Environmental Quality in Connecticut

Kent Falls State Park. Kent CT

Council on Environmental Quality

STATE OF CONNECTICUT

COUNCIL ON ENVIRONMENTAL QUALITY

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April 16, 2020

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

Dear Governor Lamont:

I am pleased to submit *Environmental Quality in Connecticut* for 2019. This is the Council's forty-eighth Annual Report to the Governor. In accordance with CGS 22a-12, this report describes environmental conditions for the 2019 calendar year. It is best read as an on-line document on the Council's website. There the values on its charts will appear under the reader's cursor and the reader can access the many supplemental document which are hyperlinked within it. To expedite reviewing the report's environmental indicators, quick summary boxes are provided above the report's charts to show the recent trend in that data.

This report is being issued when the State and our nation are in the midst of the COVID-19 virus public health emergency and, coincidentally, as we celebrate the 50th anniversary of Earth Day. That event, in 1970, was the result of a societal awakening to the cumulative impacts of human activity on our natural world. To mark that anniversary, the report was expanded to show the long-term trends for many measures of the State's environmental health, that are usually only displayed as recent trends. Air quality, water quality, raptor recovery are but a few of the measures that illustrate the salutary consequences of the environmental laws and regulations from which all of Connecticut's citizens and businesses have benefited.

The Report illustrates Connecticut's progress and its remaining challenges. It identifies areas where Connecticut will not meet its stated goals without a significant increase in effort and resources. Among the most formidable environmental challenges that lie ahead are open space acquisition, farmland preservation and reduction of greenhouse gas emissions. The Council believes that if the same focus and effort are applied to those challenges, as was applied to the air pollution and water pollution problems of the 1970's, there is reason to be optimistic about future success.

In 2019, the Council was heartened to see your administration's quick response to the two unexpected spills of PFAS, the expansion of the Governor's Council on Climate Change and the affirmation of the 2040 goal of zero carbon emissions. As always, the Council looks forward to providing you with any additional information you might request.

Respectfully submitted,

Susan D. Merrow

Susan D. Merrow, Chair

The Relevance of Earth Day During a Global Pandemic

When the Council set out to compile the 2019 Annual Report, we looked forward to doing so in the context of the 50th anniversary of Earth Day. We expected to look back with a mixture of joy and frustration at what we have accomplished in five remarkable decades of Connecticut environmental history. We could not have foreseen that this report would be issued in the midst of a worldwide pandemic, with all its possibly staggering environmental implications. The Council decided by consensus that it should not let this particular confluence go without comment.

While the 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 has 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 not political borders.

The primary risk reduction techniques being employed to combat the virus – hand washing, general hygiene and social distancing, which has led many people to discover the trails and natural spaces around them – highlight the importance of the basic concept of cleanliness and parallel society's need for clean water, clean air, general environmental hygiene and healthy open spaces.

The virus is a ruthless science teacher reminding us that the data we collect are to be ignored at our peril. The Council is alarmed by the current fashion of resistance to, and even disdain for, science. Attempts to deny the virus outbreak ironically intensified its impact and sent our economy into a state of wild disruption, offering proof of the truth that our economic welfare and our health are co-dependent. The environment does not negotiate. It responds to our stewardship without judgment. While the Council attempts to present its annual reports with minimal subjective commentary, we urge you to read this report and reflect on the consequences of denying the interconnectedness of the human economy and the natural world.

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Connecticut's Environment in the Context of Earth Day's 50th Anniversary

Looking back to move forward

2020 is the 50th anniversary of Earth Day. In 1970, Americans assembled in their communities to urge action to protect their environment which was showing the consequences of decades of economic progress that overlooked its environmental consequences. In 1970, the National Environmental Protection Act (NEPA) became law. Within two years the federal Clean Air Act and Clean Water Act were passed. These landmark laws became the foundation of additional state laws and regulations that measurably improved where we live and how we think about our society's effect on the ecosphere.

Connecticut's Council on Environmental Quality (Council) was created in 1971 along with the Department of Environmental Protection (now the Department of Energy and Environmental Protection, referred to as "DEEP"). In creating the Council, the legislature assigned it the responsibility to submit "annually to the Governor an environmental quality report, which shall set forth: (1) The status of the major environmental categories including, but not limited to, the air, the water and the land environment; (2) current and foreseeable trends in the quality, management and utilization of the environment and the effects of such trends on the social, economic and health requirements of the state; (3) the adequacy of available natural resources for fulfilling human and economic requirements of the state in the light of projected population pressures;…". This is that report for the 2019 calendar year.

Environmental Quality in Connecticut normally reports on a series of indicators that quantify trends in important environmental concerns. Usually the data is limited to the year of the report and recent data groupings, since that is of most importance to policy makers and the public. On this 50th anniversary of Earth Day, the Council thinks it is worth illustrating that the programs and policies, set out many years ago, have resulted in significant environmental improvements, many quite dramatic.

Air quality has greatly improved and per capita carbon dioxide (CO_2) emissions are on track to meet the state's short-term goal. Nitrogen levels in Long Island Sound have dropped, as has the hypoxia in Long Island Sound. Bald Eagles have made a remarkable comeback, due to elimination of the chemicals that threatened their reproductive capacity. Piping Plovers have rebounded as a consequence of human interventions to improve their habitats.

The long look also illustrates the categories in need of redoubled effort. The State's programs to preserve open space and farmland and waste diversion are not likely to achieve their goals. It will also be very challenging, in the near term, to achieve a rebound of bat, lobster, and turtle populations in Connecticut. With the climate changing, controlling the spread of invasive plants, insects, and aquatic invasive species will be very difficult.

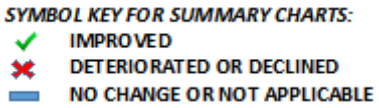
Introduction
"Environmental Quality in Connecticut"

The Annual Report of the Council on Environmental Quality for 2019

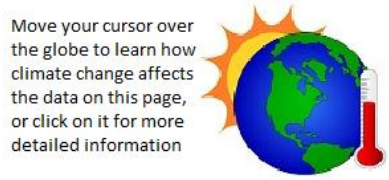
published April 17, 2020

Welcome to *Environmental Quality in Connecticut*. This edition documents the condition of Connecticut's environment through 2019. If viewing it on-line, which is how it is designed to be read, use the navigation buttons on the left to move from section to section within the report.

A "summary chart" is provided for most of the environmental indicators. On the top line of the summary is the indicator's status for the most recent year. The second line shows its status for the current year compared to the trend of the prior decade. The third line shows whether the indicator is on track to meet its goal, if applicable. (See the example at right.)



The *majority* of Connecticut's key environmental indicators are strongly affected -- almost always negatively -- by a changing climate. The symbol at left identifies the indicators that are so affected. For the online edition, running your cursor over the symbol will reveal a brief statement of the indicator's connection to climate. Clicking on the symbol (seen at left) will open a page with more details. For the printed version, please refer to "Climate Notes" at the end of the Annual Report.



The "Introduction" pages present some of the important conclusions and new features of this edition. There are eight sections of environmental indicators, from "Air" through "Personal Impact", that display a comprehensive set of environmental data. In most cases the data goes back to the earliest records at the Council to illustrate the change since the early days of the environmental movement.

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 impacts 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. For example, increases in precipitation leads to more surface runoff, which affects the water quality of rivers and streams, which affects the area and duration of hypoxia in the Sound, which impacts the distribution and abundance of marine species, which impacts food supply and economic growth.

There may be updates to the 2019 Annual Report. Sign up for e-alerts to receive a notice when updates are published. The Council welcomes your comments and questions.

This is a printed version of the Council on Environmental Quality's Annual Report to the Governor.
The online version allows viewing of its web links and interactive charts. The online version is the only way to access all the information in the Annual Report. To view the online version go to: https://portal.ct.gov/ceq/AnnualReport

The Climate Challenge

Earth Day Retrospective: In 1983, the Council's annual report highlighted the correlation between sulfur dioxide emissions and acid rain, the newly implemented automobile emissions program, and an Appendix with information on excessive atmospheric carbon dioxide and the "greenhouse effect". Today the impacts of the "greenhouse effect" and climate change are being felt across the globe.

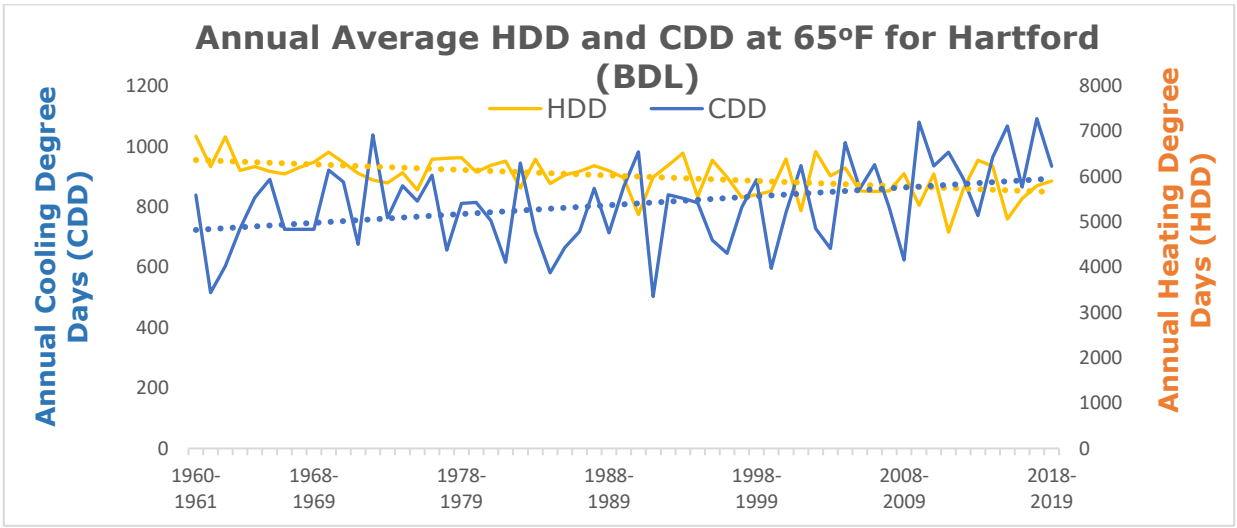
The warming of Connecticut's climate threatens to undo much of the environmental progress of past decades that is illustrated in these pages. Nearly every environmental indicator in the 2019 Annual Report has a tie to global warming. Because the global causes of the problem are exogenous, solutions must be also. Steps have been taken in Connecticut to strengthen Connecticut's transition to a decarbonized economy and enhancing the state's resiliency to the impacts of climate change. Executive Order No. 3 reestablishes and expands the work of the Governor's Council on Climate Change (GC3) to include adaptation and resiliency, expands its membership, and directs DEEP and the Public Utilities Regulatory Authority to "analyze pathways and recommend strategies" for achieving a 100 percent zero carbon target in the electric sector by 2040.

The changes in Connecticut's climate are creating compatible loci for invasive species, like the Asian tiger mosquito, emerald ash borer, and others. These, and others likely to follow will have negative economic, ecological, and public health impacts. Native animals and plants will diminish as their habitat transforms. This is already evident in the near collapse of Connecticut's lobster harvest. Foresters predict eventual reduction in the population of iconic New England species like oaks upon which very many forest species depend.

Annual average temperature, precipitation, and cooling degree days (CDD) have increased since 1960; heating degree days (HDD) have decreased.

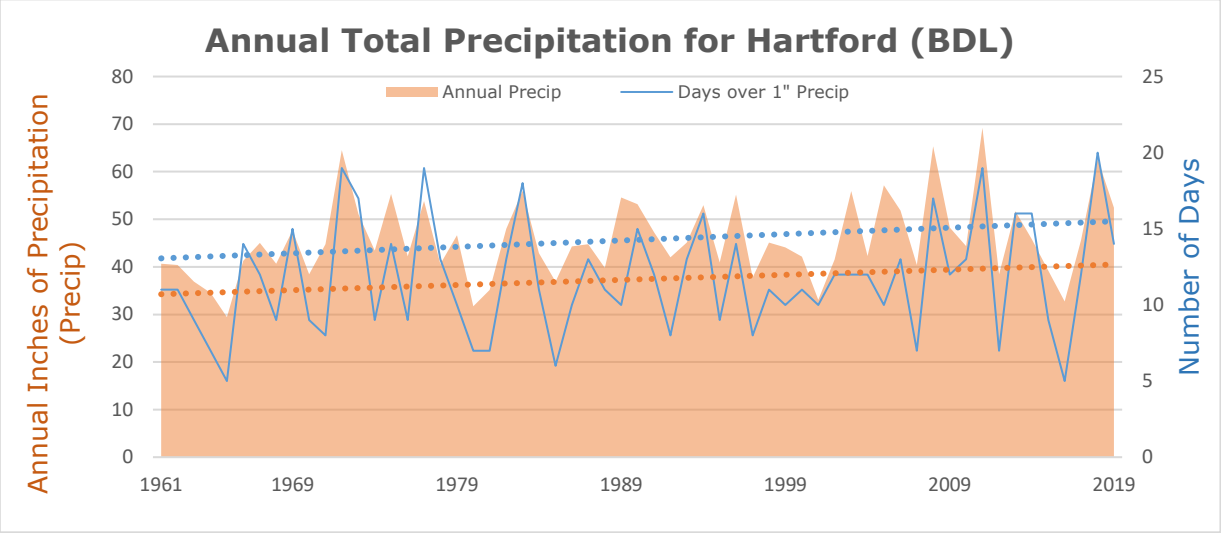
"Degree days are defined as the number of degrees by which the average daily temperature is higher than 65°F (cooling degree days) or lower than 65°F (heating degree days). Degree days reflect changes in climate and are used as a proxy for the energy demand for heating or cooling buildings." – GlobalChange.gov

Annual average HDD have decreased by approximately 11 percent while CDD have increased by approximately 23 percent since 1960.



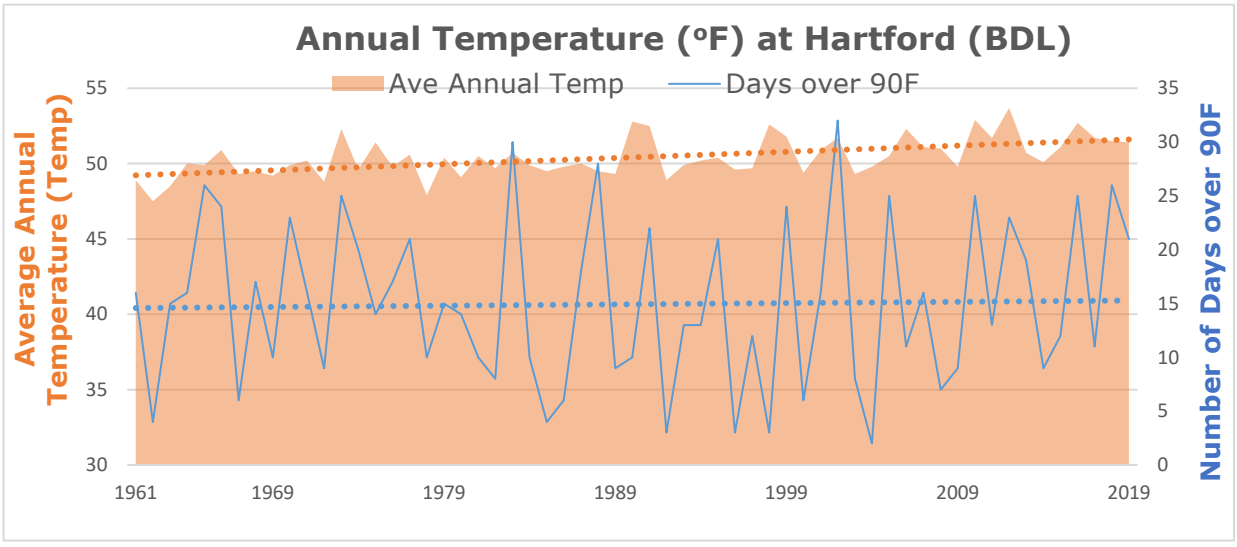
Both average annual precipitation and the annual number of days with precipitation over one inch has been increasing

The average annual precipitation since 1960 is 45.7 inches and the number of days annually with precipitation over one inch has increased by approximately 18 percent since 1960.



Both the average annual temperature and the annual number of days over 90ºF increased by approximately 4.7 percent since 1960.

The average annual temperature since 1960 is 50.4 degrees Fahrenheit (°F) and the average number of days annually with temperatures greater than 90 °F is 14.9. However, since 2000, the average number of 90+°F days has increased to 15.8.



Technical Notes: All weather data is for the weather station at Bradley International Airport (BDL).

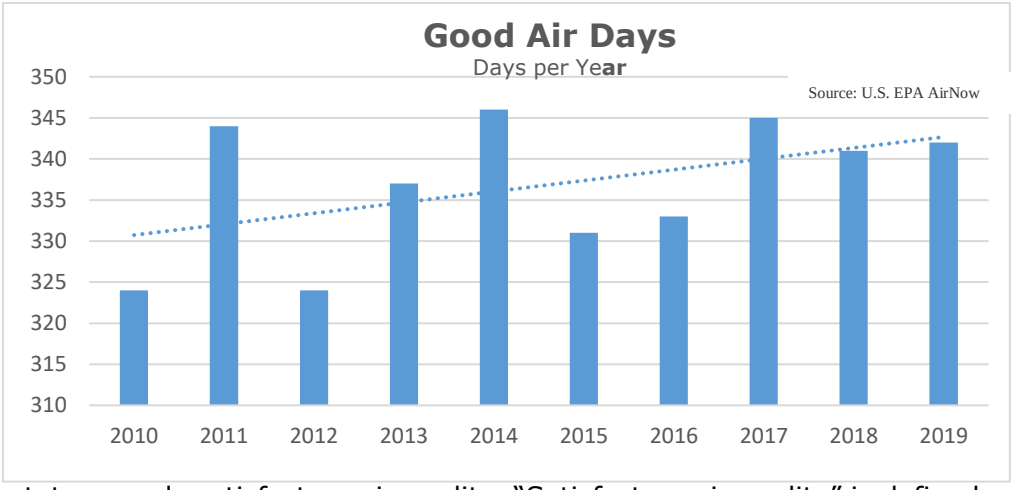
Air Days

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

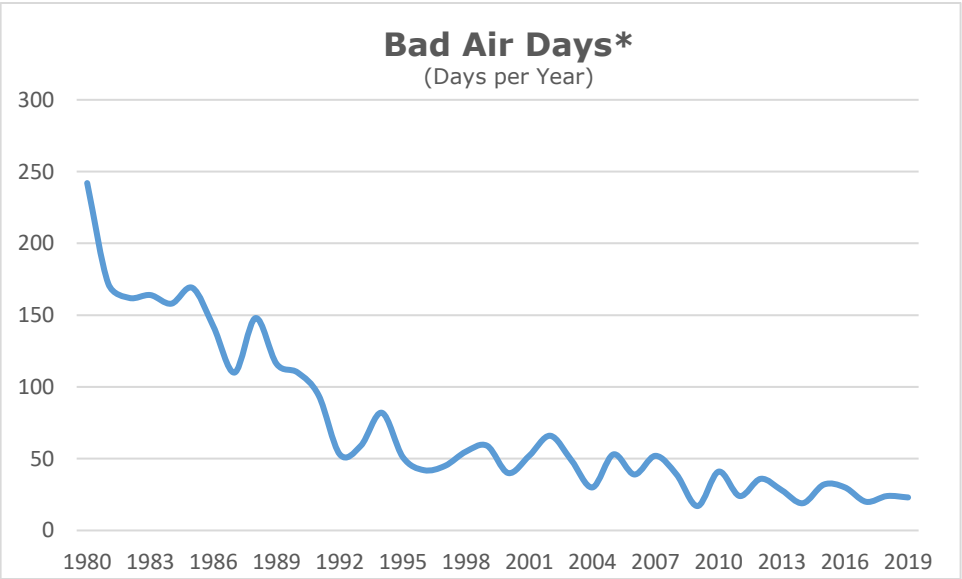
Connecticut residents breathed healthful air on 342 days in 2019: an increase of five days from the 10-year average.



The number of statewide "good air days" increased in 2019 (342) from 341 days in 2018; however, there was an increase in the number of days (2) that exceeded the standard for particulate matter (PM 2.5).

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, lead, carbon monoxide, PM, nitrogen dioxide, and ground-level ozone. The goal is for Connecticut residents to have a "good air day", every day.

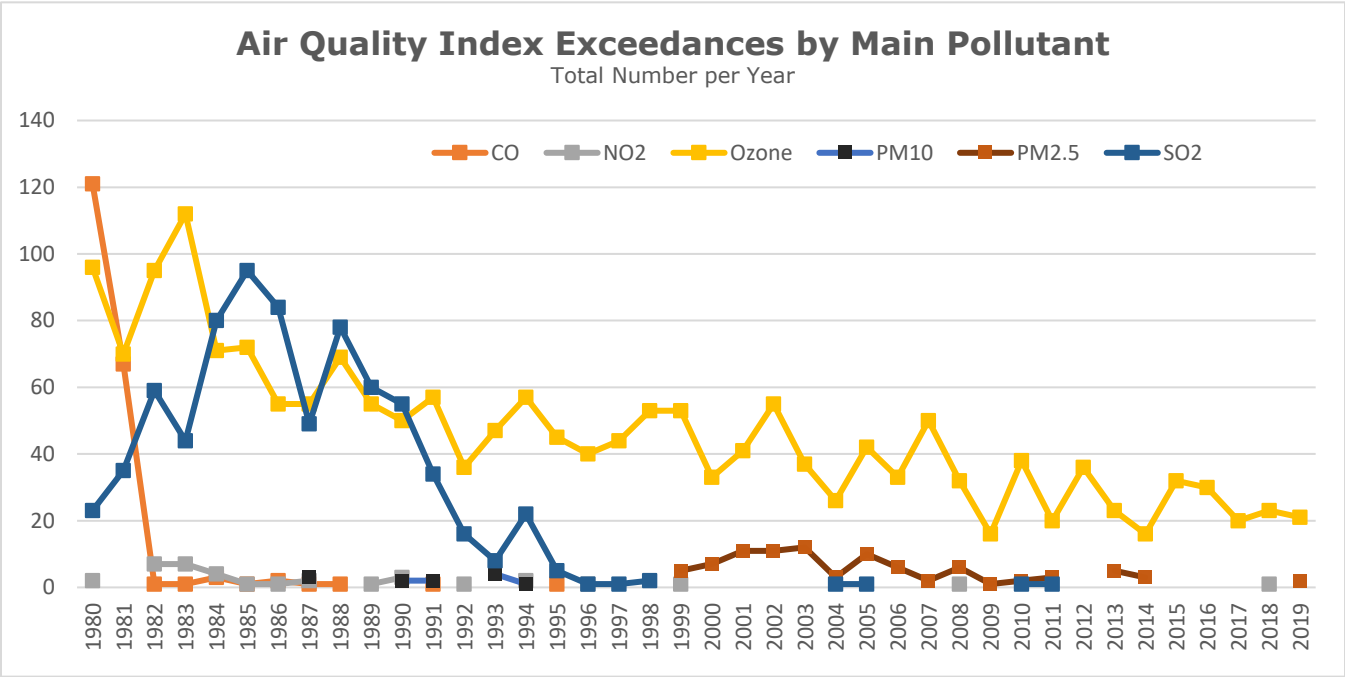
A consequence of the air pollution controls that were put in place after the 1971 Clean Air Act can be seen in the long-term improvement in the State's air.



Earth Day Retrospective: The chart shows the decrease since 1980 in days when one or more pollutant exceeded its federal standard in Connecticut from 1980 to the present.

Earth Day Retrospective: 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 those pollutants no longer are seen, due to federal restrictions on emitters, mostly to Connecticut's west and southwest. The state continues to suffer from ozone (O_3) exceedances, and occasionally from small particulate (PM2.5) exceedances (see chart below). Lead (Pb) is not shown.**

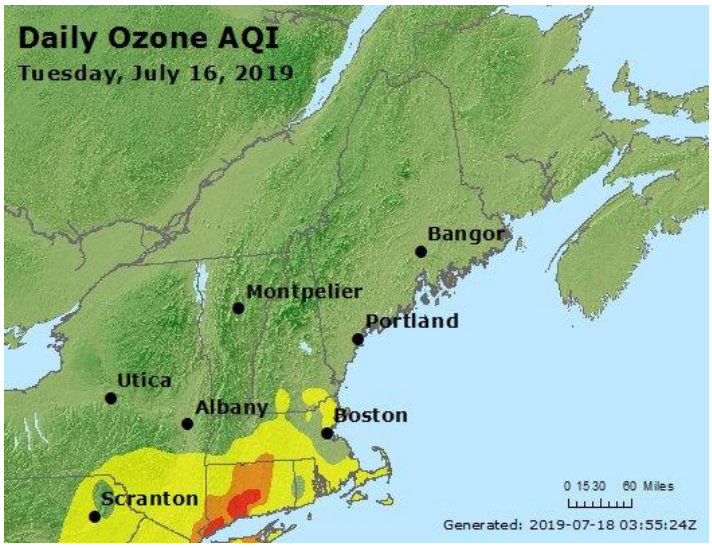
Air Pollutants



The map (below) illustrates a bad-air day in 2019 that was more intense than average but followed the typical pattern of Connecticut having the worst ozone pollution in New England. The yellow areas met the air quality standard for ground-level ozone, while the orange and red areas did not. Some residents in 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 2019, included Westport and Madison (11 each); Stratford (10); Greenwich (8); and Groton, Middletown, and New Haven (7 each); while Cornwall (0) saw the fewest.

No other New England state had more days with unhealthful levels of ozone than Connecticut, which had a total of 21 in 2019. Massachusetts was the next highest with 5 unhealthful days.



Technical Notes: * Bad air days include days in which any of the criteria pollutants exceeded their respective standard. 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 EPA reports that are derived from data received from DEEP's monitors. **Connecticut's lead levels have been below the national standard (NAAQS) since 1994. Since 2010, the average monthly level has not exceeded three percent of the standard.

Preserved Land

QUICK SUMMARY:

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

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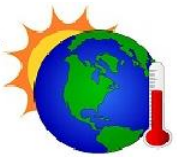
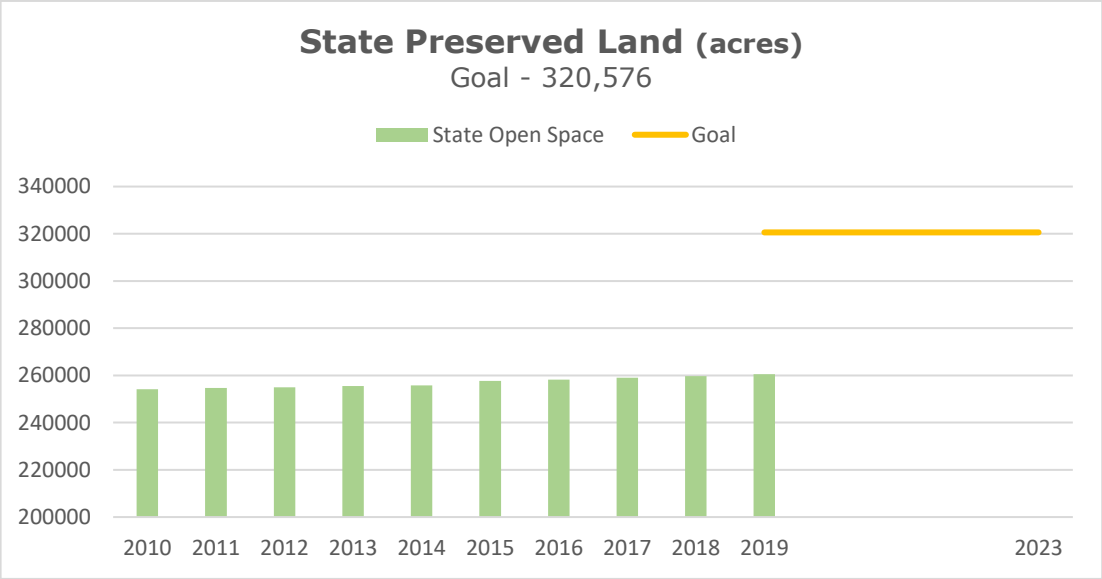


Connecticut has two land conservation goals for 2023:

Goal #1: State Owned Land

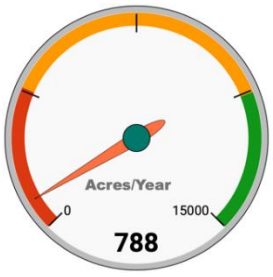
"State parks, forests, wildlife management areas and other state-owned conservation lands shall constitute 10 percent of Connecticut's land area."



In 2019, DEEP acquired 788 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.

Over the last 10 years, the state has preserved an average of approximately 640 acres per year. While Connecticut has made steady progress to increase the amount of land preserved, State preservation efforts are not nearly on track to reach the State's preservation goal by 2023, which would require an annual procurement of approximately 15,000 acres over the next four years, as shown in the graphic at right.

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



Forests, farmland and other natural habitats absorb more than 11 percent of the nation's carbon dioxide (CO_2) emissions. Land conservation offers a double benefit for the climate: it helps absorb greenhouse gases and it prevents significant GHG emissions that would result from development. In addition, research is showing that visiting a forest has real, quantifiable health benefits, both mental and physical.

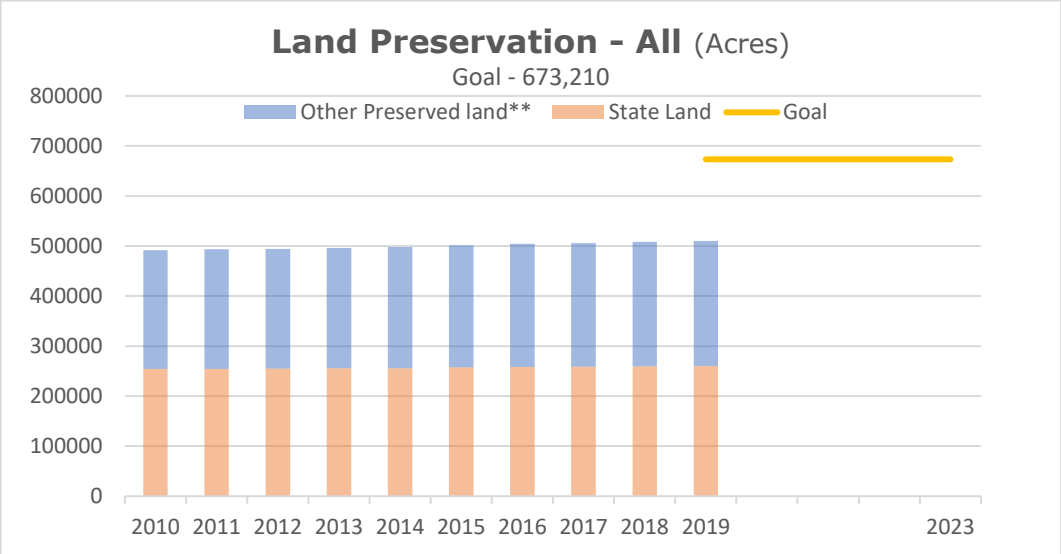
The state's preserved lands were acquired with assistance from state, federal and private funding sources and private donations. Over the last 10 years, the total acquisition cost for state land has been approximately $36.5 million and the average cost per acre has been $5,376. Using the average cost per acre value and the amount leveraged in 2018, achieving the state land preservation goal will require a total of $324 million with the state's share being $125 million using 2019 dollars.

Goal #2: All Conservation Land

"Land conserved by towns and cities, the state, land trusts, and others shall constitute 21 percent of Connecticut's land area."

As Connecticut comprises 3,205,760 acres, fulfilling the goal of 21 percent 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 "Other Preserved Land" in the chart below) exceeds 248,000 acres.

The amount of developed land in Connecticut has increased by approximately 20 percent over the last 30 years while the state's population has only grown by approximately 11 percent.* 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 435 acres through the Open Space and Watershed Land Acquisition Grant Program in 2019. An additional 1,070 acres were protected through DEEP's involvement with "other" conservation efforts in the state.

The combined acreage of the state land noted above and the land preserved by DEEP's conservation partners is estimated by DEEP to exceed 508,000 acres or approximately 75 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 has launched a registry portal as a pilot. To date, DEEP has added only about 26,000 acres or roughly 10 percent of the state-owned open space land into the registry.

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 "Other Preserved Lands" includes easements.

Forests

QUICK SUMMARY:
- COMPARED TO LAST REPORT
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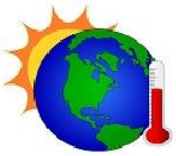
- ON TRACK TO MEET GOAL

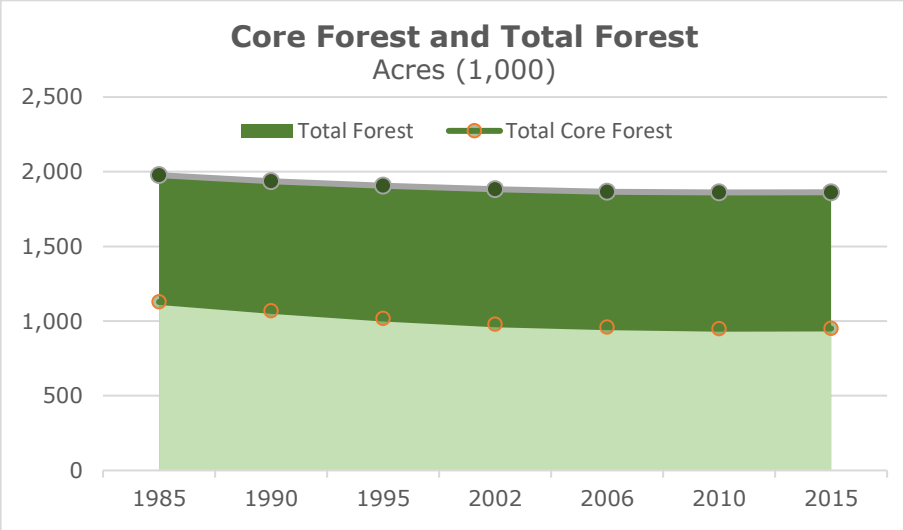
Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information



Forest acreage has been shrinking for decades.

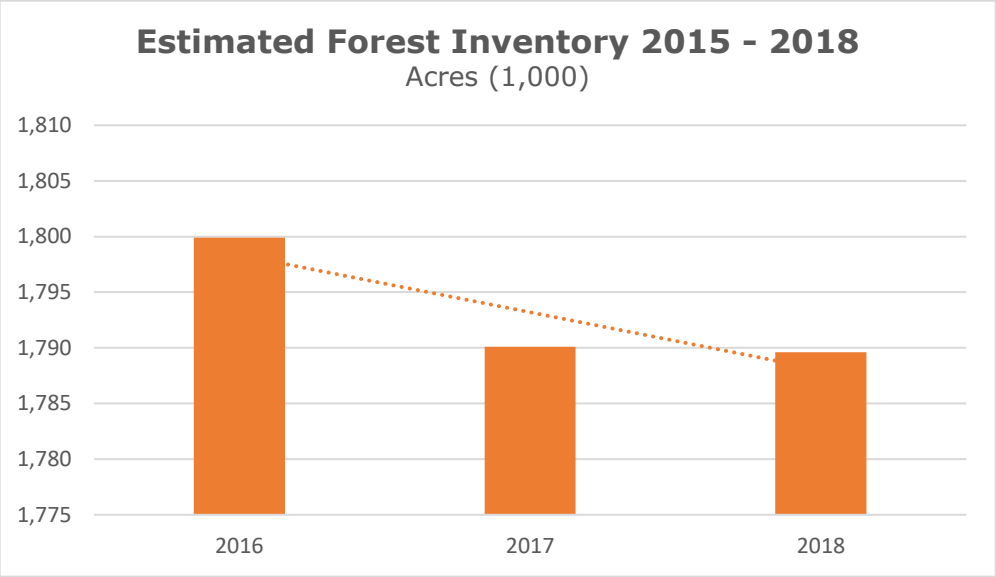
Forest Inventory: The amount of forest land in Connecticut is estimated to have increased by approximately seven percent over the last decade, which may be the result of reduced development activities associated with the great recession and the recent decline in population. Connecticut's forests contain a wide variety of tree species with over 58 species identified in 2017. In terms of number of trees, red maple is the most numerous species in Connecticut. It is estimated that 71.5 percent of the state's forest land is privately owned, 28.1 percent is owned by state and local government, and the remainder is owned by Federal agencies and Native American tribes.

Core Forest Acres:
Earth Day Retrospective:
Since 1985 Connecticut has lost over 187,000 acres of forest lands.



Estimates of core forest acres in the chart were derived by UConn's 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. Core forests provide habitat for many species of wildlife that cannot tolerate significant disturbance. 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.

As discussed in DEEP's Connecticut's Forest Action Plan 2020 Update, "fragmentation and parcelization threatens large blocks of forest which can reduce their usefulness to humans and animals and make them less resilient to other threats."



Why are forests important? Forests and other natural habitats absorb an estimated 11 percent of the nation's carbon dioxide emissions; 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. The Council uses the presence of specific forest bird species as an indicator in identifying forest ecosystem health.

Growing forests accumulate and store carbon through the process of photosynthesis. Trees remove CO_2 from the atmosphere and store it as cellulose, lignin, and other compounds. The U.S. Environmental Protection Agency (EPA) estimates that the amount of carbon sequestered in one year by one acre of average U.S. forest is approximately 0.77 metric ton CO_2.**

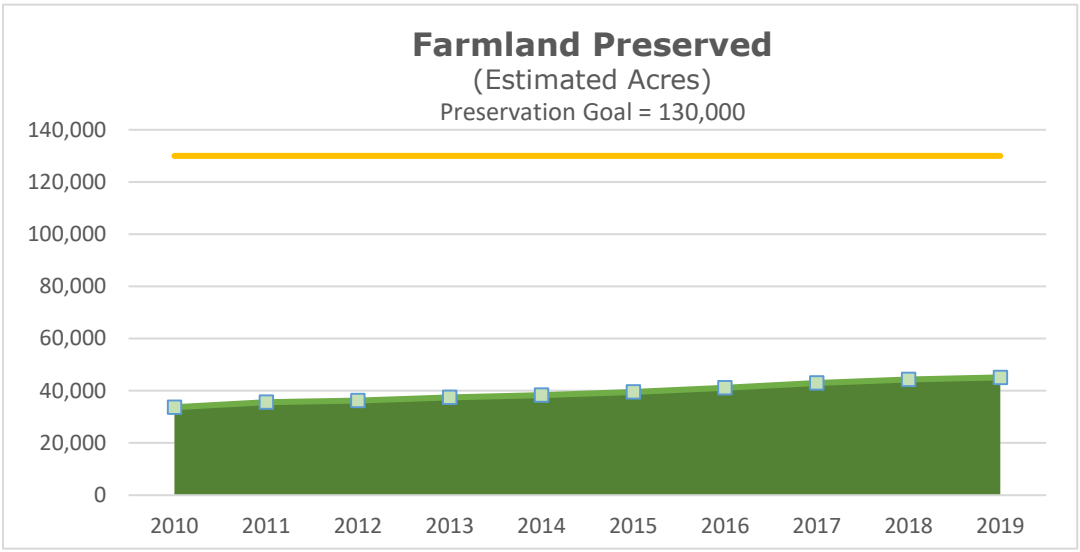
Technical Note: * The estimate of forest inventory in Connecticut depicted in the chart above is included to supplement the forest data that is provided by UConn's CLEAR satellite-derived data that is available in approximately five year intervals. This is derived from the USDA Forest Inventory and Analysis (FIA) research, which is used to determine the extent, condition, volume, growth, and use of trees on forest land. **https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references

Farmland

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

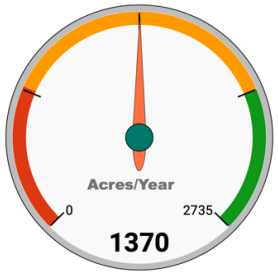
In 2019, Connecticut preserved 773 acres of agricultural land. This is less than the 1,378 acres preserved in 2018 and less than the 10-year annual average of approximately 1,270 acres.



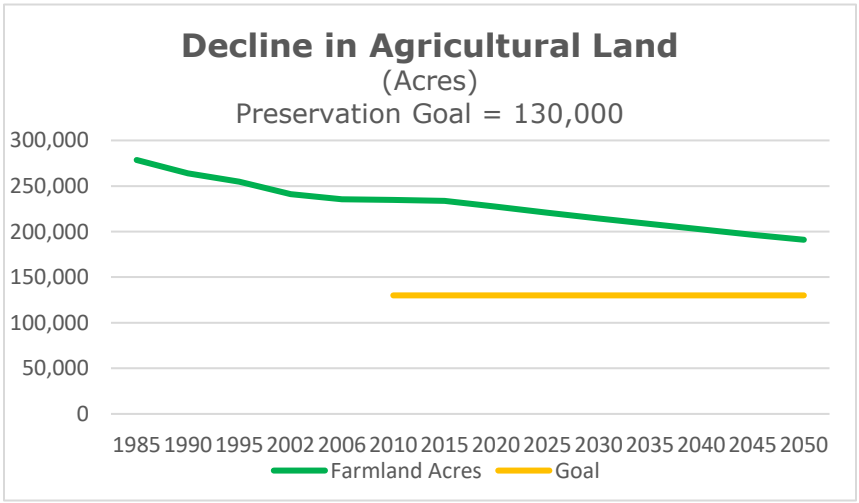
The cumulative acreage preserved by the Connecticut Department of Agriculture (DoAG), which began preserving land by purchasing development rights in 1978, has increased slowly over the last 10 years. In 2011, DoAG launched the Community Farms Preservation Program as a pilot for farms that do not meet all eligibility requirements of the longstanding farmland preservation program but are nonetheless worthy of preservation. (The acreage preserved since 2014 include both programs.) The average rate of farmland preservation since 2014 has been 1,370 acres per year.

Council projections prepared in 2019 indicate that the goal of preserving 130,000 acres could be reached by 2050 at an annual preservation rate of approximately 2,735 acres per year as depicted in the chart (right).

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



Earth Day Retrospective: Since 1985 Connecticut has lost over 87,000 acres of farmland. The chart (below) depicts the estimated cumulative farmland acreage in Connecticut through 2015 and the acreage potentially available for preservation based on the average rate of farmland loss over the last 30 years (-2.85%). The rate of farmland loss may change as development pressure increases or as demand for locally produced food and materials increase.

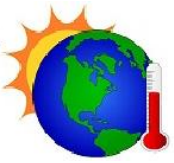


Goal: The Connecticut Department of Agriculture adopted a farmland preservation goal 130,000 acres in total, with at least 85,000 acres in cropland that originally was based on the amount of land needed for food production to sustain Connecticut's population.

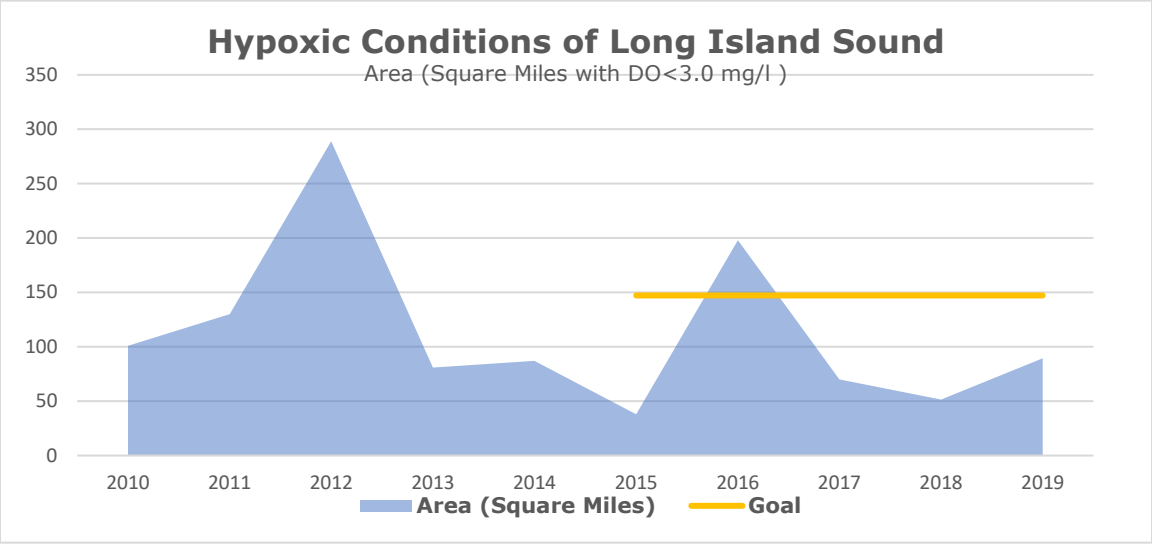
The Water of Long Island Sound

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 low levels of dissolved oxygen increased in 2019, but is on track to meet the 2035 goal.

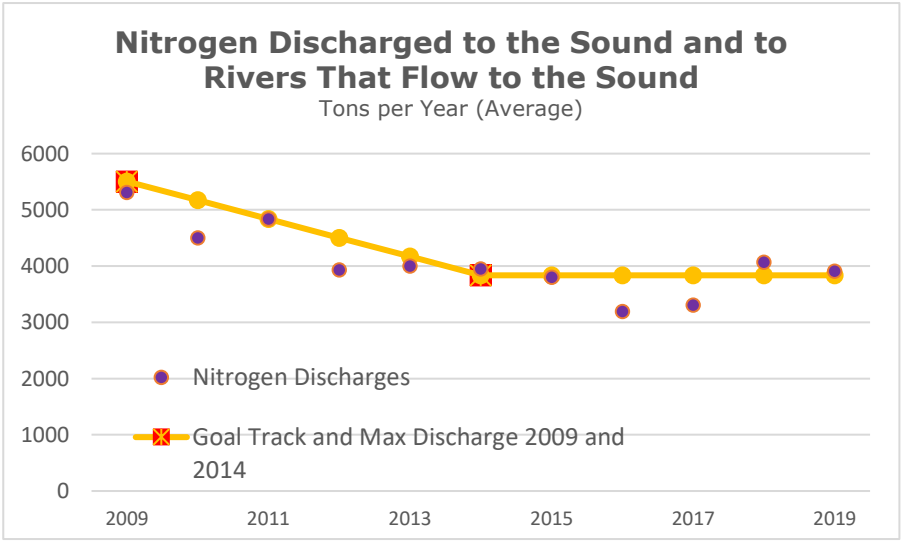


The area of Long Island Sound with hypoxia, water with dissolved oxygen (DO) concentration less than 3.0 milligrams per liter (mg/l), increased in 2019 to 89 square miles from 52 square miles in 2018, but was less than the 10-year average of 121 square miles. In addition, the number of days that Long Island Sound experienced hypoxic conditions increased in 2019 to 48 days from 35 days in 2018 and was higher than the ten year average of 47 days. The primary cause of hypoxia is nutrient pollution, primarily nitrogen and phosphorus nutrients from runoff and wastewater treatment effluent that fuels the growth of phytoplankton in the Sound.

Goal: The goal line on the top chart, set at 14 percent of the Sound's area (147 square miles), is an approximation of the target adopted in the 2015 edition of the Long Island Sound Study's Comprehensive Conservation and Management Plan. That plan's goal calls for "measurably reducing the area of hypoxia in Long Island Sound from pre-2000 averages."

The amount of nitrogen discharged to the Sound was lower than 2018, but higher than the goal line.

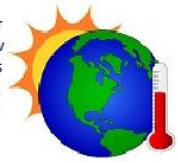
Connecticut has reduced nitrogen discharges, and consequently the area of hypoxia in Long Island Sound, over the long term, by investing in nitrogen-removal technology at sewage treatment plants and has implemented a Nitrogen Control Program; however, more needs to be done.



The Warming and Rising Waters of Long Island Sound

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

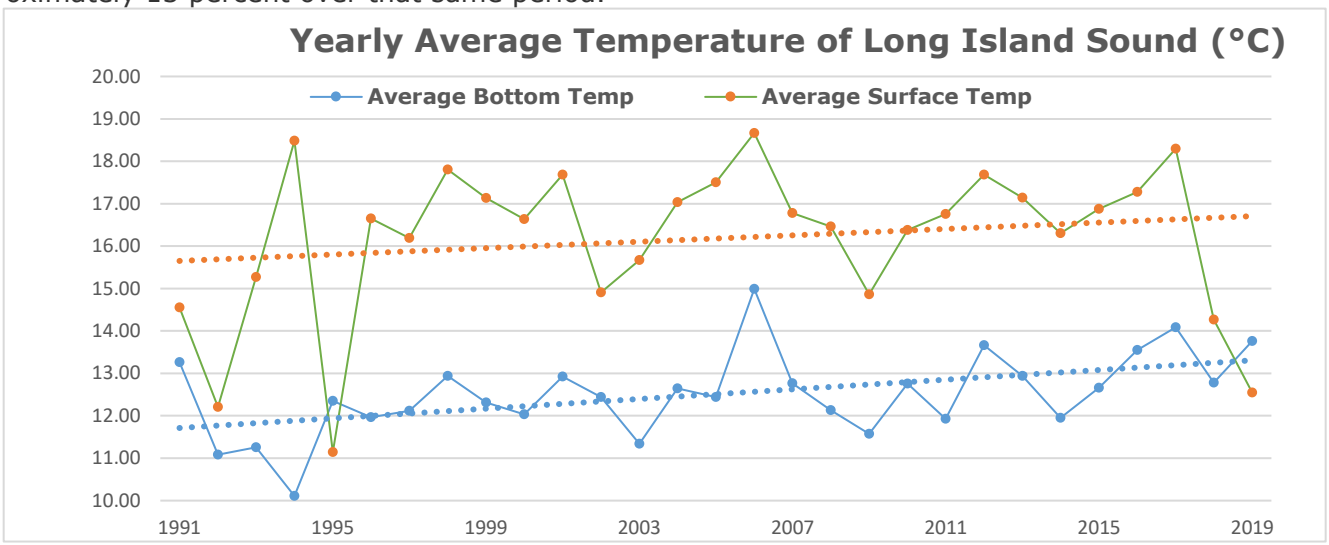
Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information



Annual average bottom and surface water temperature increased over the last 28 years.

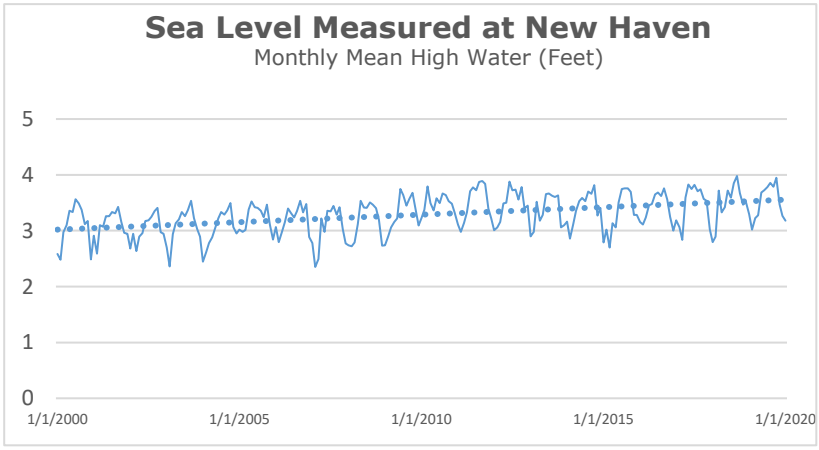
The average bottom and surface temperature of the water in Long Island Sound has been rising, with the average bottom temperature rising slightly faster than the surface water.

Earth Day Retrospective: In 2019, the average annual surface water temperature for the Sound was below the average for the previous 28 years; however, the trend indicates an increase of approximately seven percent over that same period. In contrast, the average annual bottom water temperature for the Sound was above the average for the previous 28 years and the trend indicates an increase of approximately 13 percent over that same period.



Earth Day Retrospective: The trend for mean high water data from 2000 to the present for the monitoring station in New Haven, Connecticut indicates an increase of approximately 18 percent over the prior 20-year period.

The Connecticut Institute for Resilience and Climate Adaptation (CIRCA) at the University of Connecticut recommended planning for a sea level rise of 0.5 m (1 foot 8 inches) higher than the national tidal datum in Long Island Sound by 2050. 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, will likely be displaced.



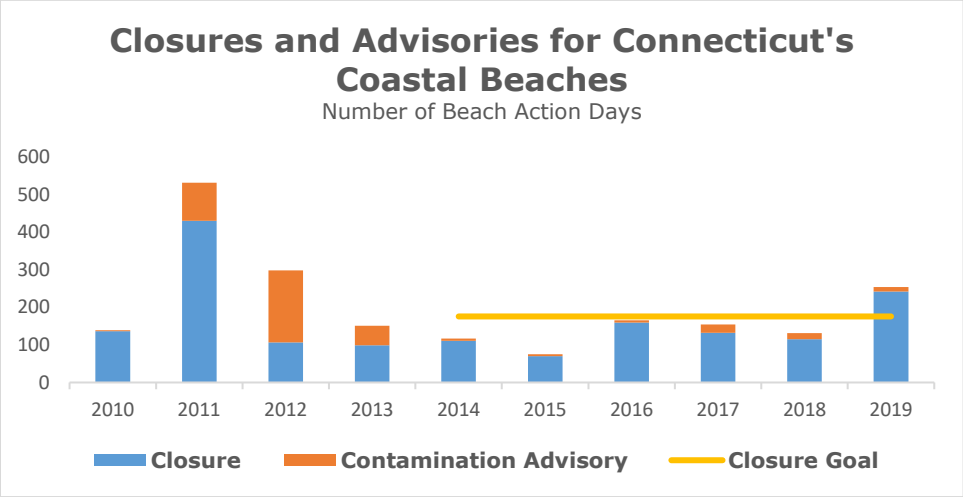
Technical Note: Year to year variations in water temperature and water levels in the Sound are less important than trends. There is no "goal" for coastal sea level, but the "Quick Summary" box above presumes warming temperatures and sea level rise are not desired trends.

Swimming

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

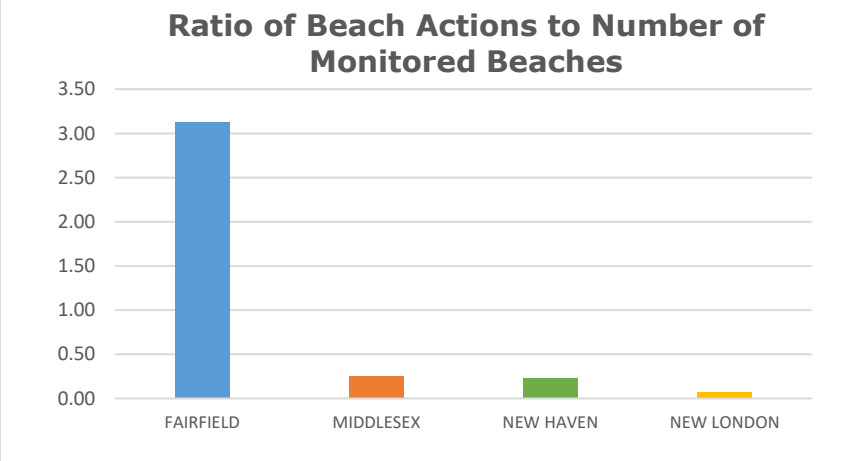
Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

Coastal swimmers saw more beach actions in 2019 than in 2018.



The chart displays both closings and advisories since 2009, which from a water quality perspective are functional equivalents. This is different than prior years when only closings were displayed. The data is from the U.S. EPA Beach Advisory and Closing Online Notification (BEACON2) system. It includes information on pollution occurrences in coastal recreation waters for 73 beaches along the Connecticut shoreline in 2019. The beach-specific advisories or closings are issued by the reporting state or local government entity. There were 254 beach action days in 2019, 95 percent (242) of which were closures and approximately 15 percent (12) were advisories. There were 102 beach actions in 2019, over 82 percent of beach actions were preemptive while the remaining 18 percent of the beach actions were the result of (sampled) elevated bacteria. All of the preemptive actions in 2019 were attributed to rainfall or the result of a sanitary sewer overflow or sewer line leak/release.

While Fairfield County had approximately 41 percent of all reporting beaches, those beaches were responsible for 91 percent of all beach actions in 2019. Because the number of beaches varies by county, the Council utilizes a ratio of beaches reporting to beach actions to illustrate the relative impact that pollution has had on coastal recreation waters. The western half of the coastline has more sewer systems with overflows and more paved surfaces that send contaminated runoff into the waters.

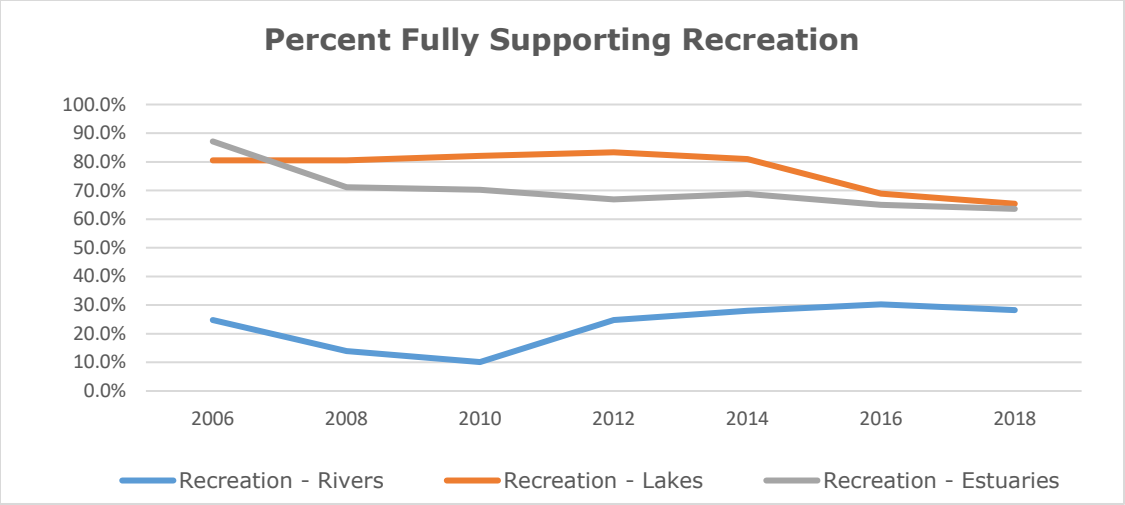


Goal: The goal for keeping beaches open is to cut the number of beach closings in half by 2035 (from 2014, with the number for 2014 calculated using a five-year rolling average). This goal was identified in the 2015 edition of the Long Island Sound Study's Comprehensive Conservation and Management Plan.

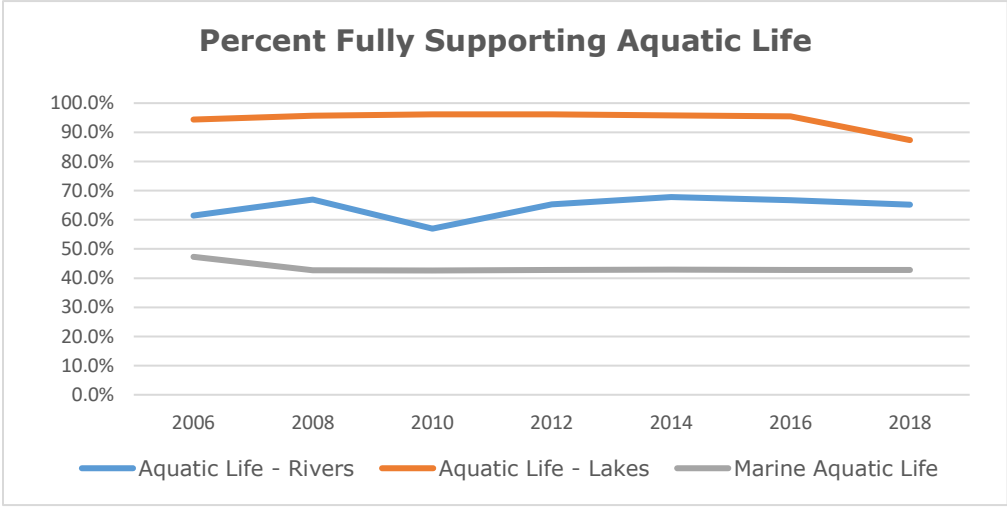
Technical Note: An action can be based on a model or policy and not be a monitored beach. The high number of beach actions in 2011 may be attributed to Tropical Storm Irene, which impacted Connecticut on August 28, 2011 and the closure Fort Hale Park Beach in New Haven, CT for 98 days. Data indicates that almost half (289) of all actions in 2011 occurred on or immediately after August 28, 2011.There was a maximum storm surge of approximately 3.5 feet and very large waves ranging from 5-15 feet. Coastal damage was greatest from Westport to Old Saybrook. Rainfall for Irene was moderate to heavy in eastern Connecticut (2-5 inches) and very heavy in western Connecticut (up to 10 inches).

Rivers, Lakes, and Estuaries

A key factor in water quality is the amount of impervious surfaces in a watershed.



There are estimated to be 5,830 river miles in Connecticut. DEEP makes water quality assessments for each designated use (aquatic life, recreation, and fish consumption) for waterbodies in the state (rivers, lakes, and estuarine areas) as either fully supporting, not supporting, insufficient information, or not assessed, which characterizes whether or not the water is suitable for that use. While the quantity of river miles assessed has increased over time, the percentage of river miles that fully support the designated use has decreased for aquatic life and especially recreation since the last reporting period (2016).



Likewise, the percentage of estuaries that fully support the designated use has decreased slightly for aquatic life and recreation since the last reporting period (2016). Notwithstanding the fact that more than 88 percent of all assessed waterbodies of the state fully support fish consumption (2018), there is a statewide fish consumption advisory for all freshwater fish, except trout, due to atmospheric deposition of mercury and all estuarine waters have a fish consumption advisory on striped bass and bluefish due to PCB contamination.

A key factor in water quality is the amount of impervious surfaces in a watershed. In nearly all cases, a stream that has *less* than 12 percent of its watershed covered by impervious surfaces will fully support aquatic life. Impervious surfaces are largely pavement and rooftops.

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.

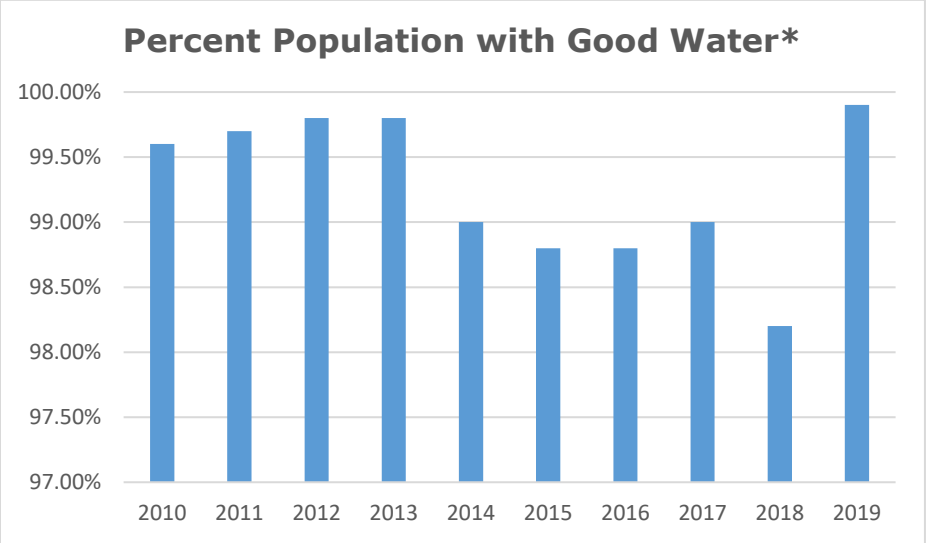
Public Drinking Water

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

Significant improvement in drinking water quality in 2019, but chloride was again the most common contaminant detected in public water systems.



This indicator shows the percentage of the population served by Community Water (C) systems and Non-Transient Non-Community Water (NTNC) 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 2019 show a substantial decrease in the number of violations from 2017 and 2018 levels. Significant improvements from two large water systems in the state resulted in a decrease in violations of disinfection byproducts and other chemicals. By far, the most common problem during 2019 in water systems was excessive levels of chloride,** which is typical of most years. 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 could lead to lead contamination. Lead contamination is uncommon in Connecticut. A 2019 report by the Auditors of Public Accounts for calendar year 2017 recommended that the DPH strengthen oversight and enforcement.

CT Water Plan: In 2019, the legislature ratified the State Water Plan. It establishes a framework for balancing human and environmental needs for water. It addresses the quality and quantity of water for drinking, ecology, recreation, business, industry, agriculture, energy, and wastewater assimilation, in the context of a changing climate.

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. Residents who drink from private wells are not required to test their water routinely, so the number of people who drink contaminated water from private wells cannot be measured.

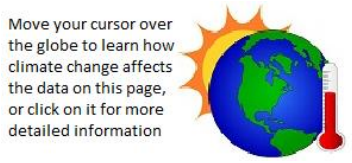
In 2019, the Department of Public Health and DEEP developed a comprehensive strategy to address per- and polyfluoroalkyl substances (PFAS) in Connecticut's environment. Although Connecticut's large Public Water Systems conducted multiple rounds of testing from 2013 to 2015 and did not detect PFAS in the water from their sources of supply, it remains a concern. These sources of supply provide drinking water for over 2.4 million daily customers in CT. Moreover, leaking heating fuel systems can impact drinking water supplies as detailed in the Council's 2019 report Fuel for Thought.

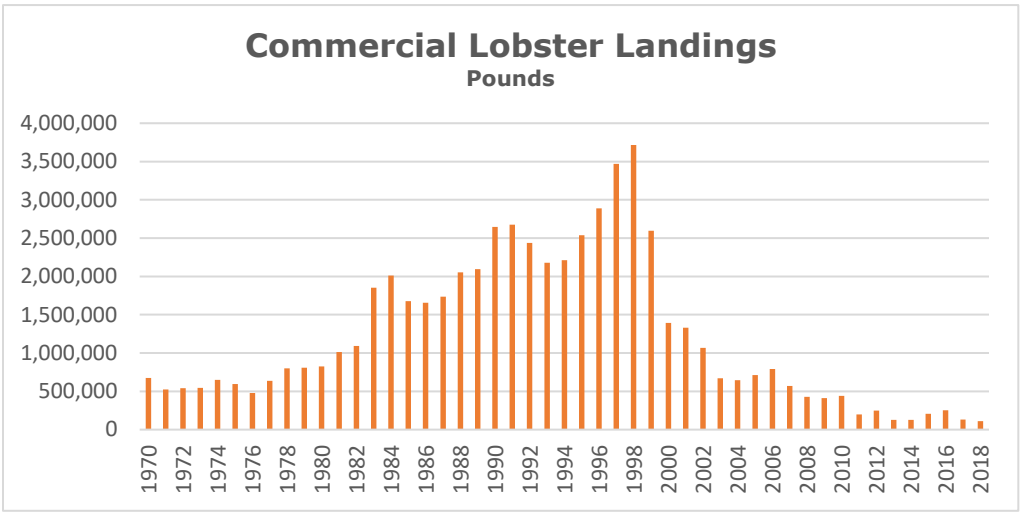
Technical Notes: *The vertical axis in the chart above has been shortened, beginning at 90 percent rather than the customary zero. This allows the reader to see year-to-year differences, which would be nearly imperceptible if the chart began at zero. **The standard for chloride is set by state regulation.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

Lobster and Fishes of Long Island Sound

QUICK SUMMARY:

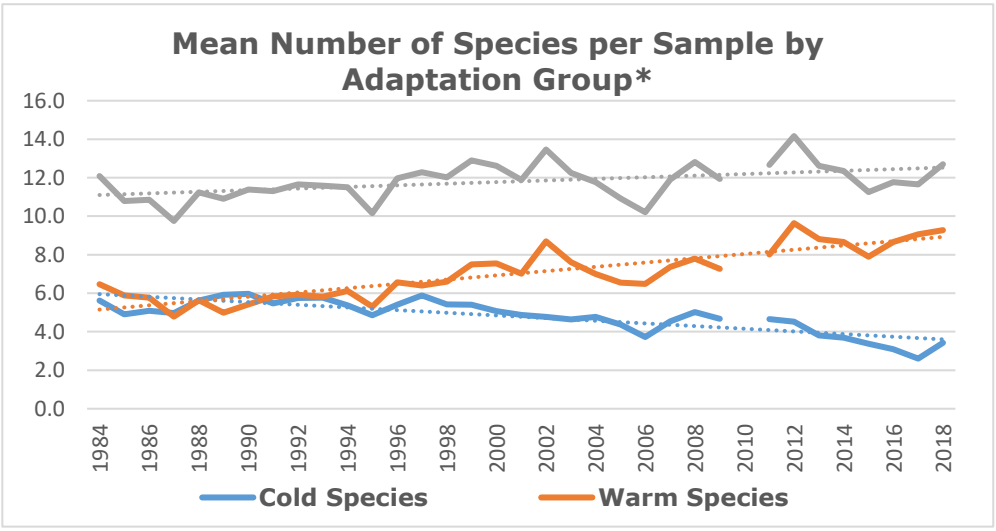
- X COMPARED TO LAST REPORT
- X COMPARED TO 10 YR. AVERAGE
- X ON TRACK TO MEET GOAL





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 110,000 pounds in 2018 (most recent data) – almost a 97 percent drop. The decline in lobsters was also confirmed by DEEP's 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 the Sound such as the presence of insecticides. Scientists did not detect pesticides in lobsters collected in 2014, leaving the warming waters as the most likely cause for Connecticut's lobster.



As noted above, DEEP surveys marine fish, squid and lobster populations 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.

A study of 686 species, published in 2018, projects the shifts in thermal habitat for fish species all along the North American continental shelf. 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.

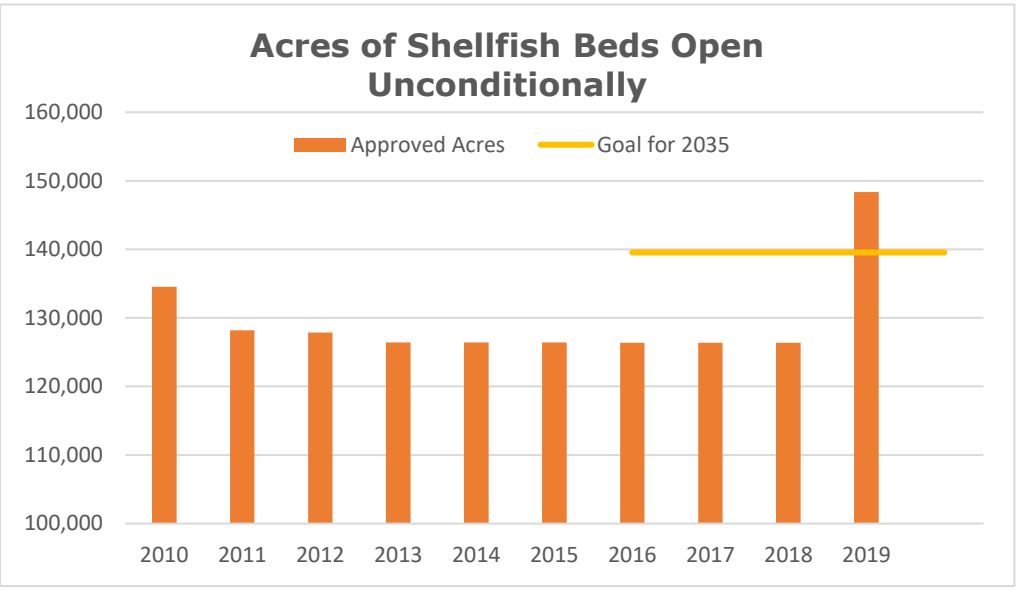
Technical Note: * Data from 2010 are missing because no fall survey was conducted that year. Finfish species captured in the CT DEEP Long Island Sound Trawl Survey were divided into adaptation groups based on their temperature tolerance and seasonal spawning habits.

Clamming and Oystering

QUICK SUMMARY:
- ✔ 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 unconditionally approved for harvesting shellfish was greater in 2019.



The Connecticut Department of Agriculture's Bureau of Aquaculture and Laboratory Services monitors shellfish beds and classifies them according to their potential for yielding healthful, uncontaminated shellfish. The chart shows the acreage of shellfish beds that are included in the "approved" category for direct harvesting.* There is also a "conditionally approved" category, not shown on the chart, which requires a management plan and might be subject to closings seasonally or after rainfalls. (Even areas that are "approved" may be closed as a precaution following exceptional rainfalls of three or more inches.) Classification changes are related to improvement or decline in water quality based upon the results of water quality monitoring and/or updated sanitary survey findings. Significant upgrades in 2019 from "Restricted" and "Conditionally Approved" to "Approved" occurred in Milford (145 acres), Madison (5,584 acres), East Lyme (11,476 acres), and Waterford (6,043 acres).

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. Only about 16 percent of the estuarine waters assessed can fully support shellfish harvesting from Class SA waters.**

Goal: The goal for marine shellfish beds, adopted in the 2015 edition of the Long Island Sound Study's Comprehensive Conservation and Management Plan, is to upgrade five percent of the 2014 restricted acres (262,831) so that shellfish may be harvested in those areas freely. Adding those upgraded acres to the 2014 baseline results in a target of approximately 139,550 "approved" acres by 2035, shown on the chart as a horizontal line.

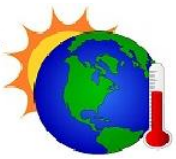
Long Island Sound Blue Plan: The Long Island Sound Blue Plan was completed in 2019. The Plan provides an inventory of the natural resources and uses of Connecticut's Long Island Sound and establishes a spatial plan to guide future use of the Sound's waters and submerged lands.

Technical Notes: * The changes in "approved" acres over the past decade have reflected changes in federal regulations and more accurate spatial measurement techniques in addition to water quality changes. ** 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.

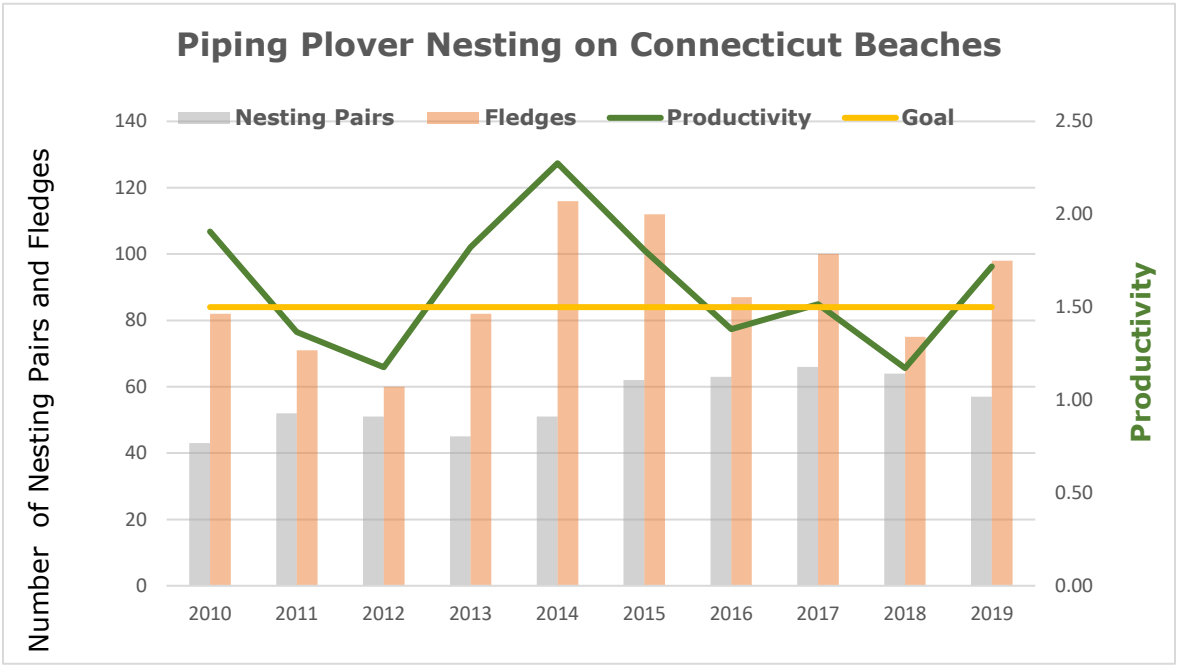
Piping Plovers

QUICK SUMMARY:
- ✓ 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 number of plover chicks to reach flight age or "fledge" in 2019 was up from 2018, and the productivity rate was higher than the goal.



Piping plovers are small shorebirds that nest only on sandy beaches with sparse vegetation. Their habitat is a narrow strip squeezed between a rising Sound and higher ground. The piping plover population is, according to the United States Fish and Wildlife Service, "an indicator of the health of the fragile beach ecosystem." (*Atlantic Coast Piping Plover Revised Recovery Plan*)

Earth Day Retrospective: In 1984, only 30 nesting piping plovers were observed in Connecticut. In 2019, 57 pairs successfully raised 98 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 2019, Connecticut plovers raised an average of 1.72 chicks per nest. Since protection and monitoring efforts began in 1984, nesting success has 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.

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.

Technical Note: Data provided by DEEP Wildlife Division.

What can I do?

Respect all shorebird nesting areas that are fenced or posted for the birds' protection.

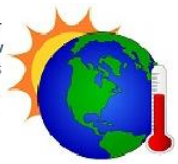
Do not approach or linger near piping plovers or their nests.

Do not attempt to "rescue" young birds that appear to be lost or too young.

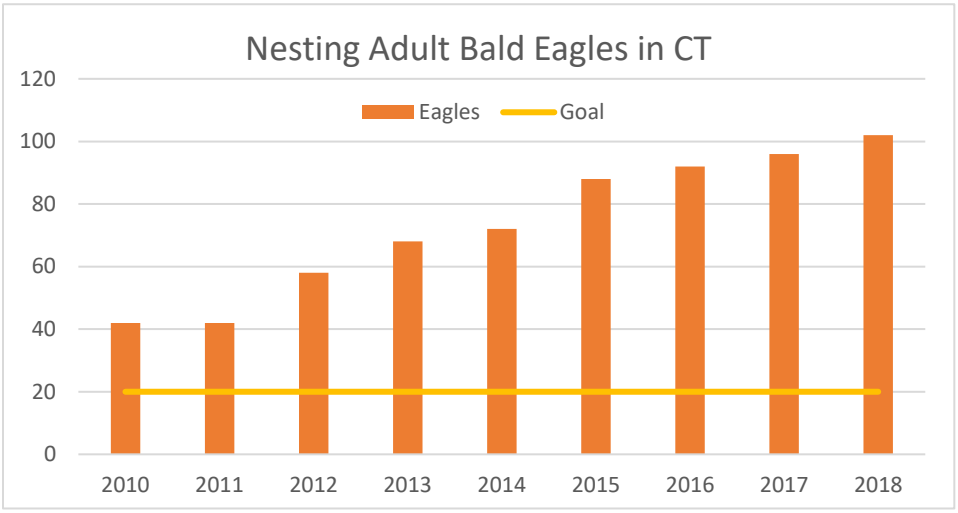
Raptors Rebound

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



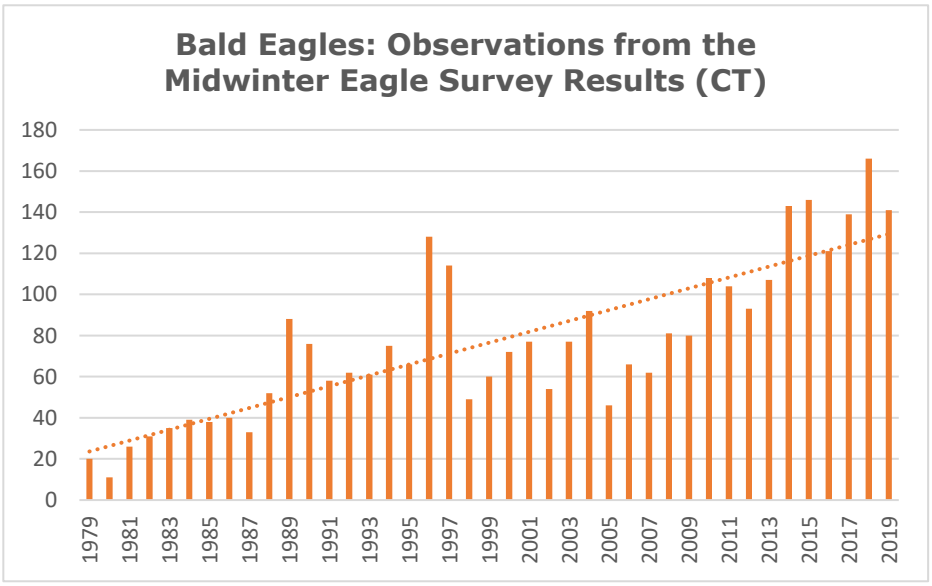
Bald eagles continue their dramatic comeback; Ospreys are doing well, too.



In 2019, Connecticut's mid-winter survey recorded 51 bald eagle nests throughout the state. This represents an increase from 2018 and more than the average over the previous ten years. 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. Eagles spend their winter mostly along larger rivers where they have become a regular sight. Iced-over rivers to the north can push more eagles south to Connecticut. 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.

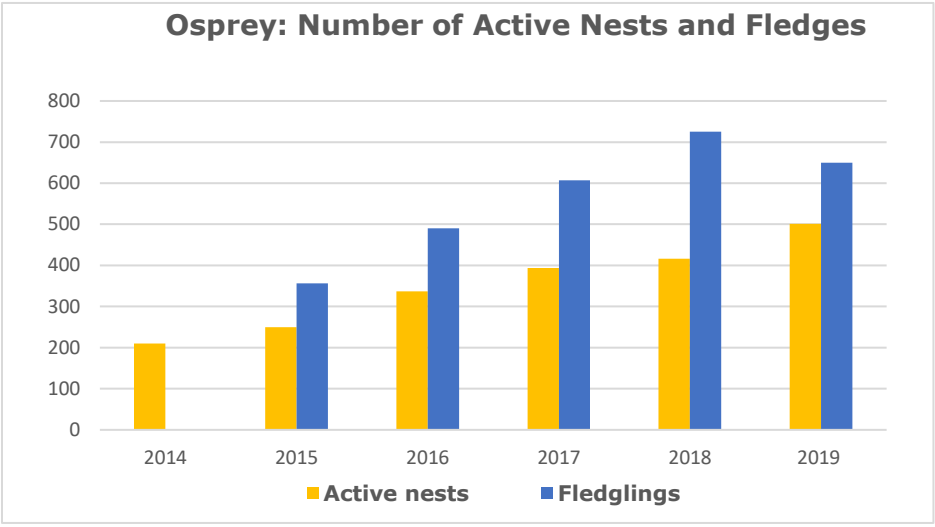
Goal: The goal for bald eagles is derived from the 1983 Northern States Bald Eagle Recovery Plan, prepared by the United States Fish and Wildlife Service. The Plan established a goal of 20 breeding birds (10 nests) for Connecticut. According to experts in the Bald Eagle Study Group, Connecticut could eventually host up to 200 nesting eagles (100 nests).

Earth Day Retrospective: Since 1979 observations of bald eagles (nesting and not) during the Midwinter Eagle Survey have increased over 400 percent. 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.*



Another large fish-eating bird of prey, the osprey, has rebounded in similar fashion to the eagle.

Earth Day Retrospective: From a low of nine nesting pairs in 1974, ospreys -- counted by the Connecticut Audubon Society's volunteers -- were seen at more than 501 active nests in 2019, meaning they were occupied by an osprey pair. The 501 active nests fledged 650 ospreys in 2019, an increase in the number of active nests of 20 percent, but a decrease of 10 percent in the number of fledglings from 2018.



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 DEEP and the Connecticut Audubon Society.

Technical Note: * U.S. Fish and Wildlife Service, Fact Sheet Natural History, Ecology and Recovery

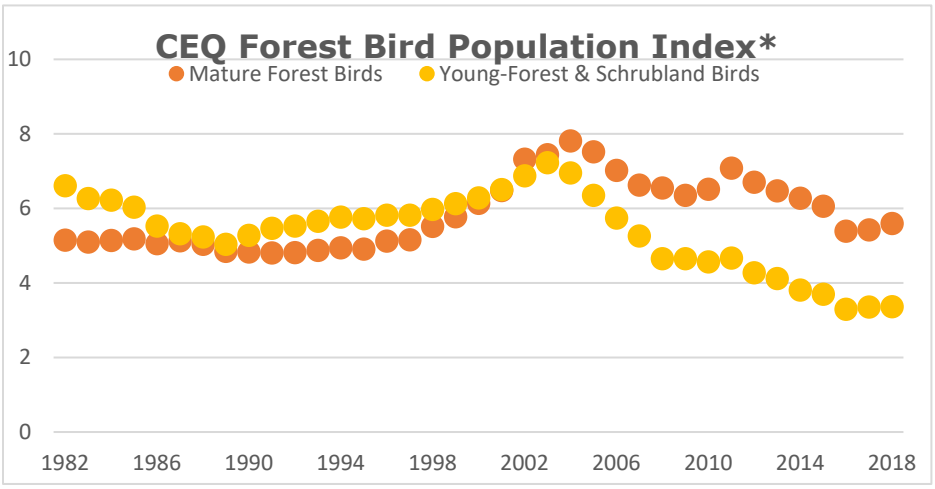
Forest Birds

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.

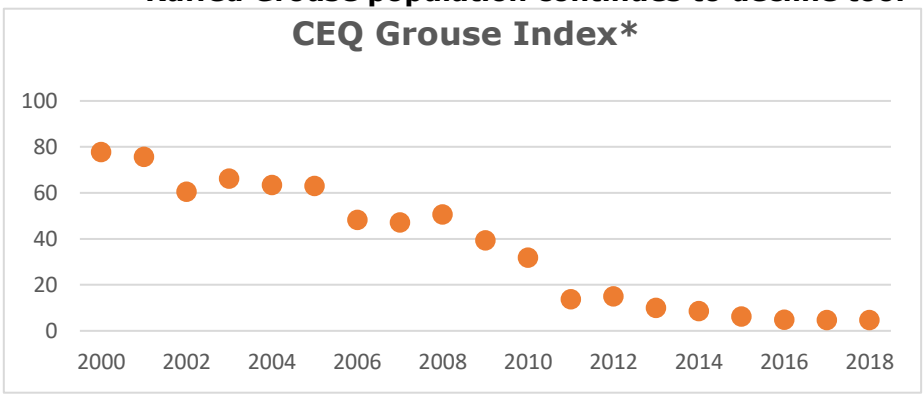


Blue-winged Warbler

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). In 2019, the Journal Science reported on a study that estimated a decline in North American bird populations approaching 30 percent over 84 years.

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.

Ruffed Grouse population continues to decline too.



Ruffed grouse populations have decreased significantly over the past 20 years. Ruffed grouse are an excellent indicator species for New England hardwood-dominated forested landscapes. The most likely cause of reduced grouse population is a decline in young forests, the effects of human activities including roads, development (fragmentation), the introduction of invasive species and pests, and reduction of vegetation favored by grouse. A similar decline in the ruffed grouse population has also been documented by DEEP from actual observations by turkey hunters over a 10-year period.

Goal: The Association of Fish and Wildlife Agencies prepared a plan in 2006 that set a target of restoring the ruffed grouse throughout North America to 1980 population levels by 2025.

Technical Notes: * The Council calculates index values (using advice from statistics experts) to show the combined population trends of several species. The Connecticut Forestlands Council Forest Ecosystem Health Committee developed a list of Avian Forest Health Indicator Species that "can be used as indicators in identifying both positive and negative areas of forest ecosystem health."

Species of Special Concern

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.

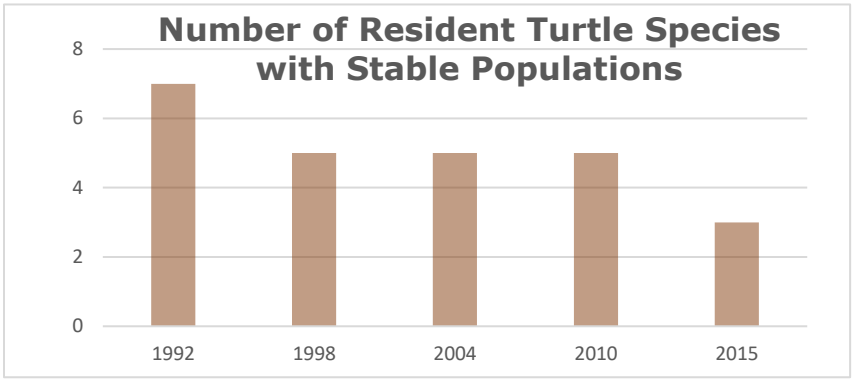
Resident Turtles

QUICK SUMMARY:

— COMPARED TO LAST REPORT

X COMPARED TO 10 YR. AVERAGE

X 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.

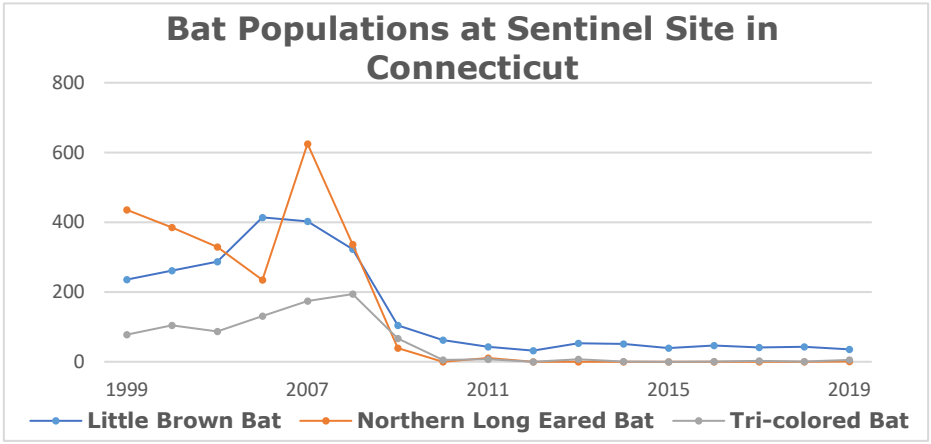
Bats

QUICK SUMMARY:

X COMPARED TO LAST REPORT

X COMPARED TO 10 YR. AVERAGE

X 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 (above) depicts data for the winter population of three cave-dwelling bat species at a sentinel hibernation site monitored annually by DEEP. 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.

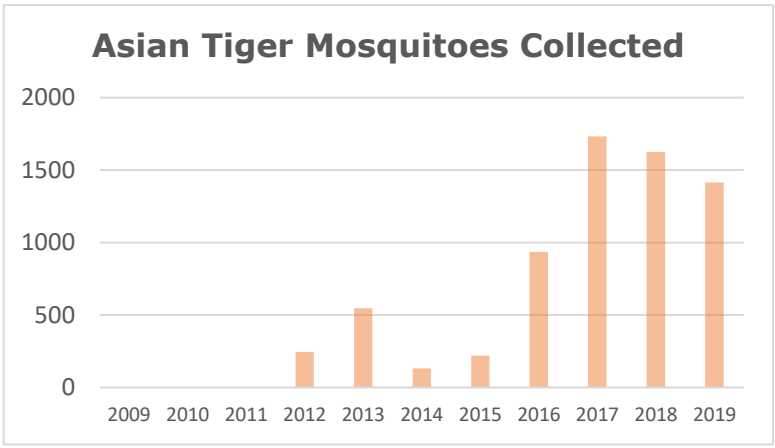
Invasive Insects

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

QUICK SUMMARY:

✓ 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 West Nile Virus and other 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.

Much of Connecticut is expected to get warmer and wetter over the coming century, enhancing mosquito populations by creating more suitable habitat. Additional information about mosquito management in Connecticut can be found on DEEP's website or www.invasivespeciesinfo.gov/profile/asian-tiger-mosquito.

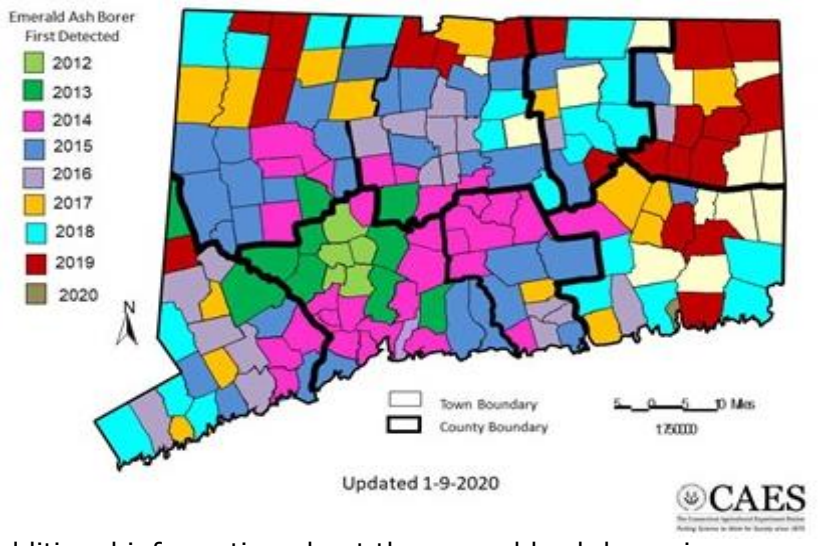
Technical Note: The "Invasive Disruptors" described in this section are species that are not native to Connecticut that have the potential to upset the ecological balance or threaten public health. Invasive species have been identified as the cause in decline of at least 48 percent of species listed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

Emerald Ash Borer

The Emerald ash borer is a significant threat to Connecticut's forests.

QUICK SUMMARY:

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



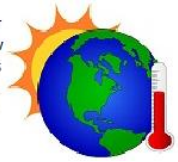
The Emerald ash borer attacks ash trees almost exclusively. In Connecticut, ash trees make up just slightly less than three percent of the trees in the forest, most of which are white ash. The loss of ash trees in a forest stand also reduces vital habitat and allows undesirable invasive plants to fill 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. Additional information about the emerald ash borer in Connecticut can be found on DEEP's website or at www.emeraldashborer.info.

Technical note: Invasive species have been identified as the cause in decline of at least 48 percent of species listed as threatened or endangered under the United States Endangered Species Act.

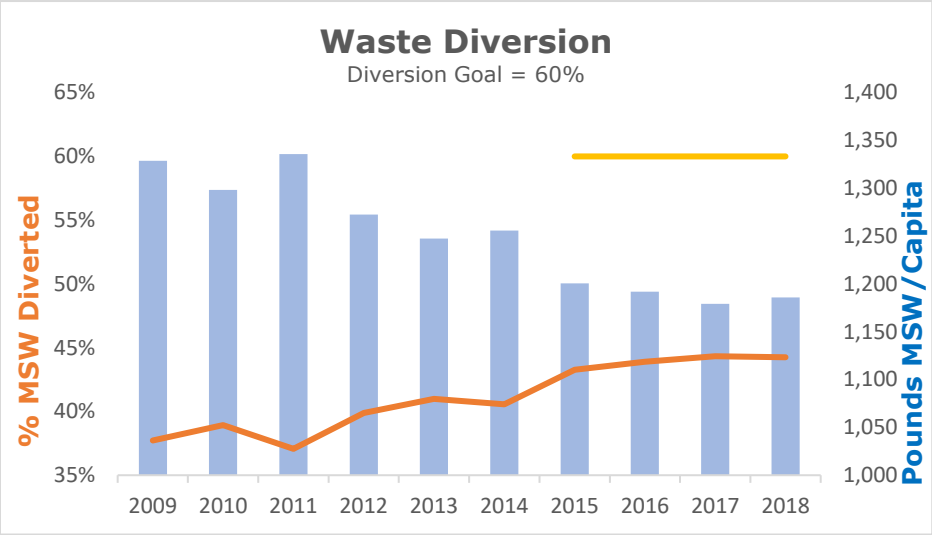
Waste Diversion

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

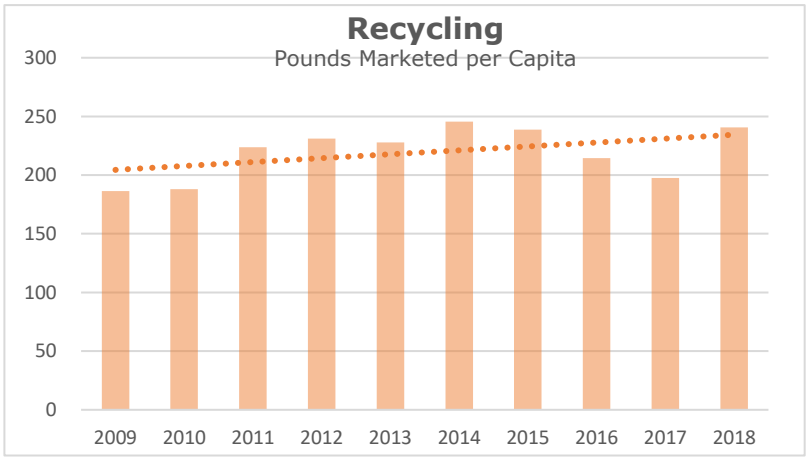
Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information



In 2018, an estimated 1.7 million tons (44.2 percent) of solid waste was diverted from disposal. At the current rate, Connecticut will not achieve its goal of 60% "diversion" by 2024.



With adoption of An Act Concerning Connecticut's Recycling and Materials Management Strategy in 2014 (Public Act 14-94**), Connecticut set a challenging goal for itself to achieve by 2024: divert 60 percent of municipal solid waste (MSW) from disposal**. Diversion" includes 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. According to DEEP's Comprehensive Materials Management Strategy, revised and adopted in 2016, one path to achieving the 60 percent diversion goal will be to boost recycling to 45 percent; however, this may be challenging without 1) additional public education on recycling, source reduction, and composting and 2) markets for the recyclable materials. The Strategy also identifies tactics to divert an additional 15 percent to get Connecticut to its goal of 60 percent diversion. Yard and food waste can be composted or even converted to fuel, as can agricultural waste. Waste can be avoided altogether through more efficient packaging.



In 2018 (most recent data available), approximately 430,000 tons of bottles, cans and paper was recycled. Bottles, cans, and paper make up the majority but not all of the material recycled in 2018. A 2015 study commissioned by DEEP found that about 16 percent of the material in Connecticut's garbage was readily recyclable but did not find its way into recycling bins. Some types of waste can be handled through programs established by the industries that produce the products. Connecticut requires producers to establish opportunities for consumers to return electronic equipment, mattresses and unwanted paint for recycling, and sees potential for more product take-backs. The effectiveness of the existing programs was evaluated in 2016.

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 goal adopted by Public Act 14-94 has been codified in Section 22a-241a of the Connecticut General Statutes. Estimated "Diversion" based on 2005 Baseline of 3.8 million tons.

Personal Impact*

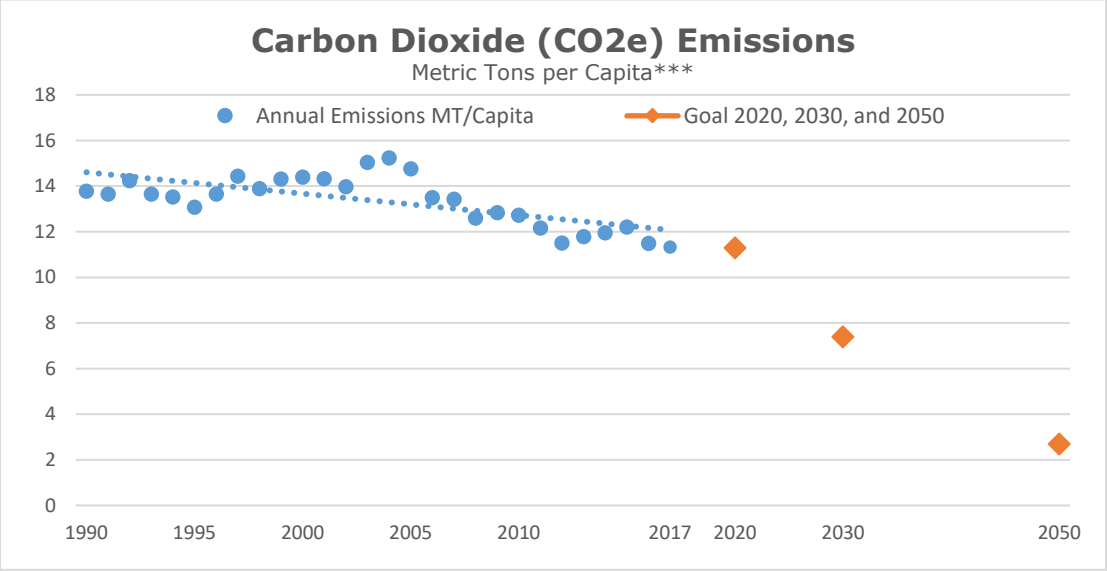
Climate Changers

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 have been on track to meet short term goals. Long term goals are more challenging.



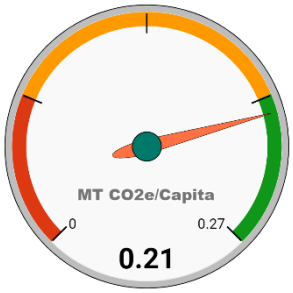
Connecticut residents remain on track to meet the 2020 goal for carbon dioxide emissions despite seeing rising per capita emissions from 2013 through 2015. The total average amount of greenhouse gases (GHG or CO_2e)** emitted by each person in Connecticut from the combustion of fossil fuels decreased in 2017 (most recent data available) from 2016 (a reduction of 1.5 percent). Early in 2016, transportation (primarily the combustion of gasoline and diesel fuel in vehicles) overtook power plants as the largest source of carbon dioxide emissions in the United States. 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 have been adjusted to account for the growth in population that is projected for 2030 and 2050. Many 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.

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) will monitor progress and make recommendations to reduce state-wide GHG emissions.

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

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



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. *** For display purposes, the X axis on the chart is not to scale.

Personal Impact*

Electricity at Home and Work

QUICK SUMMARY:

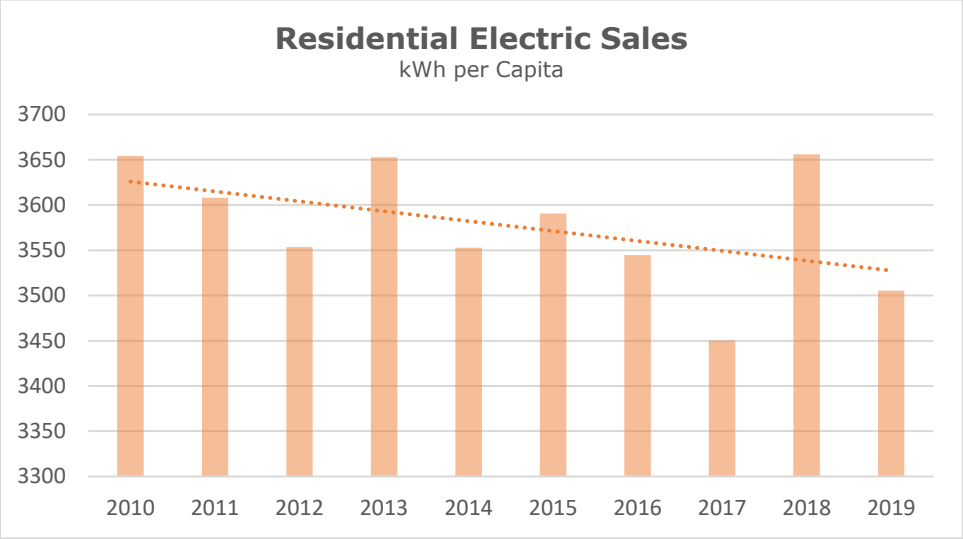
✓ COMPARED TO LAST REPORT

✓ 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

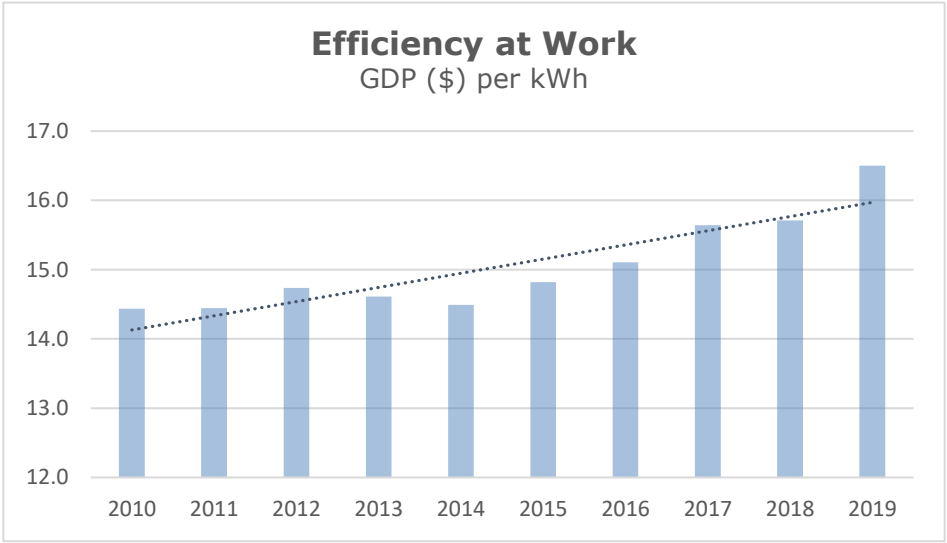
The average Connecticut resident's electric consumption decreased in 2019 to 3,505 Kilowatt-hours (kWh)/capita from 2018's high of 3,656 kWh/capita.



In 2019, Connecticut's residential sector consumed approximately 12.5 billion kWh. Approximately half of Connecticut's electricity generation comes from nuclear power and renewables; the remainder is generated primarily by fossil fueled power plants. The use of fossil fuels for electric generation increases air pollution, especially from marginal units used to meet peak demand. Conserving electricity can reduce peak demand which reduces air pollution and increases energy reliability. In 2019, average per capita consumption of electricity decreased for the residential sector in Connecticut. The decrease in 2019 came in a year with 21 days with temperatures greater than 90°F, compared to 26 days with temperatures greater than 90°F in 2018. 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.

Connecticut's commercial and industrial sectors are using electricity more efficiently in 2019

In 2019, Connecticut's commercial and industrial sector consumed approximately 15 billion kWh. Connecticut's 2019 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 $249 billion** Connecticut's economy continued to use electricity more efficiently to produce goods and services than in 2018 and the 10 year average.



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. ** Seasonally adjusted 2012 chained dollars.

Personal Impact*

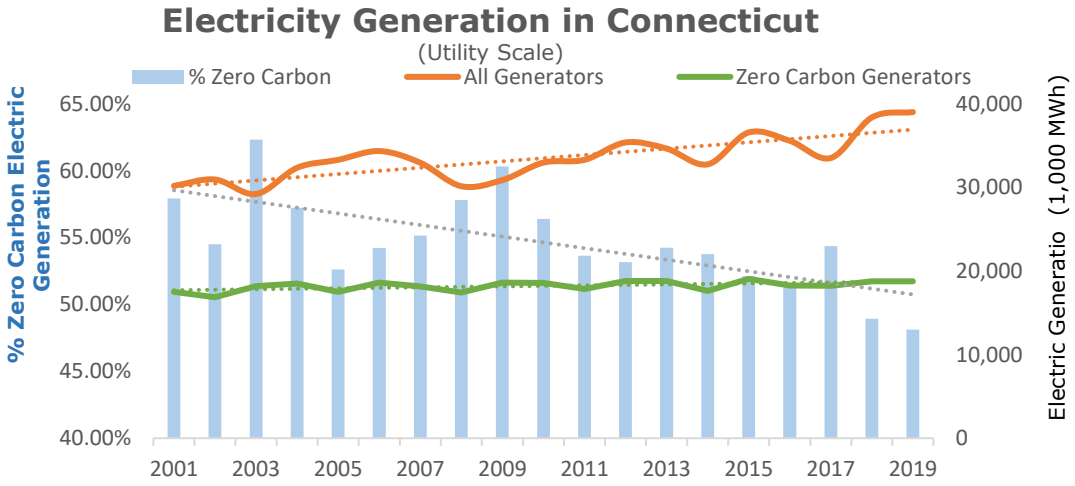
Zero-Carbon Energy

QUICK SUMMARY:

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

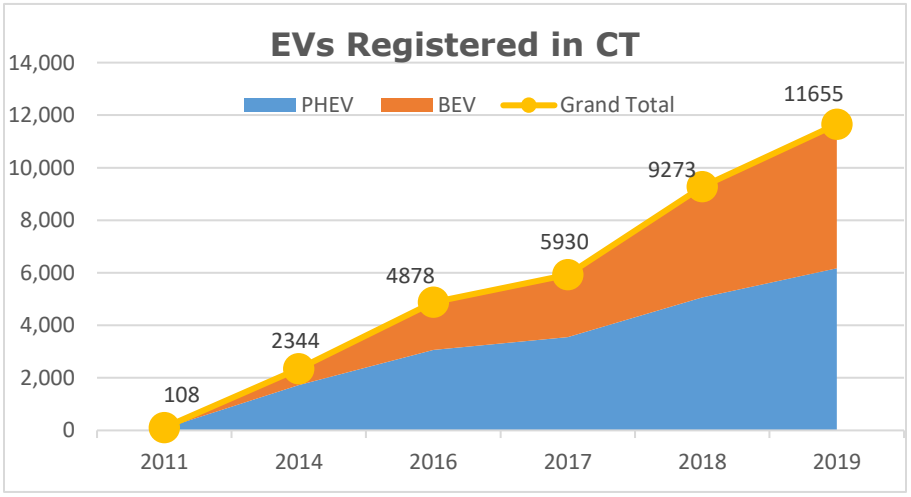
Move your cursor over the globe to learn how climate change affects the data on this page, or click on it for more detailed information

Connecticut aims to be 100 percent zero carbon for the electric sector by 2040, but the percentage of electricity from zero carbon sources has been declining.



On September 3, 2019, Governor Lamont issued Exec. Order No. 3 that seeks to address climate change adaption and resiliency, and calls for DEEP, in consultation with 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 (left), the percentage of zero carbon electric generation** in the state has decreased while total electric generation has increased. Connecticut is barely half way to the target for 100 percent zero carbon generation and projected increases in electric demand and the possible retirement of one of the Millstone units by 2040 will make achieving the 100 percent zero carbon target very challenging.

Significant reductions of carbon emissions are also acheivable by reducing the combustion of fossil fuels in the transportation sector, which will likely be achieved by increased fuel efficiency 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), and fuel cell electric (FCEV) vehicles. Electric drive vehicles currently account for less than one percent of all passenger vehicle registrations.



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 19.5 percent in 2019 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. 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. *** "Green" hydrogen refers to the production of hydrogen from sources other than fossil fuel.

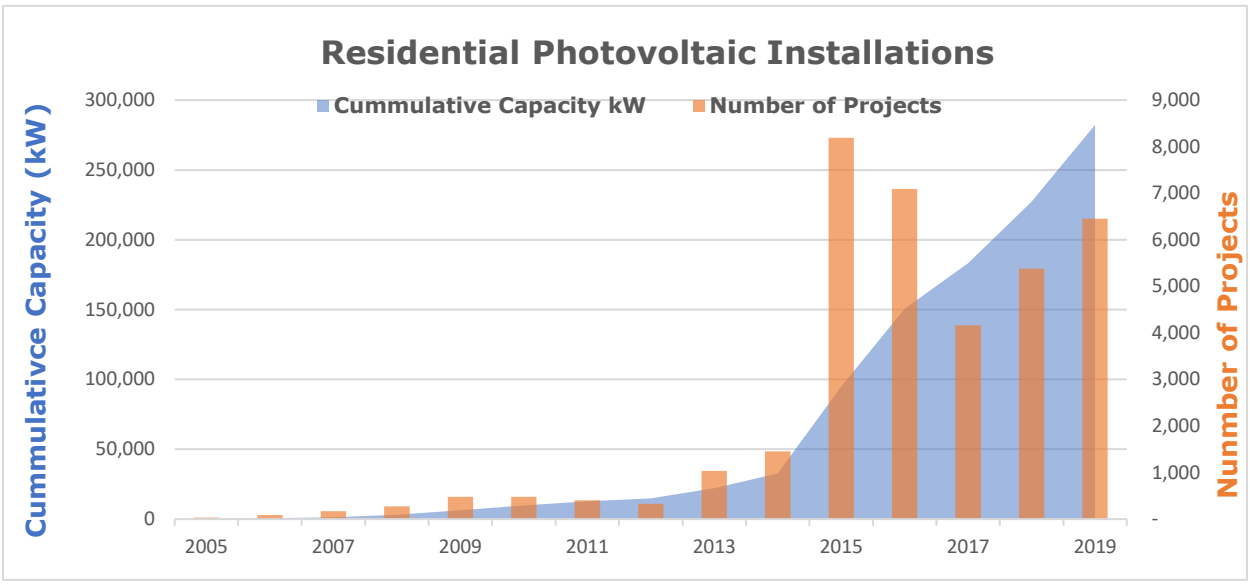
Solar Photovoltaics

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 2019, the amount of solar photovoltaic (PV) installations in Connecticut increased over the 2018 installations and the 10-year average.



Thousands of Connecticut homes now use the sun to generate much of their own electricity. In 2019, 6,452 residential solar PV systems were installed with a total capacity of 55,029 kilowatts (kW). The highpoint for residential solar PV installations came in 2015 (8,191 installations). Through the end of 2019, the total number of approved residential solar PV projects in the state had exceeded 36,000 projects with a total capacity of more than 282 megawatts (MW). The U.S. Department of Energy (Form EIA-861M) identified approximately 512 MW of PV capacity in the state through 2019, which includes commercial solar PV systems. The New England ISO projects that approximately 1,200 MW of solar PV capacity may be installed over the next 10 years.

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 electric power with zero emissions – no air pollution, wastewater, or noise. The 512 MW of installed PV capacity in the state in 2019 is calculated to produce approximately 600,000 megawatt-hours (MWh) per year, which is calculated to potentially displace annual CO_2 emissions by 167,000 tons. However, an issue with land-based solar PV installations is the impact such development has on farmland, forests, shrublands, and the species that inhabit these ecosystems. 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. The Council evaluated the impact of PA 17-218 in 2019 and found that, consistent with the intent of the legislation, DEEP had enhanced their consideration of the environmental impacts of renewable energy proposals received in response to their solicitations and the Connecticut Siting Council is now formally assessing the impact of certain solar PV proposals on prime farmland and core forests during their deliberations.

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.

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.

Personal Impact*

Transportation

QUICK SUMMARY:

X COMPARED TO LAST REPORT

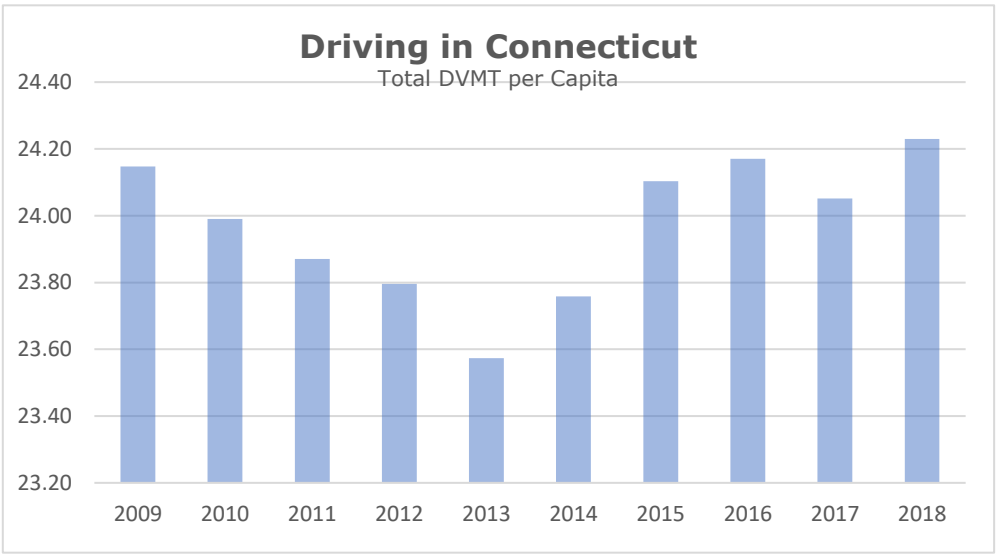
X COMPARED TO 10 YR. AVERAGE

— 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

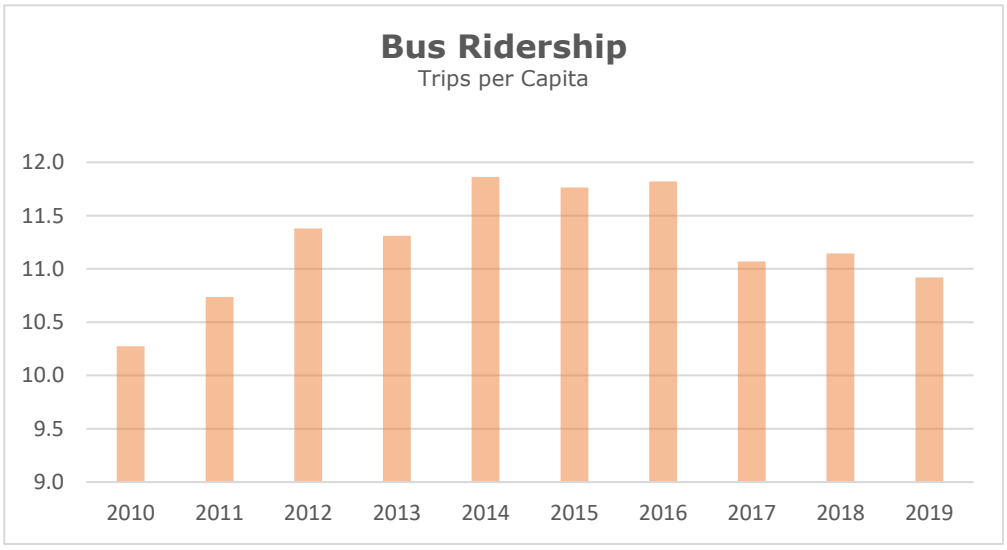
Transportation contributes 38 percent of Connecticut's economy-wide greenhouse gas emissions.

Driving: The recent trend of driving more continued through 2018 (most recent data).



Through 2013, the daily vehicle miles travelled (DVMT) by the average Connecticut resident was on a steady decline. The drop in driving was likely attributed to the great recession and mirrored the national trend. As residents drove less, gasoline consumption decreased and pollution was reduced. Since 2014, the DVMT has generally been increasing, which is consistent with the reduction in bus ridership depicted in the chart below.

Ridership: People got on the bus less often in Connecticut in 2019.



In 2019, ridership on fixed route, commuter, and ADA transit services declined to the lowest ridership numbers since 2011. In 2019, the passenger trips** per capita value was 10.9, which is approximately three percent lower than the 10-year average. 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 could include success in ride sharing efforts and the fact that gasoline prices have stayed well below the highs of some previous years.

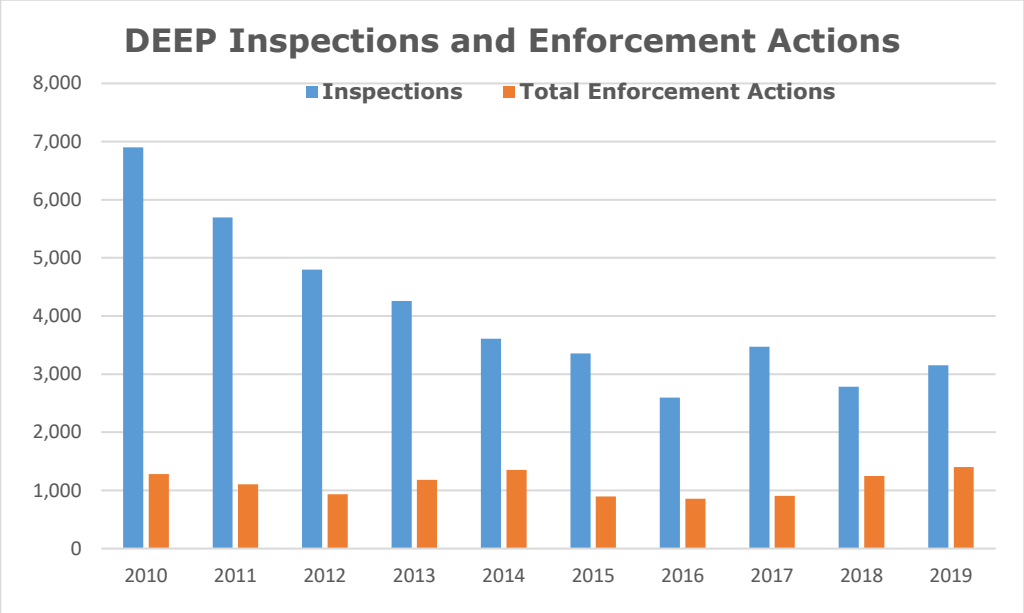
Technical Note: * Personal Impact indicators illustrate trends in behavior or practices that can be expected to influence the condition of tomorrow's air, water, land and wildlife.

Compliance

QUICK SUMMARY:

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

While inspections have decreased since 2010, the ratio of enforcement to inspections has increased.



In the 2019 Federal Fiscal Year (FFY 2019), there were 3,151 inspections performed by DEEP; an increase from the 2,784 inspections completed in FFY 2018. However, the number of DEEP inspections was approximately 30 percent less than the 10 year average of 4,493. The Council examined the relationship between inspection frequency and violations and discovered that while the number of inspections has dropped dramatically since FFY 2010, the ratio of enforcement actions to inspections has increased. In FFY 2019, approximately 45 percent of all inspections resulted in an some type of enforcement action, which could include "Informal Enforcement Actions", consisting of Notices of Violation (NOV), Notice of Non-Compliance (NON), and warning letters; "Orders"; and "Referrals" to the EPA, Attorney General, and/or Chief State's Attorney.

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 FFY 2019, Informal Enforcement Actions outnumbered Orders and Referrals combined by a factor of more than 10.

The Council's review of the NOVs issued in FFY 2011 found that the largest portion were related to violations of laws pertained to the storage or distribution of petroleum, and most of the NOVs were aimed at reducing the pollution from spills, discharges, leaks, etc.

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 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 the most 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.

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. A 2015 paper published in the Proceedings of the National Academy of Science examines "contribution of air conditioning adoption to future energy use under global warming". As global temperatures go up, people may use air conditioners more. This creates a feedback loop of increased warming and increased air conditioner use leading to more electricity demand, more emissions and consequently, more warming.

Renewable energy is one of the most effective tools against climate change. The sun provides a tremendous resource for generating clean and sustainable electricity without toxic pollution or global warming emissions. Solar panels do not release any emissions as they generate electricity. Emissions are released during the manufacturing, transportation, installation, maintenance, operation, and demolishing of these solar energy systems; while these emissions are minimal in comparison to emissions created by burning petroleum or coal, they reinforce the point that efficient use of electricity is warranted, regardless of its source. Wasted electricity always has impacts.

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 dioxide. However, other effects of a warmer climate, such as more pests, droughts, flooding, changes in atmospheric carbon dioxide and ground-level ozone concentrations will be less beneficial for agriculture. It is also noted in one report published by the U.S. EPA that warmer temperatures cause cows to eat less and produce less milk, negatively affecting agriculture: "that could reduce the output of Connecticut's $70-million dairy industry, which provides 13 percent of the state's farm revenue."

Forest Birds and Grouse: 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. Increased frequency of droughts and extreme storm events may inflict higher mortality during the breeding seasons.

Climate change has led to declines in forest bird species that are closely associated with the ruffed grouse. This habitat loss will continue to reduce grouse populations overtime. Adequate snow cover can also be important for overwinter survival in grouse populations, as they burrow into deep snow during cold winter periods. Warming temperatures will likely change the quantity and characteristics of snow, making snow roosting more difficult for the grouse.

Good Air Days: The number of days with bad air is directly related to the number of days when the high temperature exceeds 90 degrees (F.), primarily as a result of the chemistry of ground-level ozone. Also, the extra use of air conditioners on hot days leads to more pollution from power plants. Connecticut is forecast to see more hot days as the earth's average temperature increases. Unless summertime emissions of air pollution are reduced, the number of bad air days is likely to increase. The correlation between hot days and bad air, especially in urban areas, is explained more fully in a document prepared by the U.S. EPA.

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. Invasive species are well adapted to thrive in environments with high resource availability, predicted under climate change scenarios. Climate change will in many cases lead to a future of warmer temperatures and increased carbon dioxide availability, allowing some species to invade new environments. Research has shown that some invasive species show a greater response to increased carbon dioxide than non-invaders. In addition, invasive species have short life spans, strong dispersal abilities and high environmental tolerances, all of which lead them to adapt to rapid changes.

Lobsters: There has been a significant decline in the lobster population in Long Island Sound since 1999. 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 the Sound such as the presence of insecticides. Scientists did not detect pesticides in lobsters collected in 2014, leaving the warming waters as the most likely problem for Connecticut's lobster.

Piping Plovers: Coastal-nesting birds such as the Piping plover are among the species most threatened by climate change. Rising sea levels will 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.

Forests, farmland and other natural habitats are estimated to absorb more than 11 percent of the nation’s carbon dioxide emissions. Land conservation offers a double benefit for the climate: it helps absorb greenhouse gases and it prevents significant GHG emissions that would result from development. In addition, research is showing that visiting a forest has real, quantifiable health benefits, both mental and physical.

Rivers and Streams: Rivers and streams are affected greatly by fluctuations in precipitation and evaporation patterns around the world. 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. Warming temperatures are altering the water cycle and shifting precipitation patterns. 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. It goes without saying that rising levels of pollution, whether from too much or too little precipitation, will create a major strain on any ecosystem that relies on the freshwater provided by streams, rivers, and lakes, threatening the survival of many fish, plant, and wildlife species.

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. Over the past 50 years, the amount of rain falling during very heavy precipitation events has increased for most of the United States. 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, into the atmosphere. Both nationally and in Connecticut, the transportation sector is the greatest contributor to climate change. Increased utilization of zero emission vehicles will reduce greenhouse gas (GHG) emissions associated with the combustion of fossil fuels.

Warming and Rising Waters: 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. This much rise in water level is likely to have devastating effects on local coastal communities and ecosystems. The average number of warm-temperate fish species has increased significantly while the average number of cold-temperate species in Long Island Sound has decreased significantly. Many factors affect the number of species in the Sound and their abundance, and although the composition of the finfish community is changing in favor of species tolerant of warming temperatures, the overall diversity in the Sound remains high.

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. Temperature is an integral component of how ecosystems and organisms generate hypoxic conditions. 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. As temperatures increase, some marine animals require more, not less, oxygen to survive. In addition, the earlier arrival of summer results in the earlier development of hypoxia and the expansion of hypoxic environments. 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.

Activities of the Council in 2019

Research and Reports

The Council published the *Environmental Quality in Connecticut* annual report in May, 2019. This year, the Council reformatted its annual report and continued to develop new indicators to assess the ecological health and environmental quality in the State. For the first time in many years, bats and turtles were reorganized into a new page on species of special concern 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.

The Council published a report "Fuel for Thought" on the environmental issues associated with releases of Number 2 fuel oil at residential properties in the state. Unfortunately, over the last 10 years, there have been approximately 8,900 reported releases of home heating oil in the state. The Council analyzed DEEP's spills and response data, assessed the potential for future releases, and identified recommendations that could be employed to: 1) reduce the number of fuel oil releases in the state, and 2) provide a mechanism for homeowners to voluntarily secure insurance that may cover most of the remediation costs of a fuel oil release.

Advice to Other Agencies

Council staff reviewed six Environmental Impact Evaluations and 14 scoping notices prepared by other agencies, and submitted comments when deemed appropriate. The regulations for implementation of the Connecticut Environmental Policy Act were revised and adopted on September 9, 2019. These revised regulations were reviewed by the Council and included new categories of public notice in the *Environmental Monitor*. To implement the revised CEPA Regulations, new categories that were created in *Environmental Monitor* to better inform the public, including a notice for more time for Post-Scoping Notices, an agency's Record of Decision, and OPM's Determination of Adequacy for state projects. A project cancellation notice was added to inform when a project was dropped from active status by a State agency.

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

- PFAS Task Force Draft Action Plan;
- Draft Revisions to the Remediation Standard Regulations (RSR);
- DEEP's 20BY20 Initiative; and
- Public Utilities Regulatory Authority (PURA) Docket No. 19-01-25 - PURA 2019 Biennial Report To The General Assembly Concerning Its Review of Each Electric Distribution Company's Vegetation Management Practices.

The Council also reviewed 14 applications or petitions to the Connecticut Siting Council and commented on six.

The Council also commented on the potential environmental consequences of utilities' vegetation management plans, proposals by DEEP to improve efficiency and transparency, a proposed sewer extension in a rural area, DEEP's proposed revisions to its remediation standards, and the 2019 PFAS Action Plan.

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 2019 report, *Fuel For Thought*, on the problem of home heating oil spills.

In 2019, staff investigated numerous complaints, including on-going air pollution violations in Stamford, potential soil contamination in Fairfield, leaking heating oil tanks throughout the State, the tree removal policies of utilities, Japanese Knotweed along State highways, PFAS spills into the Farmington River, a demonstration project to deal with agricultural waste in Torrington and the quality of the water in a stretch of the Quinebaug River.

The Council regularly engages with state agencies including the Department of Energy and Environmental Protection, the Department of Public Health, the Department of Transportation, the Office of Policy and Management, the Department of Agriculture, 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.

Council Members

Susan D. Merrow, Chair
Resident and former First Selectman of East Haddam. Member, East Haddam Conservation Commission; Board Member, Eightmile River Wild and Scenic Coordinating Committee; Former President, Connecticut Conference of Municipalities; Former President, National Board of Directors, Sierra Club; Author, One for the Earth: Journal of a Sierra Club President; Board Member, Connecticut League of Conservation Voters; and former Trustee, Connecticut River Watershed Council.

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. Board Member, 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

2020 is the 50th anniversary of Earth Day. The Council acknowledges the contributions of environmentalists that have worked tirelessly to improve the quality of life for all species on earth. Specifically, the Council acknowledges the founder of Earth Day, Gaylord Nelson, then a U.S. Senator from Wisconsin. Senator Nelson announced the idea for a "national teach-in on the environment" to the national media; persuaded Pete McCloskey, a conservation-minded Republican Congressman, to serve as his co-chair; and recruited Denis Hayes from Harvard as national coordinator. On April 22, 1970, 20 million Americans took to the streets, parks, and auditoriums to demonstrate for a healthy, sustainable environment in coast-to-coast rallies.[1]

Since 1970, there has been significant improvement in air and water quality, the populations of certain species, and general awareness regarding the effects of human activities on the natural environment. However, there are still many challenges to be overcome including: climate change, deforestation, habitat destruction, species loss and extinction.

The Council appreciates the assistance of the many people in the Departments of Agriculture, Energy and Environmental Protection (DEEP), Transportation, and Public Health and the Connecticut Siting Council who, annually, provide data for this report. The advice and assistance of DEEP's technical staff and of Connecticut Interactive were essential in the creation of the interactive, online version of this 2019 Annual Report.

As Earth Day's 50th anniversary approaches 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. Former member of the Council, Attorney Janet Brooks, proposed the idea of focusing much of the report on the environmental accomplishments and disappointments of the decades since 1970. The Council is appreciative of the work of Brigitte Vossler, the Council's intern from Trinity College, who collected data that is referenced in the Report's text. Lastly, the Council is grateful for the service of its Chair, Sue Merrow, who is soon to resign from that position and who, in the tradition of its many previous Chairs, provided wise guidance and inspirational leadership.

Image Credits: The "warming earth" symbol used to denote indicators affected by climate change was created by the Council. The images of the Ruffed Grouse, Box turtle, Blue-winged Warbler, Piping Plover, Eagle, and Osprey were obtained from Paul Fusco and the DEEP website. The image of the Asian tiger mosquito on the Invasive Insects page was provided by Susan Ellis. The image on the cover is of Kent Falls State Park in Kent and was provided by Paul Aresta. The Council greatly appreciates their generosity in allowing the use of these excellent images in this report.

[1] https://www.earthday.org/about/the-history-of-earth-day/