

STOCKS AND RATES OF ORGANIC CARBON ACCUMULATION IN FRESHWATER IMPOUNDMENTS OF EASTERN CANADA

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¹McGill University, QC, Canada

²Universidad Científica del Sur, Lima, Peru

³Ducks Unlimited Canada, Amherst, NS, Canada





Salt marsh



Agriculture field

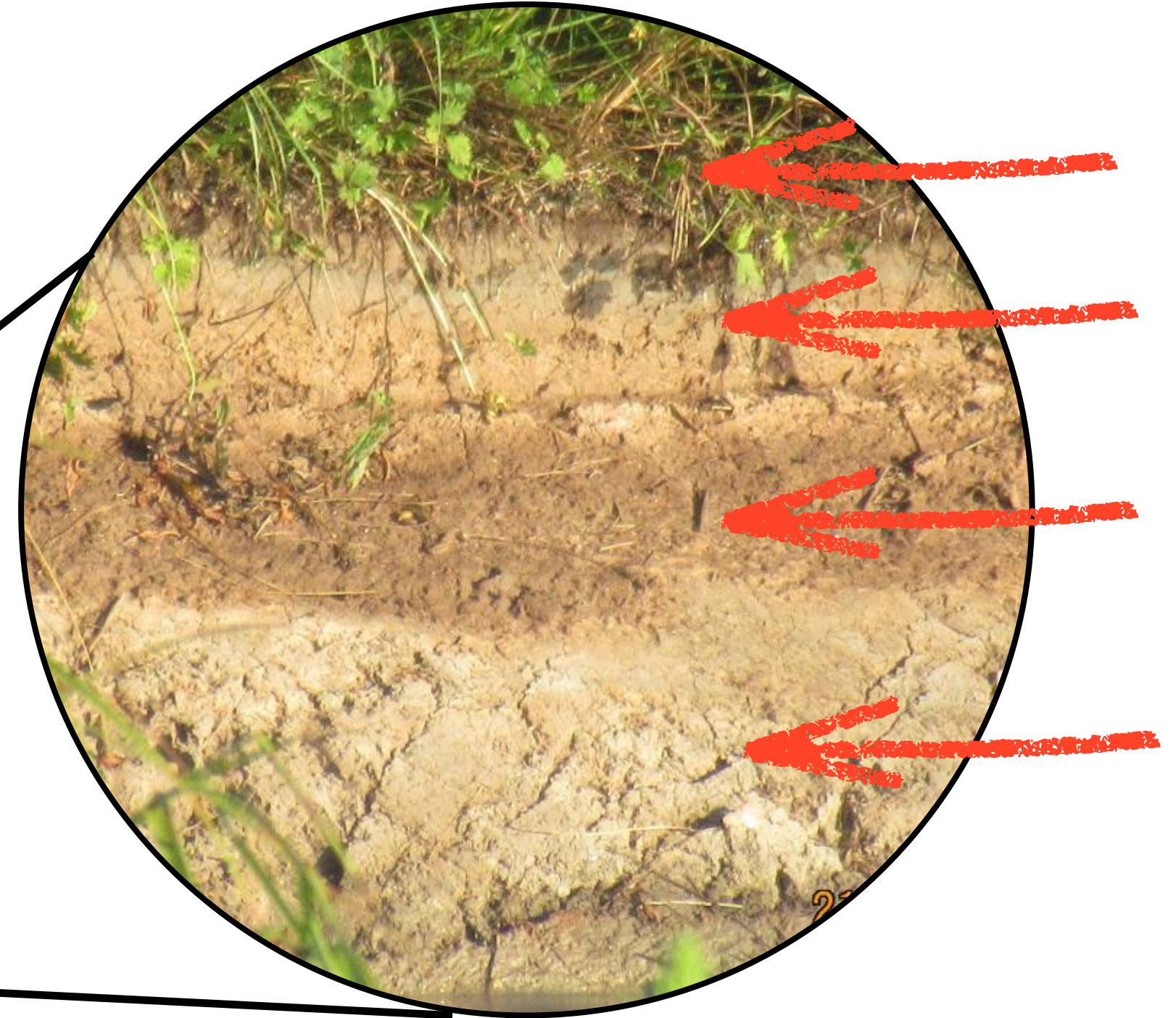


Marsh impoundment

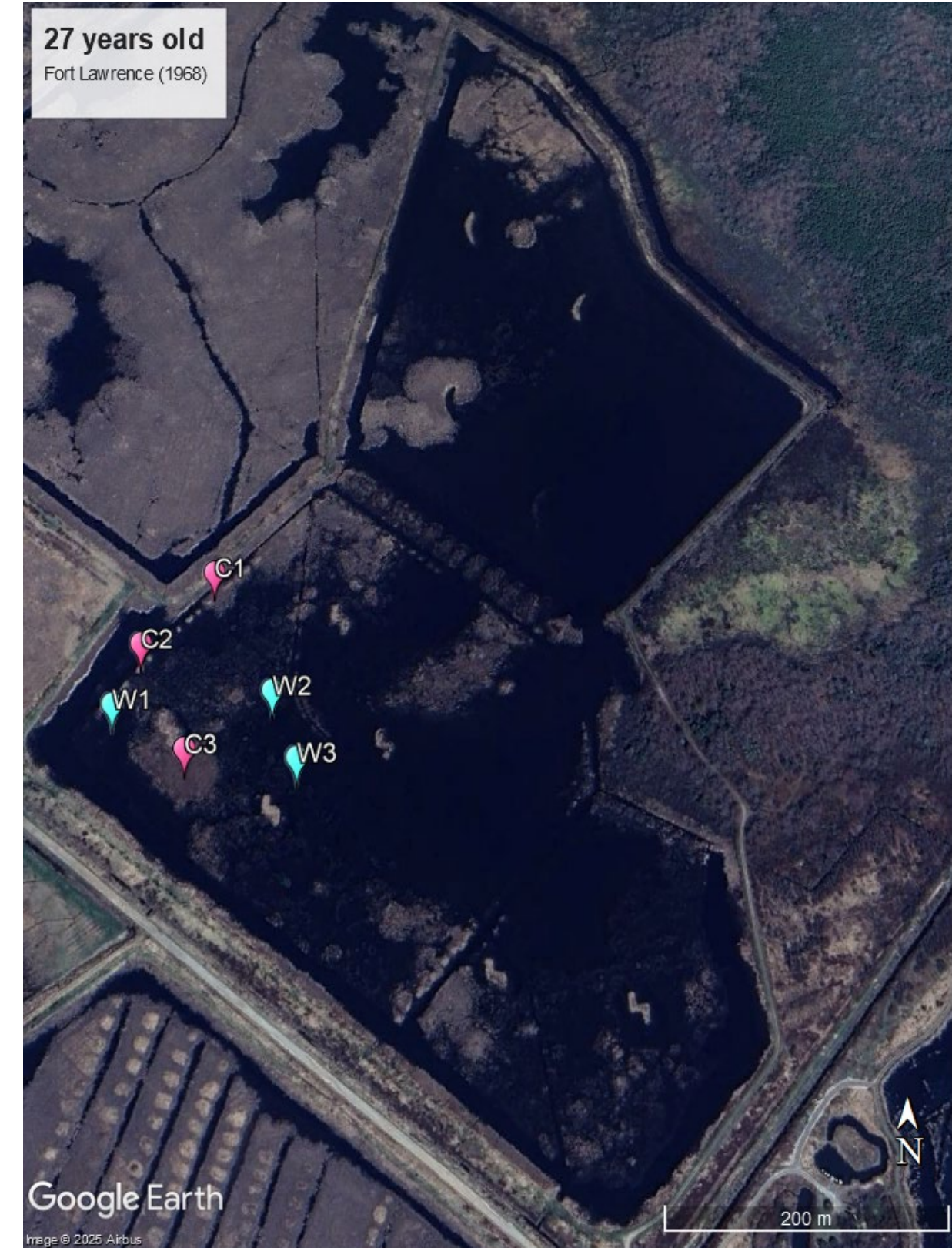
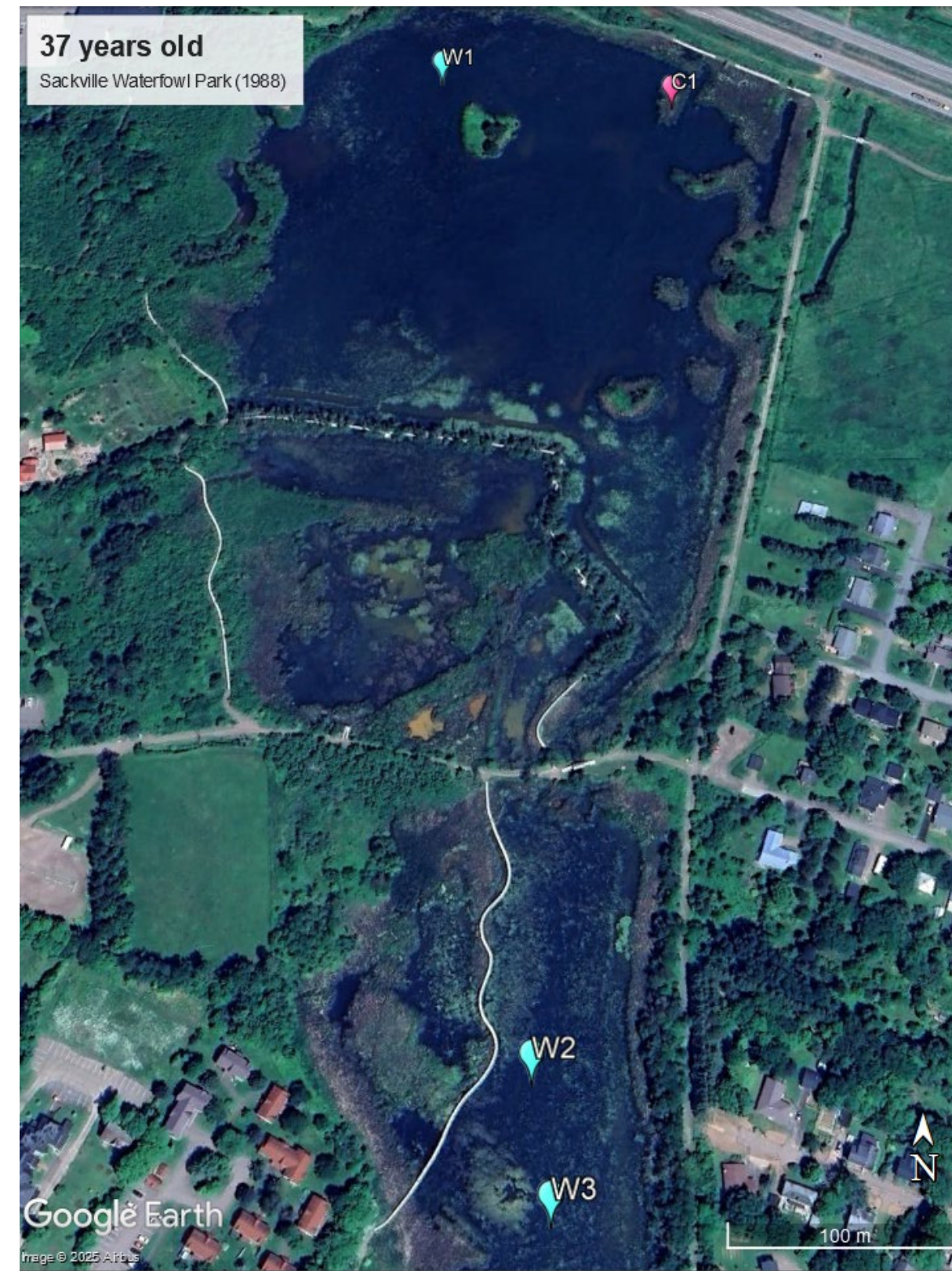
- דאָרט, פאשטלעך
- אָדער | דאָרט פאשטלעך
- שפּאַטעט דאָרט
- פאשטלעך דאָרט

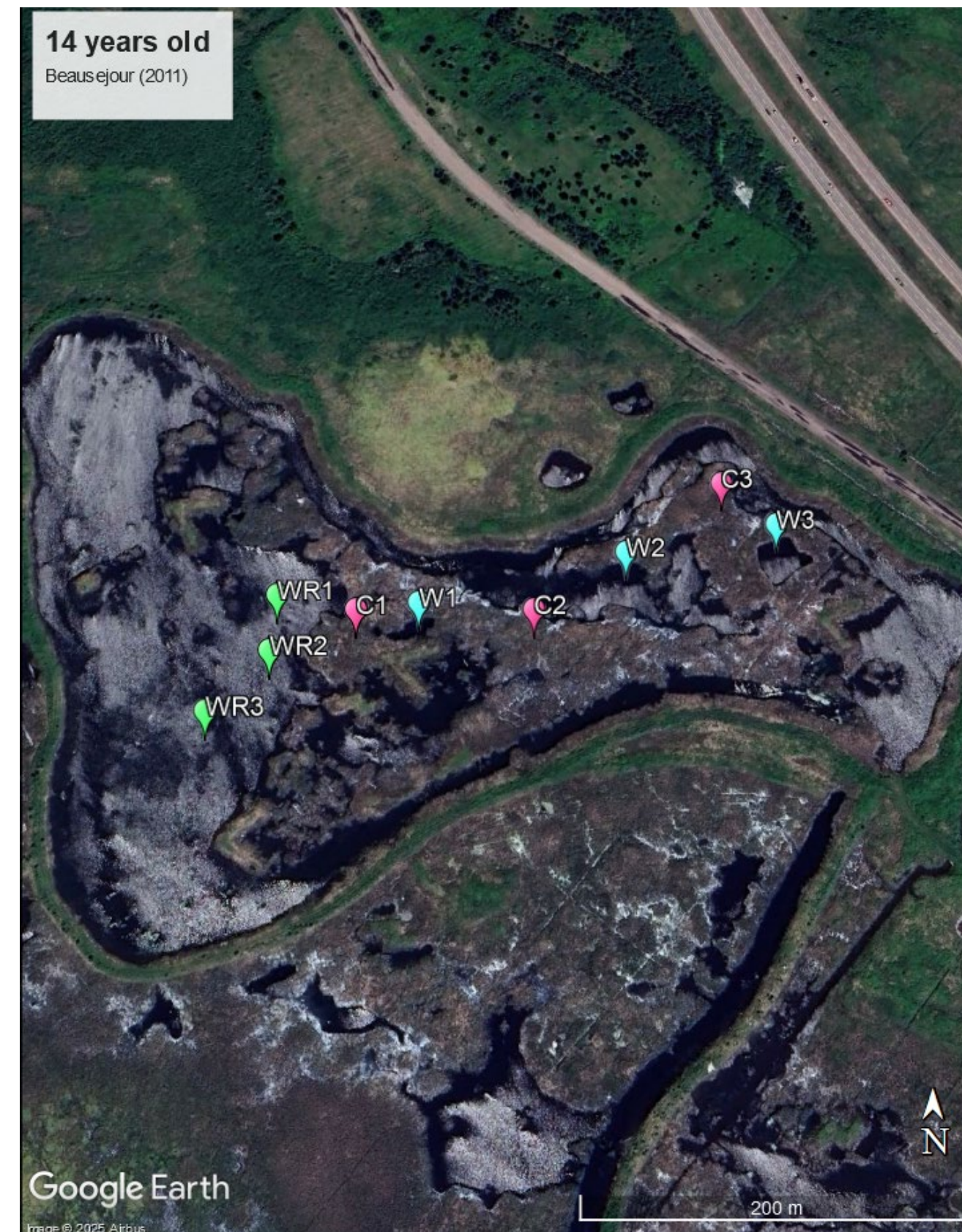
- Impact of land use changes.
- Role of soil properties
- Management practices





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- ד זכ ל ןת כחמ כלצתהן ל ש
בשאל ל רכש ןת ו רה
- לסל כחמ פיר פ לכת ל רתע
כשט אש ן רתדקט רהן
בכ ל פנתסלצטאל
- סא ן כלפ רהן רש ל גקטאלחש
פלצכ
- מת לר כ ןתפ תש קל ל סש
קתפ קטכ לעה ר
- מכ לל ט ןמתא ן ושי
שחאלטאל רה לר ו

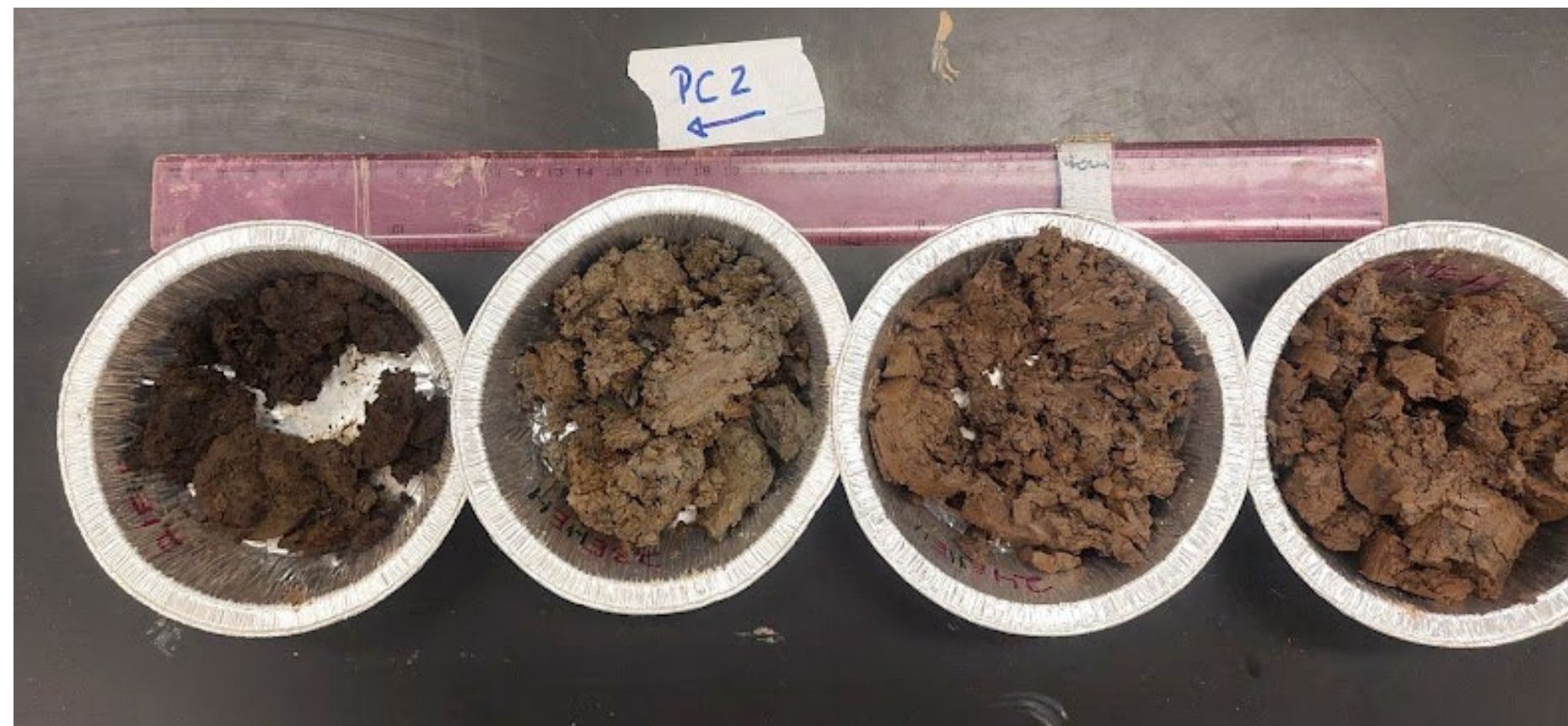
IN THE FIELD:

- Six sediment samples per impoundment (30 samples in total)
- Piston corer with minimal compaction
- Coring depth was extended to the underlying salt marsh/agricultural soil.



IN THE LAB:

- Dry at 60 °C
- Calculate the dry bulk density
- %OC content was measured by using an automated elemental analyzer.
- OC density -- >Total C stock
- C stocks were averaged over the impoundment areas to estimate the OC stored in the system.
- Accumulation C rates



Soil sample from open water: OC%



20%

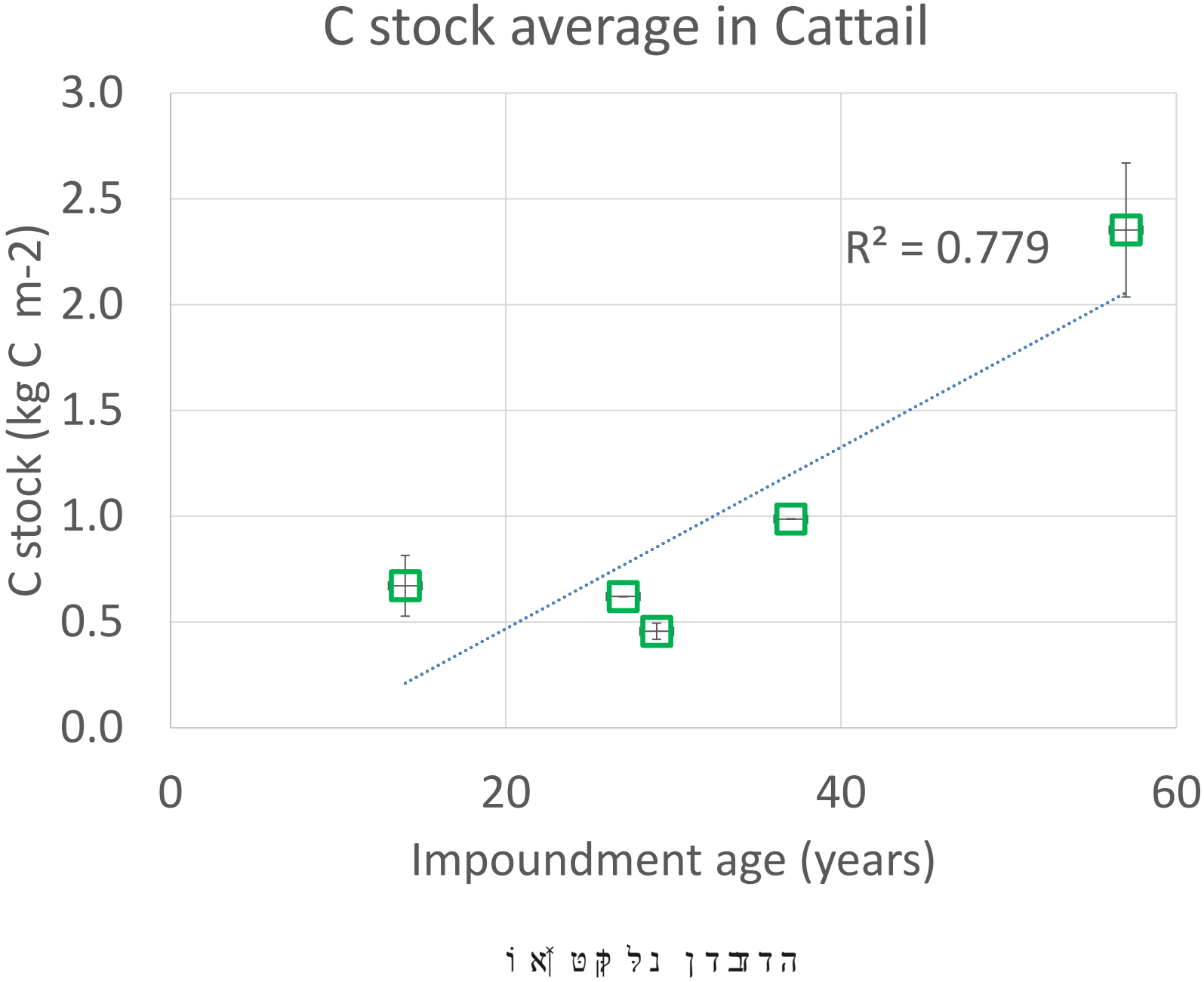
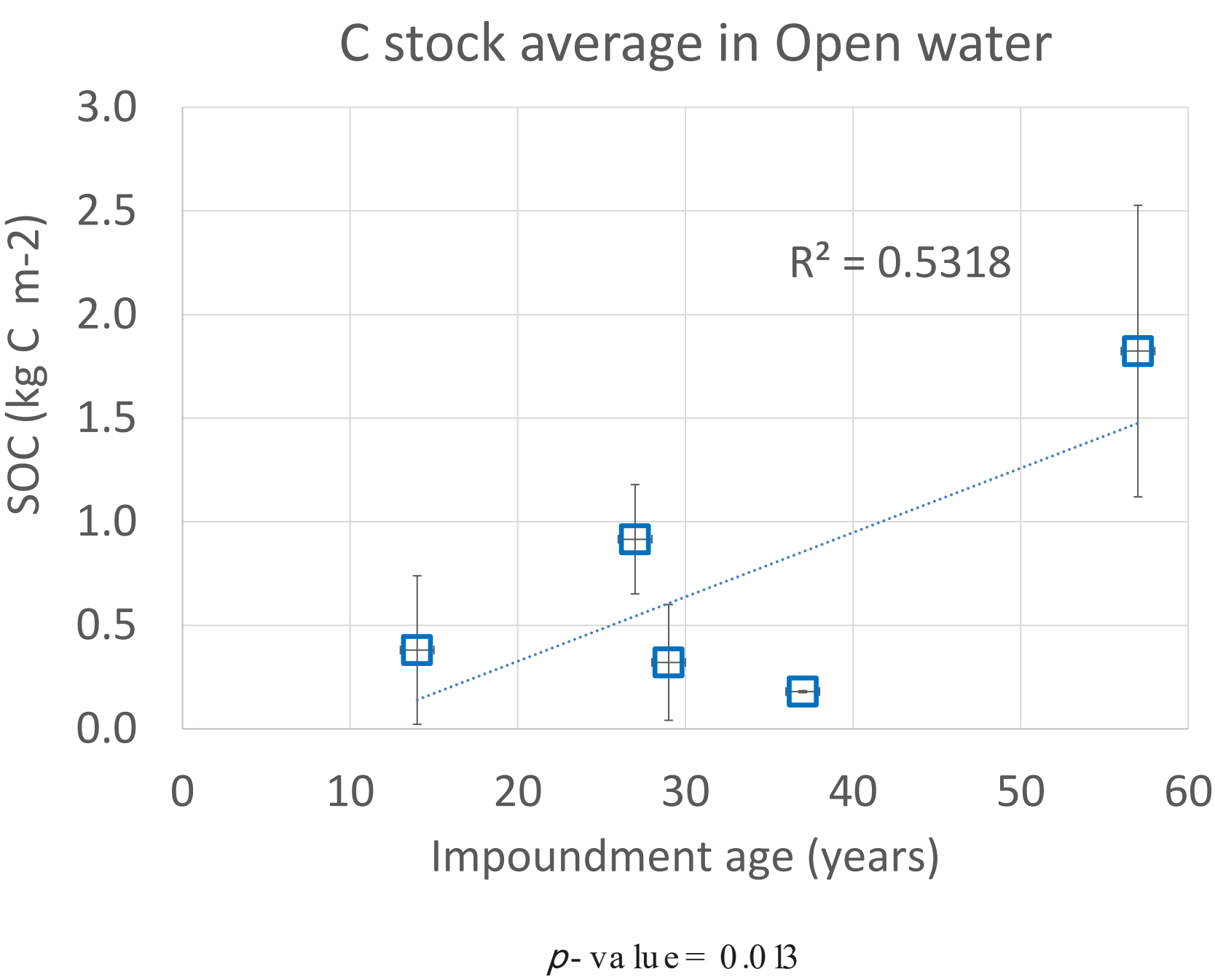
3%

6%

1%



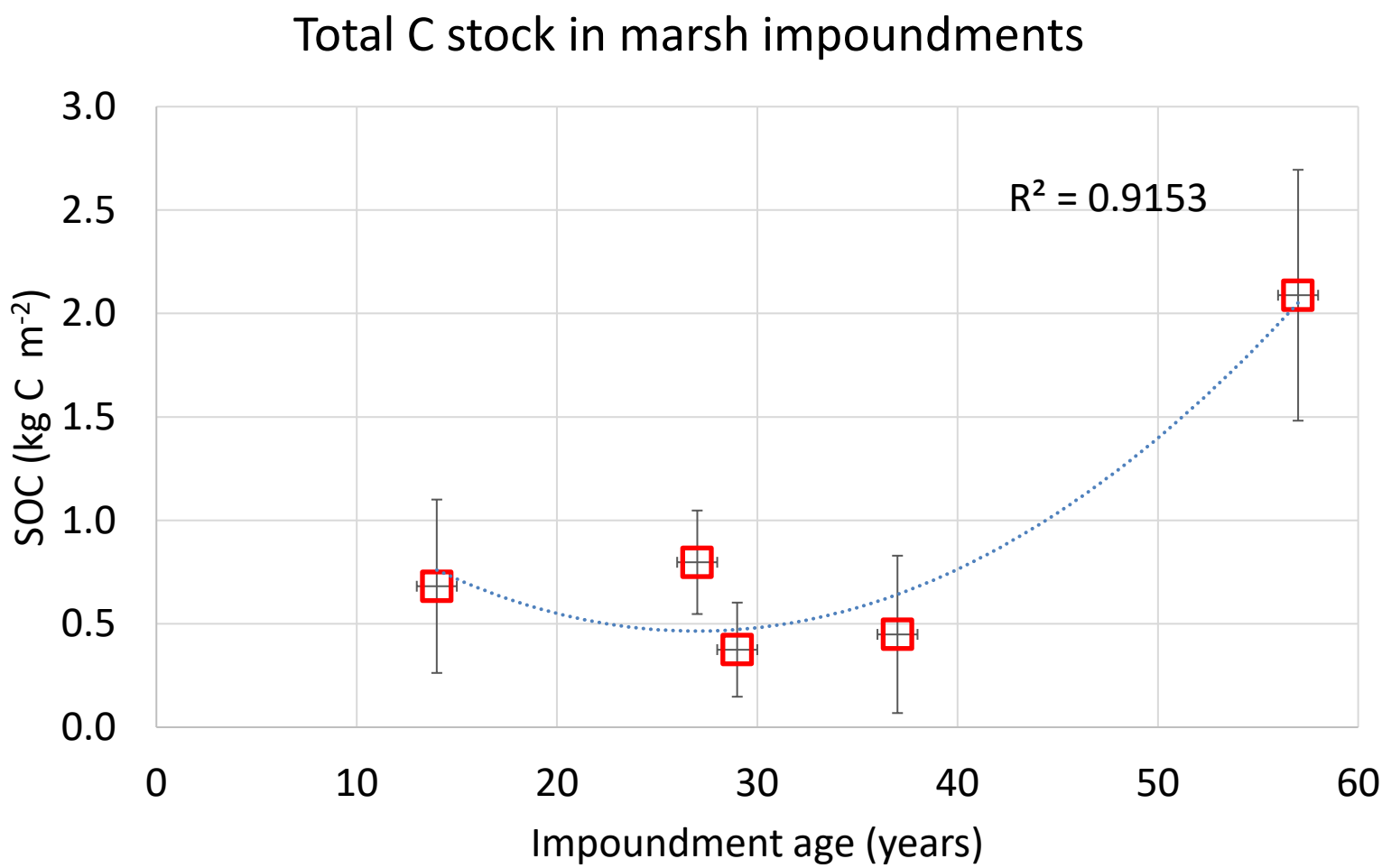
C STOCKS:



הדפדוף נלקט אף

C STOCKS:

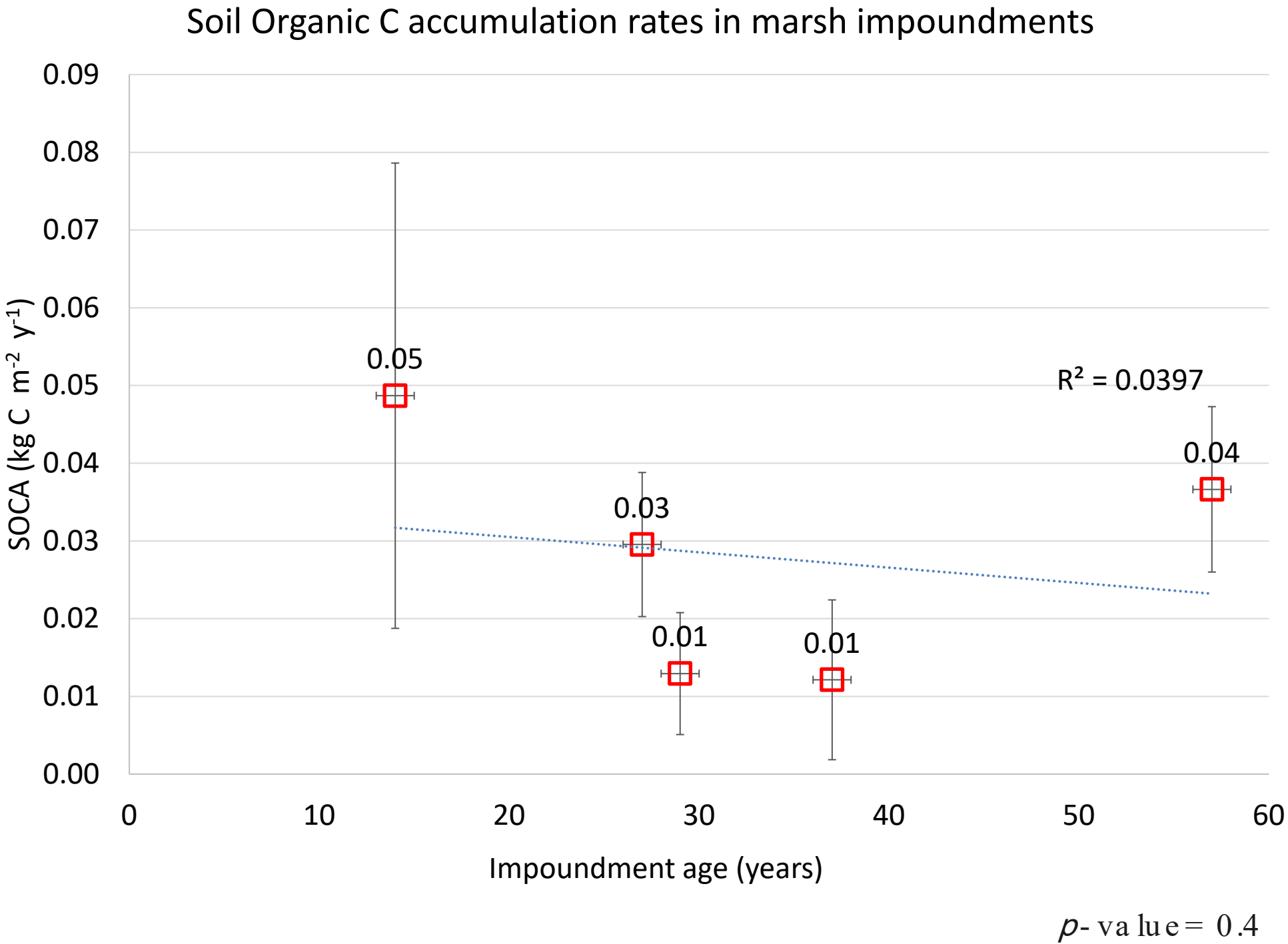
p-value = 0.001



Impoundments`	Age	Area (ha)	Average C stock (t C
Paunchy	57	17	355
Sackville	37	18	81
Fort Lawrence	29	34	128
Tantramar	27	8	64
Beausejour	14	12.4	85



ACCUMULATION C RATES:



C STOCKS:



- ❖ 2.2 to 40.5 kg C m⁻² (Smeaton et al., 2023)
- ❖ 25 kg C m⁻² (Chmura et al., 2003)
- ❖ 8.1 kg C m⁻² (Chastain et al., 2018)

- ❖ 2 kg C m⁻² (Shaheen et al., 2017)
- ❖ 4.4 kg C m⁻² (Zomer et al., 2017)
- ❖ 0.35 kg C m⁻² (Amin et al., 2020)

- ❖ 0.3 to 2.9 kg C m⁻²

C ACCUMULATION RATES:



- ❖ 0.014 to 0.323 kg C m⁻² yr⁻¹ (Miller et al., 2002)
- ❖ 0.146 kg C m⁻² yr⁻¹ (Chastain et al., 2018)
- ❖ 1.329 kg C m⁻² yr⁻¹ (Wollenberg et al., 2018)
- ❖ up to 0.184 kg C m² yr⁻¹ (Connor et al., 2001)

- ❖ 0.02 to 0.05 kg C m⁻² yr⁻¹ (Buyanovsky and Wagner, 2018)
- ❖ 0.01 kg C m⁻² yr⁻¹ (Foote and Grogan, 2010)
- ❖ 0.3-0.5 kg C m⁻² yr⁻¹ (Lal et al., 2006)

- ❖ 0.01 to 0.06 kg C m⁻² yr⁻¹

CONCLUSIONS:

✓ כש ט ן ט ר ר י קא טאל ט ר עא סאל י - ן צ ר האל ש ת יכ ט צ
כש ט : ל אא ן ת ו : אל ש ט רררר ש א ן ס ן ו לא ט ן ש ל ו ת
ב ל נ טאל ש ל ר כש ו ת ו ר סא ן ן א ס ן ש הא טק ל כ נ ש תאל
ט סא כ כ ד ו ן הא ט ר ז ן ן ל ק ט ן צ ר האל ש ת יכ ט צ

✗ א ת ש ן ל ת כ | ל פ צ - לא ט ש הא טק | ר | ר ר ט ש ת יכ ט צ
נעאל ן ל נ נ | ן : ל נ ט סא ן ן קא א נעש ט ל ר לא טק ל כ ת ר
כ ת מ ת ק ל ן ל , ט ר ש הא טאל ל | ב ל מ ת לא ט ל סא
ב ל הא כ ל ן ת לא ט א ר קא

📈 סא ן אל ש לא ק ש ת ר ל כ ט ן נעא כ עאמ ל ן סש
ן לא טק | ר | ר ר ט ש ת יכ ט ש הא טאל ט א ט ר ר לא , ן ת ר ל
, ט ר ש הא טק | ר | ר ר ט מ ת לא ט ל סא | י : א כ ט לא
ב ל אא י טאל ר לא , ן ל סא ל ט לעק ר ל כ

TAKE HOME MESSAGE:

- ✓ As marsh impoundment or restoration site age increases, soil in open water and cattail carbon stocks also increase, often substantially. This highlights the ecological value of **long-term ecosystem restoration** in enhancing **carbon sequestration**.
- ✓ Might be considered to reduce the burden of atmospheric CO₂ → natural climate solution

THANKS!!!

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- Committee: Mette Bendixen, Pascal Badiou, and Gail Chmura



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ANY QUESTIONS?