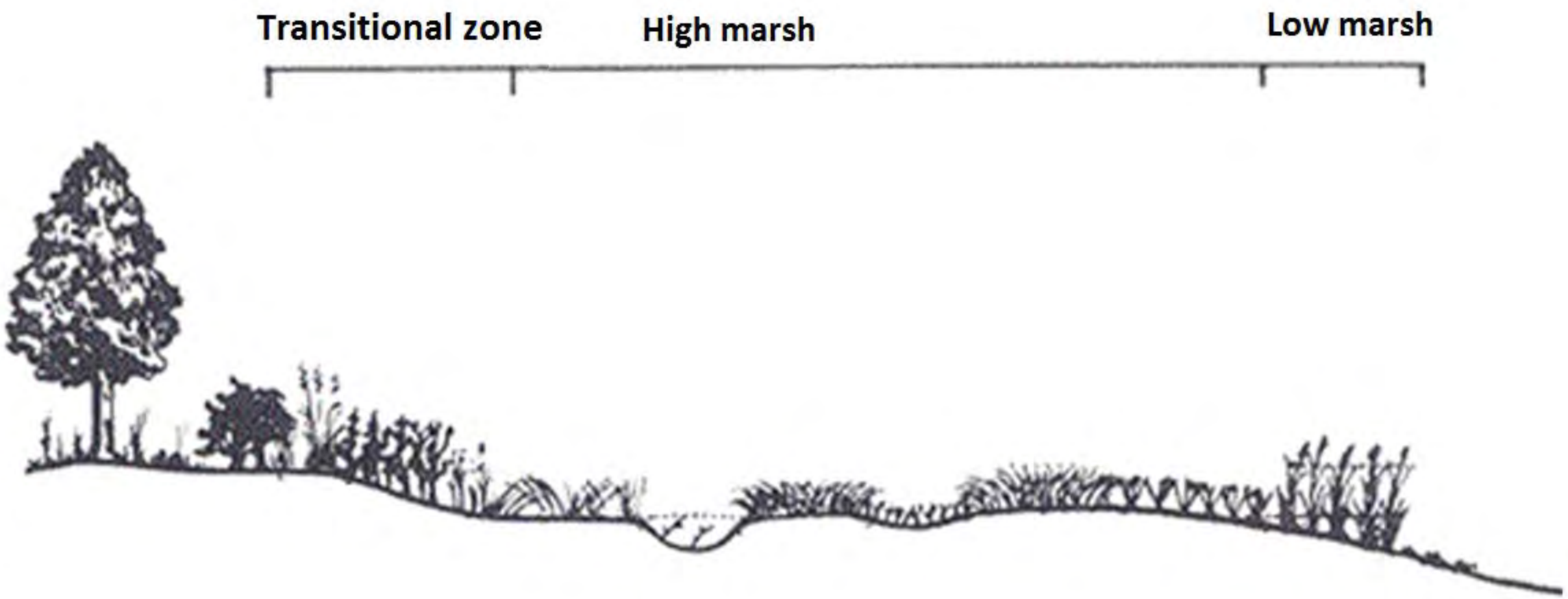


Spartina alterniflora – the engineer

- Surface roots
- Prop roots
- Rhyzomes
  - Allows colonization of zones of poor conditions

➢Stabilizing sediments
➢Aerating sediments

Salt marsh structure

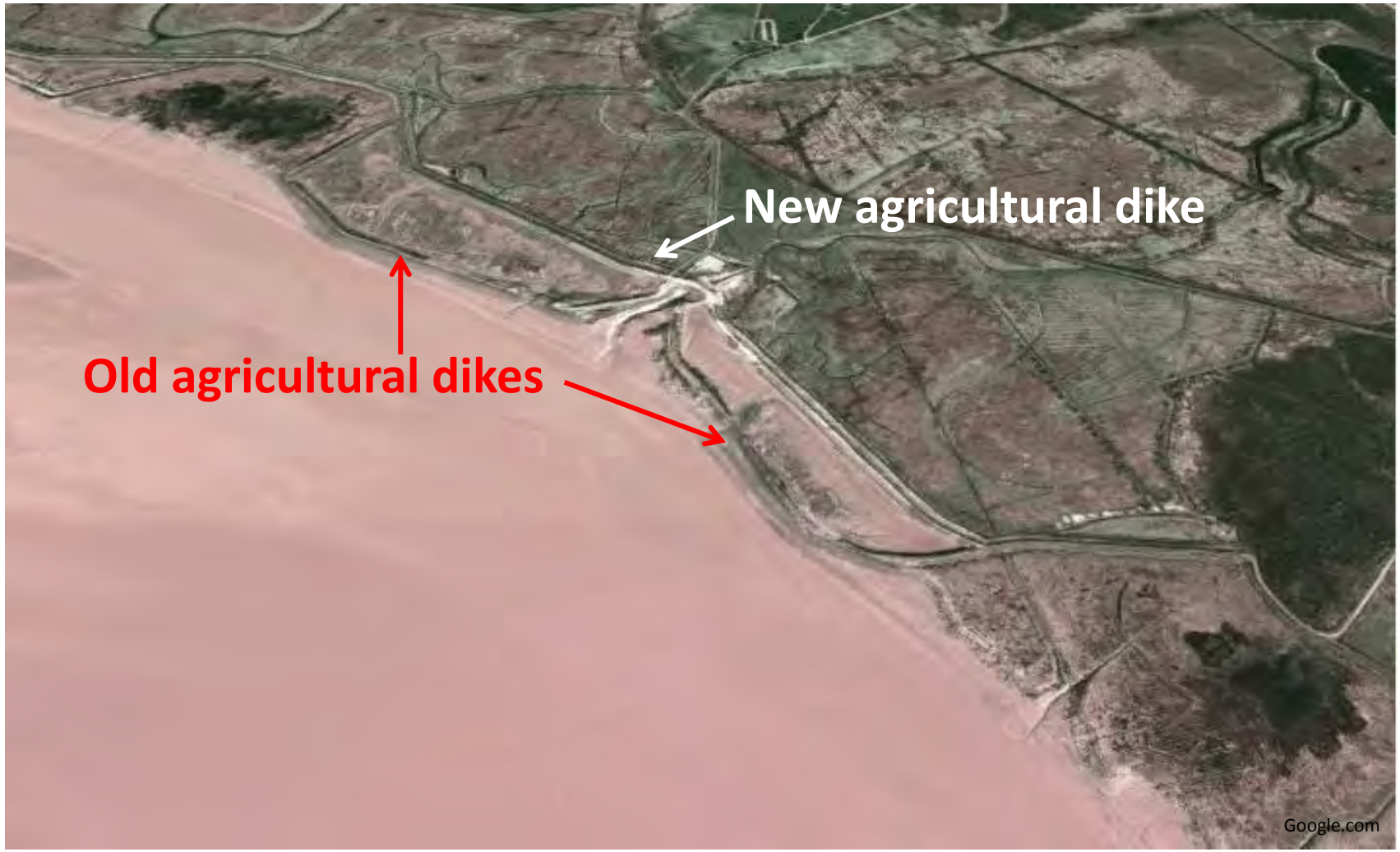


Maineflyfish.com

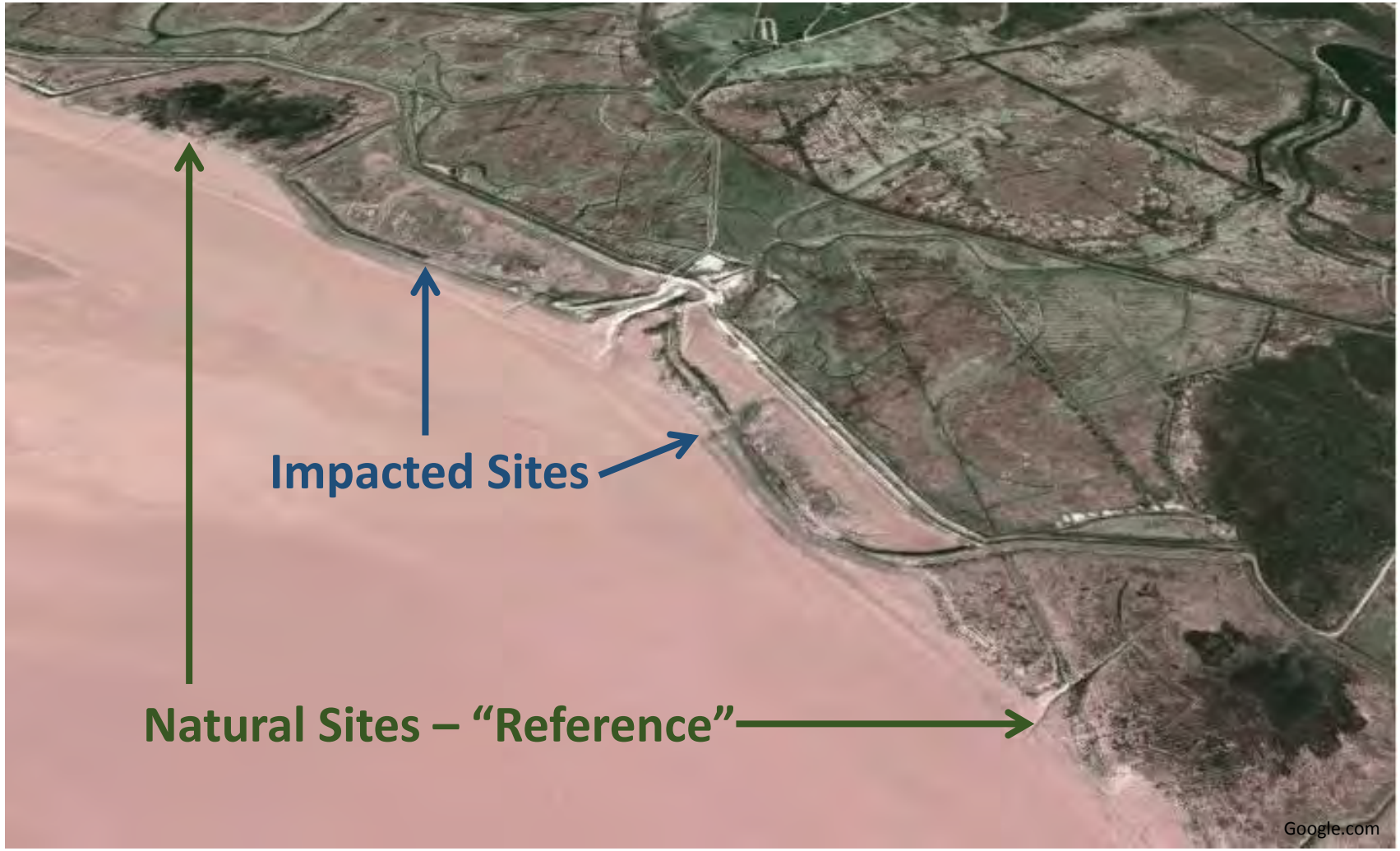

high marsh
low marsh
Spartina patens
Spartina alterniflora
Esa.org

The project at Aulac

The project at Aulac



The project at Aulac

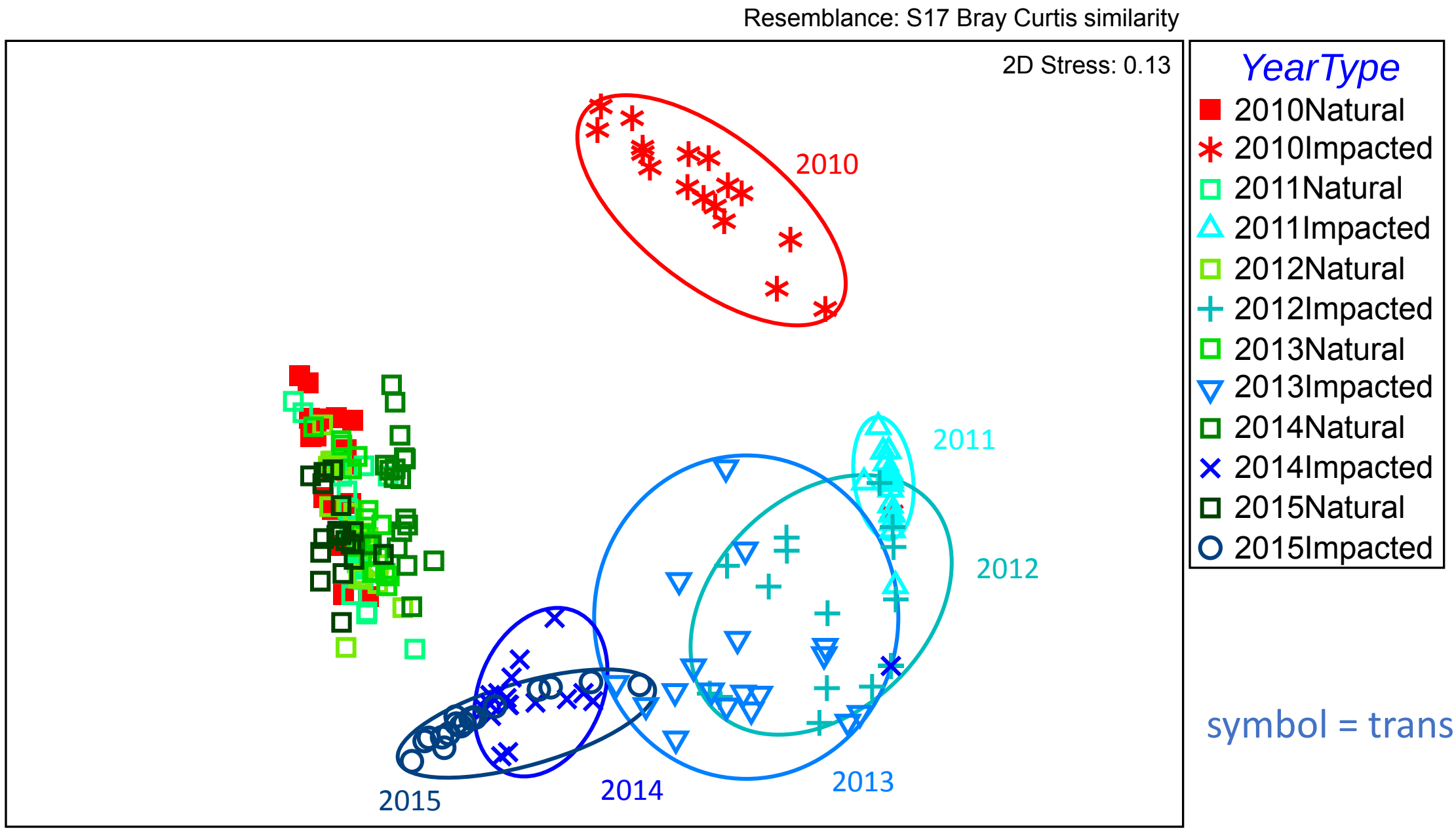


Sampling

- 4 sites
  - -Natural West/East
  - -Impacted West/East
- 3 transects per site
- 15 quadrats per transect

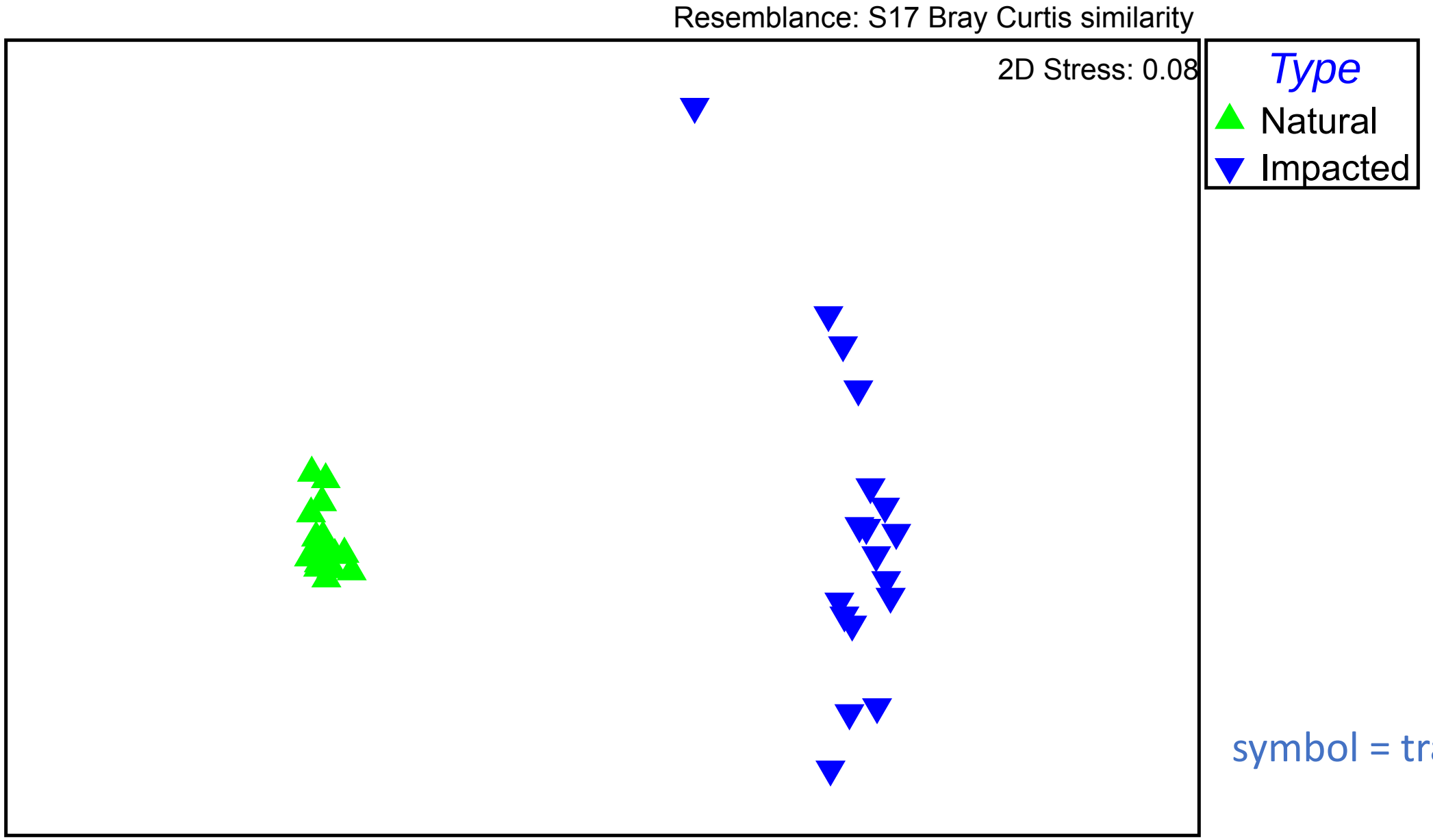
- Densities of all emergent plant and invertebrates measured
- Each sampled annually since 2010 (June – August)
- 6 years of data

nonparametric Multidimensional Scaling plot (nMDS)



symbol = transect

2010 – Pre-breach



symbol = transect

Natural

Dike edge

Water edge

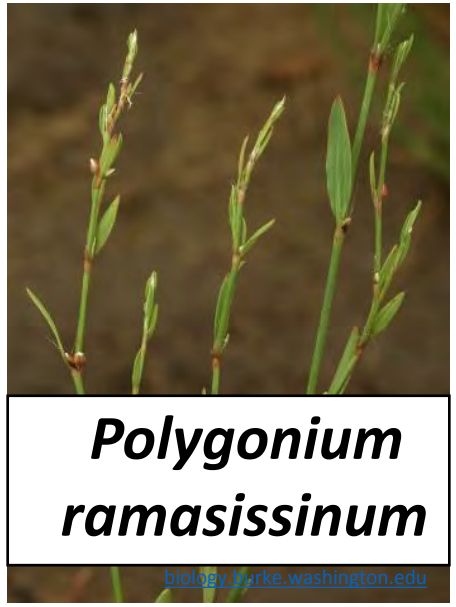
Impacted

Dike edge

Water edge

Achillea millefolium

gobotany.newenglandwild.org

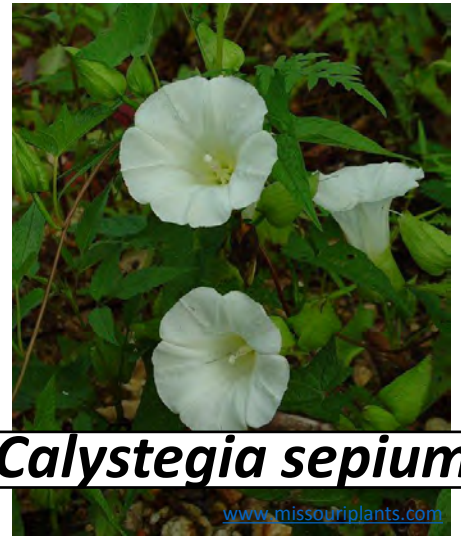


Polygonium ramasissinum

biology.burke.washington.edu

***Solidago* sp.**

ed.nasullivan.wordpress.com



Calystegia sepium

www.missouriplants.com

Spartina pectinata

illinoiswildflowers.info

Fragaria virginiana

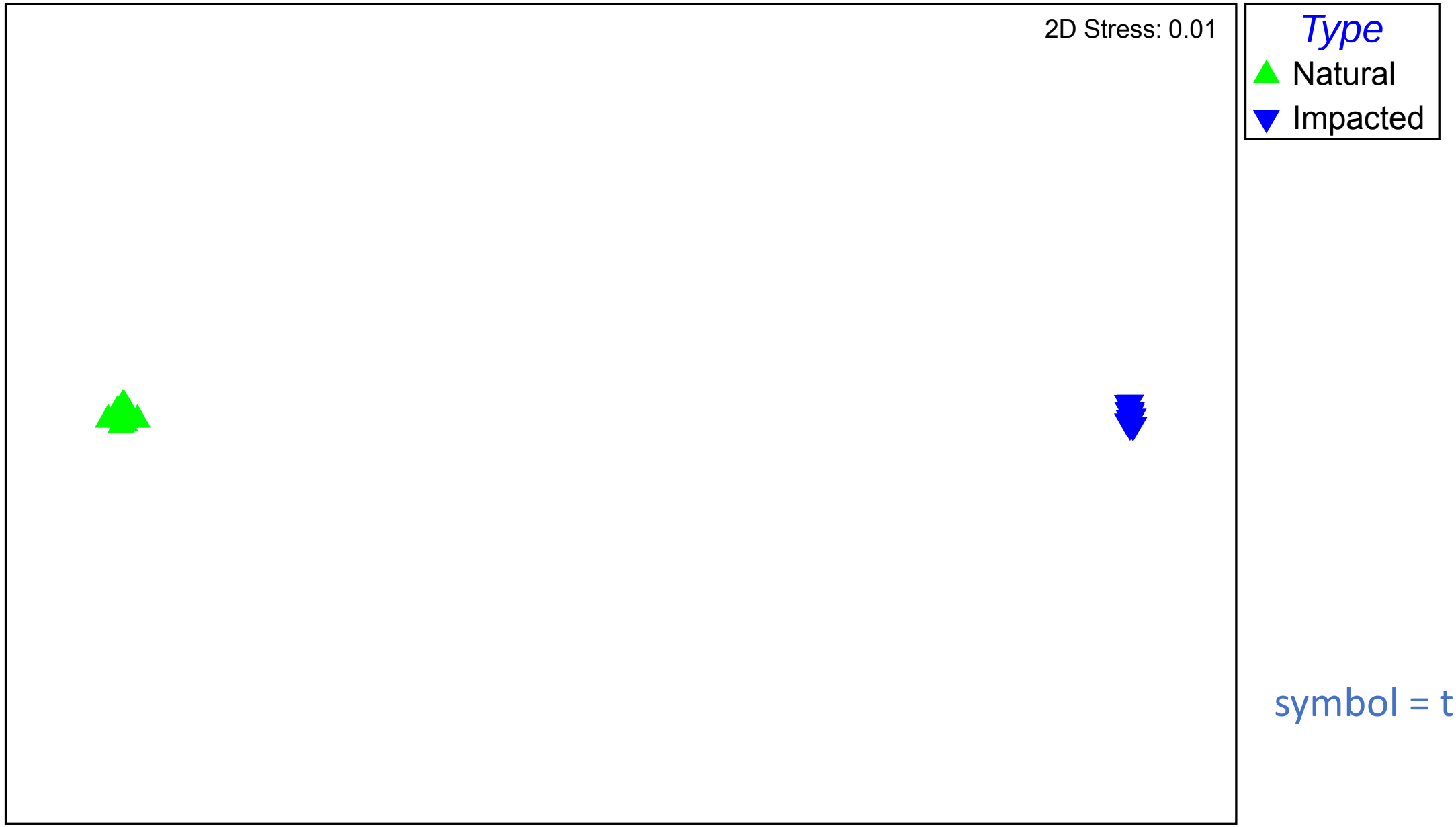
gobotany.newenglandwild.org

Polypodiophyta

pixabay.com

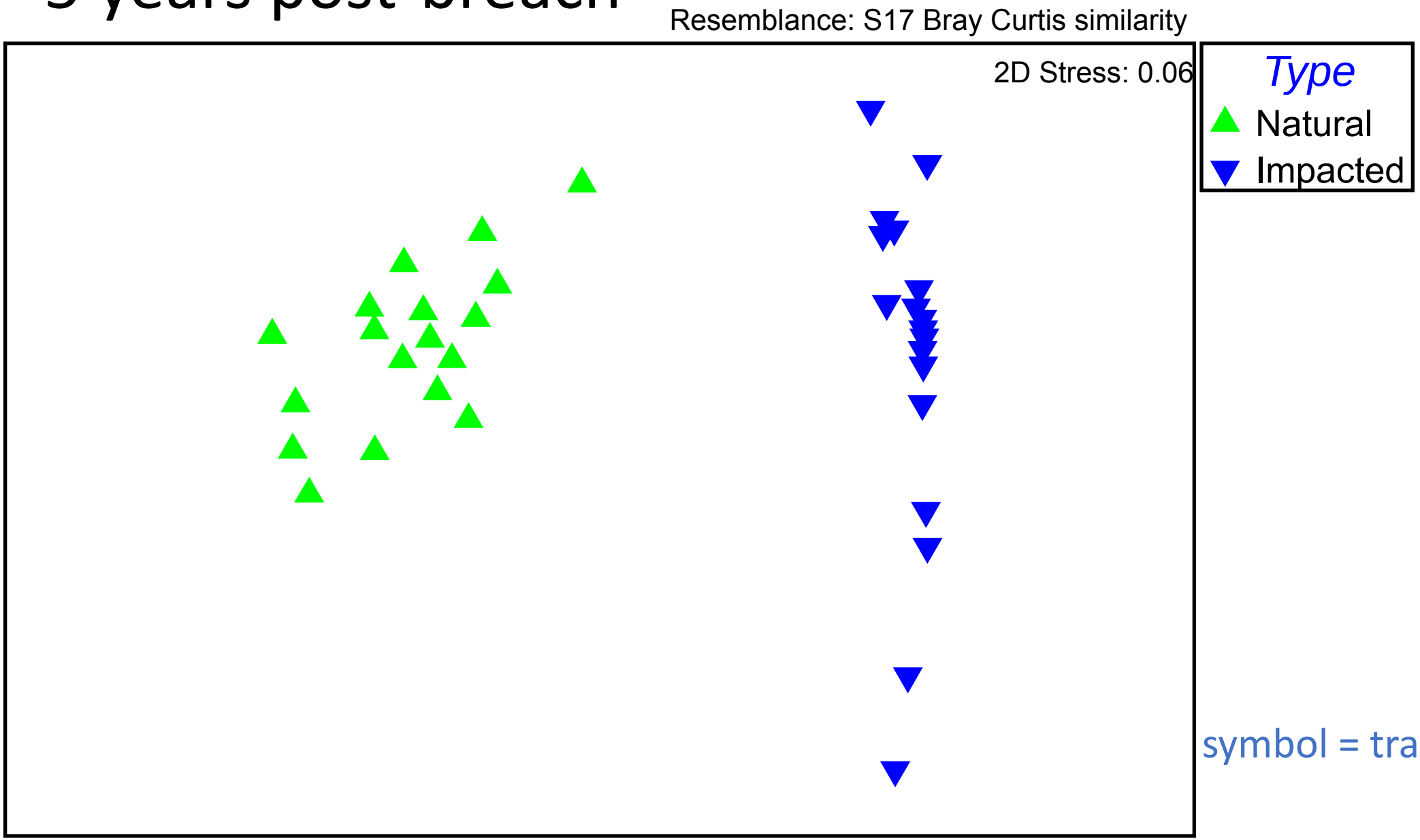
2011 – 1 year post-breach

Resemblance: S17 Bray Curtis similarity



symbol = transect

2015 – 5 years post-breach



symbol = transect

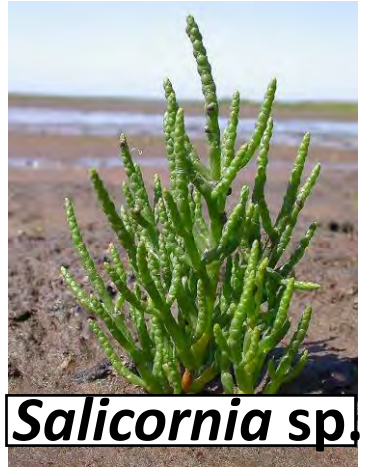
Natural

Dike edge

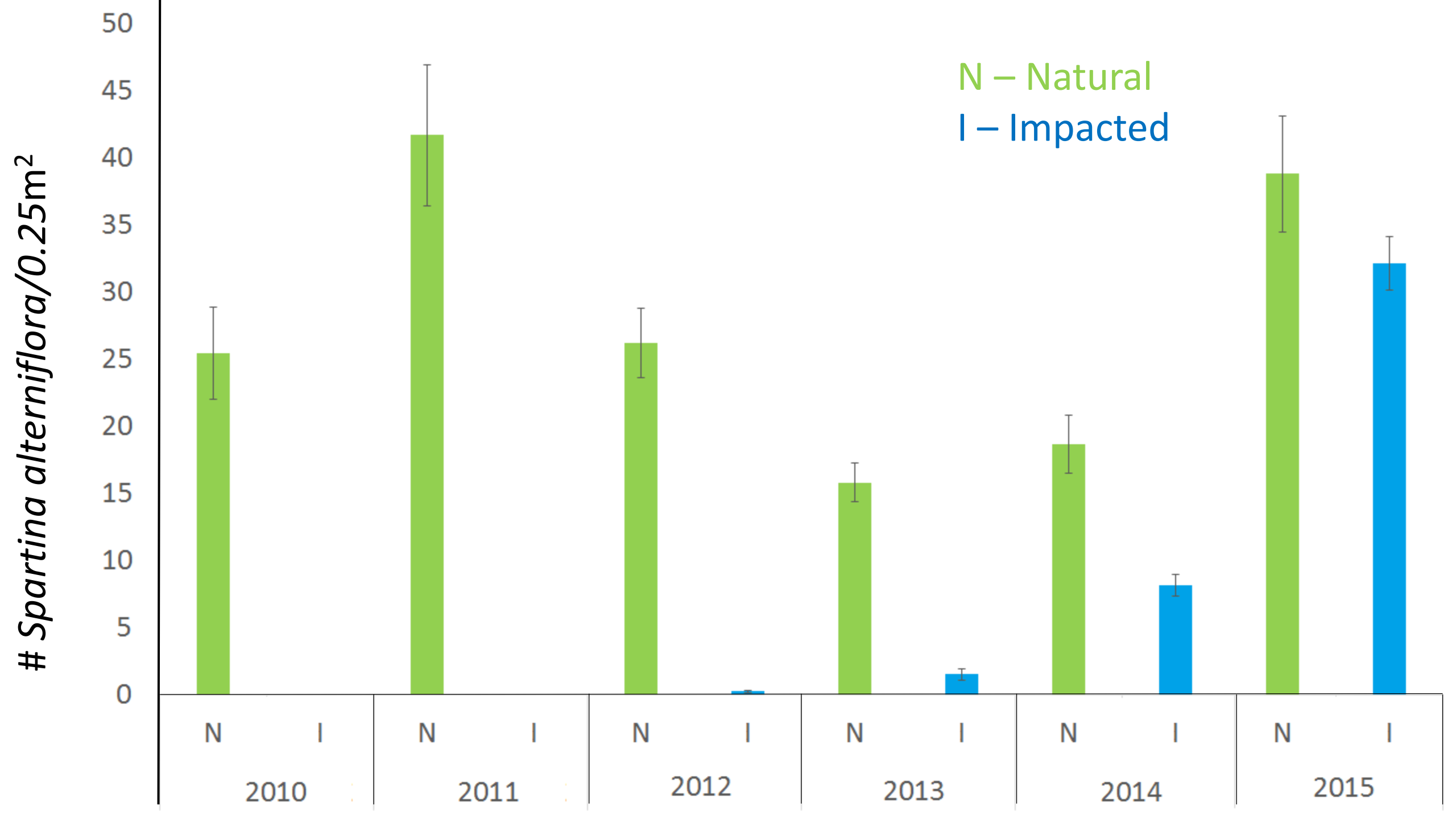
Water edge

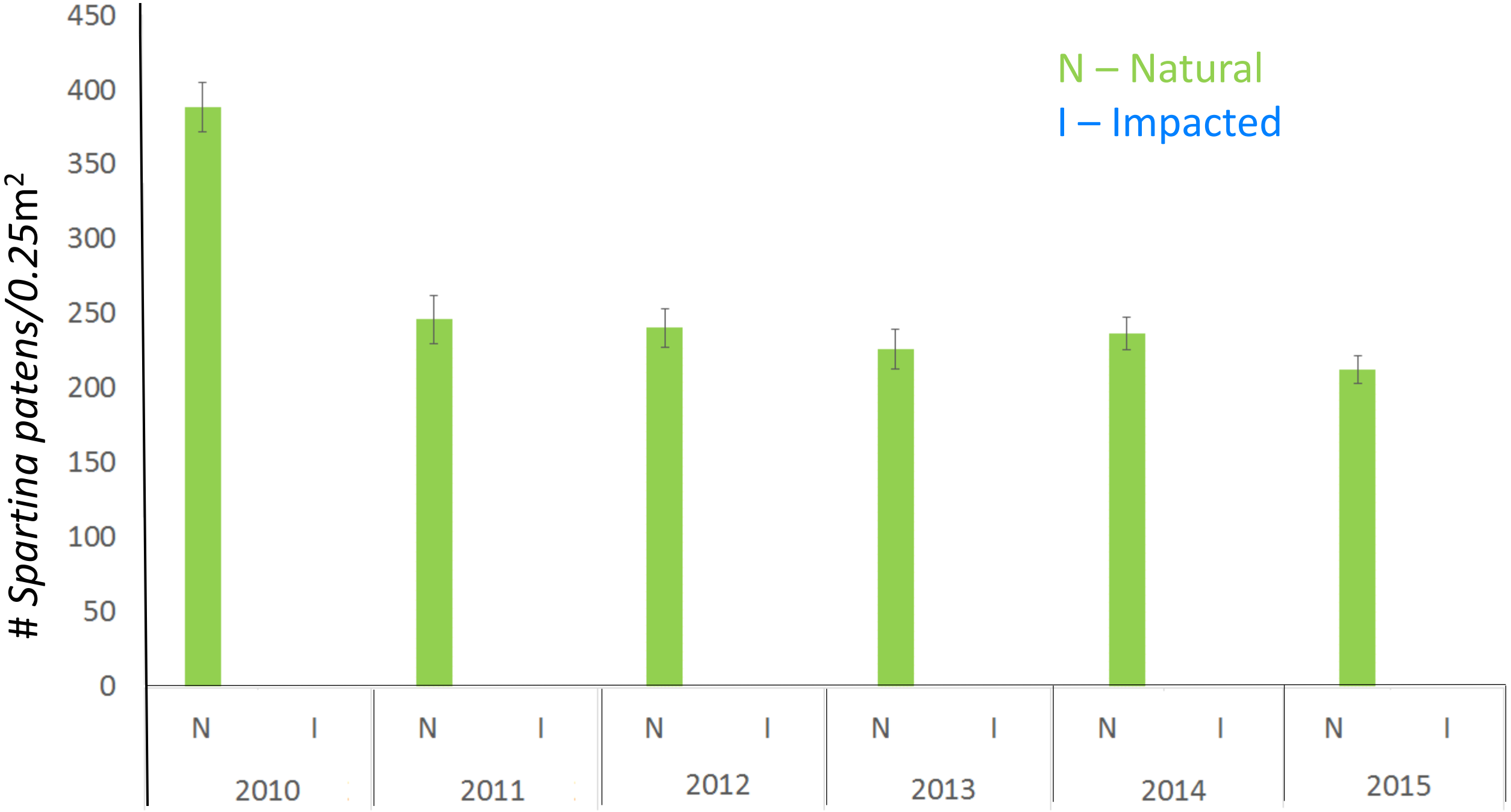
IMPACT

Dike edge



Water edge


N – Natural
I – Impacted
Spartina alterniflora/0.25m2
50
45
40
35
30
25
20
15
10
5
0
N
I
2010
2011
2012
2013
2014
2015


N – Natural
I – Impacted
Spartina patens/0.25m2
450
400
350
300
250
200
150
100
50
0
N
I
2010
2011
2012
2013
2014
2015


Oct 19, 2015
Courtesy of Sebastian Richard

Conclusions and expectations

- Community structure at impacted sites becoming similar to natural sites
  - *S. alterniflora* effectively spreading throughout impacted sites
  - Still no *S. patens* present in impacted sites
- We expect *S. patens* to establish itself in the impacted sites once the marsh elevation is high enough (due to sedimentation)
- In the upper Bay of Fundy, salt marsh restoration requires more than 5 years

Thanks to:

Sara Stewart
Cody Alderson
Rachel Bood
Kelsey Mann
Dylan Schneider
Lionel Hayter
Isaac Thomas
Spencer Virgin
Allison Dykstra
Conner Sceviour
Wade Lewis

Ducks Unlimited

UNB

Mitacs Accelerate

NSERC CRSNG

Service Canada

Acadia University

Mount Allison University

Fisheries and Oceans Canada / Pêches et Océans Canada

New Nouveau Brunswick

Dep. Agriculture, Aquaculture, Fisheries
Dep. Natural Resources
Dep. Transport and Infrastructure
Dep. Post Secondary Education and Training