Coastal New Hampshire Climate Summit 2016

Presentation Titles, Abstracts, Presenter Bios, and Topical Resources

Keynote Address

Title: *The living shoreline approach as an alternative to shoreline hardening: using science to inform coastal management policy*
Presenter: Rachel Gittman

Abstract: I will first provide an overview of the ecological effects of shoreline hardening and the extent and potential drivers of hardening in the United States. I will then describe the ecological benefits and potential limitations of living shorelines as the alternative to traditional shoreline hardening approaches (bulkheads and seawalls). Finally, I will highlight current coastal policy and management initiatives that are likely to influence how shorelines are managed in the future.

Bio: I am a Postdoctoral Research Associate at Northeastern University working with Jonathan Grabowski. I received my Ph.D. in Ecology from the University of North Carolina at Chapel Hill in December 2014 under the advisement of Charles "Pete" Peterson and John Bruno. Prior to attending UNC, I worked as an environmental consultant for the Federal government on environmental policy and management-related issues. I received a Bachelor of Science in Environmental Sciences from the University of Virginia in 2006, where I specialized in ecological conservation.

Contact Info:
Rachel Gittman, Ph.D.
Postdoctoral Research Associate
Marine Science Center
Northeastern University
430 Nahant Road
Nahant, MA 01908
r.gittman@neu.edu

Topical Resources:
http://www.northeastern.edu/gittman/ (publications can be downloaded from the living shorelines tab of my webpage)
http://www.northeastern.edu/scyphers/shorelines/
http://livingshorelinesforum.org
http://www.habitat.noaa.gov/pdf/noaa_guidance_for_considering_the_use_of_living_shorelines_2015.pdf

Session 1: ***Where the World Stands***

A. **Title:** *Sea Level Rise: What's Happening with the Polar Ice Sheets and Warming Global Temperature?*
Presenter: Dr. Cameron Wake

Abstract: The rate of sea-level rise appears to be increasing, due to warming ocean (causing water to be less dense) and melting ice shelves which are changing ice flow dynamics in many outlet glaciers in Antarctica and Greenland. Results from several new scientific papers and suggest that rising seas are already causing additional flooding events and that we may already be committed to significant (i.e., meters) of sea level rise. These recent scientific findings will be summarized and placed in the context of what this means for New Hampshire.

Bio: Cameron Wake is a research associate professor at the Institute for the Study of Earth, Oceans and Space at the University of New Hampshire and is the Josephine A. Lamprey Fellow in Climate and Sustainability at the UNH Sustainability Institute. Cameron leads a research program investigating regional climate and environmental change through the analysis of ice cores, instrumental data, and phenological records. Cameron also directs Carbon Solutions New England, a public-private partnership promoting collective action to achieve a clean, secure energy future while sustaining our unique cultural and natural resources. More on Cameron's research is available online at: http://www.eos.sr.unh.edu/Faculty/Wake

Contact Info:
Dr. Cameron Wake
Research Associate Professor
Institute for the Study of Earth, Oceans and Space University of New Hampshire

Topical Resources:
Original science report article...
http://www.atmos-chem-phys.net/16/3761/2016/acp-16-3761-2016.html
Scientists say Antarctic melting could double sea level rise. The Washington Post
http://wpo.st/GZ2R1
Similar story in the Times. http://www.nytimes.com/2016/03/31/science/global-warming-antarctica-ice-sheet-sea-level-rise.html?_r=0
And Huffington post. http://www.huffingtonpost.com/dr-james-hansen/
Abrupt Sea Level Rise Looms As Increasingly Realistic Threat
http://e360.yale.edu/feature/abrupt_sea_level_rise_realistic_greenland_antarctica/2990/

B. **Title:** *New Hampshire's Armor: What does the state's shoreline actually look like?*
Presenter: Hannah Blondin

Abstract: In December 2014, the New Hampshire Shoreline Management Conference was held to improve understanding of the advantages and disadvantages of various engineered armoring and soft shoreline management options for the state's unique coast in the context of climate change and sea level rise. Following the conference, several data needs were identified to help advance integrated shoreline management and policies that promote important assets like human health and safety, natural resources, economic development, cultural and historic resources, and recreation opportunities, among others. One important data need identified was a comprehensive, spatial inventory of engineered shoreline protection structures along the New Hampshire tidal shoreline that could be combined with existing high quality data about natural habitats like salt marshes, sandy beaches, and natural rocky shores. This integrated dataset improves our quantitative understanding of the state of the New Hampshire tidal shoreline, including the proportion of the shoreline that is armored with manmade engineered structures, and the proportion that supports natural habitats.

Bio: I graduated from the University of New Hampshire in 2015 with a Bachelor of Science in Environmental Conservation and Sustainability, where I specialized in geospatial analysis and coastal studies. During my undergraduate degree, I interned with the Great Bay National Estuarine Research Reserve Coastal Training Program. Following graduation, I began an internship with the New Hampshire Department of Environmental Services Coastal Program where I work primarily with Geographic Information Systems (GIS) to provide technical and field work support on shoreline management and salt marsh restoration projects, and participate as a member of the Coastal Adaptation Workgroup.

Contact Info:
Hannah Blondin
NHDES Coastal Program
Hannah.Blondin@des.nh.gov
603-559-0021

Topical Resources
The data set can be found on the NH Coastal Viewer: http://nhcoastalviewer.unh.edu/

C. **Title:** *Update on the NH Coastal Risks and Hazards Commission*
Presenter: Peter C. Kinner
Greenland Representative NHCRHC

Abstract: The CRHC released its draft public comment report and recommendations on March 18. This presentation will provide an overview of the recommendations. We will direct you to where you can access the draft report and to where you can provide any feedback about the recommendations.

Bio: Mr. Peter Kinner had 35 years' experience as an environmental consultant with Normandeau Associates Inc. based in Bedford New Hampshire responsibility ultimately serving for 20 years as the Senior Vice President. Trained as a Marine Scientist he has been involved with coastal aquatic and wetland projects nationwide. Mr. Kinner currently is a member of the Coastal Risk and Hazards Commission, the Board of Directors of Great Bay Stewards and a part -time employee of the UNH Coastal Response Research Center.

Contact Info:
Peter C. Kinner
pckinner@gmail.com

Topical Resources:
The New Hampshire Coastal Risk and Hazards Commission (RSA 483-E) Draft Report and Recommendations, *Preparing New Hampshire for Projected Storm Surge, Sea-Level Rise, and Extreme Precipitation,* is now available for public review and comment on the Commission's website at: http://nhcrhc.stormsmart.org/draft-for-comment/.

Written comments can be e-mailed to crhc-comments@rpc-nh.org or mailed to:

> Attn: Julie LaBranche
> Rockingham Planning Commission
> 156 Water Street, Exeter, NH 03833

The NHCRHC resources are available on the following link under the CRHC tab.
www.NHCAW.org

D. **Title:** *Climate Change in the NH Wildlife Action Plan*
Presenter: Emily Preston

Abstract: The revised 2015 NH Wildlife Action Plan included a thorough analysis of threats to species and habitats, and a suite of actions to address those threats. Climate Change affects a multitude of species and habitats, particularly those along the coast and in freshwater systems. This talk will introduce the Plan and some key actions that municipalities and others can take to help mitigate the effects of climate change on wildlife and habitats, and how these actions can also help with human adaptation.

The NH Wildlife Action Plan can be found at http://www.wildlife.state.nh.us/wildlife/wap.html. The overall threat assessment is in Chapter 4. The assessments of climate change on individual species and habitats are found in appendices A and B. Actions to help with climate change are found in Chapter 5, both within the Climate Change section and in many other actions in planning, interagency coordination and education, as well as in the appendices.

Bio: Emily Preston is a Wildlife Biologist with the NH Fish and Game Department. She is the co-coordinator of the revision of the NH Wildlife Action and participates in conservation and land use planning efforts throughout the state and region. She provides technical assistance to landowners, communities, conservation organizations and agencies on wildlife habitat protection and management.

Contact Info:
Emily Preston
Wildlife Biologist
New Hampshire Fish and Game
603 2715860
Emily.Preston@wildlife.nh.gov

Topical Resources:
The NH Wildlife Action Plan can be found at http://www.wildlife.state.nh.us/wildlife/wap.html

Session 2: ***The Built Environment***

A. **Title:** *Tides to Storms: A Coastal Vulnerability Assessment*
Presenter: Julie LaBranche

Abstract: In September 2015 the Rockingham Planning Commission (RPC) completed the **Tides to Storms** project to assess and map the vulnerability of New Hampshire coastal municipalities and public infrastructure to flooding from expected increases in storm surge and rates of sea-level rise. The project provides a regional scale understanding of what and where impacts from sea-level rise and storm surge will occur in the coast. The assessment evaluated future impacts to roads and transportation assets, critical facilities and infrastructure, and natural resources.

Bio: Julie LaBranche is a Senior Planner with the Rockingham Planning Commission in southeast New Hampshire. Her work in the region includes assisting communities with: development of plans, zoning ordinances and regulations relating to land use, natural resource protection, climate change, energy efficiency and conservation, and stormwater management; developing Master Plans and other planning documents and policies; and integrating land use and transportation planning concepts.

Contact Info:
Julie LaBranche
Senior Planner, Rockingham Planning Commission
156 Water Street Exeter, NH 03833
Phone: (603) 778-0885

Topical Resources:
For more information and project reports and maps visit
http://www.rpc-nh.org/regional-community-planning/climate-change/resources

B. **Title:** *Modeling the Effects of Sea-Level Rise on Groundwater Levels in Coastal New Hampshire*
Presenter: Jayne Knott

Abstract: Climate change studies have focused primarily on surface-water flooding from sea-level rise; however, little attention has been given to rising waters from beneath the ground surface. We have modified a USGS groundwater flow model to investigate the effect of various sea-level rise scenarios on groundwater levels. Our findings suggest that adaptation strategies must consider potential damage from rising groundwater that occur not only immediately along the coast but also at significant distances inland.

Bio: Jayne F. Knott is a Ph.D. student in the Civil and Environmental Engineering Department at (UNH). She received her B.A. degree from Mount Holyoke College in geology and physics and her M.S. degree in Civil and Environmental Engineering at M.I.T. She has more than 20-years of experience in water supply and groundwater remediation, first with the U.S. Geological Survey and later in consulting.

Contact information:
Jayne F. Knott
Gregg Hall
University of New Hampshire
jfk1011@wildcats.unh.edu
(508) 344-2831

Topical Resources:
This work is part of research being conducted by the Infrastructure and Climate Network (ICNET) and the UNH Center for Infrastructure Resilience to Climate (UCIRC) at the University of New Hampshire. http://theicnet.org/
A link to a presentation given at the Maine Sustainability and Water Conference in March on this topic is given below:
http://umaine.edu/mitchellcenter/files/2016/04/A-02-Knott_Jayne.pdf

C. **Title:** *Collaborative Research on Changing New England Winters Impacts on Low Volume Roads*

Presenter: Dr. Jennifer M. Jacobs

Authors: Jennifer M. Jacobs, Jennifer M. Jacobs, Jo Daniel, Heather Miller, Anne Stoner, Jillian Crowley, Curt Grimm, and Alli Puchlopek

Abstract: This presentation describes how future temperature changes could potentially impact subsurface freeze-thaw conditions in low-volume roads (LVRs). In the United States, the approximately three million miles of LVRs constitute about 70% of the total roadway mileage. Freezing conditions make the pavement layers much stiffer and able to support heavier vehicles without causing damage. During the spring thaw, the pavement temporarily becomes very weak and highly susceptible to damage. Road agencies increase or limit the weight that trucks can haul in response to this changing pavement strength. These changes can have a large impact on the economy of a region as well as a strong potential for ripple effects on natural and engineered systems. For this case study, we use a freeze-thaw (FT) model that is formulated in terms of a series of endpoints (freezing and thawing indices and maximum frost depth) whose values are determined via a mechanistic model that requires projected air temperatures, as well as pavement structure parameters, as inputs.

There are four main outcomes and products from this effort. 1. The research results show when and where significant changes to New Hampshire roads can be expected due to climate change, 2. A generalized set of tools and processes is now available through theICNet.org to address research questions related to infrastructure and climate change using this research as a case study, 3. Stakeholder interviews provide a policy and governance perspective regarding impacts of anticipated changes, and 4. The research reveals broader environmental and economics for the region that have not yet been considered.

Contact Info:
Dr. Jennifer M. Jacobs
Professor of Civil and Environmental Engineering
Director of the Infrastructure and Climate Network (ICNet)
Jennifer.Jacobs@unh.edu

Topical Resources:
The Freeze-Thaw research is summarized on the Infrastructure and Climate Network's website (http://theicnet.org/?page_id=718)
The ICNet Research Guide was developed using the Freeze-Thaw research as a pilot activity (http://theicnet.org/?page_id=52).
A technical presentation was given at the NOAA CPASW Burlington, VT meeting (http://www.uvm.edu/~cpasw/presentations/wed/Session%202/5CrowleyJacobsWedSession2CPASW16.pdf).

D. Title: *Addressing a perched, flood-prone crossing for coastal resilience in Newmarket*
Presenter: Peter Steckler

Abstract: Bay Road's crossing of Lubberland Creek in Newmarket is an impediment to fish passage, salt marsh migration, and flood waters. These issues are addressed, in part, by incorporating sea level rise projections into the crossing's re-design. The result: a climate-ready, ecologically compatible restoration plan.

Bio: Pete is the GIS and Conservation Project Manager at the New Hampshire Chapter of The Nature Conservancy where he has worked for the past eight years. He works on conservation planning efforts across New Hampshire, from land conservation planning and tidal crossing assessment projects in the southeast to maintaining wildlife connectivity in the northern forest. With a background in environmental and wetland science, Pete continues to learn and apply GIS to advance conservation in New Hampshire.

Contact:
Email: psteckler@tnc.org
Phone: (603) 224-5853 extension 22

Special Sessions

A. **Title:** *NHCAW Climate Champion Award* Presentation
Presenter: Chris Keeley, UNH Cooperative Extension / NH Sea Grant

Chris Keeley is the Communities & Climate Program Coordinator with UNH Cooperative Extension and NH Sea Grant. Since 2012, Chris has provided education, facilitation, and technical assistance to communities as they pursue climate change adaptation and resiliency planning. He has strong ties to local community leaders and regional experts. Chris is also a member of the NH Coastal Adaptation Workgroup. He earned his Masters of Science from the University of New Hampshire by conducting original research to investigate the motivations, processes, and outcomes of coastal communities of the Gulf of Maine as they adapt to climate change.

Topical Resources: *Sustaining Champions of Climate Adaptation in Coastal Communities: A Northern New England Study* Alexandra Philip, NH Sea Grant Doyle Fellow
https://seagrant.unh.edu/sites/seagrant.unh.edu/files/media/pdfs/extension/climate_champions_2014.pdf

B. **Title:** *Fisheries and Climate Change in the Gulf of Maine: Challenges and Opportunities for Fishing Communities*
Presenter: Erik Chapman, PhD

Abstract: In the context of the Earth's warming oceans, the Gulf of Maine is among the fastest warming coastal regions in the world. The summer of 2012 was warmest on record for the Gulf of Maine when both fishermen and scientists observed an unusual phenology and surprising species distributions. Expect more of the same this year as this winter ocean temperatures have scientist predicting that the summer of 2016 may be even warmer. For the foreseeable future, iconic fisheries for Atlantic cod, American lobster and Northern shrimp will be challenged to adapt to both warming and the largely unknown but potentially dramatic effects of ocean acidification. An overview of what scientists and fishermen are observing and what is expected in the future will be presented. Challenges to climate adaptation by fishermen in a setting where technology, management and markets conspire to limit fishermen's flexibility will be discussed. Finally, examples of how fishermen are adapting to climate change here, in other regions of the U.S., and in international fisheries will be used to frame a strategy to build resiliency of Gulf of Maine fishing communities.

Bio: Dr. Erik Chapman is a Fisheries Assistant Extension Professor and the Fisheries and Aquaculture Program Leader at NH Sea Grant/UNH Cooperative Extension at UNH. He has a MS in Wildlife Ecology and a PhD in Oceanography. He has worked extensively with the NH fishing industry and with University researchers on projects designed to support sustainable marine fisheries. He is currently leading a project with NH fishermen, funded by The Nature Conservancy, to collect ocean temperature and catch data that will inform both climate science and fishermen's ecological knowledge. His other work includes gear research designed to improve selectivity of NH fishermen and projects to develop alternative markets for undervalued, but abundant species. Dr. Chapman has also co-produced a documentary with NH Public Television entitled "Saving New England's Fisheries" that will air this May. Prior to his work in NH, he worked in the Antarctic studying the influence of a changing climate on penguins and the marine ecosystem and on farms in Wisconsin where he studied the influence of alternative farming practices on wildlife. His work overall focuses at the interface between human use and ecology and is based in Aldo Leopold's Land Ethic that extends our concept of community to include the ecosystems on which we depend.

Contact Info:
Erik Chapman, PhD
Extension Faculty/Specialist, Fisheries
University of New Hampshire
NH Sea Grant/Cooperative Extension
164B Morse Hall
Durham, NH 03824
Tel: 603-862-1935

Topical Resources:
This is a link to the Science Magazine study regarding climate change and GOM cod populations. http://www.sciencemag.org/content/early/2015/10/28/science.aac9819.full

Session 3: ***Action Where It Counts***

A. **Title:** *The Business Case for Resilience: Highlights from the NH Weathering Change Business Forum*
Presenter: Roger Stephenson

Abstract: The NH Weathering Change project convened 100 men and women to discuss the impacts of shifting weather patterns to their businesses. Science was introduced in the forum briefly, by a scientist, only as a way to show the data exist to support the changes businesses were seeing "outside their windows". New Hampshire Weathering Change was developed with the help of a dozen seasoned business leaders, all of whom have played active roles in civic and political affairs in the state for many years. People from manufacturing, forestry and agriculture, tourism, and finance shared their experiences, identified areas of public and private collaboration as well as regulatory barriers, and offered solutions. The role of diverse clean energy in strengthening resilience to more frequent disruptive weather events emerged as one of the areas of discussion

Bio: A residents of Stratham, Roger Stephenson owns Stephenson Strategic Communications and provides public relations expertise and counsel to business, government and non-profit executives. He contributes volunteer time as president of the Southeast Land Trust board of directors. Prior to beginning his public relations career with Patrick Jackson and Jackson Jackson and Wagner, Roger held a senior level position under Secretary Bruce Babbitt at the US Department of the Interior in Washington, DC. He was later detailed to the Council on Environmental Quality.

Contact Info:
Roger Stephenson
rstephenson@gmail.com

Topical Resources:
www.nhweatheringchange.com

B. **Title:** *Why CRS is important for Resilience as communities prepare for Climate Change*
Presenter: Kim Reed

Abstract: CRS is the FEMA Community Rating System, a volunteer program that communities go above and beyond the minimum standards set by FEMA. Enrolling in the CRS program is an important step for your town because homeowners are facing rising flood insurance rates along with challenges of preparing for climate change. By being part of the CRS program; residents and business owners in the special flood hazard areas can lower the cost of their insurance while the program promotes mitigation preparedness and activities in special flood hazard areas.

Bio:

Contact Info:

Kim Reed, CFM
Planning & Zoning Administrator
Rye, NH
kreed@town.rye.nh.us

Topical Resources:

The National Flood Insurance Program's (NFIP) Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. ***http://www.fema.gov/national-flood-insurance-program-community-rating-system***

Here is an article on CRS in *Downstream*, the PREP Estuaries Partnership News for May 2016. **http://us10.campaign-archive2.com/?u=5075a5bd27421833e43127c13&id=3c4d71f937&e=cfb092782a**

C. **Title:** *Restoring Natural Dunes and Protecting People: Community Based Sand Dune Restoration in Hampton and Seabrook, NH*
Presenter: Alyson Eberhardt

Abstract: Sand dunes provide a natural buffer from storm events, protect the coastline against flooding and erosion associated with storms, and maintain beaches. However, New Hampshire's dunes have been impacted by development and disturbance over the past two centuries. We are working in partnership with state and municipal decision makers, local schools and community members to restore dunes that have been destabilized in NH. This presentation will provide the results of our dune restoration work, including successes and challenges, as well as our efforts to enable landowners to continue this work beyond the project period.

Bio: As the Coastal Ecosystems Specialist for NH Sea Grant and UNH Cooperative Extension, Alyson works with community members, natural resource managers and researchers to support management efforts to protect and restore our coastal ecosystems. Her primary research and extension experience is in community-based restoration and monitoring of coastal habitats, including salt marshes, sand dunes, and shoreland buffers. She also coordinates the Coastal Research Volunteers, a citizen science program that trains community volunteers to work on local, coastal research projects. She loves eels.

Contact information
Alyson Eberhardt
Alyson.Eberhardt@unh.edu
603.862.6709

Topical Resources
First, there is the project website:
http://seagrant.unh.edu/DuneRestoration
There's this video about the project:
https://www.youtube.com/watch?v=fxo6dTP1b0k
Resources for homeowners:
http://www.mass.gov/eea/agencies/czm/program-areas/stormsmart-coasts/stormsmart-properties/

D. **Title**: *The Use of SLR in Dover's Waterfront Redevelopment*
Presenter: Steve Bird

Abstract: Dover has a municipally owned parcel in downtown along the Cocheco River that is being proposed for redevelopment in a public/private partnership. The city has hired consultants to assist in the preparation of concept plans for mixed use development. The waterfront committee instructed the consultants to consider the potential impacts of projected sea level rise in the site design. Any new buildings and infrastructure will be built at an elevation that takes into account the sea level rise projections. These improvements are intended to last for many decades so it makes sense to plan ahead.

Bio: I have worked for the City of Dover as a City Planner for 19 years. During that time I have been involved in many projects including master planning, Cocheco River dredging, waterfront redevelopment, ordinance preparation, climate change planning and conservation land preservation. I provide staff support to the Conservation Commission, Open Lands Committee, Waterfront Committee, and Planning Board. Prior to Dover, I worked at the Rockingham Planning Commission for 12 years.

Contact Info:
Steve Bird
City Planner
City of Dover, NH
288 Central Avenue
Dover, NH 03820-4169
e: s.bird@dover.nh.gov
p: 603.516.6008 f: 603.516.6049

Topical Resources:
Please include these links for the NH Coastal Risks and Hazards Commission's Science report and summary: http://nhcrhc.stormsmart.org/files/2013/11/CRHC_SAP_FinalDraft_09-24-14.pdf and http://nhcrhc.stormsmart.org/files/2013/11/STAP-Report-Summary-WEB.pdf

General Resources
http://extension.unh.edu/Resources-Community-Volunteers

http://soaknh.org/wp-content/uploads/2016/04/NH-Homeowner-Guide-2016.pdf

The new and improved NERACOOS website! The new website has improved overall site navigation to make it easier to access all of our data products. http://www.neracoos.org/

New England communities are taking action to adapt to the impacts of climate change in new and creative ways. Resilience and Adaptation In New England (RAINE) database catalogs what is happening so we can learn from these experiences, share lessons being learned, discover how to better assist municipalities, and promote collaboration. You can conduct basic searches and map the information, as well as conduct more advanced searches using all of the information in the database. https://www.epa.gov/raine