Environmental Quality in Connecticut 2013

May 2014

Welcome to *Environmental Quality in Connecticut*. This edition explores the condition of Connecticut's environment through 2013.

Clear trends in Connecticut's air, water, land and life are highlighted in "Progress and Problems." The 30 indicators that depict environmental conditions over the past ten years are summarized in "2013 At a Glance."

Regular readers of these annual reports will notice significant changes in content and format.

This report will be updated as new data become available. Sign up for e-alerts if you wish to be notified of updates.

The Council on Environmental Quality welcomes your interest, along with any questions, comments or suggestions you might have.

STATE OF CONNECTICUT

COUNCIL ON ENVIRONMENTAL QUALITY

May 21, 2014

The Honorable Dannel P. Malloy
Governor of Connecticut
State Capitol
Hartford, CT 06106

Dear Governor Malloy:

This is the Council's report to you on the condition of Connecticut's environment during 2013, which I am pleased to submit.

As always, the report's conclusions are drawn from a set of 35 environmental indicators. For this edition, the Council made several significant changes in content and format, described in "New in This Edition."

In "Progress and Problems," the Council draws several clear conclusions from the indicator data:

- Connecticut residents breathed their cleanest air in decades, which in part was a consequence of driving less, taking public transportation more often and using electricity more efficiently. Those same changes in their daily lives also helped to keep the state on track toward its goals for reducing emissions that contribute to climate change. (Throughout this report, you will see an enhanced focus on numerical goals and "goal tracks.")
- In contrast to their steady progress in clearing the air, Connecticut residents still are not on track toward their goals for conserving land, especially at the state level.
- The rate of compliance with environmental laws, as measured by the percentage of inspections that found no violations, declined to its lowest level. More than a thousand violations were found and cited. Is enforcement more efficient or are violations rife, or are both true? The report recommends further inquiry.
- Global climate change promises to make Connecticut's environmental challenges more difficult. Warmer summers, higher waters and more intense rainfall all will require Connecticut to work even harder to meet its goals for air quality, water quality and the conservation of fish and wildlife.

The broad prescription for a cleaner and more conservation-oriented Connecticut is still greater energy efficiency, better development patterns, and investment in basic conservation and restoration services. Later in the year, the Council will submit specific recommendations for improving Connecticut's environment based on the data in front of you.

This report also calls attention to the long-standing problems of archaic information systems and insufficient data. The state's progress on several fronts simply cannot be measured and reported.

The Council looks forward to providing you with any additional information or assistance that you might request.

Respectfully submitted,

Susan D. Merrow

Chair

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Improvements and Declines: 2013 at a Glance

A Note About the Role of Climate Change in Connecticut's Progress

This symbol of an overheating globe appears next to indicators that are influenced significantly by global climate change. Higher summertime air and water temperatures and more intense rainfall are countering residents' continuous efforts to improve their environment. Faced with these climate trends, Connecticut will need to take more corrective actions just to maintain current conditions and even greater actions to make genuine progress toward its goals.

This page is a summary. Details can be found on individual indicator pages. To go directly to any indicator page, please click the corresponding "GO" arrow.

Indicator	2013*	Ten-Year Picture 2004 - 2013*	On Track?
 **Good Air Days** GO	**344** Good Air Days Improved from 2012	**341** Good Air Days in Average Year	
 **CEQ Air Pollution Index** GO	**27.15** Index Value Improved from 2012	**32.83** Index Value in Average Year (Smaller = Better)	N.A. (No goal set) **Trend is Good**
Preserved Land (State Land Only) GO	**467** Acres	**610** Acres Preserved in Average Year	
Forest GO	No New Data	Core Forests Declining	N.A. (No goal set)
Farmland GO	**1170** Acres	**1106** Acres Preserved in Average Year	
Inland Wetlands GO	No New Data		

Continued on next page

Improvements and Declines: 2013 at a Glance (continued)

Indicator	2013	Ten-Year Picture 2004 - 2013*	On Track?
 **Coastal Beach Closings** GO	**2.8** Days Improved from 2012	**3.7** Days Closed in Average Year	
 **Piping Plovers** GO	**90** Birds Slight decline from 2012	**85** Nesting Birds in Average Year	 Goal is 60
 **Life & Depth of Long Island Sound** GO		**Change:** Warm-water fish in. Cold-water fish out. Water rising.	
 **Pollution and Water Quality in the Sound** GO	**92** Percent Improved from 2012	**84** Percent of Sound with Adequate Oxygen in Average Year	
 **Rivers, Streams, & Floods** GO	No New Data	Improvement slow. Floods higher.	
Bald Eagles GO	**58** Birds Improved from 2012	**30** Nesting Birds in Average Year	
Drinking Water GO	**99.8** Percent	**99.6** Percent of Public Water Meeting Standards in Average Year	

Continued on next page

Improvements and Declines: 2013 at a Glance (continued)

Indicator	2013	Ten-Year Picture 2004 - 2013*	On Track?
Human Health GO	**1** CT's Rank Among 50 States for Breast Cancer Incidence	**2000** Year Breast Cancer Trend Turned from Bad to Good	N.A. (No goal set) **Trend is Good**
Turtles GO	**Data are not Annual**		✗
Driving Our Cars GO	**23.8** Miles (2012) Improved from 2011	**24.4** Miles Driven Per Resident in Average Year (Smaller = Better)	N.A. (No goal set) **Trend is Good**
Taking the Bus GO	**11.4** Trips (2012) Improved from 2011	**10.3** Bus Trips Taken Per Resident in Average Year (Larger = Better)	N.A. (No goal set) **Trend is Good**
Compliance GO	**72** Percent Declined from 2012	**86** Percent Compliance Rate in Average Year	✗
Recycling GO	**No New Data**		✗
Climate Changers GO	**9.8** Tons (2011) Improved from 2010	**11.3** Tons of Carbon Dioxide Emitted Per Resident in Average Year	✓
Electricity GO	↓↑ Mixed Results	Most Trends Positive	?

*For a few indicators, the most recent data are from a year other than 2013, and the ten-year picture covers a slightly adjusted time period because of limits on data availability.

Progress and Problems

A few trends are clear.

Some trends are unknown because of deficient data.

Clear Trends of 2013

 Residents are driving less, taking the bus more often and using electricity more efficiently. Such actions are among the reasons that Connecticut residents breathed air in 2013 that was, on average, the cleanest it has been in decades. (The number of bad air days, however, changed but a little; the persistence of bad air days even as overall air pollution declines is a "pollution paradox" that is described in last year's report.) Connecticut also is on track to meet its goals for reducing the pollution that contributes to climate change. The beneficial changes in the pattern of daily life in Connecticut are illustrated in the Personal Impact category of this report.

 In contrast to their steady progress in clearing the air, Connecticut residents still are not on track toward their goals for conserving land, especially at the state level. (They might be on track at the local level, but there is no way to find out.) This deficiency is not self-correcting; getting back on track will require substantial state commitment to land conservation.

 Compliance with environmental laws is at an all-time low, as measured by the percentage of inspections by state inspectors that found no violations. More than a thousand violations were found, the most in more than a decade. The Council cannot be certain of the reasons for this apparent downturn in compliance; it could be the statistical product of a smaller Department of Energy and Environmental Protection (DEEP) focusing its attention on business sectors where violations are rife (much as a smaller police force might concentrate highway patrols where speeding is known to occur most frequently). Another possibility is the diminishing chance of being caught: fewer inspections were conducted last year than in any year since 1990.

Much enforcement was aimed at preventing future spills and discharges, especially of petroleum. This work is important but generally does not influence the status of today's environment and the indicators in this report. The exact relationship of enforcement to compliance and environmental quality is a subject for future investigation.

 Global climate change promises to make Connecticut's environmental challenges more difficult. Warmer summers, higher waters and more intense rainfall all will require Connecticut to work even harder to meet its goals for air quality, water quality and the conservation of fish and wildlife. Using the overheating globe image, the summary page highlights the many indicators that are affected significantly by a changing climate.

What to Do

The broad prescription for a cleaner and more conservation-oriented Connecticut has not changed much from last year:

- investment in the basics of sewage treatment, land conservation, parks and other essential services,

- more efficient and technologically-advanced heating and cooling equipment and vehicles,
- better patterns of land development and transportation, including a strategy for dealing with the rising Sound, and
- restoration of rivers, wetlands, parks, trails and greenways by state and local governments as well as nonprofit organizations and heroic individuals.

The Council submits its specific recommendations each year as a separate document.

The Unknown

State agencies historically have invested too little in data collection and maintenance. A combination of archaic information systems and too-few staff has made it impossible to assess how well or poorly the state is doing in several important ways. Nobody can tell, for example, how much land has been preserved, what percentage of garbage was recycled last year, or how many acres of inland wetlands were affected by development.

The third example (inland wetlands) illuminates the data problems particularly well. Even though every municipal inland wetlands agency is required to file a report to DEEP on every permit or other action, the data are not readily available. Paper forms must be transcribed by DEEP into an aging database format. Errors are common at every stage of the process. Neither the Council nor the public has access to the database. Data must be obtained by asking the sole staff person in that section of DEEP. For this year's report, the Council reviewed the most recent wetlands data available, which are from 2011, and determined that they do not paint an accurate picture of wetland impacts across the state.

During the past year, the Council reported a similar pattern in other data-collection programs, including those for pesticides and alternative sewage treatment systems. Permit holders are required to submit periodic reports, but there is insufficient staff to read the reports or take action when the reports fail to come in.

Before reviewing...

...the 35 indicators in this report that describe the status of Connecticut's environment, readers might find it useful to learn about some changes introduced in this edition (described on the next page).

New in This Edition

Changes in Content

The Council is reviewing and revising its set of annual environmental indicators.

Among the changes underway is an overhaul of the human health indicators. As the review continues, the human health indicators in this year's report remain unaltered but they have been put in a new category called "Resident Health."

Trend information for other resident species also is being expanded. Resident Health will include indicators of the health of some wildlife populations that in turn reflect ecological conditions. The status of resident turtle populations has been added this year, and there are plans to add bats and others.

In addition to the wildlife populations being added to the Resident Health category, trend data and information for even more species appear on the pages that depict trends in their habitats. The Forest page now includes data on forest bird populations, and information about the chimney swift, a bird that lives mainly in the air, appears on the Good Air Days page.

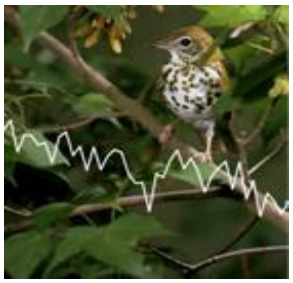
Information has been added to illustrate the expanding influence of climate change on Connecticut's environmental conditions. Photographs of higher, more frequent floods, for example, can be found on the newly-christened Rivers, Streams and Floods page.

Changes in Format

Building on the new chart format introduced last year, the Council will find several improvements:

- **The Ten-Year View:** Most indicator charts now display trends that look back ten years. Previous editions showed progress (or lack of it) over 30 years or longer. This change will help the reader to understand what is happening in Connecticut now rather than in the distant past. There are exceptions to this new rule, such as forest acreage data which are only available at five-year intervals.
- The curious and scholarly can always find the older trends by looking at the environmental quality report for 2012 or an earlier year.
- **Goal Lines and Goal Tracks** -- Goal lines have been added to show how close the state is to its goals. For goals that include a specific date for attainment, "goal tracks" have been added to indicate whether or not the state is on track to meet its goals.
- **Two Versions -- Gold and Iron**: You are reading the "iron" version. The charts are static but, unlike in the "gold" version, they can be copied or printed.

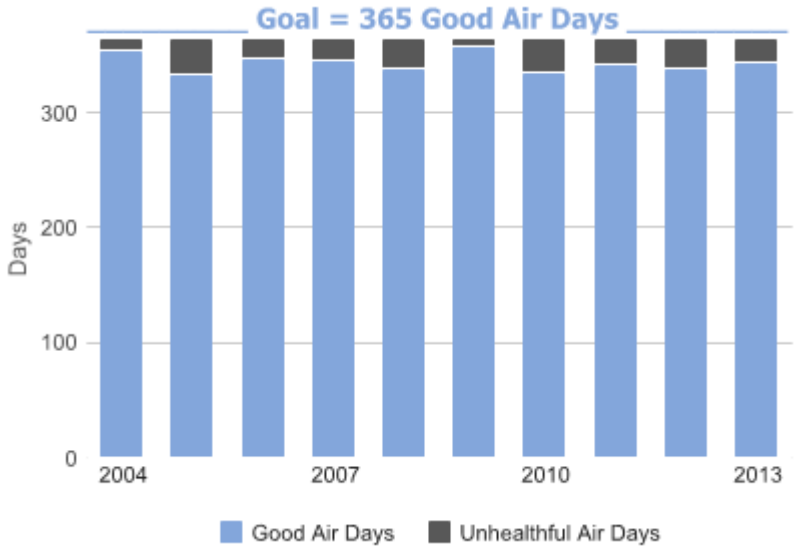
  In the gold version, which is best viewed on a desktop or laptop computer, the values of the data points appear as the cursor is moved over them. These data always have been available upon request, but now they are available instantly. The gold version charts cannot be printed, however.
- **More gauges:** For some indicators, the rate of activity -- land protection and recycling are two examples -- is critically important. The Council has added gauges to those pages that depict the current rate vs. the rate needed to reach the state's target.
- **Summary Page**: Overhauled.
- **Updates:** The Council published this report in May before some data for 2013 were available. The report will be updated as data are added. Sign up for e-alerts (specifically for "publications") to be notified when changes are made.



Good Air Days

2013 Data Improved

There were 344 days in 2013 when every Connecticut resident breathed good air, six more than in 2012.



The chart shows that there were 344 days in 2013 when every Connecticut resident breathed good air, which is six more than in 2012 and three more than the ten-year average.

Most of the 21 days of 2013 when state residents breathed unhealthful pollution occurred during hot weather in late June and July. Levels of ground-level ozone (see below) generally are higher during hot weather. As the climate warms, Connecticut will have to reduce pollution just to maintain current air quality, and reduce it even more to achieve the goal of healthful air every day.

A Good Air Day is a day when every monitoring station in the state records satisfactory air quality. "Satisfactory air quality" is defined here as air that meets the health-based ambient air quality standards for all of the following six pollutants: sulfur dioxide, lead, carbon monoxide, particles, nitrogen dioxide and ground-level ozone.

Connecticut's goal is to have air that meets health-based standards for all six pollutants. Violations of health-based air quality standards have been eliminated for four of the six pollutants, leaving ground-level ozone and fine particles as the problems.

Ground-level Ozone is created when nitrogen oxides and organic compounds in the air react in the presence of sunlight. Weather is a big factor in year-to-year fluctuations. Motor vehicles remain a major source of ozone-forming emissions despite improvements in tailpipe standards. Much of Connecticut's ground-level ozone originates in states to the west. Unless emissions in those states are reduced substantially, the trend on the chart above, which shows little change over ten years, could continue indefinitely.

In typical years, cities and towns in coastal regions of the state see the most bad ozone days. In 2007 and 2009, however, inland towns had more. The normal pattern returned in 2010 through 2013 with coastal towns suffering the most bad ozone days. In 2013, the Westport area saw the most days (11) when ground-level ozone concentrations violated the standard, and the Cornwall region the fewest (2).

Fine particles, such as those found in smoke and haze, are 2.5 micrometers in diameter and smaller. These particles can form when gases emitted from power plants, factories and automobiles react in the air. Violations of the health standard occur mostly in summer and winter, rarely in spring and fall. Most of Connecticut meets the health standard for fine particles, as the technical details of that standard allow the air in the state to exceed the numerical limit for a few days each year and yet remain in compliance with the standard. Connecticut did not see *any* violations of the fine-particle standard in 2012 but saw four in 2013 (mostly in the Danbury and East Hartford areas).

Technical Note: The federal government modified the standards for fine particles in December 2006 and for ground-level ozone in early 2008. The chart above was redrawn each time to illustrate the state's historical pattern of good air days by applying the new, stricter standards to all previous years. The federal government is again reviewing the standards for particles and ground-level ozone.

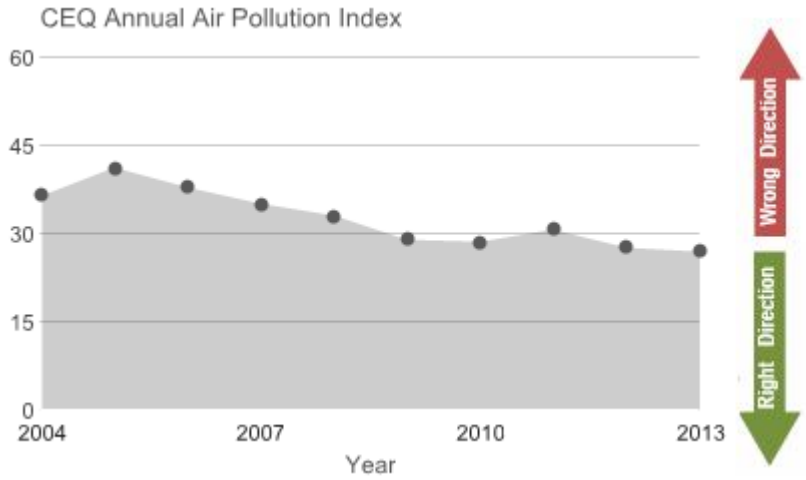
Something Else in the Air

The sight of hundreds of chimney swifts swirling into the chimney of the Willimantic Town Hall on a summer evening is a cause for celebration. The chimney swift is one of several bird species that feed entirely on the wing, devouring insects and spiders high in the air. Unfortunately, swifts and other "aerial insectivores" are in a long-term decline. One hypothesis for the decline: the insects that sustain the birds are not as numerous as they once were, or perhaps not as nutritious. Could pesticides or other contaminants be the problem? Read more about the ecology of the air in the Connecticut Audubon Society's State of the Birds report for 2013.

CEQ Annual Air Pollution Index

Average Levels of Air Pollution

Air quality was better in 2013, both in the number of days with healthful air and in this measure of average pollution levels.



The chart shows the average level of pollution in Connecticut's air for each year.

In 2013, there was less pollution in Connecticut's air, on average, than in any previous year since monitoring began in the 1970s. Levels of all pollutants except nitrogen dioxide improved.

Five air pollutants -- sulfur dioxide, carbon monoxide, particles, nitrogen dioxide and ground-level ozone -- are measured across the state by DEEP. At the end of every year the Council calculates the average level of each pollutant on a numerical scale where zero equals no pollution and 100 would represent the "unhealthful" level of the specified pollutant. The Council takes this annual number for each of the five pollutants and averages them to yield the single index value on the chart.

Lead is Out

Until 2012, this indicator charted the combined average level of six pollutants, not five as it now does. The sixth pollutant was lead. In the early 1980s, lead was a serious problem, but unleaded gasoline and other advances have reduced lead levels dramatically. Levels of lead have dropped so low that in recent years they barely registered in this indicator. By removing lead from this indicator, the Council is declaring victory on behalf of Connecticut residents. (Lead still is monitored by DEEP, so it can be brought back into this indicator if levels rise unexpectedly in future years.)

Technical Notes

Several changes were made to this indicator for 2012 and again for 2013:

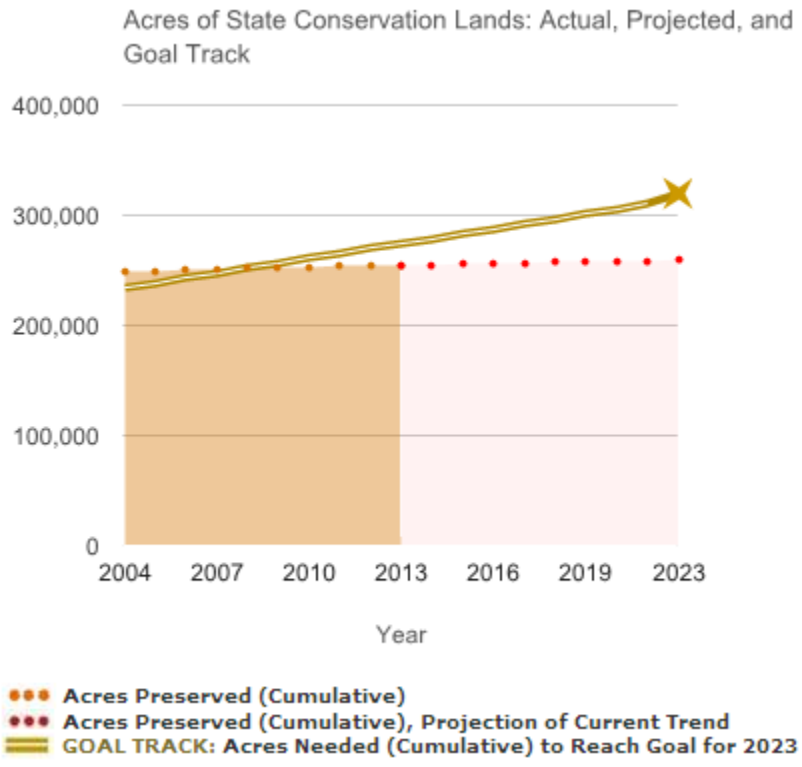
2012: The level of particle pollution now reflects only small particles (known as $PM_{2.5,}$ or particles 2.5 microns or smaller), whereas prior to 2012 it used to include larger particles (PM_{10}). The smaller particles are regarded by scientists as being more injurious to human health. As always, all previous years' index data were recalculated to be consistent with current measures.

2013: The federal government recently changed the health standard for sulfur dioxide. The annual average, previously used in this indicator, was eliminated. To relate pollution levels to the new standard, this indicator now uses an average of maximum (actually 98th percentile) daily sulfur dioxide measurements from each monitoring station. This new value emphasizes the acute effects of sulfur dioxide more than the chronic effects. A parallel change was made to the nitrogen dioxide values. As always, the index value was recalculated for all previous years; as a result, the index values increased for all years. For this particular indicator, however, the actual index values are less important than the direction of the trend.

Preserved Land

Connecticut set two land conservation goals for 2023:

- **State lands**: State parks, forests, wildlife management areas and other state-owned conservation lands shall constitute 10 percent of Connecticut's land area. Progress toward this goal is not on track, with 341 acres preserved in 2012 and 467 acres in 2013 (see chart below).



- **All conservation lands:** Land conserved by towns and cities, the state, land trusts and other nonprofit organizations and water utilities shall constitute 21 percent of Connecticut's land area. Nobody knows what that total is today.

State law sets a goal of conserving 21 percent of Connecticut's land area. The Green Plan, Connecticut's official land conservation plan, establishes 2023 as the target date. That goal includes conservation land owned by towns and cities, land trusts and other nonprofit organizations, water utilities and the state.

The same law sets a goal (10 percent of Connecticut's land area, or about 320,000 acres) for state ownership of land for parks, forests and wildlife areas. Records of state-owned lands are accurate and are charted above (top chart). From 1990 to 2004 (not shown), the state acquired about 3,500 acres each year, on average, but the pace of acquisition has slowed since then. To meet its own goal (the gold star on the top chart), Connecticut now will need to acquire about 6,500 acres per year, a rate that actually was exceeded from 2000 through 2004.

State grants helped municipalities and land trusts acquire an additional 1,068 acres in 2013. Many additional acres are preserved each year by municipalities and land trusts without state grants, but that information is not reported to the state. The Council determined that previous state estimates of the acreage owned by municipalities and nonprofit land trusts were inaccurate. Those estimates, which were reported in some previous editions of *Environmental Quality in Connecticut,* are no longer included in this report.

The absence of an accurate inventory of protected land in Connecticut is a serious deficiency. DEEP has been collecting data from municipal records in a sequential fashion for 12 years; if that effort is ever completed, the earliest-collected data will be well out of date. To make land preservation more strategic and cost-effective, Connecticut needs a reliable and up-to-date registry of the protected lands. An Act Concerning the State's Open Space Plan, adopted in 2012, should eventually lead to an accurate inventory of preserved lands.

How the Goal Track is Calculated

The State of Connecticut has been acquiring land for parks, forests and wildlife conservation for more than a century. In 1997 and again in 1999, it committed itself to the goals stated above. For the state itself, this meant acquiring another 104,000 acres to reach the goal of 321,000 acres (or 10 percent of the land within Connecticut's borders) by 2023. Achieving this goal would have required Connecticut, beginning in 1999, to acquire about 4,500 acres per year (on average), a rate that is depicted as the "Goal Track" on the top chart. Because the state has fallen below the Goal Track, it now will need to acquire about 6,500 acres per year.

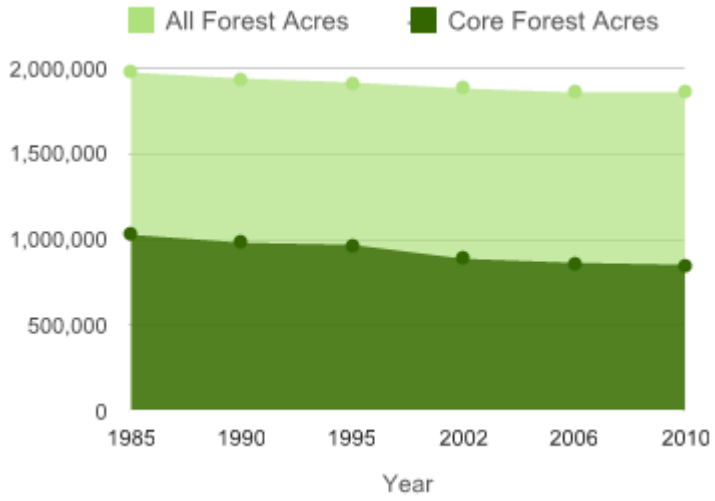
Current Trend vs. the Goal Track

Average Annual Rate of State Land Acquisition Since 2004

Average Annual Rate of State Land Acquisition Needed to Reach Goal

Forest and Forest Birds

After a century of growth and relative stability, Connecticut's forests -- especially the most valuable core forests -- have been shrinking for three decades.



This indicator shows the total acreage of forests in Connecticut. The forests are divided into core forests and other forests. Core forests are defined as being at least 300 feet from non-forest development such as roads, buildings and farms. Core forests provide habitat for many species of native forest wildlife that cannot tolerate significant disturbance. In contrast, forests that are fragmented or divided by roads and buildings serve some forest purposes but are not fully-functioning forest ecosystems. Fragmented forests are known to provide substandard 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 frequently appear in the wake of activities that fragment the forests.

Even as the total acreage of forests might fluctuate over years or decades, the extent of core forests will always show a decline, except in rare instances where roads or developments might be abandoned and reclaimed by forests.

Recent Trend

Not much forestland was lost between 2006 and 2010 (the most recent data available), presumably because of the downturn in real estate development. However, core forest acreage continued to shrink, indicating that, as noted above, even minimal development can disrupt a core forest and cause it to lose its "core" status.

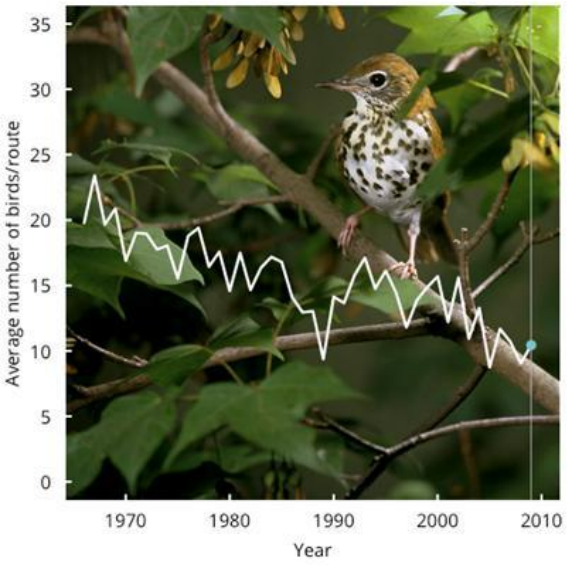
The Long View

Most of Connecticut's forests were cleared for agriculture and to fuel industry in the 19th century; the decline of farming and wood-fuel consumption allowed the forests to regenerate. From 1960 to 1980, the overall acreage of forest did not change much even with the rapid spread of roads, housing and

commercial development. According to the U.S. Forest Service, the spread of forests on abandoned farms equaled the conversion of forested land to other uses. The late 20th century brought a change; as the chart above shows, forest acreage is now declining.

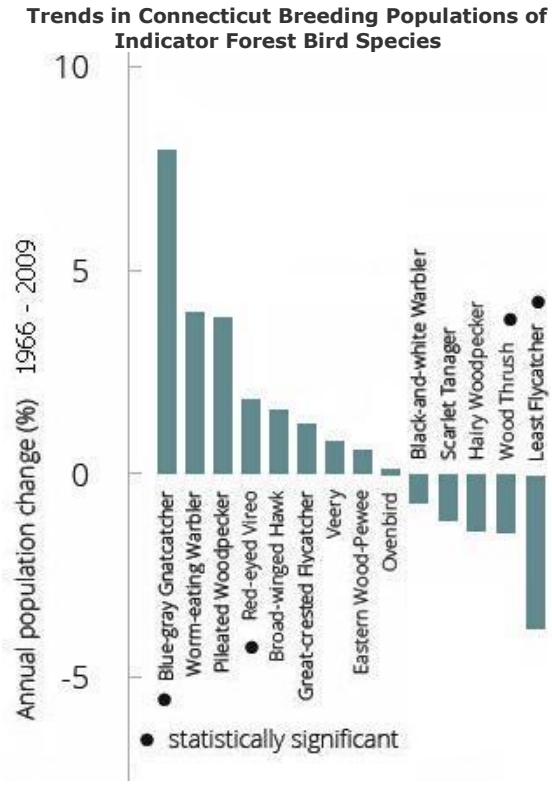
Birds as Indicators of Forest Health

The wood thrush is heard more often than seen, but is not heard as often as it once was. Researchers at the University of Connecticut analyzed and published trend data for many of Connecticut's breeding birds, including the wood thrush, shown here:



(Field, C.R., Elphick, C.S. 2012. CTBirdTrends)

Separately, a committee of experts (see technical notes, below) identified a group of bird species that, along with the wood thrush, can indicate the ecological health of Connecticut's forests. The breeding bird data for those species yield two striking conclusions.



First, several woodland bird species have declined significantly since 1966, but several others have increased or held steady, suggesting that the health of mature deciduous forests might be stable (see graph at left).

(The species with the extraordinary increase -- the blue-gray gnatcatcher -- is a southern species that has been expanding its range northward. The other species are historically native to this area.)

Second, the species judged to be good indicators of young forests and "shrublands" are down across the board, some of them by a lot (see graph at right).

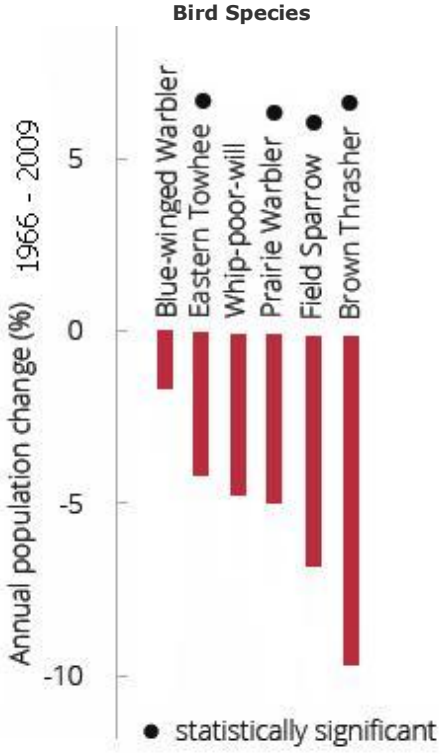
Future Council reports will highlight changes in these bird populations and what those changes tell us about Connecticut's forests.

Technical Notes: The definition and measurement of core forests is done by the Center for Land Use Education and Research (CLEAR) at the University of Connecticut as part of the Connecticut's Changing Landscape Project. The Council finds these data, derived from CLEAR's analysis of satellite imagery, to be the most accurate data available. Satellite data is examined by CLEAR every few years; this indicator includes the most recent data available (2010).

The bird trend data are published at CTBirdTrends.

The lists of indicator bird species were developed by the Forest Ecosystem Health Committee of the Connecticut Forestlands Council and published as Appendix 4 of Connecticut's Forest Resource Assessment and Strategy 2010-2015. That committee developed a list of indicator bird species for each of the different types of forests, and the Council selected the lists for deciduous forests -- by far the most common type of forest in Connecticut -- and young forests/shrublands.

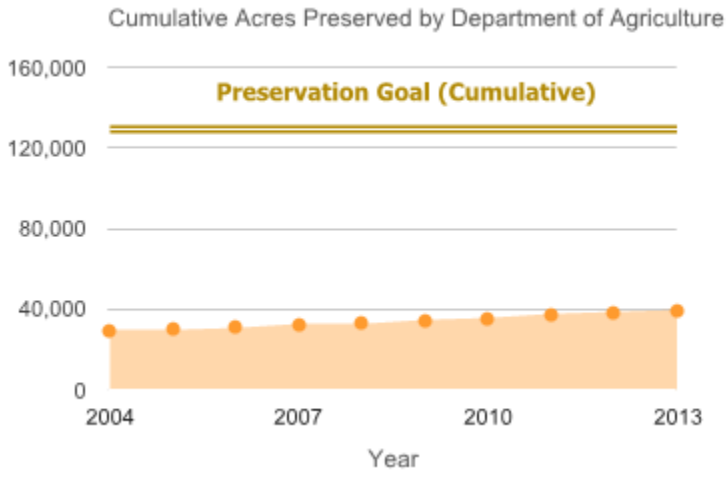
Trends in Connecticut Breeding Populations of Indicator Young Forest/Shrubland Bird Species



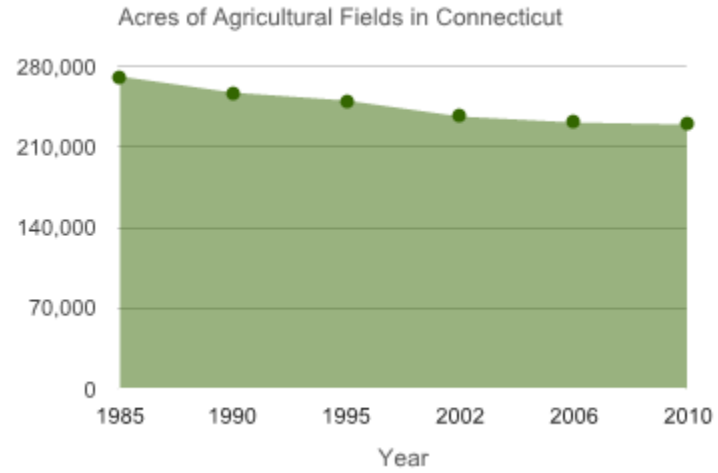
Farmland

Not On Track

Connecticut preserved 1170 acres of agricultural land in 2013, which was better than 2012 (675 acres) but down from 2011 (1,975 acres).



Farmland loss slowed considerably between 2006 and 2010 (the most recent data available):



The top chart shows the cumulative acreage preserved by the Connecticut Department of Agriculture since the program's inception in 1978. The bottom chart shows the total area of land used for crops and pasture in Connecticut.

To preserve land for future agricultural use, the Connecticut Department of Agriculture purchases the development rights to farmland from volunteer sellers. This keeps the land in private ownership with restrictions on future nonagricultural development. More than 1,300 acres were preserved each year from 2009 through 2011. In 2012, six farms participated, preserving 689 acres. The Department of Agriculture attributes the 2012 drop, in part, to the start-up of two new programs: the Farmland Restoration Program and the Community Farms Preservation Program. In 2013, Connecticut was unable to take full advantage of federal funding for farmland preservation. Most preservation funds are from state bonding and the Community Investment Act.

The lower chart shows that less farmland was lost between 2006 and 2010 (the most recent data available) than in prior years, presumably because of the downturn in real estate development associated with the recessionary economy.

This indicator does not show agricultural land acquired for preservation by municipalities and nonprofit organizations. Several towns purchased farms in recent years with no state assistance, and those acres are not reported or recorded at the state level. Along with a central registry of preserved open space, Connecticut needs a registry of preserved farmland to help state agencies and other organizations preserve land strategically.

Technical Note: Until 2008, the lower chart above showed the total acreage of land in Connecticut farms as counted by the U.S. Department of Agriculture (USDA) using survey data. The Council has found a superior data source in the University of Connecticut's Center for Land Use Education and Research (CLEAR). CLEAR staff analyzes satellite imagery to measure the actual area of fields, pastures, orchards and vineyards. In contrast, the USDA data counted all land in farms, even that which was not used for agriculture. CLEAR analyzes new satellite imagery every few years; the most recent imagery is from 2010.

What is the Source of the 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 Department currently is evaluating its statewide plan and goal.

Current Trend vs. the Goal Track

Average Annual Rate of Farmland Preservation Since 2004

Average Annual Rate of Farmland Preservation Needed to Reach Goal

Projections of the current preservation rate show the goal being reached in the 22nd century, but in reality there will not be that acreage of agricultural land remaining in the state by the end of the current century if the rate of loss continues as it has for most of the past five decades. Preservation of at least 2,000 acres annually should result in success; the gauge on the right, above, is based on that 2,000-acre annual minimum rate required for eventual success.

Data Problems

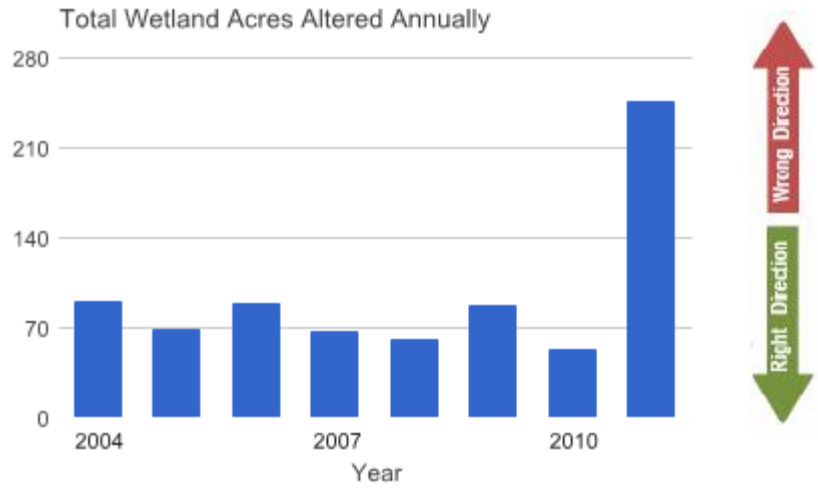
This indicator illustrates the hazards of long-term underinvestment in information systems. Since 1989, municipal wetlands agencies have been required to report all permit approvals to DEEP. Such abundant data should enable state government to measure the effectiveness of inland wetland laws, regulations and, especially, municipal training programs. Yet the most recent data available are from three years ago. For reasons described below, data from previous years are imprecise.

The apparent spike in wetland disturbance in 2011 is due to two large vegetation and wildlife management projects within wetlands, not to actual wetlands destruction. The Council could remove those projects from the data, but the many other projects included in the data have not been scrutinized for their actual impact. By now, data collection, which still relies on paper forms, and data storage and availability should be electronic.

Inland Wetlands

Latest Data Declined

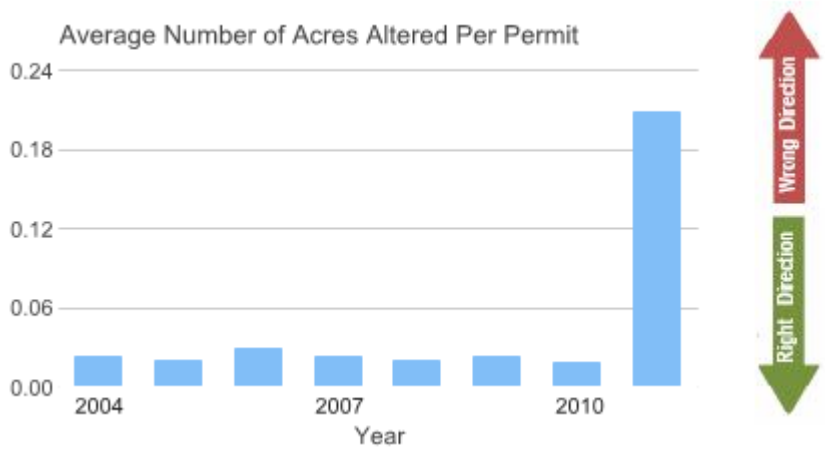
Between 50 and 100 acres of inland wetlands were altered by permitted projects each year since 2004. The sudden spike of 2011 includes two large wildlife and invasive vegetation management projects within wetlands.*



The **top chart** shows how much wetland alteration has been permitted each year by DEEP and municipal wetlands agencies. Alteration can range from total destruction (when the wetlands are filled and built upon) to conversion from one type of wetland to another (when, for example, a shallow swamp is dredged to create a pond).

In 2011 (the most recent data available), approximately 200 of the altered acres were from two reported projects: invasive plant eradication within a wetland and removal of beaver dams in another.

There is no specific goal for statewide wetlands conservation and regulation.



The **second chart** shows the area of inland wetlands affected by the *average* permit issued by municipalities and DEEP. In general, municipal agencies – which issue about 95 percent of all inland wetlands permits in the state with little or no oversight by DEEP – have become more conserving of wetlands in recent years.

According to the statistical analysis reported in the 2008 CEQ special report *Swamped*, the completion of wetlands training programs is the single biggest factor that explains why some municipal agencies are more protective of wetlands than others. The long-term trend toward less wetland impact probably can be attributed to completion of training by more municipal agency members and staff.

***Technical Notes**

1. The data for the top two charts are imprecise. Municipal wetlands agencies use paper forms to submit their reports of permit decisions to DEEP, where the data from those thousands of forms are transcribed into an electronic database. The public does not have access to the database, nor does the Council. Errors are common until DEEP audits the reported data, generally years after they are submitted. In the interim, the Council works with DEEP staff to eliminate the most obvious errors in each year's data. Data from before 1994 cannot be checked in a systematic way. Though 2011 saw some large projects to remove invasive plants and beaver ponds, the Council cannot be confident of the magnitude of the spike in the 2011 data.

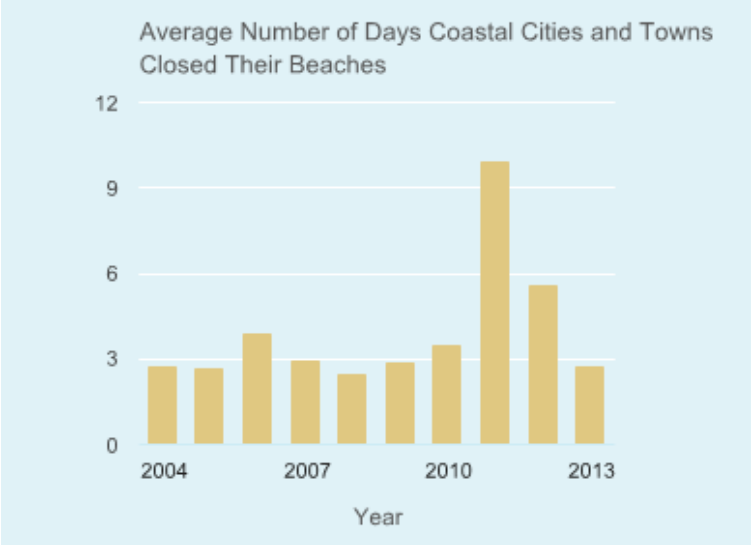
2. The Council adjusts the aggregate data in the top chart to account for the many cities and towns that do not submit required reports to DEEP. A simple extrapolation is sufficient, because the Council determined in 2008 that nonreporting towns did not differ significantly from reporting towns in their wetlands permitting activity.

3. The per-permit indicator of the second chart was added several years ago to show results of wetlands regulatory activity in a way that does not fluctuate with the economy (as the top chart might be expected to do). However, in 2012 the Council determined that during the recent recession the *nature* of wetland permit applications changed significantly, not just the total number. During the recession, very small projects such as residential decks and house additions constituted a greater portion of the total permit number. Those small projects generally cause less disturbance of wetlands than new housing subdivisions or large commercial projects. To keep the per-permit indicator meaningful across years, it now includes only the permits issued for larger projects such as subdivisions, commercial developments and municipal and utility projects. As it always does when it makes such changes, the Council recalculated the values for all previous years using the new criteria.

No Swimming at the Shore

2013 Data Improved

Coastal cities and towns closed their beaches on fewer days than in most recent years.



The Council adds up the number of days that each coastal city and town closed one or more of its public beaches, and calculates an average for all the cities and towns with beaches.

Because the bathing season is approximately 100 days long, the number of days shown on the chart above also equals the percentage of the bathing season when beaches are closed.

The cities and towns on the western half of the state's shoreline usually have a higher frequency of closings, and 2013 was no exception. Cities and towns near the western sound have more sewer systems with overflows and more paved surfaces that send contaminated runoff into the waters.

Yearly variations are products of rainfall patterns and unusual incidents such as sewer-line ruptures. The storms of 2011 (including Tropical Storm Irene) resulted in many closings, as many beaches were awash in debris, contaminated runoff and raw sewage.

Polluted surface runoff& and sewage overflows after rainstorms are the most common sources of bacteria. After heavy rains, health officials must assume that polluted runoff and/or overflow from combined sanitary/storm sewers have raised bacteria levels. Though beaches are regularly monitored for bacteria, test results are not immediate. More closings are initiated preemptively, as a precaution after heavy rain, than are initiated due to actual monitoring results. As a result, this indicator is not a perfect indicator of environmental pollution, as it changes with the weather; it still is useful, however, because it also changes with increases and decreases in discharges of untreated sewage.

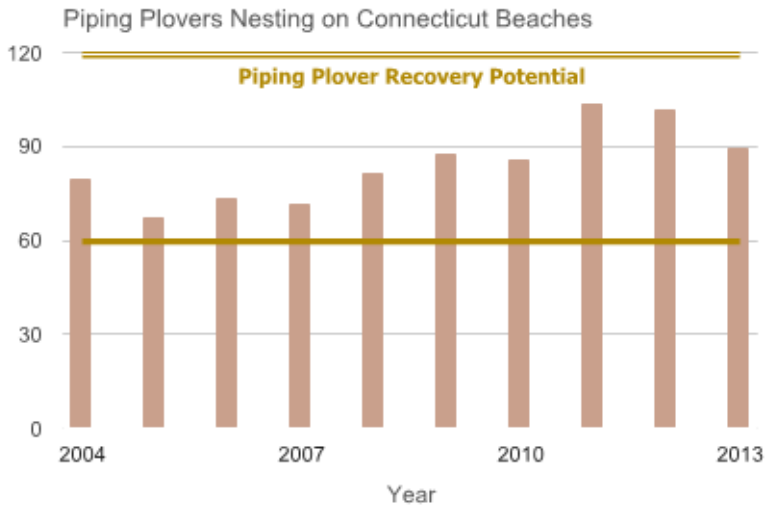
The water is tested at beaches from Memorial Day through Labor Day. At other times, the water could be clean or contaminated. Most sewage treatment plants along the coast disinfect their routine effluent discharges all year, but most treatment plants north of I-95 do not disinfect their effluent before May and after September.

Connecticut's goal is to eliminate beach closings caused by discharges of untreated or poorly treated sewage, a common cause of elevated bacteria levels.

Piping Plovers on the Beach

2013
Data
Declined

The number of plovers was down in 2013, but the ten-year trend for these threatened shorebirds has been positive, staying above the original recovery goal of 60 birds.



Piping plovers are small shorebirds that nest only on sandy beaches with sparse vegetation. Human intrusion, storm tides and predators frequently destroy nests.

Although the number of plovers on Connecticut's beaches now exceeds the initial recovery goal set in 1986, the species continues in threatened status at the state and national level.

Nesting adults are counted (and in most cases protected) every spring by hundreds of volunteers working with the Audubon Alliance for Coastal Waterbirds. The protections afforded these plovers benefit other species, including American oystercatchers and least terns, which also are threatened species in Connecticut. 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*)

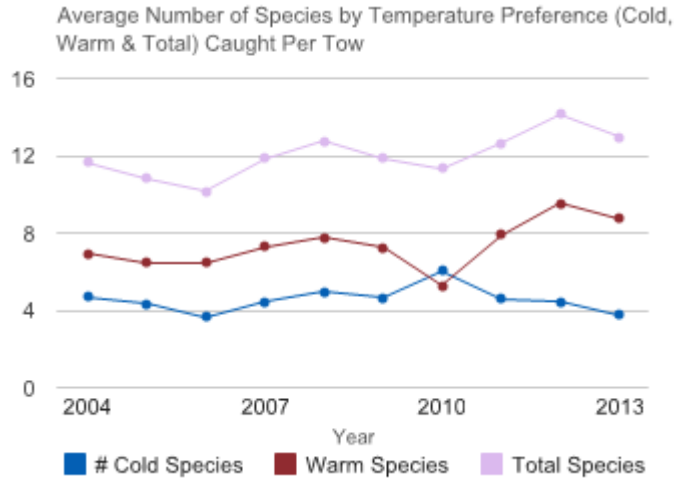
Since protection and monitoring efforts began in 1984, nesting success has improved, resulting in more returning adults in subsequent years.

The damage from Hurricane Sandy in October 2012, which rearranged many of the beaches where plovers and other shorebirds usually nested, is suspected as one cause of the decline of 2013.

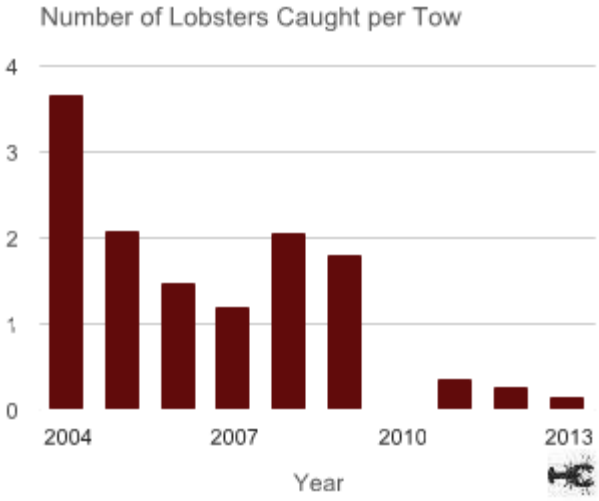
The Goal for Piping Plovers: When the federal government listed the piping plover as a threatened species in 1986, Connecticut was home to an estimated 40 nesting adults. The entire population inhabiting the Atlantic coast from Canada to North Carolina was estimated to number about 1,600. An initial recovery goal was set for Connecticut at 60 birds (and 2,400 birds over the plover's entire Atlantic coast range), a level that Connecticut has maintained every year since 2001. The federal government reviewed the goal in 1996 and revised the overall Atlantic coast goal upward to 4,000 birds; New England's share of the newer target is about 1,200 birds. At that time, scientists estimated Connecticut to have habitat for at least 120 nesting birds (depicted above as the "recovery potential"). The breeding population of Massachusetts has been so successful since then that New England's overall goal has been met. Connecticut, though it does not have a new state-specific goal based on the 1996 revision, still has a way to go to fulfill its potential.

Life and Depth of Long Island Sound

Life in the Sound is changing. Fish species from warmer regions are becoming more common as species adapted to cold water become less common. The water is warming and rising.



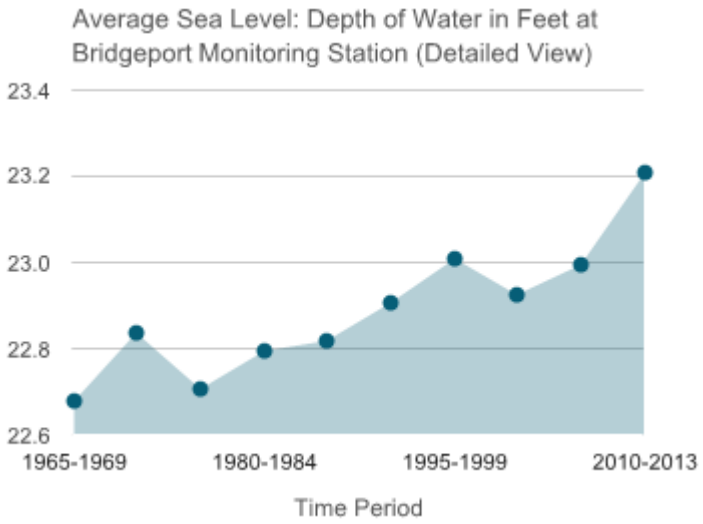
The lobster population of Long Island Sound has failed to recover.



DEEP surveys marine fish, squid and lobster populations every spring and fall by towing nets from a research vessel. The top graph shows the number of fish species caught during the spring survey. The well-documented trend toward species that favor warm water is apparent.

The second chart shows the number of lobsters caught in the average tow during the fall survey. The number caught in 2013 was the lowest ever. The steep decline of recent years is the nadir of a well-documented, decade-long decline in the lobster population that also is evident in a dramatic drop in commercial lobster landings during the same period (not shown). Throughout the 1990s (not shown on the chart), researchers generally caught between seven and eleven lobsters per tow, with a spike to nearly 20 in 1997. Researchers are focusing on a combination of four possible causes for the dramatic downturn in lobster populations since 1999: disease, changes in water quality, changes in climatic conditions and human impacts to the Sound. Research to date suggests that a trend toward warmer water temperatures is an important factor in the decline.

The average temperature of surface water in Long Island Sound has been rising. When the surface water is much warmer than the deep water during the summer, hypoxia is likely to be a problem. The chart below shows the increase in the mean sea level since 1965. The rate of rise has increased in recent years. Residents of the shoreline are well aware of the rising water level, and scientists have predicted that sea level along the northeast coast of North America will rise faster than seas worldwide.



The changes in marine life, temperature and sea level are signs of a warming Sound. The Long Island Sound Study is working on a "sentinel" monitoring strategy that will track changes in the Sound related to climate change. If successful, that strategy will help Connecticut residents understand the changes in the Sound more fully. In the meantime, change is ongoing and Connecticut will need to pay close attention, as gradual change can become sudden change.

Technical Notes

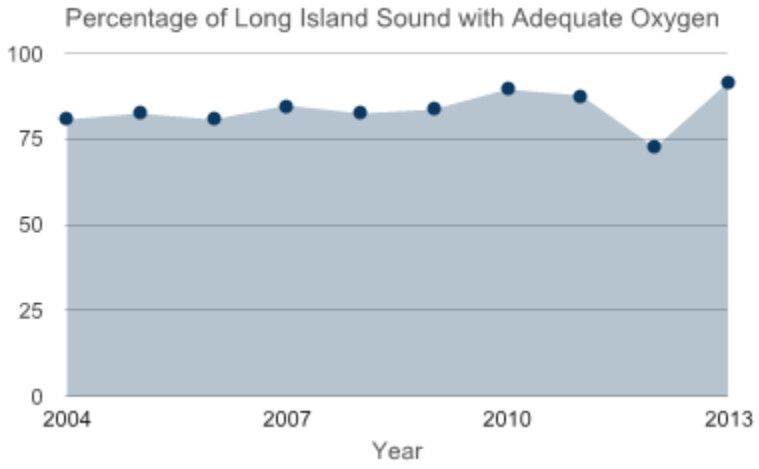
1. The cold-adapted species shown on the top chart are those that prefer water temperatures below 60 degrees Fahrenheit. The warmer-adapted species prefer water ranging from 55 to 72 degrees Fahrenheit.

2. Lobster data for 2010 are absent because repairs to the research vessel *John Dempsey* precluded the fall Long Island Sound trawl survey.

3. The bottom chart shows the average level of the Sound at a point in Bridgeport, expressed as the number of feet above a submerged reference point.

Water Quality and Pollution in Long Island Sound

The area of the Sound with adequate levels of oxygen improved substantially in 2013.



Marine life requires oxygen. The percentage of Long Island Sound that has adequate oxygen all year long is shown in the chart above. In 2013, that percentage was the best since 1997.

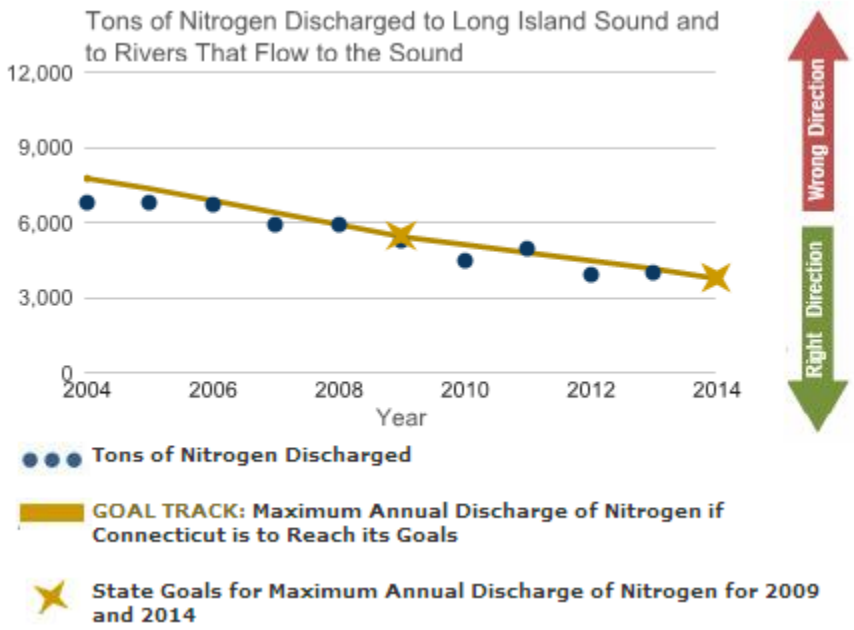
During the summer, some areas of the Sound experience hypoxia, which is a condition in the water where oxygen levels are not adequate to fully support desirable forms of life, including fish and lobsters. Hypoxia occurs when the nitrogen in pollution stimulates excessive growth of aquatic plants, which die and get consumed by oxygen-using bacteria. Connecticut's goal is to "eliminate the adverse impacts of hypoxia resulting from human activities." Hypoxia occurs predominantly in the western portions of the Sound. Weather greatly influences hypoxia, making year-to-year changes less important than long-term trends. Detailed reports that include maps of the extent and duration of hypoxia in Long Island Sound are produced annually by the Department of Energy and Environmental Protection.

To reduce the nitrogen inputs that cause hypoxia, Connecticut and New York adopted a comprehensive management plan in 1994, and built upon that plan with an expanded agreement in 2002.

Connecticut's share of the total nitrogen pollution in Long Island Sound is about one-third, and New York's is two-thirds. In 2001, the federal Environmental Protection Agency approved the New York and Connecticut joint plan for implementing a Total Maximum Daily Load (TMDL). The TMDL is the maximum amount of pollutants that can be discharged while still allowing water quality standards to be attained.

The chart below tracks the amount of nitrogen discharged by 80 sewage treatment plants in Connecticut, two large coastal industrial facilities, and a small group of industrial sources in the Naugatuck River watershed. Connecticut's investments in nitrogen-removal technology at many of those plants have been successful. Connecticut is on track to meet its 2014 target. The slightly greater nitrogen discharge in 2013 is attributed by DEEP to cooler and wetter weather, which is known to inhibit the biological processes that

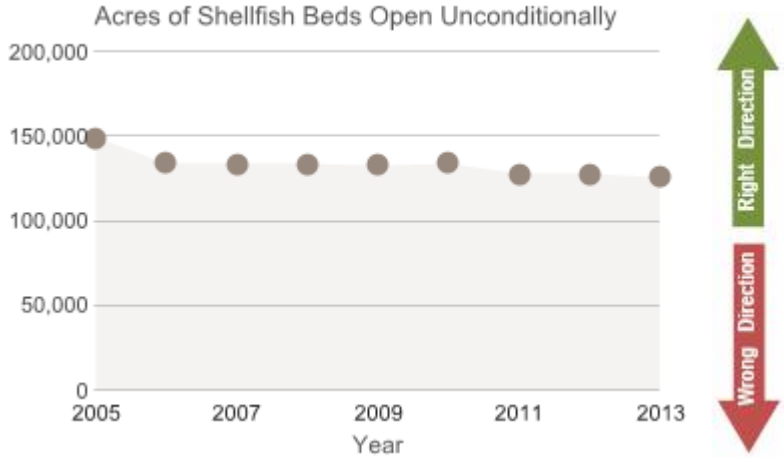
remove nitrogen from wastewater. The nitrogen discharges of New York, which lags Connecticut in nitrogen control, are not shown.



Large uncontrolled quantities of nitrogen also enter Long Island Sound when rainfall carries fertilizer from residents' lawns along with the pollutants that have accumulated on pavement.

2013 Data Declined

The area of the Sound unconditionally approved for harvesting shellfish declined slightly in 2013.



The Connecticut Department of Agriculture's Bureau of Aquaculture and Laboratory Services monitors shellfish beds and classifies them according to their potential for the harvesting of healthful, uncontaminated shellfish. The chart immediately above shows the acreage of shellfish beds that are approved for harvesting because they are generally unaffected by pollution. (Even areas that are

approved may be closed as a precaution following exceptional rainfalls of three or more inches.) Aquaculture experts have suggested that an increasing volume of runoff from lawns and pavement is flowing further into the Sound, resulting in the shrinkage of the shellfish beds that are fully approved.

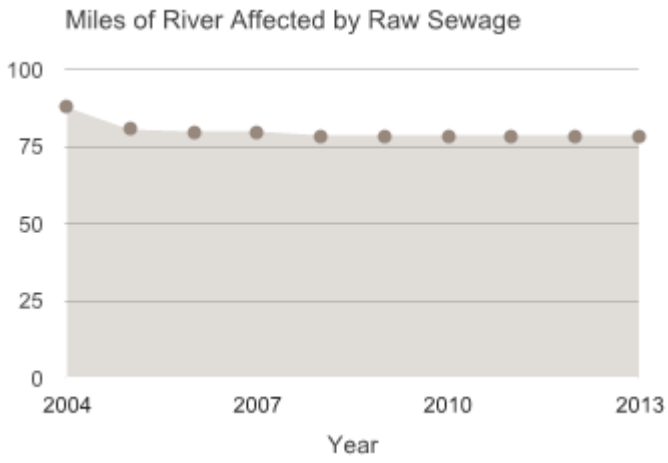
Technical Notes

1. The top chart shows the area of Long Island Sound that had adequate oxygen levels throughout each year. The sampling area (2700 square kilometers) does not include the whole Sound (3400 square kilometers). The areas not sampled are shallow waters (less than two meters deep) near shore, which generally do not experience hypoxia; bays; the eastern end of the Sound, which is not expected to experience hypoxia; and an area in the far western end, which probably becomes hypoxic in most years.

2. Hypoxia was redefined by DEEP in 2011. Areas of the Sound are now considered hypoxic where a liter of water contains less than 3.0 mg of dissolved oxygen. This is the criterion that was used prior to 2004. From 2004 through 2010, DEEP used 3.5 mg/l as the determining level. The threshold was returned to the 3.0 level in 2011 to be consistent with the definitions used by New York and the Long Island Sound Study. Data for all previous years have been recalculated to show the area of the Sound having adequate oxygen under the current definition (that is, at least 3.0 mg/l).

Rivers, Streams and Floods

About 80 miles of rivers receive overflows of raw sewage during storms.



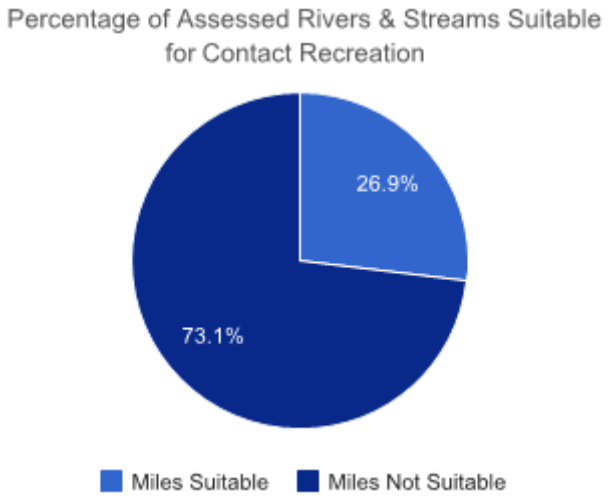
In 15 Connecticut cities and towns, sanitary sewers were built in combination with storm sewers. During storms, these combined systems carry more water than their treatment facilities can handle, and a combination of storm water and untreated sewage overflows directly into the rivers and Long Island Sound. Several of these combined sewer systems have been completely or partly separated since 1990, reducing the impact of untreated sewage on rivers. The reduction apparent in the chart above in 2005 is due to completion of a project in Jewett City that eliminated overflows of raw sewage into the Quinebaug River. There are four cities that still contain multiple combined-sewer overflow points throughout their sewer systems: Bridgeport, Hartford, New Haven and Norwich. All have reduced the number of overflow points since the 1970s but about a hundred remain (in total).

Two other cities, Norwalk and Waterbury, have reduced their overflows to periods of exceptionally wet weather. During very heavy rains, the sewage treatment systems of many other municipalities, even those without combined sanitary and storm sewers, are overwhelmed and spill untreated or poorly-treated sewage to rivers and harbors. Regrettably, scientists predict climate change to yield more frequent high-intensity rainfall events in Connecticut.

DEEP maintains an interactive map showing the exact locations where sewage routinely overflows into waterways.

Connecticut's goal is to eliminate the effects of raw sewage discharges from combined sewer systems. Progress is slow because of the extraordinary expense of separating the sewers.

Throughout the state, only **27 percent** of rivers and streams are classified as being clean enough for swimming and other water contact sports.



The pie chart below illustrates the percentage of the state's rivers and streams that are clean enough to fully support recreation. In most sections of rivers and streams, bacteria levels are higher, at least some of the time, than what is considered safe for a person swimming or playing in the water. The Department of Energy and Environmental Protection (DEEP) estimates the portion of rivers and streams that are fully safe for recreation to be about 27 percent. Most streams are not monitored directly; this estimate is based on sampling and statistical analysis by DEEP. The current figure of about 27 percent is explained further in the 2012 Integrated Water Quality Report submitted by DEEP to the federal government and approved by the federal government on January 30, 2013. The 2011 edition of that report estimated the percentage of fully safe rivers and streams to be about 11, while the 2008 edition of that report estimated the percentage to be 15.

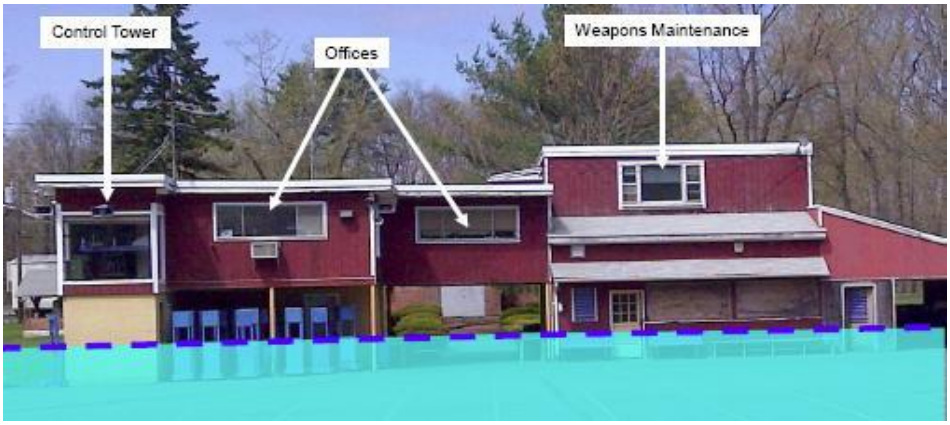
A separate statistical analysis performed by DEEP estimates that 47 percent of *wadeable* streams (which are streams shallow enough to be sampled using methods that involve wading) are suitable for recreation that involves contact with the water.

Apparent fluctuations in year-to-year results are probably due to limitations in data collection and not to widespread changes in water quality. The important conclusion of all the analyses is that the water in most Connecticut streams and rivers might not be safe for human contact.

There are hundreds of streams with where the water is of very high quality, and many of these have been documented by volunteers working with DEEP's River Bioassessment by Volunteers program. In 2013, more than 500 students and adults sampled the aquatic life in more than 90 streams. Of 137 specific locations on those streams, 33 -- the highest number to date -- were found to harbor the types of insects and other life forms that signal a healthy ecosystem.

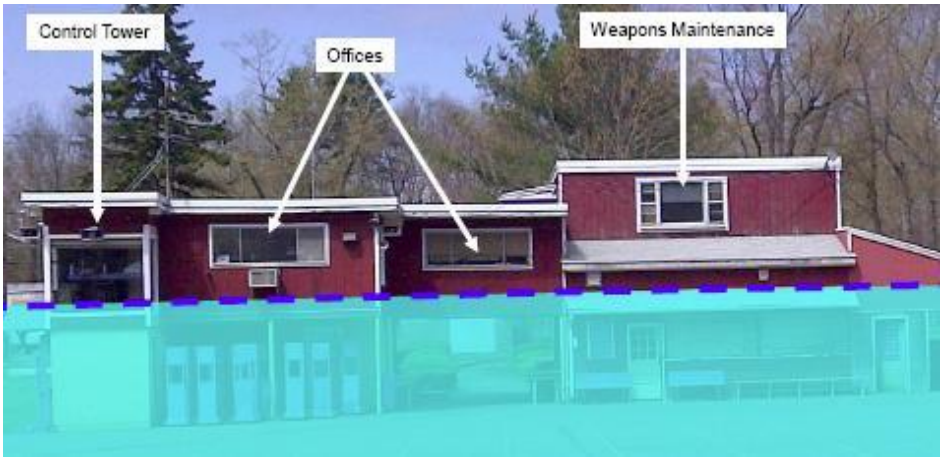
On many rivers, floods are more frequent and damaging than they used to be.

This apparent consequence of a changing climate costs the public money. As an example, the Connecticut Department of Emergency Services and Public Protection's Division of State Police is seeking a new site for its firearms training facility. While the current site near the Farmington River in Simsbury has been vulnerable to flooding for decades, the twenty-first century has seen rising waters.



The shaded area depicted in the photograph above was the average annual level of flooding, until recently. Then...

...this was the water level in 2006, 2008 and 2010. The water was even higher in 2007 (not shown). Then...



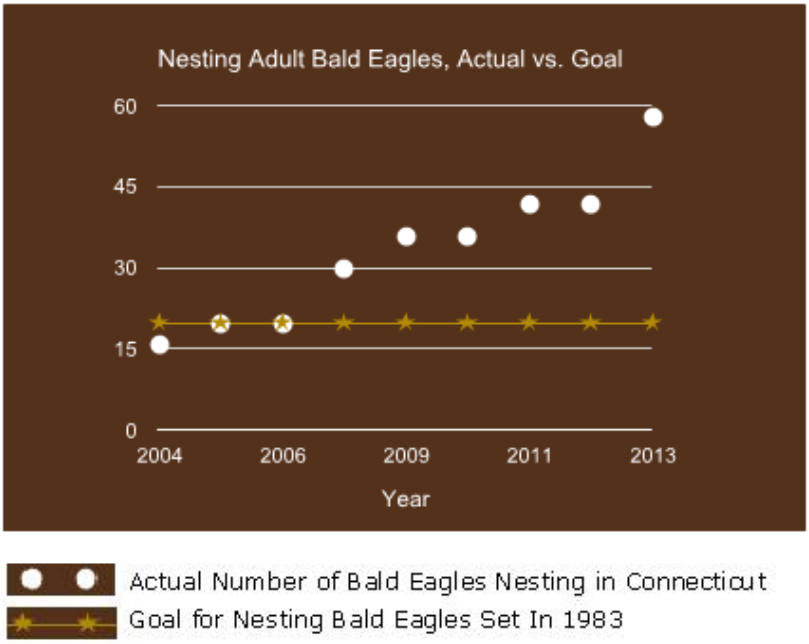
...in 2011, the year of Tropical Storm Irene, high water reached the upper floors and severely damaged the facility.

This is just one illustration of how the rainfall and flood maps used for planning and engineering throughout Connecticut will need to be revised to reflect a changing climate.

(Photographs courtesy of the Department of Construction Services)

Bald Eagles

Bald eagles have come back to Connecticut, even to cities. The chemical pollutants that interfered with their reproduction have been controlled, and large trees along fish-rich rivers offer good nesting sites.



Bald eagles stopped breeding in Connecticut in the 1950s. The species declined throughout the lower 48 states and was declared endangered in 1967. A variety of environmental conditions harmed the eagle, including the widespread use of certain chemicals (chlorinated hydrocarbons) that accumulated in its prey (mostly fish). When those chemicals were banned and polluted waterways were improved, the bald eagle was able to reproduce again. Young eagles were reintroduced into nearby states in the 1980s, and a pair found their way to Connecticut in 1991 and successfully raised a family in 1992. In 2000 there were known to be eight nesting adults. Many more have since found acceptable nesting habitat on land protected by government and private landowners including utility companies and land trusts. DEEP monitors the eagles with the assistance of the Bald Eagle Study Group and other volunteers.

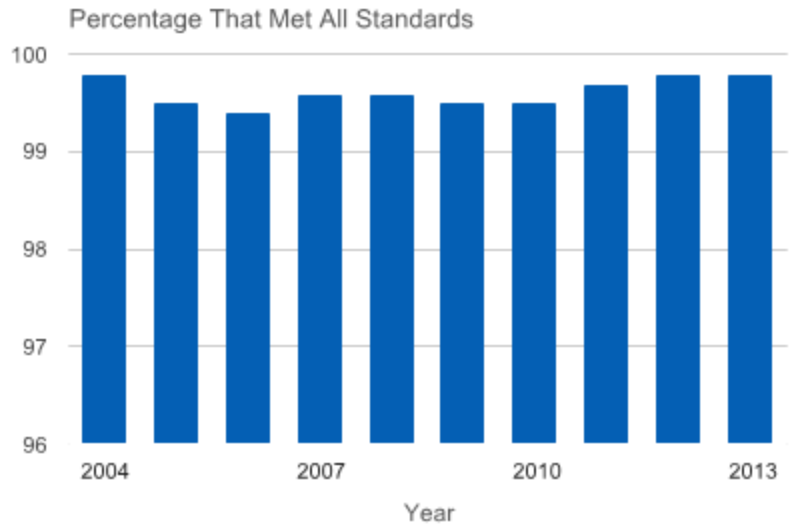
The population of bald eagles is included as an indicator because the eagle is representative of species, especially predators, that share similar habitat requirements: large areas of relatively undisturbed land near rivers or lakes where the birds can find adequate supplies of fish and other prey that are – very importantly – only minimally contaminated.

Bald eagles can be seen fairly frequently where for decades they were scarce. On one morning in March of 2013, for example, 15 bald eagles were reported by experienced birdwatchers at Wethersfield Cove, only three miles from the State Capitol.

What is the Source of the Goal? The 1983 Northern States Bald Eagle Recovery Plan, prepared by the United States Fish and Wildlife Service, established a goal for Connecticut of 20 breeding birds (10 nests), which was reached for the first time in 2005. 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.

Public Drinking Water

Most water companies delivered water that met health standards in 2013.



Every public water utility submits monthly quality reports to the Department of Public Health. This indicator shows the percentage of monthly reports that demonstrate full compliance, after weighting the reports to account for the number of people served by each utility. Though long-term problems occur, they are rare in large systems, with the exception of the downturn in 2005 and 2006 caused by a few short-term problems in larger systems. This indicator would show greater fluctuations if the larger systems failed to deliver good water. The most commonly encountered contaminants include bacteria and byproducts of disinfection, with an assortment of other chemicals and radioactive substances.

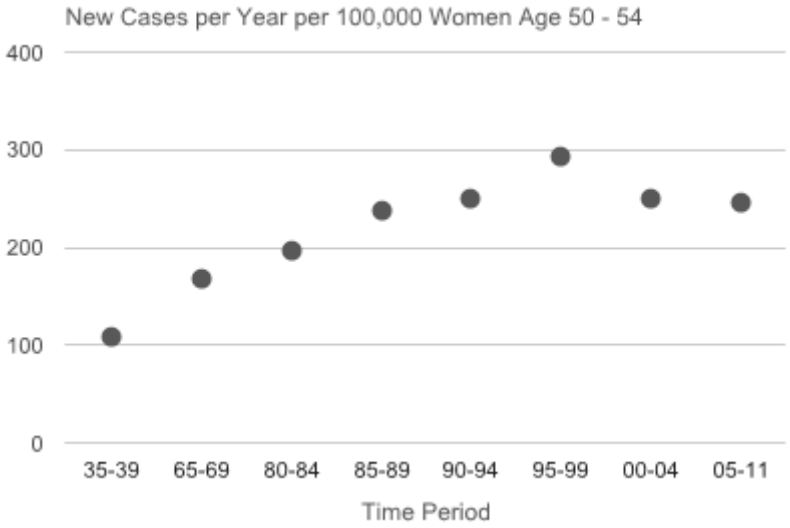
Data are not completely comparable across all states, but federal reports suggest that Connecticut is among the very best in delivery of safe water from public supplies.

About 85 percent of people in Connecticut are supplied by the public water systems included in the chart above. The other 15 percent rely 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. Residents who drink from private wells are not required to test their water, so the number of those people who drink contaminated water cannot be measured.

The Council is reviewing these indicators that depict trends in the health of Connecticut residents. The two below -- rates of cancers that are influenced by environmental contaminants -- have been included in these reports for many years. These indicators might be replaced or supplemented by other indicators next year.

Breast Cancer in Connecticut

Connecticut has the highest incidence of breast cancer among the 50 states, but has seen improvement since a peak in the late 1990s.



Of every 100,000 women in the state aged 50 to 54, a number will discover each year that they have breast cancer. That number is depicted in this graph. The data for this indicator are from the Department of Public Health's Tumor Registry, which records all known cancer cases in the state. (The Council presents data on this one age group, rather than on the entire female population, to control for factors such as changes in the average age of the larger population; age 50 to 54 was selected as a representative age group and is used in each year's report.) To minimize year-to-year fluctuations, groups of years are averaged together. (In other words, each data point on the graph shows the number of new cases in a single year, but that year is actually the average of several years.) While some breast cancers are linked to genetic factors, most are associated with non-genetic factors that include reproductive history and exposure to pollutants that can cause cancer.

Breast Cancer as an Environmental Indicator

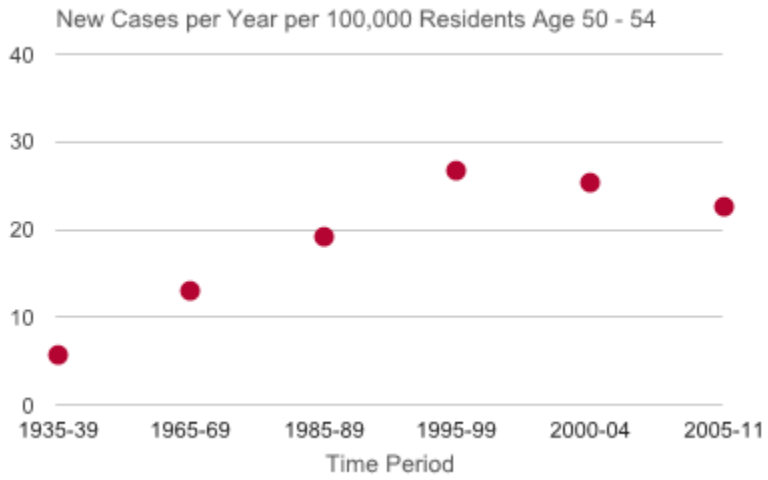
Numerous studies connect breast cancer to environmental factors, which are defined broadly to include any factor not related to a genetic or inherited trait. Some of those factors include a woman's own reproductive history while others include her exposure to radiation and potential carcinogens in food, beverages, air and water. In February 2013, a comprehensive federal report found significant opportunities to prevent breast cancer by targeting environmental factors.

Breast cancer rates vary greatly in different parts of the country. Among the 50 states, Connecticut has the highest incidence of breast cancer among females. This assessment is based on average incidence rates from 2006 through 2010, the latest years for which 50-state data are available. (Source: Department of Health and Human Services' Centers for Disease Control and Prevention.)

The annual rate of new cases in Connecticut for the 50-to-54 age group showed improvement in 2000 through 2004 and improved again slightly during the 2005 through 2011 period (the most recent data available).

Non-Hodgkin's Lymphoma

After steep increases in this cancer during most of the 20th century, the picture has improved.



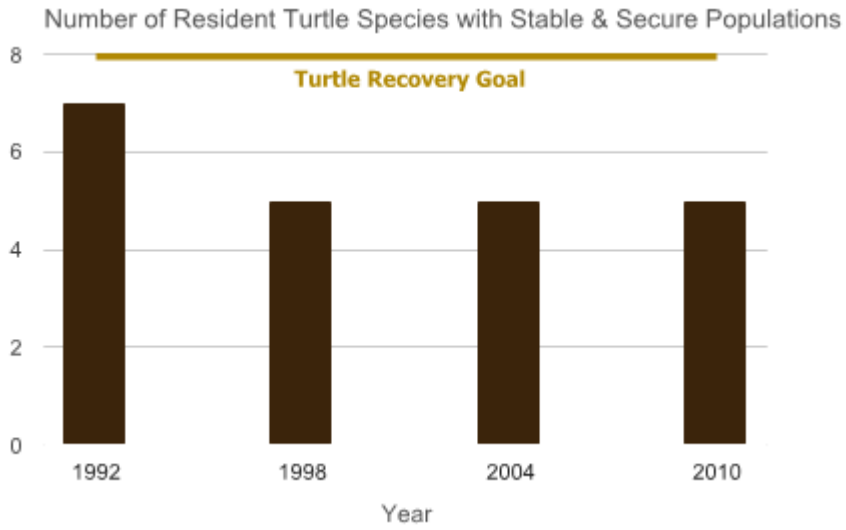
Non-Hodgkin's lymphoma is a cancer of the lymphatic system. The data for this indicator are from the Department of Public Health's Tumor Registry, which records all known cancer cases in the state. (As it does with breast cancer data, this report presents data on one age group, rather than on the entire population, to control for factors such as changes in the average age of the larger population; age 50 to 54 was selected as a representative age group and is used in each year's report.) To minimize year-to-year fluctuations, groups of years are averaged together. (In other words, each data point on the graph shows the number of new cases in a single year, but that year is actually the average of several years.)

Non-Hodgkin's lymphoma has increased markedly since recordkeeping began in the 1930s. The reasons are not well understood, though the rise of Acquired Immune Deficiency Syndrome (AIDS) since the 1980s accounts for some cases. Several studies also cite environmental factors, including exposure to diesel exhaust and certain fertilizers, pesticides and chemicals.

The annual rate of new cases in Connecticut for the 50-to-54 age group showed improvement in 2000 through 2011.

Resident Turtles

Only five of the eight species of turtle that live year-round in Connecticut have populations that are stable and secure.



Turtles are excellent indicators of ecological health. They live long lives, reproduce slowly and decline in number when their habitat declines. This indicator includes the eight species of turtle that live in Connecticut but not the marine species that visit Long Island Sound in summer.

Five turtle species are not classified as endangered, threatened or of special concern: common musk turtle, common snapping turtle, northern diamond back terrapin, eastern painted turtle and spotted turtle. The species that are rare and/or declining are the bog turtle (endangered), eastern box turtle and wood turtle (both state species of special concern).

Classification and protection of endangered species in Connecticut dates back to 1989 and the adoption of "An Act Establishing a Program for the Protection of Endangered and Threatened Species." The Department of Environmental Protection published the first list of Connecticut's Endangered, Threatened and Special Concern Species in 1992. At that time, only the bog turtle was on the list. The wood turtle and the eastern box turtle joined the list in 1998 as species of special concern. The 2015 list is expected to include at least one more species of turtle.

The Goal for Turtles

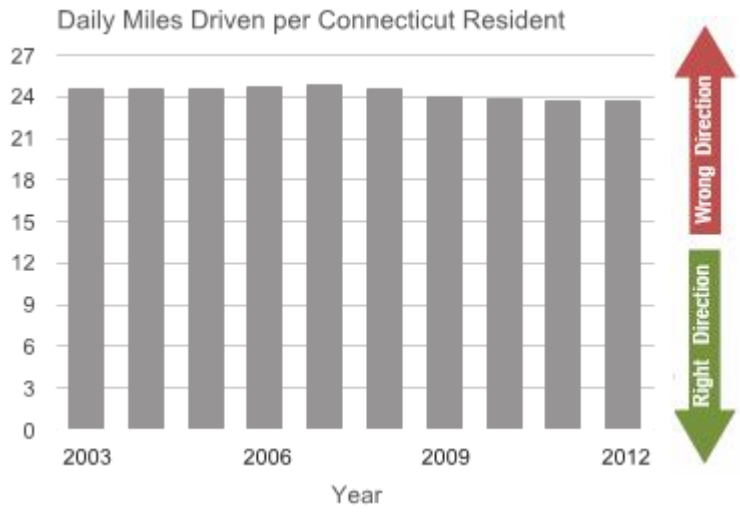
The goal for all endangered and threatened species is for recovery of their populations to a stable, sustainable level.

Coming Soon: Bats!

Driving Our Cars

Latest Data Improved

Trend reversal: Nearly every year for 25 years, the average Connecticut resident drove more miles than he or she did in the previous year. That trend shifted into reverse in 2008.



Driving a car, truck or sport utility vehicle is one of the most environmentally harmful activities a Connecticut resident will engage in personally. Impacts are direct (air pollution, oil leakage, etc.) and indirect (causing demand for new roads). The Department of Transportation estimates the total miles driven each year in Connecticut. Every year from 2000 through 2007, the average Connecticut resident drove more miles than in previous years. The reasons for the decades of increasing auto use are complex and include the fact that most new development was accessible only by private vehicle. A decline in miles driven began in 2008 and has continued to 2012 (the latest year for which data are available). The Connecticut trend lagged slightly behind the national trend for driving, which showed a dramatic drop in 2007. The national trend towards less driving is being led by the 16-to-34-year-old segment of the population.

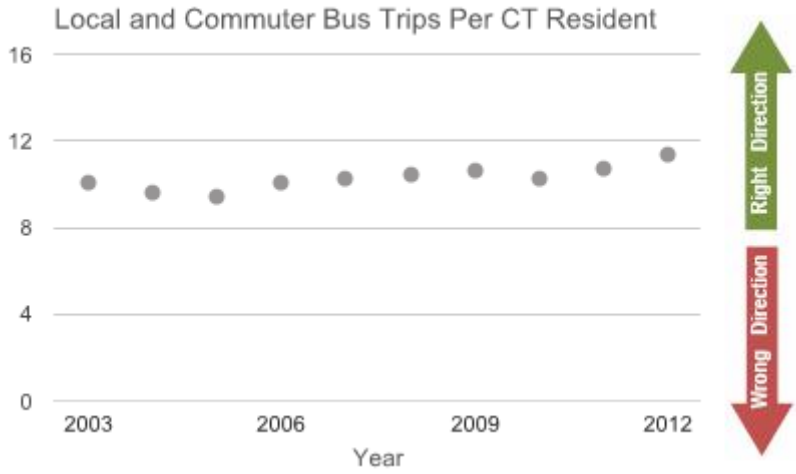
When residents began to drive less, their gasoline consumption decreased** and pollution was reduced.

*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.

** *FY 2015 Midterm Economic Report of the Governor*, Office of Policy and Management, February 5, 2014. P.47

Taking the Bus

The average Connecticut resident is taking the bus at a frequency last seen in 2001.



The number of in-state local and commuter bus trips taken by the average resident per year has been on a general upward trend after a sharp decline in 2005. Riding a bus is just one way to avoid the negative environmental consequences of driving a car. Ridership data are collected by the Department of Transportation.

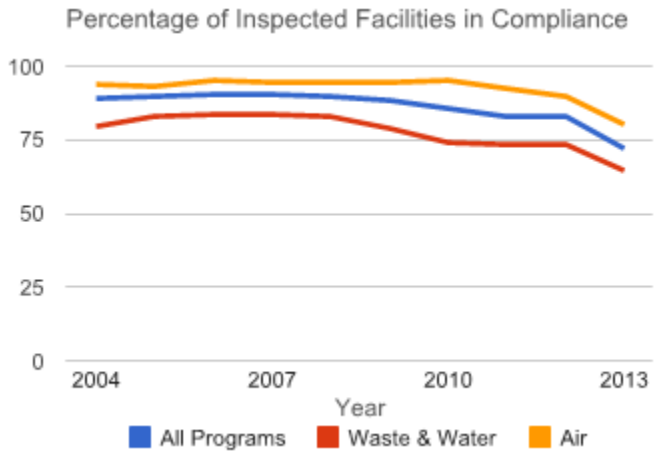
* Personal impact indicators illustrate trends in behavior or practices that can be expected to influence the condition of tomorrow's air, water, land and wildlife.

Personal Impact*

Compliance

2013 Data Declined

Compliance with environmental laws and regulations at inspected facilities declined again in 2013.



Compliance rates -- the percentage of inspected facilities found to be in compliance with environmental laws -- started to decline significantly in 2009. That downturn coincided with a sharp drop in the number of inspections conducted by DEEP:**

The Council cannot be certain of any cause-and-effect relationship between the two charts.

DEEP, faced with diminishing staff resources, has streamlined enforcement procedures in some programs and issued notices to more violators. Electronic submission of reports by permit-holders in some programs also has allowed for more targeted enforcement. To use the well-worn police-and-speeders analogy, this

would be concentrating a smaller police force on the roads where speeding is believed to be most prevalent, with the result of more tickets being issued. But targeted enforcement alone might not explain the larger number of violations. Numerous studies have shown that the average speed on highways increases when drivers believe there are no police looking for speeders. Is there an analogous increase in environmental violations when there are fewer inspections being conducted?***

Serious investigation is needed into the relationships among inspections, compliance and environmental quality (discussed below) but, in the meantime, this indicator leads clearly to a conclusion: in light of the number of violations being found (1,095 in 2013), any assumption that everyone will comply with environmental laws in the absence of enforcement would be unfounded.

Who is breaking Connecticut's environmental laws, and how is the environment affected?

To answer this question, the Council evaluated all 944 Notices of Violation (NOVs)**** issued by DEEP in 2011. The conclusions of the analysis are summarized in an April 2012 staff memo and the violators are characterized in a series of charts. The overwhelming majority of businesses where violations were found were small companies, and most violations were related to the storage, transport or distribution of petroleum. The largest group, by far, were gas stations and convenience stores. Only seven percent of NOVs were issued to manufacturers with more than 20 employees, fewer than the number issued to individual citizens.

The Council conducted a less-detailed review of the 1,098 NOVs issued in 2013. The number of violations was the largest in more than ten years. Again, the largest portion (about 40 percent) were related to violations of laws pertaining to the storage or distribution of petroleum, and most of the laws broken were aimed at reducing the risk that pollution (from spills, discharges, leaks, etc.) would occur in the future.

The Special Case of 2013

The top chart shows compliance declining in 2013 more steeply than it actually did. DEEP issued an extraordinary number of NOVs (237, or 22 percent of all NOVs issued) in 2013 to facilities with radioactive materials and/or x-ray devices. Some violations had existed for years. DEEP changed registration and enforcement procedures in its radiation programs in 2011, partly in an effort to catch up with chronic violators. NOVs related to radioactive materials and x-ray devices never exceeded 80 in prior years, and numbered fewer than 10 in some years. If the top chart could reflect the violations when they first occurred (rather than when they were cited), then compliance rates would appear slightly lower in previous years and somewhat higher in 2013 than they appear on the chart. The downward trend would remain, however.

Further evaluation of the 2013 data revealed something else notable: scofflaws everywhere. At least one third of the radiation-related NOVs were issued for failure to register radioactive materials or x-ray devices. The *majority* of the facilities receiving those NOVs failed to respond in a timely manner and received follow-up NOVs from DEEP. The entities who appear to have ignored DEEP's notices include state agencies and universities, municipalities, major corporations and smaller businesses such as recycling facilities and veterinary clinics.

Compliance and Environmental Quality

The role of compliance has changed. For decades, the extent to which people, companies and government complied with environmental laws had a major effect on the condition of the state's environment. As compliance improved, so did the air, water, wildlife and other natural resources. With a few notable exceptions, such as some municipal sewage treatment facilities that still pollute large bodies of water from time to time, the current environment owes more to past compliance efforts than to current ones. According to the Council's analysis of enforcement data (see above), most violations and enforcement actions now relate to the prevention of problems, petroleum leaks and spills. In contrast to those, many sites that are not violating any laws contribute enormous amounts of pollution to rivers and streams every time it rains. Compliance and enforcement remain important for maintaining an inhabitable state, but no longer should Connecticut residents expect higher compliance rates to lead to dramatic improvements in statewide environmental indicators; those improvements will depend on other factors.

The Data in the Charts

This top chart shows the approximate percentage of inspections performed by DEEP** that found the inspected facilities in full compliance with pertinent environmental laws and regulations. (Monitoring data self-reported by permit holders are not included here.) Beginning in 2010, DEEP stepped up enforcement activity in its underground (petroleum) storage tank program and issued many more Notices of Violation (NOVs) than in previous years.

The overall compliance rate rarely has been better than 90 percent and lately has declined. Generally, compliance with air quality regulations is higher than with waste and water regulations. The average compliance rate for all programs hovered close to 90% from 2004 through 2008 when it began to decline, dropping to 72% in 2013.*****

The number of inspections has declined every year since 2008. The 3,948 inspections conducted in 2013 marked the lowest number in decades and is less than half of what was conducted in the late 1990s and early 2000s (not shown).

The relationship, if any, between the number of inspections and rate of compliance is uncertain. Nonetheless, Connecticut -- government, businesses and residents together -- has failed to advance toward the goal of full compliance.

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**Some inspections of compliance with air quality regulations are conducted by the Department of Consumer Protection pursuant to an agreement with DEEP; these inspections also are used in calculating compliance rates.

***The analogy between speeders and environmental violators is imperfect at best. Speeders hope to avoid a ticket that comes with a significant financial penalty. A Notice of Violation (NOV) issued by DEEP, on the other hand, carries no financial penalty. Many violators risk little by delaying their compliance effort until an NOV shows up.

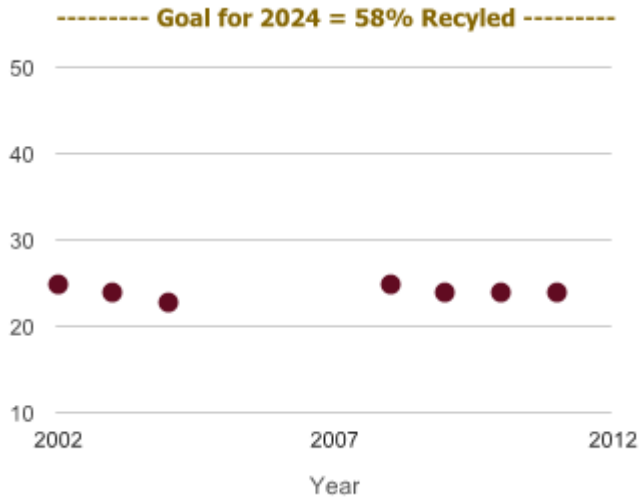
****Notices of Violation (NOVs) are informal enforcement tools, generally issued whenever DEEP detects one or more violations at a facility. They carry no financial penalty. The recipient has 30 days to respond. They can be issued for relatively minor or major violations; in cases of the latter type, the recipient might also receive an order, which might carry a financial penalty. NOVs typically outnumber orders by a factor of five or more in any year. NOVs are good indicators of trends in violations because almost all violations found through inspections result in NOVs.

*****For this indicator only, years pertain to federal fiscal years (i.e., October 1 through September 30), not calendar years.

Recycling Rate

Not On Track

Despite numerous reports of upturns in local recycling rates as communities adopt single-stream recycling, progress toward the statewide goal remains elusive.



Statewide data for 2012 and 2013 are not available.

The General Assembly established a goal of reducing and recycling 40 percent of Connecticut's municipal solid waste by the year 2000. That goal was never met, and the consequences have been enormous. Thousands of heavy trucks hauling waste to landfills hundreds of miles away have put 300,000 or more pounds of diesel pollutants into the air yearly. Another consequence is financial: each ton that is not recycled or avoided altogether and is sent instead to a resource-recovery facility or landfill costs a municipality, hauler or resident from 40 to 93 dollars, according to a 2010 report of the Legislative Program Review and Investigations Committee.

In 2006, DEEP amended the State Solid Waste Management Plan to include a goal of diverting 58 percent of Connecticut's municipal solid waste stream from disposal by 2024. This would be accomplished through recycling, composting and waste reduction (such as use of lighter packaging material). If this goal is met, Connecticut will be able to manage all of its garbage without exporting it.

Legislation adopted in 2014 requires DEEP to revise the State Solid Waste Management Plan by 2016 to include a goal of diverting 60 percent of the solid waste stream by 2024.

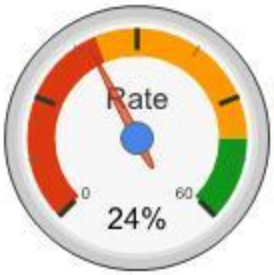
In December 2012, the Modernizing Recycling Working Group submitted a report to Governor Dannel P. Malloy that charts numerous routes to a future where much more waste is recycled and avoided. The report also includes excellent and ultimately discouraging data that shows how poorly Connecticut's recycling rates compare to other states and countries. In addition to the low recycling rate, the report estimates that only about 60 percent of bottles and cans are returned for deposit. Numerous communities have reported better recycling rates after adopting single-stream recycling, but statewide improvement

has yet to be realized. Low rates of recycling at some apartment buildings, schools and other facilities keep the overall rate low.

Technical Notes: DEEP reports suggest that the reported recycling figures depicted on the chart might underestimate actual recycling rates slightly. No data are available for 2005 through 2007.

Current Trend vs. the Goal

Average Recycling Rate Since 2004



State Goal for Recycling Rate

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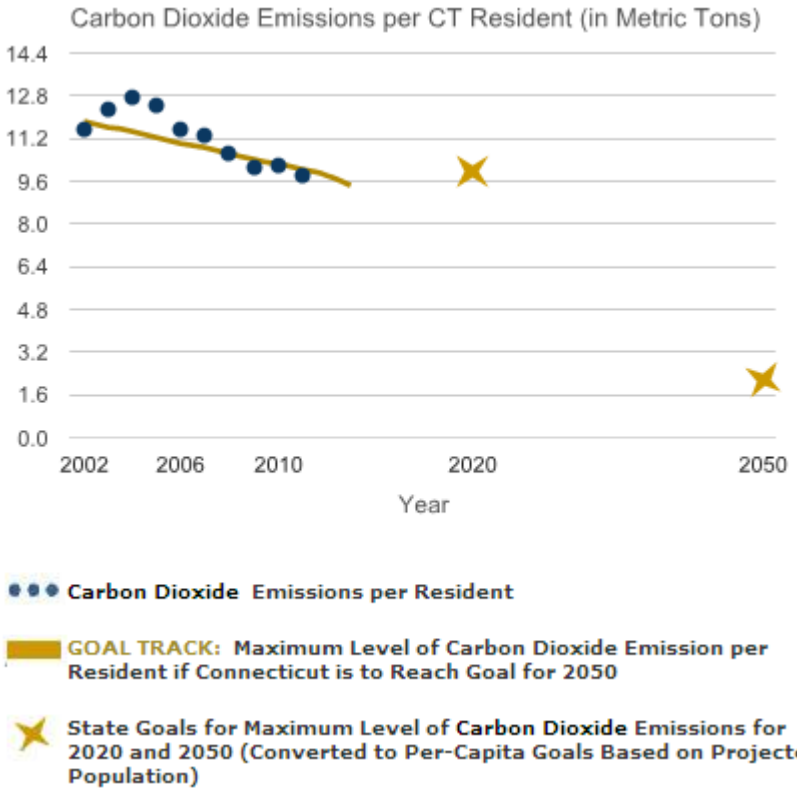
Climate Changers

Latest Data Improved

Connecticut residents are meeting the 2020 goal for carbon dioxide emissions.



Certain gases in the air function like the glass of a greenhouse: they allow the sun's energy to pass through the atmosphere to the ground, then trap the heat that radiates from the ground. These gases often are called "greenhouse gases." Worldwide, a build-up of greenhouse gases is contributing to the ongoing rise in temperature. Carbon dioxide is not the only greenhouse gas nor even the most powerful, but carbon dioxide emissions are far greater in quantity than the others. The chart above shows the total amount of carbon dioxide emitted from the burning of petroleum, natural gas and coal in Connecticut divided by the population.

How the Goal Track is Calculated

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. The chart above shows emissions *per Connecticut resident*, not total emissions. The goals on the chart have been adjusted to account for the growth in population that is projected for 2020 and 2050. Hundreds of thousands more people are expected to be living in Connecticut in 2020 and 2050, so the average resident will have to work that much harder to reduce carbon dioxide emissions if the statewide goal is to be met.

Connecticut's goals are in line with national and international estimates of the extent carbon dioxide emissions from industrialized nations will need to be reduced in order to limit the rise in global mean temperature to no more than 3.6 degrees Fahrenheit (2.0 degrees Celsius) above preindustrial temperatures.

Current Trend vs. the Goal Track

Average Annual Per-Capita Reduction in Carbon Dioxide Emissions Since 2004

Average Annual Per-Capita Reduction in Carbon Dioxide Emissions Needed to Reach Goal for 2050

Most human-generated carbon dioxide results from the combustion of fuels in houses, businesses, power plants and vehicles, which is the largest source. Connecticut is more energy-efficient than the nation as a whole, and thus the average Connecticut resident's contribution to global climate change is less than the average American's.

The most recent data available are from 2011.

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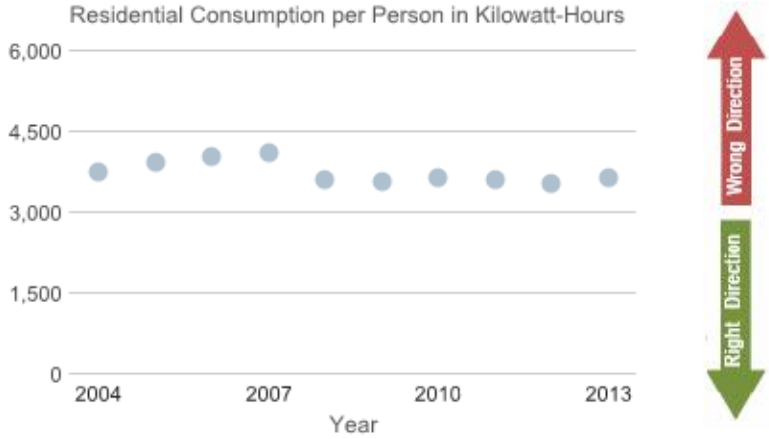
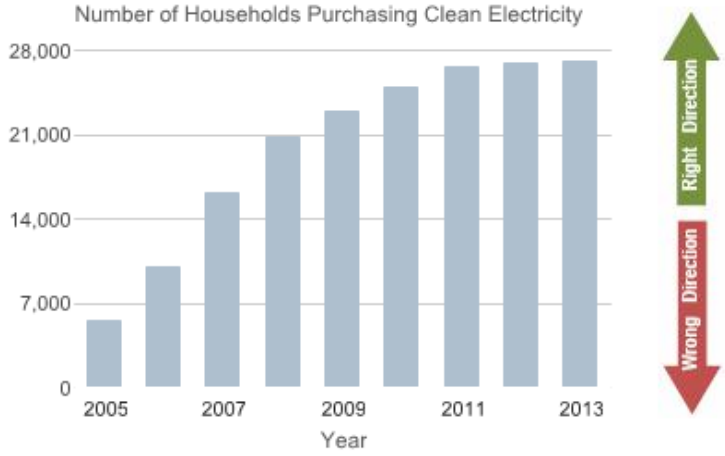
Electricity at Home and Work

At Home:

The average Connecticut resident used slightly more electricity at home in 2013 than in 2012, but still less than in most previous years.

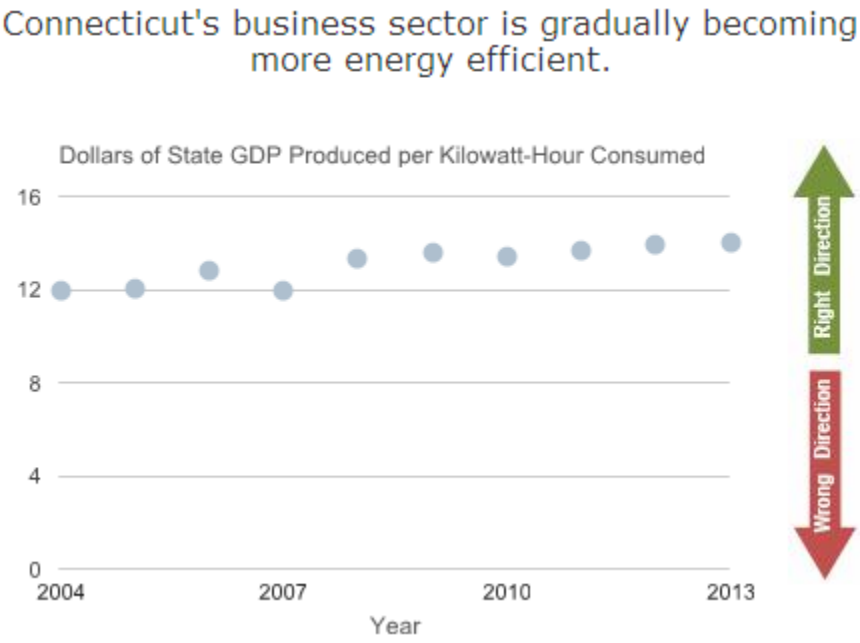


Every year from 2005 through 2011, thousands of households changed suppliers to buy electricity generated from renewable energy sources. The rate of increase since then has slowed dramatically.



At Work:

Connecticut's business sector is gradually becoming more energy efficient.



Details

Efficiency at Home: The average Connecticut household has been consuming less electricity since the peak usage year of 2007, despite small reversals in 2010 and 2013 (top chart). Nonetheless, peak demand remains excessive. According to the Connecticut Sitting Council, peak demand occurs during hot, humid summer days when residents use air conditioning Most Connecticut consumers do not purchase the most efficient air conditioners. (Appliance purchasing data previously was tracked in this report report but became unavailable in 2010.) Excessive electricity consumption in the summertime has had significant environmental consequences. On the hottest days, Connecticut's base-load power plants are unable to meet the additional demand, and older petroleum-fueled plants are brought online. Because they are used sporadically, many of these older plants are permitted to operate with no pollution control equipment. As a result, state residents generate the most air pollution on the hottest summer days when air quality is already bad.

The vast majority of Connecticut's electricity is generated from nuclear energy and the combustion of natural gas, oil and other fuels. Hydropower, wind, solar and other renewable resources are small but growing sources of electricity. Each source, renewable or not, has its own negative environmental consequences. Reducing those consequences will require Connecticut households to use electricity more efficiently. Such efficiency can be attained in part with ENERGY STAR appliances.

Buying Cleaner Electricity: The CTCleanEnergyOptions program enables customers to purchase electricity from renewable sources, especially wind. Participation grew steadily until 2012 (middle chart). The electricity that actually enters these houses is not necessarily from renewable sources. The consumer who elects this option is paying for the generation of renewable electricity on the regional

electric grid. This reduces the amount of electricity that otherwise would be generated by power plants, all of which create pollution. CTCleanEnergyOptions is a collaborative program administered by the Clean Energy Finance and Investment Authority.

Efficiency at work: The bottom chart shows the trend in the efficiency with which Connecticut's economy uses electricity to produce goods and services. Connecticut's businesses generally have been using less electricity to produce a unit of goods or services. State Gross Domestic Product (GDP) represents the total value of goods and services produced within the state in a single year. In 2013, the federal Bureau of Economic Analysis put Connecticut's GDP at $249 billion (current dollars). When adjusted for inflation, that amount is a 0.9 percent increase from 2012. At the same time, industrial and commercial electricity consumption in Connecticut increased by only 0.4 percent.

The Council investigated the question of whether the apparent improvement in efficiency might have been caused by a shift in Connecticut's economy from energy-intensive manufacturing to financial services and other business sectors that consume less energy. That shift probably has been a factor. Manufacturing GDP grew from 2004 through 2011 (the most complete data available at the time of this analysis) at a slower rate than the overall state GDP, while the financial and health care sectors expanded at a faster rate. The latter sectors probably use less electricity to create a dollar of GDP in comparison to manufacturing, so their increasing importance to the state's economy would make the overall business sector appear more energy-efficient.

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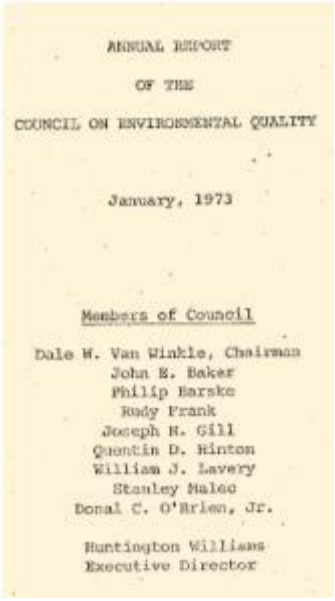
Activities of the CEQ in 2013



ANNUAL REPORT

OF THE

COUNCIL ON ENVIRONMENTAL QUALITY

January, 1973

Members of Council

Dale H. Van Winkle, Chairman
John E. Baker
Philip Barske
Rudy Frank
Joseph H. Gill
Quentin D. Hinton
William J. Lavery
Stanley Maleo
Donal C. O'Brien, Jr.

Huntington Williams
Executive Director

As 2013 began, the Council observed that it was the 40th anniversary of the first annual report on Connecticut's environment. Those 11 typewritten pages offer a window into a Connecticut that is forever in the past. Most people living in this state today have never breathed anything as bad as the air breathed by Connecticut residents during the early 1970s and probably never will.

To write that first report, members and staff relied greatly on subjective judgments. Today the Council has access to much more data to analyze the state's lingering and persistent environmental problems (though, as noted throughout this report, some data still are lacking), and its reports should be expected to be more precise and unerring. To fulfill that expectation, the Council was as busy in 2013 as it ever has been.

Research and Reports

The Council published its annual report, *Environmental Quality in Connecticut,* in April 2013. That report highlighted the extent to which many environmental indicators change little from year to year and explored the reasons for the apparent stagnation.

The Council is required to recommend legislation for "identifying the deficiencies of existing programs and activities." The Council submitted those to Governor Dannel P. Malloy in January 2014.

The Council investigated the apparent upturn in the number of proposals to use state park, forest and wildlife management lands for other purposes, and concluded that state conservation lands are not protected sufficiently. This led to the publication of *Preserved But Maybe Not: The Impermanence of State Conservation Lands* in early 2014.

From time to time the Council asks staff to prepare updates to previous reports. An example from 2013 includes a staff review of the compliance rate for alternative sewage treatment systems, which the Council had last looked at in 2007. The result was a special report, *Testing the Effluent: Some Systems Pass, Some Don't, and Some Won't Say*, in early 2014.

Review of State Projects and Programs

All agencies submit their environmental impact evaluations (EIEs) of proposed projects for the Council's advice. In 2013, the Council submitted detailed comments on a highway interchange and commercial development project that involved several agencies; the comments are leading to improvements in evaluating the impacts of multi-agency projects.

For years the Council has been encouraging agencies to prepare concise EIEs that are easily understood, and in 2013 it commended the Board of Regents for Higher Education for adopting that approach.

The Connecticut Siting Council solicits the CEQ's comments on applications and petitions. The CEQ had submitted detailed comments in 2011 on a telecommunications tower proposed to be constructed on a hill in Canaan that is known to be of extraordinary scenic and ecological value. The Siting Council denied the application. A revised application was submitted in 2013, and again the CEQ pointed out deficiencies in the application. The application was withdrawn.

Sometimes the Council's investigations of citizen complaints (see below) intersect with the Council's duties to advise state agencies. When the Council held a public forum in Mansfield in 2011, it was reminded that the University of Connecticut still had not moved its hazardous waste storage facility out of the drinking water supply watershed despite years of plans, EIEs and public input. In 2012, the university again announced a plan to evaluate alternative locations; the Council advised the university to put a priority on

sites outside the watershed, and followed the site evaluation process closely. In late 2012 an advisory committee rated the current site as the least favorable among the alternatives. An EIE was completed in 2013 and a site was selected outside of the drinking water supply watershed.

The Council also continued to take steps to help modernize CEPA.

Citizen Complaints

As noted in reports of the past four years, citizens of Haddam have spoken repeatedly to the Council about contamination of land and groundwater that has existed in their community for more than 30 years. The Council decided to follow this case closely to learn why the start of remediation in some communities is delayed for decades (if it ever occurs). In September 2012, the Council submitted a detailed letter to Governor Dannel P. Malloy to update him on the problems in Haddam "and the broader problems made evident by this case." In November 2013, the Superior Court ruled that the owner of a former industrial facility in the community was indeed required to abide by DEEP's requirements. Investigation of the site continues but, to date, there is no remedial activity.

The following are a sample of the many other complaints investigated in 2013:

- An inquiry into the status of a state-owned brownfield property: the property had been made available to potential developers under legislation adopted in 2012. The Council's investigation showed that, pursuant to prior legislation, at least ten acres of the land were to be preserved in a natural state. The Council notified the Department of Economic and Community Development and was assured that the preservation requirement would be fulfilled if the land were ever transferred. In September 2013, the land was deemed to be surplus, and the Council submitted comments to the Office of Policy and Management reiterating the need to preserve the ten acres and evaluate the resources on the remainder of the property. A decision is expected in 2014.

- A species of bamboo that can escape from cultivation and cause a number of problems.

- Questions about DEEP's improvements to parks: The Council received numerous complaints and comments about a parking-lot improvement project at a state park that eliminated a small basin that had been well used by migratory birds and birdwatchers. The Council wrote to DEEP about the concerns, and an improvement to the project-planning process is underway.

- Proposed transfer of state park land: Park enthusiasts were dismayed when the General Assembly directed several acres of state park land to be transferred to a municipality. The Council advised DEEP of the need to evaluate the natural resources on the property, and DEEP concurred.

The Council researched all of the complaints it received and offered recommendations to the relevant state agencies, where warranted.

Advice from the Public

In November, the Council released its required recommendations for corrective legislation in draft form, and invited the public to weigh in. Public officials, businesses, advocacy organizations and individual citizens spoke to the Council at a public forum held in the Legislative Office Building in Hartford, and many others submitted written comments. Read a complete summary. Their insights, technical advice and opinions helped the Council greatly in preparing its final recommendations, which were submitted to Governor Dannel P. Malloy and the General Assembly in January 2014.

In addition to the many people who spoke at the public forum, the Council heard from organizations at most regular monthly meetings. These included municipalities, DEEP, Connecticut Siting Council, Office of Policy and Management, Connecticut Water Company, University of Connecticut, BDL Real Estate Holdings, LLC, Friends of Connecticut State Parks, Audubon Connecticut, Rivers Alliance of Connecticut, Naubesatuck Watershed Association, Connecticut Land Conservation Council, Environment and Human Health, Inc. and others.

Many people across the state expressed their concerns during 2013. The Council worked to address them all, and truly appreciates the efforts people made to bring environmental problems to light. The Council looks forward to helping citizens and agencies solve the challenges of 2014 and beyond.

Council Duties

The duties 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 primary 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.

In addition, under the Connecticut Environmental Policy Act (CEPA) and its attendant regulations, the Council on Environmental Quality reviews Environmental Impact Evaluations that state agencies develop for major projects. The Council publishes the *Environmental Monitor*, the official publication for scoping notices and environmental impact evaluations for state projects under CEPA. The *Environmental Monitor* also is the official publication for notice of intent by state agencies to sell or transfer state lands.

CEQ Members in 2013

Susan D. Merrow, Chair
(appointed February 1, 2013)
Resident and former First Selectman of East Haddam. Member, East Haddam Conservation Commission. Member, Connecticut Advisory Committee, Trust for Public Land. 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. Former Trustee, Connecticut River Watershed Association.

Janet P. Brooks
Resident of Middletown. Attorney with law office in East Berlin with a practice in environmental, administrative and land use law. Member of the Connecticut Bar Association Planning & Zoning Section and Environment Section. Co-author of *Connecticut Environmental Protection Act*, Volume 15 of the Connecticut Practice Series published by Thomson West. Formerly Assistant Attorney General in the Environment Department of the Connecticut Attorney General's (AG's) Office for 18 years enforcing the state's environmental laws running the gamut from noise, odor, water pollution, air pollution, pesticides to habitat protection and preservation of land. While at the AG's Office, coordinated the wetlands appeal practice and developed the legal training for wetlands commissioners for DEEP's annual training. Recipient of 1984 German Marshall Fund grant to study the effect of citizen participation on hazardous waste clean-ups in four European countries. Based on those experiences, authored a chapter published in *America's Future in Toxic Waste Management: Lessons from Europe.* Staff Attorney for five years at the Connecticut Fund for the Environment, Inc., representing citizens groups in administrative and court proceedings. Began practice of law assisting the Middletown City Attorney in the city's opposition to the utility company's burning of PCB waste oil within the city boundaries.

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. 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.

Karyl Lee Hall
Resident of Branford. Attorney with the Connecticut Legal Rights Project. Formerly with Murtha Cullina, the Connecticut Fund for the Environment and Connecticut Legal Services. Co-Chair, Branford Conservation Commission. Co-chair, Scenic Roads Advisory Committee for Routes 146 and 77. Member, Advisory Board, Branford Land Trust. Vice President, Citizens for Branford's Environment, 2002-2009. Connecticut Bar Association Pro Bono Service Award, 2003. Former Co-chair, State Implementation Plan [for Air Management] Revision Advisory Committee.

Alison Hilding
Resident of Mansfield. Long-time advocate for the environment and children, viewing clean air and clean water as important dimensions of child advocacy. Member, Connecticut Commission on Children, 2003 to present; Executive Board since 2008, Secretary since 2012. Founding member, Mansfield's Citizens for Responsible Growth. Background in financial management; worked for NYNEX in areas of capital budgeting for growth and modernization. Manages artistic estate of an American Modern artist.

Michael W. Klemens
Resident of Salisbury. Educated in the United States (University of Connecticut) and the United Kingdom, Dr. Michael W. Klemens is a trans-disciplinary practitioner. Formally trained as a herpetologist, his current practice spans conservation biology, land-use planning, and empowering communities through the understanding and use of scientific data. Working at the interface of human societies and the natural world, he engages a diversity of stakeholders to explore how to create patterns of development that are ecologically resilient, economically viable, and socially equitable. More than three decades of field work have been concentrated in the northeastern United States. Through the support of the MacArthur Foundation he spent several years in east Africa, working with indigenous institutions to build capacity in biodiversity assessment and application of those data to protected area management, as well as studying the ecological impacts and economic mechanisms of the wildlife trade. His publications include the definitive study of Connecticut's amphibians and reptiles and over 100 scientific papers. In 1979 he joined the scientific staff of the American Museum of Natural History, where he continues collections-based research on amphibian and reptile biodiversity. He serves as a consultant to various government agencies, as well as municipalities, not-for-profit organizations, and developers and is in his second elected term to the Salisbury Planning and Zoning Commission, most recently (and currently) as its Chairman.

James O'Donnell
(appointed February 1, 2013)
Resident of Noank (Groton). Professor of Marine Sciences and Joint Professor of Physics, University of Connecticut. Master of Science and Ph.D. in Oceanography. Elected to Connecticut Academy of Science and Engineering. Has served as a Director of the North East Regional Association of Coastal Ocean Observing Systems and the Middle Atlantic Coastal Ocean Observing Regional Association. Appointed as one of Connecticut's representatives to the Bi-State Commission on Long Island Sound.

Richard Sherman
Resident of Chaplin. Architectural designer and construction manager of earth sheltered, passive solar and energy efficient residences. Former CEQ Representative to the Route 6 Advisory Committee (during previous term on CEQ). Charter Member, Transit Alliance of Eastern CT, and Citizens for a Sensible Six. Former Organizer, the Progress and Equity Partnership. Member of CEPA Working Group, League of Conservation Voters of CT. Former President, Northeast Chapter of ACLU-CT Board of Directors. Member of Peoples Action for Clean Energy (PACE) and Northeast Sustainable Energy Association (NESEA). Former Chair, Mansfield Transportation Advisory Committee. Former President, Mansfield Commonground. Member, Mansfield Planning and Zoning Design Review Panel. Former Chair, Mansfield Democratic Town Committee. Host and producer of the radio show, "A Distant Shore" on WHUS (91.7 FM, Storrs). Former Public Affairs Director of WHUS. Stopover host, American Tour d'Sol solar electric car race.

Former Members Who Served During 2013

M. Howard Beach
(member through January 2013)
Resident of Simsbury. Conservation & Zoning Compliance Officer / Planning Analyst, Town of Simsbury. Member, Simsbury Conservation / Inland Wetlands Commission from 1980 to 2004, Chairman from 1994 to 2004. Member, Board of Directors, The Farmington River Watershed Association, 2004 to 2006. Life Member and past Board Member, Simsbury Land Conservation Trust. Founding Member, Farmington Valley Biodiversity Project. Member, Town of Simsbury Open Space Committee, 1999 to 2004. Member, CT Developers Council. Member, Government Affairs Committee, Simsbury Chamber of Commerce. In 2004, completed a Masters Degree in Environmental Law at Vermont Law School.

Bruce R. Fernandez
(member through March 27, 2013)
Resident of Farmington. Retired after 18 years owning and managing a software business serving insurance companies and independent agencies. Prior to that, was a consulting engineer specializing in energy efficient power plants and paper mills, Vice-President of Operations of a small utility serving Bronxville, NY and a jet engine design/test engineer. Masters degrees in Engineering and Management. Served in United States Army Corps of Engineers as small unit commander; served in Vietnam and ten years in Army Reserves. Member, Board of Directors, Farmington Land Trust.

Barbara C. Wagner
(member and chair through March 27, 2013)
Resident of Glastonbury. Attorney with law office in Glastonbury, specializing in commercial and residential real estate. Executive Director, Wind Hill Community Farm, Glastonbury. Member, Glastonbury Council, 2000-2010. Co-Founder and Board Member of Town Center Initiative, addressing walkability issues in Glastonbury's center. Board of Trustees, Diamond Lake Land Trust. Former member, State Open Space and Watershed Land Acquisition Board.

Acknowledgments

The Council appreciates the assistance of the many people in the Departments of Agriculture, Energy and Environmental Protection, Transportation and Public Health and the Connecticut Siting Council who provided data.

Researchers at the Center for Landuse Education and Research (CLEAR) at the University of Connecticut provided very valuable farmland, forest and tidal wetland data, and UConn ornithologists made data available on long-term population trends of forest bird species.

The Council especially thanks the many citizens, businesses, and organizations who offered information and viewpoints to the Council throughout the year. The many comments received at the public forum in November were particularly helpful to the Council as it prepared its recommendations for legislation.

The Council also appreciates the work of its Executive Director, Karl Wagener, and Environmental Analyst Peter Hearn in drafting this report for review by the Council and preparing the final version for publication.

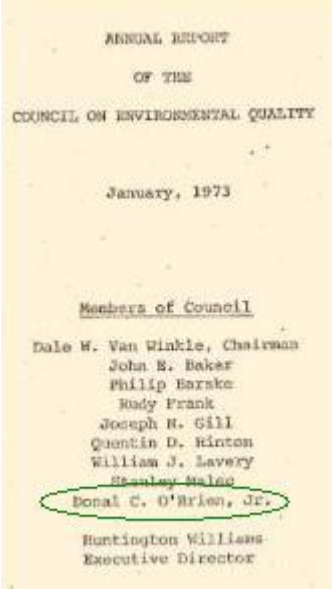
The Council notes the valuable contributions of two interns, Courtney Robishaw (University of Connecticut) and Linnea Gotberg (Trinity College); their research contributed greatly to this report.

Image Credits: The symbol used to denote indicators affected by climate change was created by Tracey Saxby, Integration and Application Network, University of Maryland Center for Environmental Science.

The photograph of the chimney swift on the Good Air Days page was taken by Julian Hough. The Council greatly appreciates his generosity in allowing its use in this report.

Remembering Donal C. O'Brien, Jr.

Eagle-eyed readers of "Activities of the CEQ in 2013" might observe that one of the original Council members listed on the cover of the January 1973 annual report is Donal C. O'Brien, Jr. After serving on the Council during its formative years and after a subsequent hiatus, Mr. O'Brien was appointed to serve again by Governor Lowell Weicker and was appointed Chair by Governor John Rowland. In all, Mr. O'Brien was appointed by four governors. The years under Mr. O'Brien's leadership saw a period of extraordinary productivity and environmental progress for the Council and the state. A resident of New Canaan, Mr. O'Brien was highly regarded for his accomplishments and prominent leadership roles in national and international conservation. Connecticut was fortunate that he was willing and able to devote so much time to conserving the environment of his home state. Mr. O'Brien died in September 2013. (Read the New York Times obituary.) Council members and staff acknowledge his extraordinary service and remember him with great affection and admiration.



ANNUAL REPORT

OF THE

COUNCIL ON ENVIRONMENTAL QUALITY

January, 1973

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John E. Baker
Philip Barske
Rudy Frank
Joseph H. Gill
Quentin D. Hinton
William J. Lavery
Stanley Maleg
Donal C. O'Brien, Jr.

Huntington Williams
Executive Director