INTERTIDAL SEAGRASS RESTORATION IN THE SOLENT: First steps with the dwarf seagrass *Nanozostera noltei*.

A project funded by the Solent Forum's Natural Environment Group (NEG) and supported by Chichester Harbour Protection and Recovery of Nature (CHaPRoN)

SEMS
Solent European Marine Sites

Natural Environment Group (NEG) Project Bidding Pro Forma

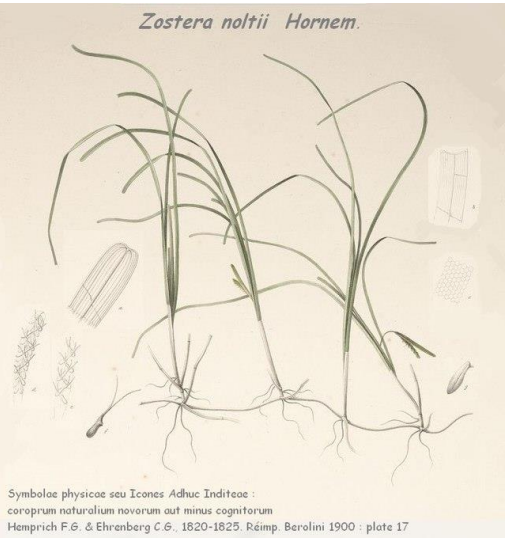
THE SOLENT FORUM
Working in partnership for the future

CHICHESTER HARBOUR
PROTECTION & RECOVERY OF NATURE

FRIENDS OF CHICHESTER HARBOUR

What is seagrass?

- Aquatic Flowering Plants that look like grasses but are more closely related to…..?
- 50-60 species worldwide. How many in the UK?
- What do they need?
- Create conditions to make habitat better for themselves by trapping sediment and improving water clarity!

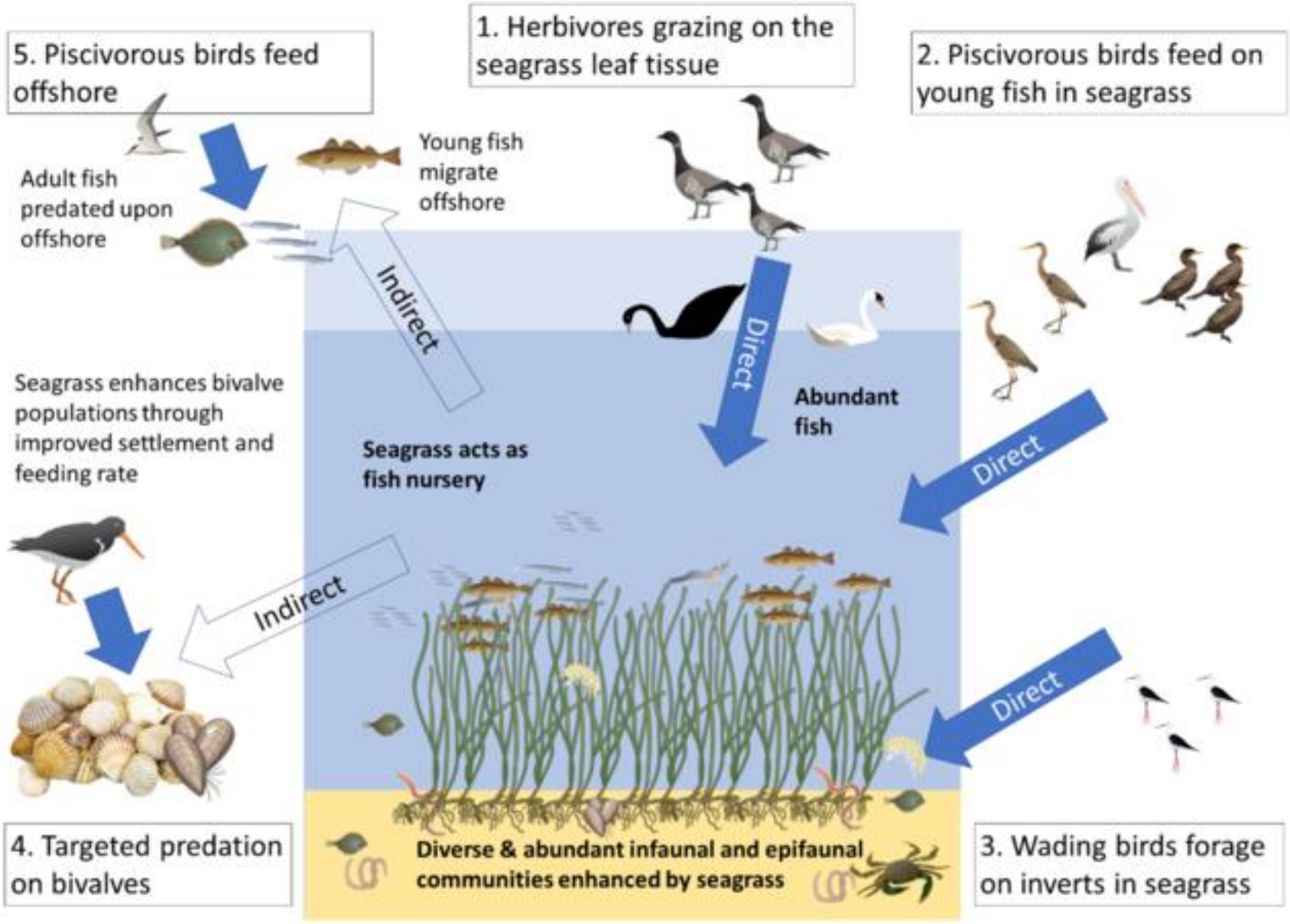


Spartina X

Seagrass ✓

Why is seagrass important?

- Seagrass supports both commercially, recreationally and ecologically important fish species by providing nursery and feeding habitat.
- Seagrasses help sequester large amounts of both carbon and nutrients, they trap nutrients, and sediments from the water column.
- Seagrass are hotspots for marine biodiversity supporting the rare stalked jellyfish, seahorses, brent geese and other wildfowl and waders.
- Seagrass meadows help bind the sediment reducing coastal erosion and protect against storm surges – wave attenuation.
- Seagrasses benefit recreation and tourism e.g. birdwatching, snorkelling/diving, paddleboarding, kayaking and fishing.



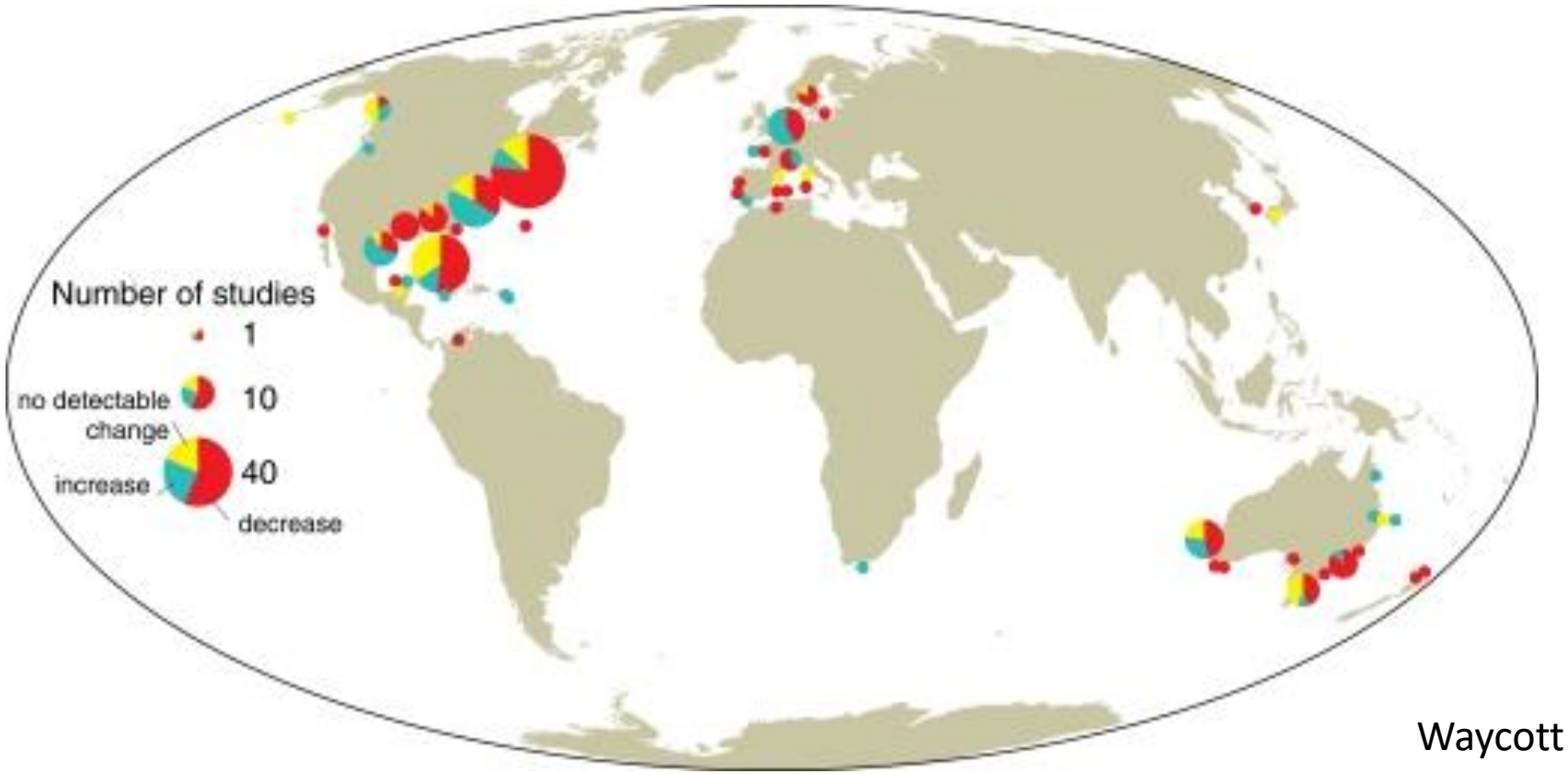
Project seagrass, 2020

What is restoration?

- “a variety of human interventions intended to produce a positive biological response” (Power & Boyer, 2014)
- “returning a system to a close approximation of its condition prior to disturbance, with both its structure and function restored” (NERC, 1992)

Why is restoration necessary?

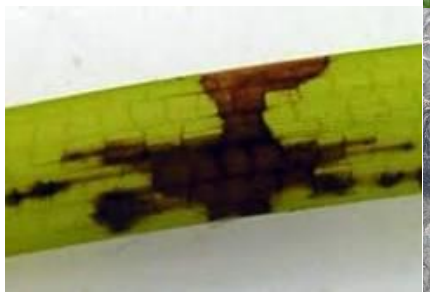
All seagrass species are experiencing a globally accelerated decline!

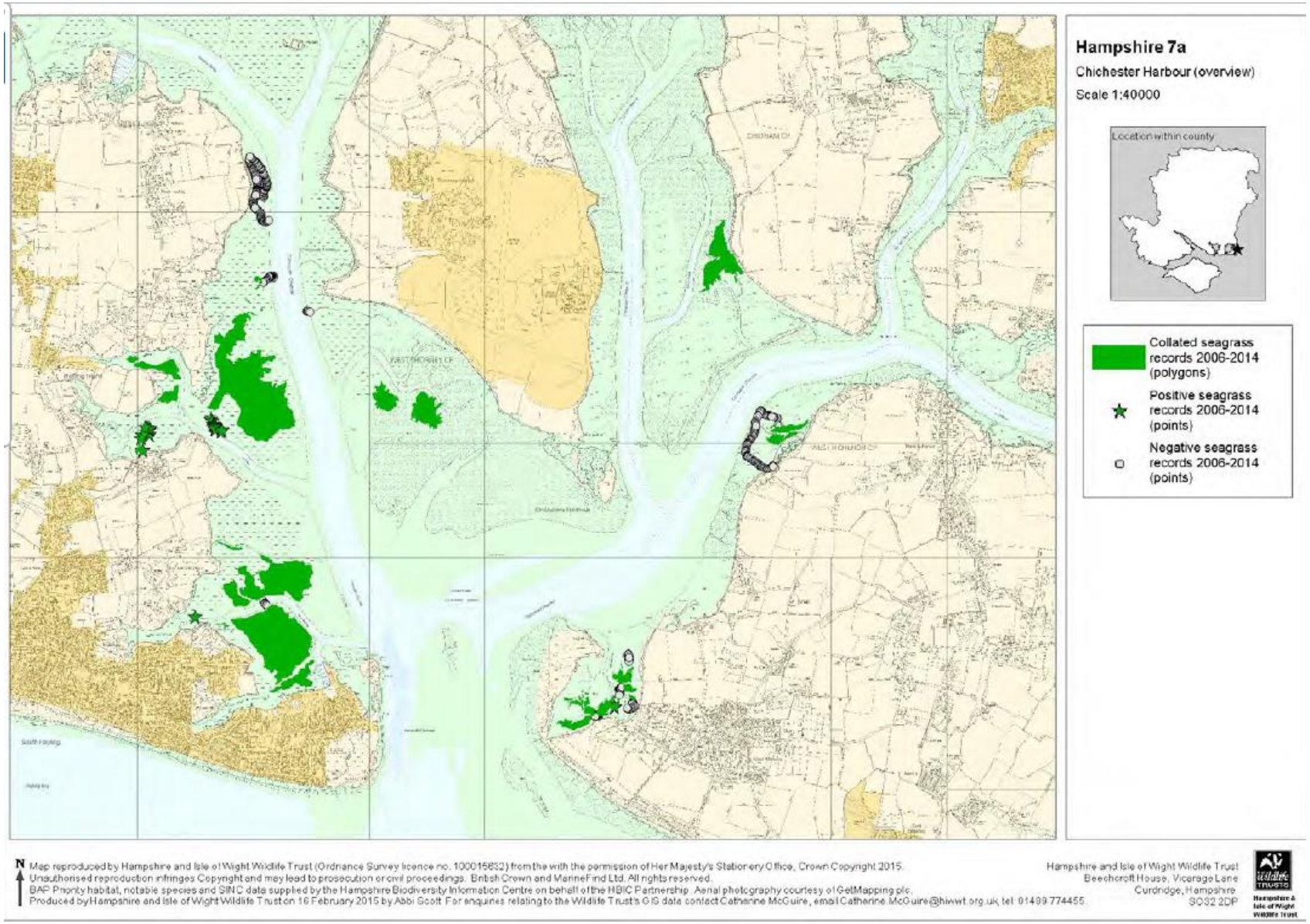


Waycott et al 2009

What is contributing to the decline?

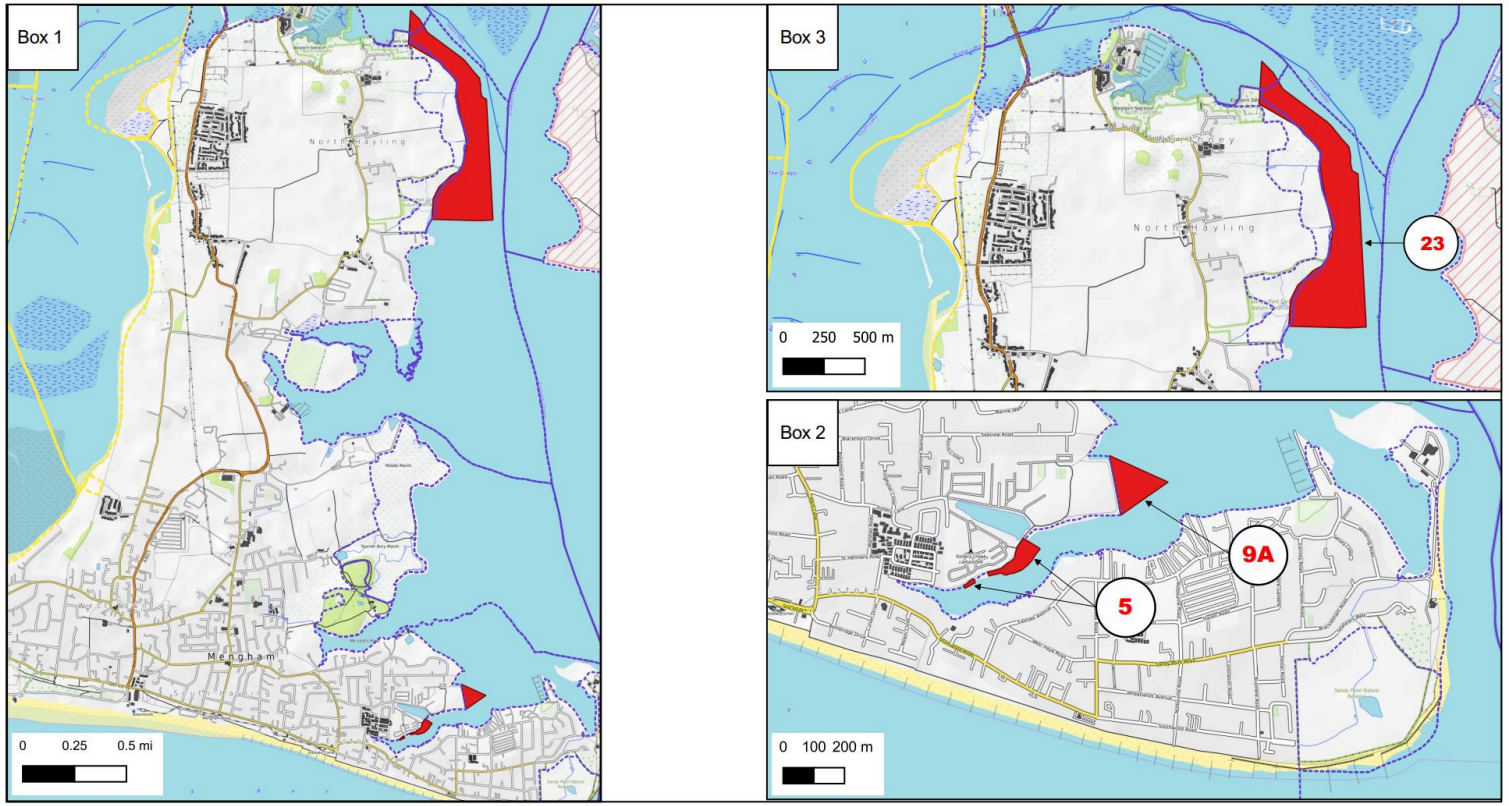
- Water Quality – Eutrophication – excess nutrients Ag
- Pollution – urban development
- Coastal development
- Disturbance
- Invasive non-native species (Sargassum, Gracillaria etc.)
- Global warming
- Disease





Marsden & Scott. 2015. Inventory of eelgrass beds in Hampshire and the Isle of Wight 2015, Section Two: Hampshire and Isle of Wight Wildlife Trust, Hampshire. 52

So what are we going to do about all this?



These three sites had mudflats between 0.5 and 1.5m above Chart Datum (CD) the preferred habitat of *N. noltei.*

The Northney site (Box 1 & 3) is large enough to support a substantial restoration trial (>120 m2) at a later date.

Collection of sediment samples

Samples analysed for:

- Particle Size analysis;
- Organic material content; and
- Redox potential

Fathom Ecology: Particle Size Results - Chichester Harbour

Station ID	Date Sampled	Visual description pre-analysis	Blott & Pye (2012) classification	Folk (1954) classification	BGS (1982) cl (modified from
Northney1	07/04/2023	Sandy mud with a few shell fragments	Very slightly gravelly sandy mud	Slightly Gravelly Sandy Mud	Slightly Gravell
Northney2	07/04/2023	Sandy mud with very small shells, shell fragments and organic fragments	Sandy mud	Slightly Gravelly Sandy Mud	Sandy
Northney3	07/04/2023	Gravelly sandy mud with shell fragments	Gravelly sandy mud	Gravelly Mud	Gravelly
Northney4	07/04/2023	Sandy mud with a few shells and shell fragments	Very slightly gravelly sandy mud	Slightly Gravelly Sandy Mud	Slightly Gravell
Northney5	07/04/2023	Sandy mud	Sandy mud	Sandy Mud	Sandy
Northney6	07/04/2023	Sandy mud with very few gravel particles, small shells and shell fragments	Slightly sandy mud	Slightly Gravelly Sandy Mud	Sandy
Mengham1	14/04/2023	Muddy sand with a few gravel particles, small shells and shell and organic fragments	Muddy sand	Slightly Gravelly Muddy Sand	Muddy
Mengham2	14/04/2023	Sandy mud with very few small shells, shell fragments and organic fragments	Sandy mud	Slightly Gravelly Sandy Mud	Sandy
Mengham3	14/04/2023	Sandy mud with very few small shells, shell fragments and organic fragments	Very slightly gravelly sandy mud	Slightly Gravelly Sandy Mud	Slightly Gravell
Lakeside1	14/04/2023	Muddy sand	Muddy sand	Muddy Sand	Muddy
Lakeside2	14/04/2023	Sandy mud with a few shell fragments and organic fragments	Very slightly gravelly sandy mud	Slightly Gravelly Sandy Mud	Slightly Gravell
Lakeside3	14/04/2023	Sandy mud with one gravel particle, a few shell fragments and organic fragments	Slightly gravelly sandy mud	Gravelly Mud	Gravelly

The sediments at Northney were in the preferred tolerances of dwarf seagrass (Valle, 2009):

- 1.47 to 5.9 phi,
- organic material of 1-10% , and
- a redox potential of 185-331 mV

CHICHESTER HARBOUR SHORELINE SEAGRASS SAFARI

CAN **YOU** HELP US RESTORE SEAGRASS WITHIN CHICHESTER HARBOUR?

We need your help to collect seagrass washed ashore this October.

Seagrass Bins will be placed at Emsworth Sailing club and Chichester Harbour Conservancy's Itchenor Office between the 21st and 31st of October.

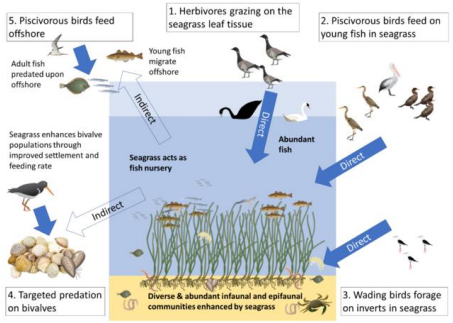
Whilst walking along the harbours beautiful coastline please keep your eyes open for seagrass in the strandline.

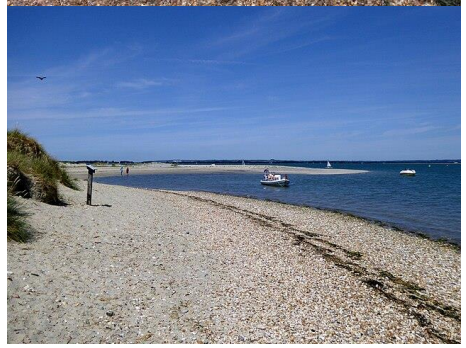
If you are lucky enough to find any please collect it, pop it into a plastic bag, then deposit the seagrass, minus the bag, in one of our two seagrass bins.

Seed will be harvested from the seagrass bins and used to restore a seagrass bed at Northney next spring. Next Your help will be vital for our efforts.

WHY IS SEAGRASS IMPORTANT?

- Seagrass is food to internationally important populations of wintering wildfowl;
- Seagrass acts as a nursery ground to seabass and other commercially and ecologically important fish species;
- It is habitat to some of our rarest marine invertebrates;
- Although seagrass accounts for 0.2% of the worlds oceans it sequesters ~10% of the carbon buried in the ocean!





WITH **THANKS TO THE NATURAL ENVIRONMENT GROUP OF SOLENT FORUM FOR THE FUNDING AND TO THE OTHER ORGANISATIONS FOR THEIR SUPPORT:**

FOR MORE INFO PLEASE CONTACT RAYNER: info@fathom-ecology.com

QR codes on bins led to a map showing the best sites to collect seagrass from the strandline in Chichester Harbour (there may be others!) as well as the location of the bins

Seagrass Super hero’s!

Local Media coverage!

EMSWORTH

GREEN NEWS

WINTER 2023 Issue 7

CLLR Grainne Rason

Reuben Mychaleckyj

HAPPY NEW YEAR

Green Reuben Mychaleckyj: photos of Reuben with Rayner collecting seagrass

SEAGRASS SUPERHERO

Our Green Campaigner Reuben Mychaleckyj is working hard with Chichester Harbour conservancy and Hampshire Wildlife Trust to save the seagrass in the Solent. **"Seagrass is an amazing tool to combat the damage to our harbours,"** says Reuben. **"It cleans the water, stores carbon dioxide 35 times faster than a rainforest and it provides a wonderful nursery for baby fish"** The recent storms means lots of the seagrass is collecting on the shoreline. Reuben is helping Rayner to collect the seagrass in bins placed around Emsworth coastline, for planting next spring when he will donning his waders to help plant the new seagrass.

Photo of Reuben in lab growing seagrass

Photo of Reuben monitoring seagrass

FINAL STRAW MAKE A CLEAN SWEEP

Cllr Rason and Green Reuben joined The Final Straw foundation Beach clean in November with almost **80 people involved and 50kg of rubbish collected.** And the beach cleans are working as the volume collected is decreasing. And Cllr Rason met with Havant Borough Climate and Environment Lead and Final Straw Foundation to work together to produce a plan to grow awareness and positive action around plastic with our schools and colleges.

CLLR GRAINNE & GREEN REUBEN : WORKING ALL YEAR ROUND IN EMSWORTH

Environment

Be a Seagrass Superhero! Chichester project looking for citizen scientists to help

Seagrass meadows are one of the most productive ecosystems in the world, but around the UK they have declined by 95% in the last 100 years. Work is taking place across the Solent to restore this precious habitat, and your help is needed here in Chichester Harbour! Read on to find out more...

Existing Seagrass restoration Techniques

Six main methods used currently:

- Improve habitat conditions to encourage natural colonisation
- Planting seeds
- Seed bombs
- Injecting seeds into sediment using mud guns
- Transplant shoots with bare roots
- Plugs and cores (transporting shoot with sediment intact)






Restoration Trials

Five experimental plots (10 x 10 m)

- Plot 1. Control – Ephemeral algae removed. No planting
- Plot 2. Seagrass seeds collected from rotted seagrass, stored in cold saline water, freshwater shocked and germinated in harbour mud before planting out.
- Plot 3. As plot 2 but shoots held in place with iron nail anchors!
- Plot 4. Seagrass seeds previously ingested by ducks (Brent goose substitutes) injected into sediment along with duck faeces.
- Plot 5. Planting of dried seagrass seeds.

All Seagrass restoration is experimental BUT based on science!

bioTROPICA
THE SCIENTIFIC JOURNAL OF THE ATBC

ASSOCIATION FOR TROPICAL BIOLOGY AND CONSERVATION

ORIGINAL ARTICLE

Mutualistic relationships in marine angiosperms: Enhanced germination of seeds by mega-herbivores

Samantha J. Tol, Jessie C. Jarvis, Paul H. York, Bradley C. Congdon, Robert G. Coles

First published: 11 July 2021 | https://doi.org/10.1111/btp.13001 | Citations: 4

Associate Editor: Eleanor Slade
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Abstract

Angiosperms have co-evolved with animals over thousands of years leading to an array of mutualistic relationships. Passage of plant seeds through animal intestines leads to an important mutualism providing the animal with food and the plant with seed dispersal and enhanced germination. This phenomenon is well studied in terrestrial angiosperms, but there is less research in aquatic environments. We studied the effect of gut passage in marine mega-herbivores (green sea turtles and dugongs) on seed germination for a

MARINE BIVALVE SHELLS OF THE BRITISH ISLES

AMGUEDDFA CYMRU

Department for Business, Energy & Industrial Strategy

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Species Account

Loripes lucinalis ((Lamarck, 1818))

Lucinoidea : Lucinidae

Tebble name: *Loripes lucinalis* (Lamarck)

Smith & Heppell name: *Loripes lucinalis* (Lamarck, 1818)

Notes on Nomenclature

Here previously as *Loripes lacteus*.

To size: To 22mm. **Shell Structure:** Solid. **Equivalve:** Equivalve. **Equilateral:** Almost equilateral, beaks slightly to anterior. **Tumidity:** Turnid. **Outline:** Circular, broadly rounded posterior dorsal margin, anterior concave. **Contour:** deeply set, short lunule.

Image Gallery

frontiers in Marine Science

ORIGINAL RESEARCH
published: 14 February 2020
doi: 10.3389/fmars.2020.00011

First Field-Based Evidence That the Seagrass-Lucinid Mutualism Can Mitigate Sulfide Stress in Seagrasses

Matthijs van der Geest[1,2], Tjisse van der Heide[3,4], Marianne Holmer[5] and Rutger de Wit[1]*

[1] MARBEC, Université de Montpellier, CNRS, IRD, IFREMER, Montpellier, France, [2] Wageningen Marine Research, Wageningen University and Research, AG Den Helder, Netherlands, [3] Department of Coastal Systems, NIOZ Royal Netherlands Institute for Sea Research, and Utrecht University, Texel, Netherlands, [4] Conservation Ecology, Groningen Institute for Evolutionary Life Sciences (GELIFES), University of Groningen, Groningen, Netherlands, [5] Department of Biology, University of Southern Denmark, Odense M, Denmark

Seagrass meadows form vital ecological components of coastal zones worldwide, but are rapidly declining. Large-scale seagrass diebacks have been related to accumulation of toxic sulfide in the sediment, a phenomenon predicted to occur more frequently in the near future due to ongoing global warming and increasing organic loading of coastal systems worldwide. Recently, a facultative mutualism between seagrasses and lucinid bivalves with endosymbiotic sulfide-consuming gill bacteria was discovered that may prevent toxic sulfide accumulation in seagrass sediments. Yet, direct field-based evidence for the importance of this mutualism in alleviating sulfide stress in seagrasses is currently lacking, as well as how its role may change when sediment sulfide levels increase due to environmental change. Here, we investigated the sulfide detoxification function of this seagrass-lucinid mutualism and its resilience to organic-loading induced sulfide stress in a temperate lagoon system (Thau lagoon, France), using a correlative

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Rochelle Diane Seitz,
Virginia Institute of Marine Science, United States

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University of Washington,

Seagrass Restoration Is Possible: Insights and Lessons From Australia and New Zealand

*Yi Mei Tan[1], Oliver Dalby[1], Gary A. Kendrick[2], John Statton[2], Elizabeth A. Sinclair[2,3], Matthew W. Fraser[2], Peter I. Macreadie[4], Chris L. Gillies[5,6], Rhys A. Coleman[7], Michelle Waycott[8,9], Kor-jent van Dijk[8,9], Adriana Vergés[10,11], Jeff D. Ross[12], Marnie L. Campbell[13,14], Fleur E. Matheson[15], Emma L. Jackson[16], Andrew D. Irving[16], Laura L. Govers[17,18], Rod M. Connolly[19], Ian M. McLeod[6], Michael A. Rasheed[6], Hugh Kirkman[20], Mogens R. Flindt[21], Troels Lange[21], Adam D. Miller[1,22] and Craig D. H. Sherman[1,22]**

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https://doi.org/10.3354/meps13975

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Large-scale eelgrass transplantation: a measure for carbon and nutrient sequestration in estuaries

Troels Lange[1,*], Nele S. Oncken[2], Niels Svane[1], Rune C. Steinfurth[1], Erik Kristensen[1], Mogens R. Flindt[1]

[1]Department of Biology, University of Southern Denmark, Campusvej 55, 5230 Odense M, Denmark
[2]German Federal Institute of Hydrology, Unit U2, Am Mainzer Tor 1, 56068 Koblenz, Germany

ABSTRACT: The accelerated global losses of seagrass meadows makes restoration increasingly important. This restoration study was conducted in a shallow Danish estuary and describes one of

So what's next?

Attempt a larger restoration using most successful trailed method. Project tentatively entitled:

Seagrass for seabass (sand-smelt, sticklebacks, seahorses and other sygnathids)!



Thanks for listening!

Any Questions?