

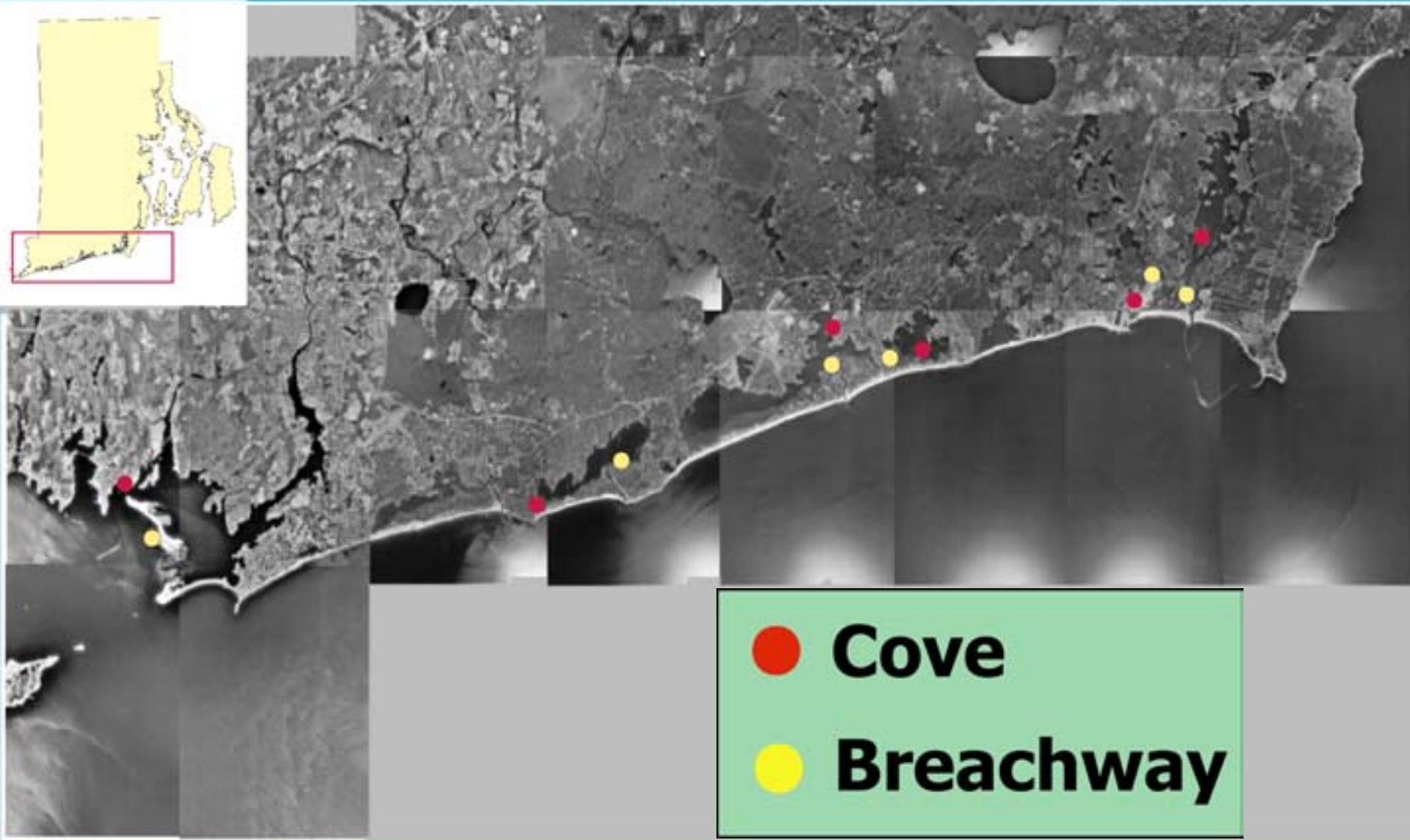


# **An Assessment of Eelgrass Health in Rhode Island Salt Ponds**



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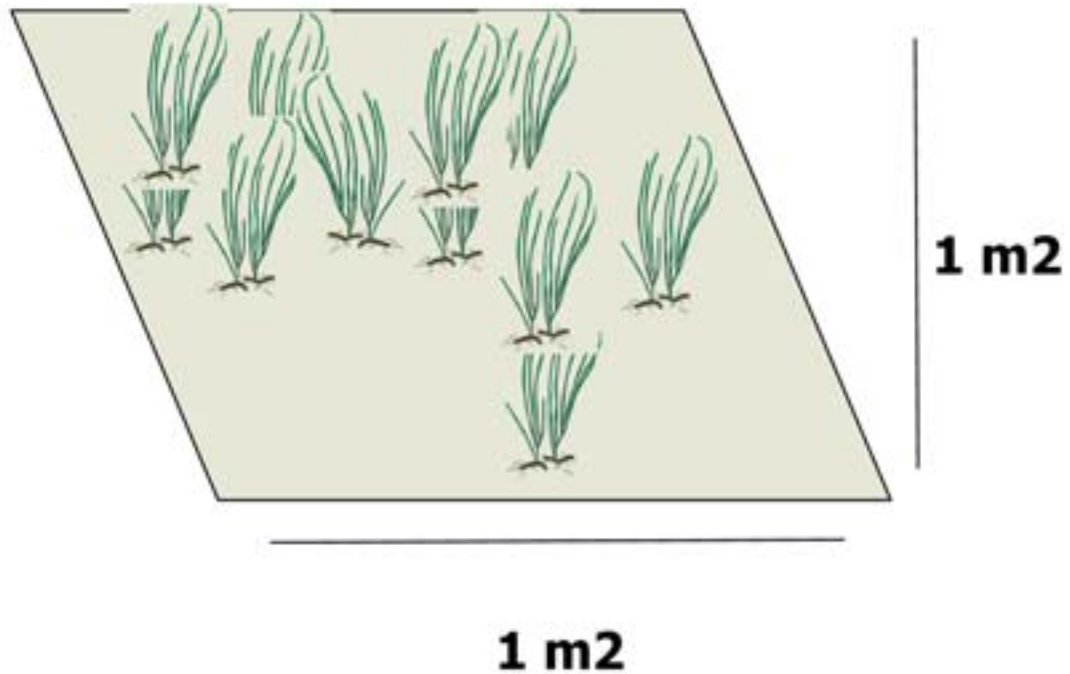
# Eelgrass Tagging Sites Summer 2001

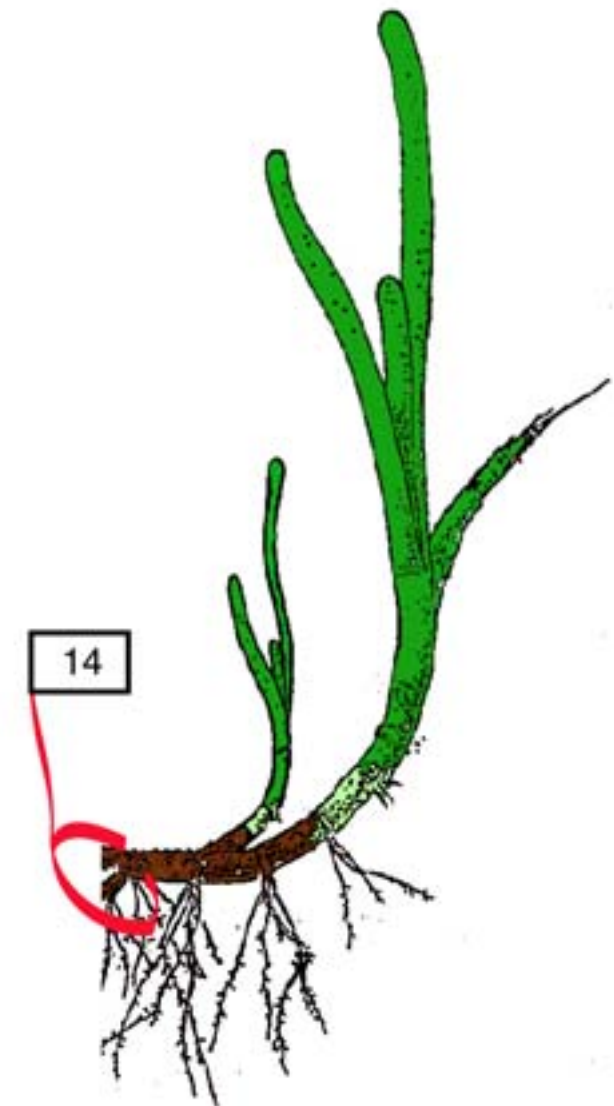
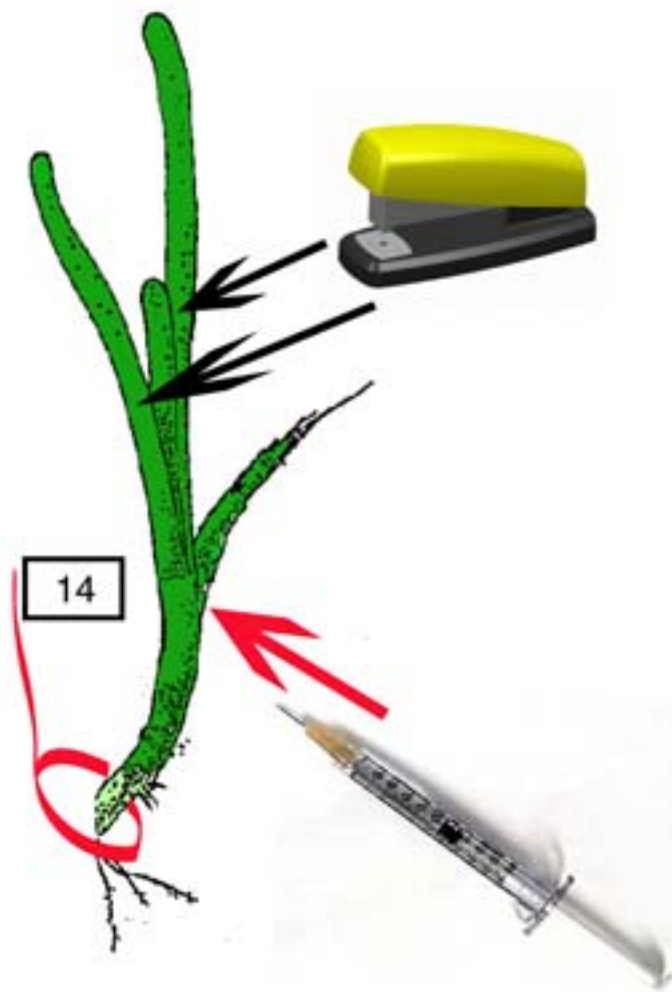


<b>Pond</b>	<b>Temperature °C</b>	<b>MANAGE estimated Nitrogen loading (kg N / km<sup>2</sup> / year)</b>
<b>Little Narraganstt Bay</b>	<b>not available</b>	<b>91,165.3</b>
<b>Quonochontaug</b>	<b>23.2</b>	<b>4,953.1</b>
<b>Charlestown</b>	<b>23.7</b>	<b>5,198.7</b>
<b>Green Hill</b>	<b>24.2</b>	<b>13,806.5</b>
<b>Pt. Judith</b>	<b>20.7</b>	<b>16,178.5</b>
<b>Potter</b>	<b>23.8</b>	<b>25,549.8</b>



**Traditional Monitoring Techniques:  
Density Counts: Shoots/m<sup>2</sup>  
Percent Cover**





# Eelgrass Growth Measurements



# Parameters Measured During Tagging 2001

Shoot density

Number of leaves per shoot, start

Number of leaves per shoot, end

Number of leaves produced per shoot

Leaf initiation rate, days

Biomass of new leaves produced, g

Area of new leaves produced,  $\text{cm}^2$

Area of new leaf production per plant per day

Leaf growth rate,  $\text{mg d}^{-1}$

Leaf growth rate,  $\text{g m}^{-2} \text{d}^{-1}$

Number of rhizome nodes produced per shoot

Node initiation rate, days

Biomass of new rhizome material, g

Rhizome growth rate,  $\text{mg d}^{-1}$

Rhizome growth rate,  $\text{g m}^{-2} \text{d}^{-1}$

Length of sheath, cm

Width of sheath, mm

Area specific weight,  $\text{g cm}^{-2}$

Maximum leaf length

Leaf width, leaf 3, mm

New growth shoot to root ratio, g/g

Number of lateral shoots produced

Biomass of lateral shoots produced, g

Lateral shoots produced,  $\text{mg d}^{-1}$

Lateral shoots produced,  $\text{g m}^{-2} \text{d}^{-1}$

Mean internode length, mm

Internode length node 1, mm

Internode length, node 2, mm

Internode length node 3, mm

Internode length node 4, mm

New rhizome produced, cm

Wasting disease index leaf 1

Wasting disease index, leaf 2

Wasting disease index leaf 3

Wasting disease index leaf 4

Wasting disease index leaf 5

Wasting disease index of oldest leaf

Sustainable eelgrass index

# Parameters Measured During Tagging 2001

## Shoot density

Number of leaves per shoot, start  
Number of leaves per shoot, end  
Number of leaves produced per shoot  
Leaf initiation rate, days  
Biomass of new leaves produced, g  
Area of new leaves produced,  $\text{cm}^2$   
Area of new leaf production per plant per day

## Leaf growth rate, $\text{mg d}^{-1}$

Leaf growth rate,  $\text{g m}^{-2} \text{d}^{-1}$   
Number of rhizome nodes produced per shoot  
Node initiation rate, days

Biomass of new rhizome material, g

## Rhizome growth rate, $\text{mg d}^{-1}$

Rhizome growth rate,  $\text{g m}^{-2} \text{d}^{-1}$   
Length of sheath, cm  
Width of sheath, mm  
Area specific weight,  $\text{g cm}^{-2}$   
Maximum leaf length

Leaf width, leaf 3, mm

New growth shoot to root ratio, g/g

Number of lateral shoots produced

Biomass of lateral shoots produced, g

## Lateral shoots produced, $\text{mg d}^{-1}$

Lateral shoots production rate,  $\text{g m}^{-2} \text{d}^{-1}$

Mean internode length, mm

Internode length node 1, mm

Internode length, node 2, mm

Internode length node 3, mm

Internode length node 4, mm

New rhizome produced, cm

Wasting disease index leaf 1

Wasting disease index, leaf 2

Wasting disease index leaf 3

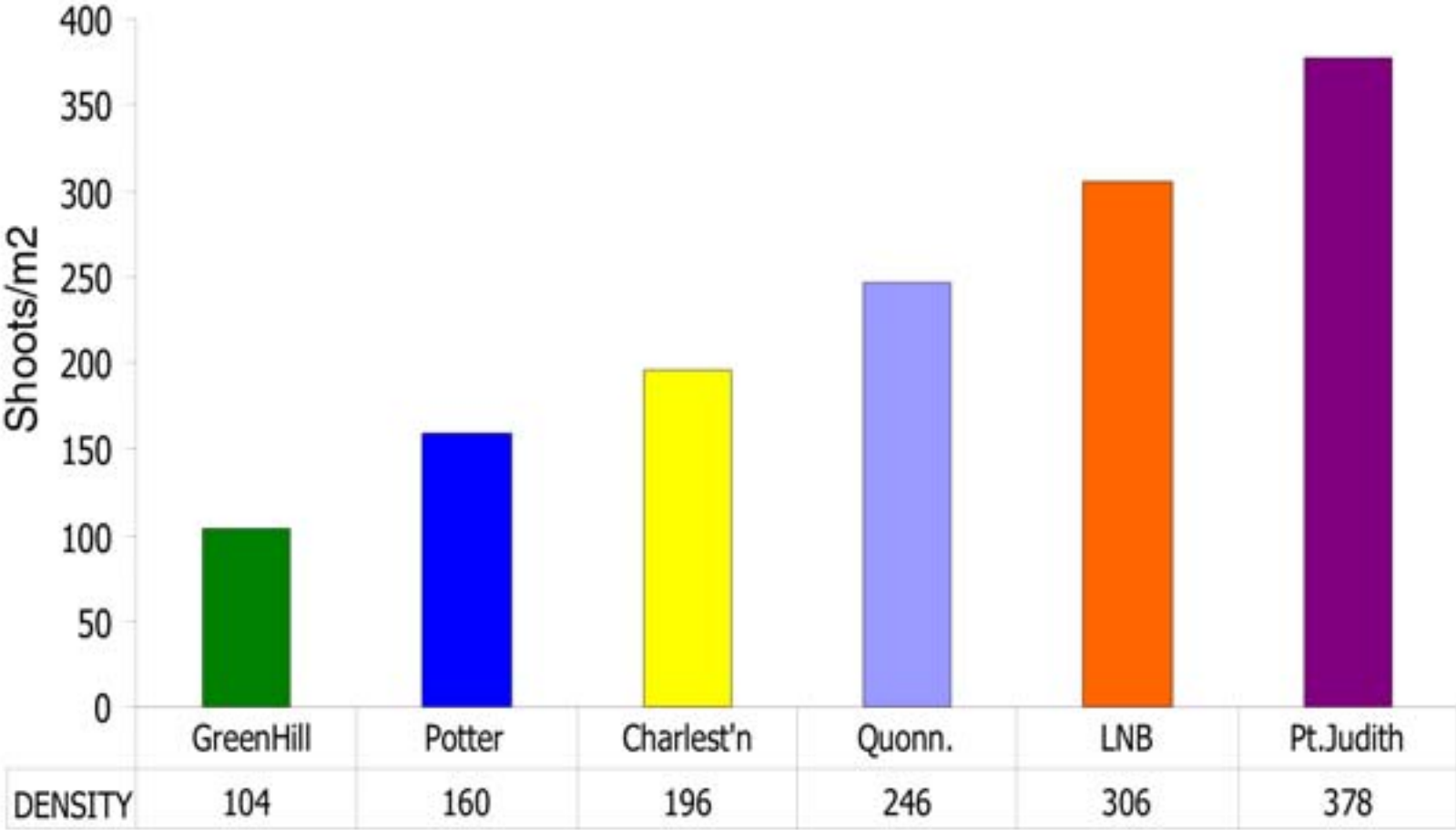
Wasting disease index leaf 4

Wasting disease index leaf 5

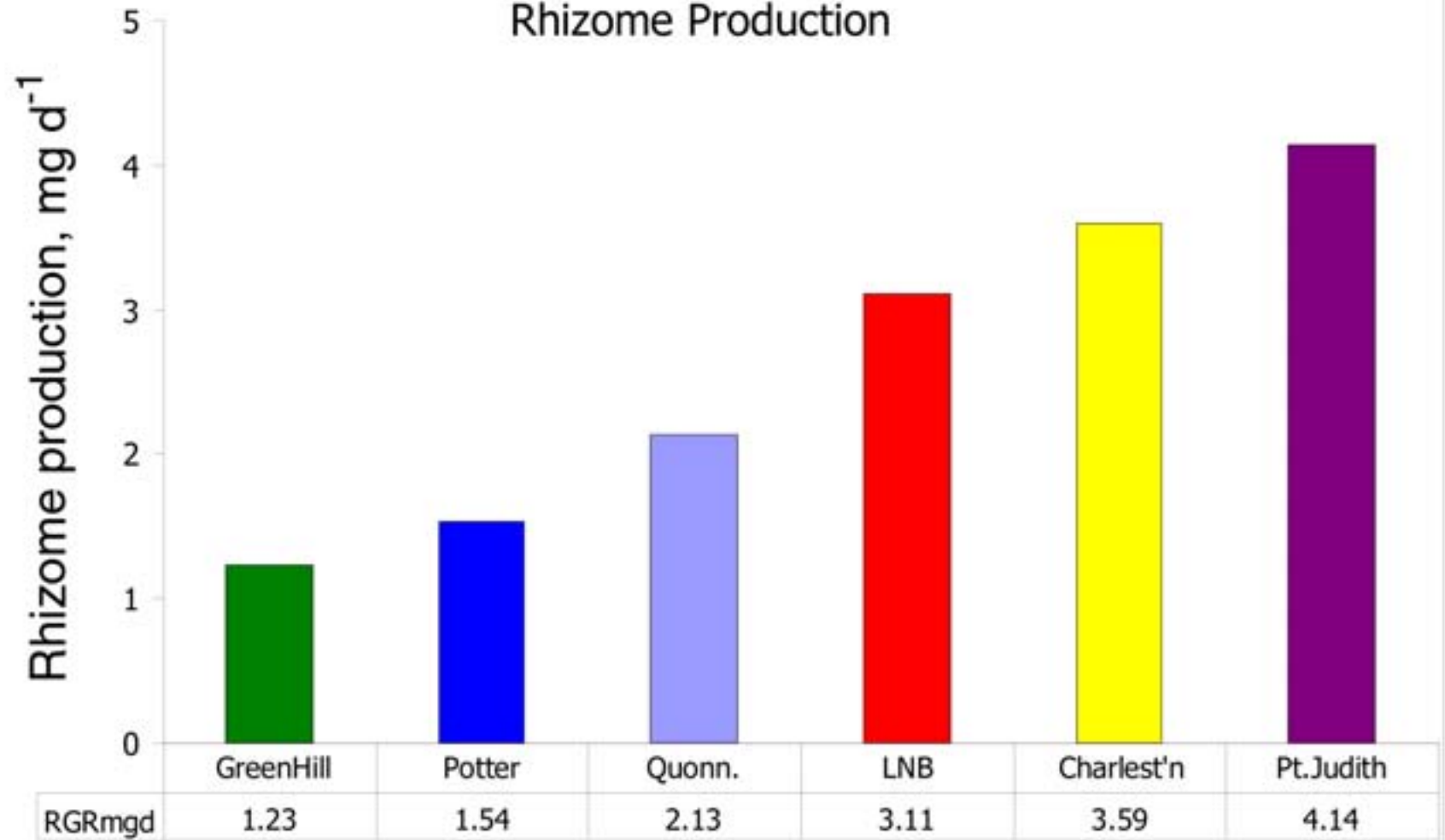
Wasting disease index of oldest leaf

## Sustainable eelgrass index

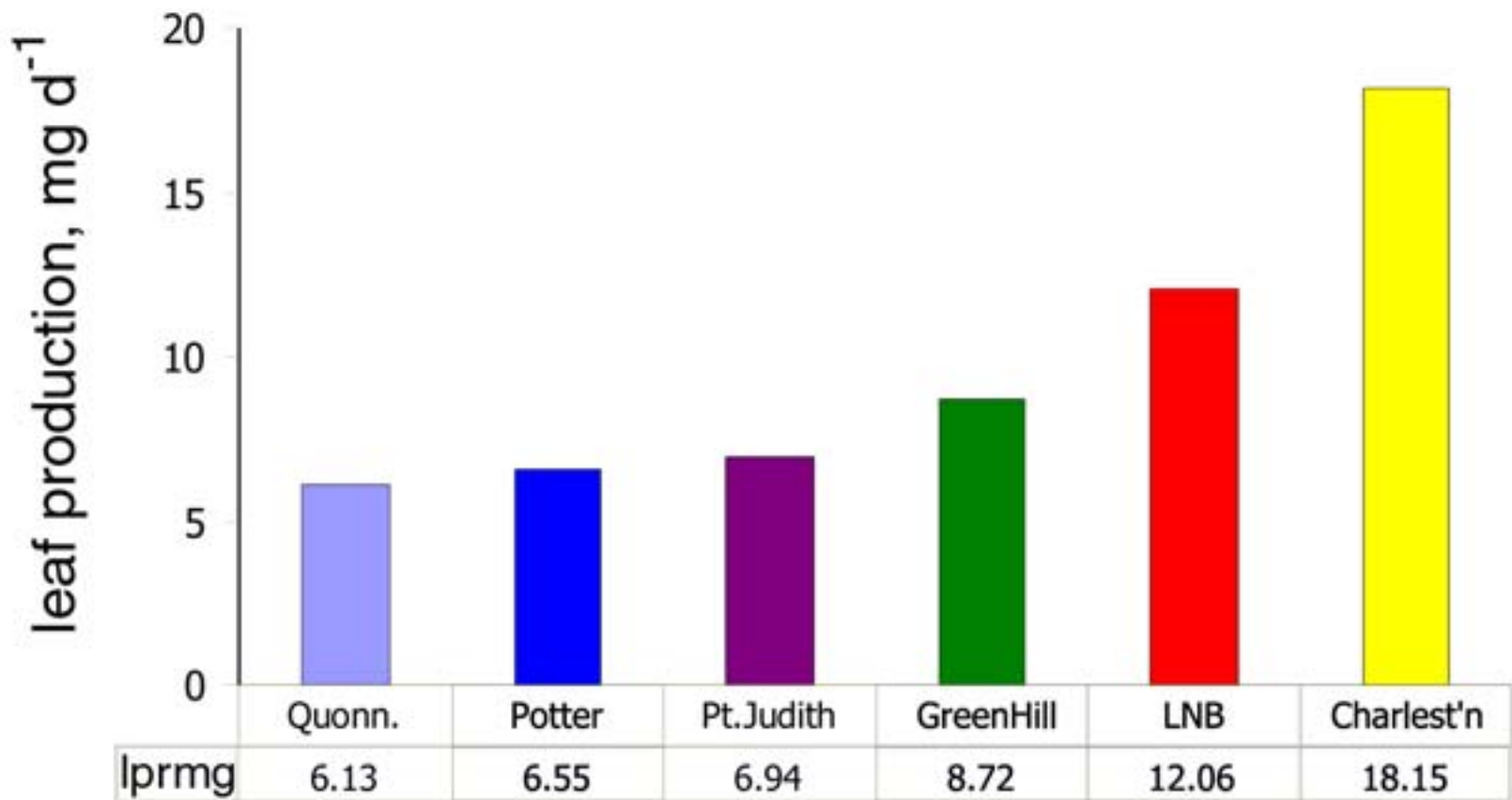
# Shoot Density



## Rhizome Production

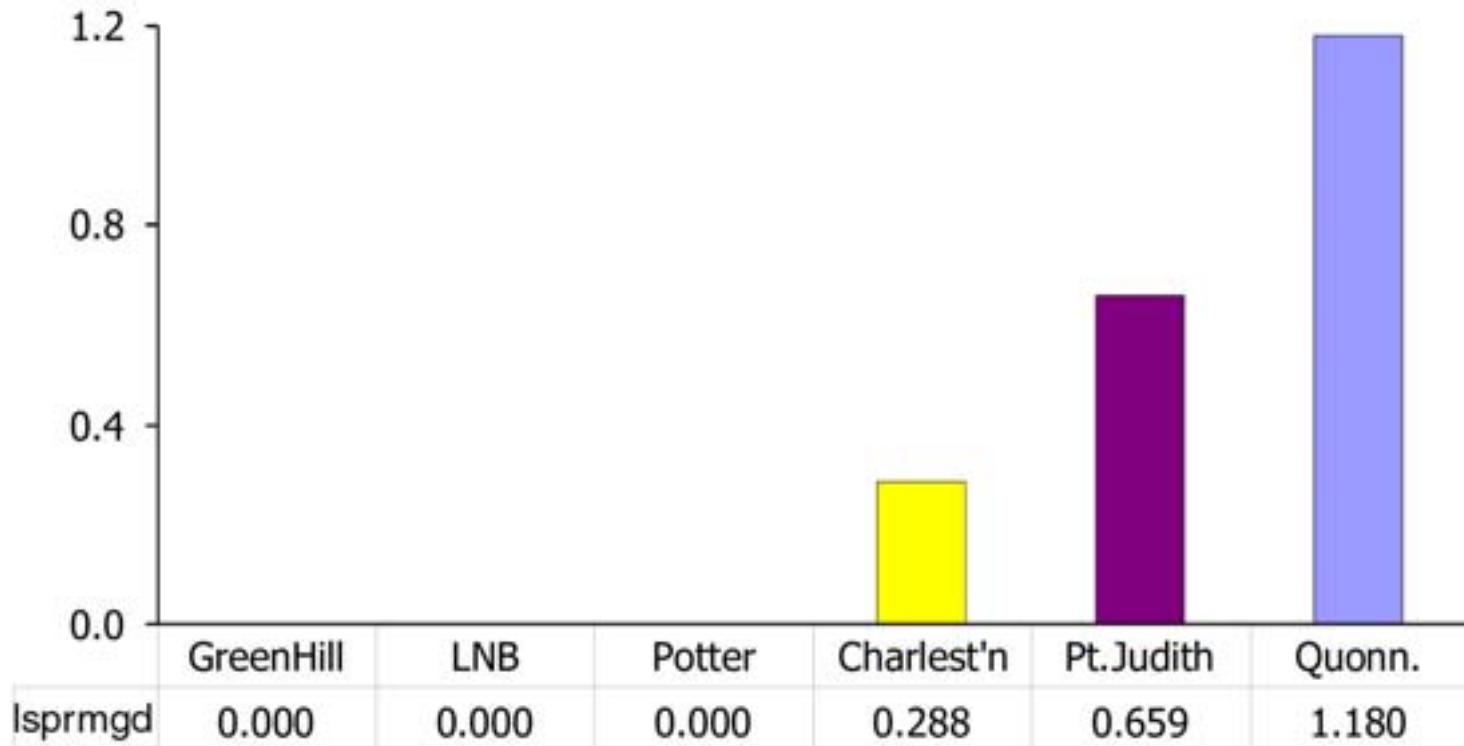


## Leaf Production



## Lateral Shoot Production

lateral shoot production,  $\text{mg d}^{-1}$



## Sustainable Eelgrass Index =

Lateral Shoot Production (mg d<sup>-1</sup>) + Rhizome Production (mg d<sup>-1</sup>)

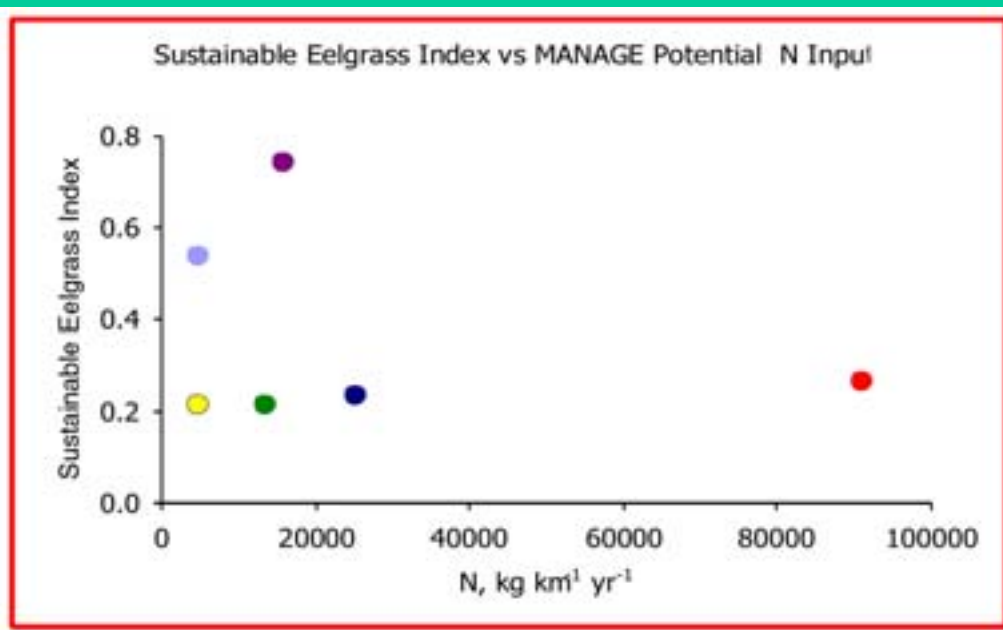
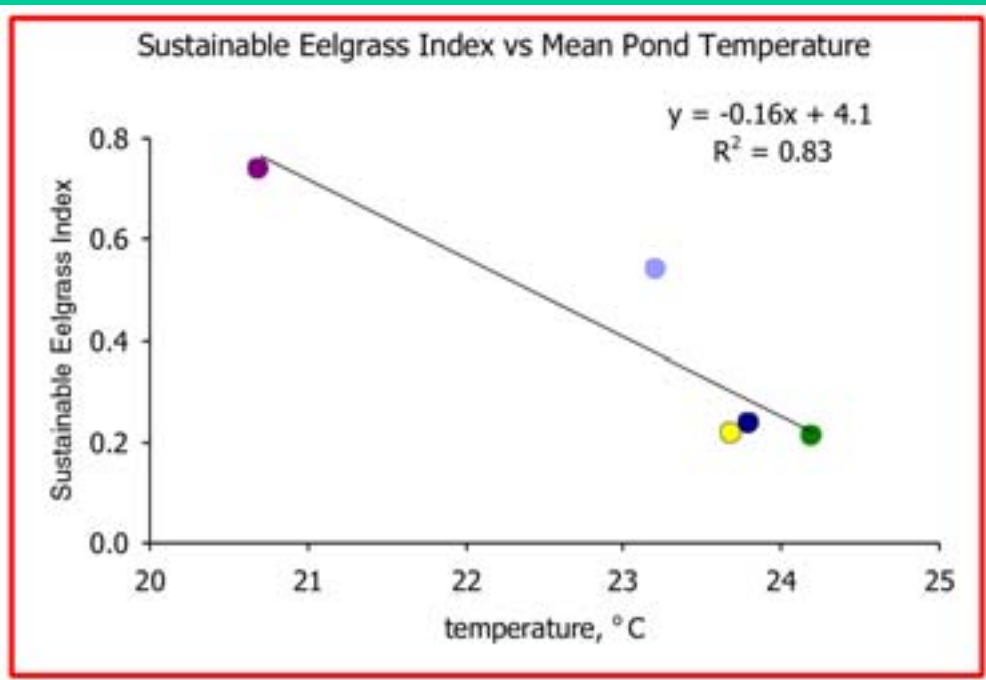
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Leaf Production (mg d<sup>-1</sup>)

- A Pt. Judith
- B Quonochontaug
- C Little Narragansett Bay  
Potter  
Charlestown  
Green Hill

p<.0001

- Little Narragansett Bay
- Quonnie
- Pt. Judith
- Charlestown
- Green Hill
- Potter



Pond	Manage Estimated mmolN/m <sup>2</sup> /day	Residence Time (Nixon et al. 2001)
Quonnie	0.97	14 days*
Charlestown	1.0	11 days
Green Hill	2.7	15 days
Point Judith	3.2	16 days
Potter	5.0	30 days
LNB	17.8	?

\*Quonnie estimated for this study

**BEST**



**WORST**

## "Health" of Eelgrass

Pt. Judith	fastest lateral shoot production rate fastest rhizome production rate lowest shoot to root ratio highest shoot density lowest water temperature
Quonochontaug	highest rate of lateral shoot production fast leaf initiation rate highest number of leaves per shoot low shoot to root ratio
LNB	long leaves but slowest leaf initiation rates lowest rhizome initiation rates low lateral shoot production rate lowest number of leaves per shoot
Charlestown	fastest leaf production rate slow lateral shoot production rates low rhizome production rate highest shoot to root ratio
Potter	slow lateral shoot production rates low leaf production and initiation rates slow rhizome production rate high water temperature some wasting disease
Green Hill	slowest production of leaves and rhizomes highest water temperature highest incidence of wasting disease lowest shoot density