Governor's Council on Climate Change (GC3)
WORKING AND NATURAL LANDS WORKING GROUP
WETLANDS SUB-WORKING GROUP
MEETING MINUTES

Meeting Date: May 15, 2020
Meeting Time: 1:00 pm
Meeting Location:
Teleconference

ATTENDENCE

Working Group Member	Title	Organization	Present
Leslie Kane	Managing Director	Audubon Connecticut	Y
Rick Bennett	Science Director	USFWS	Y
Chris Elphick	Professor	UConn: Ecology and Evolutionary Biology	Y
Julianna Barrett	Associate Extension Educator	UConn Sea Grant & NEMO	Y
Michelle Staudinger	Science Coordinator	USGS, Northeast Climate Adaptation Science Center	N
Kimberly Lesay	Transportation Assistance Planning Director	CT DOT Office of Environmental Planning	Y
Jeff Shamas	Wetland and Soil Scientist	Vanasse Hangen Brustlin	N
Rudy Sturk	Senior Manager	CT Green Bank	N
Stephen Lecco	CEP, AICP, Senior Analyst	GZA	N
Gwen MacDonald	Ecological Restoration	Save the Sound	Y
Denise Savageau	Director	Greenwich Conservation Commission, retired	Y
Jamie Vaudrey	Assistant Research Professor	Department of Marine Science, UConn Avery Point	Y
Anne Hartjen	City Planning	New Haven	N
Peter Auster	Senior Research Scientist	Mystic Aquarium	Y

Associated Staff	Title	Organization	Present
Rick Jacobson	Bureau Chief	DEEP, Natural Resources	N
Jenny Dickson	Division Director	DEEP, Wildlife	Y
Cary Lynch	Research Analyst	DEEP, Energy Research and Planning, Office of Climate Change Technology & Research	N
Beth Lawrence	Assistant Professor	University of Connecticut, Department of Natural Resources and the Environment	Y
Penny Vlahos	Associate Professor	University of Connecticut, Marine Sciences	Y
Katie Clayton	Environmental Analyst	DEEP	Y
Holly Lalime	Property Agent	DEEP, Urban Green and Community Gardens Grant	Y

Public Attendees	Affiliation	Comments
Robert LaFrance	Audubon Connecticut and GC3 Finance Working Group	Offered to do a presentation to the SWG on use of municipal funding options to do work in wetlands; would be assisted by Amy Patterson; length of time: approximately 20 minutes. Enjoyed both of today's presentations.
Kim Bradley	UConn CIRCA	none
Aaron Budris	NWCOG	none

AGENDA & NOTES

Welcome and Announcements

- Welcome, announcements, and roll call presented by Leslie Kane

Agenda Items: Informational Presentations

Wetland Carbon Services

Dr. Beth Lawrence, University of Connecticut Department of Natural Resources and the Environment

- Wetland soils store roughly a third of all terrestrial storage (vegetation=650GTC; soils=1500GTC; wetland soils=500GTC)
- Key question: can wetland conservation and management mitigate climate change?
- Carbon storage: the amount of carbon in a given reservoir (biggest pools are peatlands)
- Carbon sequestration: the rate of CO_2 uptake or SOC accumulation (leader: blue carbon)
- Blue Carbon (tidal/saline) and Teal Carbon (freshwater/inland) both store a lot of

carbon; freshwater stores eleven times more than tidal simply due to extent on the landscape.

- Wetlands are the largest natural source of methane (CH_4); it is twenty-eight times more potent than CO_2 in terms of greenhouse gases and is much higher in freshwater than tidal wetlands (sulfate reduction from seawater)
- Connecticut wetlands (2010 figures): 220,000 acres covering seven percent of the state. Palustrine wetlands are roughly 90% of the total and within that subset, forested wetlands comprise 51.4%.
- Key Research Need: how much carbon do Palustrine Forested Wetlands store? What are the CH_4 emissions?
- Plant invasion can alter carbon cycling (carbon pools; CH_4 fluctuations); Invasive species management is an important consideration and not as straightforward as it might seem—not all techniques are beneficial for carbon cycling. Control can create light penetration and species diversity, but may also increase CH_4 production.
- Salt marshes are important for carbon storage, nitrogen removal, and other ecosystem services such as buffering storms, providing habitat for rare species, recreation, and more.
- Shifts in vegetation associated with tidal restoration and sea level rise affect carbon and nitrogen-based services.
- Microbial process rates differ among vegetation zones, but not between tidally restored and unrestricted marshes.
- Half of Connecticut's coastal marshes will convert from high marsh to low marsh by 2085 (sea level rise). This shift in vegetation may result in loss of denitrification potential.
- Through a series of Marsh "organ pipe" experiments designed to test sea level rise impacts marsh vegetation, it was determined that flooding frequency alone is not driving the carbon cycle. Feedback with the plant community mediate carbon turnover.
- Coastal development and tidal restrictions are pervasive in Connecticut. How do tidal restriction and sea level rise interact to alter the magnitude and frequency of flooding? What are the consequences for carbon and nitrogen cycling?
- What happens to carbon when plants cannot keep up with sea level rise? Submergence = carbon loss (mineralization, reburied within adjacent sediment, exported into coastal oceans (Long Island Sound).
- One management option to limit marsh drowning is thin layer placement (TLP). It adds elevation capital, decreases water depth increases redox potential, reduces phytotoxins, and increases plant growth. No experimental placements have been done to date in Connecticut.
- TLP presents challenges: permitting; sediment sources; thickness; accessibility of sediment; sediment contamination and chemistry.
- TLP also presents opportunities: recycles dredge material; promotes coastal resilience; improves ecosystem services.

- Summarizing Management of Wetland Carbon Services:
  - There is a data gap regarding the role of forested wetlands
  - Strategic invasive plant management is key—*Phragmites* may provide some beneficial carbon services; management techniques may have unintended consequences
  - Restore and maintain tidal flow where possible: it restores plant communities and carbon/nitrogen services and reduces CH4
  - Need to learn more about how tidal restriction interacts with sea level rise
  - TLD: more studies are needed to develop Best Management Practices

- Questions and Answers
  - If low marsh expands, do we also need to expand high marsh to retain carbon function at today's levels? *If low marsh expands without high marsh, denitrification will decrease. Scientific studies to better address this are currently in publication.*
  - What is the best strategy for *Phragmites* control in terms of carbon cycling, mechanical/chemical or inundation? *Inundation.*
  - In thin layer deposition experiments, how was the material applied? *It was applied in a slurry to better control the deposition thickness in the experimental plots.*
  - Comment: couple marsh migration with changes in tidal flow, then use thin layer deposition if you cannot apply other methods.

Making Its Mark: the fate and transport of nitrogen and carbon in the Long Island Sound Estuary

Dr. Penny Vlahos, University of Connecticut Department of Marine Sciences

- Water chemistry studies are important in addressing the concern of hypoxia in Long Island Sound (LIS); occurs annually (peaks June-July); has decrease with recent effort to control inputs, but will change with warming water temperatures.
- The Connecticut and Housatonic Rovers are the largest freshwater sources to LIS
- Dissolved oxygen (DO) trends in LIS: lots of annual variation; can detect significant trends in 7-10 years; salinity changes need 20-50 years to detect.
- Trends from 1994-2014: DO decreased, temperature increased, there was a slight salinity freshening, but the time period wasn't really long enough to detect a significant change. Changes in DO can be completely accounted for by the increases in temperature on these timescales.
- LIS is a very dynamic system that is highly dependent on river flow.
- Annual river discharge: LIS most often exports carbon; most of the time LIS is heterotrophic (organic carbon input is greater than the organic carbon output)
- The chemical nature of LIS is related to low or high water flows of our rivers. Over 20 years, 50% was heterotrophic and exporting carbon; 15% it was heterotrophic and not exporting; 35% it was autotrophic (organic carbon input is less than the organic carbon output).
- LIS Nitrogen (N) balance: the organic form was the largest over all seasons; 60% of the input was consumed; 43% was exported as dissolved organic N, 25% as particulate organic N, 32% exported as nitrate and nitrite.

  - More precipitation likely means more organic carbon input and possibly more autotrophic periods in LIS and intensification of the N cycle (increased burial, denitrification, and total nitrogen export)
  - A new LIS Respire study will measure respiration rates in LIS and add measures of total alkalinity. It is foundational work to create a combined LIS biogeochemical model. It plans to expand to include smaller embayments

- Questions and Answers
  - Have you identified where the organic carbon in LIS is coming from? *A lot is coming from the tributaries themselves.*
  - What is the best management approach to reduce the organic carbon going in? *Reducing the organic nitrogen going into the system is actually what is most critical.*

Next steps

- Work with Tom Easley to develop a blueprint for broader community outreach and engagement; consider New Haven area as a pilot for virtual engagement efforts
- Consider inviting WestCOG to do a presentation about wetland regulations and changes to prevent vulnerable populations from flooding issues and the challenge of gentrification of key habitat areas; if areas have flooded, should people be allowed to rebuild in the same locations?
- Team should continue to populate the documents (Table of Contents) under development
- **Next meeting date:** *To Be Determined*

Public comments:

Noted Above *(Public Attendee Table)*

NOTE: *Slides/presentation will be made available on GC3 web page: www.ct.gov/deep/gc3*