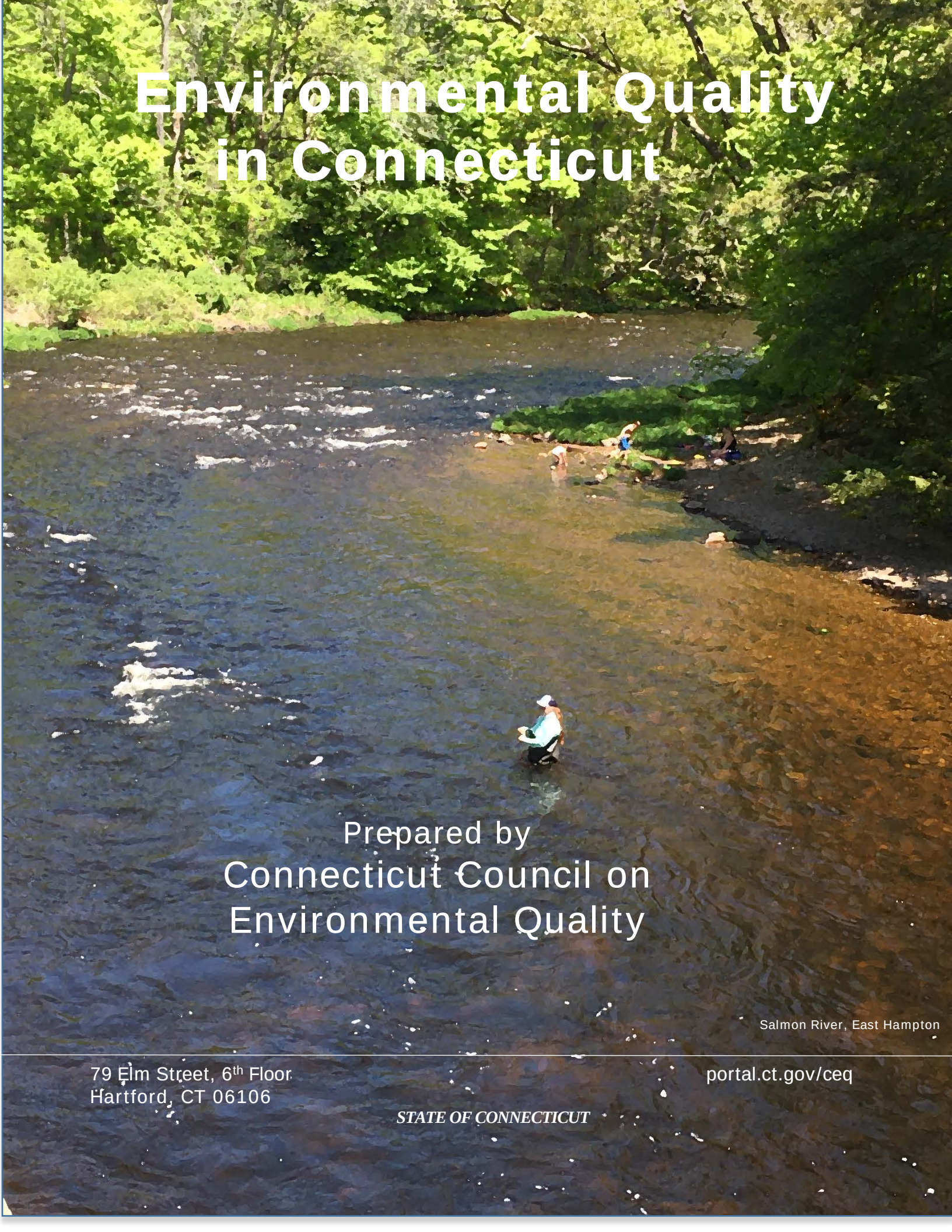
# Environmental Quality in Connecticut



Prepared by

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*STATE OF CONNECTICUT*

*STATE OF CONNECTICUT*

# COUNCIL ON ENVIRONMENTAL QUALITY

April 20, 2021

The Honorable Ned Lamont
Governor of Connecticut
State Capitol
Hartford, CT 06106

Governor Lamont:

The Council is pleased to submit *Environmental Quality in Connecticut* for 2020, as authorized by Connecticut General Statutes (CGS), Section 22a-12. This is the Council's forty-ninth Annual Report to the Governor. The report uses over fifty indicators of environmental health to illustrate environmental trends, both positive and negative, for the 2020 calendar year. In 2020, the Covid-19 virus appears to have had an impact on patterns of energy consumption and transportation. Additionally, Covid-19 restrictions limited the capacity of the State to conduct some of its normal monitoring and compliance activities.

Though this report can be printed, it is designed to be read as an online document on the Council's website. Online, the values on its charts will appear under the reader's cursor and the reader can access the many supplemental documents which are hyperlinked within it. "Quick Summary" boxes above most of the charts show the data trends for the past year and past decade. This year, a page was added at the beginning of the report that lists the best performing indicators and those most in need of improvement to meet the State's established environmental goals.

In sending this report, the Council wishes, also, to acknowledge your efforts through the Governor's Council on Climate Change and the Transportation Climate Initiative to address the State's serious climate challenge.

As always, the Council looks forward to providing you with any additional information you might request.

Respectfully submitted,

Keith Ainsworth, Esq.
Acting Chair



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# Index

# The Status of Connecticut's Environment During a Global Pandemic

While the 2019 novel coronavirus (COVID-19) emergency is not what we usually think of as an environmental issue, the viral outbreak provides an interesting lens through which to examine the data presented in this report. The virus rapidly spread globally highlighting the interrelation and cross-boundary communion of environmental conditions. There are no borders which insulate us from human actions and impacts. The differing effectiveness of each country's measures taken to control the virus instruct us that borderless problems require coordinated solutions. The virus recognizes no social, economic, racial or national lines. Likewise, air pollution, water pollution and climate change respect no political borders.

The virus imposed some practical challenges to the monitoring of environmental conditions and enforcement of environmental regulations. Data for some indicators were affected by measures to reduce exposure of State employees to COVID-19 and by residents' personal behaviors in response to the virus. Specifically, there were fewer inspections by employees of the Connecticut Department of Energy and Environmental Protection (DEEP), as detailed in the Compliance page; and there were no marine survey tows in Long Island Sound this year, as detailed in the Lobster and Fishes of Long Island Sound page.

In addition, several of the indicators increased or decreased, more than would be normally expected, due to the response to the COVID 19 virus. For example, residential electricity consumption increased significantly in 2020, in part, because people were spending more time at home, while bus ridership and bottle redemption declined in 2020.

The safety measures put in place to reduce the transmission of the COVID 19 virus resulted in a renewed appreciation for Connecticut's natural spaces. According to the Connecticut Trail Census, it is estimated that approximately 2.57 million residents visited trails throughout the State on 2020; an increase from 1.54 million users in 2019.[A] As another example, attendance at Rocky Neck State Park increased almost 100 percent from 7,774 vehicles in 2019 to 15,024 vehicles in 2020, for the period mid-March to mid-April. In addition, DEEP's Environmental Conservation Officers saw a nearly 300 percent increase in "calls for service" in the State's parks in 2020.[1] Connecticut's "Passport to the Parks" program, which was authorized in 2017, allows any State resident, by paying a $5 fee per year for each registered non-commercial vehicle, access to any of Connecticut's 139 State's parks, in addition to forests, trails, and beaches.

[A] The Connecticut Trail Census is a statewide volunteer data collection program to inform a better understanding of multi-use trail use and to share data with trail groups, trail administrators, government agencies and the public. Funded by the Connecticut DEEP Recreational Trails Program.

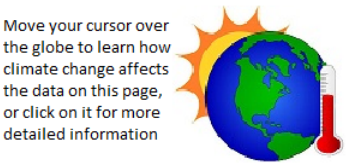
# Introduction – Understanding "Environmental Quality in Connecticut"

## The Annual Report of the Council on Environmental Quality for 2020

published April 21, 2021

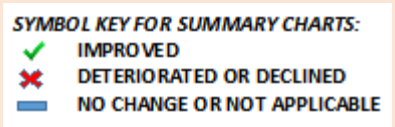
Welcome to *Environmental Quality in Connecticut*. This edition documents the condition of Connecticut's environment through 2020. This Annual Report is designed to be read online to allow use of the navigation buttons to move from section to section within it or to find the topics that interest you the most in the Index. Online, the values on the charts will appear under your cursor.

The *majority* of Connecticut's key environmental indicators are strongly affected -- almost always negatively -- by a changing climate. The symbol at right (example) will identify indicators that are so affected or those that affect the climate. For the online edition, running your cursor over the symbol will reveal a brief statement of the indicator's connection to climate that is also linked to more information. For the printed version, please refer to "Climate Notes" at the end of this Annual Report.




Generally, Connecticut's environment is better than it was ten years ago and significantly better than the environmental conditions from when the Council was created. However, long term impacts of climate change can have significant effects on several of the environmental indicators that are assessed by the Council. As identified in the Fourth National Climate Assessment, "climate change affects the natural, built, and social systems we rely on individually and through their connections to one another". Indeed, many of the indicators identified in this report are individually affected by climate change, but most are affected through their connections to one or more other indicators. The Council has noted, where appropriate, the impact of certain indicators in addressing the challenge of climate change.

**Summary Key for Indicators**: Each page in the report has an environmental theme. Where an indicator shows change over time, there will usually be a summary key to allow for a quick evaluation of the status of that indicator. The top line is the indicator's status for the most recent year; the second line shows the current year's status compared to the 10-year trend; and the third line shows whether the indicator is on track to meet its goal.




There may be updates to the 2020 Annual Report. Sign up for e-alerts to receive a notice when updates are published. The Council welcomes your comments and questions.

# Summary

The following environmental indicator has best met or exceeded its established goal:


- Eagles

The following indicators showed the biggest improvement (% change):

- Air pollution
- Residential solar photovoltaics and electric vehicles
- Commercial and industrial energy use

The following indicators might not achieve their goal:

- Diversion of solid waste
- Preservation of open space and farmland
- Recovery of lobster and bat populations

The following indicators warrant close monitoring:

- Compliance
- Invasive species
- Zero carbon electricity generation

Top three recommendations for improvement:

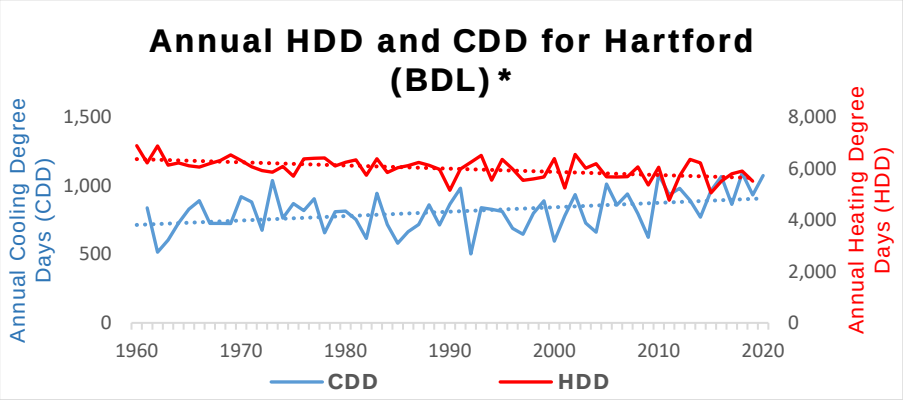

- Control of runoff from impervious surfaces
- Improve wetland data collection and wetland training
- Preserve forests, farmland, and other “open spaces”

# The Climate Challenge

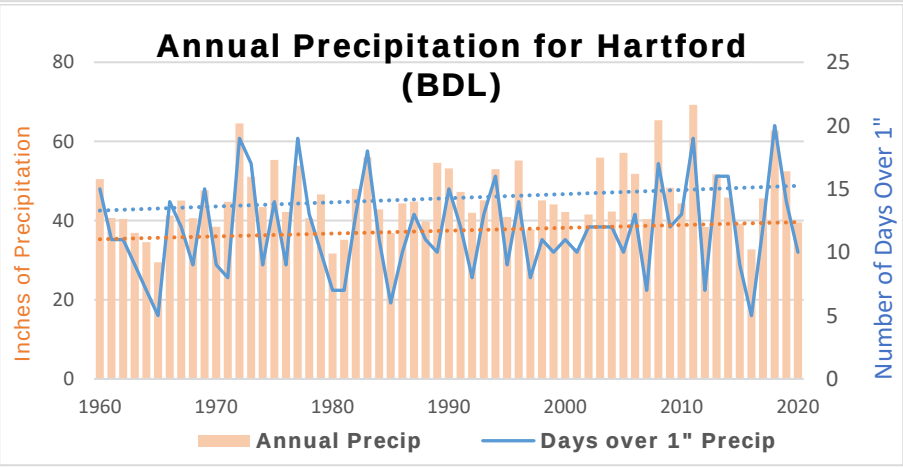
The warming of Connecticut's climate threatens to undo much of the environmental progress of past decades that is illustrated in these pages. Nearly every environmental indicator in the 2020 Annual Report has a tie to global warming. As depicted in the charts below, the trend over the last sixty years suggests that the climate is getting warmer with more precipitation.[2]

**The State's warming climate is evidenced by increased annual average temperature, precipitation, cooling degree days (CDD) and decreasing heating degree days (HDD) since 1960.**

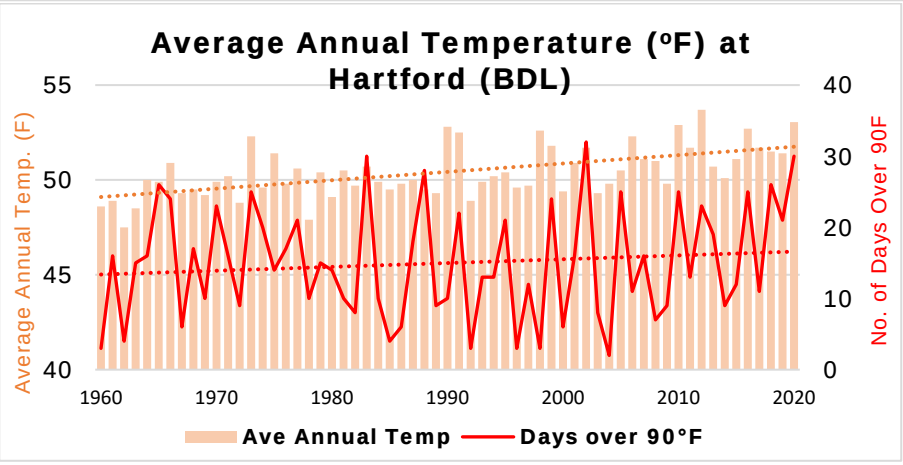
Annual average HDD have decreased by approximately 11 percent while CDD have increased by approximately 26 percent since 1960. Degree days reflect changes in climate and are a proxy for the energy demand for heating or cooling.




The average annual precipitation since 1960 is 45.7 inches and the average number of days annually with precipitation over one inch has increased by approximately 14 percent. It is predicted that as the climate warms, severe weather events like prolonged drought and extreme rainfall will become more frequent.[3]




The average annual temperature since 1960 is 51.6 degrees Fahrenheit (°F) an increase of 5.3 percent. The average number of days annually with temperatures greater than 90°F is now 15.2. However, 2020 had 30 days greater than 90°F and since 2000, the average number of 90+°F days annually has increased to 16.5.




**Technical Notes:** *All weather data is for the weather station at Bradley International Airport (BDL). "Degree days are defined as the number of degrees by which the average daily temperature is higher than 65°F (cooling degree days) or lower than 65°F (heating degree days)." – GlobalChange.gov

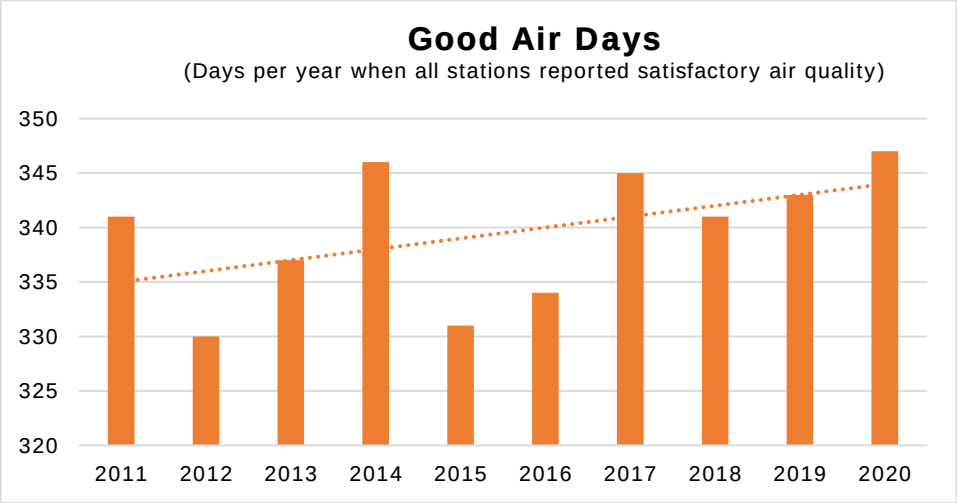
# Air Days

*QUICK SUMMARY:*

- ✓ COMPARED TO LAST REPORT
- ✓ COMPARED TO 10 YR. AVERAGE
- ✓ ON TRACK TO MEET GOAL

Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

**Connecticut residents breathed healthful air on 347 days in 2020: an improvement of ten days from the 10-year average (337).**

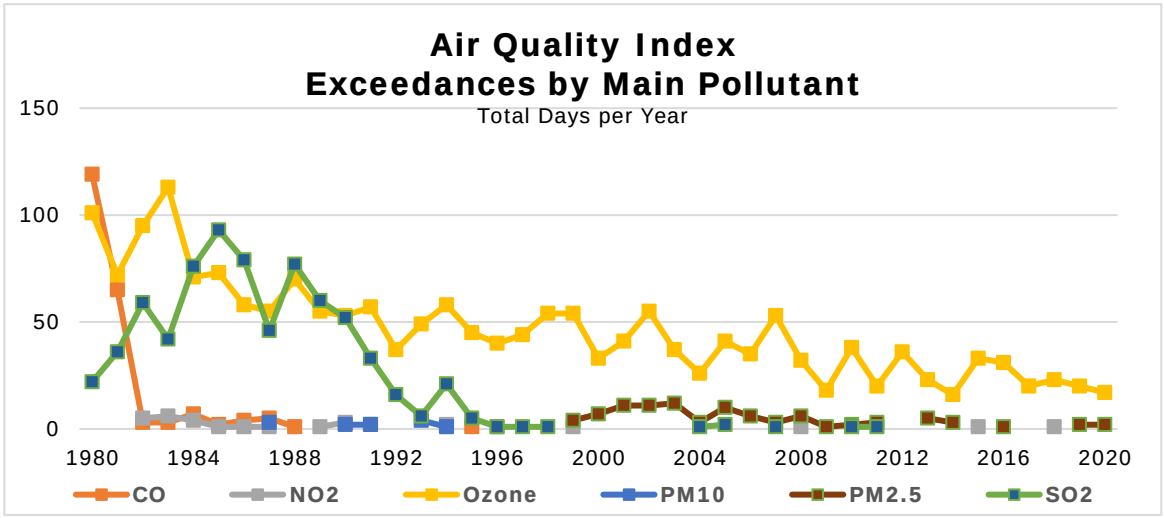



The number of statewide "good air days" increased in 2020 from 343 days in 2019 to 347 in 2020, with two days that exceeded the standard for particulate matter (PM 2.5).[4] The number of good air days has increased by approximately 2.7 percent since 2011.

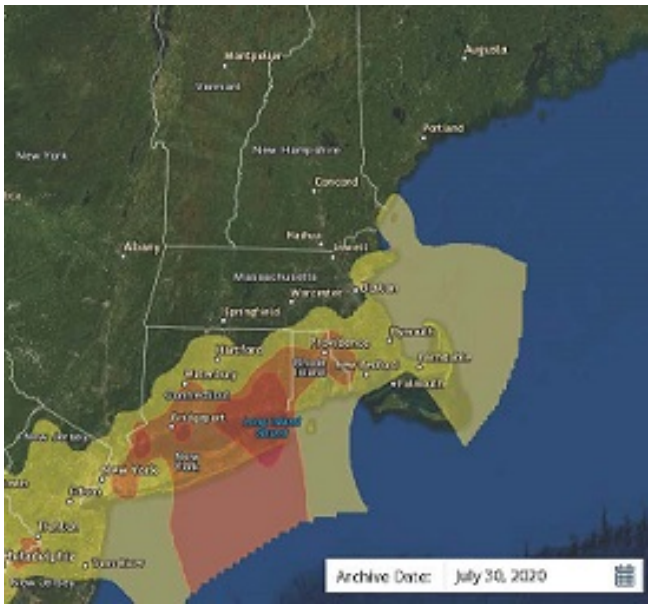
A "good air day" is when every monitoring station in the state records satisfactory air quality. "Satisfactory air quality" is defined here as air that meets the health-based National Ambient Air Quality Standard (NAAQS) for all of the following six pollutants: sulfur dioxide, carbon monoxide, particulate matter (PM2.5 and PM10), nitrogen dioxide, and ground-level ozone.*

The decrease in air pollution is the result, in part, of the air pollution controls that were put in place after the 1971 Clean Air Act. The chart below shows that in the 1980's, exceedances for sulfur dioxide ($SO_2$) and nitrogen dioxide ($NO_2$) were common. Statewide exceedances of pollutants, except for ozone, are rarely seen, due to federal restrictions on emitters, mostly to Connecticut's west and southwest. The State continues to suffer from ozone exceedances, and occasionally from small particulate (PM2.5) exceedances (see chart below). Lead (Pb) is not shown.**

## Air Pollutants



The image (right) illustrates a typical bad-air day in 2020 that was more intense than average but followed the typical pattern of Connecticut having the worst ozone pollution in New England.[5] The yellow areas indicate moderate air quality, but it meets the standard for ground-level ozone, while the orange and red areas did not. Some residents in the yellow areas, who are unusually sensitive to pollution, might have been affected. Much of Connecticut's ground-level ozone originates in states to the west. Unless emissions in those states are reduced substantially, Connecticut residents could continue to breathe unhealthful air.




Cities and towns in coastal regions of the state usually see more bad ozone days than inland locations. Coastal towns with monitoring stations that saw the most unhealthful days in 2020, included Madison (12); Stratford (8); Westport and Greenwich (6 each); while the air monitoring stations in Abington (Pomfret), Cornwall, Stafford, and East Hartford (0) saw the fewest.[6]

No other New England state had more days with unhealthful levels of ozone than Connecticut, which had a total of 17 in 2020. Rhode Island was the next highest with four unhealthful days.[7]

**Goal:** While not formally stated, the goal is for Connecticut residents to have a “good air day”, every day.

**Technical Note:** *The federal air quality standard for ozone was revised prior to the 2016 ozone season. The new standard (0.070 parts per million over eight hours) is slightly more protective of human health than the older standard (0.075). Source of the data represented in the charts is Environmental Protection Agency (EPA) reports that are derived from data received from the Department of Energy and Environmental Protection’s monitors. **Connecticut’s lead levels have been below the national standard (NAAQS) since 1994.

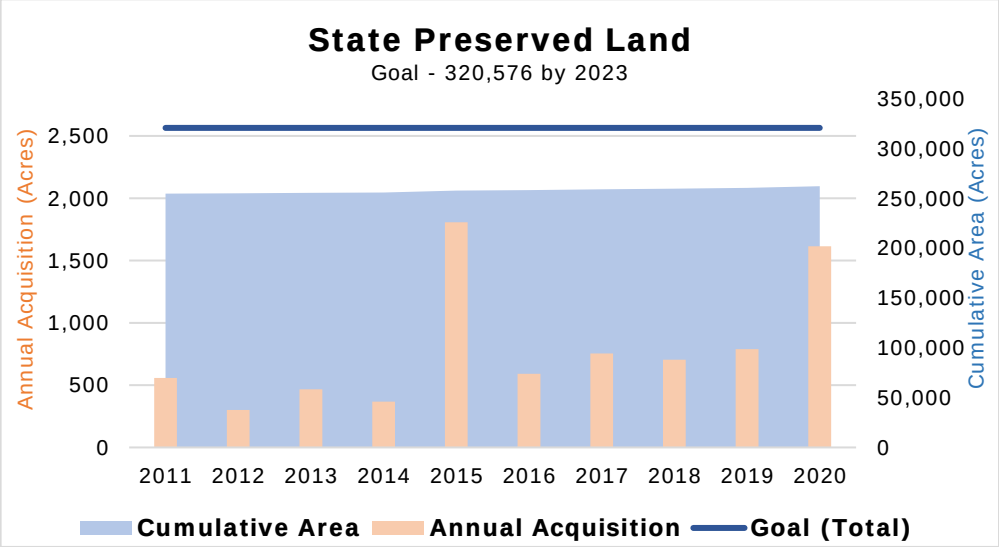
# Preserved Land

*QUICK SUMMARY:*

- ✓ COMPARED TO LAST REPORT
- ✓ COMPARED TO 10 YR. AVERAGE
- ✗ ON TRACK TO MEET GOAL

Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

**"Twenty-one percent of the state's land area shall be held as open space land."[8]**




## Goal #1: State Owned Land – 10 percent

In 2020, the Department of Energy and Environmental Protection (DEEP) acquired 1,614 acres of land* under the Recreation and Natural Heritage Trust Program, the primary vehicle for adding land to the State's system of parks, forests, wildlife areas, water access areas, and other open spaces.[9] The State invested almost $2.8 million and leveraged approximately $3.2 million to acquire the 1,614 acres in 2020.

Over the last 10 years, the state has preserved an average of approximately 795 acres per year. While Connecticut has made steady progress to increase the amount of land preserved, State preservation efforts are not on track to reach the State's preservation goal by 2023, which would require an annual procurement of approximately 19,500** acres over the next three years, as shown in the gauge graphic.

**Current Rate** (needle) **vs. Rate Needed to Achieve Goal**


Open space acquisitions provide Connecticut's residents with options for outdoor activities, preservation of scenic beauty, habitat protection and increased biodiversity, water protection and flood control. In addition, forests, farmland and other natural habitats absorb more than 11 percent of the nation's greenhouse gas (GHG) emissions.[10] Land conservation offers a double benefit for the climate: it helps absorb GHG emissions and it prevents significant GHG emissions that would result from development. Research is also showing that visiting a forest or park has real, quantifiable health benefits, both mental and physical.[11]

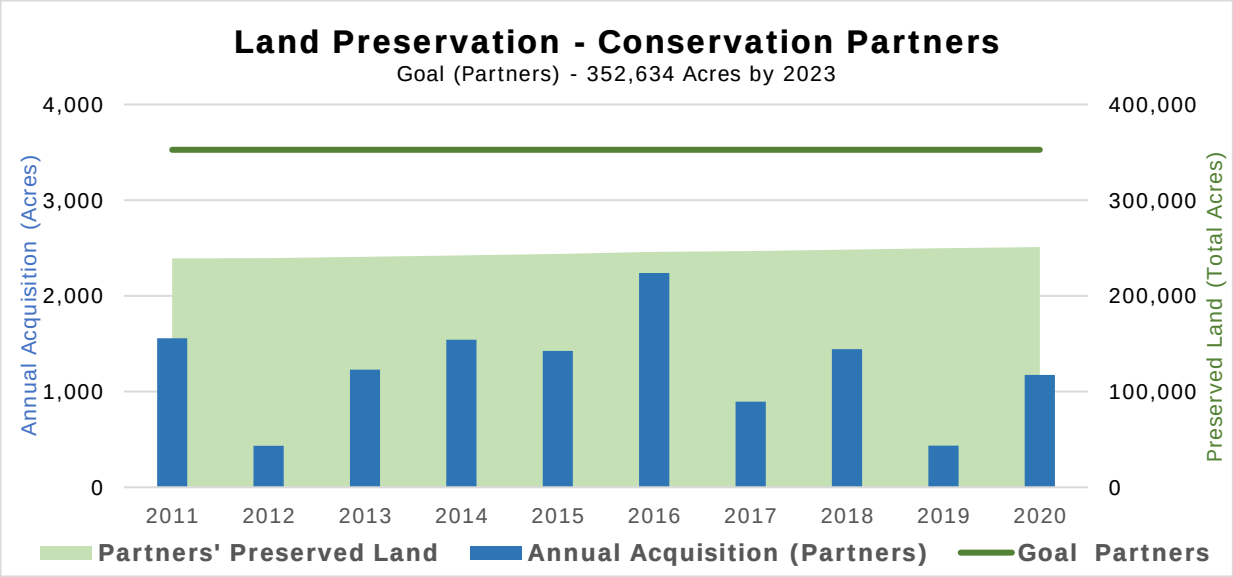
**Goal #1:** The State shall acquire ten percent of Connecticut's land for preserved open space. This goal was set in statute in 1997 (Connecticut General Statutes, (CGS) Sec 23-8(b)).

**Technical Note:** *State land is primarily owned in fee by the State. A notable exception is a 111-acre easement acquired in 2019, which is included in the State acquisition total. Acquisitions by "conservation partners" often include easements.
**Annual preservation value and gauge corrected 4-29-2021.

## Goal #2: All Conservation Lands – 11 percent

As Connecticut comprises 3,205,760 acres, fulfilling the goal of 21 percent for open space would require protection of a total of 673,210 acres. DEEP estimates that the amount of land preserved by its conservation partners, including non-profit land conservation organizations, municipalities, and water companies (identified as "Partners' Preserved Land" in the chart below) exceeds 249,465 acres, about 8 percent of the 11 percent target.

The amount of developed land in Connecticut has increased by approximately 20 percent* between 1990 and 2015[12] while the state's population has only grown by approximately 11 percent over that same period. This development pressure underscores the importance of land preservation as a strategy for minimizing and mitigating the impacts of climate change, improving water quality, enhancing habitats, and increasing opportunities for outdoor recreation.




State grants helped municipalities and land trusts acquire or protect 1,174 acres through the Open Space and Watershed Land Acquisition Grant Program in 2020 (depicted on the chart as "Partners' Preserved Land).

The combined acreage of the state land noted above and the land preserved by DEEP's conservation partners is estimated by DEEP to exceed 513,038 acres** or 76.2 percent of the state's conservation goal. The exact acreage is unknown because there is no centralized accounting of privately preserved lands.

Public Act 14-169 required DEEP to "...establish a publicly accessible geographic information map system and database that contains a public use and benefit land registry..." DEEP launched a registry portal as a pilot. To date, DEEP has only added about 26,000 acres or roughly 10 percent of the state-owned open space land into the registry. No progress on the land registry was completed in 2020, nor since September 2018.

The State's "Green Plan" set an interim open space acquisition target of 11,500 acres, consisting of 5,550 acres to be acquired by DEEP and 5,950 acres to be acquired by its conservation partners.[13] By the end of 2020, 10,638 acres of open space were acquired consisting of 4,452 acres by DEEP and 6,186 acres by the State's conservation partners.

**Goal #2:** Pursuant to CGS 23-8(b), "not less than eleven per cent of the state's land area is held by municipalities, water companies or nonprofit land conservation organizations as open space".

**Technical Note:** *Estimates of developed land based on the University of Connecticut Center for Land Use Education & Research state land cover statistics. **Estimated acres for "Partners' Preserved Lands" include easements.

# Forests

*QUICK SUMMARY:*
- COMPARED TO LAST REPORT
- COMPARED TO 10 YR. AVERAGE
- ON TRACK TO MEET GOAL

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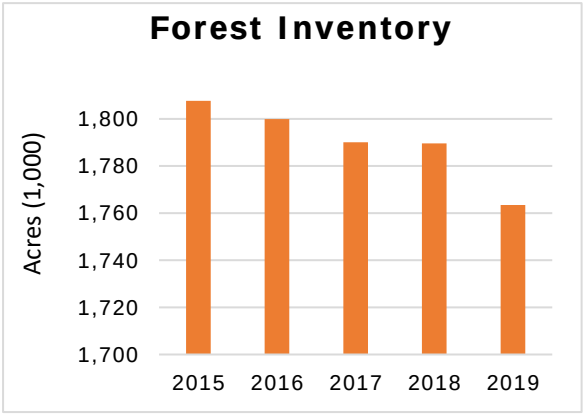
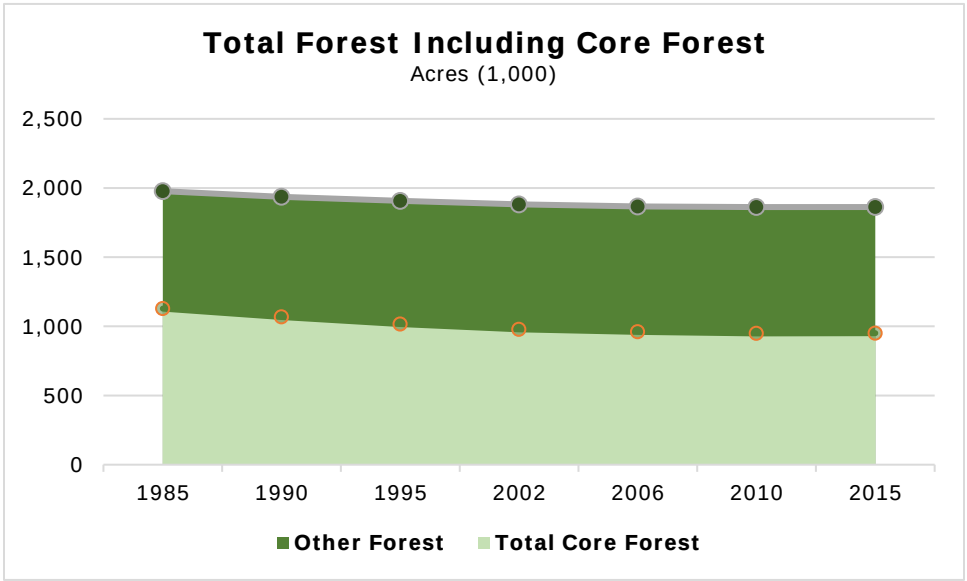
## Forest acreage has generally declined over the last five years. The reduction of core forests is concerning.

Forests and other natural habitats reduce water quality impacts associated with development, impervious surfaces, and certain agricultural practices; and provide valuable habitat. Research is showing that visiting a forest has real, quantifiable health benefits, both mental and physical.

**Forest Inventory*:** It is estimated that forests cover approximately 60 percent of the State. The amount of forest land in Connecticut in 2019 (most recent data available) is estimated to have decreased since the 2018 inventory.[14] Forest loss has stabilized somewhat from significant declines in forestland between the 1980s and early 2000s. However, it is estimated that since 1985, Connecticut has lost over five percent of its forest lands.

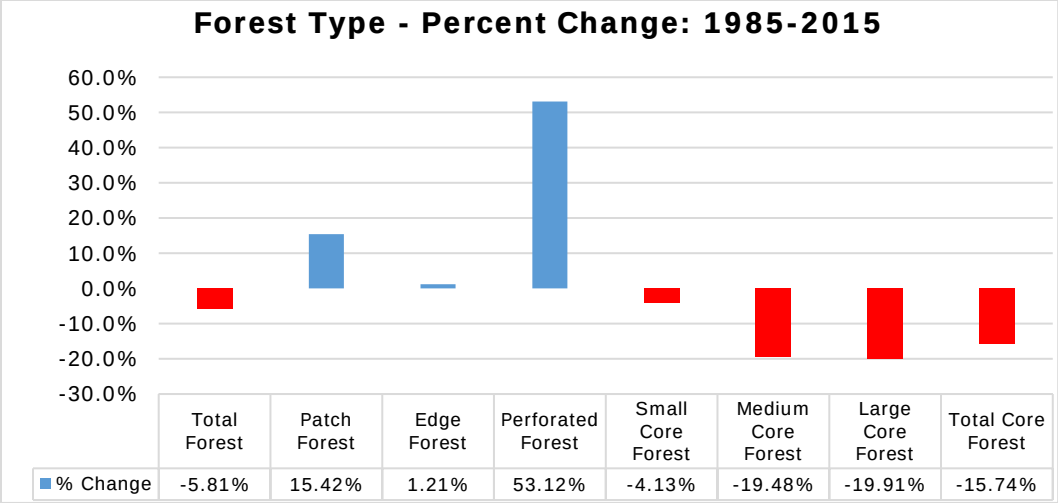



**Core Forest Acres**: Core forests** are essentially forests surrounded by other forests, and in Connecticut, it has been defined as forest features that are relatively far (more than 300 feet) from the forest-nonforest boundary. Core forests provide habitat for many species of wildlife that cannot tolerate significant disturbance. The loss of core forest cover diminishes water purification and habitat values, and could result in heavier runoff, which might lead to poorer water quality and impaired habitat.[15]




Forests that are fragmented, or divided by roads and clearings, provide some forest functions but are not fully-functioning forest ecosystems. Fragmented forests*** are known to provide substandard or poor habitat for some species of wildlife and, in many cases, less opportunity for hunting and other types of recreation. Invasive species of plants and animals often colonize areas in the wake of activities that result in fragmented forests.

Edge forests comprise the majority of forest type in Connecticut. These are areas that are the boundary between core forest and non-forested land cover features.[16] Medium (250-500 acres) and large (>500 acres) core forests have seen the greatest percentage decline since 1985. Perforated forests have seen the greatest percentage increase over that same time period; however, perforated forests only make up about five percent of forest type in Connecticut. Overall, total core forest area has declined by more than 15 percent over the 30 year period (1985-2015).




Forests also contribute to climate regulation through carbon sequestration and storage. Carbon sequestration rates and storage vary by stand age, tree species, growing conditions (including soil type, regional climate, topography, and disturbance regimes (natural or silvicultural).[17] In the northeastern United States, carbon sequestration rates typically peak when forests are around 30–70 years old, but trees continue to sequester carbon through their entire life span. Approximately 85 percent of Connecticut's forests are over 61 years of age. Carbon sequestration is also impacted by the type of trees that comprise the forest. Forests comprised of Oak/Hickory and Maple/Beech/Birch groups store a significant amount of carbon per hectare. These forest types combined comprise about 84 percent of Connecticut's forests.[18]

**Goal: "**Keeping forest as forest" is the overarching goal of Connecticut's 2020 Forest Action Plan.

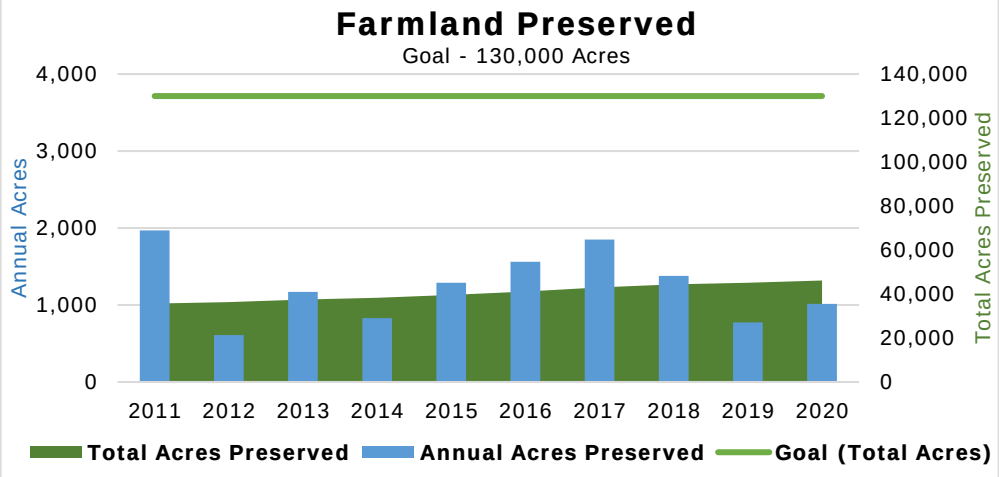
**Technical Note:** *The vertical axis in the "Forest Inventory" chart above has been shortened, beginning at 1,700 (1,000) acres rather than the customary zero. The estimate of forest inventory in Connecticut is derived from the United States Department of Agriculture (USDA) Forest Inventory and Analysis (FIA) research, which is used to determine the extent, condition, volume, growth, and use of trees on forest land. **Estimates of core forest acres in the chart were derived by the University of Connecticut's (UConn) Center for Land Use Education and Research (CLEAR), which uses satellite imagery to identify forests that are at least 300 feet from non-forest development, such as roads, buildings and farms. ***Fragmented forests consists of patch forest, which is forest along the edge of an interior gap in a forest that are degraded by "edge effects"; edge forest, which is forest along the exterior perimeter of a forest that are degraded by "edge effects"; and perforated forest, which consists of small isolated fragments of forest that are surrounded by non-forest features and completely degraded by "edge effects".

# Farmland

*QUICK SUMMARY:*
- ✓ COMPARED TO LAST REPORT
- ✗ COMPARED TO 10 YR. AVERAGE
- ✗ ON TRACK TO MEET GOAL

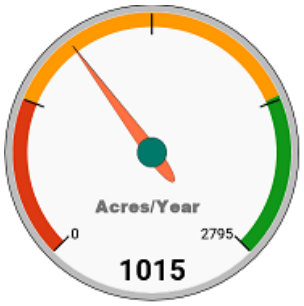
Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

## Connecticut preserved more agricultural land in 2020 than last year.




In 2020, Connecticut preserved 1,015 acres of agricultural land.[19] This is more than the 773 acres preserved in 2019, but less than the previous 10-year annual average of 1,266 acres.[20] The cumulative acreage preserved by the Connecticut Department of Agriculture (DoAg), which began preserving agricultural land by purchasing development rights in 1978, has increased slowly over the last 10 years. It is estimated that Connecticut's farms operate on approximately 380,000 acres statewide.[21] In 2019, approximately 12,000 parcels, with a combined acreage of approximately 231,000 acres were assessed at use value rather than fair market value, under "Public Act 490"*.[22]

**Current Rate** (needle) **vs. Rate Needed to Reach Goal**




Council projections prepared in 2020 indicate that the goal of preserving 130,000 acres could be reached by 2050 at an annual preservation rate of approximately 2,795 acres per year as depicted in the gauge chart. However, using the average annual acquisition rate for the last ten years, including acreage for 2020, it would take approximately 67 years to achieve the State's farmland preservation goal.

In addition to the production of food and agricultural products, Connecticut's farms have a role in mitigation, adaptation, and resiliency to the negative impacts of climate change. Well managed farms store carbon from the atmosphere in soils and plants, capture and store water from extreme precipitation events, and provide for bio-mass derived renewable energy. Soil is one of the sinks for atmospheric carbon, and one that can be managed to mitigate the effects of climate change.[23]

From 1985 to 2015, it is estimated that Connecticut lost approximately 45,000 acres of "agricultural fields",[24] which represents a loss of approximately 16 percent. The rate of farmland loss may change as development pressure increases or as demand for locally produced food and agricultural products increases. As detailed in the solar photovoltaics indicator, approximately 450 acres of agricultural land was proposed to be converted from agricultural use to power generation use in 2020**.

**Goal:** DoAg adopted a farmland preservation goal 130,000 acres in total.

**Technical Note:** *Public Act 490 is Connecticut's law (Connecticut General Statutes (CGS) Sections 12-107a through 107-f) that allows farm, forest, or open space land to be assessed at its use value rather than its fair market or highest and best use value (as determined by the property's most recent "fair market value" revaluation) for purposes of local property taxation. Based on 87 percent of municipalities reporting. **Based on proposals approved or pending by the Connecticut Siting Council in 2020.

# Wetlands

Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

**Inland Wetlands:**
Inland wetlands are defined, in Connecticut, as land, including submerged land (not including tidal wetlands) "which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial, and floodplain by the National Cooperative Soils Survey, as may be amended from time to time, of the Natural Resources Conservation Service (NRCS) of the United States Department of Agriculture (USDA)".[25] According to data from the USDA's NRCS, there are or were approximately 95,000 acres of alluvial and floodplain soils and 366,000 acres of poorly drained and very poorly drained soils in Connecticut. Collectively, the area underlain by these soils accounted for a minimum of approximately 14 percent of the total area in Connecticut.

**Implementation of the inland wetlands law has been problematic.**
Activities that are likely to affect inland wetlands and watercourses are regulated by each town's municipal inland wetlands agency. Regulated activities include, but are not limited to, filling, dredging, clearing, grubbing, grading, piping, culverting, channelizing, diverting, damming, dewatering or otherwise temporarily or permanently altering inland wetlands and watercourses. A report by the Council in 2008, "Swamped", identified a number of problems with how the law is implemented. Though some improvements have been made, there remain structural impediments to efficient implementation:

- Forms that are required to be submitted by municipalities on the actions of their inland wetlands agencies are not submitted electronically. This requires the limited staff resources to convert the written filings to electronic records.
- The requirement that at least one member of a municipal inland wetlands agency be trained is not enforced.*
- The Inland Wetlands Management Section at the Department of Energy and Environmental Protection (DEEP) has developed an online training program and produced a number of high-quality educational videos.** However, there is no guarantee that funding to maintain or update the on-line training will continue to be available.

**Tidal Wetlands:**
Tidal wetlands are defined in the Tidal Wetlands Act by their current or former tidal connection, and their capacity to support certain wetland vegetation. Unlike inland wetlands, tidal wetlands are regulated exclusively by DEEP and not by municipal inland wetlands agencies. Tidal wetlands are threatened with inundation, due to a rise in sea level attributed to the impacts of climate change, that will result in loss of habitat for marsh-dependent species.

Wetlands serve many functions; one of them being their unique ability to store and sequester carbon. Tidal wetlands remove more carbon dioxide ($CO_2$) from the atmosphere per hectare than forests. Likewise, forested wetlands, which comprise most of the inland wetlands in the state serve as important carbon sinks and continue to sequester carbon as organic matter within the forested system (both above and below ground). Although coastal wetlands are generally better carbon sinks than freshwater wetlands, the substantial extent of forested wetlands across the state should be recognized as important to greenhouse gas (GHG) mitigation strategies and incorporated into inland wetland protection efforts in Connecticut. [26]

**Technical Note:** *Connecticut General Statutes (CGS) Section 22a-42(d) requires that at least one member of the inland wetlands agency or staff of the agency be a person who has completed the comprehensive training program. **An online course would fulfill that training requirement as well as for duly authorized agents (pursuant to CGS section 22a-42a(c)(2)); however, that online training is not currently available. In addition, many towns (up to 20 percent) fail to meet their mandated reporting requirements. The unreliableness of municipal data led the Council to drop its tracking of "reported" wetlands lost.

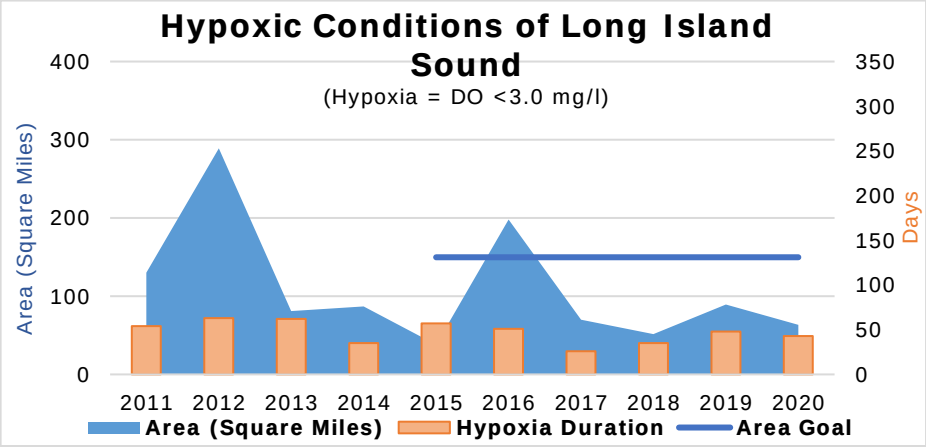
# The Water of Long Island Sound

*QUICK SUMMARY:*

- COMPARED TO LAST REPORT
- COMPARED TO 10 YR. AVERAGE
- ON TRACK TO MEET GOAL

Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

## The area of Long Island Sound with hypoxic conditions decreased in 2020.

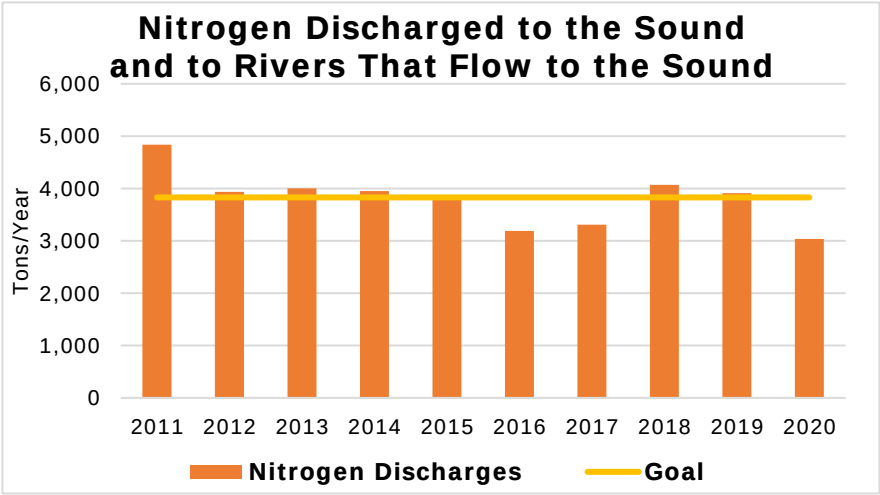



The area of Long Island Sound with hypoxia, water with dissolved oxygen (DO) concentration less than 3.0 milligrams per liter (mg/l), decreased from 89 square miles in 2019 to 63 square miles in 2020. In addition, the duration of the hypoxic conditions decreased from 48 days in 2019 to 43 days in 2020. Both area and duration data for 2020 was less than the ten-year average. Most, if not all, of the hypoxic conditions are found in the western basin of the Sound. The primary cause of hypoxia is nutrient pollution, primarily nitrogen and phosphorus from runoff and wastewater treatment effluent that fuels the growth of phytoplankton in the Sound. The average dissolved nitrogen concentration at the bottom of the Sound was approximately 0.2 mg/l (.2 parts per million) in 2020; an increase from 2019, but less than the ten-year average of .21 mg/l.[27] However, there were 25 percent less samples taken in 2020 compared to previous years.

**Goal:** The goal line on the top chart is an approximation of the maximum area of hypoxia target adopted in the 2015 edition of the Long Island Sound Study's Comprehensive Conservation and Management Plan to "Measurably reduce the area of hypoxia in Long Island Sound … by 2035, as measured by the five-year running average size of the zone."

## The amount of nitrogen discharged to the Sound in 2020 was lower than 2019.[28]

Connecticut has reduced nitrogen discharges by approximately 23 percent over the last decade. By investing in nitrogen-removal technology at sewage treatment plants and implementing a Nitrogen Control Program, nitrogen discharges from point sources have been reduced and the area of hypoxia in the Sound (see above) has been reduced. Reducing nitrogen discharges from non-point sources remains a challenge.




**Goal:** Substantial reduction of nitrogen discharges to the Sound is a goal that is shared by Connecticut and New York. Connecticut established a reduction goal of about 6,670 tons annually by 2014, which is the result of a 63.5 percent reduction from the point source baseline of 10,500 tons per year. Therefore, Connecticut's goal was established as a maximum of 3,830 tons per year by 2014.[29] Nitrogen discharges "upstream" of Connecticut (Massachusetts and Vermont) also contribute to the nitrogen loading in Long Island Sound.

# The Warming and Rising Waters of Long Island Sound

*QUICK SUMMARY:*

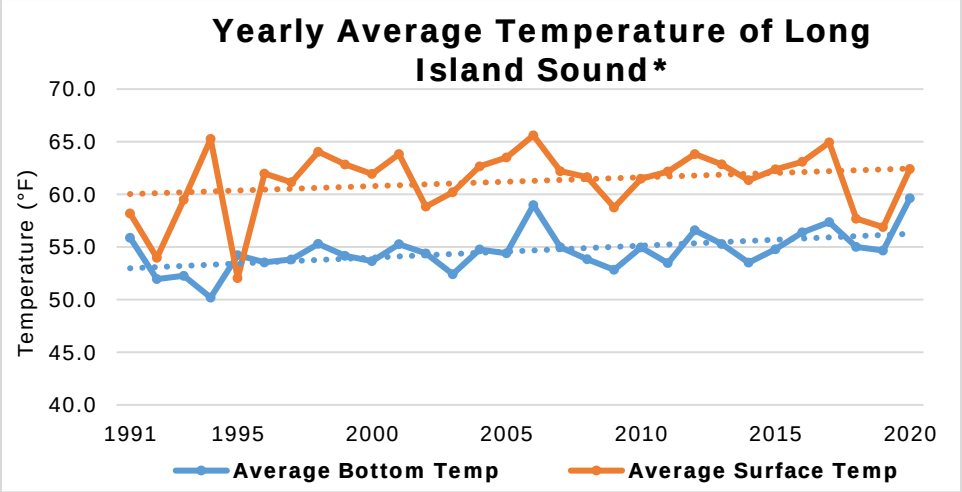
X COMPARED TO LAST REPORT

X COMPARED TO 10 YR. AVERAGE

— ON TRACK TO MEET GOAL

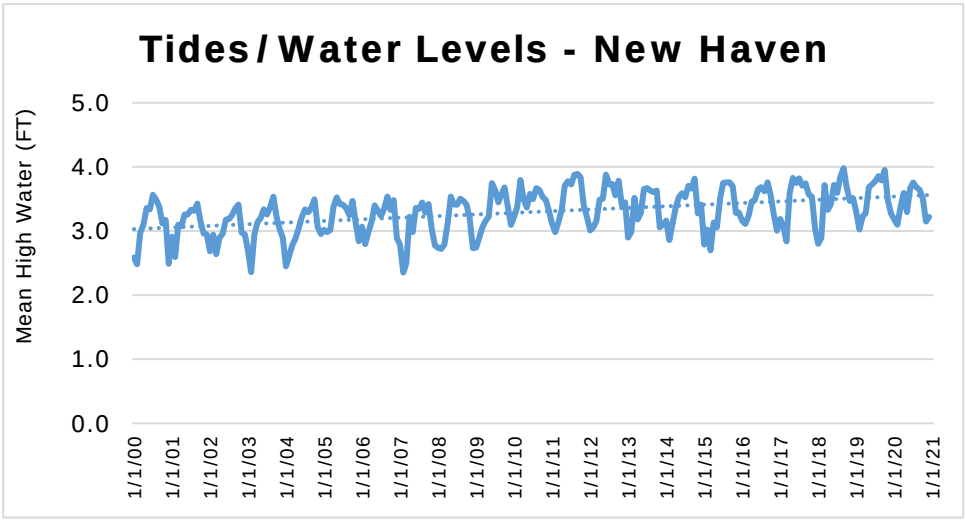
Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

## Annual average bottom and surface water temperature increased over the last 29 years.




The average bottom and surface temperature of the water in Long Island Sound has been rising, with the average bottom temperature rising faster than the surface water.

In 2020, the average annual surface water temperature (62.4°F) for the Sound was above the average for the previous 29 years (61.2°F); the trend indicates an increase of approximately eight percent over that same period. Likewise, the average annual bottom water temperature for the Sound (59.6°F) was above the average for the previous 29 years (54.4°F); the trend indicates an increase of approximately 15 percent over that same period.[30] While the long term impact of warmer water in the Sound is unknown, species diversity and biomass remain high, although there has been a shift to warm water tolerant species. Conversely, the decline in lobster population in the Sound may be the result of warmer water.




The trend for mean high water (MHW) data from 2000 to the present for the monitoring station near New Haven, Connecticut indicates an increase of approximately 17.6 percent over the prior 20-year period.[31]

As the Sound rises, more tidal wetlands will be flooded. The natural "migration" of wetlands landward in response to sea level rise is prevented in many places by fill and development. In addition, shore birds that nest in coastal areas, such as the piping plover, might be displaced.

**Goal:** While there is no established goal for water temperature or sea level rise in Long Island Sound, it is assumed that an increase in both temperature and water level is not a desired outcome.

**Technical Note:** *The vertical axis in the chart above has been shortened, beginning at 40.0 rather than the customary zero. Year to year variations in water temperature and water levels in the Sound are less important than trends.

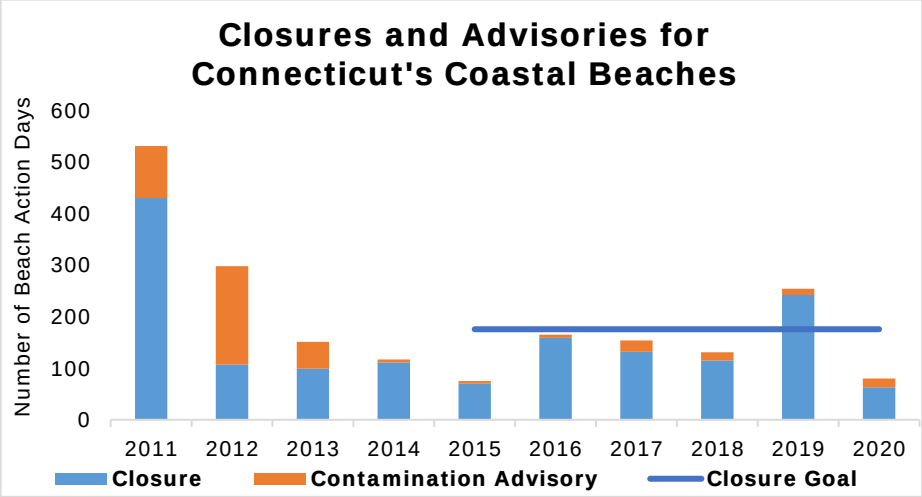
# Swimming

*QUICK SUMMARY:*

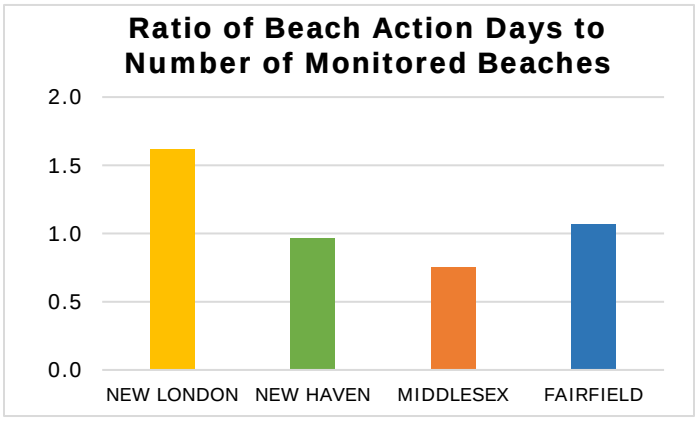
- ✓ COMPARED TO LAST REPORT
- ✓ COMPARED TO 10 YR. AVERAGE
- ✓ ON TRACK TO MEET GOAL

Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

## Coastal swimmers saw fewer beach actions in 2020 than in 2019.




The chart displays both closings and advisories at Connecticut's public beaches since 2011, which from a water quality perspective are functional equivalents. This is different than prior years when only closings were displayed. The data, derived from the Connecticut Department of Public Health and the U.S. Environmental Protection Agency (EPA) Beach Advisory and Closing Online Notification (BEACON2) system, includes information on pollution occurrences in coastal recreation waters for 72 reporting beaches along the Connecticut shoreline in 2020. The beach-specific advisories or closings* are issued by the reporting state or local government entity. There were 80 beach action days in 2020, 63 (79 percent) of which were closures and 17 (21 percent) were advisories. There were 23 beach action days (29 percent) that were preemptive due to rainfall, 39 beach action days (49 percent) due to elevated bacteria levels, and 18 (22 percent) beach action days were preemptive due to a sewage discharge or spill.[32]




While New London County had approximately 18 percent of all reporting beaches, those beaches were responsible for 26 percent of all beach action days in 2020. Because the number of beaches varies by county, the Council utilizes a ratio of beach action days to the number of reporting beaches in each county to illustrate the relative impact that pollution has had on coastal recreation waters. Typically, the western half of the coastline, which has more impervious surfaces, sees the most beach actions. In 2020, this was not the case and was perhaps due to less runoff during the summer drought and/or to unidentified factors that were associated with the COVID-19 pandemic.

**Goal:** The goal for keeping beaches open is to reduce the number of beach closings in half by 2035 (from 2014, with the number for 2014 calculated using a five-year rolling average). This goal was identified in the 2015 edition of the Long Island Sound Study's Comprehensive Conservation and Management Plan.

**Technical Note:** *During a beach closure, water conditions are deemed unsafe for swimmers and other users. A beach advisory is a warning and users decide whether they wish to risk going into the water. An action can be based on a model or policy and not be a monitored beach. The high number of beach actions in 2011 may be attributed to Tropical Storm Irene, which impacted Connecticut on August 28, 2011 and the closure of Fort Hale Park Beach in New Haven, CT for 98 days. **In 2020, Pleasure Beach in Bridgeport was closed for the season due to COVID 19.

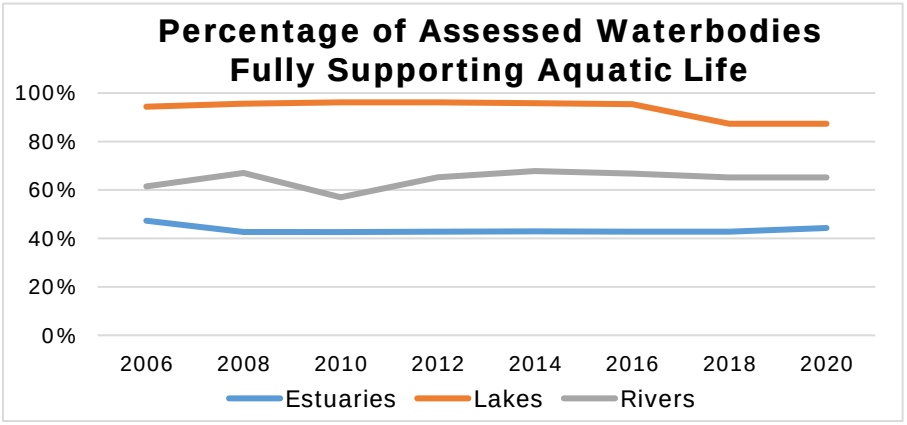
# Rivers, Lakes, and Estuaries

*QUICK SUMMARY:*

- COMPARED TO LAST REPORT
- COMPARED TO 10 YR. AVERAGE
- ON TRACK TO MEET GOAL

Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

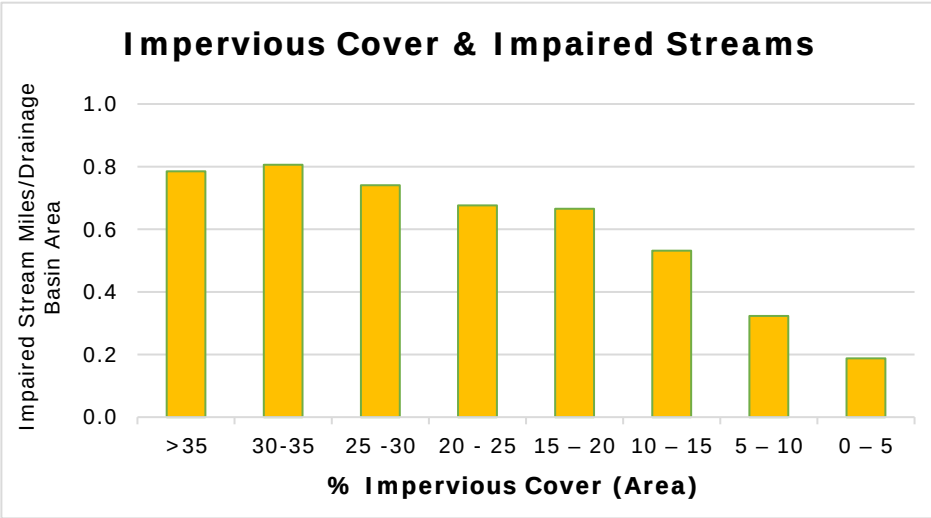
## Water quality shows little signs of improvement.




There are estimated to be 7,772 river miles, 72,509 acres of lakes, and 611.91 square miles of estuarine waters in Connecticut. Connecticut's waterbodies (rivers, lakes, and estuarine areas) provide several key functions, such as the redistribution of sediment and nutrients vital to aquatic habitats; provision of drinking water, power, and irrigation; essential habitat for an abundance of diverse plants and animals, including migrating birds and waterfowl.[33]

The Department of Energy and Environmental Protection (DEEP) makes water quality assessments for each designated use (aquatic life, recreation, and fish consumption) for some waterbodies in the State as either fully supporting, not supporting, insufficient information, or not assessed, which characterizes whether or not the water is suitable for that use. While there has been in increase in the miles of assessed rivers to all those tracked by DEEP, there has been no appreciable change in the percentage of assessed waterbodies (rivers, lakes and estuaries) that fully support aquatic life goals since 2018.[34]

**Impervious cover, wastewater treatment outflows, stormwater drainage systems and over land flow are primary factors in the transport of pollutants to surface waters!**




The Council assessed the relationship between the percent of impervious cover and the number of stream/river miles (2018 data) that do not support aquatic life or recreation for each impervious cover grouping. The ratio of the number of impaired stream/river miles divided by the total area of drainage basins for each impervious cover grouping highlights the relative impact that impervious cover has on water quality.

**Goal**: Attainment, wherever possible, of "water quality, which provides for the protection and propagation of fish, shellfish and wildlife and provides for recreation in and on the water".

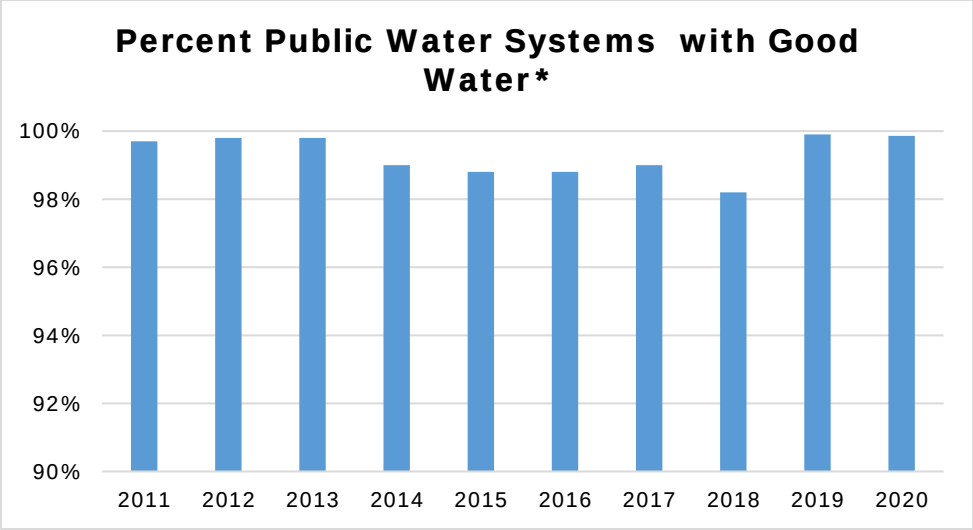
**Technical Note:** Apparent fluctuations in year-to-year water quality results may be due to limitations in data collection and study design and not to widespread changes in water quality.

# Drinking Water

*QUICK SUMMARY:*
- ✗ COMPARED TO LAST REPORT
- ✓ COMPARED TO 10 YR. AVERAGE
- — ON TRACK TO MEET GOAL

Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

## Drinking water quality in 2020 was slightly lower with chloride again being the most common contaminant detected in public water systems.




This indicator shows the percentage of the population served by Community Water systems and Non-Transient Non-Community Water systems that demonstrated full compliance with applicable standards, after weighting the reports to account for the number of people served by each system. Though long-term problems occur, they are rare in large systems.

Data for 2020 show an increase in the number of violations, based on the number of people served, from 2019 levels.[35] By far, the most common problem during 2020 in water systems was excessive levels of chloride,** which is typical of most years. In addition, the Connecticut Department of Public Health (DPH) oversees the monitoring for lead by public water supplies, and also requires public water to be tested for corrosive properties (including pH) that might result in lead contamination.

A 2019 report by the Auditors of Public Accounts for calendar year 2017 recommended that the DPH strengthen oversight and enforcement. A 2020 update indicated that DPH implemented seven of the Auditor's recommendations, and was still working on addressing the other ten recommendations identified in the 2019 Audit Report.

About 80 percent of people in Connecticut are supplied by the public water systems included in the chart above. The remainder of the population relies on private wells, which are not monitored by any government agency and are not counted in this indicator. An unknown but significant number of private wells are contaminated by pollution or naturally occurring toxins, such as arsenic and uranium. A recent United State Geological Survey study of groundwater samples collected from more than 2,000 private wells in bedrock aquifers in Connecticut found that 3.9 percent of collected samples contained arsenic concentrations greater than the U.S. Environmental Protection Agency's (EPA) maximum contaminant level (MCL) of 10 micrograms per liter (µg/L), and 4.7 percent of collected samples contained uranium concentrations greater than the EPA MCL of 30 µg/L.[36] The DPH provides guidelines for testing of private wells.

**Goal:** It is assumed that the goal is for everyone to have safe drinking water.

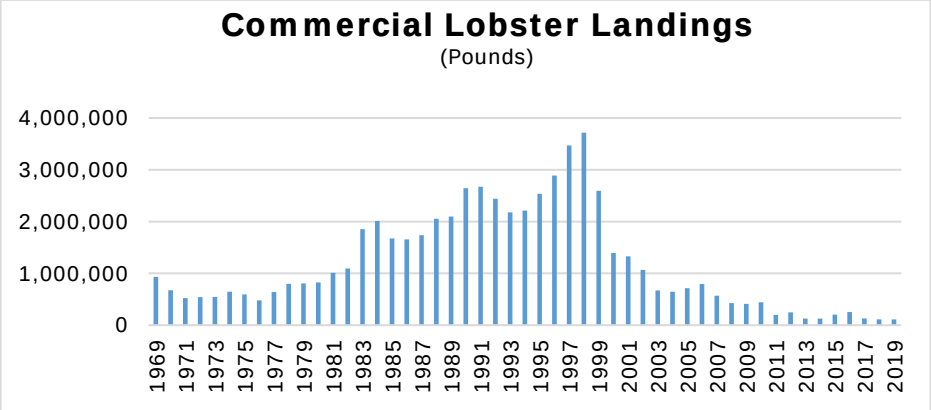
**Technical Notes:** *The vertical axis in the chart above has been shortened, beginning at 90 percent rather than the customary zero. This allows the reader to see year-to-year differences, which would be nearly imperceptible if the chart began at zero. **The standard for chloride is set by state regulation.

# Lobster and Fishes of Long Island Sound

**QUICK SUMMARY:**
- COMPARED TO LAST REPORT
- XX COMPARED TO 10 YR. AVERAGE
- ON TRACK TO MEET GOAL

Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

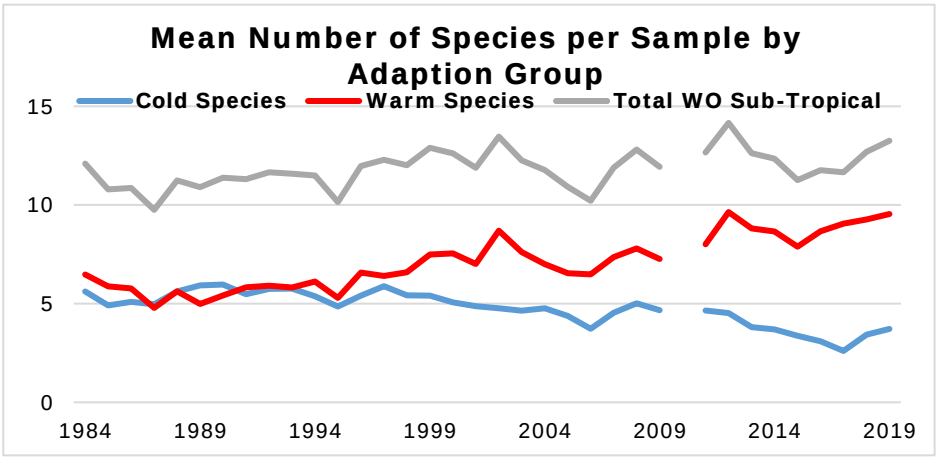
## Long Island Sound's species are trending towards animals that prefer warm water.




Lobster, which thrive in cold water, have become less common. Lobster landings in Connecticut have declined dramatically from a high of over 3.7 million pounds in 1998 to just over 111,000 pounds in 2019 (most recent data) – almost a 97 percent drop.[37]

The decline in lobsters was also confirmed by Department of Energy and Environmental Protection's (DEEP) spring and fall trawl surveys. Researchers investigated several possible causes for the dramatic downturn in lobster populations since 1998 including disease, changes in water quality, changes in climatic conditions and other human impacts to Long Island Sound, such as the presence of pesticides. Scientists did not detect pesticides in lobsters collected in 2014,[38] leaving the warming waters as the most likely cause for Connecticut's lobster decline.

DEEP surveys marine fish, squid and lobster populations, usually every spring and fall, by towing nets from a research vessel.* The chart shows the average number of fish species caught in each tow during the spring and fall surveys combined. The well-documented trend toward species that favor warm water is apparent.[39]




A study of 686 species, published in 2018, projects the shifts in thermal habitat for fish species all along the North American continental shelf.[40] The impacts of warmer water temperatures have had mixed effects on finfish found in Connecticut waters. As discussed above, the trend indicates that the mean number of warm-adapted species increased significantly while the average number of cold-adapted species declined since 1984. Overall, finfish diversity in Long Island Sound remains high, indicating that the Sound is healthy and that a strong balance of species is able to exploit the full mix of resources available throughout this ecosystem.

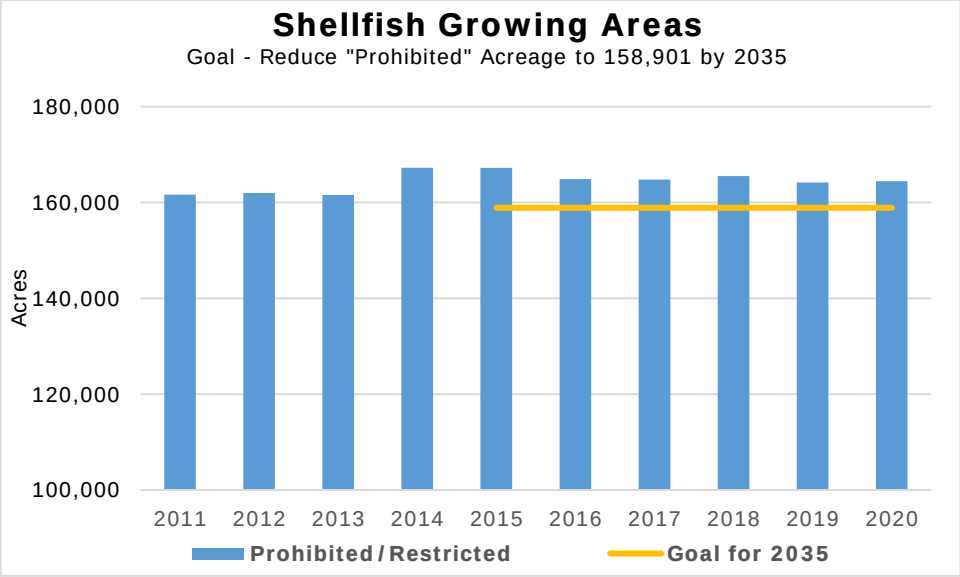
**Technical Note:** *Data from 2010 and 2020 are missing because no fall and/or spring survey was conducted those years. Finfish species captured in the Connecticut DEEP Long Island Sound Trawl Survey were divided into adaptation groups based on their temperature tolerance and seasonal spawning habits.

# Clamming and Oystering

QUICK SUMMARY:
X COMPARED TO LAST REPORT
— COMPARED TO 10 YR. AVERAGE
— ON TRACK TO MEET GOAL

Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

## The area of the Sound approved for harvesting shellfish was less in 2020.




The Connecticut Department of Agriculture's (DoAg) Bureau of Aquaculture and Laboratory Services monitors water quality and classifies shellfish growing areas according to their potential for yielding healthful, uncontaminated shellfish. The chart* shows preliminary data for 2020 for the acreage of shellfish growing areas that are designated as restricted areas that include "prohibited", "restricted relay", and "conditionally restricted relay" designations. There has been a slight decline in "approved" acreage in 2020 due to a downgrade of approved acres in Westport offshore of the Saugatuck River due to bacterial exceedances at lower rainfall amounts. The area of restricted/prohibited shellfish growing areas is determined by bacteria contamination, which is an indicator of possible sewage contamination. Changes in the classification of shellfish growing area are related to improvement or decline in water quality based upon the results of water quality monitoring and/or updated sanitary survey findings.[41]

Water quality assessment criteria for shellfishing as a designated use only applies to inner-shore, and mid-shore estuarine waters where shellfish growth is viable, which is approximately 50 percent of Connecticut's estuarine waters. According to the Department of Energy and Environmental Protection's (DEEP) 2020 Integrated Water Quality Report, only about 16 percent of the estuarine waters assessed can fully support shellfish harvesting from Class SA waters.** This percentage is unchanged since the 2018 report. Meanwhile, the percent of estuarine waters that can fully support shellfish harvesting from Class SB waters declined since the 2018 report.

**Goal:** The goal for marine shellfishing, adopted in the 2015 edition of the Long Island Sound Study's Comprehensive Conservation and Management Plan, is to "upgrade 5 percent of the acreage restricted or closed for shellfishing in 2014 by 2035". The "restricted or closed" acreage in 2014 totaled 167,264 acres, which included areas designated by DoAg as "prohibited", "restricted relay", and "conditionally restricted relay". Therefore, the goal is a reduction of restricted or closed acreage to 158,901 acres by 2035, shown on the chart as a horizontal line.

**Technical Notes:** *The vertical axis in the chart above has been shortened, beginning at 100,000 acres rather than the customary zero. **SA waters allow shellfish harvesting for direct human consumption where authorized, whereas SB waters allow shellfish harvesting with depuration or relay where authorized. Depuration is the action or process of freeing something of impurities. In the case of shellfish, this usually means moving the shellfish to areas with better water quality.

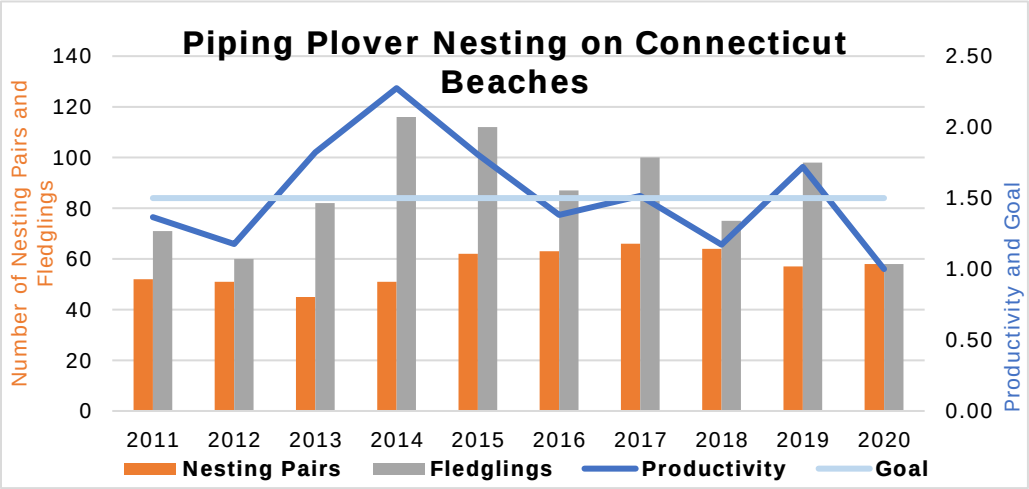
# Piping Plovers

*QUICK SUMMARY:*

X COMPARED TO LAST REPORT
X COMPARED TO 10 YR. AVERAGE
— ON TRACK TO MEET GOAL

Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

## The number of plover chicks to reach flight age or "fledge" in 2020 was down from 2019.




Piping plovers are small shorebirds that nest only on sandy beaches with sparse vegetation. The piping plover population is, according to the United States Fish and Wildlife Service (USFWS), "an indicator of the health of the fragile beach ecosystem."[42]

In 1984, only 30 nesting piping plovers were observed in Connecticut. In 2020, 58 pairs successfully raised 58 young plovers on Connecticut beaches. Scientists estimate that each pair must successfully raise an average of 1.20 young per year to maintain a stable population and an average of 1.50 young per year to successfully increase the population of piping plovers to sustainable levels. In 2020, Connecticut plovers raised an average of 1.0 chicks per nest, which is the worst productivity since 1993. Some of the causes for the low productivity include: 1) heavy human visitation of beaches during the early breeding season, 2) nest predation resulting from erecting fewer nest enclosures as a consequence of COVID-19 precautions, and 3) issues with dogs on beaches, especially at State Park beaches.[43] Since protection and monitoring efforts began in 1984, nesting success has generally improved, resulting in more returning adults in subsequent years. However, the modest size of the population requires that the species continue in threatened status at the state and national level.

Their habitat is a narrow strip squeezed between a rising Sound and higher ground. If their habitat is able to migrate upslope and inland in response to sea level rise, breeding areas could increase. However, habitat loss is anticipated on 45 percent of sandy ocean beaches that are already developed. Coastal flooding during breeding season may also affect piping plover breeding success by flooding nests and thereby increasing chick mortality.[44]

**Goal:** The goal for piping plover was derived from the Piping Plover Atlantic Coast Population Revised Recovery Plan (1996). That Plan's goal calls for 2,000 pairs along the east coast with 625 pairs throughout New England, and a five-year average productivity of 1.5 fledged chicks per pair.

****UPDATE****

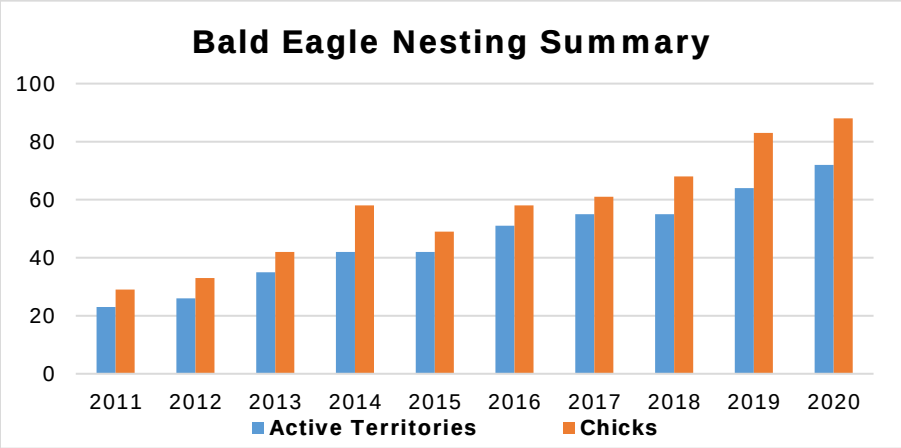
According to the U.S. Fish and Wildlife Service's 2019 Atlantic Coast Piping Plover Abundance and Productivity Estimates, there were 2,008 breeding pairs along the Atlantic coast, with over 980 breeding pairs in New England![45]

# Raptors Rebound

*QUICK SUMMARY:*
- ✓ COMPARED TO LAST REPORT
- ✓ COMPARED TO 10 YR. AVERAGE
- ✓ ON TRACK TO MEET GOAL

Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

## Bald eagles continue their dramatic comeback; ospreys are doing well, too.

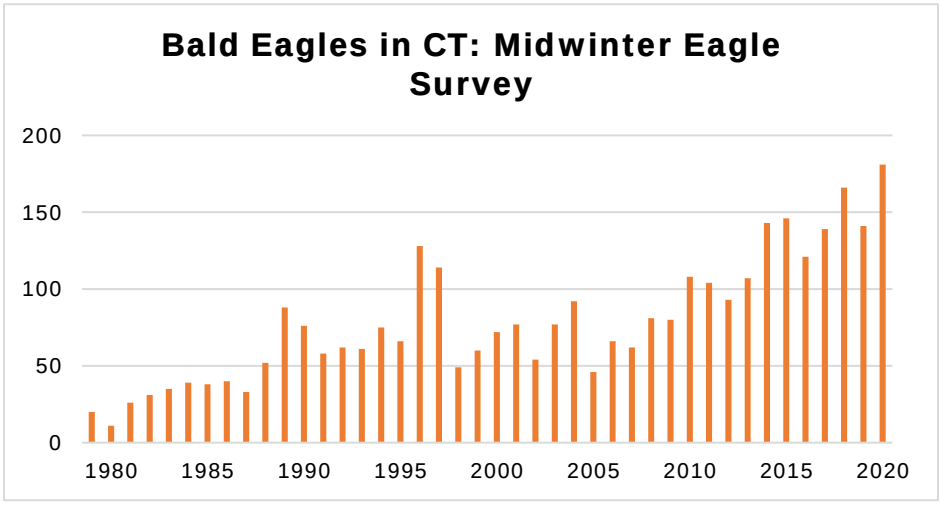



In 2020, the number of active territories and bald eagle chicks was the highest observed over the last 25 years, and likely much longer.

The population of bald eagles is included as an indicator because the eagle is representative of species, which require large areas of relatively undisturbed land near rivers or lakes where the birds can find adequate supplies of fish and other prey that are – very importantly – only minimally contaminated. Iced-over rivers to the north can push more eagles south to Connecticut. The eagles spend their winter mostly along larger rivers where they have become a regular sight. The federal government removed the bald eagle from its list of threatened and endangered species in 2007. In 2010, Connecticut changed the eagle's in-state status from endangered to threatened.

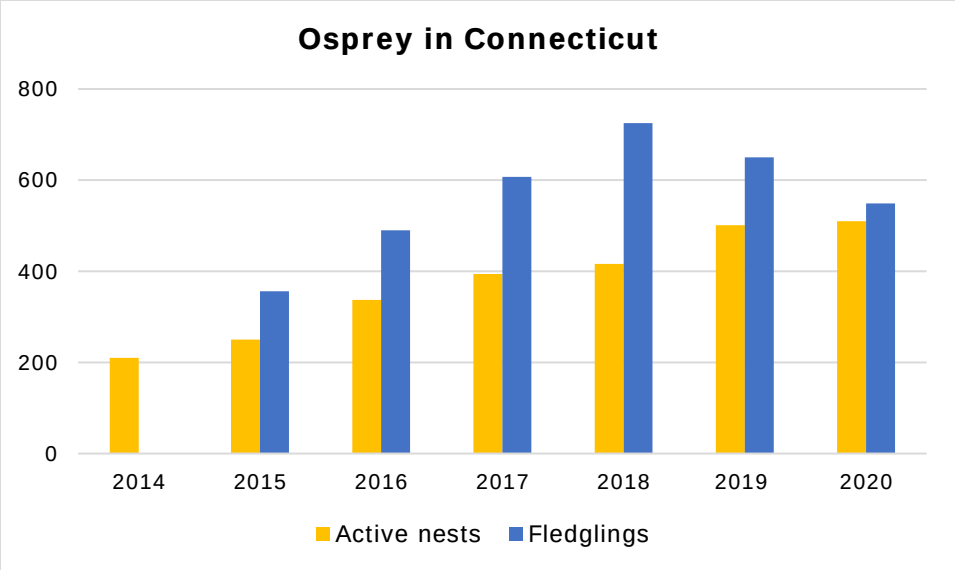
**Goal:** Territories are resource areas used by eagles that have only one active nest. The goal for bald eagles is derived from the 1983 Northern States Bald Eagle Recovery Plan, prepared by the United States Fish and Wildlife Service (USFWS). The Plan established a goal of 20 breeding birds (10 nests) for Connecticut. According to experts in the Bald Eagle Study Group, Connecticut could eventually host up to 200 nesting eagles (100 nests).

In 2020, Connecticut's mid-winter survey recorded 181 eagles throughout the State.[46] Since 1979, observations of eagles (nesting and not) during the Midwinter Eagle Survey have increased over 500 percent.[47]

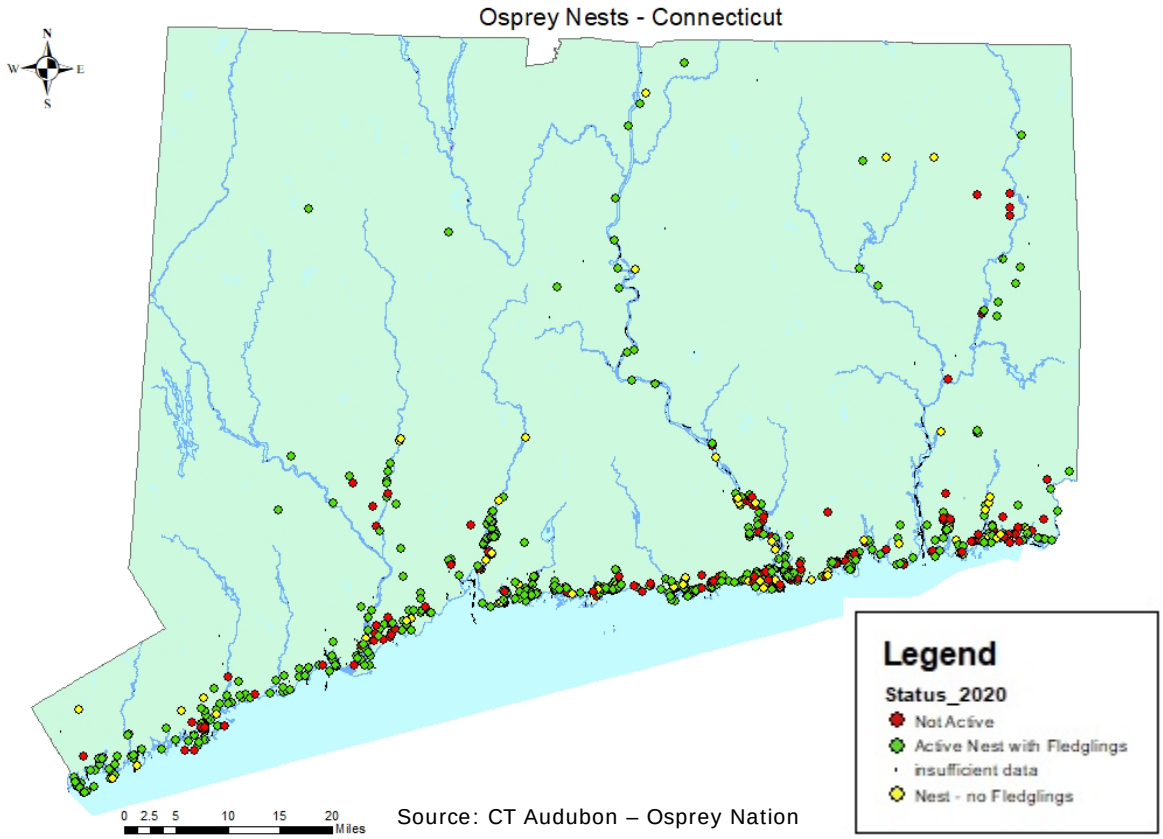



In 1967 bald eagles south of the 40th parallel were listed by the Secretary under the Endangered Species Preservation Act of 1966. The banning of DDT by the U.S. EPA in 1972 and conservation efforts (captive breeding programs, reintroduction efforts, law enforcement, and nest site protection during the breeding season) by federal, state and private organizations resulted a remarkable population rebound to the point that bald eagles no longer need the protection of the Endangered Species Act.[48]

**Osprey:** Another large fish-eating bird of prey, the osprey, has rebounded in similar fashion to the eagle. From a low of nine nesting pairs in 1974, ospreys, counted* by the Connecticut Audubon Society's volunteers, were seen at more than 510 active nests in 2020, meaning they were occupied by an osprey pair. The 510 active nests resulted in 549 observed fledglings. However, it is estimated that the number of fledglings could have been as high as 744.[49]




Osprey feed primarily on live fish; consequently, osprey nests are typically located along the Connecticut shore or proximate to water.




**Goal:** There is no established goal for ospreys in Connecticut, but ospreys are a "sentinel species," meaning their health indicates the health of the environment around them. Ospreys are being monitored by the Department of Energy and Environmental Protection (DEEP), the Connecticut Audubon Society, and volunteers.

**Technical Note:** *Data on fledglings for 2014 was not available.

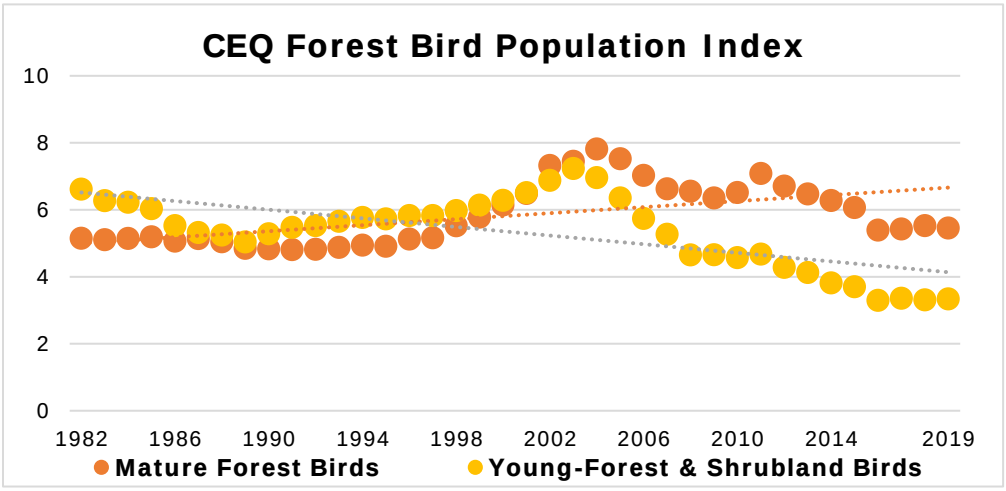
# Forest Birds

*QUICK SUMMARY:*

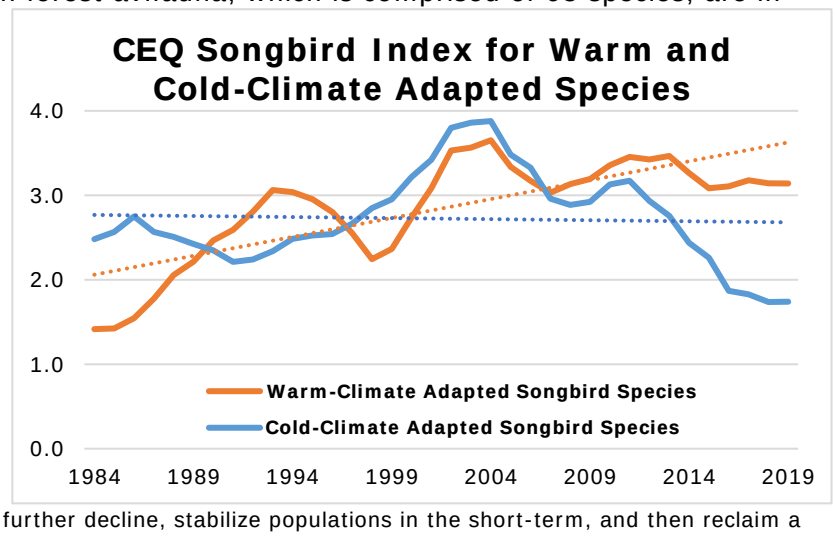
— COMPARED TO LAST REPORT
X COMPARED TO 10 YR. AVERAGE
— ON TRACK TO MEET GOAL

Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

## Forest birds, which are indicators of forest health, are on the decline.




The combined nesting populations of eight species of birds that typically inhabit mature forests and five species of shrubland birds that typically inhabit forests that are young or dominated by shrubby vegetation, sometimes known as "shrublands", has declined over the last 15 years.* As the amount of young forest and shrubland habitat has declined in Connecticut, so have the wildlife species dependent on it. Most of the mature-forest bird species are affected greatly by fragmentation. Predators, invasive species, overpopulating deer and human activities follow roads and other intrusions into the forests and cause nesting success to falter. The true forest birds, those that are not adapted to disturbed roadside or suburban habitat, will succeed in the long term only in forests that are not fragmented (i.e. core forests). Nationally, it is estimated that there has been a net loss of 2.9 billion breeding birds since 1970. Approximately 63.5 percent of Eastern forest avifauna, which is comprised of 63 species, are in decline.[50]



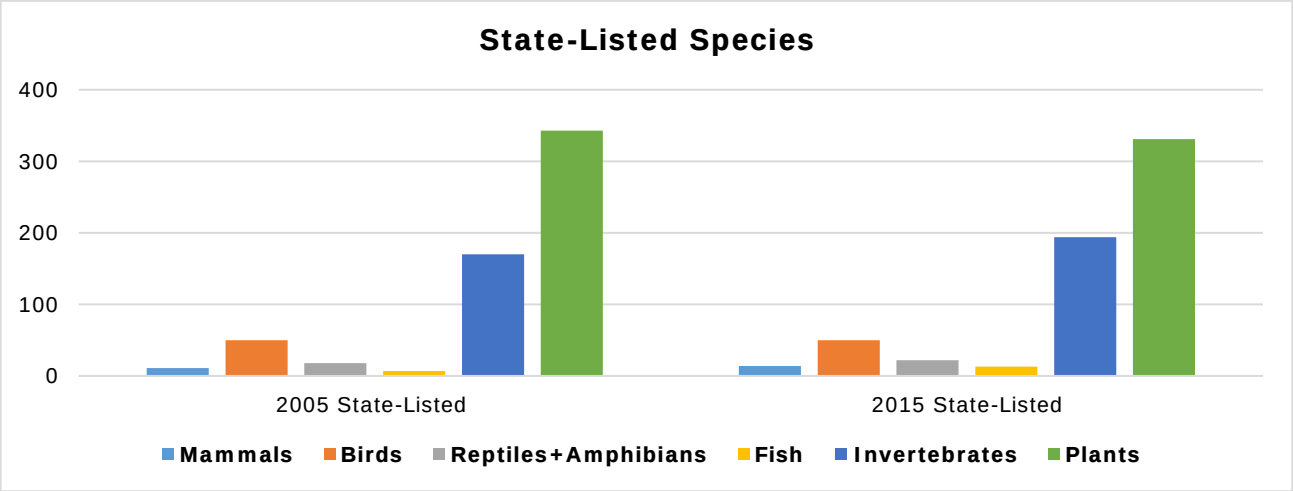

Historic data indicate that the composition of Connecticut's songbird population is changing. Songbirds that prefer warmer climates are increasing at a faster rate than cold-adapted songbird species. Warm-climate adapted songbirds have increased more than cold-adapted songbirds, which had a modest increase since 1984, but a decline in recent years.**[51]

**Goal:** The goal for a variety of landbird species identified in the Partners in Flight Landbird Conservation Plan 2016 is to prevent further decline, stabilize populations in the short-term, and then reclaim a portion of their populations within 30 years.

**Technical Notes:** *The Council calculates index values (using advice from statistics experts) to show the combined population trends of several species (for mature forest birds: Hairy Woodpecker, Wood Thrush, Eastern Wood-Pewee, Red-eyed Vireo, Scarlet Tanager, Black-and-white Warbler, Veery, Ovenbird; for bird species that typically inhabit forests that are young or dominated by shrubby vegetation: American Redstart, Blue-winged Warbler, Chestnut-sided Warbler, Eastern Towhee, and Yellow Warbler. **The CEQ Index is used to assess the presence and abundance of a total of eighteen warm-climate adapted and cold-climate adapted songbird species.

# State-Listed Species

The Connecticut Endangered Species Act, passed in 1989, recognizes the importance of our state's plant and animal populations and the need to protect them from threats that could lead to their extinction. The overall goal is to conserve, protect, restore and enhance any endangered or threatened species and their essential habitat.




As detailed in the graph above, the total number of state-listed species has increased from 599 in 2005 to 624 in 2015, an increase of approximately 4.1 percent. The listing of species as endangered, threatened, and special concern, according to their level of risk and their status, should be reviewed every five years. However, there has been no update to the state-listed species list since 2015. The current list of state-listed species is as follows:

| Taxonomic Group | Endangered | Special Concern | Threatened | Grand Total |
|---|---|---|---|---|
| Amphibians | 2 | 4 | 2 | 8 |
| Birds | 18 | 20 | 12 | 50 |
| Fish | 5 | 8 | | 13 |
| Invertebrates | 33 | 117 | 44 | 194 |
| Mammals | 6 | 8 | | 14 |
| Plants | 133 | 152 | 46 | 331 |
| Reptiles | 4 | 7 | 3 | 14 |
| **Grand Total** | **201** | **316** | **107** | **624** |

The Department of Energy and Environmental Protection (DEEP) uses Natural Diversity Data Base (NDDB) maps as a pre-screening tool to help identify potential impacts to state-listed species. These data are also used by groups wishing to identify areas of potential conservation concern. The NDDB maps, which are updated periodically (every 6 months or so), represent approximate locations of endangered, threatened, and special concern species and significant natural communities in Connecticut.

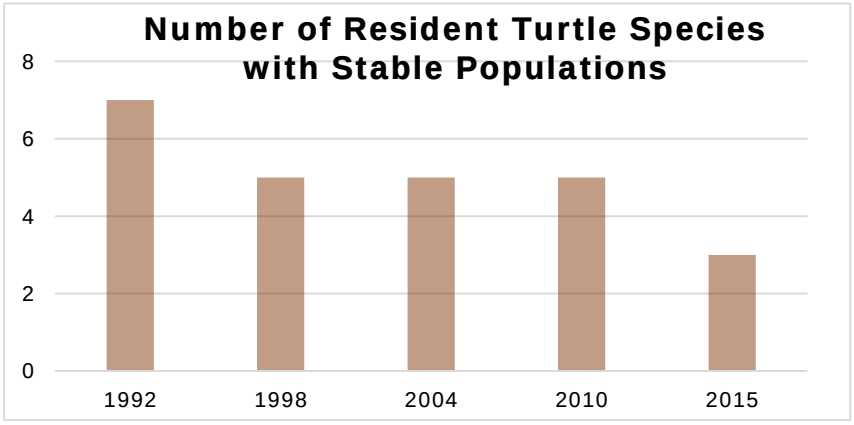
In 2005 and again in 2015, Connecticut developed Wildlife Action Plans* to identify the species of greatest conservation need (GCN), their key habitats, problems, research needs, and conservation actions.[52] The Wildlife Action Plan for Connecticut is due to be updated by 2025.

**Technical Note:** *Formerly known as the Comprehensive Wildlife Conservation Strategy.

## Resident Turtles

*QUICK SUMMARY:*

- COMPARED TO LAST REPORT
- COMPARED TO 10 YR. AVERAGE
- ON TRACK TO MEET GOAL



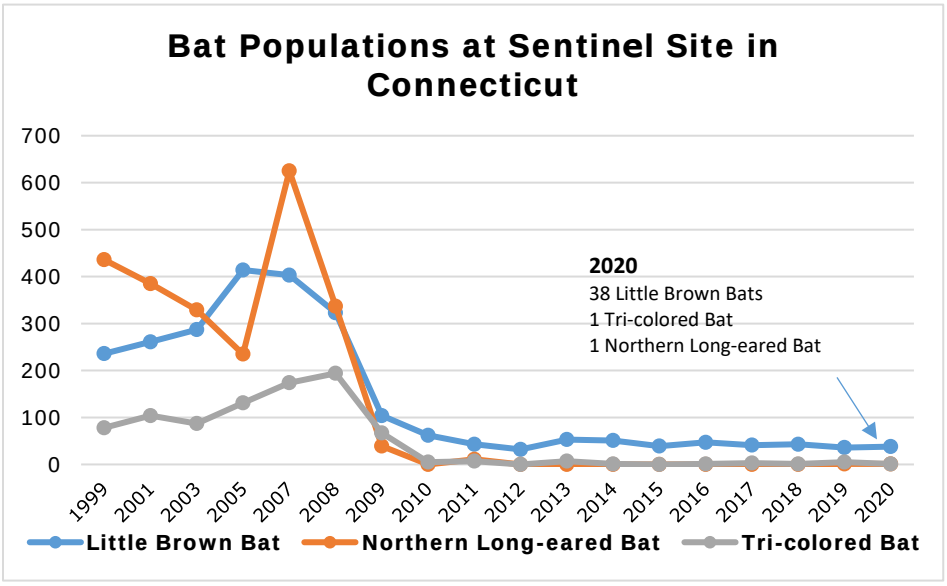

**Five of the eight turtle species that live in Connecticut year-round are listed as endangered, threatened, or of special concern.** Turtles are excellent indicators of ecological health. This indicator includes the eight species of turtle that live in Connecticut (but not the four marine species that visit Long Island Sound in summer, all of which are threatened or endangered). In 2015, five of the eight resident turtle species were listed as endangered or of special concern: bog turtle (endangered), eastern box turtle, wood turtle northern, diamondback terrapin, and spotted turtle (species of special concern). The ability for turtles to sustain a stable population will be difficult because turtles take a long time to reach sexual maturity and have low survivorship when newly hatched.

**Goal:** The goal for all endangered and threatened species is for recovery of their populations to a stable, sustainable level.

## Bats

*QUICK SUMMARY:*

- COMPARED TO LAST REPORT
- COMPARED TO 10 YR. AVERAGE
- ON TRACK TO MEET GOAL




**Eight of the nine bat species are on the latest list of species that are endangered, threatened, or of special concern.** Bat populations in Connecticut have experienced a catastrophic decline that led to the classification in 2015 of three more bat species as endangered in Connecticut and has raised concerns about the future of bats in the state. This decline in bat population, between 2007 and 2010, is primarily due to an epidemic fungal disease called white-nose syndrome (WNS). The chart depicts data for the winter population of three cave-dwelling bat species at a sentinel hibernation site monitored annually by the Department of Energy and Environmental Protection (DEEP).[53] This sentinel cave is one of Connecticut's best remaining overwintering site for cave bats. Recovery, if one occurs, will be slow: adult female bats usually produce just one pup per year. Bats eat insects, including mosquitoes, a number of which may carry diseases that affect humans, birds, horses and other animals.

**Goal:** The goal for bats is for recovery of all nine species to a stable, sustainable population.

**Technical Note:** The horizontal axis for bats displays every other year between 1999 and 2007.

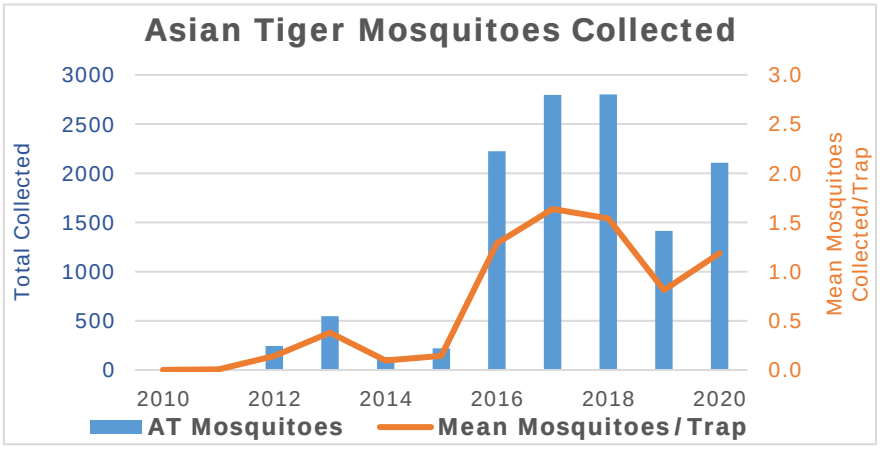
# Invasive Insects

Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

## Asian Tiger Mosquitoes[54]

*QUICK SUMMARY:*

X COMPARED TO LAST REPORT
X COMPARED TO 10 YR. AVERAGE
— ON TRACK TO MEET GOAL




The range of the Asian tiger mosquito is expanding in the United States, particularly into Connecticut and other northeastern states. Infection rates of mosquito-borne diseases, such as Dengue and Zika, are likely to rise, over the long term, as a warming climate creates more favorable habitats for mosquitoes. Connecticut is expected to get warmer and wetter over the coming century, enhancing mosquito populations by creating more suitable habitat. Data suggests that precipitation during the summer months has a greater impact on the number of mosquitoes in the state than does winter temperature. Additional information about mosquito management in Connecticut can be found on Department of Energy and Environmental Protection's (DEEP) website or portal.ct.gov/CAES.

**Technical Note**: Collection data for 2016-2018 has been modified from previous reports because of the introduction of new data from a trapping site in Bridgeport.

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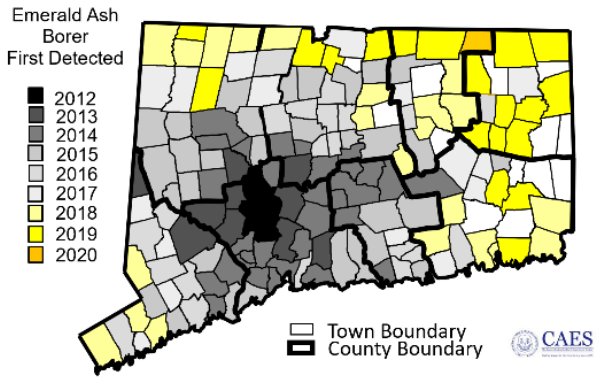
## Emerald Ash Borer[55]

*QUICK SUMMARY:*

X COMPARED TO LAST REPORT
— COMPARED TO 10 YR. AVERAGE
— ON TRACK TO MEET GOAL




The emerald ash borer attacks ash trees almost exclusively. In Connecticut, ash trees make up just slightly less than three percent of the trees in the forest, most of which are white ash. The loss of ash trees in a forest stand also reduces vital habitat and allows undesirable invasive plants to fill the gap created. Movement of ash, in particular as firewood, nursery stock, logs and wood packaging materials, has been cited as the most likely means by which emerald ash borer has spread so rapidly.[56] Additional information about the emerald ash borer in Connecticut can be found on DEEP's website or at www.emeraldashborer.info.

**Technical Note**: The "Invasive Disruptors" described in this section are species that are not native to Connecticut that have the potential to upset the ecological balance or threaten public health. Invasive species have been identified as a cause in decline of at least 48 percent of species listed as threatened or endangered under the United States Endangered Species Act.

Personal Impact*

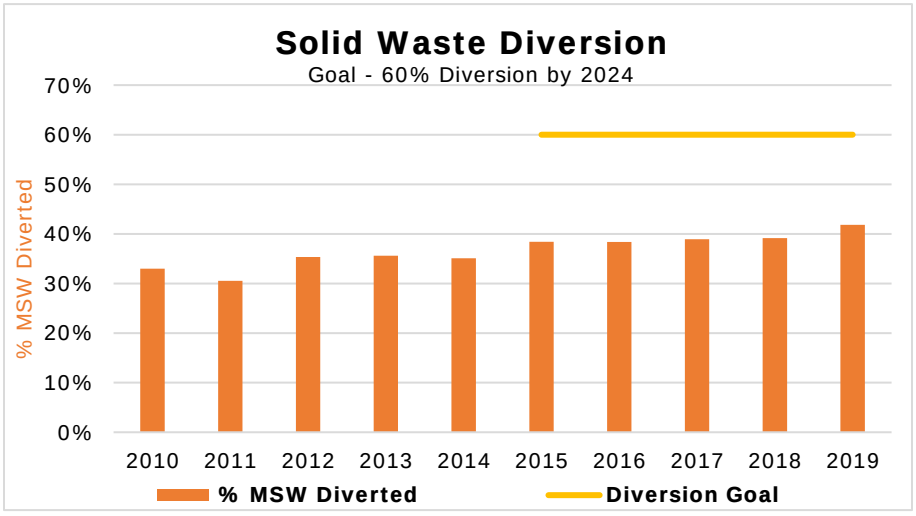
# Waste Diversion

*QUICK SUMMARY:*

- ✓ COMPARED TO LAST REPORT
- ✓ COMPARED TO 10 YR. AVERAGE
- ✗ ON TRACK TO MEET GOAL

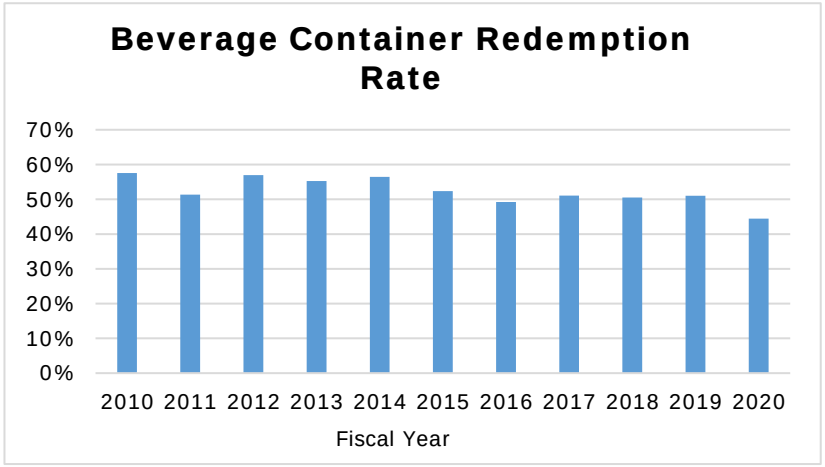
Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

**In 2019, an estimated 1.6 million tons (41.8 percent) of the State's solid waste was diverted from disposal.[57]**




With adoption of An Act Concerning Connecticut's Recycling and Materials Management Strategy in 2014 (Public Act 14-94), Connecticut set a challenging goal to achieve by 2024: divert 60 percent of municipal solid waste (MSW) from disposal. "Diversion" includes the reduction of materials before it makes it into the waste stream, reuse, recycling, composting, and waste conversion. Based on the trend over the last 10 years, Connecticut is not expected to achieve the goal of 60 percent diversion by 2024 under existing conditions.[58]

In 2020, Department of Energy and Environmental Protection (DEEP) and many municipalities in the state joined together to form the Connecticut Coalition for Sustainable Materials Management (CCSMM) to " explore ways to reduce the amount of waste that is generated in our state, improve reuse, recycling, organics collection, and other innovative solutions."[59]As of March 2, 2021, almost half (76) of all municipalities in the state were participating in the CCSMM.




In 2019 (most recent data available), approximately 467,000 tons of bottles, cans and paper were recycled. Bottles, cans, and paper make up the majority but not all of the material recycled in 2019.[60] The Council examined Connecticut's beverage container redemption program in 2020 and found that the redemption rate for deposit beverage containers has dropped by approximately thirteen percent over the last decade. In the Council's special report, *Low Deposit, Low Return*, the Council identified four recommendations to increase the redemption rate and divert more beverage containers from disposal.

**Technical Note:** *Personal Impact indicators illustrate trends in behavior or practices that can be expected to influence the condition of tomorrow's air, water, land and wildlife. ** Estimated "Diversion" based on 2005 Baseline of 3.8 million tons, which is a planning value taken from the Solid Waste Management Plan; it is not actual solid waste generation.

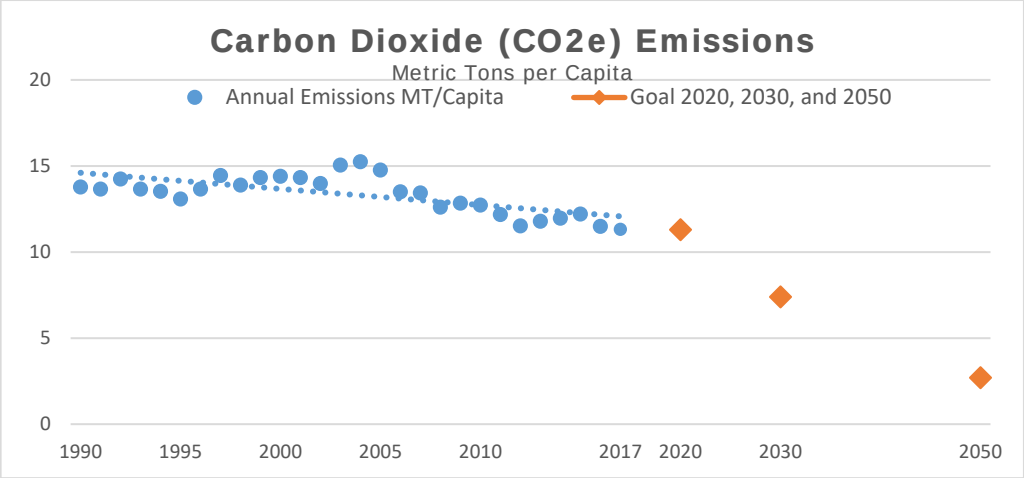
# Climate Changers

***QUICK SUMMARY:***

- ✓ COMPARED TO LAST REPORT
- ✓ COMPARED TO 10 YR. AVERAGE
- ✓ ON TRACK TO MEET GOAL

Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

## Per-capita carbon dioxide ($CO_2$) emissions decreased in 2017 and are on track to meet short term goals. Long term goals are more challenging.

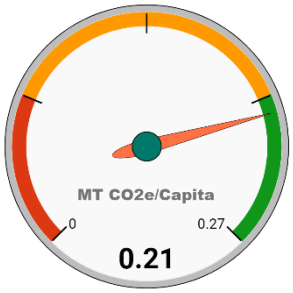



Although data for 2018 was not available at the time of publication, Connecticut residents appear to be on track to meet the 2020 goal for carbon dioxide emissions despite seeing rising per capita emissions from 2013 through 2015. The total average amount of greenhouse gases (GHG or $CO_2e$)** emitted by each person in Connecticut from the combustion of fossil fuels decreased in 2017 (most recent data available) from 2016 (a reduction of 1.5 percent). In 2017, transportation accounted for 38.1 percent of all GHG emissions in Connecticut (the combustion of fossil fuels), while power plants, industry, and the commercial/residential sector accounted for 20.9 percent, 8.9 percent, and 26 percent, respectively.***[61] While Connecticut has made significant progress to reduce emissions of GHG, everyone will have to do more to achieve the 2030 and 2050 goals (see gauge image below).

The goals on the chart above have been adjusted to account for the growth in population that is projected for 2030 and 2050. More people are projected to be living in Connecticut in 2030 and 2050, so that each resident will have to work that much harder to reduce carbon dioxide ($CO_2e$) emissions if the statewide goal is to be met.

The needle in the chart at right shows the 2017 average annual per-capita reduction (0.21 metric tons) of carbon dioxide (CO2) emissions over the previous 10 years. The per-capita reduction needed to achieve the 2050 goal is 0.27 metric tons per year.

**2017 Rate** (needle) **vs. Rate Needed to Reach Goal**




**Goal:** State law sets two goals for greenhouse gas emissions: reduce statewide emissions to 10 percent below 1990 levels by 2020 and 80 percent below 2001 levels by 2050. Governor Lamont's Executive Order 3, set a mid-term reduction target of 45 percent below 2001 levels by 2030. The Governor's Council on Climate Change (GC3) released their report in January 2021 with additional recommendations to reduce state-wide GHG emissions.

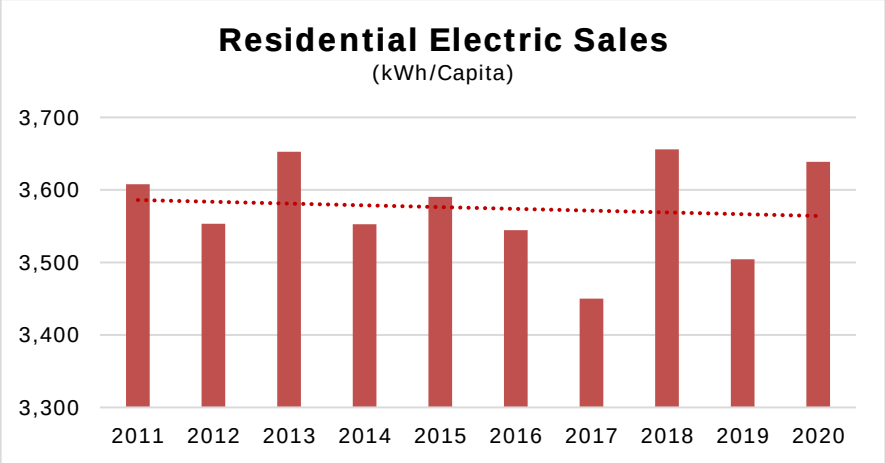
**Technical Note:** *Personal Impact indicators illustrate trends in behavior or practices that can be expected to influence the condition of tomorrow's air, water, land and wildlife. **Emissions are reported in terms of carbon dioxide equivalence (CO2e). While carbon dioxide is the primary GHG, emissions of other GHGs are expressed on the basis of their potential to contribute to global warming, relative to carbon dioxide's potential. Values from previous reports have been updated based on more current data. ***Percent of Consumption-based Accounting Total.

# Electricity at Home and Work

*QUICK SUMMARY:*
- ✗ COMPARED TO LAST REPORT
- ✗ COMPARED TO 10 YR. AVERAGE
- — ON TRACK TO MEET GOAL

Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

## The average Connecticut resident's electric consumption increased in 2020 to 3,639 Kilowatt-hours (kWh)per person.

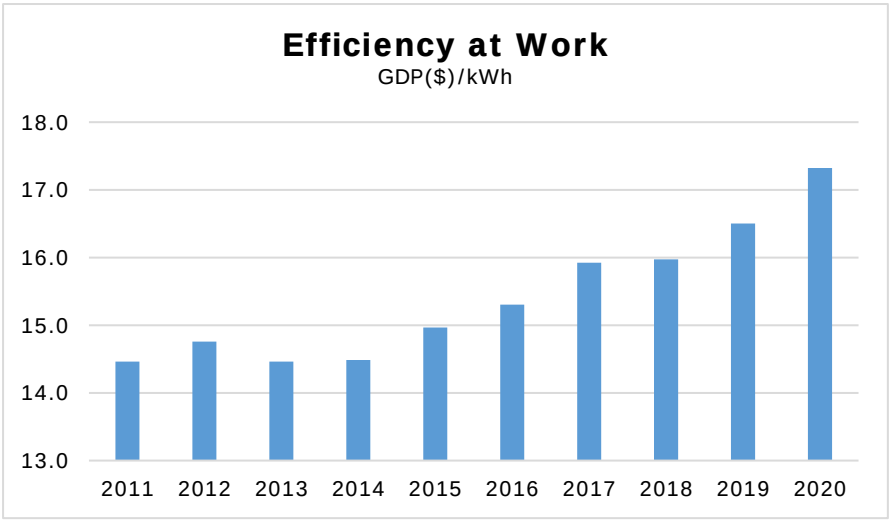



In 2020, Connecticut's residential sector consumed approximately 12,973 million kWh,[62] an increase from 2019 and higher than the prior ten-year average. The use of fossil fuels for electric generation increases air pollution, especially from marginal units used to meet peak demand. Increasing the efficiency of generating units, using renewable sources, reducing electricity use and peak demand, and carbon capture and sequestration are all viable strategies to reduce air pollution from the electricity sector. While the per capita consumption of electricity increased for the residential sector in Connecticut in 2020, electricity consumption in the commercial, industrial and transportation sectors all decreased from 2019 levels. The increase in 2020 came in a year with 30 days with temperatures greater than 90°F, compared to 21 days with temperatures greater than 90°F in 2019. Typically, the hotter the summer, the more electricity residents use to cool their homes and the more greenhouse gas emissions are released to the environment. In addition, more people were learning and working from home for some time in 2020 than in previous years, in response to the COVID 19 virus.

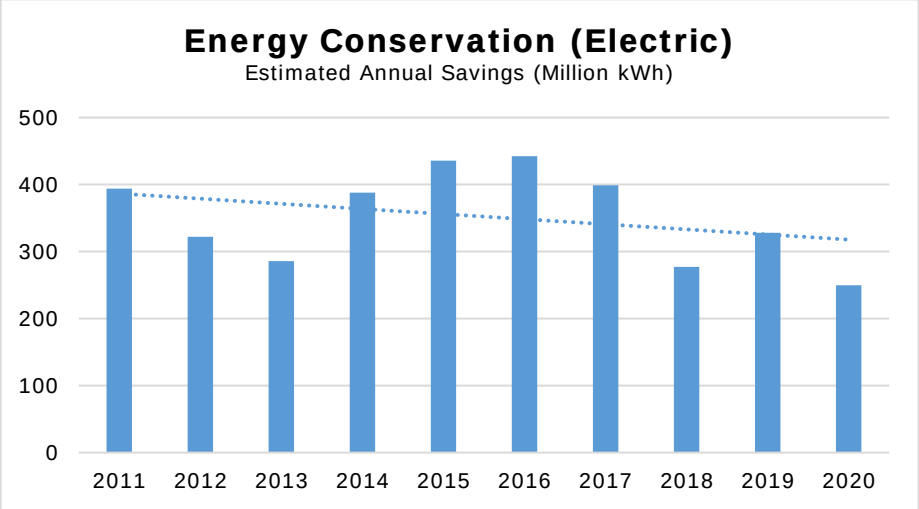
## Connecticut's commercial and industrial sectors are using electricity more efficiently in 2020

*QUICK SUMMARY:*
- ✓ COMPARED TO LAST REPORT
- ✓ COMPARED TO 10 YR. AVERAGE
- — ON TRACK TO MEET GOAL

In 2020, Connecticut's commercial and industrial sector consumed approximately 13,915 million kWh.[63] Connecticut's 2020 Gross Domestic Product (GDP), which is the total value of goods and services produced within the state in a single year, has been calculated by the Federal Bureau of Economic Analysis at almost $241,093 million** Connecticut's economy was significantly impacted by the response to the COVID 19 virus.



## Estimated annual energy savings from energy conservation programs has been declining since 2016.




*QUICK SUMMARY:*

COMPARED TO LAST REPORT

COMPARED TO 10 YR. AVERAGE

ON TRACK TO MEET GOAL

As mentioned above, reducing electricity use is an effective strategy for reducing air emissions from electric generation. Connecticut has energy-efficiency programs that have helped small and large businesses, homeowners and renters, and state and local governments manage their energy use. The Connecticut Energy Efficiency Fund (CEEF) has funded programs that provide financial incentives to reduce energy use.[64] These programs and services, administered and delivered by Connecticut's electric and gas utilities, are funded from the CEEF through a "Public Benefits Charge" on electric bills and through a conservation charge included in natural gas rates. As expected, there is a correlation between electricity conserved, or electricity that need not be generated to meet demand, and reduction of air emissions associated with electric generation. While the average annual emission rates (pounds of CO2/MWH) for fossil fuel electric generation units in Connecticut has decreased by approximately 10 percent in the last 10 years,[65] electric generation (megawatt hours - MWH) by all of Connecticut's fossil fueled power plants has increased by 56 percent over the last ten years (see Electric Generation in Connecticut chart on the Zero-Carbon Energy page). Notwithstanding the reductions in air emission rates from Connecticut's electric generating units, energy efficiency measures and energy efficient building design are preferred alternatives to electric generation as a means of reducing air emissions.

Residential and commercial buildings use 74 percent of all electricity and 39 percent of all energy use in the United States. In Connecticut, the approximately 1.4 million households and 140,000 businesses together account for more than 70 percent of Connecticut's 750 trillion BTU of annual energy consumption.[66] With widespread adoption of existing energy-efficiency building technologies and the introduction and use of new energy efficiency technologies, energy use in homes and commercial buildings could be reduced by 50 percent.[67]

**Technical Note:** *Personal Impact indicators illustrate trends in behavior or practices that can be expected to influence the condition of tomorrow's air, water, land and wildlife. The vertical axis in the charts above "Residential Electric Sales" and "Efficiency at Work" have been shortened, beginning at 3,300 kWh/capita and 13.0 GDP ($)/kWh, respectively, rather than the customary zero. ** GDP in seasonally adjusted 2012 chained dollars.

Personal Impact*

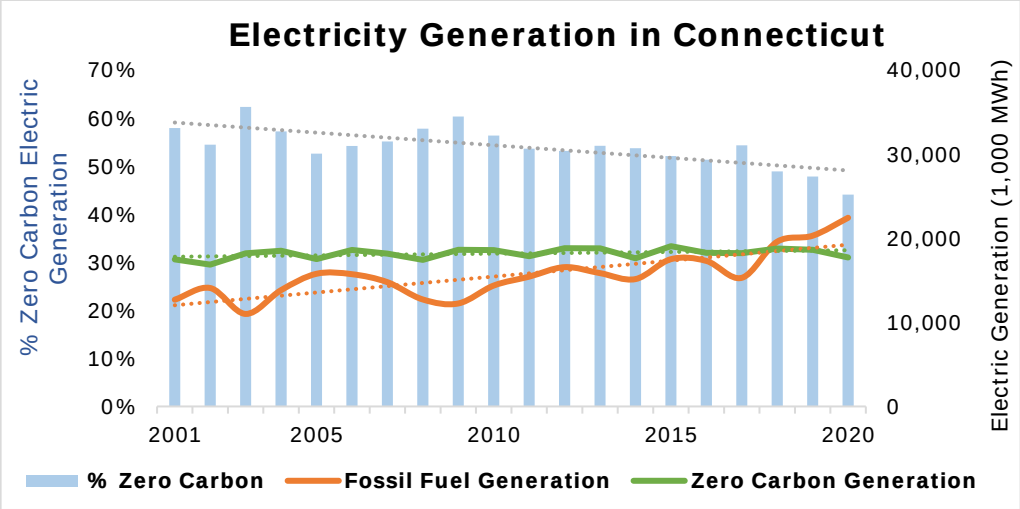
# Zero-Carbon Energy

*QUICK SUMMARY:*

X COMPARED TO LAST REPORT
X COMPARED TO 10 YR. AVERAGE
X ON TRACK TO MEET GOAL

Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

## The percentage of electricity generation from zero carbon sources in Connecticut has been declining.




On September 3, 2019, Governor Lamont issued Executive Order No. 3 that seeks to address climate change adaption and resiliency, and calls for the Department of Energy and Environmental Protection (DEEP), in consultation with the Public Utilities Regulatory Authority (PURA), to "analyze pathways and recommended strategies for achieving a 100 percent zero carbon target for the electric sector by 2040". As depicted in the chart (above), the percentage of zero carbon electric generation** in the State has decreased while total electric generation has increased.[68]

Since 2013, the state has procured approximately 710 megawatts (MW) of grid-scale solar capacity and 1,108 MW of offshore wind capacity from several separate procurements. In addition, "Connecticut entered into a long-term contract with the Millstone facility for 9 million MWh of energy (approximately 36 percent of Connecticut electric distribution companies' load) and all environmental attributes associated with the plant through 2029."[69] While these recent procurements will eventually increase the amount of zero-emission energy available for the state's residents and businesses, Connecticut is currently less than half way (44.1 percent) to the target for 100 percent zero carbon generation and projected increases in electric demand (transportation and thermal) and the possible retirement of one or more of the Millstone units will make achieving the 100 percent zero carbon target by 2040 very challenging.

In addition, electric generation from solar photovoltaic capacity is considerably lower during the winter. For the 2020-2021 winter season, the Independent System Operator for New England (ISO-NE) assumed that both behind the meter and grid scale solar generation will provide no electric generation capacity supply obligations (CSOs)*** to the regional electric grid.[70]

**Goal:** There is an ambitious goal of 100 percent zero carbon for the electric sector by 2040. By statute, a minimum percentage of electricity, which is sold to Connecticut customers, must be generated from renewable energy sources. That minimum amount is 21 percent in 2020 and will escalate to 40 percent in 2030 (Class I).

**Technical Notes:** *Personal Impact indicators illustrate trends in behavior or practices that can be expected to influence the condition of tomorrow's air, water, land and wildlife. ** Zero carbon generation includes utility scale renewables and nuclear generation and it is not the same as Class I renewable sources. Reliance on intermittent renewable technologies, which have capacity factors between 17 and 50 percent, in order to achieve the 100 percent zero carbon target, may raise reliability concerns and would require a significant amount of energy storage and/or upgrades to the electric transmission system. ***Capacity supply obligation (CSO) is a commitment to provide capacity resources that result from the annual forward capacity auction (FCA) in three years' time.[71]

Personal Impact*

# Solar Photovoltaics

*QUICK SUMMARY:*

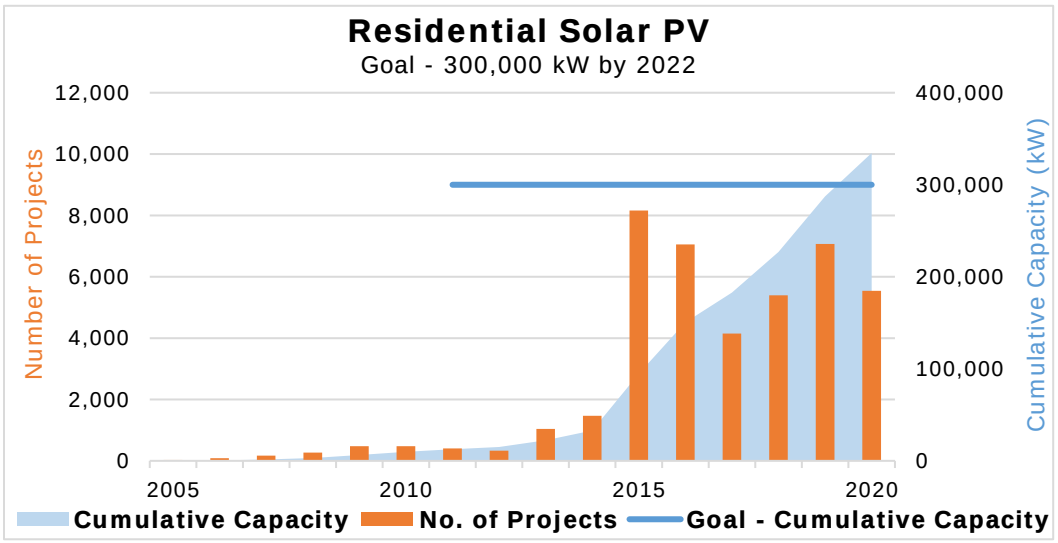
✗ COMPARED TO LAST REPORT

✓ COMPARED TO 10 YR. AVERAGE

✓ ON TRACK TO MEET GOAL

Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

**In 2020, the rate of residential solar photovoltaic (PV) installations in Connecticut decreased compared to 2019, but was still greater than the 10-year average.**




Thousands of Connecticut homes now use the sun to generate much of their own electricity. In 2020, 5,541 residential solar PV systems were installed with a total capacity of 47,275 kilowatts (kW). The high point for residential solar PV installations came in 2015 (8,163 installations and a total capacity of 61,814 kW). From 2005 through the end of 2020, the total number of approved residential solar PV projects in the state exceeded 42,134 projects with a total capacity of more than 334 megawatts (MW).[72]

**Goal:** Legislation adopted in 2011 (CGS 16-245ff) set a goal of 300 megawatts of new photovoltaic capacity installed on residential properties by the end of 2022.

The U.S. Department of Energy identified approximately 606 MW of small scale PV capacity in the state through 2020, while the Independent System Operator for New England (ISO-NE) reported total PV capacity at 682 MW (almost 54,000 sites) in the State.[73] In 2020, the ISO-NE projected that approximately 1,070 MW of additional solar PV capacity may be installed in Connecticut by 2029.[74]

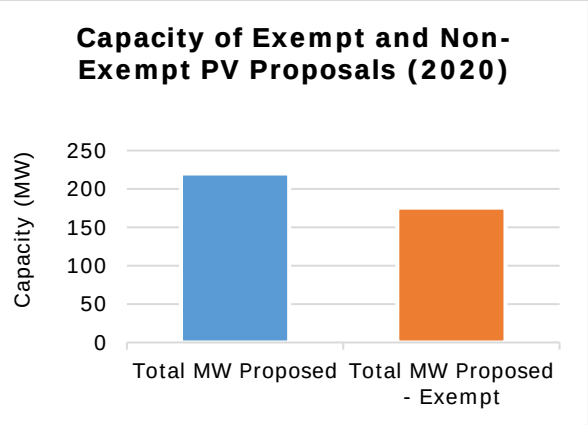
The environmental and social impact of solar PV installations in Connecticut is mixed. The primary advantage of solar PV electric generating equipment is that it produces electricity with zero emissions – no air pollution, wastewater, or noise. The 600+ MW of installed PV capacity in the state in 2020 is estimated to have produced more than 740,000 megawatt-hours (MWh) in 2020, which is calculated to have potentially displaced over 200,000 tons of carbon dioxide (CO2) emissions. However, an issue with land-based solar PV installations, primarily for utility scale solar PV installations, is the impact such development has on farmland, forests, shrublands, and the species that inhabit these ecosystems.

### Utility Scale Solar PV

As a result of citizens' concerns regarding the proliferation of land-based solar PV systems in Connecticut, the Council issued a special report in 2017, *Energy Sprawl in Connecticut*, that identified deficiencies in state policy regarding the selection and siting of land-based PV installations and recommendations to ensure prime farmland and core forest habitats were protected. In response to

citizen concerns about energy sprawl in Connecticut, Public Act 17-218 was enacted. Since Public Act 17-218 was enacted, the capacity of individual commercial PV projects, submitted to the Connecticut Siting Council for regulatory approval through the Petition for Declaratory Ruling process, has decreased.

The Council evaluated the impact of certain provisions of Public Act 17-218 and found that the potential loss of agricultural land that could result from the development of PV systems was almost half of the farmland acres preserved by the State in 2020. A review of proposals submitted to the Siting Council in 2020 for commercial solar PV systems indicated that there were a total of 22 proposals submitted (220 MW), nine were approved, two were denied or rejected, and 11 were pending a decision. The sum of the nine approved and 11 pending solar PV proposals in 2020 could impact a total of approximately 330 acres of woodlands and 450 acres of agricultural land in the state.




While the intent of Public Act 17-218 was to preserve both core forest and prime farmland, 13 of the 22 proposals for commercial solar PV systems submitted to the Siting Council in 2020 were exempt from the requirements of the law (59 percent). These proposals, which totaled 175 MW of PV capacity, were exempt either because the projects' capacity was less than two MW, the project was reopened from an earlier date, the project was selected as part of a Department of Energy and Environmental Protection (DEEP) request for proposals (RFP), or because one of the projects (a 120 MW solar PV system) was submitted to the Siting Council as an application for a Certificate (as required by Connecticut General Statutes (CGS) Section 16-50k), not through the Petition for Declaratory Ruling process. These exempt solar PV systems accounted for over 760 acres of land disturbance, of which approximately 275 acres were identified as forestland and 318 acres were identified as agricultural land.**[75]

**Technical Note:** *Personal impact indicators illustrate trends in behavior or practices that can be expected to influence the condition of tomorrow's air, water, land and wildlife. **Based on 2020 proposals approved by the Connecticut Siting Council or pending a decision.

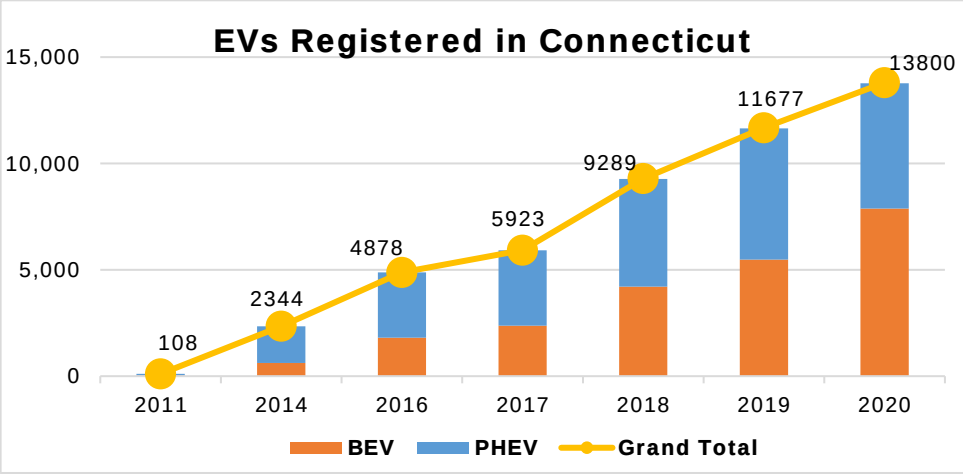
Personal Impact*

# Transportation

*QUICK SUMMARY:*
- ✓ COMPARED TO LAST REPORT
- ✓ COMPARED TO 10 YR. AVERAGE
- — ON TRACK TO MEET GOAL

Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

## Transportation contributes 38 percent of Connecticut's economy-wide emissions of greenhouse gases (GHG).




Significant reductions of GHG emissions are achievable by reducing the combustion of fossil fuels in the transportation sector, which will likely be achieved by increased fuel efficiency, increased use of mass transit, and the use of electric drive vehicles that operate on electricity or "green" hydrogen. Electric drive vehicles (EVs) include plug-in hybrid electric (PHEV), battery electric (BEV), electric motorcycles, and fuel cell electric (FCEV) vehicles.** While there has been substantial growth in EVs in the State, they currently account for less than one percent of all passenger vehicle registrations.[76]

In December 2020, Governor Ned Lamont signed a memorandum of understanding (MOU) committing to pursue "systematic and substantial reductions in motor vehicle pollution" through a cap and invest program with neighboring states and Washington DC. The multi-jurisdictional program would re-invest approximately $300 million each year in cleaner transit, modern infrastructure, and healthier communities.[77]

**Driving: The recent trend of driving more continued through 2019** (most recent data).

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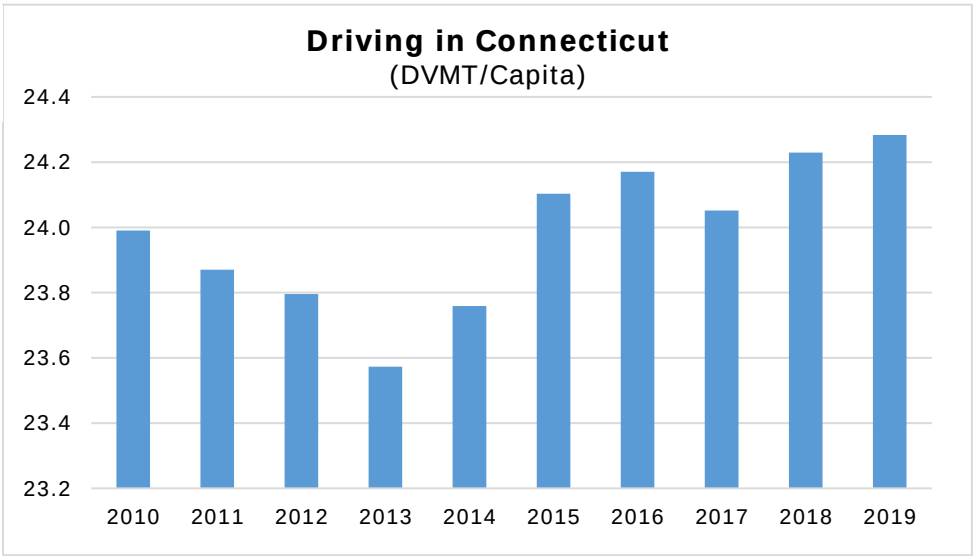
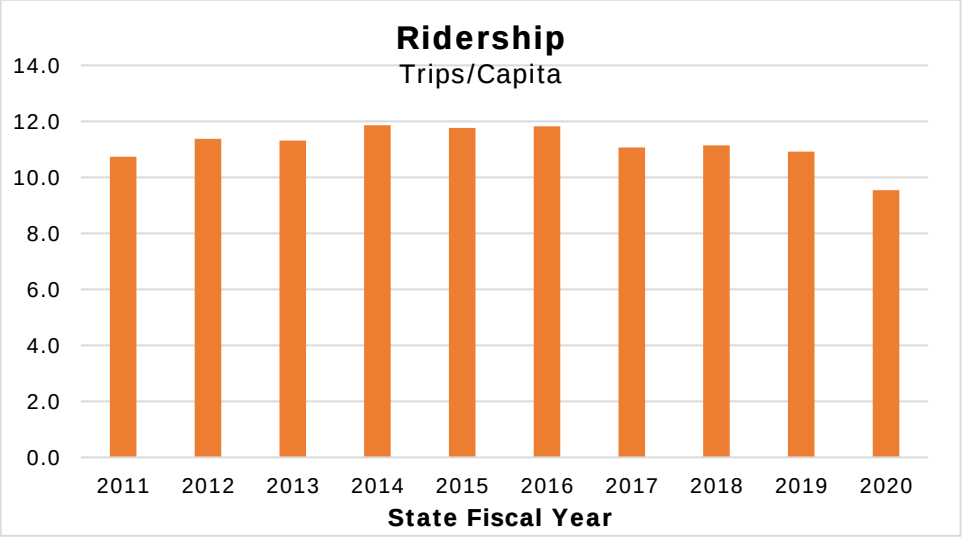



In 2019, the average daily vehicle miles travelled (DVMT) remained high with an average of 24.3 miles per person. Since 2013, the DVMT has generally increased by approximately 2 percent, which is consistent with the increase in employment in the State, and the decrease of both gas prices and bus ridership depicted in the chart below. In the past, as residents drove more,

gasoline consumption increased, which caused more air pollution. However, the trend over the last ten years suggests that even though driving (DVMT/capita) increased, gasoline consumption trended lower.[78] This is likely attributed to the use of more energy efficient cars, including zero-emission vehicles (EV). It is expected that the DVMT/capita will be lower in 2020 due to the COVID 19 pandemic.

**Ridership: People got on the bus less often in Connecticut in 2020.**

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In fiscal year (FY) 2020 (July 2019 through June 2020), ridership on fixed route, commuter, and Americans with Disabilities Act (ADA) transit services declined to the lowest ridership numbers since 2011. In FY 2020, the passenger trips*** per capita value was 9.54, which is approximately 15 percent lower than the ten-year average.[79] In late 2016, CTtransit fare prices were increased in eight transit service areas; however, the fare increase might not be the sole reason for the decline in ridership. Other factors for reduced transit trips in FY 2020 include the impact of COVID 19, relatively low gasoline prices, and the success in ride sharing efforts. In Massachusetts, where ridesharing data is required by the state, rideshare companies provided over 91 million rides in 2019, approximately 12 percent more than in 2018 and 40.6 percent more than in 2017.[80]

**Technical Note:** * Personal Impact indicators illustrate trends in behavior or practices that can be expected to influence the condition of tomorrow's air, water, land and wildlife. The vertical axis in the chart above has been shortened, beginning at 23.2 DVMT/capita rather than the customary zero. **Electric motorcycles and fuel cell electric vehicles are included in the total number of EVs registered in the State. "Green" hydrogen refers to the production of hydrogen from sources other than fossil fuel. ***The number of passengers who board public transportation vehicles. Transit-oriented development, or TOD, could increase ridership.

# Compliance

*QUICK SUMMARY:*

XX COMPARED TO LAST REPORT
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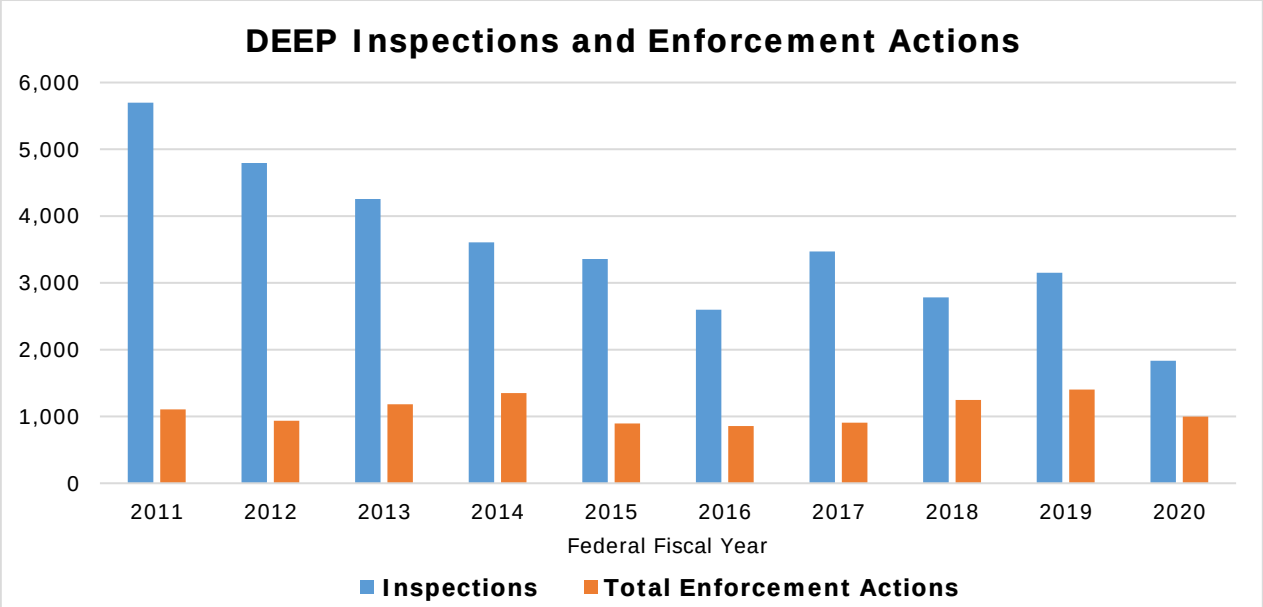
## While inspections have decreased since 2011, the ratio of enforcement to inspections has increased.




In the 2020 Federal Fiscal Year (FFY20: October 1, 2019 – September 30, 2020), there were 1,835 inspections performed by the Department of Energy and Environmental Protection (DEEP); a decrease from the 3,151 inspections completed in FFY 2019. The decline in DEEP inspections is due, in part, to the state of emergency issued in Connecticut as a result of the COVID 19 virus outbreak. While the impact of COVID 19 may have resulted in fewer inspections in FFY20; there has been a significant decline in the number of inspections over the last ten years. The number of DEEP inspections in FFY20 was roughly one-third of the inspections performed in 2011 and less than half of the inspections of the ten-year average (4,062). In FFY20, there were 998 enforcement actions, which included 925 "Informal Enforcement Actions", consisting of Notices of Violation (NOV), Notice of Non-Compliance (NON), and warning letters; 65 "Orders"; and eight "Referrals" to the US Environmental Protection Agency, Attorney General, and/or Chief State's Attorney. While the number of enforcement actions in FYY20 (998) was less than last year, it was still approximately 90 percent of the ten-year average of 1,117.

The Informal Enforcement Actions are enforcement tools, generally issued whenever DEEP detects one or more violations at a facility or permitted use. They can be issued for relatively minor or major violations; in cases of the latter type, the recipient might also receive an order, which might carry a financial penalty. In FFY20, DEEP assessed administrative penalties totaling $484,505 and required violators to fund supplemental environmental projects (SEP) totaling $432,500.[81]

# Climate Notes

*This page explains how climate change affects the environmental indicators in this report.*

**Bald Eagles and Osprey:** Climate change affects the survival of bald eagles on multiple levels, according to scientists. As climate change progresses, the National Audubon Society's climate model projects that bald eagles will have just 26 percent of their current summer range by 2080. It is possible that the birds will adapt and reclaim summer terrain as new areas become hospitable, but it isn't known whether the birds will be able to find the food and habitat they need to survive.

**Climate Changers:** Greenhouse gases (GHG), including carbon dioxide (CO2), from human activities are the most significant drivers of observed climate change since the mid-20th century. Carbon dioxide is generated as a result of the combustion of fossil fuels and to a lesser extent, the clearing of land for agriculture, industry, and other human activities. As described in a recent study released by the Governor's Council on Climate Change, carbon dioxide is the GHG that represents the greatest warming potential, which has resulted in a temperature increase of 0.9°C between 1980 and 2018 in Connecticut. Warmer temperatures have also resulted in an increase in annual average precipitation.

**Drinking Water:** Extreme rainfall events lead to more runoff when the soil simply is not able to absorb the precipitation at the rate it is falling. In urban, suburban, and agricultural areas, this runoff will pick up pollutants from the landscape and carry them to nearby rivers and other waterways, ultimately affecting the quality of drinking water. In addition to more intense storms and flooding, more frequent or longer dry spells are also projected in many climate change scenarios, which makes the scarcity of water a concern.

**Electricity at Home and Work:** Increases in temperature will likely increase energy demand, as well as change our ability to produce electricity and deliver it reliably. In a warmer climate, more electricity will be used for air conditioning and less natural gas, oil, and wood for heating. To the extent that the increased demand is met by sources that are not zero-carbon, climate warming could be exacerbated. A 2015 paper published in the Proceedings of the National Academy of Science examines the "contribution of air conditioning adoption to future energy use under global warming".

**Renewable Energy** is one of the most effective tools against climate change. Zero-carbon energy sources provide a tremendous resource for generating clean and sustainable electricity without toxic pollution or global warming emissions. Solar panels, wind turbines, hydroelectric facilities and other zero-emission technologies do not release any emissions as they generate electricity.

**Farmland:** The extent of farmland in Connecticut depends greatly on farms' profitability. Climate change may benefit some plants by lengthening growing seasons and increasing carbon sequestration. However, other effects of a warmer climate, such as more pests, droughts, flooding, changes in ground-level ozone concentrations will be less beneficial for agriculture.

**Forest Birds:** Climate change affects birds both directly and indirectly. As temperatures warm, some bird species will benefit from milder winters and extended breeding seasons. Others, such as northern birds associated with forest habitats, will likely decline in Connecticut, due in part, to increased competition and increased frequency of droughts and extreme storm events may inflict higher mortality during the breeding seasons.

**Good Air Days:** The number of days with bad air is related to a number of factors, including ambient air temperature, concentrations of air emissions, weather patterns, etc. Elevated temperatures can directly increase the rate of ground-level ozone formation, which is formed when nitrogen oxides and volatile organic compounds react in the presence of sunlight and hot weather.

**Invasions:** Global warming threatens to increase the extent, frequency, and severity of invasive species. The milder winters and extended spring that comes with climate change are helping invasive species extend their ranges, pushing aside native species and transforming habitats. The removal of temperature or moisture constraints will allow species to move into and successfully invade new areas. Species range shifts will also lead to native species moving out of their current habitat or becoming rarer. This creates ecological space for other species to increase in abundance and become invasive, or for non-native invasive species to move in.

**Lobsters:** Climate change is increasing the water temperature of Long Island Sound. Ocean warming due to climate change will act as a likely stressor to the ecosystem's southern lobster fisheries, which will continue to drive further contraction of lobster habitats into northern areas.

**Piping Plovers:** Coastal-nesting birds such as the piping plover are among the species most threatened by climate change. Rising sea levels might reduce nesting areas available for many coastal and nesting birds.

**Preserved Land and Forests:** The climate influences the structure and function of forest ecosystems and plays an essential role in forest health. Forests are sensitive to changes in temperature and precipitation and are greatly affected by fragmentation and land-use change, invasion by nonnative species, forest diseases and insect pests, and extreme weather events. One study by the United States Department of Agriculture (USDA) states that climate also affects the frequency and severity of many forest disturbances. Land conservation can help to reduce the impacts of climate change by absorbing carbon dioxide from the air.

**Rivers and Streams:** Rivers and streams are affected greatly by fluctuations in precipitation and evaporation patterns around the world. Warming temperatures are altering the water cycle and shifting precipitation patterns. Changes in the timing and location of precipitation combined with rising levels of water pollution will strain ecosystems and threaten the survival of many fish and wildlife species. An increase in severe storms due to climate change will degrade water quality and increase the risk of catastrophic floods. On the other end of the spectrum, frequent droughts, enhanced evaporation, and decreases in overall annual rainfall result in reduced water levels in streams, rivers, and lakes, which leaves less water to dilute common pollutants.

**Swimming, Clamming and Oystering:** As the atmosphere warms, changes to the amount, timing, distribution, and intensity of precipitation will continue. Warmer temperatures increase the rate of evaporation of water into the atmosphere and increase the atmosphere's capacity to hold water. What evaporates will fall as excess precipitation in many regions. As more intense precipitation leads to increased runoff, more pollution is washed into waterways, including sediments, nitrogen from fertilizers, disease pathogens and pesticides. The same factors that affect beaches present problems for shellfish beds.

**Transportation - Driving and Riding:** Burning gasoline and diesel releases carbon dioxide, a greenhouse gas (GHG) into the atmosphere. Both nationally and in Connecticut, the transportation sector is the greatest contributor of GHG emissions.

**Warming and Rising Waters:** Global mean sea level has risen about 8–9 inches (21–24 centimeters) since 1880, with about a third of that coming in just the last two and a half decades. The rising water level is mostly due to a combination of meltwater from glaciers and ice sheets and thermal expansion of seawater as it warms. The Connecticut Institute for Resilience and Climate Adaptation (CIRCA) recommended that Connecticut plan for and expect 50 centimeters (20 inches) of sea level rise by 2050 with further increases following that date.

**Waste Diversion:** Recycling and waste reduction have many direct benefits; however, the indirect benefits are also significant. Recycling and waste diversion reduce greenhouse gas (GHG) emissions that would be created by the production, transport, and disposal of municipal solid waste. Increasing recycling and source reduction has been identified as a key strategy for reducing GHG emissions in Connecticut's Climate Change Action Plan.

**Water of Long Island Sound:** Climate change has a variety of direct and indirect effects on ocean ecosystems. Increasing temperatures have the capability to make coastal and marine ecosystems more vulnerable to hypoxic conditions, as well as drive the expansion of hypoxic environments. In general, warmer water holds less dissolved oxygen than colder water. As the estuaries and oceans heat up, less oxygen is held; stratification of the Sound waters intensifies, and deeper waters then lose even more oxygen. Precipitation also is important climate factor that can affect hypoxic rates and expansion. Changes in precipitation patterns affect nutrient and hypoxic dynamics in coastal ecosystems.

**Wetlands:** Wetlands play a role in our ability to manage risks from climate change. Wetlands are an important sink for greenhouse gases, where carbon is stored and prevented from entering the atmosphere. Wetlands provide important functions including: cleaning up polluted water. slowing and storing floodwaters and snow melt, recharging groundwater. and supporting habitat for many different native plant and animal species.

# Activities of the Council in 2020

## Research and Reports

The Council published the 2019 *Environmental Quality in Connecticut* Annual Report in April 2020, to coincide with the 50th Anniversary of Earth Day. In this year's Annual Report, the Council expanded its assessment of solar photovoltaic electric generating facilities in the State and the impact certain projects have had on the destruction of core forests and conversion of agricultural land. The Council also included new data and charts on forest loss, the impact of impervious cover on water quality, and energy conservation. Again this year, bats and turtles were reorganized into a page on state-listed species because, unfortunately, no new data or no significant change has occurred regarding their population and/or distribution, which remains precariously low. The inclusion of biological indicators requires considerable care in the selection of appropriate species, and the Council is grateful for the advice it received from experts.

In 2020, the Council published a report "*Low Deposit, Low Return*" with recommendations to decrease solid waste in the state by capturing redeemables that are now lost to the waste stream. In the special report, the Council documented the relationship between the deposit fee on beverage containers and the rate at which those containers are redeemed. The report projects that based on the experience of other states, just a five-cent increase in the deposit fee could raise the redemption rate for beverage containers by at least fifty percent above the current level. Other recommendations include: expanding the types of beverage containers eligible for a deposit, assessing the need to increase the handling fee for retailers and redemption centers, and increasing the amount of post-consumer content in materials made and sold in the State and region. (see Waste Diversion)

## Advice to Other Agencies

Council staff reviewed Environmental Impact Evaluations and scoping notices prepared by other agencies, and submitted comments when deemed appropriate. The Council coordinated with the Connecticut Office of Policy and Management (OPM) and the Department of Energy and Environmental Protection (DEEP) to revise the Generic Environmental Classification Document (ECD). The Council provided training materials and updated all the notice templates to assist state agencies to develop notices for publication in the *Environmental Monitor,* consistent with the revised Connecticut Environmental Policy Act (CEPA) Regulations. In addition, a project cancellation notice was added to inform the public and state agencies when a project was dropped from active status by a State agency.

The Council commented on a federal action and several state activities and plans, including the following:

- Draft Generic ECD;
- Proposed revisions to the current spill reporting regulations;
- Draft General Permit for Discharge of Stormwater and Dewatering Wastewaters from Construction Activities;
- Proposed legislation that could have impacted Connecticut's environment; and
- Proposed Changes to NEPA Regulations.

The Council also commented on five applications for a Certificate of Environmental Compatibility and Public Need and 21 Petitions for Declaratory Ruling to the Connecticut Siting Council.

The Council continues to participate in a working group to assist with the development of regulations to implement the provisions of Public Act No. 20-9, An Act Revising Provisions of the Transfer Act and Authorizing the Development and Implementation of a Release-Based Remediation Program.

## Citizen Concerns and Complaints

State law directs the Council to investigate citizen complaints alleging violation of any statute or regulation in respect to environmental quality. The Council receives weekly inquiries regarding routine matters that are addressed by providing the person who inquired with the correct person or agency to handle the matter.

Every month the Council discusses the inquiries and complaints of environmental consequence that were presented to the Council by individuals and groups. Many times that leads to special reports, such as the Council's 2020 report "*Low Deposit, Low Return*", on the problem with the State's beverage container redemption program.

In 2020, staff investigated numerous complaints, including on-going air pollution violations and potential soil contamination in Stamford, unauthorized camping and vehicle access on state-owned lands; concerns regarding artificial turf; Japanese Knotweed; a demonstration project to deal with agricultural waste in Torrington; wetland impacts; pesticide applications; historic preservation; and water quality.

The Council regularly engages with state agencies and is appreciative of the assistance provided by the Department of Energy and Environmental Protection, the Department of Public Health, the Department of Transportation, the Office of Policy and Management, and others to answer citizen inquiries and resolve complaints. The Council also participates in webinars, meetings, workshops and other outreach activities of State agencies and stakeholder groups to offer information and to stay current on environmental issues.

# Council Duties

The main responsibilities of the Council on Environmental Quality are described in Sections 22a-11 through 22a-13 of the Connecticut General Statutes.

The Council is a nine-member board that works independently of the Department of Energy and Environmental Protection (except for administrative functions). The Chairman and four other members are appointed by the Governor, two members by the President Pro Tempore of the Senate and two by the Speaker of the House. The Council's responsibilities include:

1. Submittal to the Governor of an annual report on the status of Connecticut's environment, including progress toward goals of the statewide environmental plan, with recommendations for remedying deficiencies of state programs.

2. Review of state agencies' construction projects.

3. Investigation of citizens' complaints and allegations of violations of environmental laws.

4. Review of environmental impact evaluations that state agencies prepare for major projects under the Connecticut Environmental Policy Act (CEPA). The CEPA regulations were amended in September 2019.

5. Publication of the *Environmental Monitor*, the site where all state agencies must post their scoping notices and environmental impact evaluations under CEPA. The *Environmental Monitor* also is the official publication for notice of intent by state agencies to sell or transfer state lands.

6. Participation in studies and working groups on environmental issues, as directed by the legislature.

# Council Members

**Keith Ainsworth**
Keith Ainsworth has been an environmental and land use litigator of the New Haven Bar for nearly three decades. Keith has a broad conservation-based practice representing land trusts, non-profits, land owners and businesses in transactions and litigation throughout Connecticut before administrative agencies and state and federal courts. As a former chair of the Connecticut Bar Association Environmental Law section and a municipal first selectman (Haddam), Keith has a perspective from several sides of the table. A graduate of Tufts with a B.S. in biology, environmental studies and English literature, Keith brings a scientific and analytical background to the law. Keith is a life member of the Madison Land Conservation Trust and served on the national leadership council of Trout Unlimited. Keith also serves as General Counsel to Vista Live Innovations, Inc., a private educational institute for adults with intellectual disabilities. Keith is also an avid outdoorsman and author of several volumes of poetry.

**Alicea Charamut**
Resident of Newington. Executive Director of Rivers Alliance of Connecticut. Board of Directors, Farmington Valley Chapter of Trout Unlimited. Secretary, Fisheries Advisory Council. Co-Chair, Water Planning Council Advisory Group. Advisory Board, Connecticut Institute of Water Resources.

**Lee E. Dunbar**
Resident of Mansfield. Retired. Previously, Assistant Director, Bureau of Water Management and Land Re-Use, Planning and Standards Division, Connecticut Department of Environmental Protection. Responsible for developing scientifically defensible water quality standards and criteria to protect human health and aquatic life. Developed and implemented environmental monitoring and assessment methods; participated in the development of regulations to better manage stream flow in Connecticut streams affected by water withdrawals and diversions; and oversaw the development of regulatory programs including the Total Maximum Daily Load (TMDL) Program, Nitrogen Trading Program, and Water Quality-based Discharge Permitting Program. Awarded Lifetime Achievement Environmental Merit Award by the U.S. EPA in 2010 for significant contributions to environmental awareness and problem solving. President of the Eastern Connecticut Forest Landowners Association and Board Member, Wolf Den Land Trust.

**Alison Hilding**
Resident of Mansfield. Long-time advocate for the environment and children, viewing the protection of clean water and air as important dimensions of child advocacy, President, Mansfield Environmental Trust. Commissioner and Executive Board Member, Connecticut Commission on Children, 2003 to 2016; and founding member, Mansfield's Citizens for Responsible Growth. Background in financial management; worked for NYNEX Corporation on the capital budget with responsibility for growth and modernization; currently engaged on the grassroots level in promoting streambelt protective zoning and sustainable land use practices in Mansfield and the northeast corner of CT. Member of various CT environmental organizations.

**David Kalafa**
Resident of Middletown. Over thirty years working for the State of Connecticut developing and implementing policy for energy and conservation at the Office of Policy and Management and Department of Energy and Environmental Protection. Retired as Undersecretary for Comprehensive Planning and Intergovernmental Policy at the Office of Policy Management. Served on the State Water Planning Council and Governor's Climate Change Commission. Holds a Master of Public Administration from the State University of New York and a Bachelor’s degree in Economics from Skidmore College.

**Kip Kolesinskas**
Resident of Manchester. Consulting Conservation Scientist. Current projects include assisting agencies, NGO's, and private individuals with farmland protection, land access and affordability for new and beginning farmers, farmland restoration, and climate change adaptation strategies. Member of the Working Lands Alliance Steering Committee, and has contributed to numerous publications and initiatives including Conservation Options for Connecticut Farmland, Planning for Agriculture-A Guide for Connecticut Municipalities, and the award-winning training videos for CT DEEP's Municipal Inland Wetland's Agency Training Program. Formerly USDA Natural Resources Conservation Service State Soil Scientist for Connecticut and Rhode Island, where he worked extensively with farmers, educators, government and nonprofits to help them protect farmland and wetlands, and use soils information to make better informed land use decisions. He is a recognized regional and national speaker on soils and land use planning, farmland protection, climate change adaptation, farmland access, and wetlands.

**Matthew Reiser**
Resident of Avon. Environmental, health and safety consultant with over 20 years of experience performing regulatory compliance auditing, planning, training and reporting; air, water and waste discharge permitting; and air, water and waste sampling for industrial, commercial, municipal and institutional facilities. Member, Connecticut Chapter of the Academy of Certified Hazardous Materials Managers and Connecticut Marine Trades Association Environment Committee.

**Charles Vidich**
Resident of Ashford. Environmental and land use consultant concerned with energy efficient and sustainable patterns of development. Served as manager of the United States Postal Service Corporate Sustainability Initiatives program with responsibility for sustainability, energy efficiency and environmental management systems for the nation's 32,000 domestic and overseas Post Offices. Previously served as the principal planner for the Central Naugatuck Valley Council of Governments where he developed solar conscious land use ordinances and the nation's first comprehensive regional plan of development. Appointed to the Connecticut Land Use Education Council with the mission to improve the skills and resources available to local planning and zoning commissions. Received the Lifetime Achievement Award from EPA's National Sustainable Materials Management program. Appointed as a visiting scientist to the Harvard School of Public Health as well as the Harvard Humanitarian Initiative where he lectured on scientific approaches on the use of quarantine and the environmental control of communicable disease. He served as the pivotal expert witness in a celebrated Connecticut Supreme Court case that successfully overturned restrictive zoning regulations and in a federal district court case that successfully overturned discriminatory land use practices.

# Acknowledgments

The Council acknowledges the contributions of environmentalists that have worked tirelessly to improve the quality of life for all species on Earth. The Council especially wants to acknowledge Susan Merrow (Former Chair) who has provided wise guidance and inspirational leadership. Susan's life work has revolved around public service and environmental public policy as a lobbyist, an elected official, a participant and leader of environmental non-profit organizations, and as former Chair of the Council. Susan was a former resident and First Selectman of East Haddam during a time the town tackled major water pollution problems and began its program of acquiring large tracts of open space. She was also a member of the East Haddam Conservation Commission and Eightmile River Wild and Scenic Coordinating Committee. Susan was the former President of the Connecticut Conference of Municipalities, and was on the Board for the Sierra Club and the Connecticut League of Conservation Voters.

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The Council appreciates the assistance of the many people in the Departments of Agriculture, Energy and Environmental Protection (DEEP), Transportation, and Public Health, the Connecticut Agricultural Experiment Station, the Connecticut Green Bank, and the Connecticut Siting Council who, annually, provide data for this report.

It is appropriate to acknowledge the many individuals and organizations that have contributed greatly to the stewardship of Connecticut's environment. This includes the many State employees who administered the environmental programs, put in place by the Legislature over the last five decades, who are now about to retire, or have retired, from a career of public service. The Council especially thanks the many citizens, businesses, and organizations who offered information and viewpoints about public policies, many of which led to the Council's special reports over the years. The Council also appreciates the work of its Executive Director, Peter Hearn, and Paul Aresta, Environmental Analyst II, in drafting this report for review by the Council and preparing the final version for publication. The Council is appreciative of the work of Brigitte Vossler, Mari Cullerton, and Jamie Viens, the Council's interns in 2020, who collected data that is referenced in the Report's text.

**Image Credits**: The "warming earth" symbol used to denote indicators affected by climate change was created by the Council. The images of the box turtle and bats were provided by Paul Fusco. The image of the Asian tiger mosquito was provided by Susan Ellis. The image of the map of Connecticut with the status of Ospreys' nests was obtained from Connecticut Audubon, Osprey Nation Map. The image of the emerald ash borer map was produced by the Connecticut Agricultural Experiment Station. The image on the cover of the Salmon River in East Hampton/Colchester was provided by Paul Aresta. The image of people hiking with masks was also provided by Paul Aresta. The Council greatly appreciates their generosity in allowing the use of these excellent images in this report.

## Resources

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