Attachment C

PROPOSAL COVER SHEET
Required from all respondents

Please complete and submit this Cover Sheet with your grant The completed Cover Sheet can be scanned and emailed to Thomas.anderson@mass.gov Responses can also be sent in by regular mail to Executive Office of Energy & Environmental Affairs, Division of Conservation Services, 100 Cambridge St., 10th Floor, Boston MA 02114.

Organization information to be used for the contract:

Organization Name: BSC Group, Inc.

Mailing address: 803 Summer Street

Boston, MA 02127

Phone: 617-896-4300

Email: gdavies@bscgroup.com

Website: _____

Commonwealth of Massachusetts, Vendor Code:
VC6000173026
(if our organization has one)

CHIEF EXECUTIVE or authorized signatory:

_____

PRIMARY CONTACT FOR THIS GRANT REQUEST AND POSITION (provide name, phone, e-mail and address if different from above):

Gillian T. Davies

_____

Authorized Signature

Gillian Davies
Print Name

Senior Ecologist / Natural Climate Solutions Specialist
Title

Cover Sheet Page 1

FY 25 GRANT PROJECT INFORMATION

GRANT AMOUNT REQUESTED:

Total $ 79,997

TOTAL PROJECT BUDGET (from all sources, including grant.)

$ 87,997

Total project match

$ 8,000

Project name: Multimedia Healthy Wetland Soils Outreach Materials

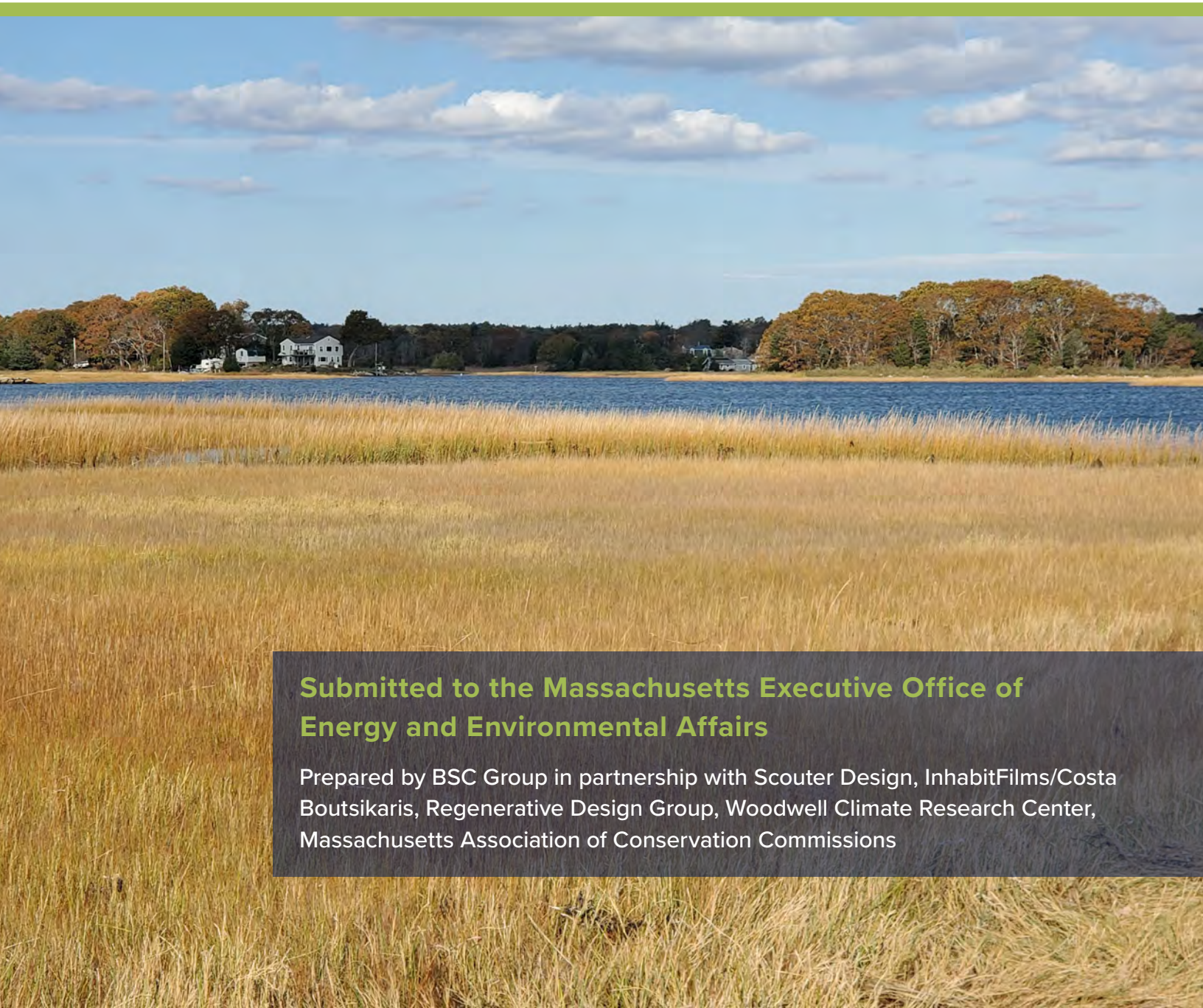
SUMMARY OF GRANT PROJECT (limit to 75 words) (Please also forward this summary of project electronically to thomas.anderson@mass.gov so we can easily cut and paste it in summary reports :

The Multimedia Healthy Wetland Soils Outreach Project addresses the historical view of wetlands as wastelands and focuses on increasing public understanding of the importance of healthy wetland soils through the development of a multimedia campaign featuring pamphlets/infographics, and short films and aims to foster appreciation of wetland soils and motivate action. The current gaps in public understanding emphasize the need for increased awareness about their significance.

BSC GROUP

Challenge Grants Implementing the Commonwealth's Healthy Soils Action Plan / NOVEMBER 19, 2024

Multimedia Healthy Wetland Soils Outreach Materials



Submitted to the Massachusetts Executive Office of Energy and Environmental Affairs

Prepared by BSC Group in partnership with Scouter Design, InhabitFilms/Costa Boutsikaris, Regenerative Design Group, Woodwell Climate Research Center, Massachusetts Association of Conservation Commissions

BSC GROUP
BUILD | SUPPORT | CONNECT

Engineers
Environmental Scientists
Software Developers
Landscape Architects
Planners
Surveyors

www.bscgroup.com

November 19, 2024

Tom Anderson
Division of Conservation Services
Executive Office of Energy & Environmental Affairs
100 Cambridge Street
Boston, MA 02114

Dear Mr. Anderson:

The Massachusetts Healthy Soils Action Plan (HSAP) Challange Grant presents an exciting opportunity to implement the HSAP's recommended action steps and to recognize the importance of soil health in sustaining healthy ecosystems and improve the current state of soil health and wetlands in Massachusetts. In response to this opportunity, BSC Group, together with Inhabit Films, Scouter Design, Regenerative Design Group, Woodwell Climate Research Center, and the Massachusetts Association of Conservation Commissions, has prepared a proposal to develop a "Multimedia Healthy Wetland Soils Outreach Project" for consideration.

A 2018 survey revealed that a significant portion of the public is unaware of wetlands in their communities, with many never visiting them or understanding their role in carbon storage. Research suggests that online channels promoting further exploration can bridge the knowledge gap between scientific research and public awareness of wetlands' roles in climate change mitigation and resilience. Further, the Massachusetts HSAP highlights the need for educational outreach on soil health practices, including those pertaining to wetlands, to enhance community resilience and economic viability.

The Multimedia Healthy Wetland Soils Outreach Project addresses the historical view of wetlands as wastelands and focuses on increasing public understanding of the importance of healthy wetland soils through the development of a multimedia campaign featuring pamphlets/ infographics, and short films and aims to foster appreciation of wetland soils and motivate action. The current gaps in public understanding emphasize the need for increased awareness about their significance.

We believe our project team is uniquely qualified to provide a practical and effective option for assisting with the implementation of the HSAP and its goals based on our unmatched repertoire of expertise in graphic design; filmmaking; wetland and soil management; wetland and soil science research and practice; and ecological restoration, as well as our proven ability to effectively collaborate to produce meaningful project deliverables. Thank you for your consideration and please feel free to contact me with any questions about our proposal or require additional information.

Sincerely,

BSC Group

Gillian T. Davies

Gillian Davies, PWS, RSS, NHCWS, CESSWI
Senior Ecologist / Natural Climate Solutions Specialist

803 Summer Street / Boston, MA 02127 / 617-896-4300

Table of Contents

Project Description

INTRODUCTION

Conduct Statewide multi-media awareness campaigns on soil health and its connection to community resilience, economic viability, and climate change.

- **Recommendation A6c**, Massachusetts Healthy Soils Action Plan, Page 78

Educational materials are needed for sharing the goals of the Healthy Soils Action Plan with municipal officials, planning and zoning boards, departments of public works, conservation commissions, developers, landscapers, realtors, and the general public.

- **RFR for Challenge Grants Implementing the Commonwealth's Healthy Soils Action Plan (Round 2)**, Attachment A, Ideas and Project Suggestions, Page 14, RFR ID: BID ENV 25 DCS 12

Wetlands were historically viewed as wastelands to be avoided, drained, filled, and/or treated as dumping grounds[1]. Studies have shown that public understanding of wetlands and their significance has improved over time, but significant gaps remain.

In 2018, the United States Geological Survey reported the results of a general public survey conducted to understand public views of wetlands[2]. Those who identify as "wildlife viewers, anglers, and/or hunters" are more likely to know of wetlands in their communities and visit wetlands at least once a year. However, 47% of those who do not identify as such *do not know of wetlands in their communities*, and 78% have not *visited wetlands in the past 12 months*. Only 42% of all respondents would be "very concerned" about the loss of carbon storage if wetlands were to disappear or be degraded, in comparison to approximately 77% of respondents who would be very concerned about the loss of clean water and clean air. Respondents looking to learn more about nature-related topics prefer to get their information through *personal experience; reading or accessing online content; and watching visual media online*.

[1] https://www.nps.gov/subjects/wetlands/why.htm
[2] https://pubs.usgs.gov/publication/ofr20171148

Research suggests that bridging the knowledge gap between scientific research and public awareness, particularly through online channels that promote further exploration, could further understanding of wetlands' crucial roles in flood mitigation, carbon sequestration, climate change adaptation, and more.

The Massachusetts Healthy Soils Action Plan (HSAP) emphasizes the need for increased awareness and implementation of soil health practices across various land use types, including wetlands. The HSAP recommends education and outreach, including the development of multi-media resources, addressing healthy soils in wetlands and other ecosystems – particularly soil health's connection to community resilience, economic viability and climate change.

Therefore, this Project seeks to increase understanding of how healthy wetland soils support climate resilience, social resilience, and economic resilience in the Commonwealth through a multimedia campaign featuring pamphlets/infographics and short films for the public, presented in an accessible, memorable, motivating, scientifically accurate manner that incites appreciation and awe for wetlands and healthy soils.

These pamphlets/infographics (final format to be determined with EEA during the first phase of the project) and short films will be produced as web-based resources. Once complete, they will be housed on the MA Healthy Soils Website developed in FY24 under the FY24 HSAP Challenge Grant (i.e. Regenerative Design Group's HSAP Challenge Grant Project C137). Because of the web-based format, community members across the State will be able to access the educational materials in one place. Nonetheless, the Project Team understands the importance of communicating that the materials exist as well as generating excitement for them, which is why the Project Team also plans on generating short "clips" for social media which will alert viewers to the existence of these materials.

This Project seeks to increase understanding of how healthy wetland soils support climate resilience, social resilience, and economic resilience through a multimedia campaign featuring pamphlets/infographics and short films for the public, presented in a manner that incites appreciation and awe for wetlands and healthy soils.

The Multimedia Healthy Wetland Soils Outreach Materials Project will be developed in four phases over an 18-month period from January 2025 to June 2026 (see the Methodology and Timeline sections). Each of these phases will further the production of seven pamphlets/infographics and seven corresponding short films that address the importance of healthy wetland soils. The pamphlets/infographics and short films will correspond visually and thematically and will be organized according to wetland types and regulatory considerations.

The Project Team is uniquely qualified to develop these multimedia resources because team members include the lead authors of the HSAP (Regenerative Design Group (RDG)), a member of the HSAP Working Group (BSC Group), and the consulting team from the Massachusetts Department of Environmental Protection (MassDEP) No Net Loss of Wetland Carbon Project (BSC Group, RDG, Woodwell Climate Research Center (Woodwell) and the Massachusetts Association of Conservation Commissions (MACC)). Additionally, the development of the short films will be led by Costa Boutsikaris of Inhabit Films, LLC, an award-winning filmmaker whose work has focused on educating the public about sustainable land use management practices for the past 10 years.

This background will allow the Project Team to draw on internal wetland healthy soil subject matter expertise and resources, while aligning with, and avoiding duplication of, prior efforts.

GOALS + OBJECTIVES

This project meets all four primary objectives of these healthy soils Challenge Grants in the following ways:

1. **Community Engagement:** To foster community involvement and education in sustainable land practices and soil health improvement.
   - This Project will engage the community on what healthy wetland soils are, why they are important, and how the community can contribute to improvements (regardless of their location, profession, etc.). The pamphlets/infographics and short films will be presented in an accessible, memorable, motivating, and scientifically accurate manner that incites appreciation and awe for wetlands and healthy soils.
2. **Promote Soil Health:** To support demonstration-type projects that document, prioritize and implement practices aimed at improving soil health and fertility.
   - The pamphlets/infographics and short films that will be generated by this Project will, in some instances, highlight practices that protect and improve wetland soil health – such that the resources focus not just on education and planning, but also on taking action, even on an individual scale.
3. **Sustainable Land Management:** To encourage innovative approaches to sustainable land management that minimizes environmental degradation, enhances biodiversity and/or restores degraded soil health.
   - The pamphlets/infographics and short films that will be generated by this Project will, in some instances, highlight approaches which support the management of wetland and wetland buffer zone soils, that minimize environmental and wetland degradation, enhance biodiversity, and/or restore degraded wetland soil health.
4. **Refine Tools for Municipal Soil Mapping, Assessment + Planning:** Update and distribute assessment and planning tools to enable municipalities, regional planning districts, and conservation organizations to visualize and integrate soil health into regular workflows.
   - While this goal is not as directly related to this Project as the other three aforementioned goals, the pamphlets/infographics and short films may, in some instances, acknowledge assessment and planning tools that viewers can explore later. Additionally, understanding of the importance of wetland soil health is essential for integrating it into regular workflows; while the pamphlets/infographics and short films will be designed for a general audience, they may prove beneficial for staff persons from municipalities, regional planning districts, and conservation organizations as well.

METHODOLOGY

The Project Team brings a deep bench with decades of experience working with the Wetlands Protection Act, associated regulations & their public interest functions of wetlands, and wetland carbon and soil carbon science, as well as HSAP expertise. As such, the Team possesses valuable expertise in crafting pamphlets/infographics and short films focused on wetland soils, and that convey narratives through data-driven insights, with an understanding of the importance of presenting technical concepts clearly and effectively. The Project Methodology is as follows:

Phase 1: Project Kickoff, Project Management, & Visioning

- The Project Team's approach to project management focuses on clear and timely communication, attention to the project's schedule and task sequencing, and quality control at key milestones to ensure that work is conducted efficiently, and project goals are met.
- The Project Team has prepared a proposed timeline including interim and final deliverables.
- A 1.5-hour virtual Project Kickoff Meeting will be held at the start of the project (anticipated in January 2025) to discuss the project timeline, discuss the intended vision and expectations for each of the final deliverables (1 logo, 7 pamphlets/infographics, 7 short films, 7 clips for social media), confirm an approach for selecting the 7 locations to be features in the materials, and solicit any additional background information that will contribute to successful outcomes.
- The Project Team has also identified five interim coordination calls (Quarterly Project Management Meetings) - for example, in April 2025, July 2025, October 2025, January 2026, and April 2026.
- Two Visioning Sessions will be held in the first 2-3 months to finalize the vision, expectations, and outlines for all of the deliverables. The Project Team envisions that the pamphlets/infographics and short films will correspond to one another, each pair (pamphlet/infographic-video) highlighting one type of wetland ecosystem in a unique location in Massachusetts, plus one pair addressing the Healthy Soils Action plan overall:

1. Healthy Soils Action Plan Overview (Pair #1)
2. Salt Marshes (Pair #2)
3. Land Under Water (Lakes, Ponds, Estuaries, Rivers, Streams) (Pair #3)
4. Vegetated Freshwater Wetlands/Bordering and Isolated Vegetated Wetlands
   - Forested/Woody Wetlands and Shrub/Scrub Wetlands (Pair #4)
   - Peatlands, Bogs, & Fens (BVW) (Pair #5)
   - Freshwater Marshes (BVW) (Pair #6)
   - Floodplain Wetlands (Pair #7)

- The Project Team anticipates that Visioning Session #1 will focus on themes for the possible Healthy Soils Action Plan Logo; templates for the pamphlets/infographics; and takeaways from example short films. Visioning Session #1 should also confirm the topics of the seven pamphlet/infographic-video pairs, as well as locations to shoot footage for each pair, if not already addressed comprehensively at the Project Kickoff Meeting. Visioning Session #2 will likely focus on selecting a final Healthy Soils Action Plan Logo from approximately 4 sketches; outlines for the pamphlets/infographics; and outlines for the short films that will later result in shooting scripts.

Phase 2: Logo & Pamphlets/Infographics Production

- Phase 2 begins with the development of an HSAP Logo. Led by Scouter Design, the Project Team will develop a logo for the Healthy Soils Action Plan which can be used on all Healthy Soils Action Plan-related materials. Scouter Design will engage the Project Team and the client during Visioning

Session #1 to understand the vision of the future logo, then present the group with up to 4 sketches that serve as draft logos (at Visioning Session #2). The final logo will be produced from feedback on the 4 sketches.

- The seven (7) informational pamphlets/infographics are intended to supplement the series of seven (7) short films that will be produced in Phase 3. Each pamphlet/infographic will be about 1-2 pages in length. The Project Team intends to use storytelling to connect scientific content, the people that generate and use this scientific content, why the information matters, and what the viewer can do as an individual – specifically around healthy wetland soils. The pamphlets/infographics will be produced from January 2025 to July 2025, so that they can serve as guideposts for the content of the short film series (footage for the short films will be gathered in spring/summer 2025, depending on weather conditions).
- The Project Team anticipates three rounds of work regarding the pamphlets/infographics. The first drafts will focus on the general placement of images and text as well as the major themes that should be addressed in each pamphlet/infographic. A meeting with EEA will be held to specifically address feedback on the first drafts. Second drafts will have near-final text and images. An additional meeting with EEA will be held to specifically address feedback on the second drafts. The seven (7) final pamphlets/infographics will each be approximately 1-2 pages in length and will be provided to EEA as PDFs. The pamphlets/infographics are scheduled to be completed by July 2025. However, relevant graphics generated during Phase 3 can be substituted into the pamphlets/infographics once Phase 3 is complete (March 2026).
- Finally, all seven (7) final pamphlets/infographics will be translated into 3 languages. The final list of three languages will be determined in discussion with EEA. The Project Team anticipates reviewing resources like EEA's Languages Spoken in Massachusetts Map to determine the final list of languages.

Phase 3: Short Film Series Production

- This phase involves the development of seven (7) short films that will form a series on healthy wetland soils in different locations and ecosystems throughout Massachusetts. Each short film will be about 2-3 minutes in length.
- Phase 3, led by Inhabit Films, will begin with pre-production which will span February 2025 to May 2025. During pre-production (as well as Visioning Sessions #1 and #2) the Project Team will identify 1-2 subject matter experts (SMEs) to interview for each short film (not mutually exclusive, there may be overlap between the short films regarding SMEs). SMEs may include soil scientists from BSC Group, RDG, Woodwell, NRCS, MACC, etc. A set of interview questions will also be developed.
- Pre-production will conclude with the development of seven shooting scripts (one for each short film). The shooting scripts address the arc of each short film, including the filming location, the concepts to be addressed and in what order, the interviewees, and the ideal footage to be captured.
- Film production will span May 2025 to October 2025 (weather permitting). Inhabit Films will travel to the seven shooting locations to document the sites, interview the subjects and get additional coverage of the regions and wildlife.
- Inhabit Films will complete all editing and motion graphics in the film post-production stage (spanning October 2025-March 2026). Seven rough draft films will be shared with the Project Team and EEA via Frame.io for feedback. Frame.io allows users to watch short films and write comments in real time. Rough draft films are considered incomplete in terms of color, sound, and b-roll and stock footage, but allow reviewers to confirm that the overall content and vision is being addressed in each short film. A progress meeting will be held to review the feedback from the rough draft films before the seven short films are finalized.

- The final video series will be delivered as HD/4K QuickTime Files via Dropbox and the 7 short films will be uploaded to YouTube for public streaming. All videos will have closed captions in English, so that the captions can be translated to the same three languages from Phase 2.

Phase 4: Dissemination

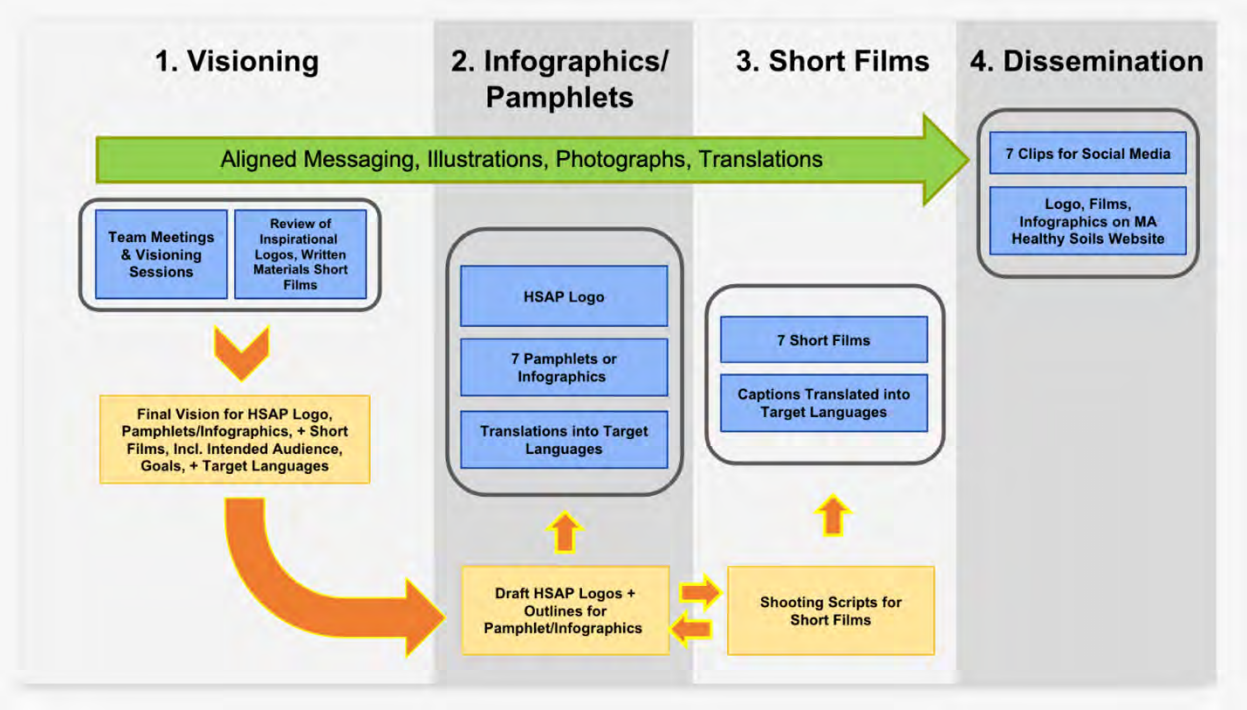
- Once all deliverables are complete, all materials will be uploaded by RDG to the MA Health Soils Website. Additionally, Inhabit Films will generate seven vertical-format clips from the seven short films for social media (approximately 30 seconds each).
- Following project completion, members of the Project Team will continue to disseminate project products at conferences and events, which will be In-Kind contributions and are not part of the project budget.

EXPECTED DELIVERABLES

The major final deliverables for this project will be:

- One (1) Final HSAP Logo.
- Seven (7) Pamphlets or Infographics (1-2 pages each), including additional copies in 3 other languages.
- Seven (7) Short Films (2-3 minutes each), with captions in English and 3 other languages.
- Seven (7) Clips for Social Media.
- As In-Kind contributions, Project Team members will continue to disseminate project products at conferences and events including after the project has been completed.

Methodology for Multimedia Healthy Wetland Soils Outreach Materials Project



Budget

On the following page we have provided our proposed budget for the Multimedia Healthy Wetland Soils Outreach Materials Project.

MULTIMEDIA HEALTHY WETLAND SOILS OUTREACH MATERIALS PROJECT BUDGET

Project Phase	Subtask	Grant Monies	In-Kind Match Contributions
PHASE 1: KICKOFF, PROJECT MANAGEMENT, AND VISIONING			
	1.1 Project Kickoff	$ 2,447	$ 0
	1.2 Quarterly Project Meetings	$ 4,543	$ 0
	1.3 Visioning Sessions	$ 3,595	$ 0
PHASE 1 TOTAL		$ 10,584	
PHASE 2: DEVELOPMENT OF HSAP LOGO + PAMPHLETS/INFOGRAPHICS			
	2.1 HSAP Logo	$ 2,455	$ 0
	2.2 Draft Pamphlets/Infographics	$ 11,894	$ 5,000
	2.3 Final Pamphlets/Infographics	$ 9,446	$ 0
	2.4 Translation	$ 3,253	$ 0
PHASE 2 TOTAL		$ 26,903	
PHASE 3: DEVELOPMENT OF SHORT FILMS			
	3.1 Pre-Production	$ 7,226	$ 0
	3.2 Production	$ 15,343	$ 1,000
	3.3 Post-Production	$ 7,180	$ 0
	3.4 Final Short Films	$ 6,681	$ 0
	3.5 Translation	$ 3,144	$ 0
PHASE 3 TOTAL		$ 39,573	
PHASE 4: DISSEMINATION			
	4.1 MA Healthy Soils Website Update	$ 600	$ 0
	4.2 Clips for Social Media	$ 2,191	$ 2,000
PHASE 4 TOTAL		$ 2,791	
GRAND TOTAL		$ 79,997	$8,000

BSC GROUP

Organizational Capacity

The BSC Project Team for the Multimedia Healthy Wetland Soils Outreach Materials Project is comprised of leading organizations who are heavily involved in major climate resilience planning efforts in Massachusetts.

ABOUT BSC

BSC Group (BSC), founded in 1965, is a full-service planning and engineering consulting firm with a staff of 185 personnel and offices in Boston, Worcester, Andover and West Yarmouth, Massachusetts, as well as Glastonbury, Connecticut, and Manchester New Hampshire. BSC has provided interdisciplinary ecological, permitting, design, planning, GIS, and construction phase services for municipal, state, and private sector clients throughout the northeast for nearly six decades. BSC's ecological team includes over 50 scientists, subject matter experts, former regulators, and advisory panel members who routinely apply their expertise to challenging projects, offering key insights and strategic benefits.

BSC PROJECT TEAM

BSC will serve as prime consultant for this proposed project and has joined forces with members of several leading Massachusetts organizations, including Inhabit Films, Scouter Design, Regenerative Design Group, Woodwell Climate Research Center, and MACC who will join together to conduct the Multimedia Healthy Wetland Soils Outreach Materials Project. Each of these leaders has unique expertise and together provide unparalleled depth in wetland management and multimedia communications (including relevant soil science research & practice, wetland science research & practice, ecological restoration, filmmaking, and graphic design fields).

The firms represented in this Project Team have a proven track record of implementing successful projects of this scale. Individually, each of these firms has been at the forefront of climate resilience, wetland + soil carbon, wetland + soil research, wetland + soil practice and wetland + soil policy work, filmmaking, and/or graphic design in their respective fields. BSC Group served on the HSAP Working Group and led the MassDEP No Net Loss of Wetland Carbon Project. Inhabit Films

is an award-winning filmmaking company that focuses their work on sustainable land use management practices and educational and promotional materials. Filmmaker Costa Boutsikaris, as a part-time orchard manager, has a working knowledge of the importance of healthy soils. Scouter Design has extensive graphic design experience developing pamphlets/infographics and logos, including several pertaining to Massachusetts wetlands. Regenerative Design Group (along with Linnean Solutions) led the production of the HSAP and was a member of the MassDEP No Net Loss of Wetland Carbon Project consulting team. Woodwell Climate Research Center was a member of the MassDEP No Net Loss of Wetland Carbon Project consulting team and is an award-winning world class ecosystem climate research center with a substantial focus on the carbon dynamics of wetlands. MACC is a non-profit that educates and supports Conservation Commissions in Massachusetts, and regularly contributes to Massachusetts wetland regulatory and policy discussions. Additionally, several of these firms/organizations have gone on to collaborate on four MVP Program projects that operationalized the insights and recommendations from the HSAP for municipalities.

KEY PERSONNEL

Gillian Davies, PWS, RSS, NHCWS; Casey-Lee Bastien RLA, SITES-AP, CPSI, OSHA; Ethan Sneesby, RSS; Emily Alderton PhD; Catarina Martinez, MEM [BSC Group]

- **Project Management + Content Development + Technical Review.** BSC will serve as the Prime with Gillian Davies as Project Manager. BSC staff will lead all meetings; coordinate with EEA; development of infographics and short films (alongside creative team); finalize all final deliverables; serve as short film SMEs/interviewees.

Costa Boutsikaris, [Inhabit Films]

- Filmmaking & Film Production + Creative Advising. Inhabit Films will produce the short films and video clips, as well as advise on alignment between the logo, the pamphlets/infographics, and the short films (particularly on alignment between the pamphlets/infographics and short films regarding photographs and illustrations).

Terri Courtemarche, [Scouter Design]

- Graphic Design + Creative Advising. Scouter Design will develop the HSAP Logo and format the pamphlets/infographics, as well as advise on alignment between the logo, the pamphlets/infographics, and the short films (particularly on alignment between the pamphlets/infographics and short films regarding photographs and illustrations).

Keith Zaltzberg, Rachel Lindsay, Bas Gutwein, Rafter Ferguson PhD, Von Harvey [Regenerative Design Group]

- Short Film SMEs/Interviewees. MA Healthy Soils Website Coordination + Technical Review + Production Support + Short Film SMEs/Interviewees. RDG will assist in the technical review of the pamphlets/infographics and short films and upload the project work products to the MA Healthy Soils Website. Additionally, RDG staff members will serve as interviewees in the short films.

Jennifer Watts PhD, Taniya Roychowdhury PhD [Woodwell Climate Research Center]

- Technical Review + Short Film SMEs/ Interviewees. Woodwell staff members will assist in the technical review of the pamphlets/infographics and short films. Additionally, Woodwell staff members will serve as interviewees in the short films.

Dorothy McGlincy, Michele Girard [Massachusetts Association of Conservation Commissions]

- Technical Review + Short Film SMEs/ Interviewees. MACC will assist in the technical review of the pamphlets/ infographics and short films. Additionally, MACC staff members will serve as interviewees in the short films.

On the following page, we have provided an organization chart demonstrating the makeup of our team. Team member profiles and project descriptions can be found in Appendix A and professional resumes for all proposed team members can be found in Appendix B.

Meet the Creative Team

Terri Courtemarche

Terri is a graphic designer and principal of Scouter Design, a certified Women Owned Small Business (WOSB). With over 20 years of graphic design experience, she supports her clients in telling their stories and connecting with their audiences through visual identities. She designs custom logos, brand identities, report templates, and more. Terri also loves to sketch, take nature photography, and hike.

Costa Boutsikaris

Costa is an award-winning filmmaker whose work has focused on educating the public about sustainable land use management practices for the past 10 years. He has shot and edited two feature documentaries: Inhabit: A Permaculture Perspective, which documented regenerative agriculture practices across the Northeast, and Inhabitants: An Indigenous Perspective, which focused on Native American land stewardship practices. He has created educational and promotional materials for leading land restoration and research entities such as Cari Institute of Ecosystem Studies and the DEP Rondout Neversink Stream Program. Costa has collaborated with a wide range of partners including Cornell, University of Vermont and PBS. Costa also works as a part time farmer in High Falls, NY where he manages an orchard.

PROJECT TEAM

EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS

DIVISION OF CONSERVATION SERVICES

PROJECT MANAGER

Gillian Davies, PWS, SSSSNE, NHCWS, CESSWI

PHASE 1

PROJECT KICKOFF + COMMUNICATIONS

BSC Group - Lead

QUARTERLY PROJECT PROGRESS SUMMARIES

BSC Group - Lead

VISIONING SESSIONS

BSC Group - Lead

Scouter Design - Contribute

Inhabit Films - Contribute

Regenerative Design Group - Contribute

Woodwell Climate Research Center - Contribute

PHASE 2

HSAP LOGO

Scouter Design - Lead

BSC Group - Contribute

Inhabit Films - Contribute

Regenerative Design Group - Contribute

INFOGRAPHICS

BSC Group - Lead

Scouter Design - Lead

Inhabit Films - Contribute

Regenerative Design Group - Contribute

Woodwell Climate Research Center - Contribute

Massachusetts Association of Conservation Commissions - Contribute

TRANSLATIONS

BSC Group - Lead

Scouter Design - Contribute

PHASE 3

SHORT FILMS

BSC Group - Lead

Inhabit Films - Lead

Scouter Design - Contribute

Regenerative Design Group - Contribute

Woodwell Climate Research Center - Contribute

Massachusetts Association of Conservation Commissions - Contribute

TRANSLATIONS

BSC Group - Lead

Inhabit Films - Contribute

PHASE 4

MA HEALTHY SOILS WEBSITE

Regenerative Design Group - Lead

SOCIAL MEDIA

Inhabit Films - Lead

DISSEMINATION (In-Kind Contribution)

BSC Group - Lead

Regenerative Design Group - Contribute

Woodwell Climate Research Center - Contribute

Massachusetts Association of Conservation Commissions - Contribute

Project Timeline

Proposed Timeline

Phase 1: Project Kickoff, Project Management, & Visioning

1.1. Project Kickoff

January 2025

A 1.5-hour virtual project kickoff meeting will be held to discuss the project timeline, discuss the intended vision and expectations for each of the final deliverables (1 logo, 7 pamphlets/ infographics, 7 short films, 7 clips for social media), confirm an approach for selecting the 7 locations to be features in the materials, and solicit any additional background information that will contribute to successful outcomes.

1.2. Project Management (Quarterly Project Management Meetings

January 2025 – June 2026

Quarterly, 1-hour calls between the Project Team and EEA will be held to allow for interim coordination.

1.3. Phase 1.3 Visioning

January 2025 – March 2025

Two visioning sessions will be held to serve as opportunities for the Project Team and EEA to finalize the vision and expectation for the final deliverables. The Team anticipates that Visioning Session #1 will focus on themes for the possible Healthy Soils Action Plan Logo; templates for the pamphlets/ infographics; and takeaways from example short films. Visioning Session #1 should also confirm the topics of the seven infographic-video pairs, as well as locations to shoot footage for each pair, if not already addressed comprehensively at the Project Kickoff Meeting. Visioning Session #2 will likely focus on selecting a final Healthy Soils Action Plan Logo from approximately 4 sketches; outlines for the pamphlets/infographics; and outlines for the short films that will later result in shooting scripts.

Phase 1 Deliverables:

- One (1) Project Kickoff Meeting
  - Project Kickoff Meeting will be held virtually (e.g., Zoom) and will span approximately 1.5 hours. Meeting notes and action items will be provided.
- Quarterly (5) Monthly Project Management Meetings
  - Project Management Meetings between the Project Team and EEA will be held virtually (e.g., Zoom) and will span approximately 1 hour each. Meeting notes and action items will be provided for each.
- Two (2) Visioning Sessions with the Project Team and EEA will be held to finalize number and goals of pamphlets/infographics and videos.
  - Visioning Sessions will be held virtually (e.g., Zoom) and will span approximately 1 hour each. Visioning Sessions will result in a final list of corresponding topics for the 7 pamphlets/infographics and 7 videos; requirements and goals for each pamphlet/infographic and video; and locations for film production for 7 videos.

Phase 2: Logo & Pamphlets/ Infographics Production

2.1. HSAP Logo

January 2025 – April 2025

Led by Scouter Design, the Project Team will develop a logo for the Healthy Soils Action Plan which can be used on all Healthy Soils Action Plan-related materials. Scouter Design will engage the Project Team and EEA during Visioning Session #1 to understand the vision of the future logo, then present the group with up to 4 sketches that serve as draft logos (at Visioning Session #2). The final logo will be produced from feedback on the 4 sketches.

2.2. Draft Pamphlets/Infographics

January 2025 – June 2025

Led by BSC Group and Scouter Design, the Project Team will develop seven (7) draft pamphlets/infographics of 1-2 pages each, beginning with first drafts which focus on the general placement of images and text as well as the major themes that should be addressed in each pamphlet/infographic. A meeting will be held to specifically address feedback on the first drafts so that edits can be incorporated into the second drafts. Second drafts will have near-final text and images. An additional meeting will be held to specifically address feedback on the second drafts so that edits can be incorporated into the final copies.

2.3. Final Pamphlets/Infographics

December 2025 / March 2026

The seven (7) final pamphlets/infographics will each be approximately 1-2 pages in length and will be provided to EEA as PDFs. The pamphlets/infographics could be completed by July 2025. However, relevant graphics generated during Phase 3 could be substituted into the pamphlets/infographics once Phase 3 is complete (March 2026).

2.4. Translation

March 2026

Finally, all seven (7) final pamphlets/infographics will be translated into 3 languages. The final list of three languages will be determined in discussion with EEA. The Project Team anticipates reviewing resources like EEA's Languages Spoken in **https://www.mass.gov/info-details/environmental-justice-populations-in-massachusetts** Massachusetts Map to determine the final list of languages.

Phase 2 Deliverables:

- One (1) Final HSAP Logo
  - › Logo will be provided as a transparent PNG.
- Seven (7) First Draft Pamphlets/Infographics - English
- Seven (7) Second Draft Pamphlets/ Infographics - English
- Seven (7) Final Pamphlets/Infographics - English
  - › Pamphlets/Infographics will be provided as PDFs, and each will be approximately 1-2 pages in length.
- Translations into Three (3) Languages
  - › All seven (7) final pamphlets/infographics will be translated into 3 languages.
- Two (2) Pamphlets/Infographics Progress Meetings
  - › Meetings will be held virtually (e.g., Zoom) and will span approximately 1 hour each. Meeting notes and action items will be provided for each.

Phase 3: Short Film Series Production

3.1. Film Pre-Production

February 2025 – May 2025

Led by Inhabit Films, the Project Team will prioritize and schedule location and subject shoots for the seven topics to be documented in the seven videos. Pre-production is closely intertwined with Visioning Sessions #1 and #2. During pre-production, the Project Team will identify 1-2 subject matter experts (SMEs) to interview for each short film (not mutually exclusive, there may be overlap between the short films regarding SMEs). SMEs may include soil scientists from BSC Group, RDG, Woodwell, NRCS, MACC, etc.
A set of interview questions will also be developed. Pre-production will conclude with the development of seven shooting scripts (one for each short film). The shooting scripts address the arc of each short film, including the filming location, the concepts to be addresses and in what order, the interviewees, and the ideal footage to be captured. A progress meeting will be held to confirm the shooting scripts.

3.2 Film Production

May 2025 – October 2025

Inhabit Films will travel to the seven shooting locations to document the sites, interview subjects and get additional coverage of region and wildlife.

3.3 Film Post-Production

October 2025 – March 2026

Inhabit Films will complete all editing and motion graphics in the film post-production stage. Seven rough draft films will be shared with the Project Team and the client via Frame.io for feedback. Frame.io allows users to watch short films and write comments in real time. Rough draft films are considered incomplete in terms of color, sound, and b-roll and stock footage, but allow reviewers to confirm that the overall content and vision is being addressed in each short film.
A progress meeting will be held to review the feedback from the rough draft films before the seven short films are finalized.

3.4 Final Videos

March 2026

The final video series will be delivered as HD/4K QuickTime Files via Dropbox and the 7 short films will be uploaded to YouTube for public streaming. All videos will have closed captions in English, so that the captions can be translated to the same three languages from Phase 2.

3.5 Translation

March 2026

All videos will have closed captions in English, so that the captions can be translated to the same three languages from Phase 2.

Phase 3 Deliverables:

- One (1) List of 7 Shooting Locations
- One (1) Interviewee List & one (1) set of Interview Questions
- Seven (7) Shooting Scripts for 7 Short Films
- Seven (7) Rough Draft Films
- Seven (7) Final Short Films - English Captions
  - The video series will be delivered as HD/4K QuickTime Files via Dropbox, and each video will be approximately 2-3 minutes in length. Each video will correspond to a pamphlet/infographic.
- Translations into Three (3) Languages
  - All seven (7) final video closed captions will be translated into 3 languages.
- Two (2) Short Films Progress Meetings
  - Meetings will be held virtually (e.g., Zoom) and will span approximately 1 hour each. Meeting notes and action items will be provided for each.

Phase 4: Dissemination

4.1 MA Healthy Soils Website

March 2026

RDG will upload all materials to the MA Health Soils Website.

4.2 Social Media

March 2026

Inhabit Films will generate seven vertical-format clips from the seven short films for social media (approximately 30 seconds each).

Phase 4 Deliverables:

- Project Team will confirm that materials are uploaded to the MA Healthy Soils Website and provide EEA with a link to the website page.
- Seven (7) Clips for Social Media
  - Social media clips (vertical format, approximately 30 seconds each) will be provided as HD/4K QuickTime Files via Dropbox; EEA staff persons can upload to state agency websites and YouTube accounts as desired.
- As an In-Kind contribution, Project Team members will disseminate the final products through social media, and when giving wetlands, healthy soils, and climate-related presentations at conferences, meetings and other events including after the project has been completed.

Project Evaluation and Monitoring

PERFORMANCE METRICS

1. The distillation of current research on wetland soil health and its connection to community resilience, economic viability, and climate change, in the form of pamphlets/infographics and short films.
2. 7 publicly available, downloadable, web-based pamphlets/infographics that can be utilized by municipal officials, planning and zoning boards, departments of public works, conservation commissions, developers, landscapers, realtors, and the general public.
3. 7 publicly available, web-based short films that can be utilized by municipal officials, planning and zoning boards, departments of public works, conservation commissions, developers, landscapers, realtors, and the general public.

REPORTING

Project progress summaries reporting project activities and accomplishments will be submitted on a quarterly basis. The project progress summaries will include quarterly check-in meeting notes, and action items. Interim deliverables will be provided according to the aforementioned scope and timeline. The final deliverables will be uploaded to the project webpage and submitted to EEA on or before June 30, 2026.

Sustainability Plan

This project represents the continuation of a partnership established between Regenerative Design Group and BSC Group that began during the production of the Healthy Soils Action Plan. Since completing the majority of the HSAP work in 2021, these firms have gone on to collaborate on four MVP Program projects that operationalized the insights and recommendations from the HSAP for municipalities. It also represents a continuation of the partnership between BSC Group, Regenerative Design Group, Woodwell Climate Research Center, and the Massachusetts Association of Conservation Commissions that formed as the consulting team for the MassDEP No Net Loss of Wetland Carbon Project, a project that provides not just a collaborative team foundation, but also a shared knowledge base about wetland soil and biomass carbon; wetland and soil health; and the extent and carbon content of Massachusetts wetlands. BSC Group and Scouter Design, and RDG and Inhabit Films – respectively – have worked together on many projects in the past few years that have communicated the value of sustainable land management (like wetland restoration and silvo pasture) to general audiences.

Regenerative Design Group has already committed to hosting and maintaining the overall MA Healthy Soils Website for up to 5 years after the completion of their 2024/2025 Development Guide HSAP Challenge Grant project, to which all final deliverables will be added. During the 5-year period, an alternate website host may be determined, provided they have the commitment and resources to continue the curation of the material.

Following the publication of the pamphlets/infographics and short films, the Project Team intends to continue this work through partnerships with leading researchers, industry actors, and professional associations. As the attached firm profiles demonstrate, each of the Project Team members already has a track record of being an industry leader in bringing healthy soils, wetland carbon and climate science, and the importance of decarbonizing our projects and wetland management practices to professionals, volunteers, and the general public. The Project Team members will share the pamphlets/infographics and short films with their communities (e.g., company websites, social media, or LinkedIn).

Additionally, many of the partners of this proposal—BSC Group, Regenerative Design Group, Woodwell Climate Research Group, and MACC -- have already begun designing and seeking funding for additional projects that contribute to increased awareness and management of healthy soils. These actions will be elaborated on, and informed by, the work in this project. We anticipate soliciting funding for further research and development during this and subsequent funding cycles.

We anticipate that the work described in this proposal will reveal additional needs and pathways to ensure the wetland professionals/managers - as well as the general public - have the knowledge, materials, and tools necessary to achieve greater wetland soil health. The team assembled for this project is committed to using these findings to address these gaps through continuing and expanding collaboration.

Risk Assessment for Project, Partners, Timeline

The members of this Project Team have an excellent track record of delivering high-quality experiences and work products on-time and on-budget. The attached resumes and project qualification sheets provide documentation of these work products and the high degree of qualification we bring to this project, including numerous professional certifications, advanced degrees, and decades of professional experience.

It is notable to mention that two of the larger projects, HSAP and the Apple Country Natural Climate Solutions project, spanned the beginning of the COVID pandemic. This required a hard pivot to remote or distanced options in outreach, education, and field-based events. The success of these projects gives us confidence that we can navigate unforeseen challenges.

We have identified the following risks and mitigation strategies for pamphlets/infographics and short films:

- Lack of participation from key professional segments
  - All content for the pamphlets/infographics and short films, including interviews with subject-matter experts (SMEs) will be generated by the project team. If desired by EEA, the Project Team can consult with qualified SMEs from trusted organizations who are not on the Project Team, such as NRCS, to provide additional input and/or interviews. However, the project team has such a deep bench that going outside the team will not be required to deliver the final materials.
- Weather challenges/seasonal variation
  - Up to 7 distinct sites will be featured in the pamphlets/infographics and short films, representing different wetland types. While weather/seasonal variation may pose some challenges regarding travel and film production (on-site videography, photography, interviews), the current timeline allows for significant flexibility. On-site videography and photography

  - will be taken over the course of an approximately three-day production period that will be scheduled some time between May 2025 and October 2025, depending on when weather conditions are most optimal. If an extreme weather event (or other, significant, unforeseen circumstance) interferes with the set production period, it will be rescheduled right away (e.g., for some time in the following two-week period).

- Staffing changes/disruptions
  - Each project team firm has a deep bench of staff that could step in should unexpected disruptions require a change of project staffing. In anticipation of this potential, the Project Team will hold regular project meetings internally with understudies and construct a resilient file sharing system accessible to all members of each firm.

- Tasks take longer than expected
  - As mentioned, each firm on the project team has a deep bench. Should tasks take longer than expected, we have the capacity to pull in additional staff to ensure that key deadlines are met, as well as a solid track record of delivering high-caliber work products.

- COVID Resurgence / Other Pandemic
  - Project meetings will be conducted on Zoom or Teams, which will reduce project costs. Filming is planned to occur outdoors, where transmission of contagious diseases is highly unlikely. The Project Team has been conducting outdoor field work successfully and safely throughout COVID highs and lows. It is anticipated that a COVID resurgence or other pandemic will not impede the project timeline, cost, or success.

In summary, we put forward this proposal as a low-risk investment due to the subject matter expertise and institutional capacity of the partners, the ability to deliver this scope of work within this budget and without requiring additional third-party funds for completion.

Appendix A

Firm Profiles and Project Experience

BSC Group

Firm Profile and Project Experience

BSC GROUP

WWW.BSCGROUP.COM

AT A glance

OFFICE LOCATIONS

HEADQUARTERS

Boston, MA

Andover, MA

West Yarmouth, MA

Worcester, MA

Glastonbury, CT

Manchester, NH

1965
BSC FOUNDED

200
TEAM MEMBERS

CORE SERVICES

Ecological Science

Permitting & Regulatory Compliance

Climate Resilience

Flood Risk Information & Modeling

Environmental Engineering

Land Surveying, GIS, Mapping & Analysis

Custom Software & Spatial Data Integration

FIRM OVERVIEW

At BSC, we partner with our clients to deliver creative and practical transportation, land development, and environmental solutions. We also help them find climate-resilient solutions. Clients trust BSC to work with them to expertly guide siting, strategically navigate regulatory processes, and holistically design infrastructure to help achieve their vision.

BSC's engineers, planners, and scientists take pride in their ability to respond nimbly to move projects forward.

We solve complex challenges by applying expertise across disciplines, sharing ideas and perspectives to see a project from every side.

The purpose of our work is to improve the quality of life in and around our communities using our skills and experience to promote balance between the built and natural environment.

Proudly employee-owned, our people are the heart of our company.

AREAS OF EXPERTISE

- Wetland and Soil Science
- Wetland Delineation
- Wetland Permitting
- Floodplain Management
- Water Quality/Water Resources Ecology
- Marine, Aquatic and Terrestrial Biology
- Botanical Surveys
- Wildlife Surveys
- Rare and Threatened Species Surveys
- Threatened and Endangered Species Permitting
- Ecological Restoration
- GIS Mapping and Assessment
- Drone-based Field Survey
- GIS Hazard and Natural Resources Mapping
- Stormwater Management and Flood Protection
- Construction Oversight and Monitoring

REPRESENTATIVE CLIENTS

MASSACHUSETTS DEPARTMENT OF CONSERVATION AND RECREATION

MASSACHUSETTS BAY TRANSIT AUTHORITY (MBTA)

MASSACHUSETTS DEPARTMENT OF TRANSPORTATION (MASSDOT)

NATIONAL GRID

MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION (MASSDEP)

EVERSOURCE

BORREGO SOLAR

GREAT RIVER HYDRO

Shores of Change

COASTAL FLOODPLAIN RESILIENCE

MassDEP | ResilientCoasts

CLIMATE RESILIENCY OUTREACH FOR COASTAL FLOODPLAINS AND WETLANDS

STATEWIDE

CLIENT

Massachusetts Department of Environmental Protection, Bureau of Water Resources, Wetlands Program

SERVICES

Climate Resilience

Coastal Ecology, Floodplains, & Wetlands

GIS

Public Outreach & Engagement

www.mass.gov/info-details/shores-of-change

BSC developed outreach products, including an interactive ArcGIS StoryMap, a set of brochures, a poster, and a video to communicate the purpose and of coastal floodplains, the importance of protecting them.

BSC worked with the Massachusetts Department of Environmental Protection and the Massachusetts Office of Coastal Zone Management to develop effective and visually engaging multimedia products to explain:

- Purpose and functionality of coastal floodplains
- How they support climate resilience, and prevent or minimize storm damage and flooding
- Why protecting and restoring coastal floodplains is crucially important amidst sea level rise and more intense coastal storms
- How the upcoming proposed regulatory change will assist in ameliorating these climate-related challenges

BSC provided MassDEP with multi-disciplinary expertise in ecology, coastal wetland science, climate resilience, and GIS, as well as hands-on experience working in coastal communities across the state, to develop a suite of outreach products, including an interactive ArcGIS StoryMap, a set of brochures, poster, and a video.

Through six featured locations across the Commonwealth, these deliverables describe how the floodplain serves Massachusetts communities, how worsening storms and rising sea levels impact them, and how to protect the coastal floodplain. BSC has engaged creative partners to enhance the project with professional photography, videography, and graphic design.

GUIDE FOR IMPLEMENTING THE HEALTHY SOILS ACTION PLAN IN DESIGN AND CONSTRUCTION

CLIENT

Massachusetts Executive office of Energy and Environmental Affairs

SERVICES

Ecological Services

Landscape Architecture

Civil Engineering

Climate Resilience

Transportation Engineering

Environmental Engineering

The Healthy Soils Action Plan (HSAP) released by the Massachusetts Executive office of Energy and Environmental Affairs provides an assessment of the condition of our soils and a blueprint for how we can effectively conserve and protect, restore, and properly manage our soils to improve the vitality of nature around us, resilience to climate change, and the health and quality of life of our residents. However, many of the recommendations either lack a clear path to implementation or are in conflict with typical practices of the development and construction industries.

BSC is working with Regenerative Design Group and others in the development of an implementation guide for the HSAP. The guide will serve as a roadmap towards engaging a cross-section of professionals in construction, development, engineering, and design in a series of coordinated events to promote general awareness of the HSAP, distill industry input and additional research and make recommendations for improving typical soil management practices and standards, and address problems. BSC's role on the project includes serving as liason to MassDOT to coordinate conversations, solicit participation and materials, and sharing insights and experience, and:

- Participating in and hosting industry work groups
- Providing technical review and production support
- Case study collection
- Reviewing of soil specifications and MassDOT specifications
- Contributing to current & recommended best practices
- Identification of existing challenges to achieving better soil health
- Supporting the development of presentation and website materials

MASSDEP NO NET LOSS OF WETLAND CARBON

CLIENT

Massachusetts Department of Environmental Protection (MassDEP)

SERVICES

Development of Innovative Wetland Carbon Protection and Restoration Strategy, Policy, and Regulations

Software Development

Wetland Carbon Accounting Science

Wetland Extent and Wetland Carbon Data Set + Mapping + Machine Learning

Leading a consulting team, BSC is working with MassDEP to identify innovative strategies, approaches, concepts, and regulatory recommendations to achieve No Net Loss of Wetland Carbon in Massachusetts and to meet wetlands-related climate goals outlined in the *Massachusetts Clean Energy and Climate Plan for 2025 and 2030, Chapter 8: Protecting Our Natural and Working Lands*. Our project team includes BSC, Regenerative Design Group, the Massachusetts Association of Conservation Commissions (MACC), and the Woodwell Climate Research Center.

BSC researched wetland carbon policies, regulations, and projects in all 50 states as well as in other countries, researched wetland carbon bylaws and regulatory provisions in Massachusetts municipalities, and led the project team in developing innovative wetland carbon protection and restoration strategies, approaches, and regulatory recommendations, including collaborating with MACC as they updated their local wetland bylaw database.

Project team member Woodwell Climate Research Center developed Massachusetts-relevant science-based wetland carbon accounting approaches, consistent with best available wetland carbon science.

Project team member Regenerative Design Group developed a cutting-edge wetland mapping approach based on machine learning that identifies previously cryptic wetlands, such as forested wetlands, which traditional mapping methods often have difficulty detecting.

The project final report is now being reviewed by MassDEP.

APPLE COUNTRY ECOLOGICAL CLIMATE RESILIENCY AND CARBON PLANNING AND ASSESSMENT

BOLTON, MA

CLIENT

Towns of Bolton and Harvard and the Devens Regional Enterprise Zone

SERVICES

Climate Resilience Planning

Climate Vulnerability Assessment

Community Stakeholder Engagement

Development of Educational Resources

Ecological Carbon Assessment

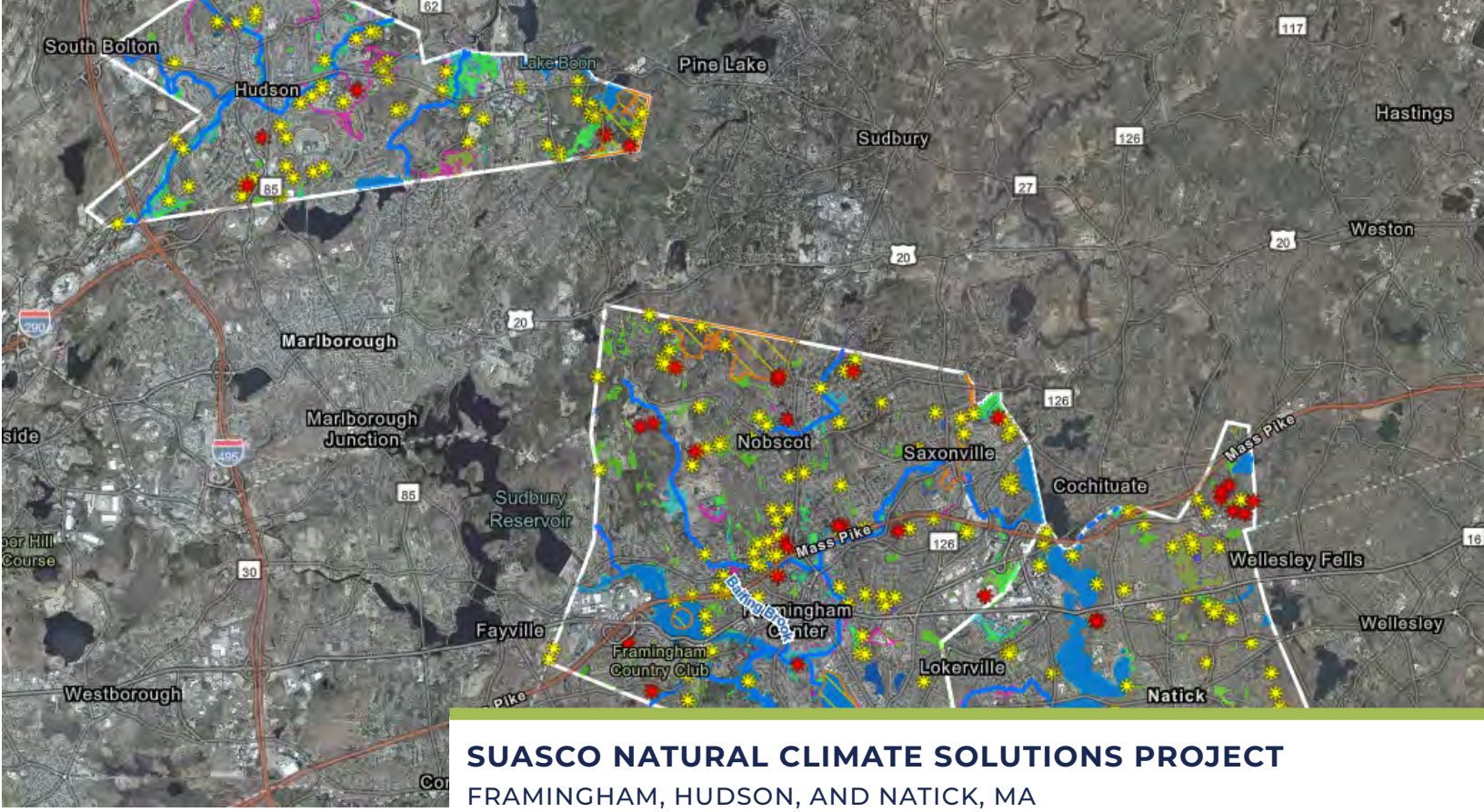
Grant Proposal Preparation

Identification of Nature-based Solutions

As part of a regional approach to climate resilience planning, BSC worked with the Towns of Bolton and Harvard and the Devens Regional Enterprise Zone (Devens) and led a multi-disciplinary consulting team that included healthy soils experts (Linnean Solutions and Regenerative Design Group) and a forest ecologist and forest carbon expert (Woodwell Climate Research Center) to provide climate resiliency and carbon planning assessment services. The project was funded by an MVP Action Grant awarded to the communities following a BSC-supported application process.

Apple Country's vast landscape of forests, farmland, wetlands, and active floodplains is essential in the area's ecological functioning, carbon functioning, and regional community and environmental resiliency. BSC's team of ecologists, landscape architects, climate resilience specialists, designers, engineers, and GIS specialists analyzed local ecological resources, conducted community outreach and engagement, and developed GIS mapping to produce predicative climate-focused documents and maps that identify and prioritize Nature-based Solutions (NbS) and best management practices and policies.

The project report highlighted opportunities for resilience and protection of wetland and forest carbon using NbS and implemented climate-smart best management practices and policies. The resulting report provided a regional perspective, analysis, and recommendations, as well as town-specific assessment and recommendations.



SUASCO NATURAL CLIMATE SOLUTIONS PROJECT

FRAMINGHAM, HUDSON, AND NATICK, MA

CLIENT

City of Framingham and the Towns of Hudson and Natick

SERVICES

Climate Resilience

Ecology

Environmental Justice

Forest Carbon and Climate Mitigation

GIS

Nature-based Solutions

Public Outreach

The SuAsCo Natural Climate Solutions Project was a collaborative effort between municipalities in the Sudbury-Assabet-Concord (SuAsCo) watershed (Hudson, Framingham, and Natick) to identify opportunities for Nature-based Solutions (NbS) that prioritize the needs and well-being of both residents and ecosystems, especially people who live in Environmental Justice and Climate Vulnerable communities within the towns while providing essential ecosystem services to the whole community.

BSC led a team of consultants to collaborate with the communities to identify opportunities for wetlands, floodplains, forests, and other ecosystems to support broader resilience planning efforts and expand communities' capacity to protect, restore, and enhance carbon sequestration and other ecosystem services through community-driven assessment of NbS, providing recommendations to improve regulations; and developing and providing educational materials and opportunities.

BSC's public engagement included coordinating core team meetings, a site walk, and NbS trainings for community members, stakeholders, and municipal staff. We developed education and outreach materials and activities, including a project website with data viewer, ecological climate resilience and carbon storage infographics, and a StoryMap. Self-guided tours are being installed in each town with signage, including QR codes linking to the StoryMap, to provide durable, accessible, and educational opportunities about climate resilience, ecosystems, and NbS.

ROCKPORT COASTAL RESILIENCE PROJECT

ROCKPORT, MA

CLIENT

Town of Rockport

SERVICES

Nature-based Solutions

Climate Resiliency

Coastal Ecology

GIS

Community Engagement

BSC collaborated with the Rockport community to identify coastal Nature-based Solutions (NbS) to climate change. This town is a front-line coastal community experiencing significant impacts from sea level rise and coastal storms; includes environmental justice populations; an artists' community; and supports multiple harbors for one of the largest lobster fishing fleets in the area.

Natural coastal ecosystems and features have been identified as opportunities for broader climate resilience planning; a community-driven assessment of NbS will increase the capacity of the community to protect, restore, and enhance coastal ecosystem services; and educational materials and opportunities have been developed and provided, including a project website, sets of coastal ecosystem, coastal Nature-based Solutions, and freshwater ecosystem infographics, and StoryMap.

Community engagement included establishing a core team, conducting a site walk to identify priority NbS sites, promoting the project and NbS at multiple community events, conducting a youth event focused on coastal ecological science, NbS, and art, and leading a field trip to share knowledge and science about the coastal ecosystem that protects the town.

A prioritized list of NbS appropriate for approximately a dozen coastal locations will be provided to the town at the end of the project, along with a preliminary scope of work and cost estimate to implement each NbS, allowing them to respond quickly to grant funding opportunities.

Scouter Design

Firm Profile and Project Experience

SCOUTER DESIGN

SMART DESIGN THAT CONNECTS YOUR STORY TO YOUR AUDIENCE.

A little about us.

Transforming ideas into visual stories that resonate with your target audience is our passion and the hallmark of our work. Our collaborative approach along with listening and communicating throughout the process allows us to create the most effective solution for your project, while creating a positive experience for all.

At Scouter Design, we work with clients to create new brands and refresh existing ones. This may include a logo or creating or expanding a business's system of products such as templates, brand guides, stationery, corporate overviews, and annual reports. We make our templates functional for our clients to help streamline their process and believe that training is an integral part of that deliverable.

We want our clients to enjoy working with us as much as they enjoy the products that we deliver. Our philosophy revolves around these three concepts.

Explore. Create. Connect.

EXPLORE
Through research and exploration, we seek to uncover and understand what your audience cares about.

CREATE
We develop smart concepts and deliver custom solutions that support your vision and relate to your audience.

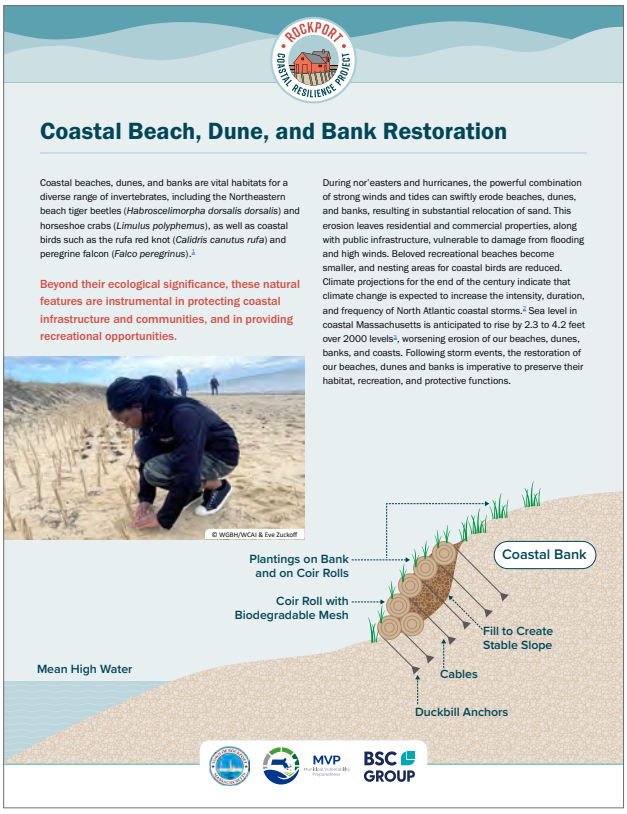
CONNECT
Our clear and compelling designs visually highlight your story that will engage your audience.

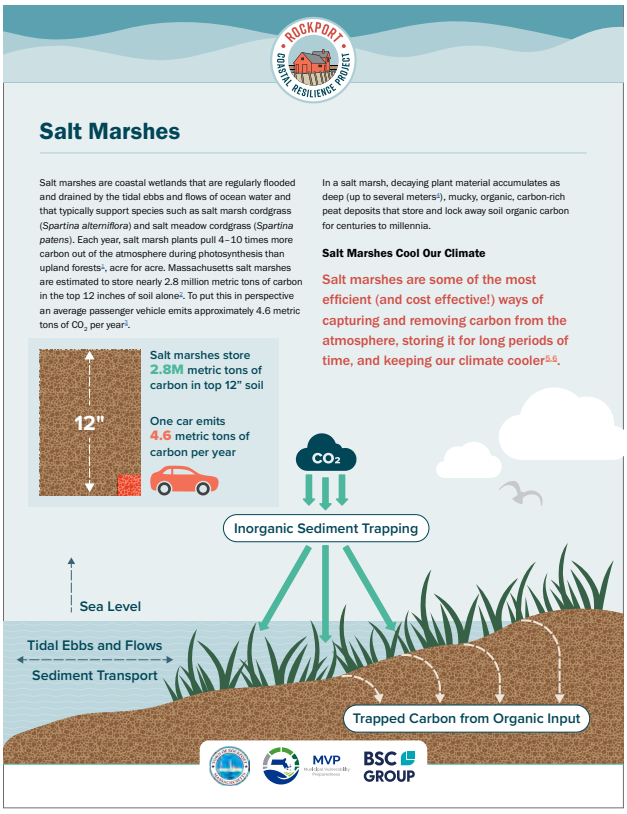
Terri Courtemarche
Principal, Graphic Designer

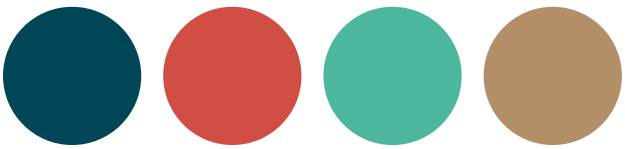
Terri brings over 25 years of graphic design experience creating logos, brand identities, templates, and report design to her clients. Her prior experience leading an in-house team of designers at an engineering firm exposed her to a range of clients that included state transportation agencies, municipalities, airports, and federal agencies. Currently, she works with engineering firms and environmental planners focusing on branding and climate action plans. Using her design skills to benefit others, Terri also volunteers with non-profit organizations to help them promote their work.

APPENDIX A / 36

ROCKPORT COASTAL RESILIENCE PROJECT TOOLKIT / MASSACHUSETTS







CLIENT'S MISSION.

BSC worked with the Town of Rockport to find solutions to mitigate climate challenges along their coastline. To inform stakeholders and community, we designed a toolkit of outreach materials that BSC and Rockport could use to promote this effort.

EXPLORING IDEAS.

Creating a strong brand around an initiative helps build community engagement and interest. This toolkit included infographics, templates, and a project logo. To customize the project's brand, we drew on the character of the coastal town for inspiration for all of the brand components.

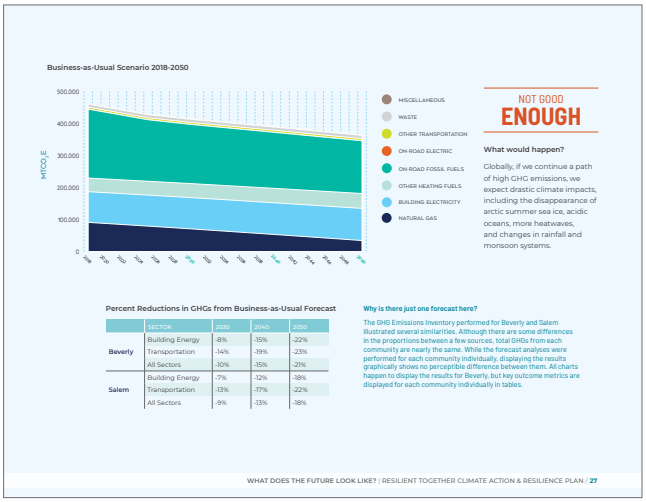
CREATING SOLUTIONS.

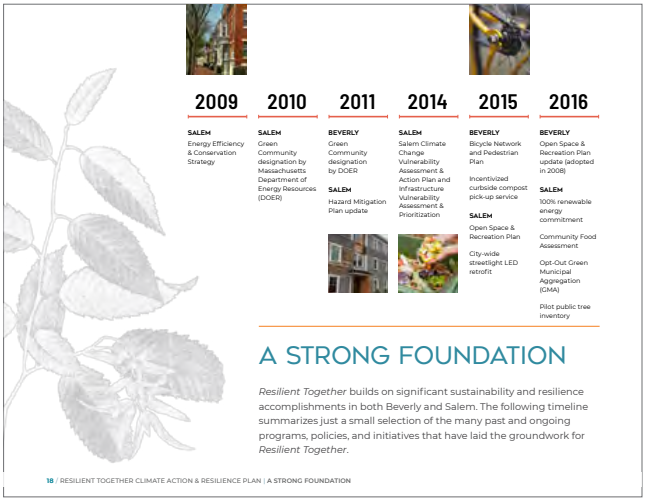
Illustrations and graphics are the best way to convey information that is complex. We created a series of infographics for the public that visually show the issues and supporting data for each topic. The graphics can be repurposed for social media and presentations.

CONNECTING PEOPLE.

Our communities are diverse. That means we can expand our reach and our message by creating the infographics in other languages depending on the languages being spoken within our community.

BEVERLY & SALEM CLIMATE ACTION & RESILIENCY PLAN / MASSACHUSETTS





BACKGROUND

Beverly and Salem worked with KLA to assess climate change within their communities and create a plan and target goals that they can achieve to address climate change.

EXPLORE

The clients wanted to highlight the inclusive process that they used to hear from and inform their communities. For this reason, it was important to show how they achieved that by using various methods such as social media, surveys, and focus groups.

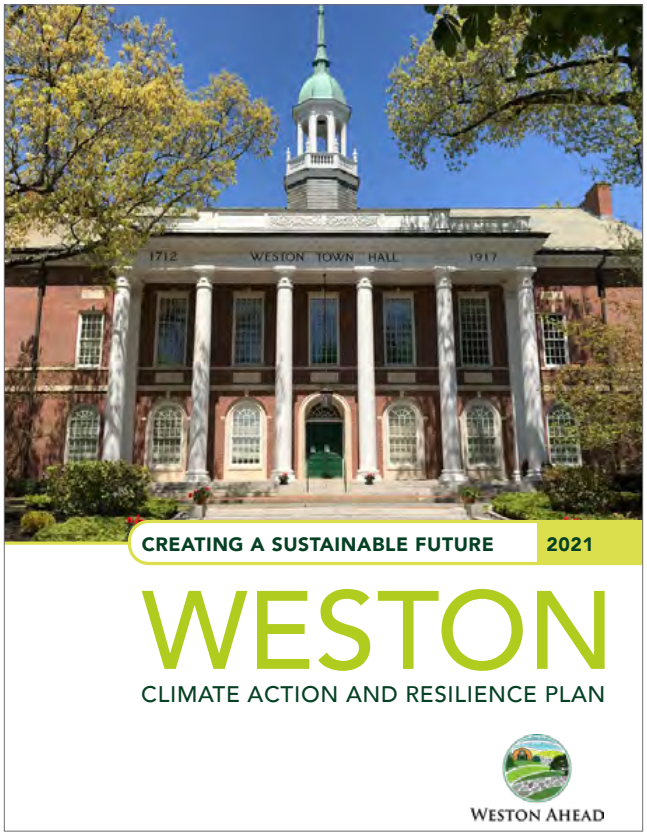
CREATE

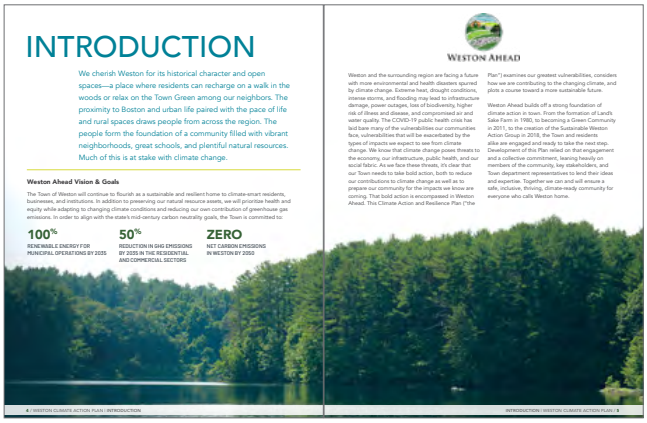
We chose to support the story by using public engagement infographics, quotes, local community stories, and photos of the community working to protect our environment.

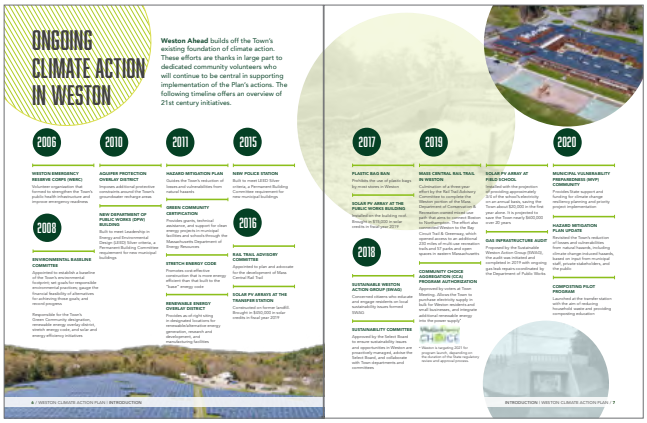
CONNECT

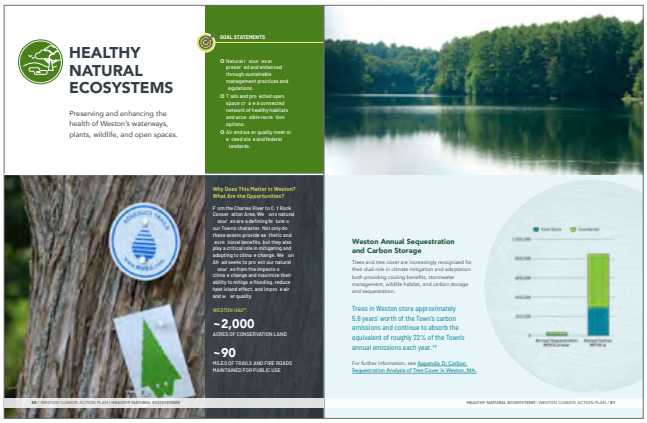
The interactive report was posted online for the community to review. It was also made ADA compliant so it was accessible to everyone.

WESTON CLIMATE ACTION & RESILIENCY PLAN / MASSACHUSETTS









BACKGROUND

The Town of Weston underwent the process of defining their goals for addressing climate change within their community with KLA. This report is the result of their findings.

EXPLORE

We explored different ways to tell their story in a visual way while also using their brand and logo. Creating smaller pieces of information helped make complex and technical information understandable for all readers.

CREATE

Each section used call out boxes to highlight important aspects of the plan; charts and infographics to easily grasp complex data; and imagery to add visual interest. These attributes helped deliver the overall goals of the plan in a visual and legible way.

CONNECT

This interactive report was posted on-line for the community to read and included attributes such as hyperlinks and bookmarks to make it easy to navigate and read.

BEVERLY & SALEM CAP SKILL SHEETS / MASSACHUSETTS

BACKGROUND

In conjunction with the Climate Action Plan, Beverly and Salem used skill sheets early in the process to inform the community about the different areas that most affect climate change and our environment.

EXPLORE

The information needed to be concise and easy to understand. Under these topics, the clients were able to create an awareness as to how our every day habits can impact our environment as well as how we can help.

CREATE

Local examples of where climate change was being addressed, whether large or small, were incorporated. Infographics and imagery made a compelling visual narrative and the brand created a consistent and cohesive message.

CONNECT

The skill sheets were designed in multiple languages because of the diversity in the communities. They were also ADA compliant so that the information was accessible to all readers.

InHabit Films

Project Experience

INHABIT FILMS LLC

SELECTED PUBLICATIONS

SILVOPASTURE EDUCATION SERIES

Regenerative Design Group

A free video series documenting Silvopasture systems in the Northeastern USA was created through a collaboration of Regenerative Design Group, Wellspring Forest Farm, and Inhabit Films, with support from the USDA National Agroforestry Center (NAC). Videos were released biweekly through the Farming with Trees collective, a decentralized network encouraging collaborative projects in Agroforestry that are grounded in the wisdom and knowledge of people, communities and ecosystems. The videos and case studies offer a snapshot of the practice of silvopasture (grazing livestock with trees) systems, along with ideas and inspiration for others to follow.

https://www.farmingwithtrees.org/projects/silvopasture-videos

https://www.youtube.com/watch?v=lY-oAQvWcvo

THE RESILIENT ONES: A GENERATION TAKES ON CLIMATE CHANGE DOCUMENTARY

PBS

This documentary follows the journey of a group of high school students in the Adirondack region of upstate New York seeking solutions to climate change. As they explore the impacts of climate change in the aftermath of Hurricane Irene, these students meet with local leaders and expert innovators to learn about both short-term adaptive strategies to extreme weather and long-term solutions to reduce carbon emissions. The video emphasizes the importance of community efforts and innovative approaches in addressing climate challenges.

https://mass.pbslearningmedia.org/resource/climate-change-and-agriculture/video-the-resilient-ones/

WESTERN WILDLIFE COLLABORATIVE FILM SERIES

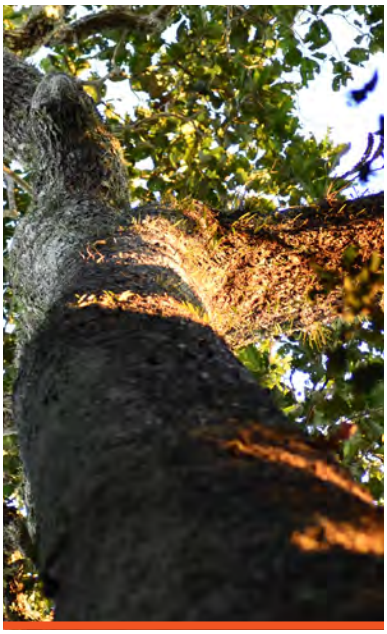
Cary Institute of Ecosystem Studies

This video highlights the Western Fire and Forest Resilience Collaborative (WFFRC) research program designed to accelerate scientific discoveries that will enhance forest resilience and wildfire decision making. WFFRC brings together scientists and practitioners to identify key knowledge gaps by leveraging fieldwork, remote sensing, and advanced simulations. By sharing its discoveries with decision makers and forest stewards, WFFRC facilitates new strategies adapted to the current and future realities of Western wildfires. Their goal is to create sustainable strategies for managing wildfires and protecting ecosystems and communities.

https://www.westernfireforest.org/about
https://www.youtube.com/watch?v=iZTIcgxZRcw&t=8s

Woodwell Climate Research Center

Firm Profile and Project Experience



Woodwell Climate Research Center

CLIMATE SCIENCE FOR CHANGE

We face the greatest challenge of our time: restoring a safe and stable climate, while adapting to inevitable impacts. Science is the core of our success. Woodwell Climate Research Center is dedicated to climate science pursued in partnership with stakeholders and decision-makers to produce maximum societal benefit. Our renowned researchers investigate how human activities are affecting the flow of carbon and water—key climate factors—through the world's most critical ecosystems, from the Arctic to the tropics. Together with our global network of partners, we generate breakthrough insights into the risks we face, and the just, effective solutions we can develop.

CREATING BREAKTHROUGH INSIGHTS

Our scientists are experts in combining field data with large-scale satellite monitoring and computer modeling to generate insights that scale from local to global. Woodwell Climate experts are:

Making climate risk actionable Decision-makers need trustworthy, relevant, and detailed information about the risks we face now and in the next few decades. We work with partners to advance understanding of climate hazards, like extreme weather and fire, and their socioeconomic and geopolitical impacts, from water and food scarcity, to labor impacts, conflict, and migration.

Filling gaps in carbon accounting Thawing of Arctic permafrost could release enough greenhouse gases to threaten our climate targets, but these emissions aren't in models and budgets. Burning trees for energy emits more carbon than fossil fuels, but is often incentivized as carbon neutral. We bring rigorous, independent science to the table to ensure realistic goals and effective policies.

Realizing the potential of natural climate solutions Forests, wetlands, and soils provide our best hope for cooling the planet. We integrate ecological and social science to develop equitable, cost-effective, and evidence-based strategies ranging from finance for forest conservation, to soil carbon monitoring, wetland restoration, and agricultural land management.

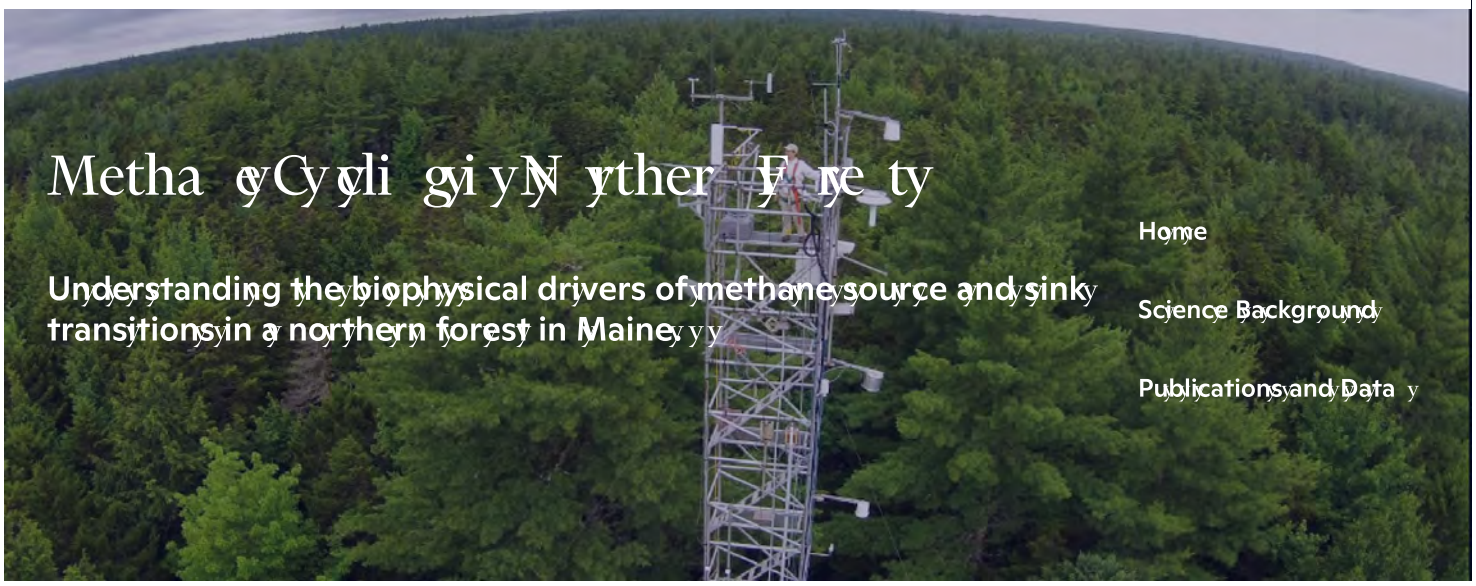
WORKING IN CONCERT FOR OUTSIZED IMPACT

We work with partners, stakeholders, and government officials in more than 20 countries across six continents—from the Arctic to the Amazon, and D.C. to D.R.C. We engage throughout the research process to ensure that our insights can be integrated into real-world decision-making. This approach has delivered outsized impact for over 35 years. Woodwell Climate researchers have:

- Helped shape the UN Framework Convention on Climate Change
- Provided Congressional testimony or briefed Hill staffers dozens of times in the past five years
- Shaped the first guidelines for corporate disclosure of physical climate risk
- Informed critical Brazilian legislation to protect 30 million acres of Amazon forest
- Contributed to more than a dozen reports by McKinsey & Company on climate risk and net zero pathways

BY THE NUMBERS

PRINCIPAL INVESTIGATORS	18
TOTAL STAFF	120+
CORE PARTNERS	30+
SCIENTIFIC PUBLICATIONS	120+/yr
MEDIA MENTIONS	6,500+/yr



Methane Cycling Northern Forests

Understanding the biophysical drivers of methane source and sink transitions in a northern forest in Maine

Research area

Arctic Carbon

Methane is second only to carbon dioxide (CO_2) in its contribution to human-induced climate change, thanks to its global warming potential—34x greater than CO_2.

However, we understand very little about methane flux in forests, the processes and feedbacks that drive it, and how methane emissions or uptake will evolve with a changing climate.

Our Work

At the Howland Research Forest, ME, we are taking on this priority for biological research and improving methane flux models. Our innovative, multi-scale, and cross-disciplinary study is identifying the conditions and mechanisms driving methane sink/source activity across soil moisture gradients in northern forests.

Led by Woodwell Climate Research Center, in collaboration with the University of Maine, Emory University, Arizona State University, San Diego State University, and the USDA Forest Service, this research uses new DNA sequencing techniques that allow us to study microbial traits. Measuring these traits across different environmental conditions ultimately helps us learn how microbes sequestration of methane in sub-boreal forests may be offsetting methane emitters globally, and how this may change under future climate conditions. The Howland Research Forest serves as a case study to identify drivers and functional relationships across wet to dry soils, and from soils to canopy.

Team

Assistant Scientist

Senior Research Associate

Research Assistant

Collaborators

Associate Professor of Forest Ecology, University of Maine

Assistant Professor, Emory University

Associate Professor, Arizona State University

Associate Professor of Ecology, San Diego State University

Research Plant Physiologist, USDA Forest Service

Ecologist, USDA Forest Service

No Net Loss of
CARBON IN WETLANDS

No Net Loss of Wetland Carbon in Massachusetts Project Final Report

July 2024

PREPARED FOR

Massachusetts Department of Environmental Protection (MassDEP)
100 Cambridge Street, Suite 900
Boston, MA 02114

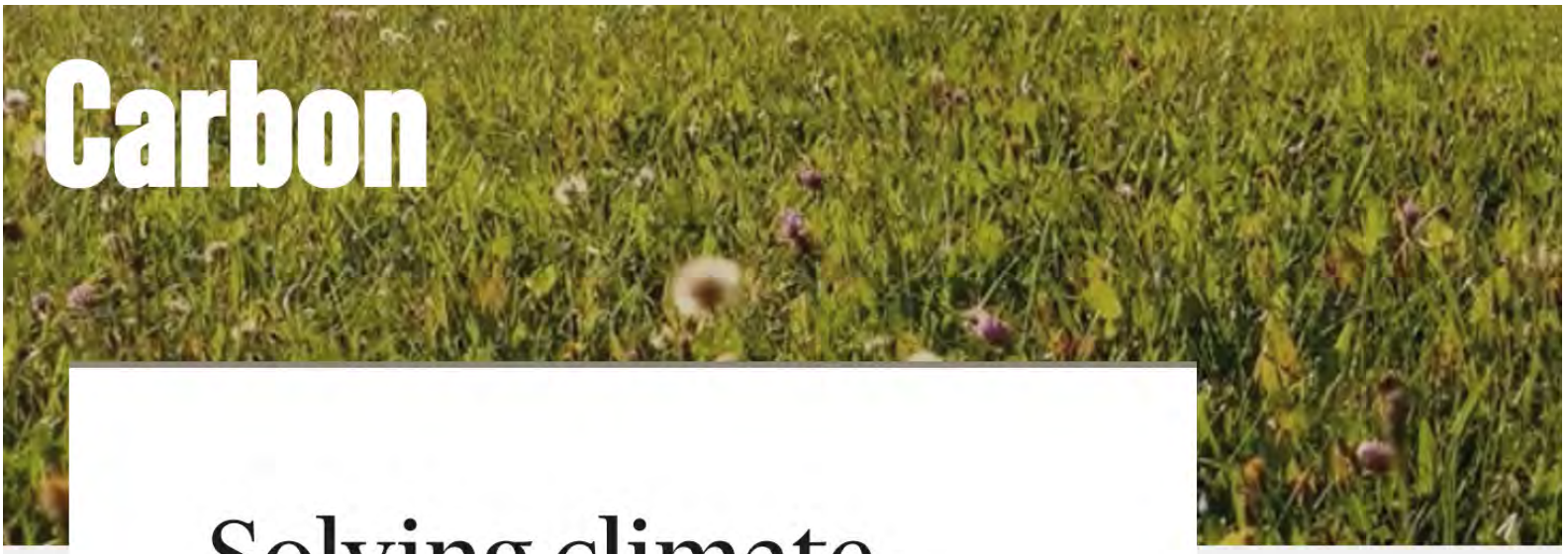
PREPARED BY

BSC Group, Inc.
1 Mercantile Street, Suite 610
Worcester, MA 01608

PROJECT TEAM & REPORT CO-AUTHORS

BSC Group, Inc.
Massachusetts Association of Conservatic Commissions
Regenerative Design Group

This report has been prepared by the No Net Loss of Wetland Carbon in Massachusetts Project Consulting Team: BSC Group, Inc., the Massachusetts Association of Conservation Commissions, Regenerative Design Group, Scouter Design, and Woodwell Climate Research Center. The specific recommendations developed by the Project Consulting Team for achieving No Net Loss of Wetland Carbon in Massachusetts have been discussed with staff from the Massachusetts Department of Environmental Protection (MassDEP) and the Massachusetts Executive Office of Energy and Environmental Affairs (EEA), who have provided valuable information and insights. However, the recommendations presented in this report do not represent policy or regulatory decisions or commitments from MassDEP or EEA. The report is intended to provide useful information for these government agencies as they develop approaches that work towards achieving No Net Loss of Wetland Carbon in Massachusetts.



Carbon

Solving climate change means reducing global carbon emissions.

Climate change is driven by the increase in concentrations of CO_2 and other greenhouse gases in the atmosphere, primarily due to fossil fuel combustion. Fortunately, the Earth's forests, soils, and natural systems can be a powerful tool to slow this dangerous build-up—if they are properly conserved and managed.

Woodwell Climate scientists work across continents and fields of study to find comprehensive strategies to promote natural climate solutions for reducing carbon in the atmosphere.

Experts

Jonathan Sanderman
Carbon Program Director

Richard A. Birdsey
Senior Scientist

Brendan M. Rogers
Associate Scientist

Christopher R. Schwalm
Risk Program Director

Wayne S. Walker
Chief Scientific Officer

Elchin Jafarov
Senior Research Scientist

Susan M. Natali
Senior Scientist

Ludmila Rattis
Assistant Scientist, Tanguro Field Station General Coordinator

Jennifer D. Watts
Arctic Program Director, Associate Scientist

All Carbon Experts

APPENDIX A / 47

Regenerative Design Group

Firm Profile and Project Experience

resilient communities. productive landscapes. nature-based solutions.

OUR FIRM

Regenerative Design Group is a worker-owned ecological design practice dedicated to creating productive landscapes and resilient communities. We work across scales, offering innovative, practical, and flexible solutions for individuals, institutions, and communities.

Our capacity for interdisciplinary thinking is informed by our backgrounds in ecology, agriculture, conservation, architecture, and education. Grounded in the principles of permaculture design, our team weaves the elements of any project into a high-functioning whole system.

COOPERATIVELY OWNED AND RUN

Founded in 2009, Worker-Owned since 2021

Founding Board of Directors, 2021

OUR WORK

Research

We support clients and their communities in articulating their vision and goals, and bringing rigorous ecological analysis and long-term climate projections to the table.

Master Planning & Campus Design

We develop designs for campuses that combine food production and learning, guiding the transition from high-input management to diverse educational landscapes.

Regenerative Agriculture & Farm Design

We work with communities and farm owners to develop diverse farming and agroforestry systems that support the farm's social, environmental, and economic goals.

Productive Habitats & Ecosystem Regeneration

We work to restore and enhance existing natural systems that provide fresh air, clean water, food, fuel, fiber, wildlife, shelter, and wild forage.

Residential Design & Integrated Homesteads

We help homeowners envision and create beautiful, efficient homes and landscapes that invite engagement through the production of food and integration of natural systems.

Massachusetts Healthy Soils Action Plan

CLIENT

Massachusetts Executive Office of
Energy + Environmental Affairs, 2019-2023

SERVICES + ACCOMPLISHMENTS

Analysis and modelling of Soil Organic Carbon (SOC) stock, segmented by land cover type

Projection of 2050 SOC flux, based on land cover change

Soil-smart planning and management priorities

Stakeholder engagement

Management of 40 person working group

PROJECT OVERVIEW

The Massachusetts Healthy Soils Action Plan (HSAP) is the nation's first effort to understand, protect, and revitalize soil function in all land uses statewide. This Plan, commissioned by Massachusetts Executive Office of Energy and Environmental Affairs, reveals the tremendous impact land use and management has on the soils of the Commonwealth and sets forth strategies and actions to increase soil health as a way to improve food security, ecosystem function, and climate resilience across the region.

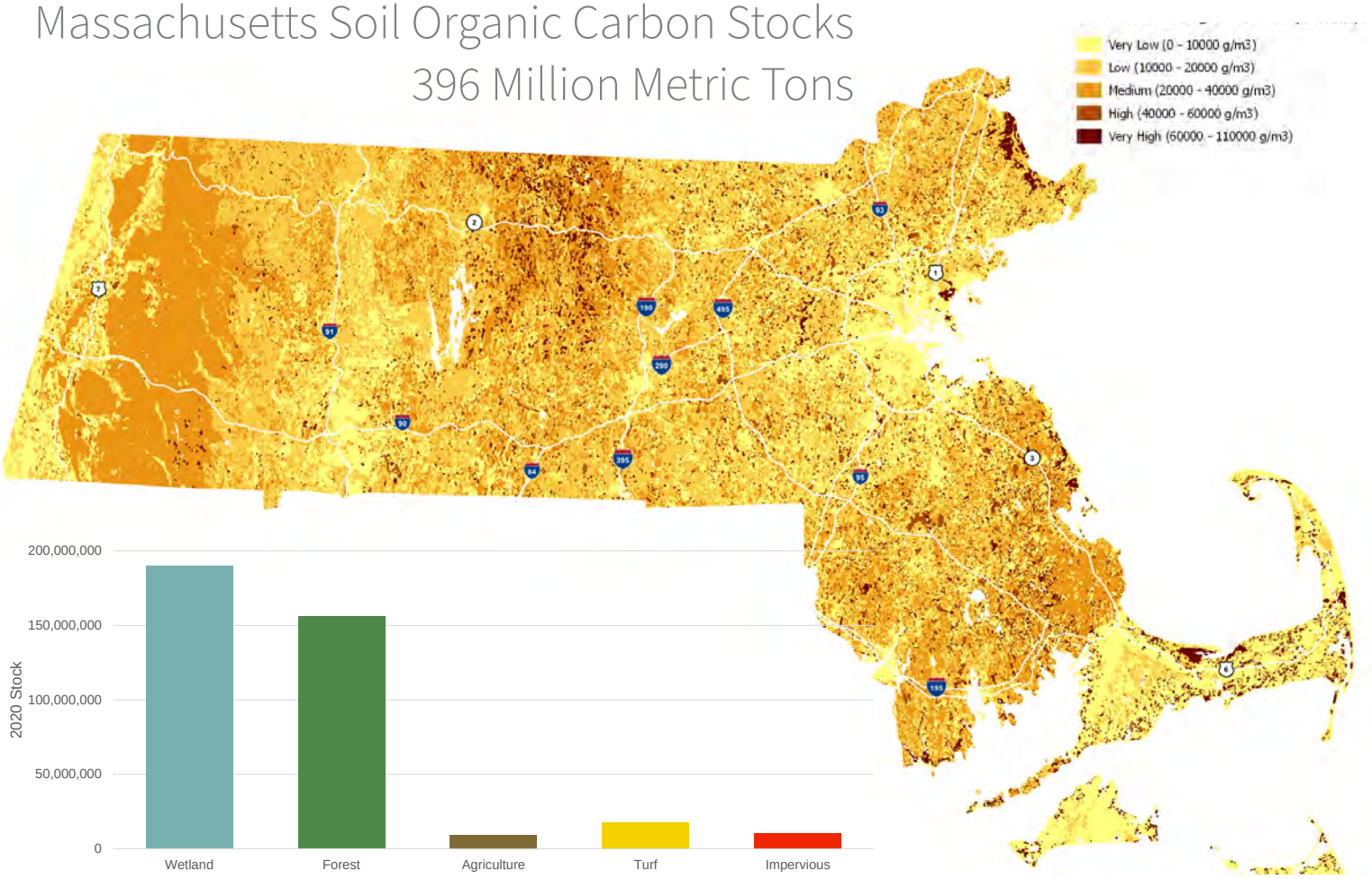
Through an 18-month process the consultant team, led by Regenerative Design Group, conducted a detailed literature review and geospatial analysis to understand the key factors and dynamics that shape soil health. This included the development of a novel method for quantifying soil organic carbon (SOC) based on land cover and drainage classification.

With guidance and review of a 40-member Working Group, representing state and federal agencies, conservation organizations, scientific advisors, and community stakeholders, RDG developed a series of evidence-based strategies and actions aimed at transforming the impact of soil management on climate from a negative to a positive.

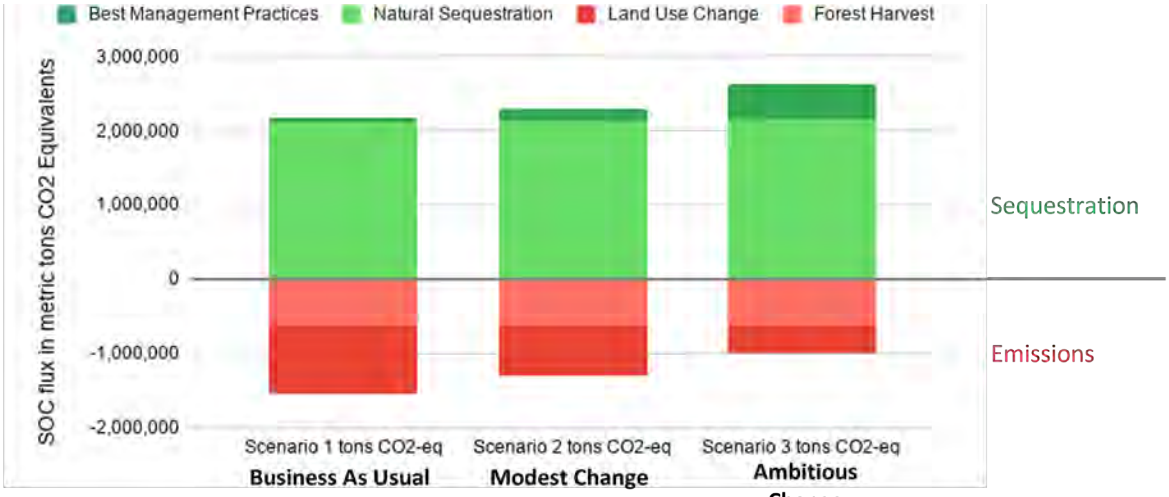
The result is a roadmap for policymakers, land managers, and soil health advocates to understand the interconnected nature of the Commonwealth's landscapes and the role they play in soil carbon sequestration and climate resilience.

Regenerative DesignGroup

Massachusetts Soil Organic Carbon Stocks
396 Million Metric Tons



2050 Comparison of Annual Soil Organic Carbon Fluxes



Business As Usual
Net Carbon Flux
632,334 CO_2 Eqv

Modest Change
Net Carbon Flux
994,479 CO_2 Eqv

Ambitious Change
Net Carbon Flux
1,623,267 CO_2 Eqv

Deerfield Soil Health Plan

CLIENT

Town of Deerfield
Municipal Vulnerability Preparedness Program, 2022

SERVICES + ACCOMPLISHMENTS

Analysis and modelling of Soil Organic Carbon (SOC) stock, segmented by land cover type

Soil-smart planning and management priorities

Intensive stakeholder engagement

Sample bylaws aimed at protecting and improving soil resources

Soil sampling across a variety of land types providing the basis for future soil health tracking

Design and execution of a “soil health field day” for 120 high school students

Awarded by the Massachusetts chapter of the American Planning Association for excellence in Sustainability & Resilience planning

Regenerative DesignGroup

PROJECT OVERVIEW

The Deerfield Healthy Soils Project is based on the premise that protecting and improving soil function across land uses is an essential component of climate-resilient planning. The overall goal of this project was to identify the most impactful actions and strategies that the community of Deerfield, Massachusetts can implement to steward its soils in ways that support the myriad of co-benefits and beneficial functions of healthy ecosystems including enhanced carbon sequestration and storage, greater fertility, and improved water dynamics.

Over the course of a year, Regenerative Design Group led a process that included high resolution modeling of Deerfield’s current healthy soil resources; presentations, workshops, and conversations with stakeholders with a special focus on farmers considering the town’s large agricultural community; soil sampling across a variety of land types providing the basis for future soil health tracking; a “soil health field day” for 120 high school students; and the development of several recommendations for potential bylaw improvements aimed at protecting and improving soil resources.

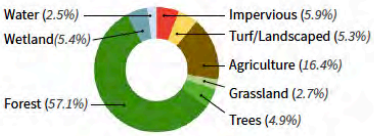
This project was completed in 2022 as part of a larger Municipal Vulnerability Preparedness action in the town of Deerfield, MA. Regenerative Design Group (RDG) worked closely with Chris Curtis (Conservation Works) who was the lead planner for the larger MVP project and who was the lead author of the sample bylaws included in our report. The consultants reported directly to Deerfield’s Climate Change and Energy Committee in carrying out the work of the project. The project was recognized in 2022 by the Massachusetts chapter of the American Planning Association with it’s Sustainability & Resilience Award.

Land cover + Soil Organic Carbon Stocks in Deerfield, MA

Regenerative DesignGroup

Data Sources: MassGIS 2016 Landcover

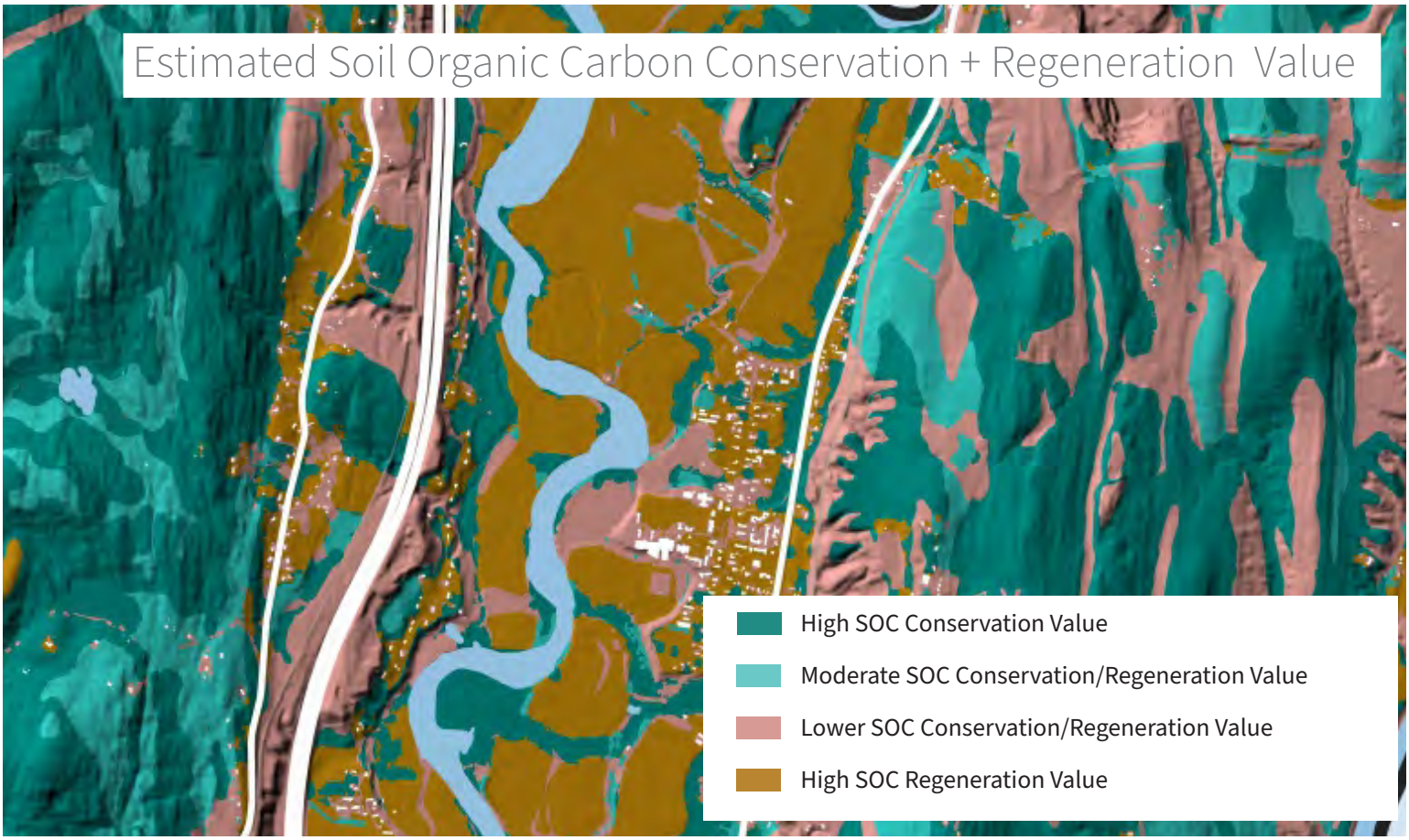
Forest	12,525 ac
Agriculture	3,506 ac
Wetland	1,160 ac
Turf & Landscaped Areas	1,123 ac
Trees	1,041 ac
Impervious	965 ac
Grassland or Shrub	571 ac
Open Water	527 ac

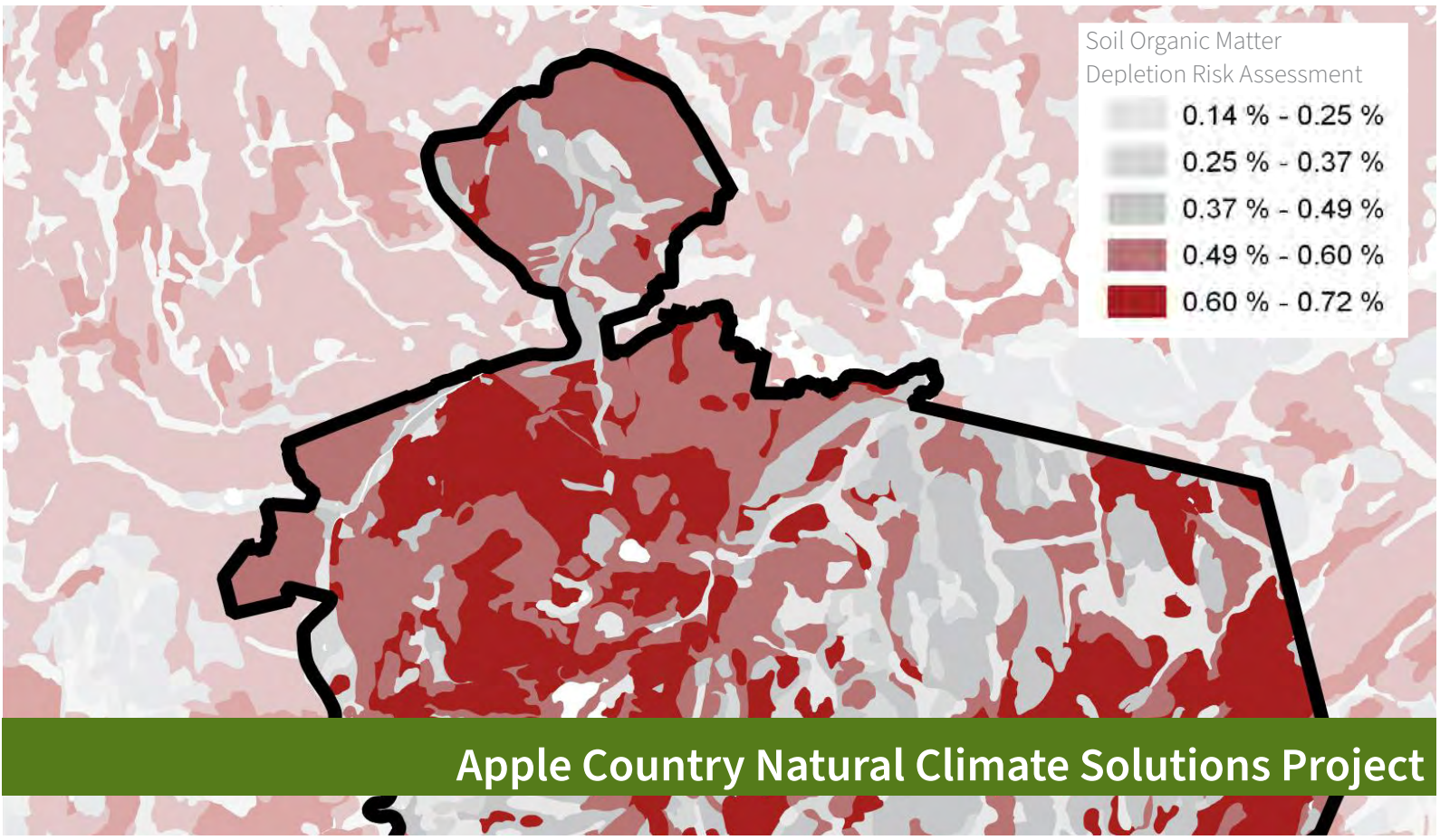


Data Sources: Soils SSURGO-Certified NRCS, NRCS Rapid Carbon Assessment, MassGIS 2016 Landcover

Very Low (0-20 tons/acre)	1,120 ac
Low (20-40 tons/acre)	3,299 ac
Medium (40-60 tons/acre)	4,481 ac
High (60-80 tons/acre)	3,306 ac
Very High (80-100 tons/acre)	5,107 ac
Exceptionally High (100+)	4,097 ac

Estimated Soil Organic Carbon Conservation + Regeneration Value





Apple Country Natural Climate Solutions Project

CLIENT

Towns of Bolton + Harvard with Devens Regional Enterprise Zone. Massachusetts Municipal Vulnerability Preparedness Program, 2019

SERVICES + ACCOMPLISHMENTS

Refined method for modeling soil organic carbon using land cover

Analysis and modelling of soil organic carbon stocks, segmented by land cover type

Projection of annual soil organic carbon fluxes for 2050 based on land use change predictions

Development of soil-smart planning and management BMPs

PROJECT OVERVIEW

In a regional effort to address the challenges of climate change, biodiversity loss, and regional development pressures, Bolton, Harvard, and Devens engaged BSC Group, Linnean Solutions, Woodwell Climate Research Center, and Regenerative Design Group to identify regional vulnerabilities and recommend nature-based climate solutions (NbS) that will increase the resiliency of their communities and ecosystems.

Nature-based Solutions provide cost-effective climate resilience by providing multiple co-benefits, including reduction of greenhouse gas emissions, improved water quality and water supply, reduced flooding, improved air quality, cooler local temperatures, fish and wildlife habitat and support for biodiversity, recreational and aesthetic opportunities, and improved physical and mental public health.

Regenerative Design Group led the mapping and analysis of soil carbon components of this project and contributed to the identification of NbS to increase regional climate resilience. To assist the communities to understand the impact of land use on health of their soils and contributions to climate resilience, RDG remapped NRCS soil carbon based on land cover (top right) and created an infographic of projected soil organic carbon fluxes in 2050 (bottom right).

Regenerative DesignGroup

Land Cover Adjusted Soil Organic Carbon

When adjusted for land cover, the total stock of SOC in Apple Country increased from 2.2 million metric tons (SSURGO) to 2.8 million metric tons, a difference of 400,000 tons.

This work suggests that the amount of carbon stored in the soils of this region is underestimated. This underestimation diminishes the significance of conserving and regenerating forests and wetlands.

ORIGINAL SSURGO SOC

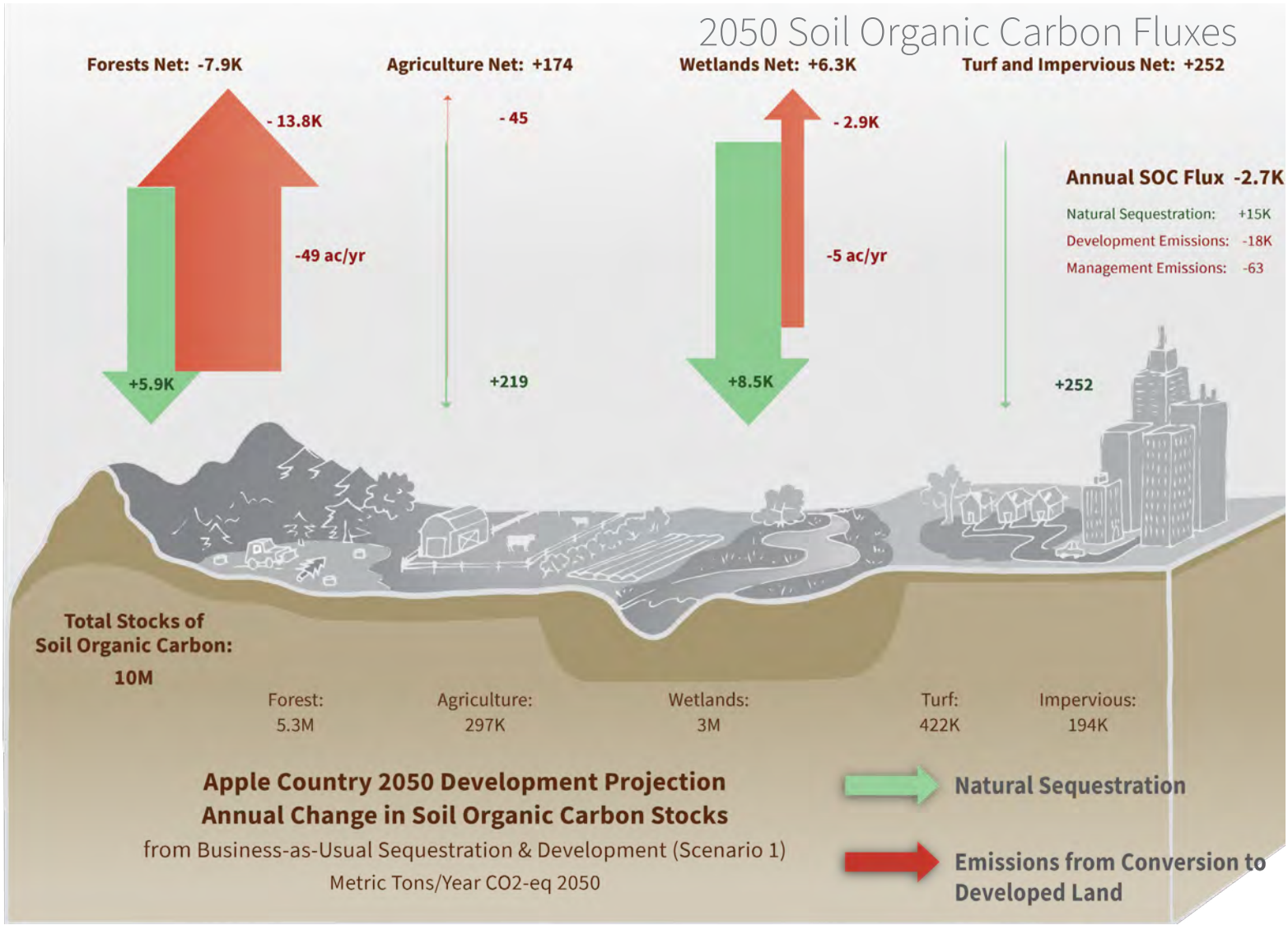
2.2 Million Metric Tons

FOREST PEDON NORMALIZED SOC

3.2 Million Metric Tons

LAND COVER ADJUSTED SOC

2.8 Million Metric Tons



SuAsCo Nature Based Solutions Project

CLIENT

Towns of Hudson, Framingham, and Natick, Municipal Vulnerability Preparedness Program, 2022-2024

SERVICES + ACCOMPLISHMENTS

Analysis and modelling of Soil Organic Carbon (SOC) stock, segmented by land cover type

Projection of 2050 SOC flux, based on land cover change

Soil-smart planning and management priorities

Selection of and recommendations for high-impact locations for nature based solutions

Focus on environmental justice and climate vulnerable populations using an analysis of a range of human health hazard data to guide project priorities

PROJECT OVERVIEW

Launched in the fall of 2022, the SuAsCo Natural Climate Solutions project is a joint effort by stakeholders in the towns of Hudson, Framingham, and Natick with consultant partners from Regenerative Design Group, Linnean Solutions, and BSC Group to identify high impact sites for nature based interventions that will support the towns' climate resilience.

With the understanding that soil health is foundational to the function of all terrestrial ecosystems, Regenerative Design Group lead an initial phase of the project aimed at establishing a baseline estimation of current soil health in the towns and analyzing the effects existing land cover and management practices have on these resources. These were summarized in a series of maps entitled Soil Functions for Resilience (top right).

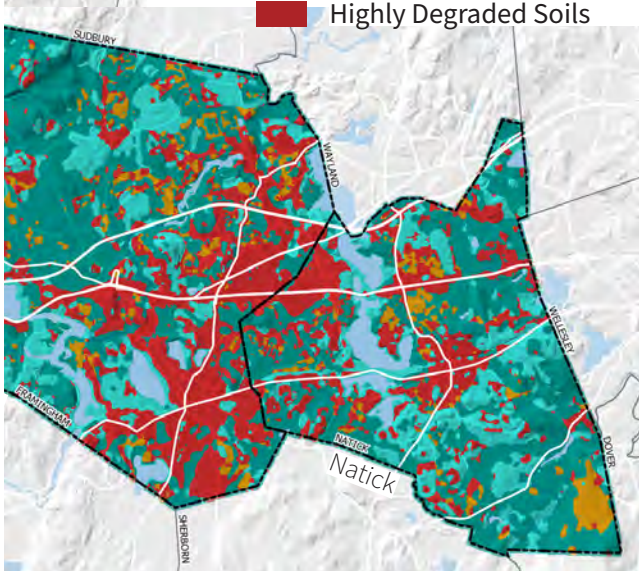
From this baseline, the team completed an analysis that combines RDG's refined soil carbon predictions with other ecological data to map ecological planning priorities. The result is a map of planning districts (bottom right) with different priorities (e.g. restore and transform or plan an manage for resilience). Appropriate recommended actions for each district and an analysis of ideal candidate sites are major products of this project. Proposed sites for nature based solutions will receive a multi-stage assessment of vegetative health by drone monitoring.

This project also has a strong focus on environmental justice and improving conditions for climate vulnerable populations. Demographic data was overlaid with other data on known ecological hazards to create a human health and vulnerability map that contribute to developing project priorities.

Regenerative DesignGroup

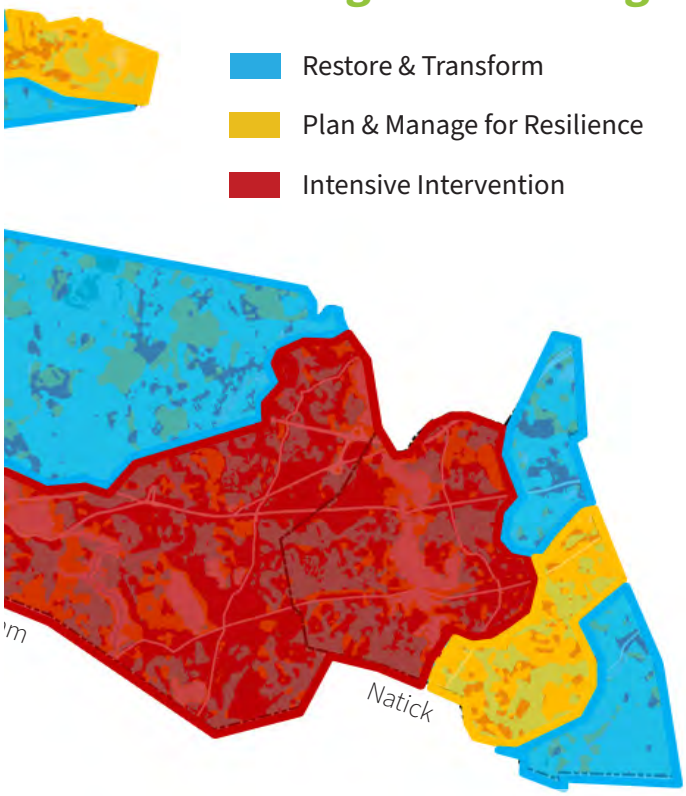
Regenerative DesignGroup

Soil Functions for Resilience



- High Performance Soils & High Carbon Soils
- Average Function Soils
- Degraded Soils with High Regeneration Potential
- Highly Degraded Soils

Ecological Planning Priorities



- Restore & Transform
- Plan & Manage for Resilience
- Intensive Intervention

Spruces Park Landscape Resource Plan

CLIENT

Williamstown, MA

SERVICES

Site Assessments

Design + Management of a Project Website

Community Survey Creation + Synthesis

Concept Development

PROJECT OVERVIEW

Spruces Park is a low-lying, mostly flat 50-acre open space park that sits in the floodplain of the Hoosic River. It was formerly the site of the Spruces Mobile Home Community, which operated for 57 years before massive flooding from Hurricane Irene in 2011 set in motion the development's closure and resettling of over 300 residents.

The park, which was purchased by Williamstown through a FEMA Hazard Mitigation Grant and is subject to FEMA regulations, has since been used for passive recreation. Our team was charged with developing a landscape resource plan that further defined ways in which the community was already using the open space, enhanced the floodplain function of the site, and integrated new uses that fit within regulatory constraints.

Organizing principles for the landscape resource plan included:

Maintain + Enhance Ecosystem Services

» Keep encroachments South of the floodway to minimize regulatory, cost and timeline constraints
» Expand and enhance floodplain plant communities

Increase Whole-Site Legibility

» Prioritize a clear hierarchy of access roads, gravel lanes, and pathways that allow for a variety of experiences; retire some of the current lanes from use
» Use "feature" trees, existing shade, congregation spots, river access, etc. to guide movement through the site

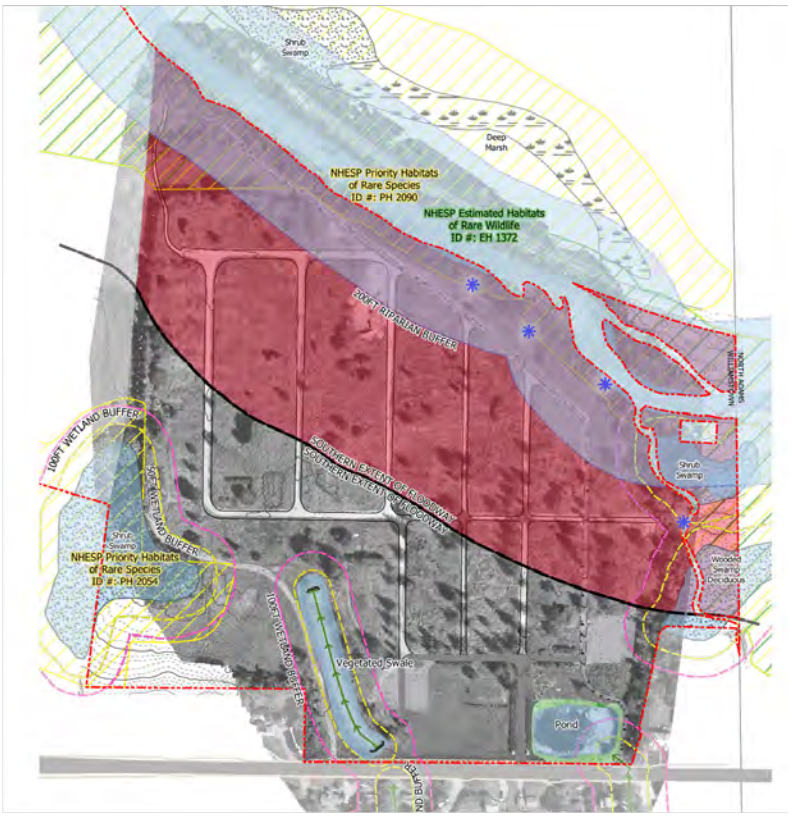
Expand Opportunities for Recreation and Gathering

» Explore a variety of configurations for mixed-use playing fields and other community field uses in the available 16 acres south of the floodway

Regenerative DesignGroup

Regenerative DesignGroup

Water Resources + Regulatory



SPRUCES NORTH

Summary of Plan Goals

1. Find a balance between wilder open space and managed community uses within the park's regulatory constraints.

2. Increase whole site legibility.

3. Expand opportunites for low imapact recreation.

Leash Laws

Williamstown leash laws require dog owners and keepers to restrain their dogs physically by leash or by voice control when they are not on the owner's property. It is recommended that park rules require on-leash on the bikepath and all areas in Spruces South. Dogs should be able to be off-leash, under voice command, in most parts of Spruces North.

1 Floodplain Forest Grove

Although extensive underground utilities limit floodplain forest restoration, there are opportunities to establish plant communities typical of floodplain forests for this region. A floodplain grove is sited at the northwest entrance to Spruces and extends along the route of the river and bike path, totalling about 6 acres, and providing a counterpoint to the open meadows that define much of the park. Recommended trees include local genotypes of Silver Maple *(Acer saccharinum)*, Cottonwood *(Populus deltoides)*, Tulip Poplar *(Liriodendron tulipifera)*, Hackberry *(Celtis occidentalis)* with an herbaceous layer of Ostrich Fern *(Matteuccia struthiopteris)* and Wood Nettle *(Laportea canadensis)*.

2 The Spruces Meadow

The Spruces Meadow is currently the dominant typology at the park. Although, in landscape terms, this zone is more akin to a savannah, or mixed woodland-grassland, it is widely referred to as a meadow. Proposed changes to this roughly 14-acre zone include retiring 4 internal N-S gravel lanes, the addition of shade trees along reamining gravel lanes, and a more comprehensive network of mown meadow paths. One annual mowing in late winter/early spring to deter woodies and optimize pollinator habitat is recommended.

SPRUCES SOUTH

3 Wet Meadow

This zone unites the existing daylighted intermittent stream with the wetland to the west to create a 6.10 acre ***pollinator-supporting*** scrub-shrub wet meadow. A circuit path with boardwalk sections protects sensitive wet areas. The existing farm road still traverses this zone, but is rerouted out of the 50' buffer.

Recommended plants for this zone include Buttonbush *(Cephalanthus occidentalis)*, Sweet Pepperbush *(Clethra alnifolia)*, Red-osier Dogwood *(Cornus sericea)*, Common Spicebush *(Lindera benzoin)*, Fox Sedge *(Carex vulpinoidea)*, Blue Vervain *(Verbena hastata)*, and Spotted Joe Pye Weed *(Eupatorium maculatum)*

4 Maple Lawn

The 0.70 Maple Lawn remains as a picnic zone, but with greater connectivity to other uses. In the context of surrounding changes, this area becomes more significant as a central gathering spot.

5 Nature Play

A 0.60 acre field nestled between the East Parking Lot, Wet Meadow, and Maple Lawn caters to children, families, and school groups that may not venture north into the larger open space. A playground of natural materials, sensory garden, and small fruit foraging create a unique spot within the the park.

6 Sports Field

Two interior lanes are retired, to allow for a U12-sized soccer field (80 yards x 55 yards). Alternatively, a regulation tournament field could fit here, albeit with some encroachment into the floodway (shown below).

7 Community Lawn

A 1.75 acre open space used for community events, movie nights, informal sports, and lawn picnics. Border tree and shrub plantings help to define the space and soften the edges between Route 2, parking and access lanes. A small covered platform with volunteer-maintained, ***pollinator-supporting*** gardens is sited close to the parking lot.

8 Spruces Pond Field

A 1.70 acre field that centers around Spruces Pond, this area is largely unchanged except for the addition of a fishing dock and diversifying the pond edge with wet-tolerant plants like Sweetflag *(Acorus americana)*, Water Plantain *(Alisma plantago-aquatica)*, Swamp Milkweed *(Asclepias incarnata)*, and Marsh Marigold *(Caltha palustris)*.

9 Entrance + Parking

Existing low juniper hedge is replaced with native flowering and shade trees to create a more welcoming arrival. Vehicle access is limited to the east and west parking lots. The west lot, as currently configured, can park 40 cars if spots are appropriately indicated. (*Finished layout of east parking lot is unclear based on Bike Path construction documents.)

Estimating land cover-based soil organic carbon to support decarbonization and climate resilience planning in Massachusetts

CLIENT

Journal of Soil Security, 2022

SERVICES + ACCOMPLISHMENTS

Meta-analysis of scientific literature on soil organic carbon in various land cover types

Development of land cover SOC averages

Estimation of total SOC statewide SOC stocks for Massachusetts

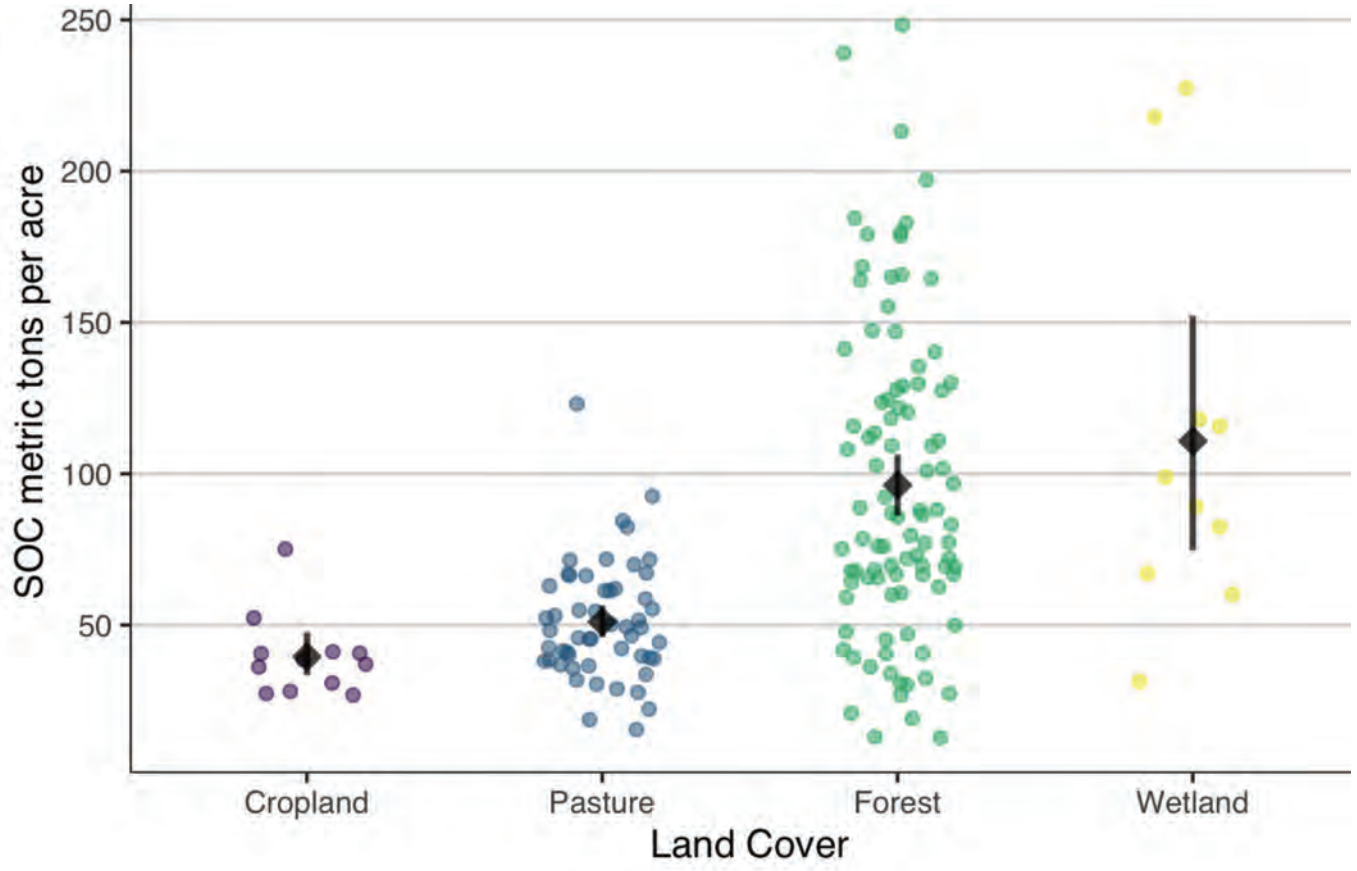
ABSTRACT

Land management and land cover change exert a strong influence on soil organic carbon (SOC) storage. As scientific, political, and business communities increase their awareness of the essential roles SOC plays in climate regulation and ecosystem functions, efforts to quantify the impacts of land use and management on SOC have increased rapidly. Existing methods of estimating SOC stocks from widely available data do not account for land cover, and are therefore of limited usefulness in understanding the impacts of past and future land use change.

This project explores a method of linking land cover to SOC, using data from public data sets and the scientific literature, to provide an SOC Inventory for Massachusetts and compares the results to those derived from a common baseline approach. Our method derives average land cover SOC values by combining data from the USDA-NRCS Rapid Carbon Assessment and the National Cooperative Soil Characterization Database with values from a meta-analysis of scientific literature. These are applied to the total area of the 20 most abundant landcover classes of Massachusetts. We compare this land cover-based approach with a baseline using SOC values found in the Soil Survey Geographic Database (SSURGO), applied to each soil map unit found within Massachusetts.

Our approach produced an estimated stock of 481 million metric tons of SOC, 29% and 109 million metric tons greater than the SSURGO baseline. We use these estimates to explore the use of the land cover based SOC values to project the impacts of likely land cover change by 2050.

Regenerative DesignGroup



CONTEXT + KEY FINDINGS

After the completion of the Massachusetts Healthy Soils Action Plan, members of RDG's consulting team published an article on the novel approach to estimating soil organic carbon at the state or larger regional scale.

Figure 3 (above) graphs the SOC mt/ha to a 1 meter depth for 172 samples tested by the National Resource Conservation Service from within 100 miles of the Massachusetts border. Cropland

An excerpt from Table 1 (right) contains the average SOC values for each major land cover type found in Massachusetts.

2016 High Resolution Land Cover Class	Average Soil Organic Carbon MT ha 1m depth	Source of SOC Value
Impervious (2)	54	Meta-analysis/ SSURGO
Developed or Open Space (5)	99	Meta-analysis/ SSURGO
Cultivated Crops (6)	81	RaCA/SCDB
Pasture or Hay (7)	126	RaCA/SCDB
Grassland or Herbaceous (8)	113	RaCA/SCDB
Deciduous Trees- non forest (9)	54	Meta-analysis/ SSURGO
Evergreen Trees- non forest (10)	54	Meta-analysis/ SSURGO
Forest (11)	214	RaCA/SCDB
Scrub/Shrub (12)	121	Meta-analysis/ SSURGO
Palustrine Forested Wetland (13)	825	RaCA/SCDB
Palustrine Scrub/Shrub Wetland (14)	825	RaCA/SCDB
Palustrine Emergent Wetland (Persistent) (15)	825	RaCA/SCDB
Estuarine Forested Wetland (16)	398	Meta-analysis/ SSURGO
Estuarine Scrub/Shrub Wetland (17)	398	Meta-analysis/ SSURGO
Estuarine Emergent Wetland (18)	398	Meta-analysis/ SSURGO

Ayer-Devens Pocket Forest Pilot Project

CLIENT

Town of Ayer
Municipal Vulnerability Preparedness Program, 2022

SERVICES + ACCOMPLISHMENTS

Stakeholder engagement

Pocket forest design

Soil testing and enhancement reccomendations

Print + digital educational materials

Town-wide analysis of ecological and social implications

Organization of a community planting day

PROJECT OVERVIEW

The aim of the Ayer/Devens Pocket Forest Project was to find the most suitable and impactful sites for planting small, dense, and diverse forests that will store and filter stormwater, cool and clean the air, increase habitat connectivity for wildlife, act as a seedbank for diverse tree species, and enhance human habitation in the Town of Ayer and the Devens Enterprise Commission.

After a robust community engagement, planning, and design process, we joined with the people of Ayer and Devens in April of this year to install one of the first pocket forests in the Northeastern US. More than 50 community members helped us prepare the soil and plant a diverse collection of trees and shrubs near downtown Ayer.

Ayer and Devens will be carrying on the momentum of this pilot project to install four more pocket forests next year (two in each town). Sites were selected based on a number of criteria that considered ecological and social factors to point towards high impact locations. We collaborated closely with BSC Group and Linnean Solutions as a consultant team to carry out this project.

Regenerative DesignGroup COOPERATIVE

Appendix B

Team Member Resumes

BSC GROUP

Gillian

Davies, PWS, RSS, NHCWS, CESSWI

Senior Ecologist/Natural Climate Solutions Specialist

Senior Associate

YEARS OF EXPERIENCE

33

EDUCATION

MES, Ecosystem Ecology
Yale University School of the Environment

BA, Psychology
Williams College

Certificate of Completion in the New England Regional Soil Science Certificate Program
University of Massachusetts

AFFILIATIONS

Global Development and Environment Institute, Tufts University, Visiting Scholar (2018-present)

Society of Wetland Scientists -Chair WOTUS ad hoc Committee, Co-Lead Climate Change & Wetlands Initiative; 2016-2017 President, Past President, President Elect

MEET GILLIAN

Gillian provides expertise and innovative solutions encompassing peer-review for Conservation Commissions, ecosystem-based climate change resiliency and mitigation assessment and planning, state and federal permitting, wetland delineation, impact analysis, wetland restoration/mitigation planning, design and monitoring, expert witness testimony, and environmental construction/post-construction inspection.

A well-respected leader in the field of wetland sciences, Gillian holds many prestigious titles at industry organizations dedicated to promoting the understanding, conservation, protection, restoration, science-based management, and sustainability of wetlands. She currently serves as Chair of the SWS WOTUS ad hoc Committee and Co-Lead of the SWS Climate Change and Wetlands Initiative. She is also a Visiting Scholar at the Tufts University Global Development and Environment Institute. In the past she has held such titles as Society of Wetland Scientists (SWS) President, SWS Professional Certification Program President, SWS New England Chapter President, and Association of Massachusetts Wetlands Scientists President.

Gillian has worked extensively with Massachusetts Conservation Commissions as a peer-reviewer and previously as an education/outreach specialist for the MassDEP. She has provided numerous workshops and presentations to Conservation Commissions and other members of the wetland's professional community in Massachusetts and internationally.

AFFILIATIONS (CONT.)

Society of Wetland Scientists Professional Certification Program, 2021-2022 President; President Elect

Society of Wetland Scientists New England Chapter; 2014-2015 President, Vice President

INTECOL (International Association for Ecology) Wetlands Working Group, Member (2021-present)

Association of Massachusetts Wetlands Scientists; 2002-2003 President, Vice President

REGISTRATIONS

Registered Soil Scientist, Society of Soil Scientists of Southern New England

CERTIFICATIONS

Professional Wetland Scientist, Society of Wetland Scientists #2181 (2011)

Certified Wetland Scientist – NH #071 (1999)

Certified Erosion, Sediment, and Storm Water Inspector, Envirocert International, Inc.

Certified Municipal Vulnerabilities Preparedness Provider – MA

GOVERNMENT SERVICE

MA Executive Office of Energy and Environmental Affairs & Commission for Conservation of Soil, Water & Related Resources Healthy Soils Action Plan Work Group (2019–2020)

GOVERNMENT SERVICE (CONT.)

MA Department of Transportation Wetland Mitigation Banking Group (2018)

MA Executive Office of Energy and Environmental Affairs Natural Resources and Habitat Subcommittee to the Climate Change Adaptation Advisory Committee (2009)

MA DEP Wetlands & Waterways Circuit Rider (1999-2003)

OTHER VOLUNTEER

National Academy of Sciences, Engineering, and Medicine Transportation Research Board Panelist (2018–2022)

PROJECT EXPERIENCE HIGHLIGHTS

MassDEP No Net Loss of Carbon in Wetlands in Massachusetts Project: Statewide

Project Manager & Senior Ecologist

Led multidisciplinary team to develop strategies and methodologies for No Net Loss of Wetland Carbon in Massachusetts policies and regulations. Consulting team developed innovative wetland soil carbon mapping using machine learning and researching and developing concepts and preliminary design for an interactive carbon accounting tool for both Teal Carbon (inland freshwater) wetlands and Blue Carbon (coastal saltwater) wetlands.

SuAsCo Natural Climate Solutions Project: Hudson, Framingham, and Natick

Project Manager & Natural Climate Solutions Specialist

Coordinated consulting team and 3 urban/suburban communities with Environmental Justice communities to identify Nature-based Solutions (NbS) to climate change and biodiversity loss. Project identified opportunities for wetlands, floodplains, forests, and other ecosystems to support broader resilience planning efforts, and expanded communities' capacity to protect, restore and enhance carbon sequestration and other ecosystem services through community-driven assessment of NbS; and developed educational materials and opportunities.

Ayer-Devens Main Streets Pocket Forest Pilot Project, MA

Project Manager & Natural Climate Solutions Specialist

Coordinated consulting team and 2 communities with Environmental Justice communities to improve community health and resilience through: the design and planting of a pilot pocket forest; community-driven selection of, and permitting assessment for, four additional pocket forest sites; development of a project website and pocket forest educational materials; and a variety of community events including a community planting day at the pilot pocket forest.

MassDEP Coastal Floodplain Outreach

Senior Ecologist

Advised project team on coastal floodplain ecological features and functions, and effectiveness of visual and text communications to inform development of a public education outreach campaign focused on the climate resilience benefits provided to coastal communities by the coastal floodplain. The campaign included development of a coastal floodplain video, pamphlet, and StoryMap.

Apple Country Natural Climate Solutions Project: Bolton, Harvard, and Devens Regional Enterprise Zone

Project Manager & Senior Ecologist

Coordinated team of consultants and 3 communities to identify Nature-based Solutions (NbS) to climate change and biodiversity loss. Project identified opportunities for wetlands, floodplains, forests, and other ecosystems to support broader resilience planning efforts, and expanded communities' capacity to protect, restore and enhance carbon storage and sequestration and other ecosystem services by providing a model for community-driven assessment of NbS; providing recommendations to improve regulations; and developing and providing educational materials and opportunities.

Rockport Coastal Resilience Project, Rockport, MA

Project Manager & Natural Climate Solutions Specialist

Led interdisciplinary team to identify coastal Nature-based Solutions. Project identified opportunities for coastal NbS to support broader climate resilience planning efforts, and expanded communities' capacity to achieve greater resilience to sea level rise and coastal storms through community-driven assessment of NbS; and developed educational materials and opportunities, including a website, StoryMap, and infographics.

Massachusetts Department of Transportation, Route 2, Lincoln and Concord, MA

Senior Wetland & Soil Scientist; & Certified Erosion, Sediment & Storm Water Inspector

Provided environmental monitoring services for complex highway improvements project (construction of new interchange, road widening, safety improvements), including monitoring of two large wetland replication areas (totaling 77,963 s.f.), with relocated streambeds. During monitoring of wetland mitigation areas, responsible for implementing innovative approach (IRIS tubes) to assessing hydric status of soils. The project area encompassed approximately 60 acres, is 2,751 meters long, and included multiple work areas operating simultaneously. Environmental Monitoring included responsibility for monitoring project compliance with MA Wetlands Protection Act Variance and Stormwater Pollution Prevention Plan conditions, preparing numerous reports, developing solutions to emerging issues, and coordinating with state and federal regulatory agencies, as well as MassDOT and the project contractor.

Massachusetts Department of Transportation, Route 18, Weymouth, Abington, Southfield, MA

Senior Wetland & Soil Scientist; & Certified Erosion, Sediment & Storm Water Inspector

Provided environmental monitoring services for complex highway widening projects (road widening, bridge replacement, safety improvements), including monitoring construction of wetland replication area (totaling 42,210 s.f.) and wetland restoration areas. The project area was 4.1 miles long and included multiple work areas operating simultaneously. Environmental Monitoring included responsibility for monitoring project compliance with MA Wetlands Protection Act and Water Quality Certification Variance and Stormwater Pollution Prevention Plan conditions, preparing numerous reports, developing solutions to emerging issues, and coordinating with state and federal regulatory agencies, as well as MassDOT and the project contractor.

Nashua River Communities Resilient Lands Management Project

Natural Climate Solutions Specialist & Senior Ecologist

Collaborating with the Massachusetts Association of Conservation Commissions, Gillian led development of wetland climate change by-laws and regulations for Massachusetts municipalities and tailored those bylaws and regulations to the specific needs of the Towns of Bolton and Clinton. This project aimed to improve community climate resilience and ecosystem carbon mitigation by protecting and restoring ecosystem services through the development and adoption of better land management practices and articulated through the writing of forest management and lawns and landscaping management guides.

Nashua River Watershed Natural Climate Solutions Project, Ashburnham, Fitchburg, Groton, Leominster, Pepperell, MA

Senior Ecologist

Advised consulting team for 5 urban/suburban communities with Environmental Justice communities on project to identify Nature-based Solutions to climate change and biodiversity loss. Project identified opportunities for wetlands, floodplains, forests, and other ecosystems to support broader resilience planning efforts, and expanded communities' capacity to protect, restore and enhance carbon sequestration and other ecosystem services through community-driven assessment of NbS.

Route 44 Relocation Project Wetland Mitigation Monitoring, Carver/Kingston, MA

Senior Wetland & Soil Scientist

Responsible for monitoring inland wetland replication/restoration areas associated with construction of relocated Route 44, for assessing invasive species, as well as report preparation. A total of 16.58 acres of wetland replication was constructed for this project, with an additional 0.4 acres of wetland restoration.

Municipal Vulnerability Preparedness Planning Projects: Amesbury, Bolton, Georgetown, MA

Project Manager & Senior Ecologist

Responsible for projects in each municipality to work with municipal staff, stakeholders, and community members to identify existing climate vulnerabilities and community strengths, future opportunities for building community climate resilience, and prioritization of those opportunities. This work provided the communities with the basis for specific, action-oriented projects to improve infrastructure, social and environmental community climate resilience, and prioritization of actions. The Georgetown MVP Planning Project included integration of the Georgetown Hazard Mitigation Plan Update.

Massachusetts Association of Conservation Commissions Wetland Buffer Zone Guidebook Project, Belmont, MA

Project Manager & Lead Author

Responsible for project to research and write comprehensive guidebook on the science and regulation of wetland resource area buffer zones and Riverfront Areas under the Massachusetts Wetlands Protection Act and local bylaws and ordinances. Preparation of guidebook includes supervision of junior staff and coordination with Massachusetts Association of Conservation Commission Buffer Zone Guidebook review team, scientific literature search, and development of recommendations for science-based review of projects under existing state regulations and local bylaws/ordinances, as well as how to develop local bylaws and ordinances supported by current scientific findings. The guidebook provides a discussion of wetland, buffer zone and Riverfront Area regulation in the context of climate change, outlining how buffer zones contribute to protection of carbon in wetlands, support climate adaptation and climate resiliency ecosystem services that wetlands provide, and protect wetlands from the impacts of climate change.

BSC GROUP

Catarina
Martinez, MEM

Resilience Planner
Associate

YEARS OF EXPERIENCE

6

EDUCATION

Master of Environmental Management (MEM)
Duke University, 2021

A.B. Integrative Biology
Harvard College, 2016

AFFILIATIONS

- Urban Land Institute
- Harvard Alumni for Climate and the Environment
- Harvard Alumni for Agriculture and Food

MEET CAT

Catarina brings experience in the fields of city- and municipal- level resilience, public-private partnerships, regenerative agriculture and sustainable food systems, air pollution, and environmental justice, with a focus on the efficacy of policy tools, science communication (she speaks fluent Spanish), and community engagement. Catarina excels at balancing scientific accuracy with storytelling, engaging design, and broad accessibility.

PROJECT EXPERIENCE HIGHLIGHTS

Penobscot Climate Action Regional Climate Vulnerability Assessment, Bangor Area Comprehensive Transportation System, Penobscot County, ME

Resilience Planner

As part of the vulnerability assessment, Catarina was involved with the methodology, design, analysis, and development of a GIS asset mapping database and initial vulnerability asset screening report. The project involved a robust data collection and organization effort, coordination with 11 municipalities and other stakeholders such as the University of Maine, stakeholder interviews, and public meetings with community members. The assessment report addressed key environmental, infrastructure, and community assets in the region, including the local economy and health.

Municipal Vulnerability Preparedness (MVP) 2.0, Commonwealth of Massachusetts' Executive Office of Energy and Environmental Affairs (EEA)

Resilience Planner

Involved in multi-consultant project to reformulate the MVP planning process, which provides support for cities and towns in Massachusetts to identify climate hazards, assess vulnerabilities, and develop and implement actions plans to improve resilience to climate change. Catarina focused on stakeholder engagement and the creating of tools to support the refreshed approach, specifically the development of written, visual, and videographic content as well as a GIS dataset for a robust web tool that guides cities and towns through the task of identifying their vulnerabilities using mappable data and other resources, such as the Massachusetts Department of Public Health.

Climate Resilience and Equity Metrics Development Project, Massachusetts Bay Transit Authority (MBTA) Capital Delivery

Resilience Planner

Involved In multi-consultant project to develop preliminary metrics for all equity and resilience-related features for MBTA projects – from preliminary design (15% design completion) through construction. The process involved performing a baseline analysis, stakeholder interviews, workshops, development of metrics, and a Memo of Findings. Catarina focused primarily on the final presentation of the baseline analysis spreadsheet, which included 44 documents, 350 indicators, and identification of all measurable targets relating to different project phases (such as construction or maintenance/operations), to different equity themes (including race, ethnicity, language, and disability), and to different climate change targets (via both mitigation and adaptation).

Stow Acres Climate Resilience Master Plan, MA

Resilience Planner

Supported outreach and engagement efforts for the Climate Resilience Master Plan, including community events, development/dissemination of a community survey, and the development of presentation materials to inform community about essential Plan steps, such as the Natural Resources Inventory.

Rockport Coastal Resilience, Rockport, MA

Resilience Planner and Assistant Project Manager

Supported the Town in its execution of a (MVP Action Grant to analyze the Rockport coastline to identify (with community support) approx. 15 sites for analysis of future Nature-based Solutions projects.

PRIOR TO JOINING BSC GROUP, CATARINA WAS INVOLVED WITH THE FOLLOWING PROJECTS:

Climate Action Research, Harvard Business School, Boston, MA

Research Associate

Catarina was responsible for conducting interdisciplinary research on Climate Action and other resilience and equity projects (as well as other topics such as public-private partnerships during COVID-19 response and leadership) in cities across the United States and Europe, including Miami and Chicago. Catarina engaged businesses, non-profits, professors, and other stakeholders through meetings and interviews to provide information to synthesize with the research team. Catarina assisted with the generation of multiple Harvard Business School case studies and affiliated documents.

Carbon Experimentation, Indigo Agriculture, Boston, MA

Analyst

Catarina was responsible for gathering and synthesizing scientific research on regenerative agriculture – which required acquiring complex data from databased and scientific literature to inform the future of Indigo's Carbon program (which allows farmers to receive carbon credits for their carbon offsets, in turn increasing soil health and reducing greenhouse gas emissions). She presented information to various company representatives and outside partners via both written and visual methods.

BSC GROUP

Casey-Lee Bastien, RLA

Landscape Architect
Associate

YEARS OF EXPERIENCE

23

EDUCATION

BS, Landscape Architecture, University of Massachusetts, Amherst

REGISTRATIONS

Landscape Architect

- MA #1554 (2008)
- RI #LA.0000667 (2018)
- NH #00192 (2021)

CERTIFICATIONS

- SITES-AP (2017-2019)
- Certified Playground Inspector (CPSI) (2013-Present)
- OSHA Construction Safety and Health

MEET CASEY-LEE

Casey-Lee designs landscape solutions that speak to the purpose and personality of a site so that it resonates with the client and users. His passion to research and innovate defining features into his designs adds meaning and value to a wide variety of project types including parks, streetscapes, transportation, institutions, and natural habitats. He has experience in horticulture and lighting design and provides coordination and design of graphic and sculptural arts, digital modeling, fabrication, and installation.

Casey-Lee has a strong regard for social justice and works diligently to bring the right solution to every project regardless of the means available to a community.

PROJECT EXPERIENCE HIGHLIGHTS

Nature-based Solutions Program for Towns in the Nashua, Sudbury, Assabet, and Concord River Watersheds, Mystic River Watershed, and other communities including Rockport, Georgetown, Burlington, and Amesbury, MA

Landscape Architect/ Ecologist/ Planner

Developed a selection matrix for assessment of the value and feasibility of Nature-based Solutions (NbS) Green Infrastructure (GI) and policy to compare restoration or enhancement project sites within each community. He developed project primer memos describing modular nature-based solutions, their prerequisites and implementation for each NbS in the matrix. He developed a unit based estimating tool for scoping NbS projects to support conceptual budgeting for project comparison. Provided subject matter expert desktop analysis for the selection of NbS project sites and content. He led community site walks and field analysis teams of local stake holders and subject matter experts for NbS-GI project selection.

I-495 Wetland Restoration Along Concord River, Lowell, MA

Landscape Architect

Provided wetland replication support for environmental monitoring efforts along the Concord River. Supported the development of a green infrastructure solution, including modifications to the contributing upland watershed through baffles and level spreaders over enhanced cultural grassland; stabilizing green grout soils and plantings within the stone to slow and cool storm water; and utilization of root wad snags, live fascines, and live stakes in addition to standard wetland replication and erosion control. To prevent highway closures, developed a plan to use canoes for implementation, enabling the project to be completed at a fraction of the projected cost and within the same season.

Island End River Daylighting, Adaptive Management Plan Chelsea and Everett, MA (ACOE)

Landscape Architect/Project Manager

BSC was asked to take over management and monitoring of riverbank revegetation after completion of the structural daylighting project performed as part of site redevelopment. Previous plantings had failed, and it was determined that a new methodology was required. Caseylee developed an adaptive landscape management plan to be implemented and overseen by BSC Ecologists and City staff. This included green grout planting of tidal saltmarsh and coastal bank grasses, and top of bank nurse plantings to alter the microclimate. New plantings required a solar powered tidal river drawn irrigation system, desalination, and an invasive species management plan.

Island End River Living Shoreline, Chelsea and Everett, MA

Landscape Architect/Project Manager

Provided landscape architecture for the planning, community outreach, digital modeling, web design, planting design, detailing of grey/green nature-based living shoreline/ storm resiliency features, estimating, permitting support, and construction documents for a linear quarter mile of riverbank and a half mile of associated riverfront area. The project included new universal access trails, riparian corridor and riverbank restoration planting, habitat enhancements, structured saltmarsh plantings, educational interpretive signage, and related amenities to improve natural function and accessibility.

Constructed Wetland Restorations, MassDOT, Various Locations, MA

Landscape Architect

Coordinated with environmental scientists regarding invasive species control, canopy restoration, flow correction, species and habitat enhancement, design of constructed wetlands, and salt marshes for the inspection and analysis of constructed drainage ways and wetlands at various locations. Designed correction and restoration of these facilities to meet MassDOT, local conservation commission, and Army Corps of Engineers requirements. Recent projects include Route 110, Amesbury; Lagoon Pond Drawbridge, Martha's Vineyard; Sudbury River Bridge Route 9, Framingham; Route 44 interchange, Carver; and Regional Transportation Center, Woburn.

Chelsea Greenway, Chelsea, MA

Landscape Architect

Designed landscape architecture for the environmental restoration and interpretive wildlife habitat formation at a former landfill between the Mill Creek tidal river and the Chelsea Greenway. Bordered on the upland side by a mixed use commercial and high-density residential neighborhood, this restoration balances ecological and recreational needs. Developed management strategies for invasive species and contaminated soils as well as tidal influence and saltmarsh restoration. Produced estimates and feasibility analysis of invasive vegetation management methods, including saltwater inundation, controlled burning, and mechanical and chemical methods. This was followed by the development of engineered habitat archetypes to restore the site to one of prime wildlife value paired with interpretive features and passive recreation.

Cambridge Discovery Park, Cambridge, MA

Landscape Architect

Served as landscape architect for the redevelopment of Acorn Office Park which included creating a combined stormwater restoration pond/wetland system, passive recreation park, and associated streetscape with trail connections. Provided analysis, design, and construction documents; coordinated with architect and subconsultants, and provided coordination during construction. Special challenges included active utility systems integrated into the existing facilities, accommodation for pedestrian access across Route 16, viewshed preservation, and proximity of the Little River.

Blackstone Gateway Park, Worcester, MA

Landscape Architect

Part of the initial planning and design of this project for many years, responsible for the development of trails and elevated boardwalks with overlooks and bridges along and over the Blackstone River. Tasks associated with this project included development of gateway gardens, boardwalk and bridge details, ecological restoration planting plans, compensatory flood storage, geotechnical analysis, and interpretive signage.

BSC GROUP

Ethan
Sneesby, RSS

Wetland Scientist

Associate

YEARS OF EXPERIENCE

5

EDUCATION

MS, Crop and Soil Environmental Science
Virginia Tech University

BS, Environmental Science and Management
University of Rhode Island

CERTIFICATIONS

- 40-Hour OSHA

REGISTRATIONS

Registered Soil Scientist, Society of Soil Scientists of Southern New England (SSSSNE)

MEET ETHAN

Ethan is experienced with various methods of soil and wastewater sampling and analysis as well as GPS and GIS related to utility projects and open water bathymetric and soil mapping. Ethan has his master's degree in crop and soil environmental science from Virginia Tech. As a graduate assistant, he worked on the evaluation of wetland water budget modeling software as well as on the construction of a library of target hydroperiods for common wetland types in Virginia, Maryland, and North Carolina. Ethan has extensively studied wetlands, soil morphology, soil conservation and their impact on environmental quality.

Ethan's advanced skillsets are put to use supporting BSC's peer review efforts, working on National Grid and Eversource projects, and assisting the firm's environmental engineering group. Ethan has a strong background in soils and wetland hydrology which serve as a boon when performing review of disturbed or complicated wetland systems where vegetation cannot be relied upon to protect our resources adequately.

PROJECT EXPERIENCE HIGHLIGHTS

Melink Solar Development, 179 Greenwich Road, Ware Conservation Commission, Ware, MA

Wetland Scientist & Soil Scientist

Responsible for wetland delineation peer review including Riverfront Area and review of two Notices of Intent on two parcels (37 acres and 38 acres). Ethan reviewed the project for compliance with Ware Conservation Commission Wetland Protection Bylaw (Chapter 30-3) and the Massachusetts Wetlands Protection Act (WPA) (M.G.L. c. 131, s. 40) and associated regulations (310 CMR 10.00 et al.). Additionally, BSC provided findings and comments relative to the project's compliance with MassDEP Wetlands Program Policy 17-1: Photovoltaic System Solar Array Review 225 CMR 20.00: Solar Massachusetts Renewable Target (Smart) Program.

Spencer Conservation Commission, 10 Meadow Road, Notice of Intent, Spencer, MA
Wetland Scientist

Responsible for the wetland delineation peer review including BVW and associated Buffer Zone, and 200-foot Riverfront Area. Reviewed the project for compliance with the Wetlands Protection Act (WPA) (M.G.L. c. 131, s. 40) and associated regulations (310 CMR 10.00 et al.).

Amesbury Conservation Commission, Notice of Intent for 9, 14, and 15 Estes Street and Estes Street Improvements. Amesbury, MA
Wetland Scientist

Responsible for Wetland Delineation peer review regarding the Notice of Intent (NOI) for a site identified as Overlook at Estes, Amesbury, MA comprising 9 Estes Street, Map 63, Parcel 22, 14 Estes Street, Map 63, Parcel 21, 15 Estes Street #R, Map 63, Parcel 19, and Estes Street Improvements. Reviewed the project for compliance with the Amesbury wetland regulations, and Wetlands Protection Act (WPA) (M.G.L. c. 131, s. 40) and associated regulations (310 CMR 10.00 et al.).

Robbins Road over Robbins Brook Bridge Replacement, Winchendon, MA
Wetland Scientist

Performed wetland delineation services in support of the Town of Winchendon's replacement of the Robbins Road over Robbins Brook Bridge. Prior to BSC's design of the bridge's replacement, Ethan demarcated the boundaries of jurisdictional wetland resources (e.g., inland bank and bordering vegetated wetland), which contributed to the preparation of a Bordering Vegetated Wetland Field Data Form for inclusion with the Notice of Intent Application (NOI).

Bellingham Conservation Commission, Peer Review of Abbreviated Notice of Resource Area Delineation 180 Paine Street, Bellingham, MA,
Wetland Scientist

Responsible for the wetland delineation peer review including BVW and associated Buffer Zone, Isolated Vegetated Wetland (IVW), Bank to a Pond, Inland Bank to Streams (intermittent and perennial) and associated Buffer Zone, Bordering Land Subject to Flooding (FEMA Flood Zone AE), and 200-foot Riverfront Area. Reviewed the project for compliance with the Bellingham wetlands protection by-law, and Wetlands Protection Act (WPA) (M.G.L. c. 131, s. 40) and associated regulations (310 CMR 10.00 et al.).

Amesbury Conservation Commission, Peer Review of Abbreviated Notice of intent, 91 Macy Street, Amesbury, MA
Wetland Scientist

Responsible for the wetland delineation peer review Including Riverfront area. Reviewed the project for compliance with the Amesbury wetland regulations, and Wetlands Protection Act (WPA) (M.G.L. c. 131, s. 40) and associated regulations (310 CMR 10.00 et al.).

National Grid, Wetland Delineation and GIS Mapping Services for E5F6 Transmission Line Insulator Replacement Project, Shelburne to Millbury, MA
Wetland Scientist

Responsible for providing National Grid with wetland delineation and GIS mapping support services for the proposed Transmission Line Insulator Replacement Project (IRP). Ethan performed wetland delineation mapping services, including data collection of dominant plant species, characterization of soils, and general hydrological field indicators within the project right of way. Data collection also included all major features (e.g., wetlands, beaver dams, crushed culverts, culvert crossings, stone walls, pipelines, and fences), which were geotagged with photographs using Trimble units/ESRI's collector. Collected features were stored in an online geodatabase, allowing the photographs and data to be intuitively viewed within an ESRI web application.

Eversource Energy, F132 Line Structure Replacement Project, Pittsfield and Lanesborough, MA
Wetland Scientist

Responsible for providing environmental consulting services for a Line Structure Replacement project from Pittsfield to Lanesborough, MA. for BSC's contract with Eversource Energy. Ethan performed field identifications of wetlands within the limits of the project right of way and prepared federal wetland field data forms to document the delineation of federal wetlands at locations where wetland impacts were likely to occur. This data collection also included obtaining stream and access road widths for construction planning purposes.

BSC GROUP

Emily
Alderton, PhD, PWS

Environmental/Ecological Scientist

YEARS OF EXPERIENCE
11

EDUCATION
PhD, Freshwater Ecology
University College London

MSc, Aquatic Science
University College London

BSc, Zoology
University College London

MEET EMILY
Dr. Alderton is an ecological scientist, specializing in freshwater ecology and habitat restoration. Her academic work has included studies of wetland plant and invertebrate diversity, monitoring of otter diet and behavior, and the restoration of wetlands using historic seedbanks. In addition to her academic work, Emily has served as a steering group member for the Norfolk Ponds Project, a UK charity focused on restoring wetlands and biodiversity within agricultural landscapes. Within this role she contributed to reports and management plans for restoring wetlands and led practical training sessions for landowners and conservation practitioners. She continues to be heavily involved in conservation volunteering.

Emily worked part-time for six years for ENSIS Ltd., a London-based environmental consultancy, where she contributed to aquatic plant and water quality surveys for the EU Water Framework Directive. She has extensive experience working with a number of rare and protected species in the UK, including Eurasian otter, great crested newt, and white-clawed crayfish.

While living in the US, she held voluntary roles with the New England Wildflower Society (conducting rare plant surveys), and on the Ecological Advisory Committee for the City of South Bend, Indiana. Professionally, she has contributed to rare species habitat assessments, municipal open space & climate preparedness programs, and a wide range of federal, state, and local environmental permits and reports with BSC.

PROJECT EXPERIENCE HIGHLIGHTS

No Net Loss of Carbon in Massachusetts Wetlands, MassDEP, MA
Researcher and Writer

BSC is assisting MassDEP in the development and expansion of Wetland Protection Act regulations and guidelines, to better protect the key role of wetlands in carbon sequestration and storage. Emily has been involved in the research and report preparation for this Project, focusing on the science and policy behind protecting the carbon value of wetlands.

No Net Loss of Carbon in Massachusetts Wetlands, MassDEP, MA
Researcher and Writer

BSC is working with MassDEP on a public outreach Project on the importance of protecting and restoring Coastal Floodplains. Emily has been working on a StoryMap website and accompanying brochures and posters, which illustrate the vital role coastal floodplains play in protecting both the built and natural environment.

Nashua River Municipal Vulnerability Preparedness, Bolton, MA

Researcher and Writer

BSC is leading development of wetland climate change by-laws and regulations for municipalities in Massachusetts and tailoring those bylaws and regulations to the specific needs of the Towns of Bolton and Clinton. Emily was heavily involved in researching how climate change has been incorporated into existing bylaws and regulations across MA, where gaps and areas for improvement still lie, and drafting initial suggestions for towns to consider incorporating into their bylaws.

Invasive Species Management Plan, US Fish & Wildlife, Hockomock Swamp, MA

Field Surveyor

Responsible for locating and mapping populations of the invasive common reed *Phragmites australis* and contributing to a management plan for the control and removal of this species. Specific duties included locating and mapping invasive species populations, researching the most up-to-date management practices for Phragmites, and completing a detailed report and management plan for controlling existing populations within the project site.

Merrimack River Boat Launch Project (Andover), Edgewater Trail (Boston), and Goddard Park Improvement Project (Auburn), MA

Researcher and writer

Prepared various state and local permits for public recreation and open space Projects, including the construction of the Edgewater Trail in Boston (a proposed greenway along the Neponset River), Merrimack River public boat launch and dock, and footbridge and park improvement project.

NHESP Rare Species Habitat Assessment, National Grid, Multiple Cities, MA, RI, and CT

Field Surveyor

Responsible for conducting habitat assessments for a range of NHESP priority-listed species, including Blanding's and Eastern box turtle, blue-spotted and marbled salamander, and the ringed boghaunter dragonfly. Specific duties included research into habitat requirements and preferences of NHESP target species, surveying areas of NHESP Priority/Estimated Habitat, identifying dominant vegetation and Massachusetts Community Types within NHESP Priority/Estimated habitat areas, identifying potentially important habitat for target species within these areas, and contributing to a detailed report of existing habitat conditions, and recommendations for reducing disturbance within potential rare species habitat.

Conservation Management Plans and Rare Species Protection

Researcher and Writer

Emily has prepared a number of Conservation Management Plans (CMPs) for minimizing and mitigating harm to rare species, for Projects where work is occurring within rare species habitats. These have included plans for turtles, salamanders, and invertebrates.

Becker Pond Dam Removal Project

Researcher and writer

Emily has been involved in the research, writing, and permitting phases of the Becker Pond Dam removal Project in Mount Washington, MA. This is a stream restoration Project being conducted by The Nature Conservancy (TNC), for which BSC provided permitting services.

Wetland Delineations, Eversource and National Grid, Multiple Cities, MA, RI, and CT

Wetland Delineator

Multiple National Grid/Eversource right of ways within Massachusetts, Rhode Island and Connecticut. Specific duties included assisting with wetland plant identification, wetland flagging, soil sampling and characterization, and taking GPS locations of wetland flags.

The Ghost Ponds Project, University College London/Norfolk Ponds Project, Norfolk (UK)

Project Leader

The Ghost Ponds Project, a collaborative project between University College London and The Norfolk Ponds Project. The project focused on the potential for 'resurrecting' buried 'ghost ponds' (ponds which had previously been in-filled during agricultural land consolidation) and using the buried seed and egg banks within these sites to restore aquatic biodiversity within farmland landscapes. The project involved detailed mapping and spatial analysis (GIS) of historic and modern pond locations, ecological surveys of existing and restored ponds, the publication of scientific papers and management guidelines for the re-excavation of ghost ponds and running public open days and training sessions for landowners and conservation practitioners, on how to excavate ghost ponds and restore existing overgrown ponds. This work formed the basis of Emily's PhD.

SCOUTER DESIGN

Terri Courtemarche

PRINCIPAL/GRAPHIC DESIGNER

978.235.0339 / terric@scoutergraphicdesign.com

PORTFOLIO: www.scoutergraphicdesign.com

EDUCATION

BFA, University of North Florida / 1992

IDEO: Design for Change 2019 / Unlocking Creativity 2019 / From Superpowers to Great Teams 2018

EXPERIENCE

Scouter Design / Chelmsford, MA / Jan. 2020-present

Explore. Create. Connect.
Smart design that connects your story to your audience.

- Collaborate with clients to develop new brands or expand on existing ones
- Logo and visual identity development
- Design branded collateral and templates, training
- Report and infographic design
- Design 508 compliant accessible documents

VHB / Watertown, MA / Nov. 1993- Dec. 2019
Graphic Design Manager

- Art direct, mentor, train, and inspire an in-house team of designers
- Designed deliverables including project branding, branded collateral for public outreach efforts, report design, infographics, presentations, email marketing, and signage/interpretive panels
- Developed templates and provided training to colleagues
- Created 508c accessible documents
- Used brainstorming and conceptualizing exercises to push the boundaries of design

AIGA Mentorship Program / 2018

PRO BONO

Reach out and Read, MN / Infographic design
San Jose Library, CA / Infographic design
Tennessee Commission on Children & Youth, TN / Logo design
Nashoba Neighbors, MA / Logo design & Annual Report
St. Theresa School, MA / Logo design

certified WBENC WOMEN'S BUSINESS ENTERPRISE

INHABIT FILMS LLC

113 Stone Dock Road
High Falls, NY 12440

COSTA BOUTSIKARIS

Director/Owner

Costa is an award-winning filmmaker whose work has focused on educating the public about sustainable land use management practices for the past 10 years. He has shot and edited two feature documentaries: Inhabit: A Permaculture Perspective, which documented regenerative agriculture practices across the Northeast, and Inhabitants: An Indigenous Perspective, which focused on Native American land stewardship practices. He has created educational and promotional materials for leading land restoration and research entities such as Cari Institute of Ecosystem Studies and the DEP Rondout Neversink Stream Program. Costa has collaborated with a wide range of partners including Cornell, University of Vermont and PBS. Costa also works as a part time farmer in High Falls, NY where he manages a orchard

SELECTED PUBLICATIONS

PBS – CINEMATOGRAPHER

"THE RESILIENT ONES: A GENERATION TAKES ON CLIMATE CHANGE" – 2015 - VIDEO LINK

CORNELL – VIDEOGRAPHER/EDITOR

SMALL FARMS PROGRAM VIDEO SERIES - 2016 - VIDEO LINK

CARI INSTITUTE OF ECOSYSTEM STUDIES - VIDEOGRAPHER/EDITOR

WESTERN WILDLIFE COLLABORATIVE FILM SERIES - 2022 - VIDEO LINK

REGENERATIVE DESIGN GROUP

SILVOPASTURE EDUCATION SERIES - 2023 VIDEO LINK

RONDOUT NEVERSINK STREAM PROGRAM DEP

STREAM RESTORATION FILM SERIES - 2023 - VIDEO LINK

INHABIT FILMS LLC

113 Stone Dock Road
High Falls, NY 12440

INHABIT FILMS - DIRECTOR/VIDEOGRAPHER - FEATURE DOCUMENTARY

"INHABIT: A PERMACULTURE PERSPECTIVE" RELEASED IN 2015 AWARDS:

"AUDIENCE CHOICE AWARD" YALE ENVIRONMENTAL FILM FESTIVAL-2015

BEST IN THEME" WILD AND SCENIC FILM FESTIVAL 2015

"AUDIENCE CHOICE AWARD" PRINCETON ENVIRONMENTAL FILM FESTIVAL–2015

INHABIT FILMS - DIRECTOR/VIDEOGRAPHER - FEATURE DOCUMENTARY

"INHABITANTS: AN INDIGENOUS PERSPECTIVE" RELEASED IN 2021 AWARDS:

"AUDIENCE CHOICE AWARD" DC ENVIRONMENTAL FILM FESTIVAL 2021

"BEST INTERNATIONAL FEATURE" PLANET IN FOCUS FESTIVAL 2021

PEOPLE'S CHOICE AWARD "WILD & SCENIC FILM FESTIVAL 2022"

GRANTS AWARDED

"POST-PRODUCTION GRANT FOR INHABIT: A PERMACULTURE PERSPECTIVE" THE NAMASTE FOUNDATION, $25,000, PROJECT DIRECTOR, 2015

"PRODUCTION GRANT FOR INHABITANTS: AN INDIGENOUS PERSPECTIVE" THE NAMASTE FOUNDATION, $50,000, PROJECT DIRECTOR, 2018

"POST-PRODUCTION GRANT FOR INHABITANTS: AN INDIGENOUS PERSPECTIVE" THE KALLIOPEIA FOUNDATION, $90,000, PROJECT DIRECTOR, 2019

"PRODUCTION GRANT OF SILVOPASTURE EDUCATION SERIES" THE NATIONAL AGROFORESTRY CENTER, $20,000, FILM DIRECTOR, 2022

JENNIFER D. WATTS

CURRICULUM VITAE

October 2024

Woodwell Climate Research Center

149 Woods Hole Road, Falmouth, MA 02540-1644 USA

C: (406) 581-8449 | E-mail: jwatts@woodwellclimate.org

Woodwellclimate.org/staff/Jennifer-watts

Researchgate.net/profile/Jennifer-Watts-7

EDUCATION

2017 Ph.D., Systems Ecology (*Remote Sensing and Ecosystem Modeling*);
College of Forestry and Conservation, University of Montana, Missoula.
Dissertation: Potential contrasts in CO_2 and CH_4 flux response under changing climate conditions: a satellite remote sensing driven analysis of net ecosystem carbon budget for arctic and boreal.

2008 M.S., Land Resources Management (*Land Rehabilitation*);
Department of Land Resources & Environmental Sciences, Montana State University, Bozeman.
Thesis: Monitoring of cropland practices for carbon sequestration purposes.

2006 B.S., Land Resources Management (*Soils and Geospatial Technology*);
Department of Land Resources & Environmental Sciences, Montana State University,

PROFESSIONAL EXPERIENCE

July 2024-	Associate Scientist & Program Director, Woodwell Climate, Falmouth, MA.
July 2019 -	Assistant Scientist, Woodwell Climate Research Center, Falmouth, MA.
Sep 2017-	Affiliate Professor of Remote Sensing, Montana State University, Bozeman, MT.
2017-2019	Postdoctoral Researcher, Woodwell Climate Research Center, Falmouth, MA.
2016-2017	Postdoctoral Researcher, NTSG, University of Montana, Missoula, MT.
2010-2016	Research Assistant, NTSG, University of Montana, Missoula, MT.
2009-2010	Research Assistant, Spatial Science Center, Bozeman, MT.
2008-2009	USGS Northern Rocky Mountain Science Center, Bozeman, MT.

PEER-REVIEWED JOURNAL ARTICLES (SELECTED)

1) Xia, Y, J Sanderman, JD Watts, et al. (2024) Coupling remote sensing with a process model for the simulation of rangeland carbon dynamics. *J. Advances Modeling Earth Systems*. In Press.
2) Virkkala, A, B Rogers, **JD Watts**, KA Arndt, S Potter, et al. (2024) An increasing arctic-boreal CO_2 sink offset by wildfires and source regions. *Nature Climate Change*. In Press.
3) Xia, Y, J Sanderman, **JD Watts**, MB Machmuller, S Ewing, C Rivard (2024) Leveraging legacy data with targeted field sampling for low-cost mapping of soil organic carbon stocks on extensive rangeland properties. *Geoderma*, 448. https://doi.org/10.1016/j-geoderma.2025.116952.
4) **Watts, JD**, M Farina, JS Kimball, L Schiferl, Z Liu, K Arndt, D Zona, et al. (2023) Carbon uptake in Eurasian boreal forests dominates the high-latitude net ecosystem carbon budget. *Global Change Biol.*, https://doi.org/10.1111/gcb.16553

5) Mullen, AL, **JD Watts,** BM Rogers, ML Carroll, CD Elder, J Noomah, Z Williams, JA Caraballo-Vega, et al. (2023) Using high-resolution satellite imagery and deep learning to track dynamic seasonality in small water bodies. *Geophysical Res. Lett*., https://doi.org/10.1029/2022GL102327.

6) Du, J, J Kimball, R Bindlish, JP Walker, **JD Watts** (2022) Local scale (3-m) soil moisture mapping using SMAP and Planet SuperDove. *Remote Sensing*, 14, 3812. https://doi.org/10.3390/rs14153812.

7) Miller SM, MA Taylor, **JD Watts** (2018) Understanding high-latitude methane in a warming climate. *Earth & Space Science News*, https://doi.org/10.1029/2018EO091947

8) ***Watts JD***, JS Kimball, A Bartsch, KC McDonald (2014) Surface water inundation in the boreal-Arctic: impacts on regional methane emissions. *Environmental Res. Lett*, 9, https://doi.org/10.1088/1748-9326/9/7/075001

PROFESSIONAL REPORTS (SELECTED)

1) Pan-Arctic Methane: Current monitoring, capabilities, approaches for improvement, and implications for global mitigation targets. https://www.wilsoncenter.org/publication/pan-arctic-methane-current-monitoring-capabilities-approaches-improvement-and
2) Carbon Monitoring Plan for Northern Great Plains Grazing Lands. Woodwell Climate. Prepared for the National Fish and Wildlife Foundation. In Press.
3) MA – No Net Loss of Carbon in Wetlands scoping study. BSC Group. Prepared for MA DEP and EEA.

PROFESSIONAL ACTIVITIES AND SERVICE (SELECTED)

Workshop/Meeting Organizing Committees (Recent, External):

2024-present: NASA Earth Science Advisory Committee member
2024-present: Meridian Group NRCS Carbon working group Chair
2023-present: National Fish & Wildlife Foundation carbon MMRV co-lead
2019-present: Woodwell Rangeland Carbon science co-lead
2022-present: Woodwell Wetland CH_4 emission mapping lead
2023: WMO International GHG Symposium, Observations & Models Session Chair
2023: 103rd AMS High-latitude Water and Carbon Cycles in a Warming World Session Co-chair
2022: Woodwell/Turner/Montana State Rangeland Carbon Workshop, Co-Lead Organizer
2020: Woodwell High Latitude CO_2 and CH_4 Flux Workshop Co-organizer
2019: NASA ABoVE Data and Model Synthesis Group Co-chair

Journal Reviewer

Science; *Nature*; *Global Change Biology*; *Geophysical Research Letters*; *Remote Sensing of Environment*; *Remote Sensing*; *Biogeosciences*; *Wetlands Ecology & Management*; *Environmental Research Letters*

Taniya RoyChowdhury, Ph.D.

RESEARCH SCIENTIST
Woodwell Climate Research Center
149 Woods Hole Road
Falmouth, MA 02540, USA

Email: troychowdhury@woodwellclimate.org
Phone: (614)-619-2131
Google Scholar Citation
ORCID id: 0000-0002-4028-7996

A. Education and Training

Pacific Northwest National Laboratory	Microbiology	Post-doc	2017
Oak Ridge National Laboratory	Biogeochemistry	Post-doc	2015
The Ohio State University, USA	Soil Science	Ph.D.	2012
University of Calcutta, India	Agricultural Chemistry & Soil Science	M.S.	2005
University of Calcutta, India	Chemistry (Honors)	B.S.	2003

B. Professional Experience

2022-Present	Research Scientist II, Woodwell Climate Research Center, Falmouth, MA
2020-2022	Research Soil Scientist, USDA-ARS, Davis, California
2018-2020	Principal Faculty Specialist, Environmental Science & Technology Department, University of Maryland, College Park
2008-2011	Graduate Teaching Associate, Soil Science, The Ohio State University
2007-2008	University Fellow, Soil Science, The Ohio State University
2005-2006	Post-Masters Research Fellow, Microbiology, University of Calcutta, Kolkata, India

C. Research Emphasis: Soil Microbial Ecology, Biogeochemistry, Carbon Cycle, Global Change

D. Selected Projects

1. **Shallow or Deep: Can cover crops make soil carbon stick**? The emerging complexities of soil microbial carbon cycling, stabilization and destabilization mechanisms must inform cover crop management to more accurately predict climate benefits of cover cropping, yet are almost completely ignored in the current discussion on climate smart agriculture. Here we interrogate the impacts of mixed-species cover crops on microbially-mediated carbon dynamics along soil depth increments up to 60 cm that is expected to represent a gradient of cover crop root density.
2. ***represent a gradient of cover crop root density*** **Pathways of carbon metabolism under cover crops.** Soil carbon sequestration has a high potential to mitigate climate change, but our predictive understanding of soil organic carbon stabilization mechanisms remains uncertain due to over simplistic accounting of microbial properties in biogeochemical models used to evaluate outcomes of agronomic management. Using a cutting-edge highly-resolved data science approach to quantification of the chemically diverse carbon substrates available for microbial uptake, this project will determine the impacts of carbon chemical diversity on soil carbon and nutrient cycling.
3. **Impact of cover crops on full soil profile carbon.** This project seeks to understand the impact of cover crops on soil carbon properties down to one meter depth by sampling at a number of replicated cover crop trials on commercial farms.
4. **Leading indicators of soil carbon change.** Change in soil carbon often takes many years to a decade to detect. This project seeks to understand if other measurements of forms of organic matter and microbial functions can be good predictors for longer term soil carbon change.

E. Professional Service

1. Guest Editor: Frontiers in Microbiology, 2022; Frontiers in Agronomy & JoVE, 2023
2. *Ad hoc* reviews for scientific journals: Applied & Environmental Microbiology, Ecological Engineering, Environmental Microbiology, Environmental Science & Technology, Journal of Geophysical Research-Biogeosciences, PLoS One, mBio, Microbial Ecology, mSystems, Soil Biology & Biochemistry, Soil Systems, Microorganisms, Global Change Biology, mSphere, Microorganisms
3. *Ad hoc* proposal review panelist for the Department of Energy, National Science Foundation, USDA-NIFA

F. Synergistic Activities

1. Advisory Board Member of Applied Microbiology International
2. Professional Memberships: International Society of Microbial Ecology; American Society of Microbiology, American Geophysical Union; Soil Science Society of America (Tri-Societies).
3. Conference Session Convener and Chair: American Geophysical Union Fall Meetings (2023, 2016); Soil Science Society of America: Division of Soil Biology & Biogeochemistry (2016)

G. Honors and Awards

2023	Recipient of Christiana Figueres Prize at Applied Microbiology International. The prize is awarded to a scientist who uses microbiology to help further our understanding of climate change or directly in solutions thereof.
2023	Travel Award Agricultural Microbiomes Thinkathon: A community-based Interactive Workshop organized by the American Phytopathological Society
2014	American Society of Microbiology Science Teaching Fellowship
2011	Edward J. Ray Travel Award for Scholarship and Service, Council of Graduate Students, The Ohio State University
2011	Young Scientist Travel Award, International conference on “Enzymes in the Environment”, Bad Nauheim, Germany
2010	Rhonda and Paul Sipp Wetland Research Award, The Ohio State University
2007	University Fellowship, The Ohio State University
2005	First in First Class, Gold Medalist, University of Calcutta, India

H. Relevant Publications (2019 - 2024)

1. **RoyChowdhury, T.,** Rubin, R., ***Jacques, M., Mullen, A., Martin, A., Caroll, M., Oldfield, E., Sanderman, J. Cover crops and full-profile soil carbon stocks: Observations from commercial trials. *Environmental Research Letters*. In prep.
2. Hamovit, N., **RoyChowdhury, T.**, Akob, D.M., Zhang, X., McCarty, G., Yarwood, S.A. Comparative assessment of a restored and natural wetland using ^{13}C-DNA SIP reveals a higher potential for methane production in the restored wetland. *Applied Environmental Microbiology*.
3. Li, Y., Xue, Y., **RoyChowdhury, T.**, Graham, D.E., Tringe, S.E., Jansson, J.K., Tas, Neslihan. Genomic insights into redox-driven microbial processes for carbon decomposition in thawing Arctic soils and permafrost (2024). *mSphere*, e00259-24.
4. Oldfield, E.E., Lavallee, J.M., and others. Greenhouse gas mitigation on croplands: clarifying the debate on knowns, unknowns and risks to move forward with effective management interventions (2024). *Carbon Management*, 15(1), 2365896.
5. **RoyChowdhury, T.,** Bramer, L., Brown, J., Kim, Y.-M., Metz, T. O., Hoyt, D., McCue, L.A., Diefenderfer, H.L., Bailey, V.L. Soil metabolomics predict microbial taxa as biomarkers of moisture status in soils from a tidal wetland (2022).

Microorganisms, Special Issue: Advances in Soil Microbiome, 10 (8), 1653. https://doi.org/10.3390/microorganisms10081653

6. Shaffer-Nothias-Thompson et al. and the Earth Microbiome Project (500) Consortium. Standardized multi-omics of Earth's microbiomes reveals microbial and metabolite diversity. *Nature Microbiology, 7, 2128-2150*.
7. Patel, K.F., Fansler, S., Campbell, T., Bond-Lamberty, B., Smith, P.A., **RoyChowdhury, T.**, McCue, L.A., Bailey, V.L. Soil texture and environmental conditions influence the biogeochemical responses of soils to drought and flooding (2021). *Communications Earth & Environment*, **2 (1),** 127.https://doi.org/10.1038/s43247-021-00198-4
8. Metz, T., Xu, C., Couvillion, S., Sontag, R., Isern, N., Maezato, Y., Lindemann, S., **RoyChowdhury, T.,** Zhao, R., Morton, B., Moore, R., Jansson, J., Bailey, V., Mouser, P.J., Romine,M., Frederickson, J. (2021). MetFish: A metabolomics pipeline for studying microbial communities in chemically extreme environments. *mSystems.*
9. **RoyChowdhury, T.,** Berns, E.C., Moon, Ji-Won, Gu, B., Liang, L., Wullschleger, S.D, Graham, D.E. Temporal, Spatial and Temperature controls on methanogenesis and organic carbon mineralization in Arctic soils from high-centered polygons (2020). *Frontiers in Microbiology. Special issue on the Microbial Communities of Polar and Alpine Soils*, 11. https://doi.org/10.3389/fmicb.2020.616518
10. McClure, R., Lee, J.-Y., **RoyChowdhury, T.**, Bottos, E.M., White III, R.A., Kim, Y.-M, Nicora, C.D., Metz, T.O., Hofmockel, K.S., Jansson, J.K., Song, H.-S. Integrated network modeling approach defines key metabolic responses of soil microbiomes to perturbations (2020). *Scientific Reports*, 10(1), 10882 https://doi.org/10.1038/s41598-020-67878-7
11. **RoyChowdhury, T.**, Lee, J.-Y., Bottos, E.M., White III, R.A., Bramer, L., Brown, J., Zucker, J., Kim, Young-Mo, Brislawm, C.J., Fansler, S.J., Metz, T.O., McCue, L.A., Callister, S.J., Song, H.-S., Jansson, J.K. Metaphenomic responses of a native prairie soil microbiome to moisture perturbations (2019). *mSystems*, 4(4) https://doi.org/10.1128/msystems.00061-19
12. Vera-Gargallo, B., **RoyChowdhury, T.**, Brown, J., Fansler, S.J., Duran-Viseras, A., Sanchez-Porro, Bailey, V.L., Ventosa, A., Jansson, J.K., Ventosa, A. Spatial distribution of prokaryotic communities in hypersaline soils (2019). *Scientific Reports*, 9:1769. https://doi.org/10.1038/s41598-018-38339-z

Regenerative DesignGroup

Keith Zaltzberg-Drezdahl

Managing Director, Head of Planning, Worker-Owner

Keith is a founding partner of Regenerative Design Group where he leads planning initiatives focused on ecological resilience and community well-being. With a background rooted in resilience planning, urban agriculture, and permaculture design, Keith combines rigorous analysis with a strong social justice mission to shape landscapes rooted in place and community. His approach to planning is grounded in understanding the ecological and social potential of place, rigorous analysis, and systematic assessment. His work includes leadership roles in projects such as the Massachusetts Healthy Soils Action Plan, where he played a pivotal role in understanding the impact of land use on soil health and carbon sequestration. His strategic insights have also guided regional climate resilience initiatives, contributing to the development of nature-based solutions that enhance environmental quality and community resilience. He shares his expertise as a lecturer and instructor at The Conway School and Smith College, focusing on sustainable design principles and environmental stewardship, and holds a BS in Environmental Design from UMass-Amherst.

FOCUS AREAS

- Landscape Carbon Accounting & Planning
- Resilience Planning & Adaptive Design
- Soil Resource Planning
- Regenerative Agriculture & Urban Farm Design
- Project Management

TECHNICAL SKILLS

- GIS Mapping and Analysis
- AutoCAD
- Adobe Creative Suite

LECTURES + WORKSHOPS

- Soil Organic Carbon Estimation, Soil Science Society of America.
- Developing Healthy and Resilient Communities: A Case Study, Architecture Boston Expo
- Regenerative Design for Change Makers, Omega Institute

SELECTED PROJECTS

MA No Net Loss of Carbon in Wetlands | MassDEP

Development of a wetland mapping approach based on machine learning that identifies previously ambiguous wetlands. This project aims to identify innovative strategies, approaches, concepts, and regulatory recommendations to achieve No Net Loss of Carbon in Wetlands in Massachusetts. Project team includes BSC Group, the Massachusetts Association of Conservation Commissions (MACC), and the Woodwell Climate Research Center.

Nashua River Watershed-Wide Nature Based Solutions | Fitchburg, Leminster, Ashburnham, Pepperell, and Groton, MA

MVP Project. Produce a multi-layered analysis of soil health challenges and opportunities for the 454 square mile Massachusetts portion of the Nashua River Watershed. Part of a larger MVP project to determine priority sites for nature-based solutions in the five project communities.

Hudson-SuAsCo Nature Based Solutions Project| Hudson, Framingham, and Natick, MA

MVP Project. Use a robust process of remote data analysis and community engagement to identify high impact sites for nature-based olutions that will support the towns' climate resilience. Focus on soil-carbon and landcover mapping and analysis to guide priority sites.

Nashua River Resilient Lands Management | Clinton and Bolton, MA

MVP Project. Development of management and stewardship guides and identification of leverage points for town bylaws changes to increase the resilience and functioning of important landscapes and ecosystems in Clinton and Bolton.

Soil Health Assessment | Deerfield, MA

MVP Project. Analysis of exisiting soil function by land cover and assessment of vulnerabilities and opportunities for soil health. Scope included healthy soils workshops and outreach events. *2022 Sustainability + Resiliency Award from the American Planning Association - Massachusetts Chapter*

Soil Health Productivity Assessment & Planning | Trustees of Reservations

Collaborated with American Farmland Trust to assess field-specific soil health and whole-site ecological health of seven Trustees farm properties. Designed and facilitated three workshops for Trustees staff and land managers. Final report included recommendations for soil health management, agroecological interventions and a discussion of trade-offs.

Climate Resiliency and Carbon Planning | Apple Country, MA

MVP Project. Collaborated with BSC Group and Linnean Solutions to assess and analyze ecological resources, and provide recommendations for nature-based solutions in the Towns of Bolton and Harvard and the Devens Regional Enterprise Zone. Extensive mapping, community outreach, site walks, and soil health assessments.

Soil Resource Assessment & Planning | Massachusetts Healthy Soil Action Plan

Project lead for a 10-person project team and 50-person working group in GIS-analysis, scientific literature review, expert interviews, and broad stakeholder engagement to develop a comprehensive Healthy Soils Action Plan for all major land uses in Massachusetts. *2023 Special Recognition Award for Significant Value to Landscape Architecture from the Boston Society of Landscape Architects*

Greenhouse Gas Environmental Impact Assessment | Massachusetts Environmental Policy Act Office

Provided QAQC and technical team support in the development of a model to estimate greenhouse gas emissions and carbon sequestration loss from tree clearing associated with proposed expansion of a utility right of way.

Regenerative Land Use Experiment | Major Northeast Utility Company

Assessment of potential for additional carbon sequestration through innovative land and vegetation management practices on ROW lands across three state for a major utility. Led in-depth study of current land cover, carbon stocks, and management practices to develop high level toolkits for land management teams.

SELECTED PUBLICATIONS

Gutwein, S., Zaltzberg-Drezdahl, K., Toensmeier, E., & Ferguson, R. S. (2022). Estimating land cover-based soil organic carbon to support decarbonization and climate resilience planning in Massachusetts. Soil Security, 9, 100076. https://doi.org/10.1016/j.soisec.2022.100076

Regenerative DesignGroup

Von Harvey

Communications Specialist

Von is a communicator and designer who applies user experience (UX), web, graphic, and marketing design to tell stories and engage with people and communities. She believes technology should have a positive impact on humanity, which includes being equitable and sustainable. Von holds a BA from Hampshire College and has professional certifications in UX design, graphic design, and digital marketing.

FOCUS AREAS

» Web and digital user experience (UX) and accessibility design
» Digital Marketing + Content Strategy

TECHNICAL SKILLS

» WordPress, Drupal, Squarespace, and Webflow CMS platforms
» MailChimp Email Marketing
» Google Analytics
» Adobe Creative Cloud

SELECTED PROJECTS

Massachusetts Healthy Soil Guide | Greenfield, MA

Created WordPress-based website for the Massachusetts Healthy Soil Guide for Construction and Development, making soil health practices and resources accessible and actionable for site construction and landscaping professionals.

PREVIOUS POSITIONS

Center for New Americans | Northampton, MA | 2023–present

Communications Specialist

- Manage WordPress CMS-based website, including content, usability, and layout updates
- Provide content and marketing strategy for social posts, blog content, and print materials

Vinka Design | Florence, MA | 2012–present

Prinicipal

- Design and implement digital marketing and advertising, content strategy, UX, and Websites for clients with a focus on artists and authors; examples include betsyhartmann.com and onematchfilms.com

UMass Amherst College of Engineering | Amherst, MA | 2021-2022

Associate Director of Communications and Digital Media

- Coordinated with team and senior leadership to ensure all digital content, including a 5,000-page website and 3 social channels, was accurate, strategic, and reflective of the user journey for various audiences
- Designed print and digital marketing materials and collateral for various offices and departments, including significant development campaigns

Regenerative DesignGroup

Sebastian Gutwein

Managing Director, GIS Specialist, Worker-Owner

Sebastian is a living systems designer whose extensive experience draws from the arts, ecology, politics and place. His extensive experience allows him to integrate diverse disciplines into comprehensive planning strategies that address complex challenges such as water conveyance, agricultural programming, and intricate GIS analysis. Since 2015, Sebastian has been the Land Surveying and Digital Design Instructor at The Conway School. He continues to expand his expertise in leveraging geospatial technology for innovative landscape planning and management solutions.

FOCUS AREAS

- Resilience Planning & Site Design
- Whole Systems Integration
- Landscape Analysis & Assessment
- Food Systems Evaluation & Design
- Implementation, Construction & Project Management
- Solar Site Design & Housing Layout

TECHNICAL SKILLS

- Digital Rendering
- GIS Analysis + Assessment
- Document Production & Design
- Land Surveying

SELECTED PROJECTS

MA No Net Loss of Carbon in Wetlands | MassDEP

Lead data and GIS analyst for a wetland mapping approach based on machine learning that identifies previously ambiguous wetlands. This project aims to identify innovative strategies, approaches, concepts, and regulatory recommendations to achieve No Net Loss of Carbon in Wetlands in Massachusetts. Project team includes BSC Group, the Massachusetts Association of Conservation Commissions (MACC), and the Woodwell Climate Research Center.

Soil Resource Assessment & Planning | Commonwealth of Massachusetts

Lead data and GIS analyst. Developed novel, data-driven model to quantify statewide soil organic carbon stocks and assess impact of land cover change on soil carbon.

Municipal Vulnerability Preparedness Projects: Soil Resilience Planning | Various Municipalities, MA

Lead data and GIS analyst. Development of unique and comprehensive models that combine soil and other ecological data with social and cultural information to identify high impact locations for nature based solutions for climate resilience. Mapping and research support for community engagement workshops and outreach events.

Greenhouse Gas Environmental Impact Assessment | Massachusetts Environmental Policy Act Office

Land use and carbon analyst. Directed development of environmental impact assessment model for greenhouse gas emissions and carbon sequestration loss from tree clearing associated with proposed expansion of a utility right of way.

Regenerative Land Use Experiment | Major Northeast Utility Company

Land use and carbon analyst. Assessed potential for additional carbon sequestration through innovative land and vegetation management practices on ROW lands across three state for a major utility. Conducted in-depth study of current land cover, carbon stocks, and management practices to develop high level toolkits for land management teams.

SELECTED PUBLICATIONS

Gutwein, S., Zaltzberg-Drezdahl, K., Toensmeier, E., & Ferguson, R. S. (2022). Estimating land cover-based soil organic carbon to support decarbonization and climate resilience planning in Massachusetts. Soil Security, 9, 100076. https://doi.org/10.1016/j.soisec.2022.100076

Regenerative DesignGroup

Rachel Wyatt Lindsay

Head of Site Design, Senior Designer, Worker-Owner

As Head of Site Design at Regenerative Design Group, Rachel works principally with organizations and homeowners to create productive, resilient landscapes. She draws from her experiences in organic farming, Latin-American sustainable development, and art to approach design with cultural sensitivity and environmental integrity. Rachel approaches projects of all scales through a soil, carbon, and water conservation lens, looking for opportunities to reduce the environmental impact of design installation while meeting the client's goals and aesthetic preferences. Her projects encourage people to engage deeply with their local ecosystems and apply holistic and low-stress approaches toward gardening and landscaping. A worker-owner at RDG, Rachel was a member of the steering committee that led the ownership transition process and has been the Treasurer of the Board of Directors since its establishment in 2022.

FOCUS AREAS

- Low Impact Site Design
- Soil Smart Design & Practices
- Productive & Edible Landscape Design
- Regenerative Small-Scale Agriculture & Gardening
- Ecosystem Integration with Native Plants
- Pollinator Habitat
- Project Management

Technical Skills

- Project Management
- Construction Support
- Site Analysis
- Detailed Site Design
- Hand + Digital Rendering
- Auto CAD, Adobe, + GIS
- Document Production

SELECTED PROJECTS

Healthy Soils Guide for Site Design + Construction | Commonwealth of Massachusetts

Project manager and outreach coordinator of a multi-firm collaboration to develop guidelines for the implementation of the Healthy Soils Action Plan in site design and development projects.

Estate Garden | Concord, MA

Lead designer and project manager for 2,000 sq. ft. of terraced production gardens with surrounding orchard, greenhouse, and small livestock managment area.

Soil Resource Assessment & Planning | Commonwealth of Massachusetts

Research assistant, coauthor, and document production manager for the Healthy Soils Action Plan for all major land uses in Massachusetts. *2023 Special Recognition Award for Significant Value to Landscape Architecture from the Boston Society of Landscape Architects.*

Low Impact Forest Residence | Hurley, NY

Site design and construction support for a new home in a pine, oak, and hickory forest, with a rapid rate of re-establishment due to strict limitation on soil disturbance, rigid soil amendment specifications, and native plant designs.

Ecologically Sensitive Residence | Wayland, MA

Landscape design for a pre-existing home surrounded by ecologically valuable wetlands and floodplain forest. Plans included the relocation of snapping turtle nests, minimal soil disturbance, and a native-forward plant palette.

Residential Site Grasslands Regeneration | Littleton, MA

Soil and ecosystem restoration for an 8-acre clear cut new home site, including

the establishment of edible landscaping, 4 acre native meadow, and successional restoration of an oak, red maple, and American chestnut forest.

The Gann Farm | Gann Academy, Waltham, MA

Supporting design services for an existing 3-acre student farm, including regenerative principles for no-till vegetable production, outdoor classroom, and a 1-acre food forest.

RiverMills Green Infrastructure Renovation | Chicopee, MA

Lead designer for site analysis, troubleshooting, vegetation inventory, and stormwater infiltration renovation plans for an existing green infrastructure system at the RiverMills Senior Center, a brownfield redevelopment project in the Riverfront Area of the Chicopee River.

Urban Pollinator Streetscape | Northampton, MA

Lead designer for the transformation of a lawn-dominated landscape into a fully perennial multi-season pollinator habitat garden with rainwater collection and infiltration.

Tropical Agroforestry Farm Assessment + Land-Use Master Plan | Gashora, Rwanda

Associate designer and document production management for the Rwanda Institute for Conservation Agriculture preliminary feasibility assessment.

EDUCATION + PROFESSIONAL DEVELOPMENT

- B.A. Anthropology + Studio Art, Wesleyan University, 2005
- M.S. Ecological Design, The Conway School of Landscape Design, 2015
- Massachusetts Association of Conservation Commissions Fundamentals Certificate, 2022
- Greenfield Conservation Commission, 2016-2018, Vice-Chair 2018-2022
- SosteNica: The Sustainble Development Fund of Nicaragua, Board Member 2012 - present
- Agroecology and Biointensive Agriculture, Las Cañadas, Cooperative, Huatusco Mexico, 2010
- Fullbright Scholar, Nicaragua 2009

LECTURES + WORKSHOPS

- *Unlocking the Carbon Potential of Soils (with Chris Hardy, Sasaki, and Gillian Davies, BSC Group) - American Society of Landscape Architecture 2024 Conference, Washington D.C.*
- *Healthy Soils at Home - Greening Greenfield, Greenfield MA*
- *Soils for High Functioning Landscapes - Ecological Landscape Alliance Season's End Summit*
- *Eco-Friendly Solutions for the Home Garden and Landscape* and *Regenerative Farming: Sustainable agriculture and its ties to global well-being* - Wesleyan University Institute of Lifelong Learning
- *Planning for Change: Design and Land Management in a Time of Climate Change* - Simsbury Land Trust
- *Rain Gardens: Why they are important, and how to make one that works* - Springfield Garden Club
- *Green Infrastructure Workshop Series* - City of Holyoke, MA + Pioneer Valley Planning Coalition
- *Designing Gardens for the Benefit of All* - Association of Professional Landscape Designers

Regenerative DesignGroup

Rafter Ferguson

Senior Researcher

Rafter specializes in research, education, and training focused on integrating agroecology, racial equity, and full-spectrum social justice into sustainable development practices. He applies participatory research and design methods, combining quantitative and qualitative data analysis with popular education approaches. His expertise spans agroforestry, climate change mitigation and adaptation, and grassroots farmer-centered development initiatives. Rafter is committed to fostering resilient communities through innovative planning strategies that prioritize environmental stewardship and social equity.

SKILLS

- Group facilitation + public speaking
- Multivariate statistics, data analysis, and visualization with R/RStudio (including dimension reduction, clustering, bootstrapping, and Bayesian and frequentist multilevel modeling)
- Software: Google Drive Suite, Microsoft Office Suite, iWork Suite

EDUCATION

- University of Illinois at Urbana-Champaign Ph.D., Crop Sciences, 2015
- University of Vermont M.S., Plant and Soil Science, 2011
- Bard College B.A., Anthropology, 2001

SELECTED PROJECTS

MA No Net Loss of Carbon in Wetlands | MassDEP

Data, GIS analysis, and technical writing for a wetland mapping approach based on machine learning that identifies previously ambiguous wetlands. This project aims to identify innovative strategies, approaches, concepts, and regulatory recommendations to achieve No Net Loss of Carbon in Wetlands in Massachusetts. Project team includes BSC Group, the Massachusetts Association of Conservation Commissions (MACC), and the Woodwell Climate Research Center.

Hudson-SuAsCo Nature Based Solutions Project|
Hudson, Framingham, and Natick, MA

MVP Project. Research and integrate relevant data to create infographic and related materials that reveal a comprehensive picture of the effect of timber harvest on the above and below ground carbon storage in aging forests. Materials are used to make the case for town bylaws and planning strategies towards promoting proforestation where applicable.

PROFESSIONAL EXPERIENCE

Interlace Commons | 2022-Present

Justice, Equity, and Diversity Consultant

- Qualitative research with BIPOC farmers to address barriers to agroforestry adoption
- Co-author of report “From the Roots Up: Centering racial justice to build transformative agroforestry” (with Ruth Tyson)
- Co-author of curriculum for technical service providers “Working with People, Working Across Difference: Social Competencies to Grow Agroforestry” (with Ruth Tyson)

Union of Concerned Scientists Washington, DC | 2018-2021

Scientist, Food and Environment Program

- Research, communication, and advocacy bridging agroecology and sustainability with farmer-centered equity issues
- Build and manage relationships with grassroots coalition partners with a focus on BIPOC-led and -centered organizations

Haverford College Haverford, PA | 2016-2018

Mellon Postdoctoral Fellow and Visiting AP of Environmental Studies

- Developed and ran original courses on politics and science of sustainable agriculture, the climate crisis, and related issues
- Organized "Beyond the Grassroots," a 1-day symposium bringing together agroecology researchers, organizers, and farmer-activists

University of Lisbon Lisbon, Portugal | January-July 2016

Postdoctoral Research Fellow with EU project "Bottom-up Climate Adaptation Strategies Towards a Sustainable Europe"

- Designed, co-organized, and taught an international course on research design for research professionals, graduate students, and grassroots activists
- Facilitated visioning and strategy sessions for interdisciplinary research on bottom-up adaptation strategies with lab members in the Centre for Ecology, Evolution, and Environmental Change

SELECTED PUBLICATIONS

Gutwein, S., Zaltzberg-Drezdahl, K., Toensmeier, E., & Ferguson, R. S. (2022). Estimating land cover-based soil organic carbon to support decarbonization and climate resilience planning in Massachusetts. Soil Security, 9, 100076. https://doi.org/10.1016/j.soisec.2022.100076

Spangler, K., McCann, R. B., & Ferguson, R. S. (2021). (Re-)Defining Permaculture: Perspectives of Permaculture Teachers and Practitioners across the United States. Sustainability, 13(10), 5413. https://doi.org/10.3390/su13105413

Toensmeier, E., Ferguson, R., & Mehra, M. (2020). Perennial vegetables: A neglected resource for biodiversity, carbon sequestration, and nutrition. PLOS ONE, 15(7), e0234611. https://doi.org/10.1371/journal.pone.0234611

Ferguson, R. S., & Lovell, S. T. (2017). Diversification and labor productivity on US permaculture farms. Renewable Agriculture and Food Systems, 1–12. https://doi.org/10.1017/S1742170517000497

Ferguson, R. S., & Lovell, S. T. (2017). Livelihoods and production diversity on U.S. permaculture farms. Agroecology and Sustainable Food Systems, 41(6), 588–613. https://doi.org/10.1080/21683565.2017.1320349

Ferguson, R. S., & Lovell, S. T. (2015). Grassroots engagement with transition to sustainability: diversity and modes of participation in the international permaculture movement. Ecology and Society, 20(4), 39. https://doi.org/10.5751/ES-08048-200439

Ferguson, R. S., & Lovell, S. T. (2013). Permaculture for agroecology: design, movement, practice, and worldview. A review. Agronomy for Sustainable Development, 34(2), 251–274. https://doi.org/10.1007/s13593-013-0181-6

For other publications see: Complete publication list. Google Scholar. ResearchGate.

Regenerative DesignGroup

Eric Giordano

Assistant GIS Analyst, Worker-Owner

Eric is a designer, musician, and avid composter. He began his journey in ecological design in NYC, where he built rainwater harvesting systems, ran a composting hub, and consulted on several garden projects. He received a Permaculture Design Certification from the Center for Bioregional Living, a Master Composter Certification from the NYC Compost Project, a Certificate of Horticulture from the Brooklyn Botanic Garden, and a Masters of Science in Ecological Design from the Conway School. Eric is dedicated to rethinking the way we meet human needs in a way that honors and regenerates Earth's living systems.

FOCUS AREAS

- Resilience Planning & Site Design
- Landscape Analysis & Assessment
- Food Systems Evaluation & Design

TECHNICAL SKILLS

- Digital Rendering
- GIS Analysis + Assessment
- Document Production & Design
- Drone Surveying

SELECTED PROJECTS

Municipal Vulnerability Preparedness Projects: Soil Resilience Planning | Various Municipalities, MA

Mapping and production support to develop unique and comprehensive models that combine soil and other ecological data with social and cultural information to identify high impact locations for nature based solutions for climate resilience. Research and production for community engagement workshops and outreach events.

Nashua River Watershed-Wide Nature Based Solutions | Fitchburg, Leminster, Ashburnham, Pepperell, and Groton, MA

GIS analysis of soil health challenges and opportunities for the 454 square mile Massachusetts portion of the Nashua River Watershed. Produced 93 page report that clarified high level strategies for promoting soil health specific to each project community.

Hudson-SuAsCo Nature Based Solutions Project| Hudson, Framingham, and Natick, MA

Support remote data analysis and community engagement to identify high impact sites for Nature-based Solutions that will enhance the towns' climate resilience. Focus on soil-carbon and landcover mapping and analysis to guide priority intervention sites.

Deerfield Healthy Soils Project | Deerfield, MA

Mapping, research, graphics, and report production for a comprehensive guide to protect soil health in Deerfield, MA. Included recommended bylaw updates for protecting vulnerable soil resources. *2022 Sustainability + Resiliency Award from the American Planning Association - Massachusetts Chapter.*

Greenhouse Gas Environmental Impact Assessment | Massachusetts Environmental Policy Act Office

GIS analysis and development of environmental impact assessment model for greenhouse gas emissions and carbon sequestration loss from tree clearing associated with proposed expansion of a utility right of way.

DOROTHY A. MCGLINCY

10 Juniper Road • Belmont, MA 02478 • (978) 886-7143 • dorothy.mcglincy@maccweb.org

CAREER SUMMARY

Accomplished environmental project leader, with experience in government, environmental consulting, industry, and non-profit organizations. Proven ability to coordinate work and projects successfully, manage complex matters, develop creative approaches and solutions, and work collaboratively with diverse organizations.

PROFESSIONAL EXPERIENCE

MASSACHUSETTS ASSOCIATION OF CONSERVATION COMMISSIONS (MACC) • BELMONT, MA

Executive Director, 2017 to present.

- Direct MACC's education, advocacy, and financial programs. Advocate for strong, science-based legislation and regulations to protect wetlands and open space.
- Provide leadership to MACC members, staff, board of directors, and wetlands experts to educate more than 2,000 participants each year in wetlands regulations, open space management, and sound environmental policy.
- Coordinate and maintain strong working relationships with state regulators, municipal organizations, environmental non-profit associations, and wetland consultants to improve regulations, guidance documents, action plans, and protect the environment. Participate in the *State Commission for Conservation of Soil, Water & Related Resources* (2017 – present)*;* active in the *Healthy Soils Action Plan Working Group* to prioritize and protect wetland, forested, agricultural, and suburban soils in Massachusetts (2022-present); participate in MassDEP's *Massachusetts Handbook Delineation of Bordering Vegetated Wetlands* review team (2022); participate in MassDEP's wetlands working groups for regulatory and guidance document updates; participate in the *Land Subject to Coastal Storm Flowage Advisory Group* (2018-2021), and in MassDOT's *Small Bridges and Culverts Working Group* (2019-2020).
- Directed team of environmental consultants (BSC Group), MACC staff, and other wetland experts to create the *MACC Wetland Buffer Zone Guidebook*.
- Coordinated environmental coalition team for successful passage of the *Public Lands Preservation Act* (PLPA) in 2022.
- Directed MACC staff and interns to update the *List of Massachusetts Municipal Wetland Bylaws, Regulations, and Policies* (2019).
- Coordinated MACC's Climate Connections Committee to support the *Nashua River Communities Resilient Lands Management MVP Project* and develop climate-smart, local wetland bylaw and regulation provisions.

CUMBERLAND FARMS, INC. • FRAMINGHAM, MA

Senior Environmental Project Manager, 2013 to 2016

- Managed a portfolio of 200 remediation and construction management projects for the corporate environmental group. Improved consistency and project performance of multi-disciplinary teams working in seven states. Provided technical and regulatory expertise to Cumberland Farms' legal, real estate, planning, finance, and risk management departments.

VERTEX ENVIRONMENTAL • BOSTON, MA

Senior Project Manager, 2012 to 2013

- Managed environmental remediation, auditing, and compliance projects for clients throughout the US. Directed all aspects of environmental site investigations, health and safety plans, hazardous

waste management, contractor specifications, and regulatory permitting to meet client expectations on time and within budget.

TRC ENVIRONMENTAL CORPORATION • LOWELL, MA
Senior Program Manager, 2003 to 2012

- Directed large site investigation, remediation, and renewable energy projects for diverse clients throughout the US, meeting regulatory requirements and project budgets. Managed rapid response and emergency cleanup activities following transformer explosions, carbon monoxide releases, large oil spills, and hazardous materials releases. Provided Licensed Site Professional (LSP) services, supervised sampling teams, coordinated public relations meetings, and prepared final written reports.

GEI CONSULTANTS, INC. • WINCHESTER, MA
Senior Project Manager, 2000 to 2003

- Directed regulatory compliance programs, environmental and safety audits, ASTM Phase I/II due diligence investigations, and spill cleanups for manufacturing, energy, industrial, airport, and insurance sector clients.

USGEN NEW ENGLAND, INC. (AKA NEW ENGLAND POWER COMPANY) • WESTBOROUGH AND BOSTON, MA
Environmental Manager-Senior Environmental Engineer, 1993 to 2000

- Directed hazardous waste management, waste minimization efforts, and environmental permitting for 15 fossil fuel and hydroelectric power plants in 10 states for the corporate environmental department. Tracked state and federal regulations; provided updates to power plant personnel.
- Provided strategic environmental expertise to multi-disciplinary teams, plant managers, and safety staff across 10 states. Routinely met with regulators and interest groups to establish strong relationships and shape environmental regulations that affected the utility industry. Established corporate policies and Best Management Practices to implement new regulations in a cost-effective manner.
- Environmental Management Systems Team Leader and author of company guidance documents related to management of hazardous waste, solid waste, coal/oil ash, PCB waste, and USTs.

CERTIFICATIONS AND EDUCATION

- Franklin & Marshall College, Lancaster, Pennsylvania. Bachelor of Arts, Geology.
- Massachusetts Licensed Site Professional, 1993-2023. License No. 7336. New Hampshire Professional Geologist, 2002-2022. License No. 462. Continuing Education Courses for PG and LSP licenses.
- OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) training.
- MACC Fundamentals for Conservation Commissioners Certificate Training Program Graduate.

AWARDS AND AFFILIATIONS

- *Member Award for Outstanding Service,* LSP Association, 2013.
- *Environmental Excellence Certificate of Appreciation*, US Gen, Brayton Point Station, 1999.
- *Outstanding Contribution Award,* LSP Association, 1993-1996.
- A Better Chance of Andover, Board of Directors, Governance Committee Chair.
- LSP Association 1993-present: President, 2002-2003; Board of Directors, 1994-1996, 2002-2004; Program Committee Chair; Member Services Committee Chair; Regulations Committee Co-Chair, Legislative Committee Chair; Steering Committee Member.

MICHELE AMIE GIRARD

95 Pinnacle Road
Harvard, MA 01451 *mamie.girard@gmail.com* *978-514-3056 (m)*

EXPERIENCE:

Education Coordinator
Massachusetts Association of Conservation Commissions (MACC). Belmont, MA. May 2006-- Present

Responsible for the coordination and implementation of MACC's education programs to train more than 2,000 participants per year in wetlands, forestry, open space protection, and **climate-related programs including climate migration and building climate resilience in land stewardship**. MACC offers up to 40 programs annually, the core components being: the Annual Environmental Conference; multiple offerings of MACC's 12-unit certificate program for Conservation Commissioners; in-person and via live webinars; Fall Conference; and several single-topic workshops**. Manage MACC's "Helpline" service to commissioners, responding to requests for guidance interpreting wetland laws and regulations and understanding their responsibilities.** Serve as instructor for several programs and work collaboratively with the Board of Directors, Education Committee, and organization partners to identify constituent training needs, develop program agendas, content, and secure instructors. Develop and update training programs with MassDEP and other environmental partners. Represent MACC at events and meetings, including participating in government agency and steering/advisory committee meetings as needed. Foster and maintain relationships with key state officials, corporate and non-profit partners.

Assistant Conservation Administrator/Acting Director of Conservation
Conservation Commission, Town of Boxford. Boxford, MA. April 2003 – April 2006

Assisted in all aspects of wetland permitting under the Wetland Protection Act and Boxford's Wetland Protection Bylaw. Served as the Acting Director of Conservation during the Director's absence. Reviewed land development proposals for conformance with state and local wetland and stormwater management laws and regulations and conducted field inspections at development sites. Worked with the public, answering questions about permitting requirements and natural resource management and responding to wetland violations. Provided administrative and limited technical support to the Boxford Lakes, Ponds and Streams Committee and served as a member of the Stormwater Advisory Committee. Helped develop cable television program on wetland permitting issues. Supervised internship program.

Conservation Commissioner
Harvard, MA. May 2002 – April 2005; Associate Member, June 1999 – October 2000

Reviewed wetland permit applications, attended and voted at meetings, conducted site walks, wrote Orders of Conditions, and responded to wetland violations. Represented the Commission in front of other town boards. Shepherded conservation applications through the Community Preservation Act funding process on behalf of the Commission. Worked jointly with the Bare Hill Pond Watershed Management Committee, managing the development of a volunteer monitoring program for Bare Hill Pond.

Conservation Agent
Town of Townsend, MA. October 2000 – May 2001

Assisted the Conservation Commission in the enforcement and administration of the Massachusetts Wetlands Protection Act. Reviewed and commented on wetland permit applications. Conducted site visits to confirm wetland delineations, evaluated ongoing projects in wetland resource areas, and responded to wetland violations. Served as the Commission's liaison with the public, town boards and state officials.

OTHER RELEVANT EXPERIENCE

Council Member, Native Plant Trust, Framingham, MA *February 2011 -- Present*

Trustee, Harvard Conservation Trust Harvard, MA *May 2013 – May 2016*
- Vice President, *November 2014 – May 2016*

Keystone Cooperator *April 2011 – Present*
Attended the 3-day UMass Extension Keystone Training Program at Harvard Forest from April 14-17, 2011, focusing on forest ecology and management, wildlife management and land conservation. In exchange for the training and resources, Keystone Cooperators agree to return to their communities and volunteer a minimum of 30 hours of their time on projects of their choosing.

Board Member, Massachusetts Association of Conservation Commissions
Belmont, MA. March 2003 – March 2006.

Member, Advisory Board to the Bare Hill Pond Watershed Management Committee *Harvard, MA. June 2000 – April 2003*

Served as a liaison between the Bare Hill Pond Watershed Management Committee and the Harvard Conservation Commission.

Technical Paper: How Horses Pose Problems for Conservation Commissions
July 2001 – February 2002, Required for completion of Resource Management Program at Antioch New England Graduate School, Keene, NH. Project Tutor: Marielle Stone, DEP-CERO

The document discusses the role horses play in the agricultural landscape. The document also offers guidelines for reviewing wetland permit applications pertaining to horse-related projects and makes recommendations for regulatory changes.

Wetlands Intern, Massachusetts Department of Environmental Protection
Central Region Office, Worcester, MA. June - October 2000

Assisted the Wetland Program staff in reviewing wetland permit applications. Participated in site visits with wetland staff for permitting and enforcement inspections and prepared a draft document regarding an appeal of a Conservation Commission's determination.

Program Leader/Trail Guide/Sanctuary Volunteer
Massachusetts Audubon Society, Wachusett Meadow Wildlife Sanctuary, Princeton, MA. 1993 – 1998.

Developed and conducted monthly nature programs for preschool-age children. Led family programs and interpretive walks as a trail guide. Away from the sanctuary, conducted programs for libraries, elementary school classes, preschools, and preschool teacher workshops. Coordinated the sanctuary's 1997 annual Bird-a-thon fund-raiser.

EDUCATION:

- **Master of Science, Antioch University New England.** Program: Resource Management & Administration
- **Biology Coursework, University of Massachusetts**
- **Bachelor of Arts, *Cum Laude*, Harvard College.** Concentration: Government
- **Massachusetts Keystone Project**
- **MACC's Fundamentals for Conservation Commissioners Certificate Program**

BSC GROUP

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