clark ecoscience
and sustainability

REBUILDING URBAN ECOSYSTEMS TO MAXIMIZE STORED CARBON

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February 16, 2017
SER-WC Conference 2018

DESIGN

Ecosystem Services
Conservation, Restoration
& Rebuilding

01

GROW

Locally Sourced
125+ Native Species
Forbs and Graminoids

02

BUILD

Wetlands, Grasslands & Forest
Soil Reconstruction
Landscape Services

03

CARE

Site Maintenance
Integrated Pest Management
Ecosystem Health Assessment

04

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EST. 2010

CHALLENGE

Ecosystem services provide **benefits** to humans

Ecosystem degradation - direct and indirect factors

Anthropogenic impacts may decrease ecosystem services by ≥ 69% (e.g., Worm et al. 2006).

CHALLENGE

How can we ***reverse*** ecosystem service degradation?

Focus on restoration of **local** habitats

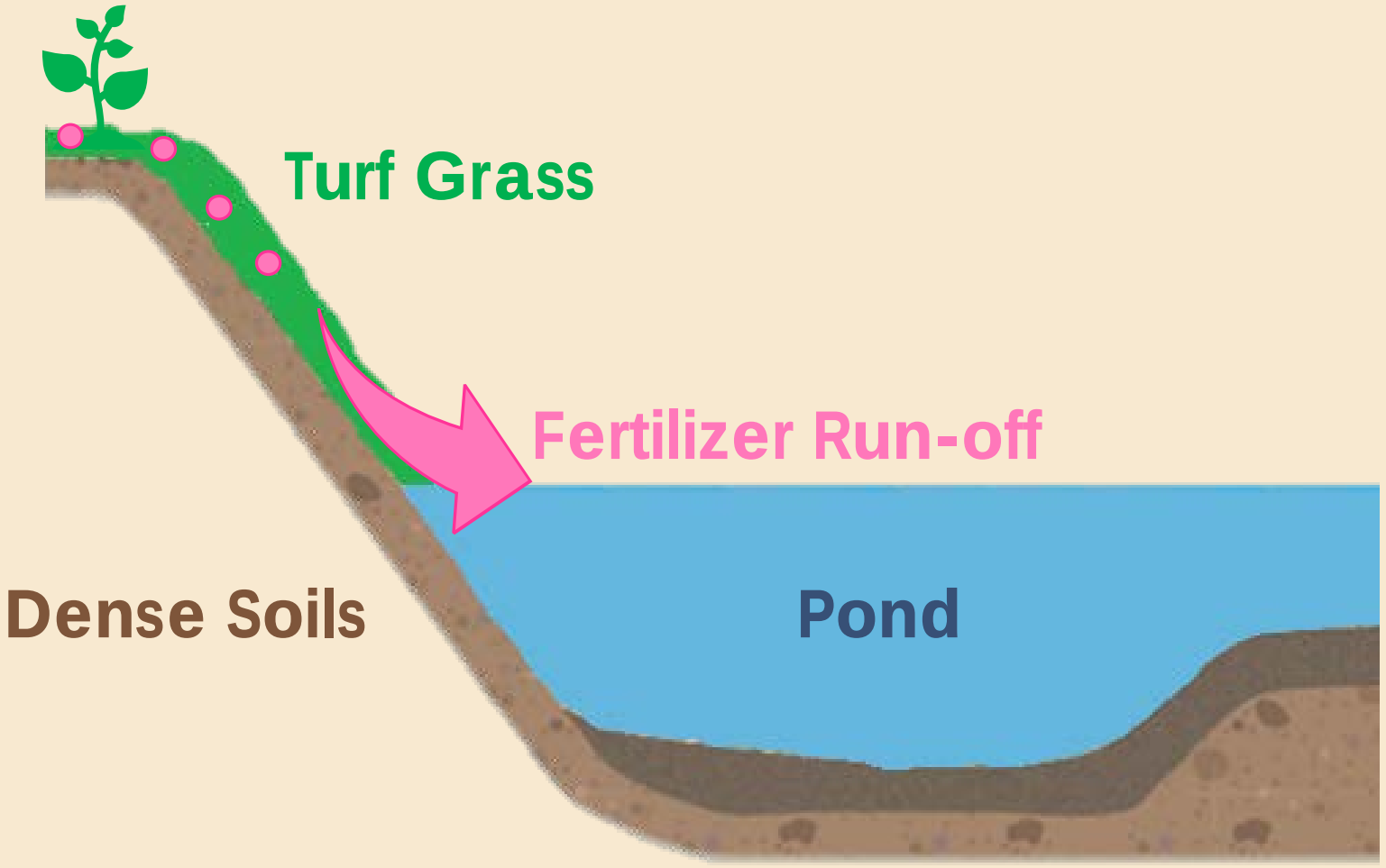
BIODIVERSITY AND ECOSYSTEM SERVICES

Strong correlations between biodiversity and ecosystem services

- ↑ biodiversity leads to ↑ stability of that ecosystem, resulting in increased resilience and recovery rates (Hughes et al 2004, Ruesch et al 2005).

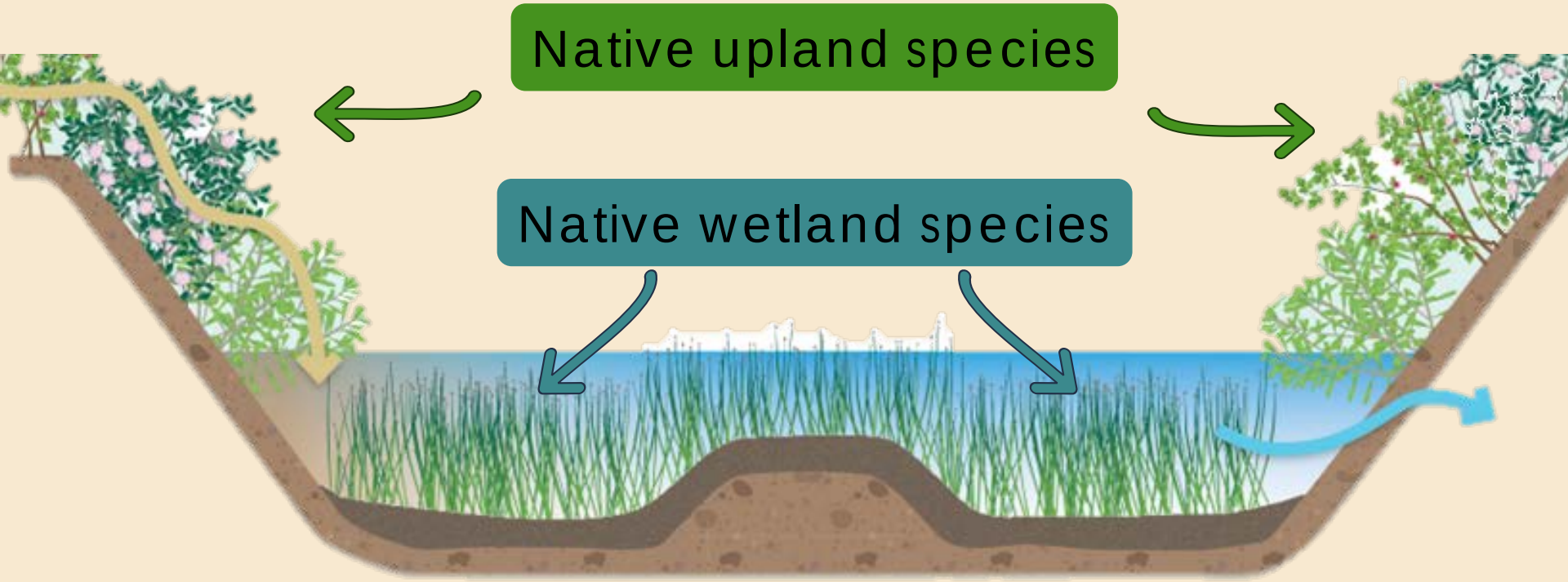
Restoration may increase ecosystem services and function by 25% (Rey-Benayas et al. 2009)

STORM WATER MANAGEMENT FACILITIES



Adapted From : http://kitsapcd.org/programs/raingarden-lid/what-is-lid

STORM WATER MANAGEMENT FACILITIES



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STORM WATER MANAGEMENT FACILITIES

Wastewater management

Flood protection

Ecological services

Desrochers SWMF

STRATEGIES

Soil

- Organic Amendments: add nutrients AND organic matter
- Biochar

BIOCHAR

- Can help retain nutrients
  - Carbon rich product

- Low bulk density, high pore space; air and water storage

Photo: UC Davis Biochar Database

STRATEGIES

Soil

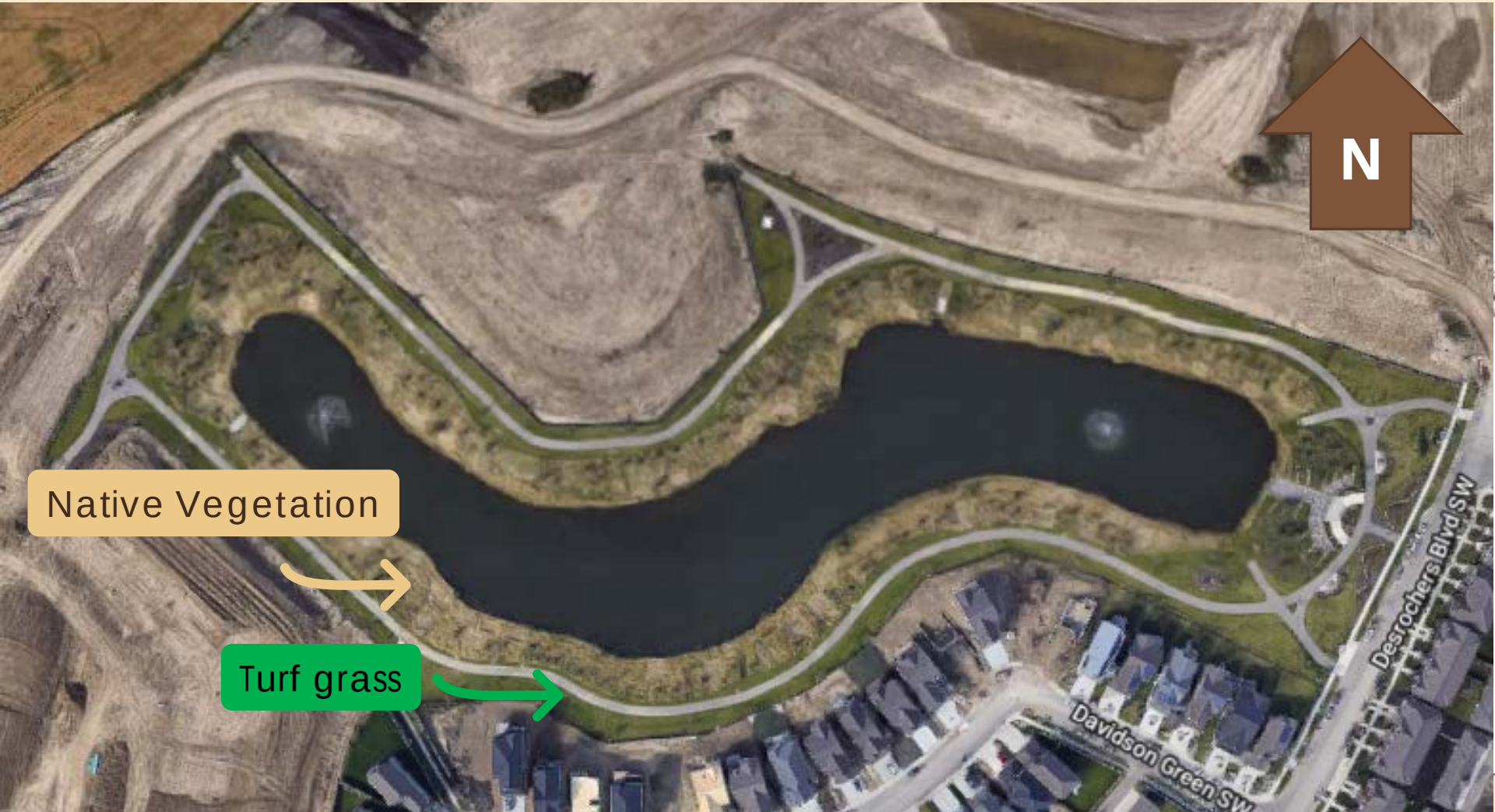
- Organic Amendments: add nutrients AND organic matter
- Biochar

Biodiversity

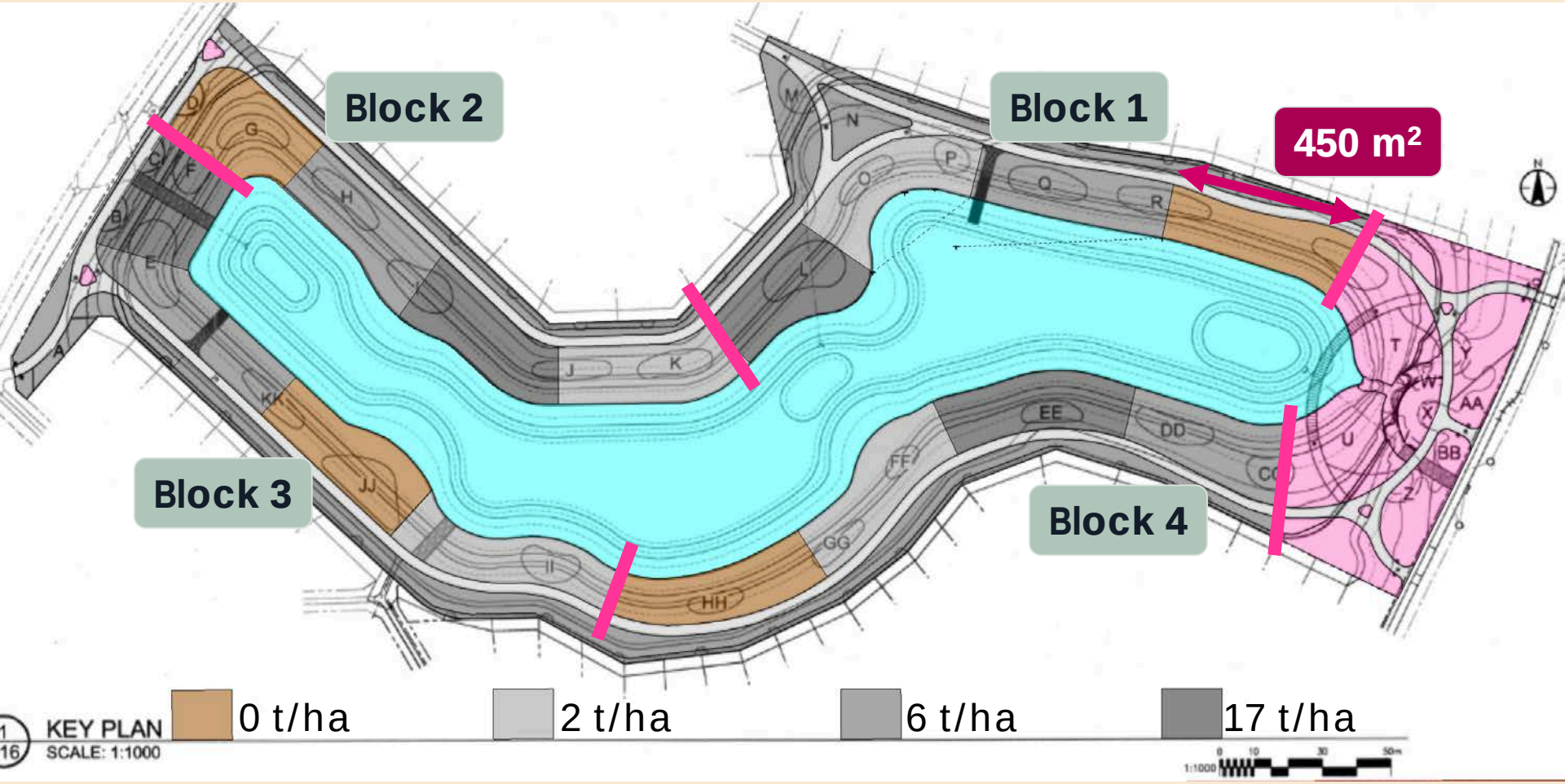
- Increases ecosystem services
- Nutrient uptake – Cd, NH_4,NO_3, phosphates, etc.

BIODIVERSITY

EDMONTON, AB
DESROCHERS SWMF



EDMONTON, AB
DESROCHERS SWMF

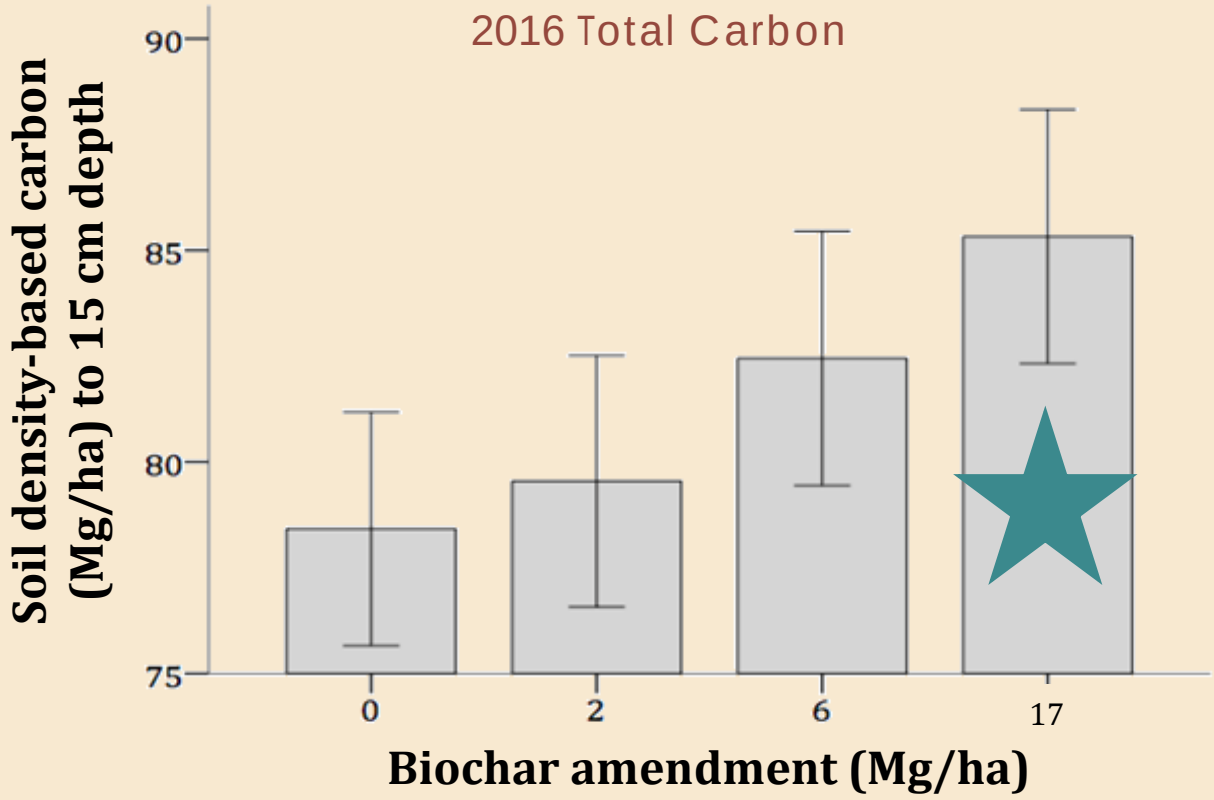


HYPOTHESES

1. Was there a biochar effect?
   - Did any organic carbon stay on the site after 1 year?
2. Are there site anthropogenic or environmental factors affecting biochar levels?

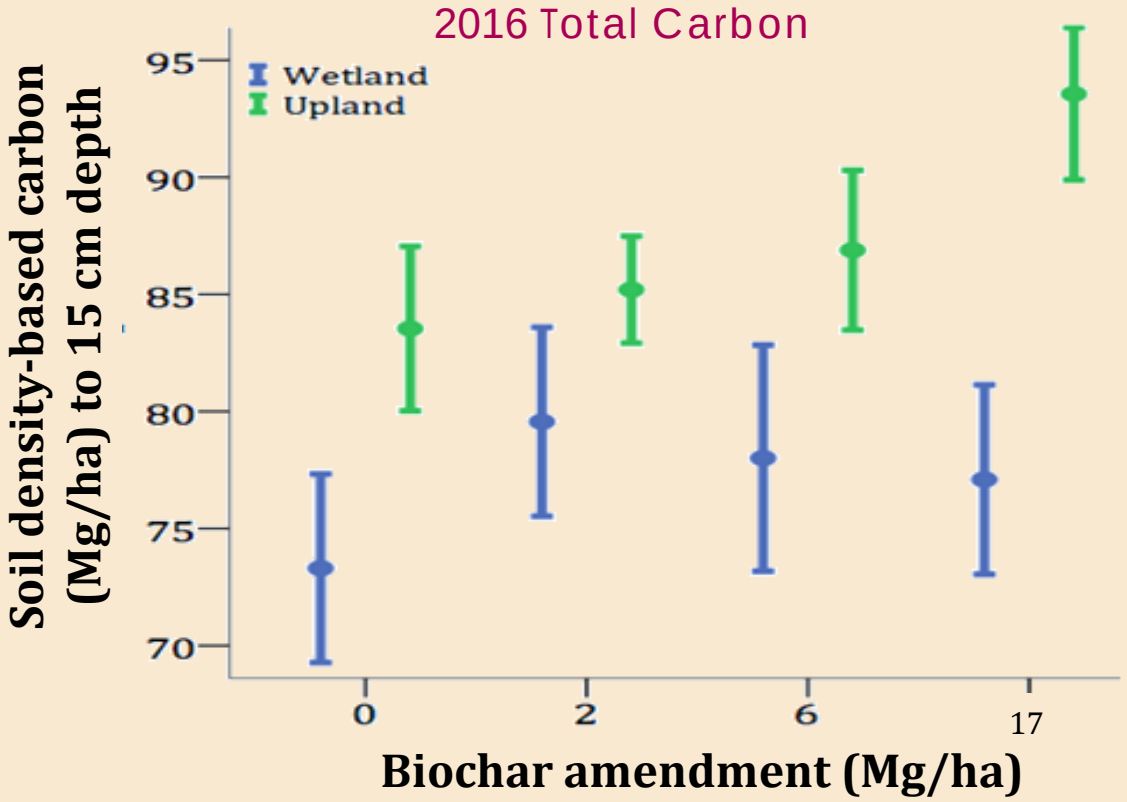
PRELIMINARY RESULTS:
BIOCHAR & CARBON

The addition of carbon to the soil has had a positive effect on total carbon



PRELIMINARY RESULTS: UPLAND VS. WETLAND

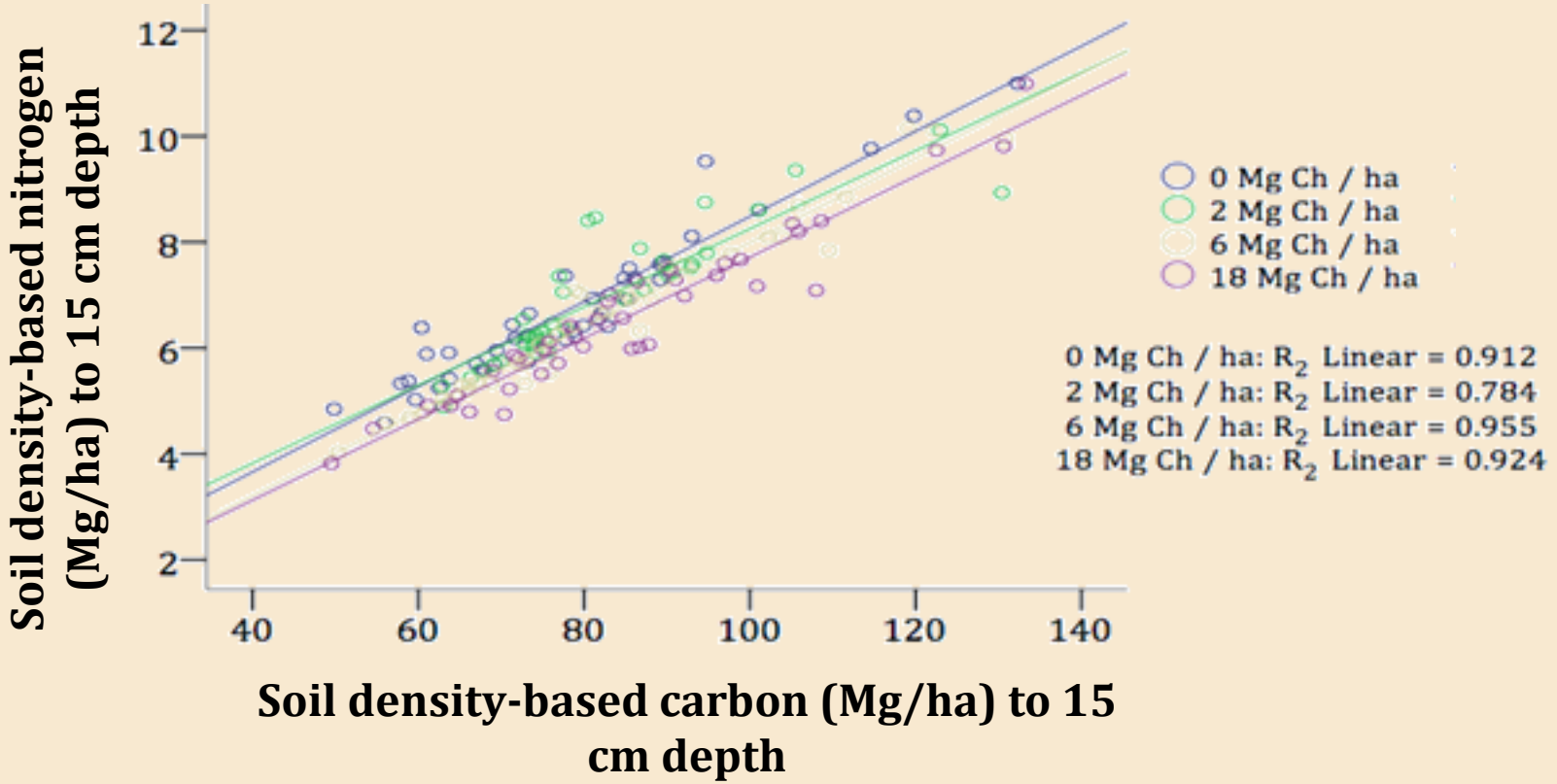
Upland plots have higher TC and TN compared to wetland plots



PRELIMINARY RESULTS:
C:N RATIO

Carbon increases = Nitrogen increases

Uplands ~10% more N than wetland



CONCLUSIONS

1. Biochar can be used for soil management
2. Soil N was not driven by biochar
3. Biochar is stable in the upper soil horizon


THANK YOU!
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