DRAFT NATURE-BASED SOLUTIONS (NBS) INITIATIVE

A program evaluation required pursuant to Section 12 of Public Act 25-125

MAY 12, 2026

CONNECTICUT DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION

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Executive Summary

As required by Section 12(a) of P.A. 25-125, DEEP has evaluated 22 of its programs that integrate and advance nature-based solutions (NBS) to address a changing climate, biodiversity loss, and restoring community resilience. This effort involved pulling together dozens of interdisciplinary staff and technical experts in the most in-depth look to date on how NBS are being deployed across the state.

Nature-based solutions include a wide variety of ecosystem-based approaches utilized to address societal challenges. At the most basic level, think about the decisions involved with planting and maintaining trees in an urban area. What species of trees, where, how, when? These are important considerations because the environmental and community benefits provided by a healthy urban forest and green spaces – shade, wildlife habitat, flood retention, and other ecosystem services – can be magnified when best practices are employed.

DEEP's evaluation found that NBS are generally well-integrated into DEEP's programs. **Chapter III** shows the synergies between DEEP's 22 NBS programs and 10 NBS best practices identified in Section 12(b) of P.A. 25-125. **Chapter II** describes and provides local examples of each of the 10 NBS best practice icons shown below. **Appendix III** provides a key to the icons and color-coding for significance.

The following graphic (discussed further in the introduction to **Chapter III**) summarizes how often DEEP's 22 NBS programs use the 10 best practices and divides the uses into three categories: as a **primary purpose**, **co-benefit**, or as an **eligible** practice for funding support.

DEEP NBS Programs	Carbon sequestration	Control Invasives	Soil Health	Avoid Conversion	Restore Habitats	Climate-Smart Ag	Stormwater Management	Shoreline Protection	Urban Forestry	Open Space	Totals
Primary	0	3	0	5	9	0	6	4	6	9	42
Co-Benefit	11	5	8	5	6	3	6	3	4	4	55
Eligible	3	3	2	5	2	4	2	0	3	3	27
Totals	14	11	10	15	17	7	14	7	13	16	124

In developing this evaluation, DEEP also consulted with seven state agencies – the Departments of Agriculture, Housing, Insurance, Public Health, and Transportation as well as the Office of Policy and Management and the Connecticut Green Bank. DEEP asked each agency to identify its NBS programs and conducted a similar analysis relating programs to the 10 best practices.

The following graphic summarizes the 24 NBS programs identified across those seven (7) agencies, as discussed more in the introduction to **Chapter IV**.

Other Agencies NBS Programs	*Carbon sequestration*	*Control Invasives*	*Soil Health*	*Avoid Conversion*	*Restore Habitats*	*Climate-Smart Ag*	*Stormwater Management*	*Shoreline Protection*	*Urban Forestry*	*Open Space*	Totals
Primary	0	2	3	0	8	0	1	0	0	1	15
Co-Benefit	2	7	8	3	4	7	5	2	4	4	46
Eligible	3	5	4	3	5	4	6	3	3	1	37
Totals	5	14	15	6	17	11	12	5	7	6	98

The Public Act also charged DEEP with identifying opportunities to "advance NBS in the state"; **Chapter V** addresses that challenge. Opportunities for advancement include building on NBS programs that used to be federal funded (e.g., the Urban and Community Forestry Programs of the USDA Forest Service that have been eliminated or cut severely); NBS programs that have received bonding previously; and in addressing new NBS-related commitments (e.g., the natural and working lands (NWL) data and models for DEEP's greenhouse gas inventory report have current deficiencies).

This evaluation is in draft form; we look forward to public feedback and expanding our analysis of the key takeaways from this evaluation in the final report.

I. Introduction

In 2025, the Connecticut Legislature turned its attention to a rapidly growing area of interest to stakeholders across the state: Nature Based Solutions. Through Section 12(a) of Public Act 25-125 (P.A. 25-125), the Legislature required the Department of Energy & Environmental Protection (DEEP) to "evaluate how to integrate and advance nature-based solutions in the state that support climate change mitigation, climate change adaptation, ecosystem resilience and biodiversity." Those efforts by DEEP to advance nature-based solutions are collectively referenced in the legislation as the "nature-based solutions initiative," or NBS Initiative.

As part of its evaluation, DEEP must also (pursuant to Section 12(b)) "consider best practices that encourage the use of the state's ecosystems to naturally sequester and store carbon, reduce greenhouse gas emissions, increase biodiversity and protect against climate change impacts …" and (pursuant to Section 12(c)) seek review and input from seven other state agencies – the Departments of Agriculture, Housing, Insurance, Public Health, and Transportation as well as the Office of Policy and Management and the Connecticut Green Bank.

All of those goals have been met in preparing this draft evaluation.

Lastly, DEEP is required by Section 12(c) of P.A. 25-125 to host one listening session for the purpose of receiving public comments before posting an "NBS Initiative Program Evaluation" (hereafter referenced as the "NBS Report") on the DEEP website by July 1, 2026 for additional review and written comment.[1]

[1] The text quoted in this section is excerpted from Section 12 of Public Act 25-125.

Two listening sessions are scheduled for the afternoon and evening of Tuesday, May 26, and DEEP will make this Draft NBS Report before those sessions so that the public can provide oral and written input for DEEP's consideration in a Final NBS Report. More information about the sessions can be found on the webpage for the nature-based solutions program evaluation: https://portal.ct.gov/deep/planning/nature-based-solutions

A. What are Nature-Based Solutions (NBS)?

"Nature-based solutions" or "NBS" are umbrella concepts that include a wide variety of ecosystem-based approaches utilized to address societal challenges. NBS rely on natural processes that are dynamic, so they require adaptive management, monitoring, and adjustments over time.[2] The NBS goals in P.A. 25-125 are to help address the societal challenges posed by climate change, biodiversity loss, and supporting community resilience.

Efforts on NBS are regional, national, and global in scope. NBS are defined globally as:

> *Actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services and resilience and biodiversity benefits.*[3]

NBS include a wide variety of actions and policies implemented in natural and managed ecosystems that ultimately provide benefits to communities through reduced flooding, retained ecosystem services, sustainable economies, and many other desirable results such as risk reduction during extreme weather events.

The inter-relationships between the actions and policies involved with nature-based solutions can be quite complex. However, it's important to recognize that **there is no one-size-fits-all solution** available to address Connecticut's complex climate, biodiversity, and resilience threats as they intensify; and it is likely that neither built nor nature-based solutions can handle these existential threats alone.

Despite their inherent complexities, NBS are clearly an important tool in society's "solutions toolbag" to achieve a healthy mix of ecosystem, resilience, and biodiversity benefits that makes Connecticut special, and it is important to both understand how state agencies are currently integrating NBS into their programs as well as evaluate opportunities for the state to advance NBS-related investments going forward.

[2] Cohen-Shacham, E., Walters, G., Janzen, C., & Maginnis, S. "Nature-Based Solutions to Address Global Societal Challenges." 2016. https://portals.iucn.org/library/sites/library/files/documents/2016-036.pdf
[3] Definition of nature-based solutions adopted by United Nations Environmental Assembly. 2022.

B. Synergies between NBS and Other State/National Efforts

DEEP's efforts to integrate and advance NBS programs build upon many synergies with related work at the state and national level. Following are some notable examples of foundational efforts that both preceded and complement DEEP's ongoing work on nature-based solutions:

Governor's Council on Climate Change

In 2020, the Governor's Council on Climate Change (GC3) featured dedicated working groups that published several in-depth reports on "Working & Natural Lands" that featured recommendations related to Agriculture/Soils, Forests, Rivers, and Wetlands. The reports provide important source materials for this report.

In 2021, the GC3 Phase I Report: Taking Action on Climate Change and Building a More Resilient Connecticut for All included several recommendations for near term actions in the Working & Natural Lands areas (see recommendations #24 – 48 in that report) that continue to be priorities for DEEP and other state agencies.

Subsequent reports and plans such as the Policy on Resilient Forests for Connecticut's Future (PRFCT Future) were produced to reflect community consensus points and provide additional clarity to help carry forward recommendations from the GC3 working groups. This NBS report cites several recommendations from the GC3.

Executive Order 21-3

In December, 2021, Governor Lamont's Executive Order 21-3 includes 23 actions that State executive branch agencies are directed to take to reduce carbon emissions through over 30 recommendations from the GC3 in the areas of buildings and infrastructure; clean transportation; community climate resilience; health, equity and environmental justice; economic development and jobs; and working and natural lands. The working and natural lands section of the executive order features efforts by DEEP to implement Connecticut's Forest Action Plan and further climate resilience using nature-based solutions; and by the Department of Agriculture to engage stakeholders around the climate resilience and mitigation potential of agricultural lands.

Net Zero Policy for Connecticut

Connecticut's annual Greenhouse Gas (GHG) Inventory historically only included data on gross emissions, which means that it only tracked the sectors responsible for emitting GHGs. Starting in 2022, following Executive Order 21-3 implementing recommendations of the Governor's Council on Climate Change, DEEP began using the land use, land use change, and forestry (LULUCF) output of EPA's State Inventory Tool to estimate the amount of carbon being sequestered in Connecticut's natural and working lands as part of the GHG Inventory. With the establishment of a net-zero by 2050 target in Section 2 of Public Act 25-125, DEEP is now required by law to include carbon sequestration in the inventory.

The current GHG Inventory shows that natural and working land sequestered 4.9 MMTCO2e in 2023, with 98% of that sequestration occurring in forest land and urban forests. While the LULUCF output from the State Inventory Tool allows for analysis of forest carbon at a statewide scale and comparison to other sectors and states, it does not allow for tracking policy implementation (e.g.,

progress on tree planting) or assessing trends in forest carbon on a timescale that is meaningful for climate policymaking. Finer spatial and temporal resolution is required for this. DEEP intends to explore options, within available resources, to update its carbon sequestration methodology, including adding spatial and temporal resolution of GHGs from forestlands, related land use change, and biological carbon stocks in urbanized areas.

By incorporating the best available science and sequestration data, Connecticut can track and report on its progress towards its 2050 target with greater accuracy and precision. Connecticut's current 2050 target is to reduce emissions 80% below the 2001 level, equivalent to 9.7 MMT CO2e. If the 2023 carbon sequestration levels of 4.9 MMTCO2e were, at a minimum, maintained, Connecticut would still need an additional 4.8 MMTCO2e in carbon sequestration to reach net zero, assuming emissions could not be reduced more than 80% below 2001 levels. There are two overarching pathways for carbon sequestration available for the state to meet its net-zero by 2050 target: Natural and Working Lands (NWL) which are considered alongside efforts highlighted in this report on nature-based solutions; and through Technological Carbon Dioxide Removal (Tech CDR).[4]

U.S. Climate Alliance

Connecticut is an active member of the U.S. Climate Alliance (USCA) -- a bipartisan coalition of governors representing 24 states dedicated to securing America's net-zero future by advancing state-led, high-impact climate action. USCA includes Natural and Working Lands as one of its top policy priorities and published a Policy Guide on Climate and Land Use Planning in 2025 which includes case studies from various states that can be used to advance climate goals through land use planning, climate-resilient development, and various methods of promoting healthy natural and working lands. In 2025, DEEP received support from USCA to conduct a Connecticut Net Zero Carbon Sequestration Assessment. The work on this assessment has been foundational to assist DEEP in fulfilling its obligations to report on the greenhouse gas sequestration potential for natural and working lands in the state's greenhouse gas inventory.

Green Infrastructure

Green infrastructure is a nature-based solution that delivers environmental benefits by mimicking natural processes, such as natural water flow and infiltration. Green infrastructure is often implemented through the technique of low impact development (LID) which can be integrated into development and redevelopment projects to manage stormwater. These actions are instrumental to improving and protecting water resources to ensure a clean and adequate supply of water today and into the future. Green infrastructure often enhances traditional stormwater management practices with extensive co-benefits such as aesthetic views, pollinator support, habitat for wildlife, flood mitigation, temperature mitigation, and more. DEEP provides more information on its efforts on green infrastructure via https://portal.ct.gov/deep/water/green-infrastructure.

[4] More information on DEEP's implementation efforts associated with the state's Net-Zero Policy are available in 2026 CT DEEP Report on Connecticut's Climate Progress required by the Global Warming Solutions Act (CGS Sec. 22a-200a). https://portal.ct.gov/DEEP/Climate-Change/CT-Greenhouse-Gas-Inventory-Reports

Connecticut's Conservation and Development Policies Plan for 2025-2030

Connecticut's Conservation and Development Policies Plan for 2025-2030 (C&D Plan) is the state's comprehensive strategies plan for land and water resource conservation, preservation, and development, guiding state agencies and influencing regional and local planning with a focus on smart growth via principles like higher density housing, transit-oriented development, resource protection, and resilience. The C&D Plan is legislatively adopted, and it is developed and implemented by the Office of Policy and Management in partnership with the Continuing Legislative Committee on State planning and Development.

The C&D Plan, adopted in early 2025, establishes a set of Visions affecting the future of the state's shared natural, built, cultural, and social environments, and emphasizes the overlapping and sometimes competing nature of these priorities. For state agency plans, programs, and actions required to be consistent with the C&D Plan, new implementation processes encourage holistic thinking beyond typical areas of expertise and consideration of all relevant aspects of the Plan in assessing benefits and drawbacks. Incorporation of nature-based solutions and related principles is an example of how a state agency may balance conservation and development objectives in line with the C&D Plan. Moreover, the interrelated C&D Plan visions work well with the multi-agency and multi-disciplinary approaches inherent to nature-based solutions.

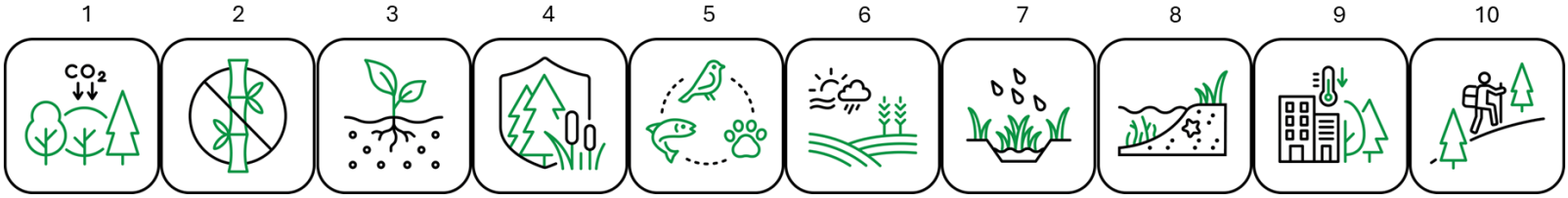
C. Using Icons and Color-coding for NBS Practices and Program Priorities

There are many NBS practices employed by resource management professionals, engineers, and others to make progress toward climate, biodiversity, and community resilience goals. Sometimes, describing these practices concisely can be difficult.

Icons, however, are images that communicate information clearly, concisely, and consistently. Icons can be easier to absorb than large blocks of text by utilizing memorable and concise visual images. DEEP developed icons to be used in two ways in this report:

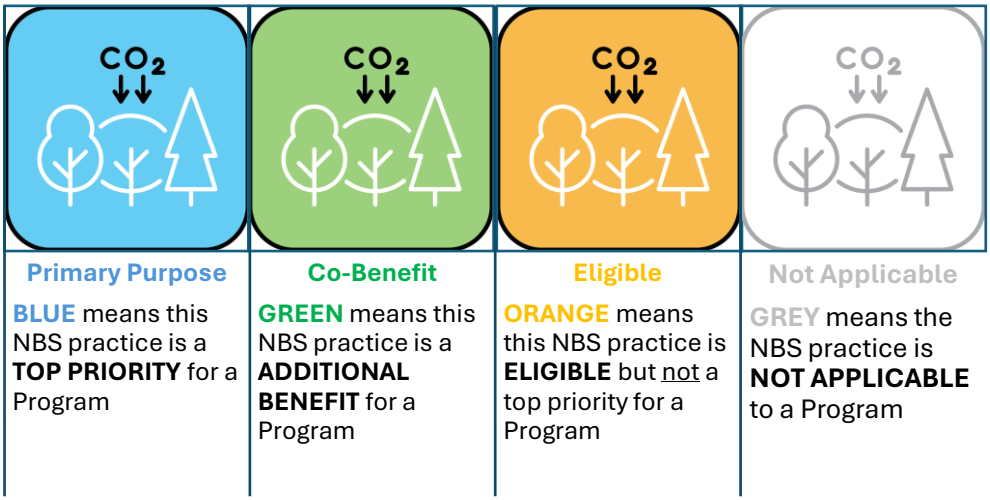
- to represent certain NBS practices highlighted in Section 12(b) of Public Act 25-125; and
- to identify (through "color-coding") the intensity of relevance of these NBS practices to various NBS programs of DEEP and other state agencies.

Following are icons that DEEP developed to represent the NBS practices in Public Act 25-125:



1. Increase carbon sequestration through increased forest acreage, including reforestation.
2. Control invasive species.
3. Encourage soil health across all landscapes.
4. Protect carbon stocks through avoiding the conversion of forests and wetlands to other purposes.
5. Restore habitats to improve biodiversity.
6. Increase climate-smart agriculture and soil conservation to reduce greenhouse gas emissions while improving habitat and protecting biodiversity.
7. Increase community resilience by improving water quality and addressing flooding and drought through nature-based stormwater management.
8. Increase community resilience by improving water quality and addressing flooding and drought through shoreline protection that uses nature-based approaches such as living shorelines.
9. Improve air quality and reduce urban heat island effects through urban forestry and increasing green spaces.
10. Increase access to open space for public health benefits.

Color-coding shows the **Primary**, **Co-Benefit**, **Eligible**, or **N/A** relevance of an NBS practice:



Primary Purpose	Co-Benefit	Eligible	Not Applicable
BLUE means this NBS practice is a **TOP PRIORITY** for a Program	**GREEN** means this NBS practice is a **ADDITIONAL BENEFIT** for a Program	**ORANGE** means this NBS practice is **ELIGIBLE** but not a top priority for a Program	**GREY** means the NBS practice is **NOT APPLICABLE** to a Program

Program Example: Clean Water Act/Section 319 Grants

For the "Clean Water Act/Section 319 Grants" example above, the color-coding shows that:

- **One** NBS practice (in **BLUE**) is a **Primary Purpose** of the Program,
- **Two** NBS practices (in **GREEN**) are additional **Co-Benefits** of the Program,
- **Three** NBS practices (in **ORANGE**) are **Eligible** but not priorities of the Program,
- **Four** NBS practices (in **GREY**) are **Not Applicable** to this NBS program.

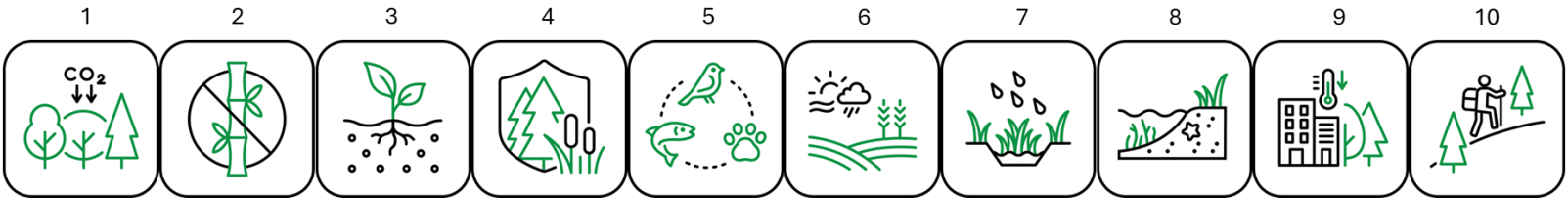
A "Key to Icons and Color-Coding" is included as Appendix III. It may be useful to open Appendix III as a separate document for a side-by-side easy reference as you read through this report.

** Although individual NBS programs and 10 practices from Section 12(b) of P.A. 25-125 are emphasized throughout this report, this report is not intended to be a fully comprehensive list of NBS programs and practices, nor should this limitation detract from the likelihood that a wide variety of actions and practices (beyond those represented here) may be required to address the specific challenges of climate change and/or biodiversity loss while also providing ecosystem services, resilience, and other benefits to people.

II. NBS Practices in PA 25-125 with CT Examples

Section 12(a) of P.A. 25-125 requires DEEP to evaluate how to integrate and advance nature-based solutions that support climate change mitigation and adaptation as well as ecosystem resilience and biodiversity, and Section 12(b) requires DEEP to consider the following 10 best practices as part of its evaluation:

1) Increase carbon sequestration through increased forest acreage, including reforestation,
2) Control invasive species,
3) Encourage soil health across all landscapes,
4) Protect carbon stocks through avoiding the conversion of forests and wetlands to other purposes,
5) Restore habitats to improve biodiversity,
6) Increase climate-smart agriculture and soil conservation to reduce greenhouse gas emissions while improving habitat and protecting biodiversity,
7) Increase community resilience by improving water quality and addressing flooding and drought through nature-based stormwater management,
8) Increase community resilience by improving water quality and addressing flooding and drought through shoreline protection that uses nature-based approaches such as living shorelines,[5]
9) Improve air quality and reduce urban heat island effects through urban forestry and increasing green spaces, and
10) Increase access to open space for public health benefits.



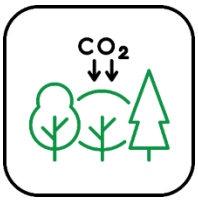
In this chapter, DEEP provides the following for each of these 10 NBS practices:

- Background describing each practice.
- Citations to relevant scientific research and multi-stakeholder reports.
- Connecticut examples of successful applications of each practice.

In this introduction, we emphasize that these 10 practices are broad and include a wide variety of sub-practices that may or may not be suitable based on many site-specific, species specific, and many other variables and conditions. At the same time, the focus on these 10 practices should not imply that other NBS practices that address the challenges of climate change, biodiversity, and ecosystem resilience should not also be priorities worthy of consideration.

[5] Although they are combined into one practice in the text of Section 12(b) in P.A. 25-125, practices 7 and 8 listed above are presented as two community resilience practices throughout the report – one focused on stormwater management and one focused on shoreline protection.

A. Increase carbon sequestration through increased forest acreage



Background: Trees and forests are known to remove atmospheric carbon and sequester it in their wood and roots, also contributing to the deposition of carbon into stable soil sinks through their roots.

Forests account for 56-58% of Connecticut's land cover, sequestering approximately 4.9 MMTCO2e between 2022-2023.[6] Connecticut statewide maintains the most carbon-dense forests in the Northeast, in terms of aboveground carbon storage on a per acre basis.[7]

As climate-driven disturbances such as drought and wildfire continue to intensify in the state, it will likely become more difficult for Connecticut's forests to naturally sequester and securely store carbon.

Forests, and the increase of forested acreage, present an opportunity to leverage natural processes for amplifying long-lasting and stable carbon sequestration and storage so that Connecticut may achieve its goal of reaching emission levels below 2001 levels by 2030 – and ultimately, net zero levels by 2050.

Best Management Practices (BMPs): Due to the significant variations between forested sites, the following set of BMPs (with citations to the best available science wherever possible) are not intended to be fully comprehensive or necessarily applicable to all sites:

Promote tree species diversity: increases niche partitioning across soil types and topographies;[8] promotes diversified growth forms and canopy stratification amidst varied precipitation and soil moisture conditions;[9] increases post-disturbance successional forest regeneration potential;[10] localized species diversity promotes resilience to insects and pathogens through negative density dependence.[11]

Maintain and/or increase "redundancy" *(whereby multiple species are available to fill the same ecological function)*: evidence suggests that Connecticut's historically high redundancy is beginning to waver (e.g., the historic loss of chestnut trees have been compounded by the more recent declines in elm, ash, beech, hemlock, and oak). As such, there is need to ensure that

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[6] Forest Inventory EVALIDator web-application Version 1.8.0.01. St. Paul, MN: U.S. Department of Agriculture, Forest Service, Northern Research Station. http://apps.fs.usda.gov/Evalidator/evalidator.jsp

[7] Northeastern states include the six New England states, New York, New Jersey, and Pennsylvania.

[8] Canham, C.D., Papaik, M.J., Uriarte, M., McWilliams, W.H., Jenkins, J.C. and Twery, M.J. "Neighborhood analyses of canopy tree competition along environmental gradients in New England forests." 2006. https://doi.org/10.1890/1051-0761

[9] Liptzin, D. and Ashton, P.M.S. "Early successional dynamics of single-aged mixed hardwood stands in a southern New England forest, USA." 1999. https://www.sciencedirect.com/science/article/pii/S0378112798004484

[10] Lorimer, C.G. and White, A.S. "Scale and frequency of natural disturbances in the northeastern US: implications for early successional forest habitats and regional age distributions." 2003. https://www.sciencedirect.com/science/article/abs/pii/S0378112703002457

[11] Jactel, H., Brockerhoff, E. and Duelli, P. "A test of the biodiversity-stability theory: meta-analysis of tree species diversity effects on insect pest infestations, and re-examination of responsible factors." 2005. https://link.springer.com/chapter/10.1007/3-540-26599-6_12

multiple species and multiple unrelated genera are retained to ensure species can fill roles previously held by those now in decline.[12]

Disincentivize high-grading practices: by extensively high-grading stands or selecting with too-extreme a preference for individual species, there is potential to unsustainably reduce the structural and species diversity of harvested stands.[13] As climate disturbances intensify, retaining diversity is key to future forest resilience.

Promote landscape-scale heterogeneity in stand age and structure: this includes retaining legacy structures such as snags and deadwood, which promote biodiversity.

Leverage disturbance events to promote emergence of new age classes: disturbances alter the successional trajectory of affected areas, including the species, age, and structural diversity of remaining vegetation communities. In some instances, depending on disturbance intensity and extent, some areas may be managed to promote landscape heterogeneity and the long-term creation of old-growth characteristics.[14]

Implement silvicultural biocontrol: as invasive species persist in Connecticut, including both plants and insects, it is important to monitor and mitigate these disturbances through active intervention using biocontrol.

Encourage long-term transition of edge habitats back to more intact forested areas when possible: in moderate amounts and when not permanent, edge habitats can increase local and landscape scale biodiversity by opening niches less or unavailable in core forest areas, such as nesting and flowering conditions. Though temporary edges may provide unique habitats that can boost biodiversity, permanent edges can invite invasives and disturb other intact habitats. Managing edge forest as part of a long-term transition across a variety of tree ages back toward an intact forest can make that forest more resilient and diverse.

"Keep Forests as Forests" and mitigate future fragmentation: the state should disincentivize development in core forest areas to reduce fragmentation, especially for mature or designated old-growth stands. Furthermore, when acquiring lands for protection, the state should focus on areas that pose opportunities to create increased connectivity and corridor potential, such as areas abutting lands already under conservation easements or otherwise protected areas.

Balance active and passive management strategies: depending on site-specific characteristics and long-term objectives for a given stand, science-informed passive management may be important for achieving mature and old-growth characteristics over time.[15]

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[12] Johnson, D.J., Beaulieu, W.T., Bever, J.D. and Clay, K. "Conspecific negative density dependence and forest diversity." 2012. https://pubmed.ncbi.nlm.nih.gov/22605774/

[13] Canham, C. D. "Forests Adrift-Currents Shaping the Future of Northeastern Trees." 2020. https://yalebooks.yale.edu/book/9780300238297/forests-adrift/

[14] Catanzaro, P. and D'Amato, A. "Restoring Old-Growth Characteristics to New England's and New York's Forests." 2022. https://portal.ct.gov/-/media/DEEP/forestry/Restoring-Old-Growth-Characteristics.pdf

[15] "Southern New England Forest Management in an Era of Climate Change. A Position of the Yankee Division of the Society of American Foresters." 2020. https://newenglandforestry.org/learn/initiatives/ex

CT Example: **DEEP Management of State Forests**

DEEP manages approximately 250,000 acres of public land, of which approximately 175,000 acres is designated as state forests. In general, DEEP's management of state forests is focused on achieving forest health and resilience. Through science-based data collection and analysis, DEEP constantly monitors tree growth and projected tree cover on DEEP-managed public forests to track forest health and resilience over time.

One of the primary goals is to maintain abundant tree cover so carbon sequestration is not diminished over time by loss of tree cover to forest health threats such as insects, disease, and invasive plants. The plan for each individual forest to maintain abundant tree cover and sustain carbon sequestration over time is explained at the state forest level through detailed forest management plans available online at Forest Management on State Lands. DEEP's forest management plans include robust input from various natural resource professionals and local and statewide stakeholders to achieve a balance of multiple benefits for the public -- forest health, recreational access, and vibrant wildlife habitat keeping common species common and protecting those species identified as endangered, threatened, or special concern. DEEP's forest management goals are congruent and complimentary to its statewide Forest Action and Wildlife Action Plans that are typically updated every five years with significant public input.

B. Control invasive species

Background: Invasive species are non-native species that exhibit an aggressive growth habit and can out-compete and displace native species. Invasive organisms can spread rapidly, disrupting ecosystems, and cause ecological and economic harm.

For plants, the Connecticut General Statutes (CGS § 22a-381b-d) defines invasive plants using nine biological criteria:

1. The plant is nonindigenous to the state.
2. The plant is naturalized or has the potential to become naturalized or occurring without the aid and benefit of cultivation in an area where the plant is nonindigenous.
3. Under average conditions, the plant has the biological potential for rapid and widespread dispersion and establishment in the state or region within the state.
4. Under average conditions, the plant has the biological potential for excessive dispersion over habitats of varying sizes that are similar or dissimilar to the site of the plant's introduction into the state.
5. Under average conditions, the plant has the biological potential for existing in high numbers outside of habitats that are intensely managed.
6. The plant occurs widely in a region of the state or a particular habitat within the state.
7. The plant has numerous individuals within many populations.
8. The plant is able to out-compete other species in the same natural plant community.
9. The plant has the potential for rapid growth, high seed production and dissemination and establishment in natural plant communities.

The law specifies that before listing a plant, the Invasive Plant Council will determine that the plant has each of the characteristics 1-5 and at least one of 6-9. and specifies that “no person shall move, import, sell, purchase, transplant, cultivate or distribute any reproductive portion of any invasive plant” for the listed plant species.

In addition to invasive plants, invasive animals, fungi, and other species also have spread rapidly and disrupted ecosystems across Connecticut. To name just a few, examples of invasive animals in Connecticut include emerald ash borer, spotted lanternfly, hemlock wooly adelgid, jumping worms, the nematodes causing beech leaf disease, and zebra mussels. Invasive fungi include the pathogens causing Dutch elm disease, chestnut blight, and beech bark disease, and also the white nose fungus is an invasive organism that is devastating multiple bat species.

The introduction, establishment and spread of invasive species is widely recognized as one of the most serious threats to native ecosystems. Globally, invasive species are involved in 60% of all species extinctions -- alongside land- and sea-use change, direct exploitation of organisms,

climate change, and pollution -- and considered to be "primarily responsible" for 16 percent of extinctions.[16,17]

Invasive species can have direct effects on native species through competition or through predation, infection, herbivory, or parasitism, and they can also have indirect effects such as community interactions through intermediate species, changing habitat characteristics like litter deposition or fire susceptibility, or changes in interaction with soil biota and abiotic characteristics.

Climate change can exacerbate problems caused by invasives by disrupting the stability of environments and communities and proliferating the disturbed scenarios in which invasives thrive. Many invasives are able to tolerate or benefit from climate change variables like weather extremes and increasing temperatures, while native species suffer and are reduced in numbers.

Higher atmospheric CO_2 may accelerate vine growth. Warmer winters have enabled the spread and increased overwinter survival of invasive species (e.g., hemlock woolly adelgid). Climate-driven changes increase new arrivals and expansion risks due to delayed starts to winter and earlier springs. Invasive species are reducing the diversity of Connecticut forests and wetlands, key ecosystems for sequestering carbon and mitigating climate change. Efforts to control invasives can help maintain ecosystem structure and function which support biodiversity and resilience.

Best Management Practices (BMPs): A wide variety of best management practices related to "controlling invasives" utilize a hierarchy of intervention based on feasibility, cost-effectiveness, and progression of colonization by the invasive species. The hierarchy starts with prevention (highest value, lowest cost); next is early detection and rapid response; this is followed by containment, control and population management; and last is restoration following control.

The framework in the following table lays out best management practices across all interventions, drawing from the IUCN Guidelines for the Prevention of Biodiversity Loss Caused by Alien Invasive Species (2000),[18] the CBD/IUCN Invasive Alien Species Toolkit for Kunming-Montreal Global Biodiversity Framework Target 6 (2025),[19] the IPBES Thematic Assessment on Invasive Alien Species and their Control (2023), and CT-specific program documentation from DEEP and the Connecticut Invasive Plants Council.

[16] Summary for Policymakers of the Thematic Assessment Report on Invasive Alien Species and their Control of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). 2023. https://www.ipbes.net/ias

[17] Schwindt, E., August, T.A., Vanderhoeven, S. et al. "Overwhelming evidence galvanizes a global consensus on the need for action against Invasive Alien Species." 2024. https://doi.org/10.1007/s10530-023-03209-x

[18] IUCN Guidelines for the Preservation of Biodiversity Loss Caused by Alien Invasive Species. 2000. https://portals.iucn.org/library/efiles/documents/Rep-2000-052.pdf

[19] CBD Toolkit for Target 6 Invasive Alien Species. 2025. https://www.cbd.int/invasive/cbdtoolkit

Action	BMPs for Controlling Invasive Species
Actively prevent and manage potential invasion pathways	• Actively enforce and strengthen the CT Invasive Plants Council prohibited species list, including species identified by research to have high invasion potential. • Encourage watercraft inspection and decontamination at boat launches, and other practices to minimize aquatic invasive species spread (e.g. discouraging live bait transport across water bodies). • Leverage interactions between multiple invasive species, e.g. by removing tree of heaven from highways and public lands as a proactive spotted lanternfly habitat reduction measure.
Increase access to early detection and rapid response channels	• Expand and promote citizen science reporting infrastructure and integrate into a unified CT reporting interface. • Encourage invasive species surveys as part of state and federally funded restoration project site assessments.
Utilize species-appropriate integrated control methods (i.e., use the least-toxic effective methods, combine approaches, and monitor outcomes)	• For Terrestrial Plants: use mechanical removal for small infestations, herbicide for large monocultures, and biological control where approved agents are available. Always follow with native planting. • For Aquatic and Wetland Plants: use mechanical removal for water chestnut, aquatic herbicide for large infestations, open marsh water management for phragmites in tidal systems, and drawdown scheduling synchronized with native plant phenology generally. • For Forest Pests: use biocontrol for hemlock woolly adelgid and emerald ash borer, targeted insecticide for high-value individual trees, and salvage harvest and replanting for affected emerald ash borer stands. • For Aquatic Animals: use watercraft inspection and decontamination, and population management in line with the Atlantic Flyway management plan for mute swans.
Establish Native Species in Post-Control Restoration	• Include native species establishment plans in invasive control projects.

	• Follow CT Wildlife Action Plan habitat-specific guidance. • Monitor for reinvasion for multiple years post-treatment and fund follow-up control as an eligible expense in grant programs. • Use competitive native groundcover establishment as a passive tool for suppressing reinvasion.
Coordinate at the Landscape Scale and Across Jurisdictions	• Organize invasive control efforts around watersheds and landscape units as opposed to individual project sites or grant cycles. • Establish cross-jurisdictional coordination mechanisms, including with neighboring states, to share survey data and avoid duplicative work. FL's CISMA model is an illustrative case study. • Prioritize control in and adjacent to CT Wildlife Action Plan Conservation Opportunity Areas and OSWA-protected lands.
Incorporate Measurable Outcomes and Adaptive Management	• Incorporate baseline ecological assessments and post-treatment monitoring into grant program guidelines. • Develop standardized invasive control project monitoring protocols consistent with the CT Wildlife Action Plan.

CT Example: **Control of invasive plants in multiple State Forests**

DEEP's Forestry Division implemented several projects in the Centennial Watershed, Natchaug, Naugatuck, and Pachaug State Forests involving various treatments to control previously popular landscaping plants such as Japanese barberry, winged euonymus, multi-flora rose, and others that had spread from nearby plantings to become considerable invasive species problems throughout hundreds of acres of forest. Some populations, such as the winged euonymus documented in the Wyassup block of the Pachaug SF, had spread and become established over decades with mature plants reaching 10-12' tall with spacing at moderate to high density.

In other sites, such as in the southern extent of the Natchaug SF in Hampton, DEEP responded on the early side of an invasive plant infestation in the wake of a considerable die-off of oaks and ash trees following spongy moth defoliation and emerald ash borer girdling. Invasive plant control was implemented through three treatments during 2023-2024 to reduce understory competitiveness of invasive plants by 95% and increase the likelihood of the forest regenerating to native tree and shrub species. Treatments have attained the 95% control target, and the site is now being used as a Connecticut Agricultural Experiment Station research plot to study the forest regeneration trends which occur under dying ash canopies with invasive understories when compared to those understories where invasive plants have been effectively controlled.

C. Encourage soil health across all landscapes

Background: Healthy soils are living, well-structured sponges full of organisms[20] that store water and carbon, cycles nutrients, and resists erosion. Healthy soils show good structure and aggregation (crumbly, stable aggregates), high biological activity and diversity (roots, fungi, microbes, fauna), strong infiltration and water-holding capacity, as well as active nutrient cycling with balanced fertility.

There are a multitude of soil types in Connecticut. When healthy, these soils exhibit low bulk density and compaction; plenty of pores for air and water circulation, and adequate amounts of organic matter.

These characteristics make the soil more resistant and resilient to drought, heavy rain, contamination, and disturbance; as well as more capable of sustaining biodiverse life both within it and aboveground, and ultimately able to be a "sink" for carbon storage and sequestration.

The soil is one of the largest sinks for atmospheric carbon, and one that may be managed economically to mitigate the effects of climate change. Improving soil health in agricultural fields, forests, and urban open space (fields, parks, urban gardens, lawns) increases atmospheric carbon sequestration and reduces emissions.

Globally, protecting or restoring soil carbon can provide 3 billion tons of cost-effective climate mitigation each year. This represents 25% of the potential of natural climate solutions -- of which 40% is protection of existing soil carbon and 60% is rebuilding depleted stocks. Soil carbon comprises 9% of the mitigation potential of forests, 72% for wetlands, and 47% for agriculture and grasslands. Overall, soil carbon is important to land-based efforts to prevent carbon emissions, remove atmospheric CO_2, and deliver ecosystem services in addition to climate mitigation.[21]

Soil health supports climate mitigation by (1) preventing CO_2 emissions by conserving soil organic carbon (SOC), (2) increasing removal of atmospheric CO_2 by building SOC through sequestration, and (3) reducing non-CO_2 greenhouse gases (N_2O and CH_4) through improved management of natural and working lands. This is achieved through practices that avoid land conversion and erosion, reduce nutrient losses, and build organic matter and soil biodiversity.[22]

Soil health supports resilience/adaptation because it improves the physical, chemical, and biological properties that determine how all landscapes respond to heat, drought, intense rainfall, flooding, and disturbance. Soil health promotes climate resilience by increasing water infiltration and storage, strengthening soil structure and erosion resistance, supporting plant rooting and biological function, and improving recovery after disturbance—reducing vulnerability to drought, flooding, extreme rainfall, and heat.

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[20] Food and Agriculture Organization of the United Nations webpage content. 2026. https://www.fao.org/global-soil-partnership/resources/highlights/detail/en/c/1309274/.

[21] Bossio, D.A., Cook-Patton, S.C., Ellis, P.W. et al. "The role of soil carbon in natural climate solutions." 2020. https://www.nature.com/articles/s41893-020-0491-z

[22] Ibid.

Best Management Practices (BMPs): BMPs for soil health in all landscapes (agricultural lands, forests, wetlands, developed lands, and recreational spaces) may include a combination of the following practices:

Protect, restore, and steward

- Restore degraded soils and habitats (wetlands, forests, agricultural and urban open space; afforestation/reforestation where suitable)
- Use locally adapted native plant material; encourage nurseries to supply local genetics
- Protect core natural areas and connectivity to reduce fragmentation

Minimize disturbance

- No/low/reduced till (incl. strip-till); controlled traffic; avoid work on wet soils
- Plan & protect during projects: limit disturbance, distribute loads, keep soils covered; decompact & compost only where disturbance is unavoidable
- Low-impact forestry/rec access: follow site-appropriate BMPs; reuse skid trails/landings if well sited; enforce on-trail use; use low-impact harvesting equipment

Maximize soil cover and living roots

- Multispecies cover crops and conservation cover
- Perennial land covers (perennial crops, meadows, native groundcovers)
- Intercropping/polyculture and crop rotation
- Mulch; retain crop residue/leaf litter/woody debris (snags, slash, stumps where safe)
- Intensive/managed rotational grazing
- Soil-friendly mowing (e.g., conservation mowing; improved hayland practices that preserve cover and structure)

Water Management

- Green stormwater infrastructure: rain gardens, bioswales/grass swales, tree trenches, permeable pavements, green roofs, xeriscaping, no-mow zones
- Protect hydrology: maintain riparian buffers; restore wetlands; reduce alterations to site drainage

Nutrient Management

- Compost and manure additions; manure systems enabling timely, low-pressure, low-disturbance application
- Nutrient management emphasizing slow-release/organic sources matched to crop need
- Integrated Pest Management (IPM) to minimize pesticides/biocides while protecting beneficials and soil biota

Maximize Biodiversity

- Agroforestry (hedgerows, riparian buffers, alley cropping), silvopasture, and urban/peri-urban trees & plantings (drought-tolerant where appropriate)
- Pollinator/field-edge habitat strips and native plantings across landscapes

Encourage soil health across all landscapes

Minimize Contamination

- Use/test for clean fill/topsoil/compost; specify PFAS-free, low-plastic amendments.
- Use IPM/pesticide stewardship plus 4R nutrient management (Right Source, Rate, Time, Place) and safe manure systems.
- Control invasives using least-toxic methods; and do periodic soil testing.
- Stop pollutants at the source via water, sediment, and site stabilization controls.
- Where contamination exists, remove/replace the topsoil, install raised beds (for safer growing), and apply in-situ treatment/immobilization.

CT Example: **CT Soil Health Initiative (CT RC&D)**

The CT Soil Health Initiative is a long running program of the Connecticut Resource Conservation and Development Area, Inc. (CT RC&D) program focused on improving soil health through hands on education and practical demonstrations, including rolling cover crops, soil pit investigations, and rainfall simulations comparing healthy and degraded soils.

The CT Soil Health Initiative highlights how healthy, organic matter rich soils improve drainage, increase disease resistance, and enhance water holding capacity. CT RC&D hosts workshops, educational events, and pilot programs across Connecticut typically on working farms in partnership with USDA NRCS staff, who provide technical expertise, and instruction. These well attended events bring together agricultural producers alongside nonprofit, federal, and university partners to promote the adoption of effective soil health practices statewide.

D. Protect carbon stocks through avoiding conversion of forests and wetlands

Background: There are an estimated 220,000 acres of wetlands in Connecticut (~7% of the state's land area) and approximately 1.8 million acres of forest (~56% of the state's land area). There is some overlap between these two cover types, especially in forested wetland areas.

For many decades in Connecticut, forests and wetlands have shared a common threat – fragmentation or parcelization due to sprawling development including associated infrastructure and roads – which has contributed to several other challenges that nature-based solutions are trying to address, such as the proliferation of invasive species into fragmented habitats, compacting of soils, creation of heat islands, and more. That is why opportunities to develop compactly and re-develop brownfields and other places that are already disturbed can be effective at avoiding additional conversions of forests and wetlands.

Studies have concluded that wetlands are critically important for storing carbon, especially in the top 1 meter of soil, when compared to other biomes.[23] Not coincidentally, the conversion of wetlands to other cover types leads to higher levels of carbon loss than the conversion of any other ecosystem type.[24] In addition to their mitigation potential in the form of high carbon sequestration and storage, wetlands can also provide adaptation benefits such as storm surge protection and rainwater collection for use during drought.[25]

Similarly, forests are known to sequester and store large amounts of carbon in both their above- and below-ground biomass, also increasing soil carbon pools through root respiration. In fact, avoided forest conversion and improved forest management, when considered together, have the potential to contribute as much as 50% of the total carbon sequestration possible globally.[26]

Connecticut's Inland Wetlands and Watercourses Act supported by a statewide policy goal of "no net loss of wetlands" provides a strong tool to municipal inland wetlands commissions to avoid conversion of wetlands. Forests are protected more by incentives such as the P.A. 490 program that offers property tax relief to large forest landowners (generally greater than 25 acres) who keep their forests as forest, outreach/training for individual forest landowners through extension and service foresters, and strong certification and continuing education programs for credentialled forestry professionals. Perhaps implementation of a "no net loss of forests" policy will provide some additional mechanisms to protect forests from conversion.

Best Management Practices (BMPs): There are several recommended BMPs related to avoiding the conversion of forests and wetlands in the GC3 Forests Sub-Group Report (2020), GC3 Wetlands Sub-Group Report (2020), Policy on Resilient Forests for Connecticut's Future (PRFCT Future,

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[23] Villa and Bernal. "Carbon sequestration in wetlands, from science to practice." 2017. https://www.sciencedirect.com/science/article/pii/S0925857417303658?via%3Dihub

[24] Zhang et al. "Impact of land use type conversion on carbon storage in terrestrial ecosystems of China: A spatial-temporal perspective." 2015. https://www.nature.com/articles/srep10233

[25] Jeethu J. C. & Kaladevi V. "Wetlands and Climate Change Resilience, and Enhancing Ecosystem Services for a Sustainable Future." 2025. https://cspub-jcc-submission.org/index.php/jcc/article/view/197/278

[26] Kaarakka, L., Cornett, M., Domke, G., Ontl, T., & Dee, L. E. "Improved forest management as a natural climate solution: A review." 2021. https://doi.org/10.1002/2688-8319.12090

2021), and Taking Action on Climate Change: Building a More Resilient Connecticut for All: Phase I Report, Near-term Actions (2021).

Retaining forest and wetland ecosystems, either through acquisition and protection or through low-impact development, is like purchasing an insurance policy for a resilient future. Avoiding conversion helps to both preserve existing carbon stores as well as the potential for long-term sequestration and storage. Allowing conversion and loss of forests and wetlands can take away that metaphorical insurance policy and put additional pressure on remaining natural resources to provide adequate ecosystem services to keep communities resilient.

CT Example: **Tri-Lakes Property Acquisition**

DEEP acquired 642.9 acres of important wildlife habitat and wetlands in Killingly to establish a new Wildlife Management Area (WMA). The property has a varied landscape, encompassing forests, wetlands, and four lakes ranging from 7 to 41 acres and supporting a rich array of plant and animal species.

This significant land purchase for residents and visitors (one of the largest acquisitions by DEEP in the past decade) was largely funded by a federal U.S. Fish & Wildlife Service Pittman-Robertson Grant.

Source: OSWA Report, April 2025

E. Restore habitats to improve biodiversity

Background: Habitat degradation has reduced the capacity of Connecticut's ecosystems to sequester carbon, support biodiversity, and buffer communities against climate impacts. Restoration rebuilds that capacity by leveraging natural ecological processes: after an initial investment removes stressors and reestablishes native communities, landscape regeneration may be designed to proceed with reduced ongoing management inputs.

Habitat restoration refers to facilitating recovery of ecosystems that have been degraded, damaged, or destroyed, and adding resilience in ecosystems that are still intact. Key approaches for habitat restoration in Connecticut include:

- Protection and restoration of riparian buffers
- Removal of obsolete dams and stream crossing rightsizing to restore natural stream function
- Coastal and tidal habitat restoration for degraded salt marshes, dunes, and estuaries
- Peatland and wetland rewetting to restore hydrological function
- Forest and shrubland restoration to support seedling dispersal and recruitment on rewilded or successional lands
- Landscape-scale ecological corridor maintenance and restoration
- Invasive species management to ensure the long-term resilience of native species in restored habitats

Habitat restoration is also one of the most multi-beneficial NBS interventions available: a single well-designed project can simultaneously improve carbon storage, recover biodiversity, reduce flood risk, and increase community resilience, generating returns across multiple NBS practices emphasized in Public Act 25-125.

Best Management Practices (BMPs): Following are several ecological and technical best management practices which can guide how habitat restoration programs are implemented on the ground. This framework draws from standards documents from the Society for Ecological Restoration (SER) and International Union for Conservation of Nature (IUCN).

Ecological & Technical Best Management Practices	
Ecosystem Attribute	Associated Best Management Practices
Absence of Threats	Conduct a pre-restoration threat assessment to identify active stressors to target for control. Remove or right-size barriers to aquatic connectivity, such as obsolete dams or undersized culverts, before or concurrent with carrying out in-stream habitat work.

	Implement targeted invasive species control before planting native species. Install deer exclosures where browsing would impede native vegetation recovery. Identify if there are upstream or upland water quality threats which need to be addressed for restored aquatic habitats.
Appropriate Physical Conditions	Restore natural hydrology, such as by reconnecting tidal flow to degraded salt marshes and reestablishing water table levels in drained or filled freshwater wetlands. Remediate compacted or contaminated soils prior to revegetation of target plant communities. Reestablish natural stream channel geometry and bankfull dimensions using natural channel design principles. Restore natural sediment dynamics and coarse woody debris recruitment in forest and riparian systems. Minimize soil disturbance by using low-impact equipment where possible.
Appropriate Species Composition	Use native, locally sourced, and genetically appropriate seed and plant material. Prioritize species assemblages that support Species of Greatest Conservation Need identified in the Connecticut Wildlife Action Plan, such as native milkweeds for monarch butterflies, or native oaks for specialist woodland birds. Cross-reference the relevant CT DEEP habitat profile in the Connecticut Wildlife Action Plan (Chapter 2 for the specific site). Account for climate-driven range shifts in species selection.

Structural Diversity	Incorporate into projects both vertical and horizontal complexity of vegetation, substrate, and physical features. For terrestrial projects: retain and recruit coarse woody debris such as snags, logs, and brush piles as structural habitat for birds, reptiles, and invertebrates. For wetland projects: maintain open water, emergent marsh, scrub-shrub, and upland buffer as a structural mosaic. For tidal projects: allow salt marsh migration landward under sea level rise scenarios for long-term structural habitat capacity.
Healthy Ecosystem Function	Restore natural disturbance regimes where appropriate, such as floodplain inundation, forest gap creation (e.g. through selection harvest), and prescribed fire (in fire-adapted communities such as pitch pine-scrub oak barrens). Support pollinator communities by having diverse bloom periods across native flowering plants. Restore fish passage to reconnect migratory corridors. Promote passive regeneration where seed sources and conditions allow. Retain coarse woody debris and leaf litter on restoration sites to support decomposer communities and nutrient cycling.
Connectivity with Other Habitats	Design restoration projects to enhance landscape connectivity, prioritizing Conservation Opportunity Areas identified in the Connecticut Wildlife Action Plan. Restore and buffer riparian corridors to facilitate wildlife movement to and from upland habitats.

	Protect intact upland buffers around restored wetlands and riparian areas to minimize edge effects and recolonization by invasive species.

CT Example: **CT's 2025 Wildlife Action Plan – the Blueprint for Biodiversity**

Connecticut's 2025 Wildlife Action Plan (WAP) sets forth a shared vision: to conserve the state's diverse native fish, wildlife, and plant species, along with the habitats they depend on, for both their intrinsic value and the ecological and social benefits they provide. The WAP is the state's blueprint for achieving six broad goals ranging from restoring and maintaining resilient species and ecosystems to implementing, monitoring, and evaluating conservation actions, as well as expanding public engagement in wildlife protection.

Developed through extensive coordination with tribal nations, conservation partners, municipalities, state and federal agencies, and the public, the WAP reflects an inclusive perspective of the conservation needs of Connecticut over the next decade. While DEEP facilitates the planning process for the WAP as a state agency; it is a plan for all of Connecticut shaped by and designed to support the collective work of the people, organizations, and communities committed to the stewardship of the state's natural heritage.

Connecticut's 2025 Wildlife Action Plan Vision and Goals
Vision: *Connecticut's diverse native fish, plants, wildlife species, and associated habitats are conserved for their intrinsic value and the ecological and social benefits they provide.*
Goal 1: CT has healthy and resilient populations of native fish, wildlife, & plants.
Goal 2: CT has healthy and diverse habitats and ecosystems supporting native species.
Goal 3: Issues impacting CT's native species and their habitats are identified, understood, and addressed.
Goal 4: Actions are taken to protect CT's native species & their habitats.
Goal 5: CT's native species and their habitats, associated threats, and actions taken to minimize threats are monitored and evaluated to ensure goals and objectives are being met.
Goal 6: People are informed about and engaged in protecting CT's native species & habitats.

F. Increase climate-smart agriculture and soil conservation

Background: Climate-smart agriculture and soil conservation refer together to the advancement of agricultural systems that both mitigate and adapt to climate change and provide overall resiliency to our food and fiber systems and communities.

Climate-smart agriculture and soil conservation includes farming and land management practices designed to protect and restore soil health, protect water resources, biodiversity and resiliency of working lands involved in food production. It also includes practices that support water conservation and energy efficiency.

As noted earlier in the practice focused on "soil health," soil is a dynamic resource that is comprised of mineral, air, water and organic material. A major component of restoring soil health is increasing and maintaining carbon/organic matter in the soil. Soil organic carbon is one of the more stable forms in which carbon can be stored. When practices that increase soil carbon storage are applied at scale, they can lower atmospheric CO_2 growth.

Healthy soils provide a variety of functions that increase plant productivity while reducing the need for other inputs. Restoring and maintaining soil health increases plant and root functions, which both reduces the amount of fertilizer and need for pesticide applications. Soil health also increases the water-holding capacity of the soil, makes crops more resilient to drought, and reduces the need for irrigation. Reducing the need for fertilizers, pesticides, and irrigation directly reduces GHG emissions associated with these energy intensive agricultural inputs.

Climate-smart agriculture and soil conservation measures ensure that Connecticut is resilient to the impacts of climate change by providing a plentiful local food supply, clean and abundant drinking water, and has reduced risk for both flooding and drought.

Best Management Practices (BMPs): BMPs for climate-smart agriculture in Connecticut include the implementation across agricultural landscapes of the following depending on seasonal, soil, and other variations between sites:

- ✓ Soil health best management practices
  - Cover cropping
  - Reduced till/no till
  - Crop residue
  - Crop rotation
  - Rotational Grazing
  - Composting
- ✓ Pollinator habitat restoration
- ✓ Water conservation best management practices

Increase climate-smart agriculture and soil conservation

- Soil health practices that increase organic matter and water retention
- Drought tolerant species including use of native species
- Drip Irrigation
- Precision irrigation

✓ Energy efficient practices and infrastructure

- Energy efficient lighting
- Energy efficient irrigation
- Energy efficient heating and cooling
- On farm clean energy installations

CT Example: **Forestation in Bridgeport/Miyawaki Forest Project**

The *Forestation in Bridgeport* project was funded by the Department of Agriculture's Climate Smart Agriculture and Forestry Grant program as a demonstration of how the Miyawaki Forest Method could rapidly transform compact, degraded urban parcels into thriving native ecosystems. Working with seven Bridgeport Public Schools, Aspetuck Land Trust created densely planted micro-forests that now serve as living classrooms, carbon sinks, and natural habitats. Teachers, students, city partners, and community volunteers collaborated to heal the urban landscape while building climate literacy. Each forest followed the Miyawaki method of native-species selection, soil preparation, and dense planting to accelerate natural succession.

The ecological outcomes have been measurable and impressive: tripled carbon sequestration, nearly 4,000 gallons of additional storm-water infiltration annually, and an overall increase in native plant biomass of over 85%. Habitat for two vulnerable species was also restored within city limits. Equally significant are the human results. More than 250 students, families, and community volunteers helped plant and tend the forests, building civic pride and environmental literacy. As Connecticut's first urban Miyawaki forest project, *Forestation in Bridgeport* demonstrates how climate resilience and environmental equity can thrive side by side.

G. Increase resilience through nature-based stormwater management

Background: Stormwater runoff is one of the primary drivers of water quality impairment, flooding, and aquatic (freshwater and estuarine/marine) habitat degradation in Connecticut. As development of impervious surfaces including roads, parking lots, and rooftops increases, rainfall that would otherwise infiltrate into soil or be taken up by vegetation is rapidly conveyed into storm drains and nearby waterbodies. More impervious surfaces result in increased runoff volume and velocity, mobilized pollutants, destabilized stream channels, and reduced groundwater recharge. Overall, this represents a cumulative negative impact on the natural systems that we all depend on for drinking water, wildlife, and recreation.

Nature-based stormwater management options and solutions address these challenges by restoring or mimicking the natural hydrologic processes that regulate water movement across the landscape. By using soils, vegetation, wetlands, floodplains, and other natural systems to absorb, store, filter, and slowly release water, nature-based solutions reduce pollutant loading, moderate flooding, and improve watershed resilience to drought and climate change.

NBS provide a multi-benefit approach to managing stormwater that addresses both environmental and community resilience challenges at a lower cost than engineered solutions.

Traditional stormwater systems are designed primarily to move water away from developed areas as quickly as possible. While effective for drainage, this approach can worsen downstream flooding, degrade water quality, stress stormwater and wastewater infrastructure, and disrupt natural hydrology. NBS instead focus on restoring natural water retention and infiltration processes that ultimately:

- Reduce nutrient and sediment pollution entering waterways
- Protect drinking water sources and aquatic habitats
- Reduce flood risks in downstream communities
- Improve groundwater recharge and drought resilience
- Enhance ecosystem health and biodiversity

Best Management Practices (BMPs): By integrating stormwater management into natural landscape systems, communities can achieve multiple environmental and climate goals simultaneously. There are several best management practices that are recommended for nature-based stormwater management:

Riparian Buffer Protection and Restoration

Vegetated buffers along rivers and streams are among the most effective natural stormwater management practices. Protecting existing riparian vegetation is often the most cost-effective strategy for protecting water quality and managing stormwater. Benefits include:

- Filtering sediment and nutrient pollution.

- Reducing flood water velocity limiting erosion and allowing for sediment deposition.
- Stabilizing streambanks.
- Providing shade that regulates water temperature.
- Improving aquatic habitat and biodiversity.

Wetland Protection and Restoration

Wetlands provide natural flood storage and water filtration. Wetland restoration projects can restore essential functions where they have been lost due to development or drainage. Key stormwater benefits include:

- Storing floodwaters during large storms.
- Moderating hydrologic flows.
- Removing nutrients and pollutants through natural biological processes.
- Supporting groundwater recharge.
- Providing critical wildlife habitat.

Floodplain Restoration

Reconnecting rivers to their floodplains allows stormwater to spread out and slow down during high flow events. Floodplain restoration is increasingly recognized as an important climate resilience strategy. Benefits include:

- Reduced downstream flood risk.
- Improved sediment deposition and nutrient retention.
- Enhanced habitat complexity.
- Increased groundwater recharge.

Soil Health and Landscape Practices

Healthy soils play a critical role in stormwater management. Good soil practices increase the ability of landscapes to absorb and retain water during storm events. Practices that improve soil infiltration and water storage include:

- Reduced soil compaction.
- Improving soil health by increasing organic material in soil through:
    - Mulching in leaves on lawns.
    - Adding compost.
- Native vegetation plantings.
- Conservation landscaping.

- Minimizing impervious cover.

Green Infrastructure

Green infrastructure captures and treats stormwater close to where it falls, slowing runoff, filtering pollutants, and increasing infiltration. Examples include:

- Rain gardens and bioretention areas.
- Vegetated swales and bioswales.
- Permeable pavement systems.
- Green roofs.
- Urban tree canopy expansion.

CT Example: **Hamden Town Center Park Bioretention**

The Clean Water Act Section 319 nonpoint source grant program funded a project to mitigate the impacts of stormwater pollutant runoff and flooding from a 74-acre urban watershed consisting of commercial and residential land use. The project was awarded to Save the Sound and the Town of Hamden, who also provided significant resources to support the project which is currently the largest known bioretention project in the state.

The watershed is approximately 21% impervious cover that discharges to a central location in Hamden's Town Center Park. The project created a large stormwater bioretention system that includes a scour pool at the pipe outlet, planted slopes around the stormwater outfall headwall, a stormwater conveyance system - comprised of cobble steps and pools used to slow and infiltrate runoff, planted banks along the channel, and four bio-retention cells separated by cobble weirs, and two main overflow weirs. Total annual volume of stormwater managed by this project was calculated at over 96 million gallons per year.

CT Example: **Meriden Green Flood Control Project**

The Meriden Green, constructed using brownfield and economic development grants, is central to the revitalization of downtown Meriden that also includes mixed-use development related to the new Amtrak station. Harbor Brook was daylighted and its channel restored to its original location using nature-based solutions including the construction of pools and riffles using native stones and boulders. The stream channel's banks were stabilized and planted with native, low maintenance wetland species selected to promote riparian habitat, biodiversity, and nutrient assimilation. Within the Green, landforms were developed to contain a 100-year flood event while creating a natural appearance for the park and to provide space for civic events and free play. In addition to being a major park feature, a bridge connects the neighborhoods on one side of the park to the downtown and the rail-station even during flood events.

Design plans prepared by SLR were developed over a multi-year period through a thorough public vetting process. Regulatory permitting from federal, state and local agencies was a critical piece for driving this project to construction. It is one of the largest flood control projects that the state has permitted over the last 25 years and one of the first flood control projects to use nature-based solutions to achieve flood storage/ reduction. Construction materials for the Meriden Green are designed to withstand periodic inundation and can be easily cleaned after flood events. The regulatory approval process was one of the most complex in Connecticut, involving several federal, state, and local environmental agencies.

H. Increase resilience through nature-based shoreline protection

Background: A living shoreline is a form of "green" infrastructure that serves to protect and stabilize coastlines using plants, shellfish, sand, rock, wood, and other natural materials. Living shorelines use a combination of techniques that can include the creation or restoration of marshes, shellfish reefs, submerged aquatic vegetation, reef balls, low rock sills, and more. Living shorelines provide a cost-effective alternative for erosion protection to traditional hardened shoreline infrastructure, while also offering environmental benefits.

Living shorelines create habitat, supporting the needs of a variety of fish, birds, shellfish, and other species, thereby increasing biodiversity. Living shorelines improve coastal resilience to sea level rise by creating a contiguous land-water interface that allows for marsh migration further upland and reduced shoreline erosion.

Healthy tidal marshes are also an important element of shoreline protection. Approximately 15 feet of marsh can reduce intense wave energy by 50% in certain environments, which allows sediment to collect and stabilize the shoreline during storm events.[27] Tidal marshes are also one of the most efficient ecosystems for carbon storage in the world.[28]

Sea levels in Long Island Sound, as measured at Bridgeport, CT; New London, CT; Kings Point, NY; and The Battery, NY (which lies outside of Long Island Sound but its long history of data collection offers a point of comparison for Long Island Sound locations), are rising at a rate at least 33% higher than global sea level rise between 1970 and today.[29] The sea level in Connecticut is expected to rise by 20 inches by 2050.[30]

Living shorelines help to build resilience against increased storm events and associated erosion, infrastructure loss and damage, reduced water quality, and loss of wildlife. Unlike gray infrastructure like seawalls, living shorelines have some capacity for self-repair following storm disturbances, and can support adaptation to gradual sea level rise by allowing sediment to accumulate and anchor vegetation that keeps coastlines from receding. Coastal wetlands, including those that are part of living shorelines, provide $11,190 per acre in ecosystem services

[27] "Restore-Adapt-Mitigate: Responding to Climate Change Through Coastal Habitat Restoration." *Restore America's Estuaries*. 2012. https://estuaries.org/wp-content/uploads/2018/08/RAE_Restore-Adapt-Mitigate_Climate-Chg-Report.pdf

[28] Davis, J., C. Currin, C. O'Brien, C. Raffenburg, A. Davis, "Living Shorelines: Coastal Resilience with a Blue Carbon Benefit." 2015. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0142595

[29] "Sea Level Trends." *Long Island Sound Partnership*. 2026. https://lispartnership.org/ecosystem-target-indicators/sea-level-trends-for-kings-point/

[30] O'Donnell, J. "Sea Level Rise in Connecticut, Connecticut Institute for Resilience and Climate Adaptation." 2019. https://circa.uconn.edu/wp-content/uploads/sites/1618/2019/02/SeaLevelRiseConnecticut-Final-Report-1.pdf

annually.[31, 32] Based on this value assessment, Connecticut's roughly 14,836 acres of tidal wetlands and flats could deliver an estimated $166 million in ecosystem services each year.[33]

States are increasingly recognizing the importance of living shorelines and adapting their policies to prioritize them. In 2013 and 2020, respectively, Maryland and Virginia established that living shorelines are the preferred method of stabilizing and protecting shorelines, unless proven otherwise.[34]

Best Management Practices (BMPs): Several BMPs assist nature-based shoreline protection:

Prioritizing Planting of Native Species: Prioritizing native species in living shorelines offers benefits for erosion and flooding protection and wildlife habitats. East coast living shorelines should contain a range of native plants tailored to average high-water levels for maximum effectiveness: common species in Connecticut's coastal marshes include smooth cordgrass in low marshes and saltmeadow cordgrass in high marshes.[35]

Tailoring Living Shoreline Structures to Different Wave Energies: Where wave energy is low, living shorelines composed of just vegetation are optimal, offering the benefit of breaking up small waves and a buffer for marshes to migrate further upland. Except for where wave energy is high, living shorelines composed of vegetation and structural support in the form of sills or reef balls secure vegetation and break up incoming waves.[36]

Constructing Living Structure/Breakwater that Creates Habitat:

- *Oysters:* Responding to the dramatic decrease in eastern oyster populations in Long Island Sound, constructing regenerative oyster reefs serves benefits of reducing wave energy, enhancing wildlife habitat, and reducing shoreline erosion. Recruiting wild oyster larvae using, for example, reef balls and concrete oyster castles like in the Stratford Point project enables constructed reefs to self-expand with time, assuming that water salinity, temperature, and soil content are optimal for oyster survival. Bagged oyster shells are also used and can easily be removed to align with regulatory requirements. Research out of East Carolina University shows that living shorelines containing breakwaters that recruit oysters absorbed up to 15% more wave activity after two recruitment periods, with multiple rough vertical layers of oyster shells breaking up waves.[37] Additionally, studies show that one oyster can filter around 50 gallons of

[31] FEMA Ecosystem Service Value Updates. 2022.

[32] Calculated as the sum of: $8,955 in value in 2021 USD: $1,648 per acre per year in aesthetic value, $125 per acre per year in climate regulation value, $2,420 per acre per year in habitat value, $1,624 per acre per year in recreation and tourism value, $1,035 per acre per year in flood and storm hazard risk reduction, $1,558 per acre per year in water filtration value, and $544 per acre per year in water supply value; adjusted for inflation to calculate 2026 value using the US Bureau of Labor Statistics' CPI Inflation Calculator: https://www.bls.gov/data/inflation_calculator.htm

[33] 2025 Connecticut Wildlife Action Plan.

[34] Living Shorelines." 2026. https://www.cbf.org/issues/living-shorelines/

[35] "Tidal Marshes." 2026. https://climate.uconn.edu/habitats-resources/coastal/tidal-marshes/

[36] "Understanding Living Shorelines." 2026. https://www.fisheries.noaa.gov/insight/understanding-living-shorelines

[37] Trista Talton. "Thriving Oyster Colonies on Living Shorelines Boost Protection." 2026. https://coastalreview.org/2026/01/thriving-oyster-colonies-on-living-shorelines-boost-protection/

water each day, if not more, thus enhancing water quality and reducing the risk of hypoxia and algal blooms.[38]

- *Fish:* Similar to structures that create habitat for oysters, living shorelines that create fish habitat also have benefits for local economies by creating opportunities for fishing.[39]
- *Horseshoe Crabs:* Oyster castles can also be used to facilitate movement of horseshoe crabs along living shorelines, as demonstrated by a living shoreline in Delaware Bay.[40]

Beneficial Use of Dredge Material: Tidal marshes persist by trapping and accumulating sediment, which allows them to keep pace with sea-level rise, but human interventions (e.g., dams) trap and reduce the supply of sediment in river systems, which hinders marshes from building elevation and leads them to drown and disappear. Strategically placed dredged sediment in marshes can rebuild elevation, enhance resilience, and even create new marshland. Supplying sediment to these systems can enhance marsh health for wildlife that depend on this habitat, such as the threatened Saltmarsh Sparrow.

This "beneficial use" of dredged material for marsh nourishment is an emerging climate adaptation strategy that turns a waste product into a restoration and coastal protection tactic. Using locally available dredged sediments to benefit marshes could also offset costs associated with dredged material disposal. Special Act 25-17 directs DEEP to develop a plan for beneficial use dredging by February 1, 2027. Additionally, the U.S. Army Corps of Engineers 70 by 30 goal seeks to increase beneficial use to 70% by 2030. Today, USACE utilizes 30-35% of available sediments dredged from federally overseen navigation routes for beneficial purposes.[41]

[38] "Oysters - More Than Just Good Eats." 2025. https://lispartnership.org/2025/11/oysters-more-than-just-good-eats/

[39] "The Living Breakwaters: A Model for Nature-Based Infrastructure - Tottenville, South Shore of Staten Island." 2025. https://www.billionoysterproject.org/blog/the-living-breakwaters-a-model-for-nature-based-infrastructure

[40] James Miller. "Learning from a Living Shoreline in Delaware Bay." 2021. https://www.fws.gov/story/2021-06/learning-living-shoreline

[41] "Discover, Learn, and Grow Beneficial Uses of Dredged Sediment." 2026. https://budm.el.erdc.dren.mil/

CT Example: **Stratford Point Living Shoreline & Tidal Wetland Restoration**

This project initiated in 2014 utilizes artificial shellfish reefs (a.k.a. reef balls) to protect 750' of beach/shoreline at Stratford Point from coastal erosion while also supporting 4.5 acres of intertidal habitat, 1.5 acres of coastal dune habitat, and 25 acres of woodland/meadow mix. The effort, located alongside a designated "Important Bird Area" at the confluence of the Housatonic River with Long Island Sound, is coordinated by Sacred Heart University with funding from the U.S. Army Corps of Engineers In-Lieu Fee Program, CIRCA, and NOAA's Coastal Resilience program.

Source: Sacred Heart University

To adaptively manage the site, a second restoration project is being developed to extend the marsh seaward by 0.35 acres over an additional 250 feet of shore using bagged slipper shells and small, modular oyster castles near the marsh edge and cordgrass plantings in the intertidal zone. The site was recognized in 2020 as the "Best Restored Shore Area" by the American Shore and Beach Preservation Association.

I. Improve air quality and reduce urban heat islands through urban forestry

Background: Urban forests and green spaces are central elements of a community's green infrastructure that provide improved air quality, carbon storage and sequestration, enhanced biodiversity, absorbed emissions, and protection or buffering against climate change impacts.

Tree-lined streets; large, mid-sized, and smaller "pocket" parks; community, residential, and rooftop gardens; and green areas associated with residential properties are all part of this urban forest and green space network. Collectively, these forested and green areas help mitigate the impacts of increased ambient air temperature (i.e., the heat island effect), help to improve air quality by filtering and cleaning air through vegetative respiration, manage stormwater runoff through greater infiltration and absorption, enhance biodiversity, and provide recreational, public health, economic, and other community benefits.

Urban forests sequester and store carbon at significant levels. Results from a national study of urban forests in eight cities, including New Haven, CT, found carbon storage of up to 21.4-26.7 kg of carbon per square meter.[42] Results from a 2013 study on carbon storage in a select number of cities found that Hartford's trees store 10.89 kg of carbon per square meter (based on 2007 data) -- the third highest storage amount amongst surveyed cities.[43]

In addition to their direct effect on GHG emissions, well-positioned trees play an important role in reducing the impacts of heat and cold on both indoor and outdoor settings. In warm weather, trees

[42] Jevon, F., Crown, C. A., Clark, J. A. G., Doroski, D. A., Darling, L., Sonti, N. F., Yesilonis, I. D., Dietsch, G., Bradford, M., & Pregitzer, C. C. "Native trees are responsible for the high carbon density in urban natural area forests across eight United States cities." 2025. https://doi.org/10.1111/1365-2664.14823

[43] Nowak, David J., Eric J. Greenfield, Robert E. Hoehn, and Elizabeth Lapoint. "Carbon Storage and Sequestration by Trees in Urban and Community Areas of the United States." 2013. https://doi.org/10.1016/j.envpol.2013.03.019

can reduce air conditioning needs or prevent heat-related health emergencies, and in cold weather, trees can serve as a buffer against wind to reduce the need for heat.

A 2017 study suggested that nationally, the average reduction in residential energy use due to trees is 7.2 percent and that specific designs to reduce energy use using urban trees could increase these values and further reduce energy use and improve air quality. The study also estimated that in Connecticut, approximately $141.3 million/year in energy costs are being saved by trees positioned around residential buildings, although these modeled benefits were limited to urban tree cover and the broader effects in less urban areas were likely under-represented.[44]

Neighborhoods with 40% urban tree cover or more see temperature reductions of 7-9 degrees (F). During heat waves, this temperature differential can literally represent the difference between life and death.[45]

Urban green spaces also offer significant refugia and habitat for a number of wildlife species. In these more urbanized settings, it has been shown that increasing native vegetation from 10 to 30 percent can lead to a resulting increase in the occupancy of native species by 10 to 140 percent.[46]

Urban trees also can reduce flooding by helping to slow and absorb stormwater, with one study documenting up to a 25 percent reduction in runoff volume as well as a 25 percent reduction in peak flow.[47] In New York City, its trees reduce runoff by more than 516 million gallons of stormwater each year.[48]

Because of the many values provided by urban forests, Connecticut has a goal of increasing tree canopy cover in environmental justice communities by 5 percent by 2040 – in communities an existing tree canopy coverage of less than 40 percent – with a focus on also increasing equitable access to these trees and the benefits they provide.[49]

Best Management Practices (BMPs): BMPs comprehensively range from planning and maintenance to community engagement and conservation all with the intent of ensuring existing urban forest and green resources remain and are improved over time.

Planning and Inventory

[44] Nowak, David J., Nathaniel Appleton, Alexis Ellis, and Eric Greenfield. "Residential Building Energy Conservation and Avoided Power Plant Emissions by Urban and Community Trees in the United States." 2017. https://research.fs.usda.gov/download/treesearch/53420.pdf
[45] Orloff, Whitney. "Greening Without Displacement: The USDA's Urban Forestry Approach." 2025. https://www.eesi.org/articles/view/greening-without-displacement-the-usdas-urban-forestry-approach#:~:text=Today%2C%20over%2080%25%20of%20Americans,to%20all%20other%20land%20types
[46] Oliveira, Williams, Jéssica Luiza S. Silva, Marcelo Tabarelli, and Ariadna V. Lopes. "Benefits of Urban Trees to People and Their Potential Contribution to All the 17 Sustainable Development Goals." 2026. https://www.sciencedirect.com/science/article/pii/S2666719326000543
[47] Alivio, Mark Bryan, Matej Radinja, Mojca Šraj, and Nejc Bezak, "An Evaluation of the Stormwater Runoff Reduction of Two Distinct Tree Species to Support Urban Greening as Nature-Based Solutions." 2025. https://www.sciencedirect.com/science/article/pii/S1618866725001268
[48] NYC Urban Forest Plan 2026. https://www.urbanforestplan.nyc/
[49] Public Act 23-206: https://www.cga.ct.gov/2023/sum/pdf/2023SUM00206-R02SB-00896-SUM.pdf

- Fully recognize and incorporate existing urban forest and green space areas into land use and planning documents and reports within a given city or urban landscape; development of local policies such as tree ordinances; additional state-level regulatory incentives or availability of grant funding could facilitate planning efforts. As needed, look to engage with other professionals and networks (i.e., CT Urban Forest Council) to find planning document examples, approaches, and models to refer to that will help create greater consistency across municipalities in Connecticut.
- Define the current ownership, location, condition, and accessibility of the collective urban forest and green space resources and integrate information into a long-term, adaptive management plan to help improve key measurable metrics such as percent increase in urban tree canopy over time.
- Ensure urban forest and green space plans are supported by comprehensive Geospatial Information System (GIS) assessments that allow for the accurate inventory and tracking of urban tree health and species diversity with direct links to maintenance interventions in a respective master urban tree canopy plan.

Planting and Maintenance

- Planting efforts should account for proper site and species selection. Native species should be considered where conditions allow, especially native species that are resilient to urban heat island effects and other environmental challenges of urban landscapes. Be sure to encourage and engage residents in the planting efforts.
- Direct attention towards developing a mixture of age and size classes to help increase the ability of current and future urban tree canopies to withstand disease, pests and pathogen outbreaks, and other environmental disturbances.
- Work towards the 10-20-30 guideline for species diversity goals for a particular area of focus. The guideline prescribes that a sustainable urban tree population should contain no more than 10% of any single species, 20% of any genus, or 30% of any family.[50]
- Ensure that planting sites are prepared to accommodate additional trees through consideration of receiving soil conditions and adequate growing space. Receiving soils should be enhanced with the addition of nutrients and organic matter to help with fertility and soil moisture requirements. Tree pits should be as large as possible but no smaller than 4’ by 4’.
- Planting and post-planting require proper planting techniques that emphasize protecting root structure as well as regular watering of newly planting trees (particularly immediately after installation during the hotter/drier summer months) and structural pruning early on.
- Proactive maintenance and pruning of mature trees is critical to maintain health, improve structure, and minimize safety hazards over the long term.

Community Engagement and Outreach

[50] Michael R. Freiburger, Colleen Murphy-Dunning, Danica A. Doroski, P. Mark Ashton, Jacob D.J. Peters, “The 10/20/30 planting rule aligns with traditional plant diversity metrics across spatial scales.” 2025. https://www.sciencedirect.com/science/article/pii/S1618866725004467

- Conduct community-based efforts that focus on opportunities for residents to help with tree planting and care such as watering, which will help with greater awareness amongst the community and foster greater stewardship in the immediate and long-term life cycle of urban tree canopies.[51]
- Assess and justify planting efforts to reduce the inequitable distribution of urban tree canopy in cities in Connecticut.

Leadership, Governance, and Funding

- Secure commitment of leadership to require the incorporation of these BMPs into new redevelopment or development projects, launching and protecting policies, regulations, by-laws that favor urban forest management, community engagement and public support, and identification and application of funding for Urban Forestry and Green Space maintenance and improvements.
- Establish and strengthen partnerships between municipal staff with local and state-wide non-profit organizations to advance local Urban Forestry and Green Space maintenance, improvements, and plans.

CT Example: **DEEP's Urban and Community Forestry (UCF) program**

DEEP's UCF program assists municipalities, non-profits, and community groups throughout the state in caring for and increasing their urban and community forests. Urban trees deliver key benefits to residents, including mitigation of extreme heat, improved air and water quality, and increased access to green space in communities disproportionately affected by climate change. Two recently funded projects through DEEP's UCF Program exemplify these benefits.

Bridgeport has the lowest tree cover in the state, leaving residents disproportionately exposed to extreme heat. To address this, Groundwork Bridgeport launched a tree planting and stewardship program in partnership with Emerge, a local workforce development organization. In addition to planting new trees, crews provide ongoing care for existing trees, recognizing that mature trees deliver greater cooling, air quality, and stormwater benefits than young trees alone. Groundwork Bridgeport also conducts inventories of existing trees and monitors their health, enabling strategic management of urban forests to maximize climate mitigation benefits.

South Norwalk is a low-canopy, high-impervious-surface neighborhood near a Norwalk Housing Authority complex. The Norwalk River Watershed Association, in partnership with the Norwalk Land Trust, is removing 7,000 square feet of pavement and replacing it with densely planted native trees and shrubs. By converting paved areas into green space, this initiative demonstrates how nature-based solutions can be implemented in highly developed neighborhoods where existing planting space may be limited.

These projects were funded through one-time resources made available by the Inflation Reduction Act; DEEP's Urban Forestry Program currently has no long-term funding to sustain these initiatives.

[51] Wirtz, Zach, Shannon Hagerman, Richard J. Hauer, and Cecil C. Konijnendik. "What Makes Urban Forest Governance Successful?" 2021. https://www.sciencedirect.com/science/article/pii/S1618866720307184

J. Increase access to open space for public health benefits

Background: For a relatively small state, Connecticut offers an amazing diversity of activities that are central to a $6 billion outdoor recreation economy (the second largest in New England) sustaining an estimated 50,275 jobs.[52] Ensuring access to open space sustains economic as well as significant public health benefits. Of course, the green spaces and recreational lands themselves provide for many additional ecosystem services discussed earlier in this chapter.

Access to open spaces provides significant physical and mental health benefits across all demographics. Several studies highlight the following advantages:

1. Physical Health Benefits:[53]
    - Improved sleep quality, reduced blood pressure, enhanced immune function, and increased physical activity.
    - Urban open spaces mitigate heat island effects, reduce pollution, and provide opportunities for outdoor activities, improving overall physical health.
2. Mental Health Benefits:[54]
    - Reduced stress, anxiety, and depression.
    - Enhanced cognitive function, attention span, emotional regulation, and mood.
    - Long-term benefits include improved academic performance and social cohesion.
3. Demographic-Specific Benefits:
    - Children: Nature exposure fosters curiosity, resourcefulness, and cognitive development while reducing screen addiction.[55,56]
    - Adults: Stress relief and improved mood, especially for those affected by urbanization and sedentary lifestyles.
    - Seniors: Accessible open spaces promote physical activity and mental well-being.[57]
    - People with Disabilities: Accommodations in parks enable equal access to nature's benefits. Experiences in nature help build self-confidence and self-reliance.[58]

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[52] U.S. Dept of Commerce: Bureau of Economic Analysis. "2024 Outdoor Recreation Economic Statistics for Connecticut." https://apps.bea.gov/regional/outdoor-recreation/pdf/Connecticut2024.pdf

[53] Jimenez MP, DeVille NV, Elliott EG, Schiff JE, Wilt GE, Hart JE, James P. "Associations between Nature Exposure and Health: A Review of the Evidence." 2021. https://pmc.ncbi.nlm.nih.gov/articles/PMC8125471/

[54] Bo-Yi Yang, et al. "Greenspace and human health: An umbrella review." 2021. https://www.sciencedirect.com/science/article/pii/S2666675821000898#abs0020

[55] Tillmann S, Tobin D, Avison W, et al. "Mental health benefits of interactions with nature in children and teenagers." 2018. https://jech.bmj.com/content/jech/72/10/958.full.pdf

[56] Lomax T, Butler J, Cipriani A, Singh I. "Effect of nature on the mental health and well-being of children and adolescents: meta-review." 2024. https://www.cambridge.org/core/journals/the-british-journal-of-psychiatry/article/effect-of-nature-on-the-mental-health-and-wellbeing-of-children-and-adolescents-metareview/CDFA53EA8BEFFDA0613B80632F3FB18B

[57] Bole A, Bernstein A, White MJ. "The Built Environment and Pediatric Health." 2024. https://pubmed.ncbi.nlm.nih.gov/38105697/

[58] Movahed M, Martial L, Poldma T, Slanik M, Shikako K. "Promoting Health through Accessible Public Playgrounds." 2023. https://www.mdpi.com/2227-9067/10/8/1308

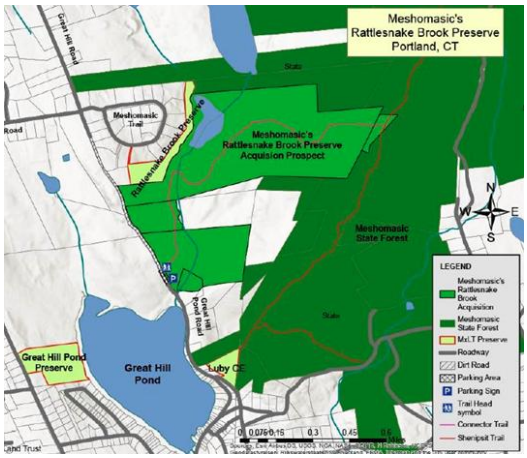
Increase access to open space for public health benefits

Best Management Practices (BMPs): There are several BMPs and policies to maximize the health benefits of open spaces:

1. **Ensure Equal, Accessible, and Safe Green Spaces**:
    - Develop parks within walking distance of neighborhoods, especially underserved areas.
    - Improve safety with solar lighting and community involvement.
    - Remove barriers such as limited hours, high costs, or transportation challenges.
2. **Integrate Nature into Schools and Daily Life**:
    - Incorporate nature-based learning in school curricula and create green schoolyards.
    - Schedule regular outdoor activities during school hours and encourage outdoor play at home.
3. **Support Nature-Based Programs**:
    - Fund community and school-based outdoor learning initiatives.
    - Train educators in nature-based teaching methods.
    - Partner with local organizations to provide guided outdoor activities.
4. **Promote Urban Planning for Open Spaces**:
    - Implement "15-minute city" concepts to ensure proximity to parks.
    - Engage community members in the design and maintenance of green spaces.

CT Example: **Meshomasic Rattlesnake Brook Preserve (OSWA) Grant**

There are many examples of projects that receive matching funds through the OSWA grant program that can be highlighted here. In May 2025, OSWA supported a grant to the Middlesex Land Trust (MLT) to acquire a 145.08-acre property that buffers and expands upon MLT's existing Rattlesnake Brook Preserve and the 15,000+ acre Meshomasic State Forest greenway. The acquisition protects the area's water quality and habitats, expands upon existing passive recreation with additional hiking trails, bird watching, fishing and improved access to hunting opportunities on State lands.



OSWA Report, May 2025

MLT will add a public access trail that connects to the Shenipsit Blue-blazed Hiking Trail, securing a key ridgeline section of the trail. The purchase will protect an existing wildlife migration corridor, a ridgeline forest, a large wetland and a stream corridor. Many habitats at risk from climate change will be better protected: forested swamps, core forests and riparian lands adjacent to cold water streams (Rattlesnake Brook). In addition to providing significant recreational and public health benefits, this acquisition will protect habitats of several threatened and rare species.

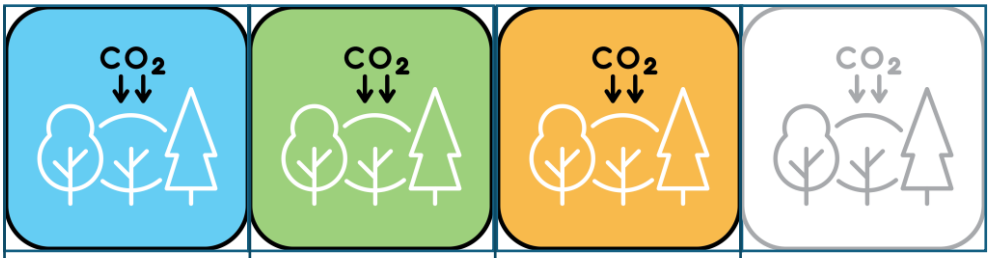
III. Evaluation of DEEP's NBS Programs

As noted earlier, Section 12(a) of P.A. 25-125 requires DEEP to evaluate how to integrate and advance nature-based solutions that address climate change, biodiversity loss, and restoring community resilience.

Section 12(a) specifically references 10 DEEP programs to be evaluated (these are shown with an asterisk * after the program name), and another 12 DEEP programs were added when the criteria for NBS were considered across all DEEP programs.

The evaluation of DEEP's NBS programs focuses on the integration of the 10 NBS best practices listed in Section 12(b) of P.A. 25-125 and highlighted in Chapter II. The integration of DEEP programs and best practices is shown in several ways in this Chapter:

- A matrix of "DEEP NBS Programs" on the following page provides an overview of all 22 NBS programs showing the integration between programs and practices "at a glance."
- A program description, funding source, and an analysis of which of the 10 best practices are integrated is included for each of the 22 programs.
- Color-coding shows the **Primary**, **Co-Benefit**, **Eligible**, or **N/A** relevance of an NBS practice to individual programs as follows:

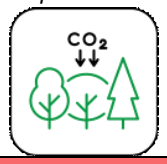


Primary Purpose	Co-Benefit	Eligible	Not Applicable
BLUE means this NBS practice is a **TOP PRIORITY** for a Program	**GREEN** means this NBS practice is a **ADDITIONAL BENEFIT** for a Program	**ORANGE** means this NBS practice is **ELIGIBLE** but not a top priority for a Program	**GREY** means the NBS practice is **NOT APPLICABLE** to a Program

The NBS programs of the seven (7) agencies that DEEP consulted with pursuant to Section 12(c) of P.A. 25-125 are evaluated in Chapter IV in a similar way.

A "Key to Icons and Color-Coding" is included as Appendix III. It may be useful to open Appendix III as a separate document for a side-by-side easy reference as you read through this report.

Following is the distribution of best practices across DEEP's 22 programs (BP is used as the abbreviation for "best practice" and BP icons are numbered from left to right).

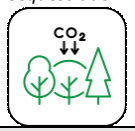
DEEP NBS Programs	*Carbon sequestration* 	*Control Invasives* 	*Soil Health* 	*Avoid Conversion* 	*Restore Habitats* 	*Climate-Smart Ag* 	*Stormwater Management* 	*Shoreline Protection* 	*Urban Forestry* 	*Open Space* 	**Totals**
Primary	0	3	0	5	9	0	6	4	6	9	42
Co-Benefit	11	5	8	5	6	3	6	3	4	4	55
Eligible	3	3	2	5	2	4	2	0	3	3	27
Totals	14	11	10	15	17	7	14	7	13	16	124

The number of DEEP NBS programs that rank best practices as **Primary** focus areas have the strongest association with restoring habitats, protecting open space, and stormwater management. At the same time, DEEP programs are under-represented in best practices supporting carbon sequestration, soil health, and climate-smart agriculture (not that this is a strength typically associated with DEEP's mission). It's important to note that urban forestry – one of the current primary top echelon focus areas of DEEP programs – will soon become an under-represented best practice focus area because three federally-funded urban forestry programs have been targeted for federal funding cuts or elimination.

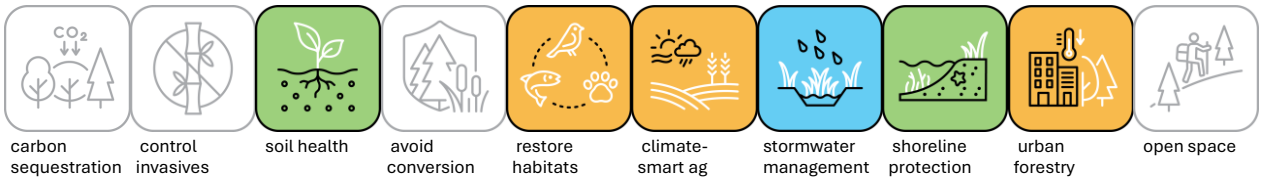
The number of DEEP NBS programs ranking best practices as a **Co-Benefit** have the strongest association with carbon sequestration, soil health, restoring habitats, and stormwater management. In contrast, DEEP programs are under-represented in supporting best practices associated with shoreline protection.

No specific conclusions are made about NBS programs based on which best practices may be **Eligible** for support, but the general distribution across programs is shown above.

DEEP's 22 NBS programs are described individually with best practices identified for each throughout the rest of this chapter.

DEEP NBS Programs	*Carbon sequestration* 	*Control Invasives* 	*Soil Health* 	*Avoid Conversion* 	*Restore Habitats* 	*Climate-Smart Ag* 	*Stormwater Management* 	*Shoreline Protection* 	*Urban Forestry* 	*Open Space* 
Clean Water Act/Section 319 Grants	N/A	N/A	Co-benefit	N/A	Eligible	Eligible	Primary purpose	Co-benefit	Eligible	N/A
Clean Water Fund Grants	N/A	N/A	N/A	N/A	Co-benefit	N/A	Eligible	N/A	N/A	N/A
Coastal and Estuarine Land Conservation Program (CELCP)	N/A	N/A	N/A	Eligible	Co-benefit	N/A	N/A	N/A	N/A	N/A
DEEP Climate Resilience Fund (DCRF)	Co-benefit	N/A	Co-benefit	Co-benefit	Co-benefit	Co-benefit	Primary purpose	Primary purpose	Primary purpose	Co-benefit
DEEP Management of Public Lands	Co-benefit	Co-benefit	Eligible	Primary purpose	Primary purpose	Eligible	Eligible	Co-benefit	Eligible	Primary purpose
Dingell-Johnson Act/Sport Fish Restoration Programs	N/A	Eligible	N/A	Eligible	Primary purpose	N/A	N/A	Co-benefit	N/A	Primary purpose
Forest Landowner Assistance	Eligible	Primary purpose	Eligible	Eligible	Primary purpose	Eligible	N/A	N/A	N/A	N/A
Forest Legacy Program (FLP)	Co-benefit	N/A	N/A	Primary purpose	Co-benefit	N/A	N/A	N/A	N/A	Eligible
Highlands Conservation Act	Co-benefit	N/A	N/A	Primary purpose	N/A	N/A	Co-benefit	N/A	Co-benefit	Primary purpose
Land and Water Conservation Fund Programs	Co-benefit	Co-benefit	N/A	Co-benefit	Co-benefit	N/A	Co-benefit	N/A	Primary purpose	Primary purpose
LIS Ecosystems Grant Program	N/A	N/A	N/A	N/A	Primary purpose	N/A	Primary purpose	Primary purpose	N/A	N/A
Long Island Sound Partnership (LISP)	N/A	Co-benefit	Co-benefit	Eligible	Primary purpose	Eligible	Primary purpose	Primary purpose	Eligible	Co-benefit
Open Space and Watershed Land Acquisition Grants (OSWA)	Co-benefit	N/A	N/A	Primary purpose	N/A	N/A	Co-benefit	N/A	Co-benefit	Primary purpose
Pittman-Robertson Act Programs	Co-benefit	Eligible	Co-benefit	Eligible	Primary purpose	N/A	N/A	N/A	N/A	Eligible
Recreational and Natural Heritage Trust Program (RNHT)	Co-benefit	N/A	N/A	Primary purpose	N/A	N/A	Co-benefit	N/A	Co-benefit	Primary purpose
Recreational Trails Grant Program	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Primary purpose
Technical Service Provider Recruitment and Retention Program	Co-benefit	Co-benefit	Co-benefit	Co-benefit	Co-benefit	N/A	N/A	N/A	Co-benefit	N/A
Urban and Community Forestry Planning	Co-benefit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Primary purpose	Co-benefit
Urban Forest Equity Grant/Trees for Communities	Eligible	Eligible	Co-benefit	N/A	Eligible	N/A	Co-benefit	N/A	Primary purpose	Primary purpose
Urban Forested Natural Areas and Riparian Corridor Restoration Grant	Eligible	Primary purpose	Co-benefit	N/A	Primary purpose	N/A	Primary purpose	N/A	Primary purpose	Eligible
Urban Green & Community Garden (OSWA)	Co-benefit	Co-benefit	N/A	Co-benefit	Primary purpose	Co-benefit	Primary purpose	N/A	Primary purpose	Primary purpose
Wetland Habitat and Mosquito Management (WHAMM)	N/A	Primary purpose	Co-benefit	Co-benefit	Primary purpose	Co-benefit	Co-benefit	Primary purpose	N/A	Co-benefit

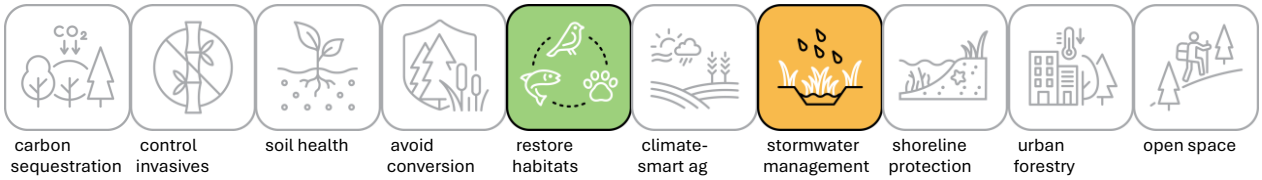
Clean Water Act/Section 319 Grants*



Funding source: Federal/EPA (60%) + State (40%)

Clean Water Act Section 319 grants from EPA to states, territories, and tribes support a wide variety of activities including technical assistance, financial assistance, education, training, technology transfer, demonstration projects and monitoring to assess the success of specific nonpoint source pollution implementation projects.

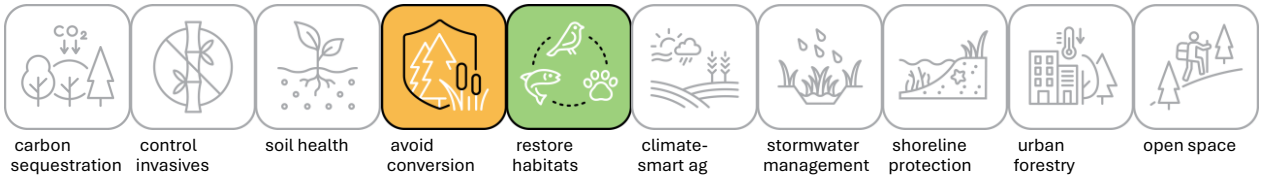
Clean Water Fund Grants*



Funding source: Federal/EPA + State/Bonding

Clean Water Fund grants and low-interest loans support investments, primarily by municipalities, in wastewater infrastructure including treatment plant upgrades, sewer overflow control, nutrient removal for Long Island Sound, and climate resilience projects, administered by DEEP. Funding comes from federal EPA grants and state bonds, supporting projects to improve water quality, public health, and infrastructure resilience, with a focus on combined sewer overflows (CSOs) and green infrastructure.

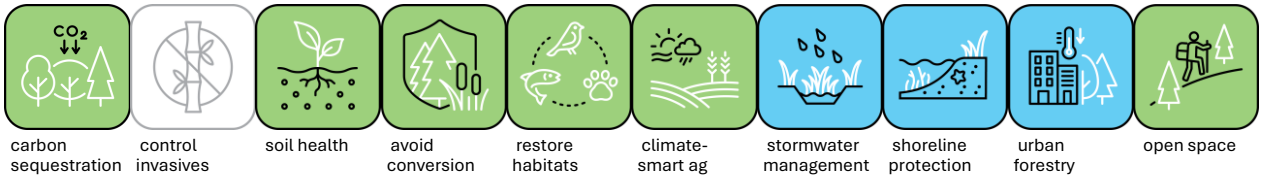
Coastal and Estuarine Land Conservation Program (CELCP)



Funding source: Federal/NOAA

The Coastal and Estuarine Land Conservation Program (CELCP) provides federal funds via NOAA to protect critical coastal lands through acquisition or easements, with state implementation managed by DEEP and support from the Connecticut Land Conservation Council (CLCC) for land trusts. Key funding opportunities for land trusts include the federal CELCP, CLCC's own programs like LEAP and Transaction Assistance Grants (TAG), and DEEP's Open Space & Watershed Land Acquisition Grants, often using federal match funds.

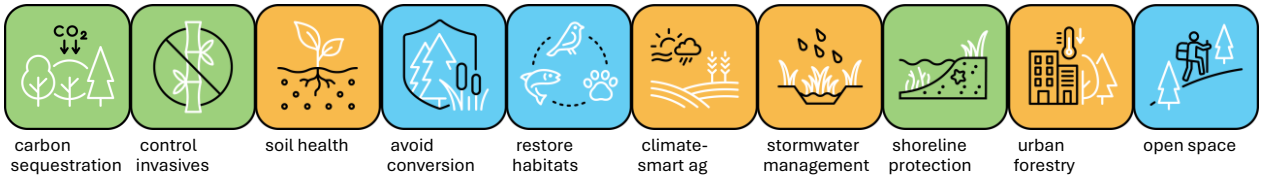
DEEP Climate Resilience Fund* (DCRF)



Funding source: State/Bonding

The DEEP Climate Resilience Fund (DCRF) is authorized pursuant to CGS Sec. 16-243y to support projects that protect communities and critical infrastructure from extreme weather. This opportunity is open to municipalities, non-profit organizations, and other entities, and includes new funding categories that will support a wide range of community and energy resilience projects from microgrids to flood mitigation projects. This program has made funding available for measures as diverse as flood control projects, climate-smart improvements to energy infrastructure and other community lifelines, wildfire prevention strategies, nature-based solutions for cooling urban centers, energy resilience measures, and other innovative resilience projects.

DEEP Management of Public Lands

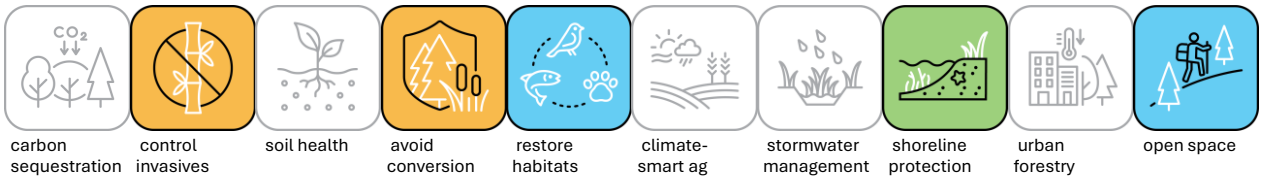


Funding source: State GF/Passport to the Parks Fund

Although the focus of this report is on the "funding programs" of DEEP and other state agencies, there are many significant efforts, such as DEEP's long legacy of managing lands for the public, that may not neatly fit into that organizing principle but are just as tied to NBS.

Since the 1600's, Connecticut state fish and game agencies have played a critical role in managing wildlife populations on behalf of the citizens. Today, the state supports carbon sequestration and storage, biodiversity, and ecosystem resilience, as well as clean drinking water, recreation, and many other public benefits across 262,000+ acres comprised of 142 state parks and forests, over 90 wildlife management areas cover, and other public lands managed in ways that are integrally linked with nature-based solutions.

Dingell-Johnson Act/Sport Fish Restoration Programs

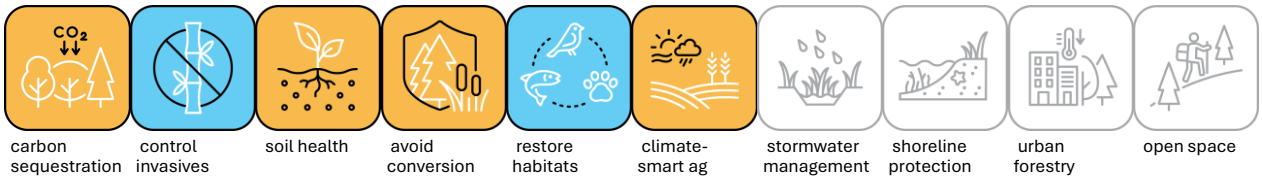


Funding source: Federal (U.S. Fish & Wildlife Service)

Since 1950, the Sport Fish Restoration Act (Dingell-Johnson Act) has provided funds for states to conserve and restore sport fish species and habitats. These funds also support programs that connect people with nature through outdoor recreation and aquatic resource education programs.

Revenue comes from manufacturers' excise taxes on sport fishing equipment, import duties on fishing tackle and pleasure boats, and a small engine and motorboat fuel tax.

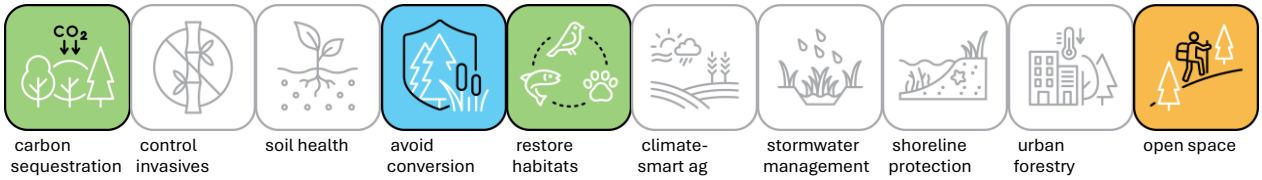
Forest Landowner Assistance



Funding source: Federal (USDA Natural Resources Conservation Service)

Of Connecticut's ~1.8 million forested acres, approximately 73% are privately owned by individuals, families, land trusts, tribal owners, clubs, and corporate owners. The Forest Landowner Assistance program is a partnership effort between DEEP Forestry, the Connecticut Soil and Water Conservation Districts, Connecticut Land Conservation Council, & the Connecticut Forest & Park Association to assist and equip private forest landowners with resources necessary for them to take a more active role in understanding their forests with an eye to being better forest managers and land stewards. Better forest stewardship means that more communities benefit from healthy forests as they enhance our quality of life with ecosystem services such as clean air and water, wildlife habitat, biodiversity, climate benefits, foraging and game harvesting opportunities, recreational opportunities, and renewable forest products.

Forest Legacy Program (FLP)

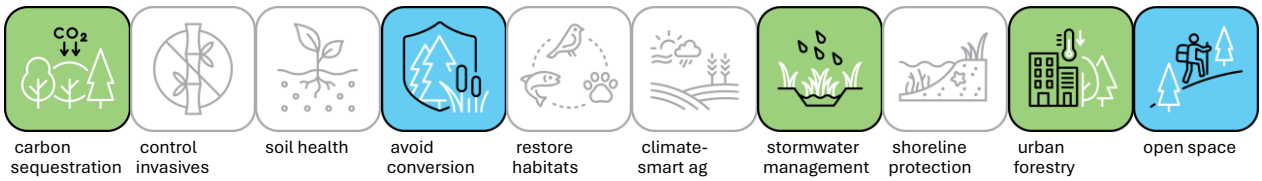


Funding source: Federal (USDA Forest Service)

DEEP partners with the US Forest Service to implement the Connecticut Forest Legacy Program (FLP). The FLP helps to identify and conserve environmentally important forests. The program protects working forests, those forests that protect water quality and provide habitat, forest products, opportunities for recreation and other public benefits.

The program encourages and supports acquisition of conservation easements. Conservation easements are legally binding agreements transferring a negotiated set of property rights from one party to another, without transferring property ownership. Most FLP conservation easements restrict development, require sustainable forestry practices, and protect various environmental values. There are also limited instances under the program where properties are purchased outright for their conservation values. In both instances, the federal government may fund up to 75% of program costs, with at least 25% coming from private, state or local sources.

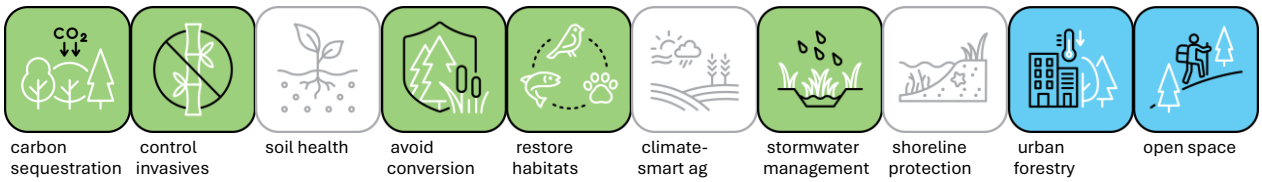
Highlands Conservation Act



Funding source: Federal (U.S. Fish & Wildlife Service) matching grants

The Highlands Conservation Act authorizes the U.S. Fish and Wildlife Service to provide grant funding from the Land and Water Conservation Fund (LWCF) to state agencies in the Highlands Region (CT, NJ, NY, and PA) to acquire land in partnership with municipalities, non-profits, and private landowners with a focus on protecting lands critical for drinking water, recreational, and cultural resources.

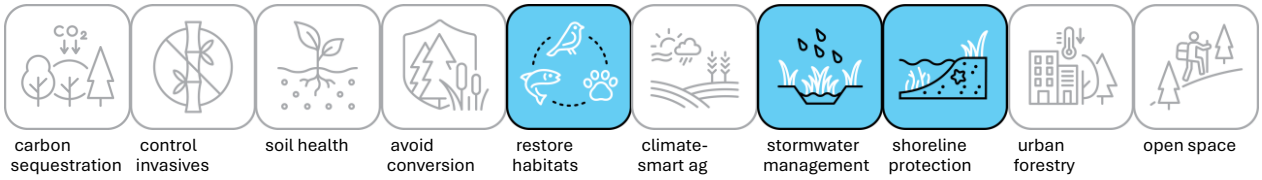
Land and Water Conservation Fund Programs (LWCF)



Funding source: Federal (National Park Service)

The Land and Water Conservation Fund (LWCF) is a federal grant program administered by the Department of Interior, National Park Service. The goal of LWCF is to increase quality opportunities for outdoor recreation. It consists of a Federal Side and a State Side. The State Side program provides funding to the State of Connecticut, through DEEP, for recreational planning, acquisition of lands and waters, and facility development.

Long Island Sound Ecosystems Grant Program*



Funding source: Federal (EPA), Bipartisan Infrastructure Law

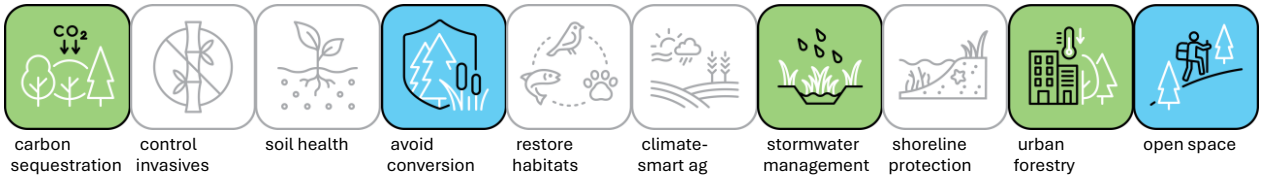
The Long Island Sound (LIS) Ecosystems Grant Program supports the planning and implementation of projects focused on coastal habitat restoration and green stormwater infrastructure across the state. There are two primary goals of the program: 1) to promote large-scale habitat restoration and enhance restoration planning, while also helping coastal communities and ecosystems adapt to changing environmental conditions; and 2) to further promote the application of green stormwater infrastructure techniques to reduce nonpoint source pollution, improving water resource quality. This program is supported by the EPA through the Bipartisan Infrastructure Law and is anticipated to have a maximum of two solicitations.

Long Island Sound Partnership*

Funding source: Federal (EPA) through Bipartisan Infrastructure Law

The Long Island Sound Partnership (LISP) was established under Sections 320 and 119 of the Clean Water Act to authorize support for joint efforts between EPA's National Estuary Program, the states of CT and NY, and a number of nonprofit, educational institution, and other partners dedicated to the implementation of the LIS Comprehensive Conservation and Management Plan (last revised in 2025). The CCMP provides the blueprint for collaboration with goals, objectives, actions, and funding strategy identifying short- and longer-term resource needs for the next 10 years.

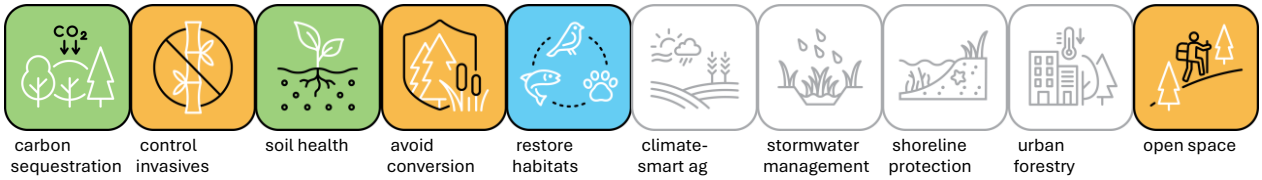
Open Space and Watershed Land Acquisition Grants* (OSWA)



Funding source: State/Bonding and Community Investment Act

The Open Space and Watershed Land Acquisition (OSWA) grant program (CGS Sec. 7-131d to 7-131k, inclusive) provides financial assistance to municipalities and nonprofit land conservation organizations to acquire land for open space, and to water companies to acquire land to be classified as Class I or Class II water supply property. Awards are granted to projects that offer the highest conservation and recreational value.

Pittman-Robertson Act and Programs



Funding source: Federal (U.S. Fish & Wildlife Service)

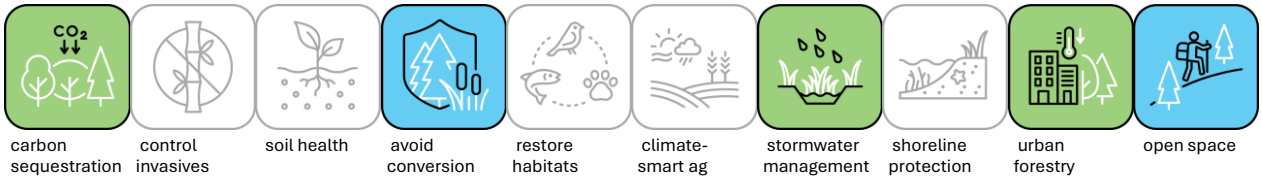
The Pittman-Robertson Wildlife Restoration Act (Pittman-Robertson) provides funding through the U.S. Fish and Wildlife Service for states to support wildlife restoration, conservation, and hunter education and safety programs. Funding for Pittman-Robertson programs comes from federal excise taxes on firearms, ammunition, and archery equipment. Funding is apportioned through three formula-based programs: the Wildlife Restoration Program (Section 4(b)), Basic Hunter Education and Safety Program (Sections 4(c) and 8(b)), and Enhanced Hunter Education and Safety Program (Section 10). FWS also allocates funding for a Multistate Conservation Grant Program (Section 11) and for general program administration (Section 4(a)). To be eligible for Pittman-

Robertson funding, the law requires states to have laws ensuring all hunting license fees are directed solely toward the administration of the state wildlife agency (16 U.S.C. §669).

The Wildlife Restoration Program provides funds to state fish and wildlife agencies to restore, conserve, manage, and enhance wild birds and mammals and their habitats. States must submit to FWS proposed wildlife-restoration projects or comprehensive fish and wildlife resource management plans to receive funds under this program. Among other purposes, the funds may be used to provide public access to wildlife resources; to acquire, restore, and manage wildlife areas; to conduct research on managing wildlife and its habitat; to facilitate public access for hunting or other wildlife-oriented recreation; and to maintain completed wildlife-restoration projects. Federal funds may be used for up to 75% of costs of implementing projects.

The Multistate Conservation Grant Program, amongst other priorities, authorizes grants for multistate conservation projects available to (1) states; (2) groups of states; or (3) nongovernment organizations (subject to certain conditions).

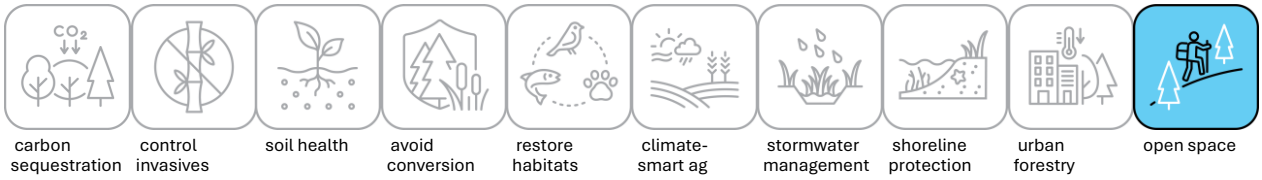
Recreational and Natural Heritage Trust Program (RNHTP)



Funding source: State/Bonding

The Recreation and Natural Heritage Trust Program (RNHTP) was established by the General Assembly in 1986 to help protect and preserve Connecticut's natural heritage. It is the Department's primary program for acquiring lands and waters to be added to the State's system of public Parks, Forests, Wildlife Management, recreational water access, and other natural open spaces. Through the RNHTP, the Department handles the acquisition of land of statewide significance which represents the ecological and cultural diversity of Connecticut, with a focus on unique features such as rivers, mountains, rare natural communities, scenic qualities, historic significance, connections to other protected land, and access to water.

Recreational Trails Grant Program



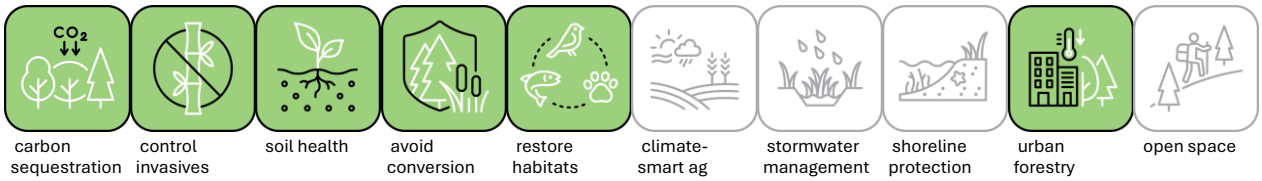
Funding source: State/Bonding

The CT Recreational Trails Grant program was established (CGS Section 23-103) to provide funding to private nonprofit organizations, municipalities, state agencies and tribal governments in support of trail projects including:

- Planning, design and construction of new trails (motorized and non-motorized).
- Maintenance and restoration of existing trails (motorized and non-motorized).

- Access to trails by persons with disabilities.
- Purchase and lease of trail construction and maintenance equipment.
- Acquisition of land or easements for a trail, or for trail corridors.
- Operation of educational programs to promote safety and environmental protection as related to recreational trails.

Technical Service Provider Recruitment and Retention Program

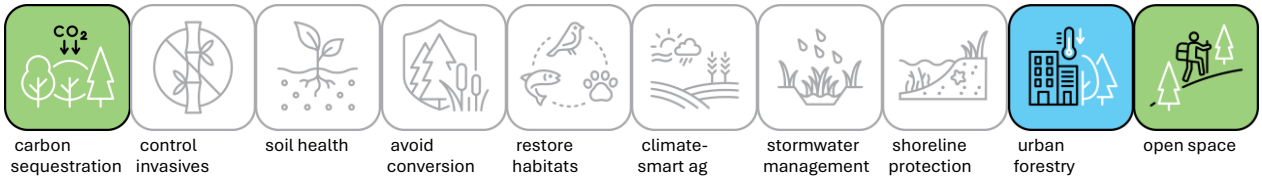


Funding source: Federal/USDA Natural Resources Conservation Service

The Technical Service Provider (TSP) Recruitment and Retention Program is a partnership between the CT NRCS, Connecticut Council on Soil and Water Conservation (CT CSWC), and the DEEP Forestry Division to pay foresters for their time to become a TSP or retain their status as a TSP. This professional development opportunity is open to certified Foresters who are licensed to practice Forestry in Connecticut. TSPs work with a woodland owner to offer planning assistance in the development of a Forest Management Plan to NRCS specifications and can also offer design and implementation services to the woodland owner. Most of the non-income producing forest management conducted on private lands in Connecticut is cost shared through NRCS' Environmental Quality Incentives Program (EQIP) and Conservation Stewardship Program (CSP), both of which require a current forest management plan. To receive NRCS cost share financial assistance for the development of a forest management plan in Connecticut, a private woodland owner must hire and work with a TSP.

This partnership helps meet the increasing need for TSPs to support cost-shared planning and forest practice implementation statewide.

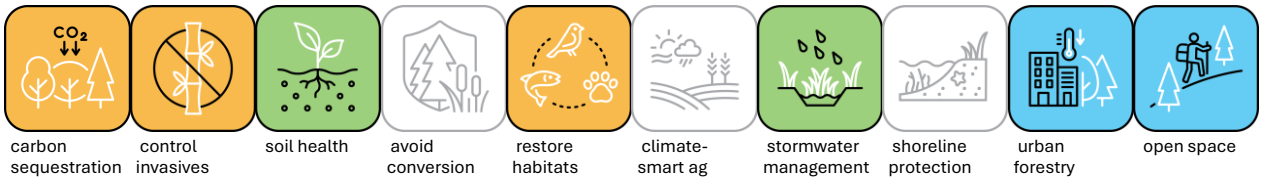
Urban and Community Forestry Planning*



Funding source: Federal/USDA Forest Service (may not be offered in future years)

The Urban and Community Forestry Planning Grant Program offers funding for municipalities and non-profit organizations to pursue planning projects such as tree inventories, management plans, or other monitoring programs that will help communities to make informed management decisions about their urban and community forests.

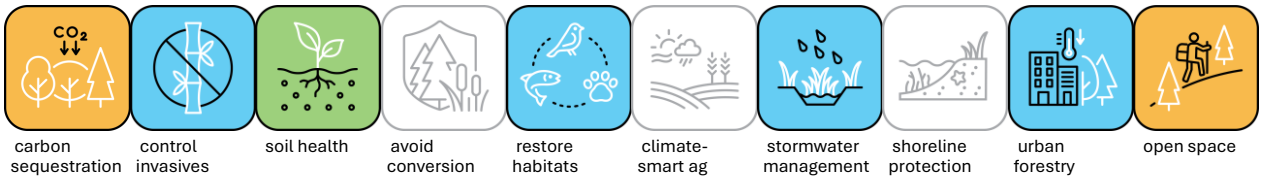
Urban Forest Equity Grant/Trees for Communities*



Funding source: Federal/IRA/USDA Forest Service (one-time funding may not be offered in future years)

Through the Inflation Reduction Act, funding was available to municipalities, nonprofits, and other eligible organizations to increase access to trees and the benefits they provide in low-tree canopy communities throughout Connecticut. This grant program provided financial support for projects that would increase tree cover or contribute to other urban forestry objectives such as improvement of forest health or utilization of urban wood. Projects were required to be rooted in community support and demonstrate efforts to meaningfully incorporate community needs into project design.

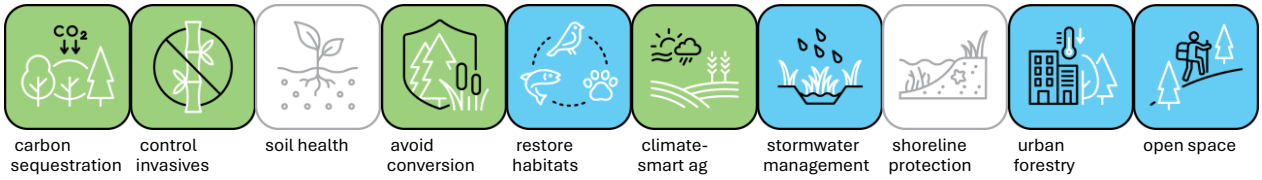
Urban Forested Natural Areas and Riparian Corridor Restoration Grant*



Funding source: Federal/BIL/IRA/USDA Forest Service (one-time funding, may not be offered in future years)

The Urban Forested Natural Areas and Riparian Corridor Restoration Grant was available to nonprofits and municipalities to support local land managers in their efforts to address forest health issues by providing funding for management interventions to promote the health and resilience of urban natural forested areas and riparian corridors. Such projects included, but were not limited to, chemical or mechanical removal of invasive plant species, vine removal, tree planting, and other site treatments intended to slow the spread of invasive plants and promote regeneration of native tree species.

Urban Green & Community Garden Grants* (OSWA/UGCG)

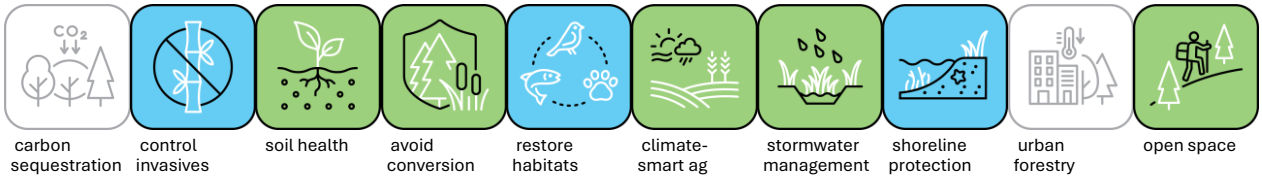


Funding source: State/Bonding and Community Investment Act

DEEP's Urban Green and Community Gardens Grant Program (UGCG) is available to municipalities and non-profits with projects in distressed municipalities, targeted investment communities and environmental justice communities. The program (CGS Sec. 7-131d – 7-131k, inclusive) provides funding assistance to develop or enhance urban green spaces for public enjoyment and/or

environmental education. Promotion of open space in an urban setting may include, but may not be limited to, the development of a community garden or reclaiming and enhancing existing open space for the public's use. Grants are awarded to projects that demonstrate the highest ability to benefit neighborhoods near urban population centers.

Wetland Habitat and Mosquito Management (WHAMM)



Funding source: State

The Wetland Habitat and Mosquito Management (WHAMM) Program of the DEEP Wildlife Division uses an integrated approach to manage mosquitoes that includes larval (immature) and adult mosquito population monitoring, public education, and cultural, biological, and chemical control methods. The management of mosquitoes in Connecticut is a collaborative effort involving DEEP, the Connecticut Agricultural Experiment Station (CAES), and the Department of Public Health (DPH), with support from the Department of Agriculture and UCONN's Department of Pathobiology and Veterinary Science.

Where environmentally feasible, the Wetland Habitat and Mosquito Management (WHAMM) Program uses water management for source reduction and biological control of mosquitoes by making the sites 1) unsuitable for mosquito egg and larval development and 2) enhancing the area to provide open water habitat for natural mosquito predators, such as fish and birds. Water management provides more permanent control of mosquitoes than insecticides, resulting in a substantial reduction in insecticide applications and costs.

In tidal saltmarshes, a technique known as Open Marsh Water Management (OMWM) is the preferred method for controlling mosquitoes and enhancing or restoring wetland habitat. Unlike the parallel grid-ditch method used in the 1930s, which had adverse effects on tidal wetland hydrology and habitat, OMWM involves the selective excavation of shallow pools and ditches in mosquito-breeding areas. These pool and ditch networks are not connected directly to tidal channels and, therefore, do not drain at low tide. A higher water level is maintained in the pools, which provides habitat for fish and other wildlife and encourages revegetation of the surrounding marsh by native grasses. Mosquito management is achieved by modifying egg-laying sites and creating open water habitat for small, naturally abundant killifish, which prey on mosquito larvae and pupae. OMWM systems provide long-term control of mosquitoes, thus reducing the need to apply insecticides. If insecticides are required, DEEP employs integrated pest management strategies.

IV. Evaluation of Other State Agency NBS Programs

Section 12(c) of P.A. 25-125 requires DEEP to consult with the following seven (7) state entities for their review and input to this NBS Report:

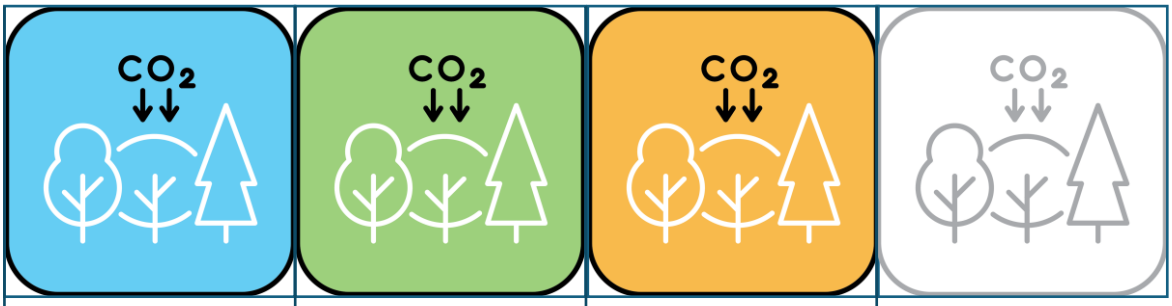
- Department of Agriculture
- Department of Housing
- Department of Insurance
- Department of Public Health
- Department of Transportation
- Office of Policy and Management
- The Connecticut Green Bank

Similar to the evaluation of DEEP's NBS programs in Chapter III, this chapter focuses on the integration of the NBS programs administered by these seven state entities with the 10 NBS best practices highlighted in Chapter II and listed in Section 12(b).

It's important to note that each of these consulting agencies was asked to identify its own NBS programs as well as the relative priorities of the best practices (based on the criteria in P.A. 25-125). Each agency was also asked to identify opportunities for advancement of NBS for consideration in Chapter V of this report.

Again, the integration of programs and best practices is shown in several ways in this Chapter:

- A matrix of "Agency NBS Programs" provides an overview of all NBS programs "at a glance."
- Each program includes a program description, funding source, and an analysis of which of the 10 best practices are integrated with that program.
- An evaluation of the importance of each best practice for each program is shown using the color coding as follows (an Icon Key is also available in Appendix III):



Primary Purpose	Co-Benefit	Eligible	Not Applicable
BLUE means this NBS practice is a **TOP PRIORITY** for a funding Program	**GREEN** means this NBS practice is an **ADDITIONAL BENEFIT** for a funding program	**ORANGE** means this NBS practice is **ELIGIBLE** but not a top priority for a funding program	**GREY** means the NBS practice is **NOT APPLICABLE** to the NBS program

Following is the distribution of best practices across the 26 NBS programs of these seven state agencies:

Other Agencies NBS Programs	*Carbon sequestration*	*Control Invasives*	*Soil Health*	*Avoid Conversion*	*Restore Habitats*	*Climate-Smart Ag*	*Stormwater Management*	*Shoreline Protection*	*Urban Forestry*	*Open Space*	Totals
Primary	**0**	**2**	**3**	**0**	**8**	**0**	**1**	**0**	**0**	**1**	15
Co-Benefit	**2**	**7**	**8**	**3**	**4**	**7**	**5**	**2**	**4**	**4**	46
Eligible	**3**	**5**	**4**	**3**	**5**	**4**	**6**	**3**	**3**	**1**	37
Totals	5	14	15	6	17	11	12	5	7	6	98

The number of NBS programs across these seven agencies that rank best practices as **Primary** focus areas have the strongest association with restoring habitats and lesser associations with soil health and best practices for controlling invasives. Several best practices are not identified as primary focus areas for any NBS program, notably carbon sequestration, avoiding conversion, climate-smart agriculture, shoreline protection, and urban forestry.

The number of NBS programs across seven agencies that rank best practices as a **Co-Benefit** have the strongest association with controlling invasives, soil health, and climate-smart agriculture. In contrast, several programs are under-represented in supporting best practices, notably carbon sequestration, avoiding conversion, and shoreline protection.

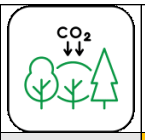
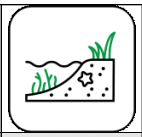
The best practices most **Eligible** for support include stormwater management, controlling invasives, and restoring habitats.

Considered cumulatively, the best practices considered by the greatest number of agency NBS programs include restoring habitats, soil health, and controlling invasives. The least considered best practices include carbon sequestration, shoreline protection, avoiding conversion, and protecting open space respectively.

26 NBS programs across seven agencies are described individually with best practices throughout the rest of this chapter.

A. Department of Agriculture

The Department of Agriculture (DoAg) works to support and grow the state's farming and aquaculture sectors by developing farms, promoting local products (like the CT Grown program), preserving farmland, managing animal health and regulations, and providing grants and resources for farmers. Its mission is to foster a healthy economic, environmental, and social climate for agriculture through programs for development, resource protection (like farmland preservation), and public education about agriculture's importance to Connecticut's economy and heritage. Because of the close connections between agricultural practices and land use, there are several programs of DoAg that involve nature-based solutions.

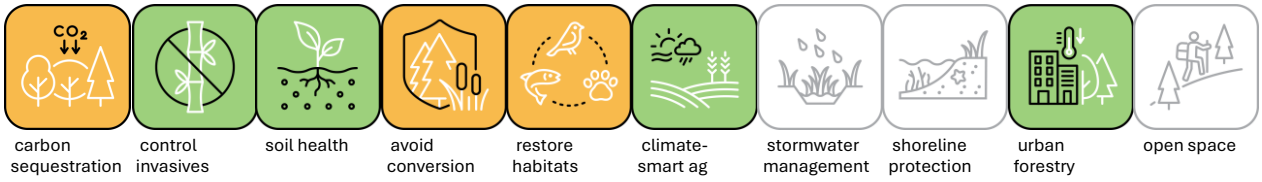
DoAg NBS Programs										
Ag Enhancement Grant	N/A	Eligible	Eligible	N/A	Eligible	Eligible	N/A	N/A	N/A	N/A
Climate Smart Ag & Forestry Grant	Eligible	Co-benefit	Co-benefit	Eligible	Eligible	Co-benefit	N/A	N/A	Co-benefit	N/A
Farm Transition Grant	N/A	Eligible	Eligible	N/A	Eligible	Eligible	N/A	N/A	N/A	N/A
Farmland Restoration, Climate Resiliency, & Disaster Preparedness Grant Program	Eligible	Co-benefit	Co-benefit	Eligible	Eligible	Co-benefit	N/A	N/A	Eligible	N/A
Specialty Crop Block Grant Program	N/A	Eligible	Eligible	N/A	Eligible	Eligible	Eligible	N/A	N/A	N/A

Agricultural Enhancement Grant

Funding source: Community Investment Act

Supports municipalities, nonprofits, and councils of government with projects that support agricultural viability.

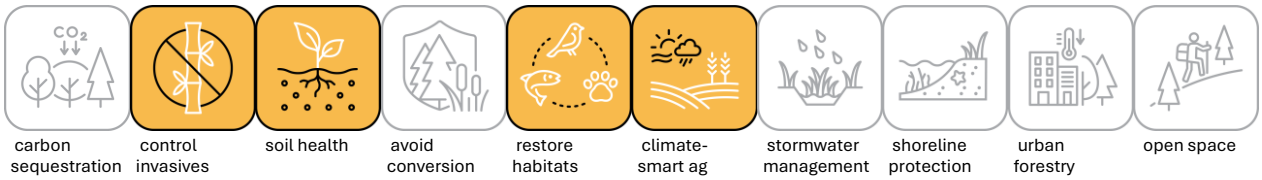
Climate Smart Agriculture & Forestry Grant



Funding source: State special allocation

Awarded in FY 2024 with projects still ongoing to provide funds to farmers to support implementation of climate smart ag and forestry practices.

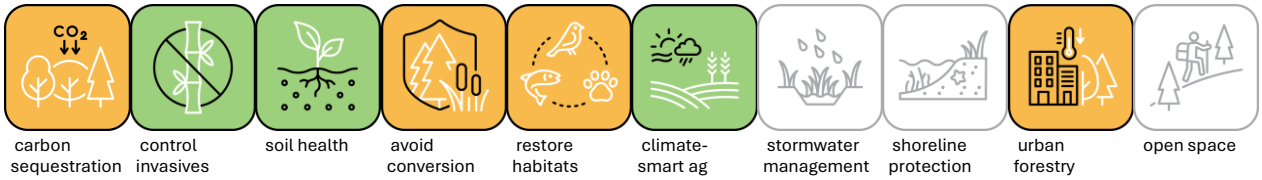
Farm Transition Grant



Funding source: Community Investment Act

Supports farms looking to expand, diversify, and transition their agribusinesses.

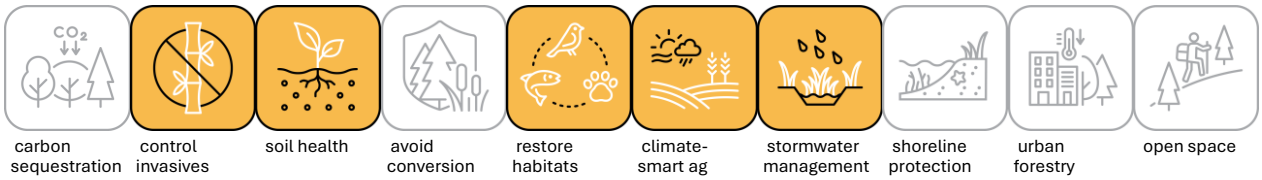
Farmland Restoration, Climate Resiliency & Disaster Preparedness Grant



Funding source: State Bonding

Supports farmers with conducting farmland restoration and improving climate resiliency on farms through the development of a Farmland Restoration & Climate Resiliency Plan.

Specialty Crop Block Grant



Funding source: Federal (USDA Agricultural Marketing Service)

The Specialty Crop Block Grant program provides funds to eligible applicants to increase the competitiveness of specialty crops through an annual allocation.

B. Department of Housing

The Department of Housing (DOH) works to ensure everyone has access to quality, affordable housing by promoting development, preservation, and revitalization, aiming to eliminate homelessness and strengthen communities through funding, policy, and partnerships with local entities. They manage programs for renters (like Rental Assistance & Section 8), homeowners (like down payment assistance), and developers (grants, loans, tax credits) for new construction, rehabilitation, and special needs housing. DOH leads state housing policy, working with various agencies and stakeholders to create inclusive housing opportunities for all income levels.

DOH did not identify any specific NBS funding programs that it administers. However, DOH did share its “Sustainability Values and Goals” statement (updated August 2025) which is provided as guidance to developers of housing projects funded by the agency. Some of the top-line values and goals that can be related to nature-based solutions include the following statements:

- DOH promotes housing projects that emphasize convenient walkable designs, biking infrastructure and access to public transportation …
- DOH promotes protection of our finite natural lands by supporting sustainable land use practices …; and
- DOH promotes climate resilience, energy efficiency, and sustainable building standards …

Although the DOH values and goals are guidance to housing developers rather than required attributes, there are examples of projects such as Resilient Bridgeport which advances several of DOH's sustainability values and goals.

Resilient Bridgeport consists of two integrated projects in the South End of Bridgeport, the "Rebuild by Design" (RBD) Project and the "Flood Risk Reduction Project" working together to reduce flood risk, enhance climate resilience, and support the long-term viability of this highly vulnerable coastal community.

The RBD Project, which is currently under construction with a projected completion date of June 2027, emphasizes nature-based and adaptive infrastructure, including an elevated Johnson Street Extension to maintain emergency access, targeted roadway re-grading to improve drainage, and a 2.5-acre stormwater park with a pump station system to capture, treat, and convey stormwater to Cedar Creek. These features reduce chronic flooding, improve water quality, and create community green space.

Complementing this, the planned Flood Risk Reduction Project provides coastal protection for approximately 64 acres through a system of buried steel sheet pile (I-wall), earthen berms, and concrete T-walls with deployable flood gates, along with raised roadways for dry egress. A pump station and green infrastructure such as bioswales and rain gardens manage internal drainage and discharge filtered stormwater to Bridgeport Harbor.

Together, these projects integrate gray and green infrastructure to lower flood risk, maintain critical access during emergencies, and advance nature-based solutions that align with DOH's goals for sustainable land use, climate resilience, and enhanced community livability.

C. Department of Insurance

The Connecticut Insurance Department (CID) is protects consumers by regulating the state's insurance industry, ensuring companies act fairly, remain financially solvent, and provide accessible products, all while fostering a competitive market through enforcement, education, and outreach, and working with national bodies like the National Association of Insurance

Commissioners (NAIC). Because insurance is a global industry, the CID also works with the International Association of Insurance Supervisors (IAIS) to enhance supervision and use of best practices worldwide. CID handles consumer complaints, licenses agents, and oversees company operations to safeguard policyholders' interests.

CID does not provide insurance directly and did not identify any specific NBS funding programs that it administers. However, CID did provide significant information about the connections between the insurance industry and climate/resiliency considerations.

For example, since 2022 the CID has been requiring the industry to participate in the climate disclosure survey which requires insurers doing business in Connecticut to disclose how they are considering the impacts of climate on their financial decisions. In 2022, insurance regulators adopted the Financial Stability Boards disclosure recommendations by the Task Force on Climate and Financial Disclosure (TCFD). Industry has been required to disclose annually their financial risk disclosures related to climate and resiliency in Connecticut. These include existing information available such as the NAIC Climate Risk Disclosure Survey, Connecticut Bulletin No. FS-44 (Guidance for Connecticut Domestic Insurers on Managing the Financial Risks for Climate Change), Own Risk Solvency Assessment (ORSA) Summary Report filings, and SEC-required disclosures, if applicable.

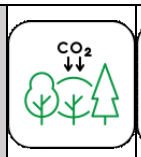
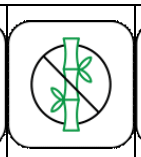
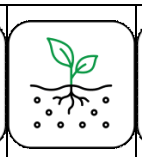
CID is able to review insurance providers to determine the following:

- The governance structure in place through which board members and senior management have oversight over material climate-related risks.
- How climate risks are incorporated into the company's overall business strategy.
- Whether the insurer considers the impact of climate change risks when determining its investment strategy and/or monitoring the risks in its investment portfolio.
- Whether the insurer's business continuity plan address a wide range of relevant natural and man-made disasters, such as climate change.
- Whether the insurer runs climate-based stress scenarios to determine the impacts on assets.
- Whether various catastrophe models are used to help establish appropriate underwriting and reinsurance standards.

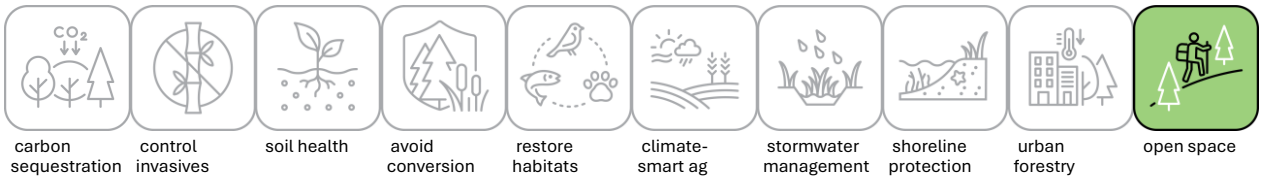
Specifically related to nature-based solutions, the CID continues to participate in and contribute to the Sustainable Insurance Forum (SIF). SIF is a global network of insurance supervisors and regulators launched in 2016 to address sustainability issues, particularly climate change, within the insurance sector. Convened by the United Nations Development Programme (formerly UNEP FI) with the International Association of Insurance Supervisors (IAIS), SIF aims to integrate environmental, social, and governance (ESG) factors into insurance supervision, covering over 90% of the global market. Several SIF workstreams, including the Transition Plans Working Group and the Capital and Supervisory Framework Working Group, provide opportunities for CID to consider further engaging on work relating to biodiversity and nature related risk to build on the 2021 SIF Scoping Study: Nature-related Risks in the Global Insurance Sector, and perhaps also on the 2024 UN Environment Programme report, Insuring a Resilient Nature-Positive Future: Global guide for insurers on setting priority actions for nature.

D. Department of Public Health

The Department of Public Health (DPH) is dedicated to protecting and improving the health and safety of all Connecticut residents through a diverse set of programs and services. DPH works to ensure communities have access to quality care. DPH monitors environmental factors like drinking water quality as well as responds to public health emergencies, licenses healthcare facilities and providers, provides health-related data and statistics, and more. There are several programs and policies at DPH that are related to NBS.

DPH NBS Programs										
Beaches Environmental Assessment and Coastal Health (BEACH) Act	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Co-benefit
Drinking Water State Revolving Loan Fund	N/A	Eligible	N/A	N/A	N/A	N/A	Eligible	N/A	N/A	N/A
Farm to School Grant Program	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Co-benefit	Co-benefit
Recreational activity permitting on water company land	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Primary purpose
Water Company Land Permitting	N/A	N/A	N/A	Co-benefit	N/A	N/A	Co-benefit	N/A	N/A	N/A

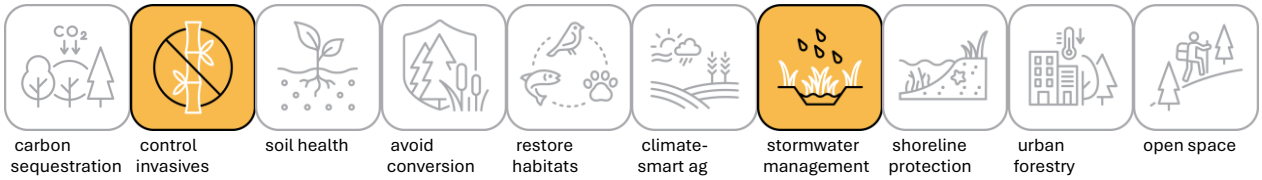
Beaches Environmental Assessment and Coastal Health (BEACH) Act



Funding source: Federal (U.S. EPA)

Under the BEACH Act, the EPA awards grant funding (typically funded) to CT DPH to monitor water quality. CT DPH utilizes CT DEEP and local health partners for the collection, transport, and testing of water samples from coastal state beaches. CT DPH compiles testing data and reports it to the EPA BEACON system. When bacteria levels are too high to safely recreate, the public is notified via beach advisories or closings.

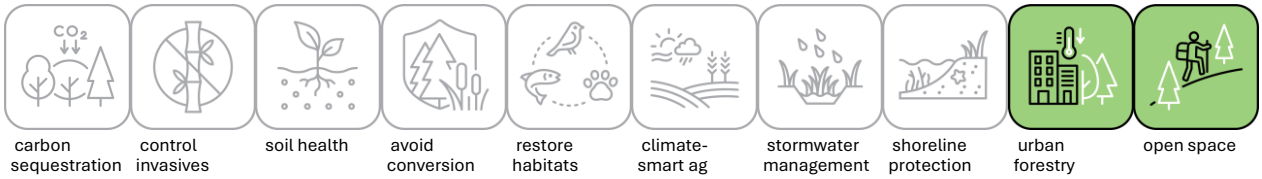
Drinking Water State Revolving Loan Fund (DWSRF)



Funding source: Federal (U.S. EPA) + 20% state match

Under DWSRF, the EPA provides a capitalization grant (typically funded) to CT DPH based on the results of the Drinking Water Infrastructure Needs Survey and Assessment. The state then contributes an additional 20% match. These comprise the revolving loan fund, which provides loans and other assistance to water systems to address risks to human health, ensure compliance with the Safe Drinking Water Act, and assist systems with the most critical need.

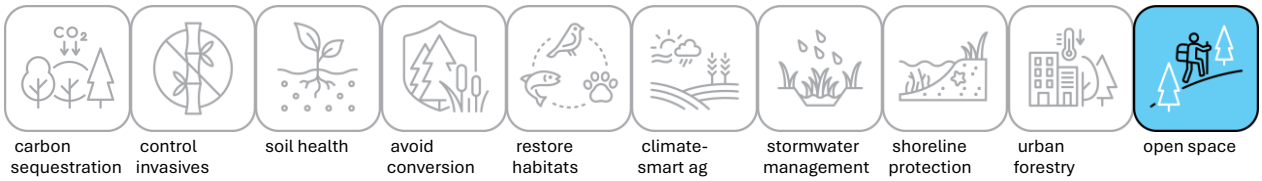
Farm to School Grant Program



Funding source: Federal (USDA Food and Nutrition Service)

Under the USDA's Food and Nutrition Service, CT DPH was awarded funding (funded once) from 2020-2024 for the Farm to School Grant Program, supporting Farm to Early Care and Education programming like gardening, agricultural education, and improving access to local produce for meals and lessons. Most recently, funds from SNAP-Education and Preventative Health and Health Services Block Grant helped sustain these efforts. All funding has lapsed as of 10/1/2025, though community gardens remain functional at sites that worked to establish them. CT DPH plans to apply for a FY 2026 Farm to School Grant to continue existing work, evaluate program effectiveness, and identify sustainability mechanisms.

Recreational Activity Permitting on Water Company Land



Funding source: n/a

CGS Section 25-43c states that recreational activities, which could include hiking or shoreline or boat fishing, may be allowed by water companies on reservoir and aquifer protection areas, but only with rules developed in consultation with CT DPH and, in some instances, CT DEEP. CT DPH must issue a permit for these activities, and the agency can impose conditions or prohibit recreation altogether to protect drinking water quality. Importantly, Section 25-43c explicitly allows public recreational access on certain water-company lands and reservoirs through the permitting process.

Water Company Land Permitting

Funding source: n/a

CGS Section 25-32 requires that a water company must obtain a permit from the Commissioner of Public Health to sell, lease, assign, or change the use of any water company land, and provides restrictions for the sale of water company land and allowable and prohibited uses of water company land. The limits on the sale, development, and alteration of lands provide protection for forests and wetlands, which could have positive downstream effects on water quality.

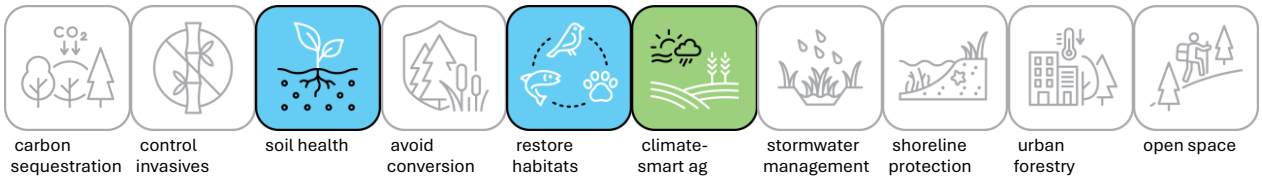
E. Department of Transportation

The Department of Transportation (CTDOT) provides safe, efficient, and accessible multi-modal transportation for Connecticut residents, managing highways, rail (CTrail, Metro-North), buses, and ferry operations, with a core mission of "improving lives through transportation." CTDOT focuses on safety, economic vitality, and quality of life through infrastructure maintenance, planning, and operations. With over 3,715 miles of state-maintained state roads to steward in addition to responsibilities associated with bus, rail, ferry, ridesharing, bridges, and related infrastructure, the CTDOT has a significant presence throughout the state.

CTDOT has several programs and project specifications that can be associated with specific individual projects, funding opportunities, and site characteristics appropriate for investments in nature-based solutions.

CTDOT NBS Programs										
Aquatic Organism Passage	N/A	N/A	Primary purpose	N/A	Primary purpose	Co-benefit	N/A	N/A	N/A	N/A
Compensatory Mitigation	Co-benefit	Primary purpose	Primary purpose	Co-benefit	Primary purpose	N/A	Co-benefit	Co-benefit	N/A	Co-benefit
Control and Removal of Invasive Vegetation	N/A	Primary purpose	Co-benefit	N/A	Primary purpose	N/A	N/A	N/A	N/A	N/A
Fisheries Enhancements	N/A	N/A	Co-benefit	N/A	Primary purpose	N/A	N/A	N/A	N/A	N/A
Monarch Candidate Conservation Agreement with Assurances (CCAA)	N/A	Co-benefit	Co-benefit	N/A	Primary purpose	N/A	N/A	N/A	N/A	N/A
MS4 Water Quality BMPs	N/A	N/A	N/A	N/A	Co-benefit	N/A	Primary purpose	N/A	N/A	N/A
Pollinator Program	N/A	Co-benefit	Co-benefit	N/A	Primary purpose	N/A	N/A	N/A	N/A	N/A
Site-Specific Seed Mixes	N/A	Co-benefit	Co-benefit	N/A	Primary purpose	Co-benefit	Co-benefit	Co-benefit	N/A	N/A
Soil Health Specifications	N/A	Co-benefit	Primary purpose	N/A	Co-benefit	Co-benefit	N/A	N/A	Co-benefit	N/A
Stream Crossing Design / Wildlife Shelves Crossing	N/A	N/A	N/A	N/A	Primary purpose	Co-benefit	Co-benefit	N/A	N/A	N/A

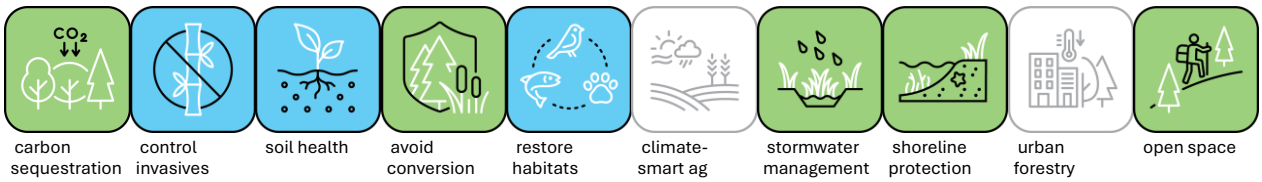
Aquatic Organism Passage



Funding source: Federal/State (Project Specific)

The purpose of **aquatic organism passage** in construction projects and permits is to facilitate the movement of aquatic species, ensure regulatory compliance, protect natural resources, mitigate indirect impacts, enhance ecosystem resilience, and foster collaboration with regulatory agencies. Commitments for protecting migratory and resident fish populations include in-water time of year (TOY) restrictions, maintaining a minimum hydraulic opening within watercourses, soft starts for vibratory impacts (1 hour before and after sunrise/set), lighting preventing measures, and confinement of in-water work areas.

Compensatory Mitigation

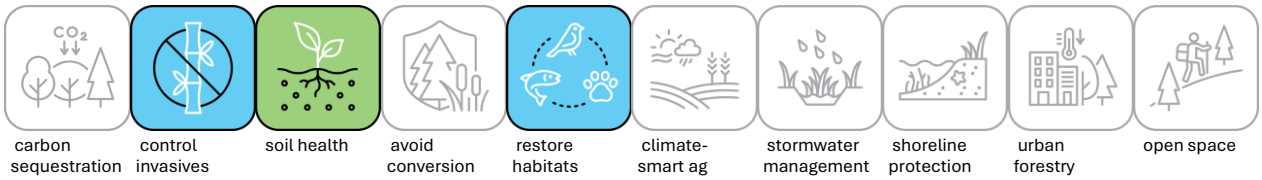


Funding source: Federal/State (Project Specific), In-Lieu Fee Program (AudubonCT)

The mitigation process is closely tied to the CTDOT permit application and regulatory review process, which is coordinated by the Office of Environmental Planning (OEP). The purpose for mitigation is to compensate for permanent impacts to the regulated area(s). Temporary impacts may be considered for additional compensation to account for temporal losses if the temporary impacts are in place for extended durations on a project. CTDOT ensures that all environmental regulations, laws, and practices are adhered to and that any necessary permits are obtained before construction begins. Mitigation is tied to the total permanent impact a project may have and therefore often requires mitigation to compensate for those impacts by creating or enhancing new wetland habitat. The size of the mitigation areas would be based on ratios (2:1 or 3:1 or 4:1) that depend upon the type of resources being impacted.

Special contract provisions to develop a site provide the means and methods for the contractor(s) to complete the necessary work to adhere to the conditions of the permit and CTDOT regulatory commitments. These provisions play a vital role in safeguarding sensitive ecosystems during construction projects.

Control and Removal of Invasive Vegetation

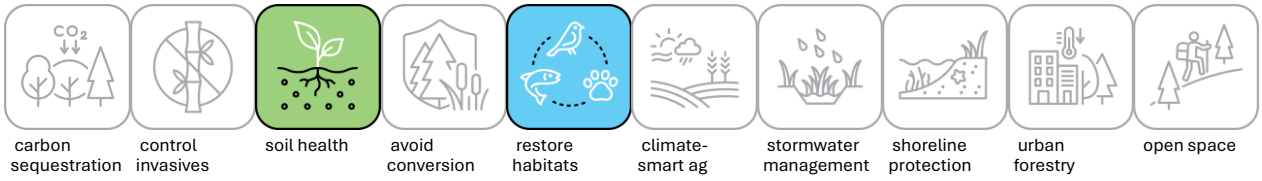


Funding Source: Federal/State (Project Specific)

CTDOT's project specification provides the means and methods to control invasive species on projects. Additionally, this specification can be used for Maintenance Highway Operations for use along various state routes.

The specification for the control and removal of invasive species includes the development and implementation of an Invasive Vegetation Removal Plan (IVRP). The IVRP requires identification and treatment methods for the control of invasive vegetation onsite. This work also includes the removal and off-site disposal of invasive vegetation from within the project limits in accordance with the accepted IVRP. Invasive control and removal application(s) treat all areas within the optimal growing season (between April 15 and October 15). Additional spot treatment measures may be warranted within the same optimal growing season in any year throughout the life of the contract including a one-year warranty if full control and removal of the invasive species is not achieved within the project limits as outlined in the IVRP or as accepted by the CTDOT.

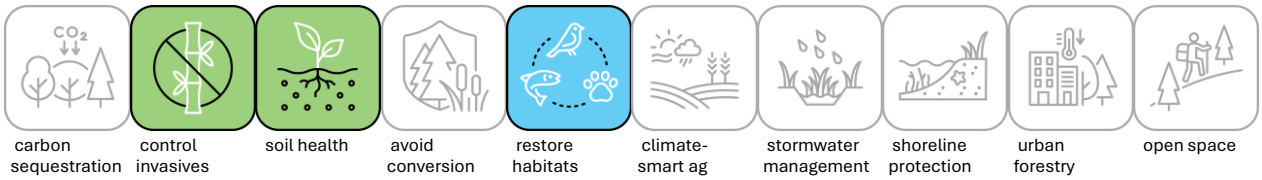
Fisheries Enhancements



Funding source: Federal/State (Project Specific)

Fisheries enhancements is a permitting commitment made by CTDOT with the regulatory agencies to mitigate environmental impacts, restore fisheries habitats, promote fish passage, and supports biodiversity. Fisheries enhancements are implemented in construction under the guidance of CTDEEP Fisheries and CTDOT Office of Environmental Planning (OEP) personnel. This includes reviewing and approving streambed material and boulders required to restore habitats that support fish life cycles and biodiversity. Enhancements may involve activities such as the creation of spawning habitats, installation of structures (like rock weirs, j-hooks, step pools, streambank revetment, root wads, channel or toe boulders, and fish ladders) that provide shelter and feeding areas for fish, as well as improve fish and other aquatic passage within the waterway.

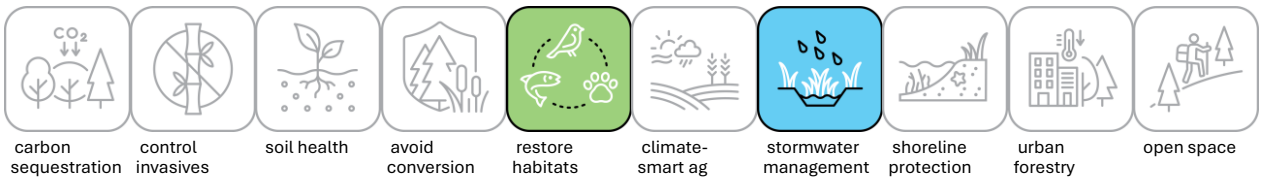
Monarch Candidate Conservation Agreement with Assurances (CCAA)



Funding source: Federal/State (Project Specific)

CTDOT enrolled in the voluntary Monarch CCAA program in October 2025, committing to implement conservation / vegetation management practices on enrolled CTDOT rights of way throughout the state to provide a net benefit to monarch butterflies. The agreement provides regulatory assurances that additional conservation measures will not be required on enrolled lands if the monarch is listed under the Endangered Species Act (ESA).

MS4 Water Quality BMPs

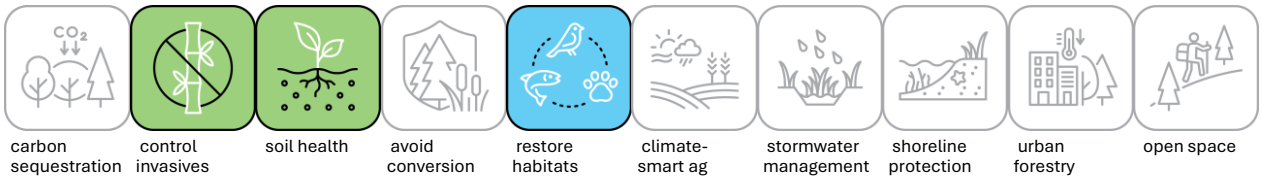


Funding source: State (Project Specific)

The MS4 program seeks to implement structural water quality improvement measures (aka, BMPs) both as part of transportation capital projects and separately through identifying and implementing stand-alone MS4 retrofit projects. All projects that impact drainage are required to prepare documentation noting efforts to reduce directly connected impervious area (DCIA).

This includes using the CTDOT MS4 Project Design Maximum Extent Practicable (MEP) Worksheet to guide project designs towards implementing Best Management Practices (BMPs) that are feasible given project-specific constraints The maximum extent practical worksheet is a tool used to track the required metrics that must be reported to CT DEEP annually in order to comply with the CTDOT MS4 General Permit. It also demonstrates that stormwater mitigation was pursued in a project's design to the maximum extent practical. Best management practices include natural dispersion utilizing methods such as vegetative filters, infiltration trenches, infiltration basins, grass channels, dry water quality swales, and supplemental check dams.

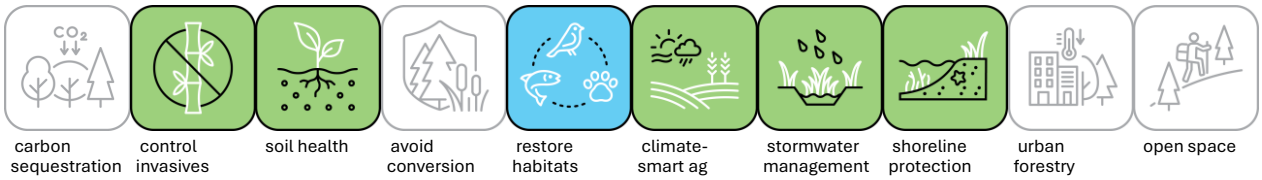
Pollinator Program



Funding Source: Federal/State (Project Specific)

Pursuant to Public Act 16-17, CTDOT implemented a pollinator program by establishing conservation areas in selected locations within the state highway system. The designation of conservation areas is determined by several factors including available space, sight line distances, terrain characteristics, soil conditions, and the existing presence of invasive plants and woody vegetation. Reduced mowing practices allow the existing seedbank to germinate, set seed, and propagate for increased pollinator habitat.

Site-Specific Seed Mixes

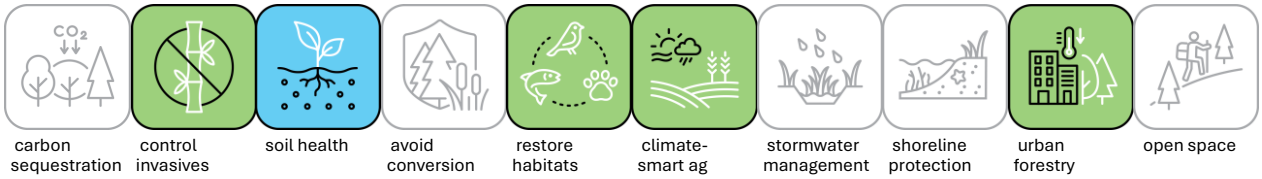


Funding source: Federal/State (Project Specific)

A wide variety of site-specific seed mixes are used to establish slope/ground disturbed stabilization. The type of seed mix is based on the project location and what resource is being impacted. Each of the seed mixes (conservation seeding for slopes, wetland grass establishment, floodplain establishment, shoreline grass establishment, and wildflower establishment), sites are typically not maintained and allowed to germinate and grow to provide vital vegetation for wildlife species such as bees and monarch butterflies. Shoreline seeding is placed along the shore because the seed mix is salt tolerant. Wetland seeding is placed to reestablish disturbed areas in environmentally sensitive areas where the wetland seed mix is capable of growing under wet conditions.

Turf establishment, turf establishment-lawn, and low growth mix are maintained seed mixes that are typically placed along the highways, medians, and local roads. Seed mixes play a vital role in environmental protection, soil stabilization, site restoration, focusing on specific ecological functions such as erosion control, habitat creation, and biodiversity enhancement.

Soil Health Specifications



Funding source: Federal/State (Project Specific)

Several specifications in the "Standard Specifications for Roads, Bridges, Facilities and Incidental Construction" Form 819 (2024) relate to measures that can be taken to protect soil health:

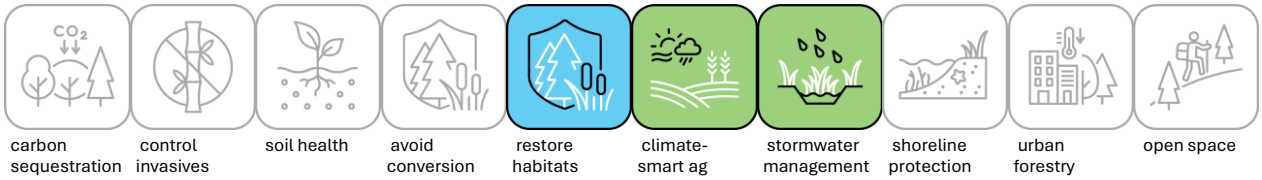
- **Section 9.44 Topsoil**: Work shall consist of furnishing, placing and shaping topsoil in areas shown on the plans or as directed by the Engineer. The topsoil shall be placed to a depth of 4 inches unless stated otherwise in the Contract. Section 9.44 ensures quality control, supports environmental protection, provides guidance for contractors, and integrates with other specifications to promote effective and sustainable landscaping practices.

- **Section 9.49 Furnishing, Planting, and Mulching Trees, Shrubs, Vines, and Ground Cover Plants:** Shall consist of furnishing trees, shrubs, vines and ground cover, preparation of planting areas, plant layout, planting, staking and guying, fertilizing, watering and mulching, as indicated on the plans or in the Contract. Section 9.49 emphasizes care for living plants, compliance with regulatory requirements, material specifications, standardization of practices, and environmental enhancement, all of which contribute to the successful establishment of vegetation in roadside development.
- **Section M.13 Roadside Development:** Consist of Topsoil and Planting Soil, Agricultural Ground Dolomitic Limestone, Fertilizer, Seed Mixtures, Mulch Materials, Compost, Plant Material, Sod and Erosion Control Matting. Roadside Development specifications serve to enhance aesthetic value, control erosion, protect the environment, improve safety, manage stormwater, standardize practices, and support wildlife habitat. These provisions are essential for creating and maintaining functional, safe, and visually appealing roadside areas in construction projects.

In addition, there are special provisions on projects that can only be altered with consent from CTDOT as the owner supplementing standard specifications for specific contract needs. These "owned special provisions" define unique project work, procedures, or requirements not covered in standard documents or the qualified products list.

Special provisions for soil are crucial for developing and implementing innovative soil management practices, spurring plant growth, maintaining soil quality, providing site-specific adaptations, offering guidance for effective use, and with engineered slopes. These provisions play a vital role in the successful execution of construction projects while addressing the unique challenges that can be posed by site specific soil conditions.

Stream Crossing Design/Wildlife Shelves Crossing



Funding source: Federal/State (Project Specific)

Stream crossing design BMPs include wildlife considerations such as including constructed banks on each side of a stream and through the crossing to tie into the existing streambanks outside a bridge/culvert span. This BMP supports proper alignment to prevent bank erosion or streambed scour. At a minimum one of the banks requires a wildlife shelf, according to the USACE regulatory requirements. The constructed banks (with a wildlife shelf) will allow for terrestrial passage for wildlife and prevent flow from being focused to one side and scouring the bed, especially against the structure's sidewall which may undermine the footings in the case of spans.

F. Office of Policy and Management

The Office of Policy and Management (OPM) is the Governor's primary staff agency, responsible for formulating, analyzing, and implementing state public policy, implementing and monitoring the execution of the enacted budget, and managing intergovernmental relations. OPM oversees the

executive agencies that report to the Governor and assists state and quasi-public agencies and municipalities in implementing the law and public policy on behalf of the people of Connecticut. OPM provides interagency and intergovernmental support towards land use, natural resource protection, climate solutions, and resilience primarily through these functions within the agency:

- Office of Responsible Growth, Intergovernmental Policy and Planning Division: The Office of Responsible Growth (ORG) focuses on intergovernmental land use issues through several programs including the development and implementation of Connecticut's C&D Plan, the oversight and administration of the Connecticut Environmental Policy Act, and through participation and coordination of the state Water Planning Council and Interagency Drought Workgroup. In addition to these programs, ORG participates in several interagency efforts regarding natural resource protection and climate resilience.
- Climate and Infrastructure Policy, Office of the Secretary: The Climate & Infrastructure Policy Development Director leads inter-agency and intergovernmental collaboration on climate mitigation, resiliency, and sustainability issues, particularly with fiscal policy, state facilities, plans, and operations as well as leading the development and implementation of climate and infrastructure strategies for OPM and with the Office of the Governor.
- State Bond Commission: The Secretary of OPM is the Secretary of the State Bond Commission and is responsible for maintaining the records and minutes of the proceedings of the Commission. The Secretary reviews agency requests for bonding of capital projects for submittal to the State Bond Commission. Staff at OPM support the completion of the Annual Information Statement, which is a comprehensive report providing updated financial, economic, and operational information about the state, published by the Office of the Treasurer. This report discusses the work done across the Executive Branch, including in the climate mitigation and resiliency context, to protect state investments.

Small Town Economic Assistance Program (STEAP)

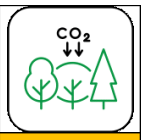
Funding source: State/Bonding

The Small Town Economic Assistance Program (STEAP) is focused on supporting smaller municipalities throughout the state by providing grants geared towards economic development, conservation and environmental protection, historic preservation, and quality-of-life capital projects. STEAP provides funding to support municipal government services and fiscal stability for localities that are ineligible to receive Urban Act funding. Examples of eligible STEAP projects that could incorporate nature-based solutions include park, landscape, and streetscape improvements, land acquisition, pedestrian infrastructure improvements, and pollution management projects. STEAP grants are awarded by OPM and administered by various state agencies. The program is bond funded and grants are distributed based on funding availability.

G. The Connecticut Green Bank

The Connecticut Green Bank is a quasi-public state agency. As the nation's first state-level green bank, the Green Bank remains a leader in the clean finance movement, leveraging public and private funds to scale-up projects to confront climate change by reducing greenhouse gas emissions and increasing climate adaptation and resilience across Connecticut. The Green Bank's success is helping Connecticut create jobs, increase economic prosperity, promote energy security, and address climate change.

In 2021, the Green Bank's model was expanded through Public Act 21-115 to include environmental infrastructure, related to water, waste and recycling, climate adaptation and resiliency, agriculture, land conservation, parks and recreation, and environmental markets, including carbon offsets and ecosystem services. The Green Bank's approach to environmental infrastructure includes nature-based solutions as well as hard infrastructure improvements that can increase both social and ecological resilience.

CT Green Bank NBS Programs										
Capital Solutions	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible	Eligible
C-PACE Resilience	Co-benefit	N/A	Co-benefit	Co-benefit	Co-benefit	Co-benefit	Eligible	Eligible	Eligible	Co-benefit
Smart-E (Homeowner Loan Product)	N/A	Co-benefit	N/A	N/A	Co-benefit	N/A	Eligible	Eligible	Co-benefit	N/A

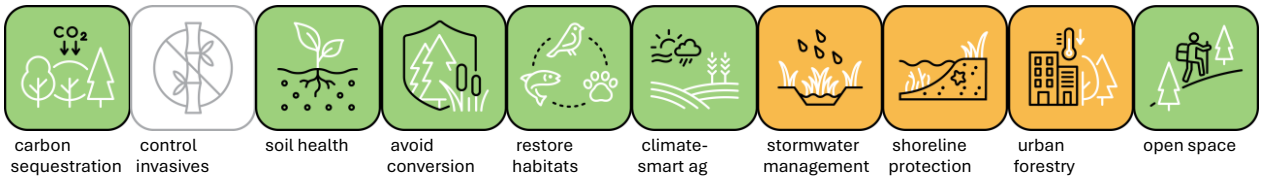
The Green Bank has expanded its portfolio of loans available for homes and commercial properties to include the financing of nature-based solutions along with a host of climate adaptation and resilience measures. Projects that embrace nature-based solutions, including natural infrastructure that promote stormwater management, healthy vegetation, soils, and aquatic ecosystems that offer flood control and hazard risk reduction, are eligible to be financed.

Capital Solutions Open Rolling RFP (Capital Solutions)

Funding source: CT Green Bank

The **Capital Solutions Open Rolling RFP (Capital Solutions)** loan offering provides access to capital for Connecticut projects that catalyze clean energy deployment and energy efficiency, reduction of greenhouse gases, environmental infrastructure, improved public health outcomes, job creation and economic development. More information on Capital Solutions is available at https://www.ctgreenbank.com/investment-solutions/green-bank-capital-solutions/

Commercial Property Assessed Clean Energy (C-PACE)

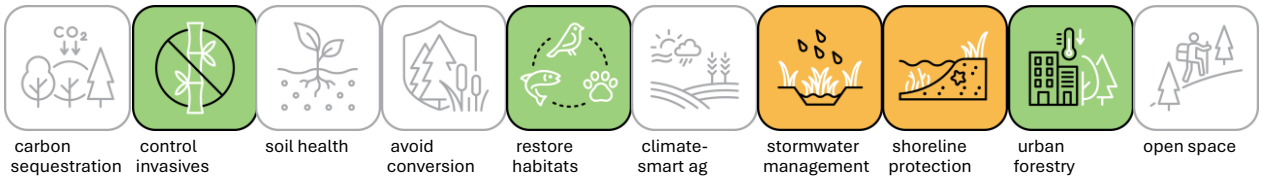


Funding source: CT Green Bank

Commercial Property Assessed Clean Energy (C-PACE) is a commercial product that supports eligible resilience improvements. Applicants complete a resilience study that assesses the expected cost savings of the resilience improvements over the useful life of the improvements. Nature-based solutions, natural infrastructure that promotes stormwater management, healthy vegetation, soils, and aquatic ecosystems such as flood control and hazard risk reduction are within the C-PACE Resilience eligibility.

The Green Bank facilitates lending offerings through C-PACE both through projects originated by the Green Bank and via those originated through other capital providers. For projects not originated by the Green Bank, other qualified capital providers can offer funding through the C-PACE program with private capital, with the Green Bank serving as program administrator. More information on C-PACE is available at https://www.ctgreenbank.com/building-solutions/c-pace/

Smart-E



Funding source: Private capital for Smart-E loans is available through a network of Connecticut credit unions and local banks, supported by a Green Bank loan loss reserve

Smart-E is a lending product for homeowners that includes many improvements that can be financed with this low interest, flexible term loan including nature-based resilience measures. Nature-based measures include replacing impervious surfaces, planting native and/or shade trees, and tree removal. More information on Smart-E is available at https://www.ctgreenbank.com/home-solutions/smart-e-loans/

V. Opportunities to Advance NBS Programs

Section 12(a) of P.A. 25-125 requires DEEP to evaluate how to integrate and advance NBS in Connecticut to help our state meet the massive challenges of climate change, biodiversity loss, and restoring ecosystem resilience. This Chapter is dedicated to identifying programs and approaches that will advance NBS going forward.

Recent swings in federal policy and related funding mechanisms related to programs associated with climate- and nature-based solutions are good reminders that future funding for current

priorities may never fully be "secure." The abrupt shift in priorities from the Biden Administration to the Trump Administration – in particular the funding reductions to programs of the Inflation Reduction Act and Bipartisan Infrastructure Law – may result in some NBS programs listed in this report only being short-term funding opportunities.

In addition to continuing current NBS programs/investments discussed in Chapter III and Chapter IV and perhaps restoring federal funding in the future for some of these priorities, we also include opportunities for advancement of efforts that either have been supported through recent legislation or may truly be new opportunities for consideration in future budget cycles.

A. Review and Coordinate Existing Resilience Funding and Financing Mechanisms

Given the cross-sector and growing scale of impact of climate change on our state, the type of financing needed to help Connecticut better prepare for, respond to, recover from, and mitigate against disasters while ensuring economic stability and safeguarding public welfare will need to be diverse, distributed, and deliberate. One of the critical success factors would be the integration of climate change projections and identifying the appropriate conditions, siting, and design of nature-based solutions as an adaptation tool.

B. Develop a Community of Practice within State Agencies for NBS

There is an opportunity to consider NBS across state agency operations. Certain common functions across state agencies might be good places to start:

- Review permitting
- Review financing
- Determine appropriateness and feasibility framework
- Deliver technical assistance
- Incorporate into agency practices

C. Pilot Resilience Improvement Districts

Public Act 25-33 authorized new powers for municipalities to fund resilience infrastructure. These financing arrangements are built on top of the existing tax incremental financing vehicles in state statute with a focus on resilience. These Resilience Improvements Districts (RIDs) support cross-boundary arrangements, prioritize nature-based solutions and ecosystem services, protect existing housing, and require demonstrable resilience and economic benefits. The CT Green Bank is working with the Resilient Cities Catalyst of pilot RIDs in Connecticut to identify opportunities and constraints for the establishment and administration of such financing mechanisms.

D. Restore Support to Discontinued NBS Programs

As noted earlier, several NBS-related programs had funding for grants and/or staff support that was discontinued as part of a shift in priorities and cutbacks to the federal Inflation Reduction Act and/or Bipartisan Infrastructure Law. In addition, there are other efforts that were explored as pilots for which future funding sources may not yet be identified.

Below we identify the NBS programs in this report for which federal funding has either been eliminated, or may have additional opportunities for bonding investment:

CT DEEP NBS Programs	Funding Source
Outdoor Recreation Legacy Partnership	Federal: Land and Water Conservation Fund/National Park Service
Urban Forest Equity Grant/Trees for Communities	Federal: Inflation Reduction Act/USDA Forest Service
Urban Forested Natural Areas and Riparian Corridor Restoration Grant	Federal: Bipartisan Infrastructure Law & Inflation Reduction Act/USDA Forest Service

CT Department of Agriculture NBS Programs	Funding Source
Climate Smart Agriculture & Forestry Grant	State special allocation

E. Expand Natural and Working Lands Modeling in GHG Inventory

In 2025, DEEP included "natural and working lands" (NWL) as part of the Greenhouse Gas Inventory report for the first time.[59] "Natural and working lands" are a nationally recognized inventory category that has some overlap with, but is separate and distinct from, nature-based solutions. The GHG Inventory report included that the measurable sequestration from NWL – primarily based upon forests and soils using available "Land Use, Land Use Change, and Forestry" (LULUCF[60]) models – sequestered approximately net 4.9 MMTCO2e in 2023.

Over the past decade, models for accurately representing the significance of working and natural lands to the sequestration of greenhouse gases have been improving. Access to new data, AI simulations, and other advances may enable DEEP to continue refining the accuracy of analyses of NWL sequestration that can be included in future GHG inventory reports.

The 2024 CT GHG NWL Inventory largely relies upon the U.S. EPA's State Inventory Tool (SIT) to create a "preliminary estimate" of emissions and sinks in the NWL sector. Estimates for forests and urban forests are provided in SIT with some limitations, and these estimates comprise 95% of net sequestration. As such, future updates to the CT NWL GHG Inventory should consider adding spatial and temporal resolution of GHGs from forestlands, related land use change, and biological carbon stocks in urbanized areas.

[59] Connecticut Greenhouse Gas Emissions Inventory (1990 – 2023), August 2025.
[60] NWL/LULUCF models are defined by the Intergovernmental Panel on Climate Change (IPCC) guidelines for greenhouse gas inventories.

EPA's SIT is a downloadable Excel-based program that includes sector-specific modules, with similar (though more simplistic) methods and sectoral coverage to the National GHG Inventory. It provides default data, though users can also upload their own. It also includes a projection tool that extrapolates based on past trends.

The SIT has several key limitations:

- Low spatial resolution (statewide only)
- Low temporal resolution (Most data can 5-20 years old. For example, wood products data is from 1997.)
- Uncertainty is not quantified but is likely very large, especially for smaller states due to smaller plot sample size
- SIT analysis excludes wetlands

For forests, the SIT uses Forest Inventory Analysis (FIA) data from the USDA Forest Service, which is based on a small number of plots that are remeasured every 5-7 years. As a result, data is averaged across a long timeframe, obscuring annual changes. The SIT allows for analysis of forest carbon at a statewide scale and comparison to other sectors and states but does not allow for tracking policy implementation (e.g., progress on tree planting) or assessing trends in forest carbon on a timescale that is meaningful for climate policymaking or a more regular reporting regime. Finer spatial and temporal resolution is required for this.

In addition to SIT excluding wetlands from its analysis, it is likely that other NBS factors (such as the carbon sequestered by soils) are under-represented because accurate figures are difficult to calculate on a statewide basis. These are a few examples of modeling and data gaps that DEEP will need to address over time to more accurately inventory NWL sequestration as models improve and data becomes more readily available. In the future, DEEP expects to have access to higher-resolution, digitized geospatial data from statewide remote sensing efforts that may allow some of these current data gaps to be addressed.

Appendices

Appendix I: Public Act 25-125, Section 12

Substitute House Bill No. 5004

Public Act No. 25-125

AN ACT CONCERNING THE PROTECTION OF THE ENVIRONMENT AND THE DEVELOPMENT OF RENEWABLE ENERGY SOURCES AND ASSOCIATED JOB SECTORS.

Sec. 12. (NEW) (*Effective from passage*) (a) The Commissioner of Energy and Environmental Protection shall evaluate how to integrate and advance nature-based solutions in the state that support climate change mitigation, climate change adaptation, ecosystem resilience and biodiversity through (1) the microgrid and resilience grant and loan pilot program authorized pursuant to section 16-243y of the general statutes, (2) the open space and watershed land acquisition program authorized pursuant to sections 7-131d to 7-131k, inclusive, of the general statutes, as amended by this act, and (3) other applicable state and federal programs administered by the Department of Energy and Environmental Protection that advance nature-based solutions, including, but not limited to, (A) federal Clean Water Act programs, (B) the Long Island Sound Study program, and (C) the Urban Forestry program. The department's efforts to advance such nature-based solutions shall be known as the nature-based solutions initiative.

(b) The commissioner shall, as part of such evaluation, consider best practices that encourage the use of the state's ecosystems to naturally sequester and store carbon, reduce greenhouse gas emissions, increase biodiversity and protect against climate change impacts including: (1) Increasing carbon sequestration through increased forest acreage, including reforestation, (2)

controlling invasive species, (3) encouraging soil health across all landscapes, (4) protecting carbon stocks through avoiding the conversion of forests and wetlands to other purposes, (5) restoring habitats to improve biodiversity, (6) increasing climate-smart agriculture and soil conservation to reduce greenhouse gas emissions while improving habitat and protecting biodiversity, (7) increasing community resilience by improving water quality and addressing flooding and drought through nature-based stormwater management and shoreline protection that uses nature-based approaches such as living shorelines, (8) improving air quality and reducing urban heat island effects through urban forestry and increasing green spaces, and (9) increase access to open space for public health benefits.

(c) Not later than July 1, 2026, the commissioner shall post such nature-based solutions initiative program evaluation on the department's Internet web site for review and written comment. As part of that evaluation, the commissioner shall seek review and input from the Departments of Agriculture, Public Health, Housing, Transportation, the Insurance Department, the Connecticut Green Bank and the Office of Policy and Management. In addition, the commissioner shall host one listening session before such nature-based solutions initiative is so posted in order to seek public comment.

Governor's Action:
Approved July 1, 2025

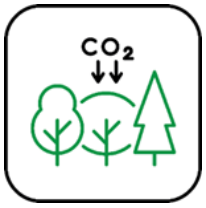
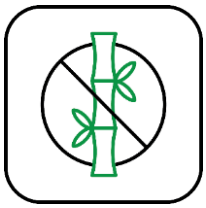
Appendix II: DEEP's NBS-Related Management Plans, Policies & Guidance

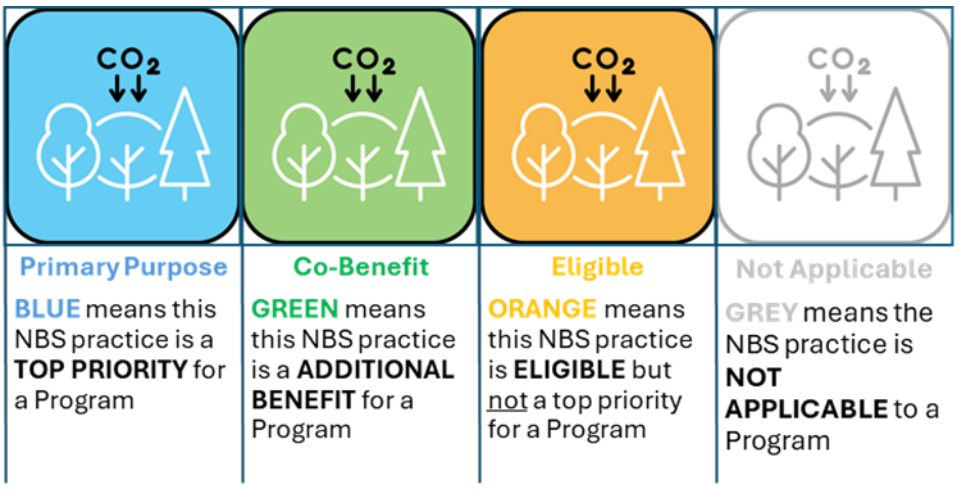
In addition to administering the NBS-related programs listed in the body of this report, DEEP conducts its operations based on many **plans**, **policies/regulations**, and **guidance** documents that are also closely associated with the 10 NBS practices highlighted in Public Act 25-125. Below the following list of plans, policies, and guidance (with links to webpages with additional information), the list is cross-referenced with icons representing NBS best practices and color-coded for emphasis (similar to how state agency programs are presented in Chapters II and III).

- Agricultural Wastewater Guidance
- Aquifer Protection Act
- Best Management Practices for Golf Course Water Use
- Coastal Management Act
- Commercial Stormwater General Permit
- Comprehensive Open Space Acquisition Strategy ("Green Plan")
- Connecticut Beach Association's Guide to Coastal Activities and Permitting
- Connecticut Golf Industry Best Management Practices
- Connecticut Guidelines for Soil Erosion and Sediment Control
- Connecticut's Aquifer Protection Area Program Municipal Manual
- Flood Management Act
- Forest Action Plan
- Forest Management Plans on State Lands
- Governor's Council on Climate Change (GC3) Phase 1 Report: Near Term Actions 2021
- Living Shorelines Primer
- Living Shorelines Techniques
- Long Island Sound Blue Plan
- Low Impact Development Appendix to the Connecticut Guidelines for Soil Erosion and Sediment Control
- Low Impact Development Appendix to the Connecticut Stormwater Quality Manual
- Manual of Best Management Practices for Agriculture
- Nuisance Aquatic Vegetation Management
- Recommendations for Phosphorus Strategy Pursuant to PA 12-155 Final Report
- Resident's Guide to Green Roofs (2010)
- Resident's Guide to Low Impact Development (2008)
- Resident's Guide to Rain Gardens (2009)
- Resident's Guide to Vegetated Riparian Areas (2011)
- Statewide Comprehensive Outdoor Recreation Plan (SCORP)
- Stormwater Quality Manual
- Tidal Wetlands Act/Regulations
- Wildlife Action Plan

Policy Guidance, Management, and Plans	Carbon sequestration	Control Invasives	Soil Health	Avoid Conversion	Restore Habitats	Climate-Smart Ag	Stormwater Management	Shoreline Protection	Urban Forestry	Open Space
Agricultural Wastewater Page	N/A	N/A	Primary purpose	N/A	Co-benefit	Primary purpose	Co-benefit	N/A	N/A	N/A
Aquifer Protection Act	N/A	Eligible	Co-benefit	Eligible	Eligible	N/A	Primary purpose	Eligible	Eligible	Eligible
Best Management Practices for Golf Course Water Use	Co-benefit	Eligible	Primary purpose	Co-benefit	Co-benefit	N/A	Primary purpose	Eligible	Eligible	N/A
Coastal Management Act	N/A	N/A	N/A	N/A	Co-benefit	N/A	Eligible	Eligible	N/A	N/A
Commercial Stormwater General Permit	N/A	N/A	Eligible	N/A	N/A	N/A	Primary purpose	N/A	N/A	N/A
Comprehensive Open Space Acquisition Strategy ("Green Plan")	N/A	N/A	N/A	Eligible	N/A	N/A	N/A	N/A	Eligible	Primary purpose
Connecticut Beach Association's Guide to Coastal Activities and Permitting	N/A	N/A	Co-benefit	Primary purpose	Primary purpose	N/A	Co-benefit	Primary purpose	N/A	N/A
Connecticut Golf Industry Best Management Practices	Co-benefit	Co-benefit	Co-benefit	Co-benefit	Co-benefit	N/A	Primary purpose	N/A	N/A	N/A
Connecticut Guidelines for Soil Erosion and Sediment Control	N/A	N/A	Primary purpose	N/A	Co-benefit	N/A	Eligible	Eligible	N/A	N/A
Connecticut Guidelines for Soil Erosion and Sediment Control	Co-benefit	N/A	Primary purpose	Co-benefit	Co-benefit	N/A	Eligible	Eligible	Co-benefit	Eligible
Connecticut's Aquifer Protection Area Program Municipal Manual	N/A	Eligible	Co-benefit	Eligible	Eligible	N/A	Primary purpose	Eligible	Eligible	Eligible
Flood Management Act	N/A	N/A	N/A	N/A	N/A	N/A	Eligible	Eligible	N/A	N/A
Forest Action Plan	Eligible	Eligible	Eligible	Eligible	Eligible	N/A	N/A	N/A	Eligible	Co-benefit
Forest Management on State Lands	Eligible	Primary purpose	Primary purpose	Primary purpose	Primary purpose	N/A	Eligible	Eligible	Co-benefit	Primary purpose
Governor's Council on Climate Change (GC3) Phase 1 Report: Near Term Actions 2021	Primary purpose	N/A	Primary purpose	Primary purpose	Co-benefit	Primary purpose	Primary purpose	Eligible	Primary purpose	N/A
Living Shorelines Primer	N/A	N/A	Co-benefit	Co-benefit	Co-benefit	N/A	Primary purpose	Primary purpose	N/A	N/A
Living Shorelines Techniques	N/A	N/A	Co-benefit	Co-benefit	Co-benefit	N/A	Primary purpose	Primary purpose	N/A	N/A
Long Island Sound Blue Plan	N/A	N/A	N/A	Eligible	N/A	N/A	N/A	Co-benefit	N/A	N/A
Low Impact Development Appendix to the Connecticut Guidelines for Soil Erosion and	Co-benefit	N/A	Primary purpose	Co-benefit	Co-benefit	N/A	Primary purpose	N/A	Co-benefit	Eligible
Low Impact Development Appendix to the Connecticut Stormwater Quality Manual	Co-benefit	N/A	Primary purpose	Co-benefit	Co-benefit	N/A	Primary purpose	Eligible	Co-benefit	Eligible
Manual of Best Management Practices for Agriculture	N/A	N/A	Primary purpose	N/A	Primary purpose	Primary purpose	Co-benefit	N/A	N/A	N/A
Nuisance Aquatic Vegetation Management	N/A	Primary purpose	Eligible	N/A	Primary purpose	N/A	Eligible	N/A	N/A	Eligible
Recommendations for Phosphorus Strategy Pursuant to PA 12-155 Final Report	N/A	N/A	Co-benefit	N/A	N/A	N/A	Primary purpose	N/A	N/A	N/A
Resident's Guide to Green Roofs (2010)	N/A	N/A	Eligible	N/A	Primary purpose	N/A	Primary purpose	N/A	Primary purpose	Primary purpose
Resident's Guide to Low Impact Development (2008)	N/A	N/A	Co-benefit	N/A	Co-benefit	N/A	Primary purpose	Eligible	Eligible	Co-benefit
Resident's Guide to Rain Gardens (2009)	N/A	N/A	Eligible	N/A	Primary purpose	N/A	Primary purpose	N/A	Eligible	Eligible
Resident's Guide to Vegetated Riparian Areas (2011)	N/A	N/A	Co-benefit	N/A	Co-benefit	N/A	Primary purpose	N/A	N/A	Eligible
Statewide Comprehensive Outdoor Recreation Plan (SCORP)	N/A	N/A	N/A	Co-benefit	N/A	N/A	N/A	N/A	N/A	Primary purpose
Stormwater Quality Manual	N/A	N/A	Eligible	Co-benefit	Co-benefit	Co-benefit	Primary purpose	Eligible	N/A	N/A
Tidal Wetlands Act/Regulations	N/A	N/A	N/A	Eligible	Primary purpose	N/A	Co-benefit	Eligible	N/A	N/A
Wildlife Action Plan	Eligible	Eligible	Co-benefit	Eligible	Primary purpose	N/A	Eligible	Eligible	N/A	N/A

Appendix III: Key to NBS Best Practice Icons and Color-Coding

1	 Increase **carbon sequestration** through increased forest acreage, including reforestation	2	 **Control invasive s**pecies
3	 Encourage **soil health** across all landscapes	4	 Protect carbon stocks through **avoid**ing the **conversion** of forests and wetlands to other purposes
5	 **Restore habitats** to improve biodiversity	6	 Increase **climate-smart ag**riculture and soil conservation to reduce greenhouse gas emissions while improving habitat and protecting biodiversity
7	 Increase community resilience by improving water quality and addressing flooding and drought through nature-based **stormwater management**	8	 Increase community resilience by improving water quality and addressing flooding and drought through nature-based **shoreline protection** including living shorelines
9	 Improve air quality and reduce urban heat island effects through **urban forestry** and increasing green spaces	10	 Increase access to **open space** for public health benefits

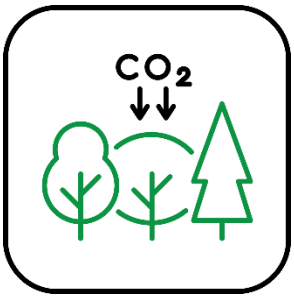


Appendix IV: More about the NBS Icons

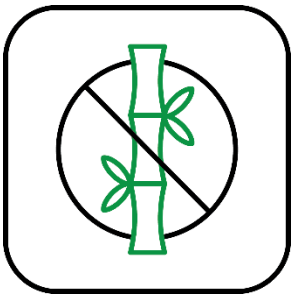
There are 10 NBS practices identified in Section 12 of P.A. 25-125 and, of course, many more that are not included in this report. As noted earlier, it can be difficult to describe each of these practices concisely, so DEEP developed icons to more easily communicate information visually with simple images substituted for potentially large blocks of text. The intention is that each icon not only would correspond with the individual NBS identified in P.A. 25-125, but also the icons can be experienced collectively as a set with some consistency amongst style and base colors.

The icons were initially developed by DEEP under a Canva Pro software license enabling staff[61] to combine elements and publish unique designs for the focused purpose of this report. The icons were finished using Adobe Illustrator software with attention to consistent line widths, color scheme (black and green base images, with color-coded icon sets created in Blue, Green, Orange, and Grey), and simplified images across the icon set.

1. **Increase carbon sequestration through increased forest acreage, including reforestation**

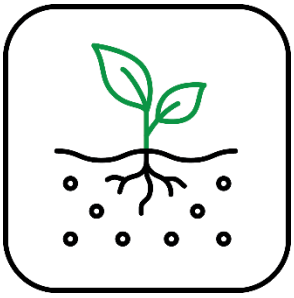


2. **Control invasive species**

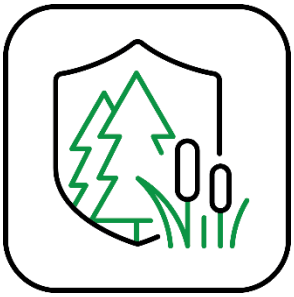


[61] Special thanks to Jordan DiDomenico, Environmental Analyst II in DEEP's Office of Environmental Review & Strategic Initiatives (ERSI), for her artistic vision in launching and coordinating the icon effort, along with Joe Cunningham, Visual Media Designer III in the Office of Communications, for his expertise in simplifying, sharpening, and giving final form to the icons.

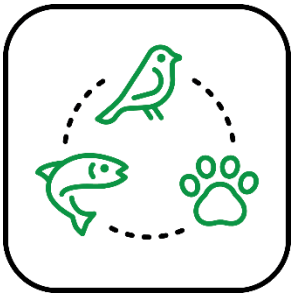
3. **Encourage soil health across all landscapes**



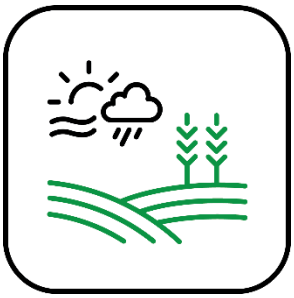
4. **Protect carbon stocks through avoiding the conversion of forests and wetlands to other purposes**



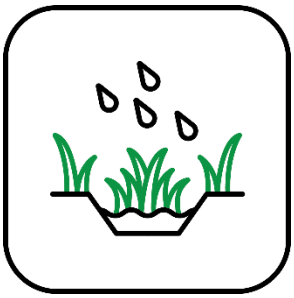
5. **Restore habitats to improve biodiversity**



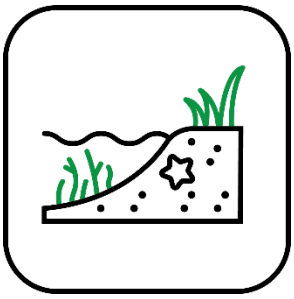
6. **Increase climate-smart agriculture and soil conservation to reduce greenhouse gas emissions while improving habitat and protecting biodiversity**



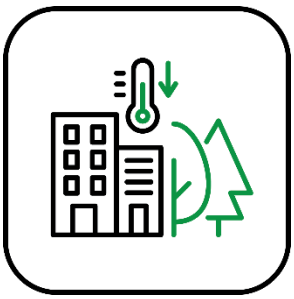
7. **Increase community resilience by improving water quality and addressing flooding and drought through nature-based stormwater management**



8. **Increase community resilience by improving water quality and addressing flooding and drought through nature-based shoreline protection including living shorelines**



9. **Improve air quality and reduce urban heat island effects through urban forestry and increasing green spaces**



10. **Increase access to open space for public health benefits.**

Appendix V: Definitions of key terms

Section 12 of P.A. 25-125 specifies that nature-based solutions must 1) reflect the concepts of climate adaptation and mitigation, ecosystem resilience, and biodiversity; as well as 2) utilize the state's ecosystems to naturally sequester and store carbon, reduce greenhouse gas emissions, increase biodiversity, and protect against climate change impacts.

Key terms to understand NBS are included below from the glossary of terms produced by the Intergovernmental Panel on Climate Change (IPCC):[62]

Adaptation: In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate and its effects. The array of strategies and measures that are available and appropriate for addressing adaptation involve a wide range of actions that can be categorized as structural, institutional, ecological, or behavioral.

Biodiversity: *Biodiversity* or biological diversity means the variability among living organisms from all sources including, among other things, terrestrial, marine and other aquatic *ecosystems*, and the ecological complexes of which they are part; this includes diversity within species, between species, and of *ecosystems* (UN, 1992).

Climate: In a narrow sense, *climate* is usually defined as the average weather -or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities- over a period of time ranging from months to thousands or millions of years. The classical period for averaging these variables is 30 years, as defined by the World Meteorological Organization (WMO). The relevant quantities are most often surface variables such as temperature, precipitation and wind. *Climate* in a wider sense is the state, including a statistical description, of the *climate system*.

Climate Change: A change in the state of the *climate* that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. *Climate change* may be due to natural internal processes or external forcings such as modulations of the solar cycles, volcanic eruptions and persistent *anthropogenic* changes in the composition of the *atmosphere* or in *land use*. Note that the United Nations Framework Convention on Climate Change (UNFCCC), in its Article 1, defines *climate change* as 'a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere, and which is in addition to natural climate variability observed over comparable time periods.' The UNFCCC thus makes a distinction between *climate change* attributable to human activities altering the atmospheric composition and *climate variability* attributable to natural causes.

[62] Definitions are from the Intergovernmental Panel on Climate Change (IPCC), 2022: Annex II: Glossary [Möller, V., R. van Diemen, J.B.R. Matthews, C. Méndez, S. Semenov, J.S. Fuglestvedt, A. Reisinger (eds.)]. In: *Climate Change 2022: Impacts, Adaptation and Vulnerability.* Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 2897–2930, doi:10.1017/9781009325844.029.

Ecosystem: A functional unit consisting of living organisms, their non-living environment and the interactions within and between them. The components included in a given *ecosystem* and its spatial boundaries depend on the purpose for which the *ecosystem* is defined: in some cases, they are relatively sharp, while in others they are diffuse. *Ecosystem* boundaries can change over time. *Ecosystems* are nested within other *ecosystems*, and their scale can range from very small to the entire *biosphere*. In the current era, most *ecosystems* either contain people as key organisms or are influenced by the effects of human activities in their environment.

Ecosystem Services: Ecological processes or functions having monetary or non-monetary value to individuals or society at large. These are frequently classified as (1) supporting services such as productivity or *biodiversity* maintenance, (2) provisioning services such as food or fiber, (3) regulating services such as *climate regulation* or carbon *sequestration* and (4) cultural services such as tourism or spiritual and aesthetic appreciation.

Greenhouse Gases (GHGs): Gaseous constituents of the *atmosphere*, both natural and *anthropogenic*, that absorb and emit radiation at specific wavelengths within the spectrum of radiation emitted by the Earth's *ocean* and *land* surface, by the *atmosphere* itself and by clouds. This property causes the greenhouse effect. Water vapor (H2O), *carbon dioxide (CO2)*, nitrous oxide (N2O), *methane (CH4)* and *ozone (O3)* are the primary GHGs in the Earth's *atmosphere*. Human-made GHGs include sulphur hexafluoride (SF6), hydrofluorocarbons (HFCs), chlorofluorocarbons (CFCs) and perfluorocarbons (PFCs); several of these are also O3-depleting (and are regulated under the Montreal Protocol).

Hazard: The potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury or other *health impacts*, as well as damage and loss to property, *infrastructure*, *livelihoods*, service provision, *ecosystems* and environmental resources.

Impacts: The consequences of realized *risks* on *natural* and *human systems*, where *risks* result from the interactions of *climate*-related *hazards* (including *extreme weather/climate events*), *exposure*, and *vulnerability*. *Impacts* generally refer to effects on lives, *livelihoods*, *health* and *well-being*, *ecosystems* and species, economic, social and cultural assets, services (including *ecosystem services*) and *infrastructure*. *Impacts* may be referred to as consequences or outcomes and can be adverse or beneficial.

Invasive Species: A species that is not native to a specific location or nearby, lacking natural controls, and that has a tendency to rapidly increase in abundance, displacing *native species*. *Invasive species* may also damage the human economy or human *health*.

Mitigation (emissions): A human intervention to reduce *emissions* or enhance the *sinks* of *greenhouse gases*.

Nature-Based Solutions (NBS): Actions to protect, sustainably manage and restore natural or modified *ecosystems* that address societal challenges effectively and adaptively, simultaneously providing human *well-being* and *biodiversity* benefits. (IUCN, 2016).

Nature-Based Solutions (NBS) Initiative: DEEP's efforts to advance nature-based solutions in Connecticut.[63]

Resilience: The capacity of interconnected social, economic and ecological systems to cope with a hazardous event, trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure. *Resilience* is a positive attribute when it maintains capacity for *adaptation*, learning and/or *transformation* (Arctic Council, 2016).

Resilience (State): The ability to prepare for and adapt to changing conditions and withstand and recover rapidly from deliberate attacks, accidents or naturally occurring threats or incidents, including, but not limited to, threats or incidents associated with the impacts of climate change[64] such as risks related to extreme heat, drought or prolonged or intense exposure to precipitation.[65]

Risk: The potential for adverse consequences for human or ecological systems, recognizing the diversity of values and objectives associated with such systems. In the context of *climate change*, *risks* can arise from potential *impacts* of *climate change* as well as human responses to *climate change*. Relevant adverse consequences include those on lives, *livelihoods*, *health* and *well-being*, economic, social and cultural assets and investments, *infrastructure*, services (including *ecosystem services*), *ecosystems,* and species.

In the context of *climate change impacts*, *risks* result from dynamic interactions between *climate*-related *hazards* with the *exposure* and *vulnerability* of the affected human or ecological system to the *hazards*. *Hazards*, *exposure* and *vulnerability* may each be subject to *uncertainty* in terms of magnitude and *likelihood* of occurrence, and each may change over time and space due to socio-economic changes and human decision-making.

Sequestration: The process of storing carbon in a carbon pool.

Sink: Any process, activity or mechanism which removes a *greenhouse gas*, an *aerosol,* or a *precursor* of a *greenhouse gas* from the *atmosphere*.

Source: Any process or activity which releases a *greenhouse gas*, an *aerosol,* or a *precursor* of a *greenhouse gas* into the *atmosphere*.

Sustainability: Involves ensuring the persistence of *natural* and *human systems*, implying the continuous functioning of *ecosystems*, the conservation of high *biodiversity*, the recycling of natural resources and, in the human sector, successful application of *justice* and *equity*.

[63] The "Nature-Based Solutions Initiative" is defined in P.A. 25-125, not in the IPCC glossary of terms.
[64] Definition from CGS Sec. 16-243y, which established state's microgrid and resilience grant program.
[65] Added risks related to extremes referenced in P.A. 25-33, Section 16 (c)(3)(E).

Appendix VI: Summary of Public Comments