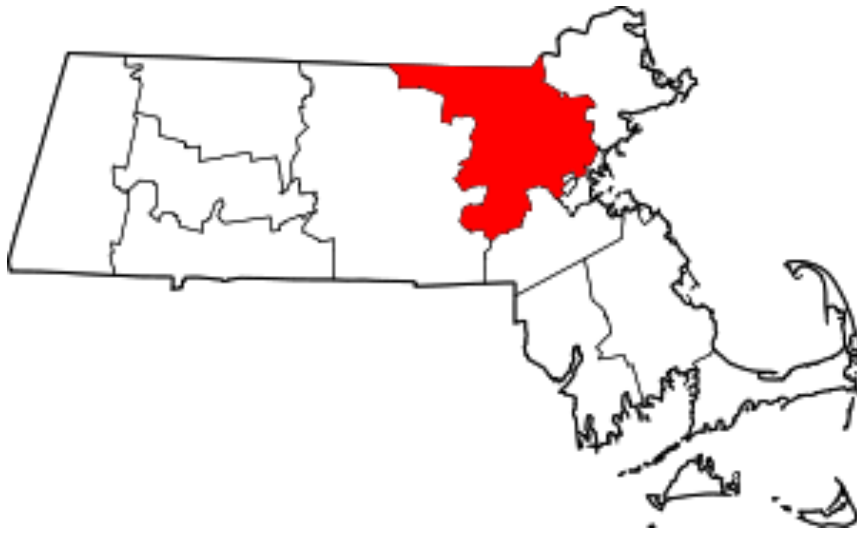


Middlesex Conservation District



Long Range Plan

2022 – 2032

Middlesex Conservation District Mission Statement

The mission of the Middlesex Conservation District is support of atmosphere, soil, water, plant and animal health to achieve balance and harmony between the people of the district and their natural surroundings through locally driven solutions that include planning, education and collaboration.

Introduction

This plan is meant to be an inspirational and enjoyable one hour read that serves multiple purposes.

A brief historical overview of the past four centuries of the New England Land and its People is provided to help answer the question “Who we are and how did we get to where we are today?” A few words on the encouraging and most recent Massachusetts and North East States regional direction are also included. The description of the Middlesex Conservation District organization and method of operation is intended to answer the question of “How do we work?” The Districts accomplishments over the past 75 years are provided as examples of successful efforts and possible future endeavors. The End Notes and Appendices provide references and links to a wide variety of information relative to conservation and sustainability and provide examples of environmental and technology change that will affect our future work and the tools we will use.

Opportunities for specific activities in the next ten years are the operational portion of this plan. It will serve best if it is reviewed and updated annually and used to guide annual plans that are the ultimate actions of the district.

The writers are hopeful that this document will assist in recruiting and orienting future members of MCD Staff and Board, informing other individuals or organizations that are interested in our work and serve as a supporting document in future fundraising efforts necessary to insure the ongoing viability of the conservation district.

Part 1 - Who we are and how did we get to where we are today?¹

Historical Context of New England and Middlesex County

Pre-Colonization-

Approximately 10,000 years ago Native American tribal nations followed the receding glaciers into the lands of what is now the New England region. Native tribes had established an environmentally sound, sustainable, and productive agricultural system using interplanted maize, beans and squash. Native tribes often lived near waterways where the fertile river banks and harbors had been cleared and maintained by frequent burning. The rivers provided large seasonal fish migrations that supplied both food and crop fertilizer. As Europeans colonized

¹ *Factual information is referenced in the end notes section beginning on page 20

North America, they stole the well-tended farmlands of Native Americans. These farmlands were readily accessible by water. * What we refer to as Middlesex County today is the stolen lands of the Nipmuc, Massachusetts, Pawtucket, and Agawam people.

The Rapid Expansion of Colonizers and the Importance of Agriculture-

In 1620, the first European colonizers forced the occupation of Native American Farmlands which had long been established to create Plymouth Colony. During the first decade, no animal power was used for plowing or water power used for milling grain or sawing lumber, all was done by hand. A governance was established, each man received 20 acres of tillable land and a family might receive as much as 100 acres. Each parcel would have waterway access. By 1630 an agricultural system was thriving with enough surplus to initiate trade with the Dutch New Netherland settlement at the mouth of the Hudson, and to settle the financial obligations with the English backers of the Plymouth Colony. * This early success encouraged the 1629 founding of the very well planned and financed Mass Bay Company whose boundaries were defined as the territory between the Charles River and 3 miles north of the Merrimack. This is land where much of Middlesex County and all of Essex County stands today. In the decade of 1630-1640 colonizers from England continued to arrive. The charter of this Mass Bay Company allowed its governance to reside in the new land rather than England. New townships were granted by the General Court to responsible groups of 40 or more, The townships were typically of 36 square miles and chartered to elect their own officers, pass bylaws and choose a minister. Concord, accessible by water, was the first inland town in 1635 was followed by Dedham on the Charles River in 1636 and Sudbury on the Musketahquid in 1638. The Mass Bay Colony flourished so that 37 plows and oxen to pull them were in use by 1637, in 1638 the first bolt of cloth was woven in Rowley, in 1643 a sum of one thousand acres of orchard were reported in the colony as well as rapidly increasing livestock and vegetable production. In 1645 20,000 bushels of grain were exported. By 1660 abundant timber and many supporting skills and industries had produced numerous great ships of up to 350 tons to serve the thriving fishing and export trade with Europe and other American Colonies. In 1742 Faneuil Hall in Boston was built as a central market and trade center, as well as a major center for the slave trade. It is crucial to note that the success of the economy of this region, has deep roots in slavery and slave labor. By 1771 over 300 ships for whaling and other trades had been built. * Farming also flourished as it produced increasingly valuable crops. In 1853 New England farms reported extensive greenhouse market garden production, particularly for those farms near large cities. The green houses were warmed by the decomposition of the surplus manure from the city streets and stables allowing for multiple successions of crops across an extended season with continual soil fertility and high profit. In a similar example of the efficiency of closely coupled enterprise the Connecticut River distilleries raised hogs fed on spent distillery grain providing hog manure to local tobacco farmers who supplied the cigar manufactures of the prosperous Connecticut River Valley. In 1860 Massachusetts grew 3.2 million pounds of Tobacco. New England towns near the shore fertilized with fish, kelp and rockweed to get excellent yields. In 1858-59 New England exported 120,000 bushels of apples to England. After the Civil War the New England population increased rapidly from 3.5 million in 1860 to 4.7 million in 1890. During this period, there was a large transition of immigrant labor, where food consumers were not land owning, food producing farmers. Eldest sons inherited farms and siblings went to work in manufacturing

jobs or went West to occupy land made available by the 1862 homestead act. In 1864 25 million quarts of milk were delivered to Boston. By 1870 Midwest butter began to arrive by train from the West but local demand was high enough to take all local products as well as imports. In 1880 New England total butter production was 51.5 million lbs.*

Education-

Before the 1776 American Revolution New Englanders had 150 years of experience in self-government. Education for the rapidly increasing population was often provided by small township schools throughout New England. "Spelling Book", "Reader" and "Grammar for Schools" written by Connecticut school teacher Noah Webster in 1783-1785 and "Geography Made Easy" written by Jedediah Morse in 1790 were their foundational texts. Many townships had libraries and library associations were becoming established. In 1827 the Massachusetts legislature decreed a public school system supported by taxes and that each town of more than 500 families would have a high school. By 1830 the Massachusetts population was 610,408 people. Horace Mann, president of the Massachusetts Senate, persuaded the legislature in 1837 to establish the first State Educational Commission. In 1840 it was required by Massachusetts law that every citizen receive at least 6 months education and Massachusetts established its first normal school to train teachers in Lexington. *

In 1862 the Morrill Act provided 30,000 acres of public land per state for each member of the Senate and House of the State to support a College, for the benefit of Agriculture and Mechanic arts. * Later additions to this Land Grant College Act included agricultural field experiment stations, research and extension services, and after 1890 specific protection for minority admissions. *

As of 2007 the greater Boston Metropolitan area inside beltway 128/95 was home to 44 colleges and universities enrolling 236,124 students that serve not only as a valuable resource to this region but also an attraction for new people and ideas that continuously refresh our thinking. *

The Rise of Manufacturing-

In 1814 the Charles River Waltham Mill was the first to demonstrate the emerging power loom technology. In 1822 that concept was greatly expanded by damming the Merrimack River in East Chelmsford to create highly advanced canal networks and powered textile manufacturing centers in Lowell and Lawrence. These were enterprises of a scale unlike any undertaken in America at that time, and relied heavily on immigrant labor, with dangerous and unfair labor practices, hours, and wages.* By 1836 Lowell was producing 50 million yards of woven textiles per year. These vast textile enterprises flourished through the 1890s partially due to initial innovative labor practices and later due to highly exploited low-cost immigrant labor. Numerous other industries were also growing rapidly. In 1833 Lynn produced 1.5 million pairs of shoes, * and in 1855 Worcester's 22 foundries produced 152,686 plows. Boston's agricultural supply houses sold plows, rakes, cultivators, shovels, hoes, forks, scythes and axes each in the tens of thousands per year. * Hadley produced 600,000 brooms in 1845 from locally grown broom corn. * An early start in manufacturing combined with a strong educational system has

allowed the greater Boston area to become a leader in world changing economic developments such as Digital Electronics, Computing and the recent Biotechnology industry.

Expanding Transportation-

A wide spread web of canals, turnpikes and railways was required to transport the increasing farm goods and manufactured products from inland cities without river access. In the 1790s several bridges were built across the Charles River connecting Cambridge and lands north to Boston. The Middlesex canal from Chelmsford on the Merrimack connected the Merrimack River traffic to Boston in 1803 and in 1811 was extended to include Manchester, New Hampshire. * In 1835 the Boston to Worcester railway opened, extended to Springfield by 1839 and then by 1842 through the Berkshire mountains to the Hudson river. In 1847 this railway carried 88,438 tons of freight between Albany and Boston. The Boston to Lowell railway was completed in 1836, followed by the Boston to Providence railway. By 1850 New England's system was the highest density railway in the United States. Most farms were claimed to be within 12 miles of a railroad and manufacturing and farming were readily connected to a vastly larger market. * While the expansion of the railroad helped local farms deliver their produce to a wider area it also opened the route for Western produce to enter the Massachusetts markets where an expanding population of manufacturing salaried workers were able to buy food with their cash wages

The Decline of Agriculture-

The Civil War marks the high point of New England farmland acreage and the low point of forested land. During this period, New England began to see increasing rates of farm abandonment. As early as 1825 Boston alone used 120,000 cords of firewood and the Vermont Railway system used 63,000 cords yearly. Charcoal production for foundries, lime production, and heating for all rural homes also consumed large amounts of firewood. Petersham reported a decrease of 66% of its forested land between 1831 and 1865 and the sand dunes on Cape Cod grew significantly with ship captains reporting tree stumps on the remnants of land a mile from shore. Conservationists warned of the dangers of deforestation and towns began planting trees along town main roads. * It is interesting to note that Thoreau's "Walden- or Life in the Woods" was published in 1854, well into the New England period of deforestation, and that Walden site was second growth forest. * In 1900 Yale established its school of forestry and forestry practice became a profession. *1870-1900 were very hard years for New England farmers. In 1870 many New England farms were still prosperous but the 1870 farm census showed thousands of small farms were out of production and New England reported 400,000 acres of reduction in improved land. * As early as 1855 a note to the Middlesex Agricultural Society indicated the hay fields were so depleted that they would scarcely support cattle. * To this day soil studies indicate many hayfields in Massachusetts suffer soil compaction likely due to many years of haying without nutrient replacement. Cheap Western grain transported by rail drove prices down by 60% and Maine cattle and wool shearing decreased by 30%. In 1881 the Mechanical Refrigeration Company opened in Boston and the railroads added refrigerated cars. * In 1895 Massachusetts reported 1576 vacant farms and the Farm Census of 1900-1920 indicated New England lost 35,324 farms although people often continued to live in the sound buildings. Farm Summer boarders and tourism became an important farm supplemental income. *1900-1920

New England population increased 32% but increasingly competitive products from the West caused many poorly located and uneconomic New England farms to leave production and others to operate on slim profits. Meanwhile, the Dust Bowl, a long drought and series of dust storms of the 1930s devastated an estimated 50 million acres of Texas, Oklahoma, Kansas, Colorado and New Mexico causing tens of thousands of families to abandon their farms. The dust that was blown and skies that were darkened as far East as Washington DC most likely provided emphasis for the massive federal conservation action that followed. In 1935 the Soil Conservation Service, now the Natural Resources Conservation Service (NRCS) was created as part of the US Dept of Agriculture with the mission to supply equipment, financial aid and education to improve soil and water resources with an initial emphasis on those lands devastated by the Dust Bowl. Over time NRCS also assumed responsibility for many flood control projects smaller than the very large projects taken on by the US Army Corps of Engineers. In 1937 State Conservation Districts began forming, enabled by their State's adoption of the Federal Standard State Soil Conservation Districts Act. By 1945 all 48 states had formed conservation districts that provided the communication links between NRCS and the conservation needs and people of their districts. The combined effect of Land Grant University Agricultural Extension Services, NRCS and Conservation Districts provided farmers with more modern technical support than in the past but new challenges were arising. *

WW1 and WW2 had major impacts on farming. Not only were there labor shortages for US farms but there was also the added burden of supplying food to the US military and European ally populations whose farm lands were unable to produce in a war zone. The 20 million family Victory Gardens of WW1 and WW2 annually produced 8 million tons of fresh fruit and vegetables, 40% of the total consumed in the US, a profoundly amazing example of the power of a vast network of small food producers operating at high efficiency. * An outcome of these Wars was the introduction of a more synthetic fertilizer and pesticide intensive farming, now considered by many to produce lower quality food and destructive to soil, animal and pollinator life.

Environmental Movement and Farming-

In 1962 a penetrating writer and marine biologist, Rachel Carson, published "Silent Spring" an extremely thorough book clearly showing the destructive effects of DDT that launched the international movement against indiscriminate use of pesticides. Although DDT was banned, other pesticides replaced it. Over 1 billion pounds per year of pesticide is used annually in North America, more than 3 lbs. for every person. * Beginning in 1947 J.I. Rodale through the Rodale institute promoted the use of organic synthetic chemical free farming with a strong emphasis on composting. Rodale is credited with building the organic farming movement in the United States that is today providing approximately 5% of the total US at-home food purchased. 45% of Americans actively try to include organic food in their diets. Healthy food and diet are important priorities to an increasing number of people. * A recent webinar on that topic attracted an on-line audience of approximately 350,000 listeners attending its week-long session. A desire for fresh local food is generally accompanied by support of local farming and preservation of farmland.

Climate Change-

While the original charter of NRCS and Conservation Districts was soil and water it is now abundantly obvious that the atmosphere is also a critical link. In the past 40 years the number of US climate related events causing damage of more than \$1Billion in present dollars has increased from 1 to 22 annually and atmospheric CO2 and global warming is increasing rapidly. (see appendix table 1). There is much conservation work required in this area but it is comforting to know that the North East States are strong leaders in understanding this issue and taking bold action. The Regional Green House Gas Initiative (RGGI) is a cap and auction system in which all New England states plus other northeast states incentivize electricity power plants to reduce emissions. RGGI has achieved more than 40% GHG reduction between 2005 and 2014 while the state GDPs grew 8%. * The next bold step in emission reduction was taken in 2021 when Massachusetts mandated that all new automobiles sold in Massachusetts in 2035 and beyond must be fully electric. State climate change legislation has been signed into law outlining the plan for net zero atmospheric carbon emission by 2050 that would include widespread adoption of solar and wind renewable electricity as well as improved building codes with efficient electric heating and cooling. * Massachusetts has also been a leader in requiring composting of food waste and healthy soil legislation. * From the low point in 1880 of 30% forested land area Massachusetts has returned to approximately 66% forested land in 1970 * but providing for increasing population and increasing renewable solar energy collection will require skillful planning to balance energy, farmland, forest and climate effects to maximize sustainability.

The Pandemic, Supply Chains and Food Supply-

The Covid-19 Pandemic of 2019 has claimed, as of April 5, 2022, 982 thousand US lives and 6.2 million lives worldwide. * After three years the pandemic is still raging so the ultimate magnitude of this event is not yet known. Many nations across the globe shut down all non-essential activity and travel for months. Food shortages and supply chain disruptions of all types sent a strong message that more needs to be done to ensure a secure and equitable food supply that will serve all members of the population. New England is particularly vulnerable with 88% of its food being imported. With the pandemic there has come renewed interest in the “New England Food Vision” originally set forth in 2014, for developing a path to increase present New England home grown food from the present meager 12% to 50% while increasing active farm land from the present 4.5% to 15% by 2060. The food vision plan has the support of numerous universities across the New England states. * Interestingly the 2021 rising cost of transportation appears to be making local food a more attractive proposition, a reversal of the effect of low-cost rail transportation in the 1890s. Due to the cost of trucking milk to their processing plant in Western New York a large milk conglomerate announced that in 2022 it will terminate all organic milk procurement in the Northeast cancelling contracts with 89 organic milk producers. * Perhaps there will be a brighter side of this emerging story where processing and distributing this milk more locally, within New England, is more economic, reduces transportation pollution, and increases the resilience of the local community who would then be producing their own food.

Looking Forward-

Today, at the beginning of 2022, there is a rising tide of conservationism, now more often called sustainability, as the world population witnesses the devastating effects of climate change. The covid-19 pandemic has caused a global reconsideration of values, how we should collaborate as a civilization and the role of small and large government as well as the private sector. The interdependence of global supply chains has been made clear as never before and human civilization increasingly reveals its true environmental structure where everything is connected to everything else. The nature of today's most important issues is Global not simply National or even Regional so perhaps this arising awareness of the interconnectedness of things will be a catalyst to bring us to better understand the need for balance and harmony between people and their surroundings. What civilization has cast asunder civilization can right again.

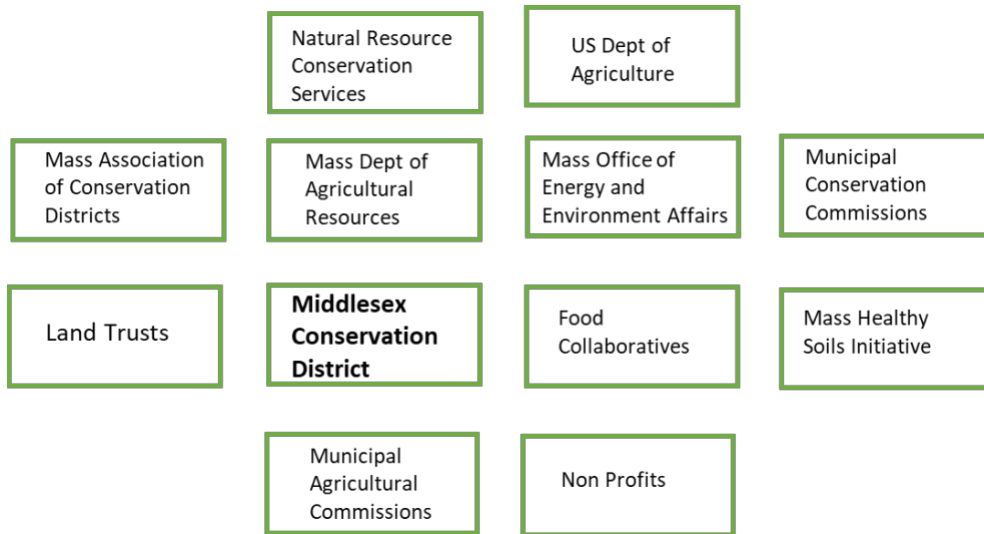
The combination of growth in population, immigration, education, farming, manufacturing, transportation, a revolutionary war, a civil war and two world wars were powerful influences in shaping the people and culture of New England and their interaction with the land. We are rapidly moving into a new era that will test our ability to reestablish balances that will be critical for those who follow.

Part II- How do we work?

Organizational Overview of Middlesex Conservation District:

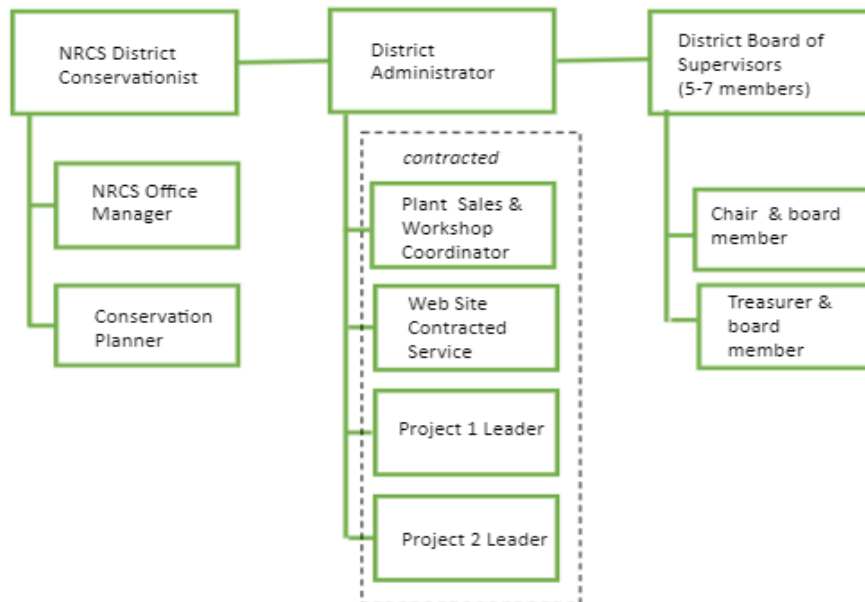
Massachusetts Conservation Districts Operating World

The "Operating World" of the Middlesex Conservation District is shown below as a graphic of the organizations with which we interact. In this group of organizations much of the productive output is through collaboration efforts rather than a direct command structure. State conservation districts are one of many links between the public and the organizations shown below and are closely coupled with the Federal Natural Resource Conservation Service (NRCS). The public includes landholders, farmers, all residents and businesses interested in environmental issues.



Middlesex Conservation District Local Organization

The chart below indicates the members and their relationships within a fully staffed and functional conservation district. The relationship between NRCS/federal agency, and a conservation district/state agency, is one of professional expertise and funding from NRCS combined with the district’s role in outreach, public awareness and coordination. General Process and Legal Guidance for conservation districts can be found in the Supervisor Handbook



Part III- Examples of work done; Middlesex Conservation District Achievements of the Past 75 years

Middlesex Conservation District Contributions 1947-2021

Cooperative Agreements and Partners:

USDA Natural Resources Conservation Service (NRCS) – Prior to 1994 known as USDA Soil Conservation Service

USDA Farm Service Agency (FSA) – Prior to 1995 known as USDA Agriculture Stabilization and Conservation Service

UMass Extension Service

MA Executive Office of Energy and Environmental Affairs (EOEEA)

MA State Commission for Conservation of Soil, Water and Related Resources

MA Dept of Agricultural Resources (MDAR)

MA Division of Fisheries and Wildlife

MA Division of Forests and Parks

MA Division of Water Resources

Massachusetts Association of Conservation Districts (MACD)

National Association of Conservation Districts

Massachusetts Envirothon State Steering Committee

Patriot Resource Conservation and Development Council

Nashua River Watershed Association

Sudbury-Assabet-Concord Watershed Association (SuAsCo)

Soil Survey for Middlesex County Completed in 1988

As land development increased in Middlesex County, there was an increase in demand for updated soils information. Natural Resources Conservation Service (NRCS) Soil Scientists were based in the Westford Field Office to work on remapping the County and update the existing soil field sheets and soil definitions that were last published in 1924. The District developed an Interim Soil Report and town soil maps for each of the 54 towns in the County. These along with copies of field sheets could be viewed in the office or purchased. Middlesex Conservation District (MCD) staff became quite proficient in assisting people locate a site and identify soils using the soil field sheets. By providing these services landowners were able to get information they needed and the soil scientists were able to do the work to update the whole county. The District served to disseminate soils information and erosion and sediment control guidance by offering training workshops and personal guidance. NRCS have been the source of soils information and the District has been fortunate to have direct access to that information. The Web Soil Survey became available in 2005 and the Middlesex County Soil Maps were published in 2009.

Working with NRCS to Establish Conservation Practices on the Land

Soils Investigation, Farm Conservation Plans, Contour Farming, Cover Cropping, Crop Rotation, Strip Cropping, Pasture Improvement, Farm & Wildlife Ponds, Woodland Management, Tree Planting, Terraces, Field Diversions, Tile and Open Farm Drainage, Nutrient Management, Waste Management, Irrigation Water Management, Fish Pond Management, Mulching, Pasture Management, Pest Management, Stream channel Improvement Structures. The District reviewed landowners' requests for assistance, participated in the formation of and council member for the Patriot Resource Conservation and Development Area and monitored Agricultural Preservation Restrictions held by NRCS.

Conservation Education:

Seminars, Workshops, Newsletters and Presentations covering Environmental Law, Erosion Control, Gardening, Plants and Wildlife, Soil Science, Stormwater Management and Title 5

Individual Workshops and Programs on Following Topics: Backyard Composting, Detention-Infiltration Basins, Difficult to Determine Hydric Soils, Elementary School Environmental Training, Environmental Adjudicatory Appeals, Erosion and Sediment Control Guidelines, Erosion Control Field Day in partnership with E.J. Prescott with speakers and product demonstrations, Farm Estate Management, Farm Tours, Farming in Wetland Resource Areas, Farmland Preservation, Hydric Soils for Municipal Leaders, Integrated Pest Management Landscaping, MA Chapter 61, Municipal Conservation Planning, Nutrient Management, No-Till Production, Open Space and Recreation, Plant Identification, Invasive Species Management, Pollinator Attraction and Health, Pond Stewardship, Shade Gardening, Soils Workshop for municipal staff in Boxborough and surrounding communities, Spotted Wing Drosophila, Title 5 Soil Evaluators Course, TR55 Urban Hydrology, Urban Hydrology Workshops, Wetland Delineation, Woodland Management.

Other Facilitation: Facilitated NRCS GPS Field Training for Watertown High School students, participated in Cambridge Reservoir Advisory Committee in fostering long term stewardship of the Cambridge Reservoir Watershed, assisted Farmer group in establishing and promoting a Buy-Local campaign for Merrimack Valley Farms, developed with Organization for the Assabet River a Non-point Source Citizen Education traveling display presented throughout the watershed, formed Local Work Groups to survey county resource concerns and actions to assist the MA State Technical Committee prioritize technical assistance to Middlesex County producers.

Sudbury-Assabet-Concord (SuAsCo) Watershed Project Initiated in 1955

Sponsored by MCD and Worcester County Conservation District with engineering and technical assistance from Soil Conservation Service to design control measures that prevent flooding on the Sudbury, Assabet and Concord Rivers. The District was a signing partner providing the required local voice and design reviews for the landowners and municipalities seeking help with flooding within the watershed from the Soil Conservation Service (now NRCS). Digital

Equipment Corp wanted to move their headquarters to Maynard, but needed assurance the river would not flood out downtown, so the Delaney Dam was constructed along with others within the SuAsCo Watershed.

Baiting Brook Watershed Project

Initiated 1956

Sponsored by the Middlesex Conservation Service, Soil Conservation Service, and the municipality of Framingham. This earthen dam project protects 2182 acres of fields and neighborhoods in Framingham that were flooding before the Baiting Brook Dam project. One of the MCD Supervisors (Donald Jackson) was a farmer who hayed fields in the area of Baiting Brook.

Annual Plant and Tree Sales

First Plant Sale 1962.

Provided low-cost tree seedlings, native plants and pollinator support plants for Middlesex landowners to purchase and plant. (Spring and Fall sale each year). Outreach in the form of newsletters and brochures for many years and now the website. An Earth Day celebration was held in 2002 to highlight local agriculture and products.

Camp Paul

A 12-acre tract of land in Chelmsford was planned and designed by the Soil Conservation Service and MCD with community assistance. Handicapped accessible trails, ponds, bridges, driveways, parking lots, and a nature study were some of the facilities created.

Woodland Management Guide

A Compilation of management information for land owners to manage their wood lots was written in cooperation with Mass Division of Forests and Parks, Soil Conservation Services and Cooperative Extension.

Model Soil Erosion and Sediment Control Bylaw

Written as guidance for communities considering adoption of this bylaw by an intern with assistance from the law firm of McGregor, Shea and Doliner and the Soil Conservation Service. With Funding from a State Conservation Commission Grant, MCD assisted the town of Groton in developing the first Storm Water Protection Bylaw in the state and reviewed erosion control projects for the town on a fee basis.

Envirothon

An environmental education program for Massachusetts secondary schools. Middlesex has been a sponsor and member of the steering committee involved in the yearlong planning that culminates in a competition in May. The district provided a soil workshop for participating students.

Part IV- *Tasks for the Future*

Long Range Plan Topics

The following topics are areas in which there is known public interest and need. The recommended approach is to review and update the long-range topics annually and use these to guide the work in each year's annual plan. Given the accelerating rate of our culture and environment's change, continual planning is particularly important.

1) Outreach and Visibility *

To be effective Middlesex Conservation District must have strong outreach and visibility across its diverse 55 municipalities. A population table and map of these communities are provided in the appendix. This is necessary to build strong relationships with these communities to understand and meet the collective needs. Fortunately, the recent acceleration in the use of online meeting tools facilitates high quality workshops that can connect a very diverse and sometimes distant talent to a wide audience more conveniently and at much lower cost than in the past.

Outreach activities include:

- Social media, including email distribution lists
- Providing workshops with expanded use of online meeting tools
- User friendly website with resource and education materials
- Promotion of the District at local events
- Cooperation with other districts and organizations
- Increasing awareness and access to services
- Encouraging and assisting educators to include conservation in education in school curriculum

2) Climate Change and Soil Health

The health and vitality of soil everywhere, from the smallest backyard garden to the largest Midwestern farm, plays an integral role in food production – and it's threatened by climate change. (see Appendix B)

Educating people about the causes and results of declining soil health is paramount in a time where we are facing change in ways we have never before experienced. We must emphasize that the result of atmospheric health, which is affected by human interference in natural cycles, in turn directly affects food production. Possible ways in which the District could facilitate change are as follows:

- Encourage and promote practices that result in minimal soil erosion
- Host workshops and provide reference material on carbon sequestration in heathy soil and other means
- Facilitate soil testing
- Education of the importance of atmosphere in soil health
- Composting
- Collaboration with other organizations

- Educate people on what they can do at home to make a difference
- Promoting no till practices

3) Conservation via Food*

Increasing interest in locally grown, fresh and healthy food for all sectors of our population is very much aligned with the preservation of local farm land and conservation. Since 1880 and particularly after World War II, farmland in Massachusetts has steadily declined. Today, much of Middlesex County is suburban housing, commercial business, with second growth woodlands accounting for the majority of open space. As of 2020, more than 500,000 households throughout the state rely on the federal Supplemental Nutrition Assistance Program (SNAP). Due to the COVID-19 pandemic, food banks throughout the state have seen a 64% increase in the number of people seeking food donations. MCD can support food insecure community members through promoting SNAP assistance and the Healthy Incentives Program (HIP) through relevant MCD events, social media posts, and website resources.

Food demand in Middlesex County is steadily rising, while harvested cropland is decreasing in Middlesex County. (see Appendix B). At 1.6 million population and a little more than half a million acres Middlesex County is no longer able to grow the food that comprises the typical American diet. In the New England Food Vision where the less populated rural land of all New England is considered, Cereal Crops and Meat production would still need to be grown outside of New England to achieve New England growing 50% of its own food on 15% of its land. This is three times the amount of New England land that is farmed today but more than fourfold increase in local food.

To increase local food supply in Middlesex County, the county requires more local farmland. Middlesex County can best aid this need, by serving as a liaison of information across the several food policy and sustainable agriculture working groups across the state.

Current policy efforts call for the support of New Entry farmers, specifically black, indigenous, people of color (BIPOC) farmers. As a result of centuries of systemic racism which has created systems of oppression in housing, land access, etc., it is crucial for the Middlesex Conservation District to support the protection of current farmland and new farmland. Policy efforts also call for sustainable agriculture practices with new bills limiting uses of pesticides, herbicides such as glyphosates, and incentivizing farmers to create and maintain healthy soils.

A key component to protecting farmland for the next generation of farmers, will be supporting MDAR's Agricultural Preservation Restriction (APR) Program and encouraging succession planning among Middlesex County Farmers. Another important food related topic is the arising urban farming movement. The approaches to providing food to highly urbanized areas are broad, ranging from use of vacant lots in inner cities to

“factory farming” in artificial environments within shipping containers or warehouse. An important part of urban farming is the benefit to youth in becoming more aware of how food is grown and “grass roots” food supply.

Middlesex County can approach this work by collaborating with organizations such as MDAR, New Entry Sustainable Farming Project, CISA, NOFA Mass, etc., on workshop events, community outreach efforts, etc. In addition to sustainable agriculture initiatives, MCD can bring attention to food waste reduction and gleaning efforts. Examples of relevant gleaning organizations include Boston Area Gleaners, who partner with farmers to alleviate the burden of excess harvest, while saving this produce from becoming food waste through food donations.

With so many organizations taking part in this important work, Middlesex Conservation District has an opportunity to meet with relevant organizations and assist in statewide food and farming goals on a county level.

4) Agricultural Consideration in Municipal Land Use Planning *

Conservation support for preservation of the land, character and health of Middlesex County can be broadened by increased municipal action for forest land and farm land preservation. Land preservation requires extensive planning at all levels. 86% of Massachusetts open land is privately owned by people many of whom are retirement age putting this land at risk of being sold for development. While waterways and open space for forest and recreation has long been considered in municipal land use planning, agriculture has not typically been as high on the public’s priority list but this is changing with the increased awareness of the importance of local high-quality food and food security. While interest in locally grown food is increasing, existing farmers are also increasingly aging out resulting in farm land that is changing ownership. With collaborative public effort farmland can be preserved rather than being converted to business or residential development. This is an excellent area in which to work with local Ag Comms and Planning groups via hosted speakers etc. Of the 55 municipalities in Middlesex County there are 34 towns without Ag Comms that could benefit from them. In addition, there are 17 towns that have not adopted the Community Preservation Act (CPA) which would entitle them to matching state funds for purchase of farm land, fund farm worker housing, etc. (See Appendix A, Table of conservation minded organizations by Town). Hosting a webinar on the value of Ag Comms and municipal adoption of the Community Preservation Act could be part of an outreach project used to emphasize the importance of Municipal Land Use Planning. This outreach could also include examples of successful farmland preservation provided by the many land trusts and non-profit environmental organizations within Middlesex County.

5) Farm Viability *

In the 1982 MCD Long Range Plan it was stated that the land in productive agriculture decreased from 18% in 1951 to 5.5% in 1980 while urban land use increased from 17% to 37% in this same time period. Comparing data from the USDA Farm Census for Middlesex county we learn that harvested cropland reduced 42 % between 1987 and 2017 while the population increased by 18%. (see appendix B) There is clear indication that the public is increasingly interested in local fresh food which begs the question of why is productive farmland decreasing? Increasing land value for Residential and Industrial use and inheritance tax of increasingly valued land is often cited as the reason for farmland being sold off. At the same time there are very successful farmers who are producing revenues of over \$100,000 per acre and profit of over 25% of revenue per year. The key to their success appears to be primarily attention to crop selection, diversification, direct marketing, and sound business accounting and management.

In addition, there is an emergence of data and technology application in farming that is long overdue and appealing to many young people who are seeking promising careers in trends of the future. This will be very helpful in attracting next generation farmers who previously viewed farming as unskilled, low pay work. An important consideration in applying farm technologies such as hydroponic or soilless controlled environment farming will be the nutritional value of the food produced. Given that some of these technologies will yield up to ten times the food per acre there will be strong profit motivations that must be balanced against the need for the public's nutritional health and the farm's ability to suitably merge with the landscape and community.

The more productive farming can be, the more it can compete for cost of land and provide sustainable wages and benefits. The more progressive farming is, the more it will be able to attract the next generation enthusiastic minds that can take it forward.

The large population of Middlesex (more than twice the next largest county) means there are nearby food markets that can be served directly or with fewer middlemen. Presently farmgate to end user distribution costs account for 50% of the food dollar so all farms that can market closer to the end user will be more viable.

Surveying Middlesex County to gather information and provide outreach on the above topics can be a way for MCD to increase farm viability. Having successful farmers provide talks regarding their approach to profitable and enjoyable farming could be considered as an outreach topic.

6) Conservation of Watersheds, Wetlands and Forested Lands*

Middlesex County is home to over 40,000 acres of wetlands, several major watersheds, and over 1 million acres of forested land. While municipalities conserve these crucial resources, so do land trusts, non-profit organizations, and volunteer groups. In the

conservation of watersheds, wetlands, and forested lands, MCD can serve as a bridge between these groups, community members, and NRCS.

The largest threats to Middlesex County's natural resources include nutrient pollution and runoff, residential and commercial development, and flooding. In order to successfully serve the district's conservation needs, MCD can create a survey to email and mail to key organizations working to protect these resources. This survey can be used to inform MCD programming and educational opportunities, as well as inform relevant organizations to community and conservation needs.

Additionally, MCD can work with other conservation districts to utilize this information across the state. To accomplish this goal, MCD should connect with MACD staff who can assist in creating the survey and determining relevant organizations that can assist. With so many wonderful conservation efforts throughout the county, MCD can utilize its website to list relevant local organizations working to conserve these crucial natural resources, as well as share information about current conservation projects and initiatives such as the Wild and Scenic Rivers Program.

7) Providing Technical Assistance*

The Middlesex Conservation District works to connect our community to conservation resources. One of the ways in which the district accomplishes this goal is through providing technical assistance. MCD has a strong relationship with the Natural Resource Conservation Service, which provides technical support for soil health, landscape planning, financial assistance through grants, easements, and farm bill programs. In addition to connecting community members to NRCS programs, MCD also provides educational and training opportunities through workshops on farm planning, pollinator gardens, and other relevant conservation related workshops.

In order to accommodate the ever-growing conservation needs of the district, MCD can create an accessible google form for community members to request connection to services, and also offer ideas on workshops that MCD can provide that are relevant to community conservation needs. In addition to providing an accessible form, MCD will continue to send out surveys during events to gauge community interest and the range of outreach within the community. MCD should also consider connecting with a local expert or firm that can assist community members who are seeking conservation assistance on residential properties. This person or organization would serve as a contact for community needs that do not fall under NRCS programs.

8) Pollinator Protection*

35% of global food production requires pollinators. In Massachusetts over 45% of agricultural commodities rely on pollinators making them a critical component of

agricultural production and a health ecosystem. In the past 20 years pollinator communities have been in rapid decline.

Middlesex Conservation District can promote the conservation, health, and well-being of pollinators, critical to both agricultural production and ecosystem health, through promotion of pollinator friendly farming practices, education, workshops, outreach, and collaboration with individuals, public and private entities.

- Plant sale (sale of native species/ pollinator packs)
- Workshops
- Outreach/community education
- Collaboration with existing organizations
- Girl/Boy scouts, school presentations

9) Fund Raising for Long Term Support of MCD

Conservation Districts have a large array of activities that require day to day attention. The tasks would be best served by a permanent full-time staff of two people who are able to evolve, develop skills and efficiency, and devote the time these tasks require to be thoroughly carried out. Outreach, webinar and event planning, reading and discussion groups, coordination and interfacing with other groups, planning agendas and writing minutes for monthly board meetings, seasonal plant sales, guiding sensitive issues through sometimes controversial waters and keeping good records are not tasks that can adequately be done on a part time basis. Addressing this need may be the single most important matter in determining the success of the future Middlesex Conservation District and recognizing the need is the first step in finding the solution. Full staffing of the permanent employees also attracts a more talented board of supervisors and assures best use of their skills when the ground work has already been well prepared. Adequate permanent staff can also help in preparing issues for, and interfacing with, NRCS. Full time permanent staff is also required to more adequately interface, on the ground, with all 55 municipalities and become more familiar with their different needs and unify support, particularly regarding issues of regional conservation. To pay a sustainable salary for two permanent full-time people with health care, basic benefits and maintain a modest office with phone, internet and networking software requires on the order of \$250,000 per year. Depending on annual grants is not a secure way to be successful in this matter nor is it a model of wise planning or management on the part of the district. One way to develop an ongoing funding stream for this support is to develop an endowment of approximately \$5million and develop methods to make these funds available for Middlesex Conservation District, a quasi-government organization. This effort could be further defined by conversations with appropriate legal experts, university legacy fund managers, financial service companies who offer donor advised funds and others who have successfully solved the ongoing funding problem for charitable causes. Raising an endowment of this size will take time, as does

most significant undertakings, but it will well be worth the effort and may be the difference between thriving and simply surviving.

Part V – The Future

Over the past 75 years, the priorities and sustainability requirements of Middlesex County have dramatically changed. Change will continue at an increasing rate as Massachusetts begins to see the impacts of climate change, population growth, technology evolution, and cultural shifts. In the past 75 years, the Middlesex Conservation District has served as a valuable conservation and educational resource for the needs of our community. This Long-Range Plan is a tool that can ensure the relevancy and sustainability of the conservation district in guiding the everchanging role of conservation and sustainability towards harmony between a land and its people. It is our hope that this plan will be used to increase community engagement, environmental education, and the conservation of working landscapes in Middlesex County.

Part VI- Middlesex Conservation District Policies

- **Toxic Materials Policy-** The district will not attempt to advise specifically on matters relating to any category of toxic materials or their use but will suggest these questions and discussion of these matters be taken up with appropriate authorities. In Massachusetts the authorities are as follows:
 - Massachusetts Department of Environmental Protection is the highest State level authority and has overall responsibility with expertise in the many areas of toxic waste.
 - Regulation and enforcement of pesticides is done through the Mass Dept of Agricultural Resources.
 - Dept of Public Health (DPH) is responsible for drinking water regulations and enforcement.
 - Municipal Boards should also be consulted to learn what specific rules they may have regarding toxics and environmental protection.
 - There is through the Toxics Use Reduction Act, which applies to facilities that use large amounts of toxic material, an interagency Administrative Council on Toxics Use Reduction and an associated Advisory Committee.

- **Conservation Plan Policy-** The district considers a conservation plan the property of the cooperator. Copies will be made to others only with the express permission of a cooperator.

- **Collaboration Policy-** The district will financially support the state and national associations to the extent they are able and will participate as much as possible in their activities. The district will also support collaborative efforts, with other conservation districts and allied organizations to the extent they are able.

Part VII- End Notes

End Notes for Part 1: Historical Context of New England and Middlesex County

Pre- Colonization

Page 2: *population of Native American New England Tribes- Historical Atlas of Massachusetts, Wilkie, Tager and Doyon – 1991 pages 10-14*

Page 2: *description of Native American farmlands – The Long Deep Furrow. H.S Russell- 1982 abridged version pg. 13*

The Rapid Expansion of Colonizers and the Importance of Agriculture

Page 3: *details of first 9 years at Plymouth Colony- The Long Deep Furrow- pages 9-10*

Page 3: *details of Massachusetts Bay Colony through 1771- The Long Deep Furrow- pages 24-63*

Page 4: *details of New England enterprise through 1880- The Long Deep Furrow- pages 221-271*

Education

Page 4: *Education in New England through 1840- The Long Deep Furrow- pages 120-194*

Page 4: *The 1862 Morrill Act the Land Grant University - The Long Deep Furrow- page 246*

Page 4: *The US Land Grant University System: An Overview. Aug 29,2019*

<https://crsreports.congress.gov/product/pdf/R/R45897>

Page 4: *Boston Colleges and Universities.*

https://en.wikipedia.org/wiki/List_of_colleges_and_universities_in_metropolitan_Boston

The Rise of Manufacturing

Page 4: *Textile Mills in Lowell and Lawrence. The Long Deep Furrow- page 191*

Page 4: *Lynn shoe industry. The Long Deep Furrow- page 139*

Page 4: *production of large quantities of farm tools. The Long Deep Furrow- page 241*

Page 4: *Hadley 600,000 brooms produced in 1845. The Long Deep Furrow- page 224*

Expanding Transportation

Page 5: *bridges and canals. The Long Deep Furrow- page 142*

Page 5: *New England Rail connections for farms and manufacturing. The Long Deep Furrow- page 189*

The Decline of Agriculture

Page 5: *deforestation. The Long Deep Furrow- pages 228-230*

Page 5: *Thoreau's Walden camp. Thoreau's Country. D.R. Foster- pages 73-74*

Page 5: *1900 Yale School of Forestry. The Long Deep Furrow- page 277*

Page 5: *1870 New England farm census reports 400,000 acres loss of improved land. The Long Deep Furrow- page 255*

Page 5: *Middlesex County depleted hay fields. The Long Deep Furrow- page 212*

Page 5: *the effect of rail transportation and refrigeration. The Long Deep Furrow- page 256, page 262*

Page 5: *loss of Massachusetts and New England farms The Long Deep Furrow- pages 279-280, page 314*

Page 6: *The Dust Bowl. The National Drought Mitigation Center- <https://drought.unl.edu/dustbowl/>*

Page 6: Honoring 86 Years of NRCS. United States Dept of Agriculture (includes formation of Conservation districts)

https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/about/history/?cid=nrcs143_021392

Page 6: Victory Gardens. History - <https://www.history.com/news/americas-patriotic-victory-gardens>

The Beginning of the Environmental Movement

Page 6: History of Organic Farming in the U.S. Sustainable Agriculture Research and Education

<https://www.sare.org/publications/transitioning-to-organic-production/history-of-organic-farming-in-the-united-states/>

Page 6: US Organic Food Interest and Market Share. USDA 2016

<https://www.ers.usda.gov/data-products/chart-gallery/gallery/chart-detail/?chartId=87354>

Climate Change

Page 7: Regional Greenhouse Gas Initiative.

https://www.rggi.org/sites/default/files/Uploads/Fact%20Sheets/RGGI_101_Factsheet.pdf

Page 7: Net Zero Atmospheric Carbon by 2050. <https://www.mass.gov/news/governor-baker-signs-climate-legislation-to-reduce-greenhouse-gas-emissions-protect-environmental-justice-communities#:~:text=The%20legislation%20signed%20by%20Governor,of%20no%20less%20than%2050%25>

Page 7: Food Waste Composting. <https://www.mass.gov/guides/commercial-food-material-disposal-ban>

Page 7. Healthy Soil Legislation: <https://nerdsforearth.com/massachusetts-soil-health-policy>

Page 7: Restoring Forests: 300 of Forest and Land Use in Massachusetts. Harvard Forest

<http://faculty.bennington.edu/~kwoods/classes/local%20landscape/readings/land-use%20change.pdf>

The Pandemic, Supply Chain and Food Security.

Page 7: Pandemic Statistics.

<https://gisanddata.maps.arcgis.com/apps/dashboards/bda7594740fd40299423467b48e9ecf6>

Page 7: New England Food Vision. https://foodsolutionsne.org/wp-content/uploads/2014/07/LowResNEFV_0.pdf

Page 7: New England Dairies. <https://www.nodpa.com/n/5995/Danone-Drops-89-Organic-Dairies-and-exits-New-England-and-Upstate-New-York-Updated-91521>

End Notes for Part IV: Tasks for the Future

Outreach and Visibility

Page 13: Advice on outreach. <https://ctb.ku.edu/en/table-of-contents/implement/access-barriers-opportunities/overview/main>

Page 13: Outreach to Increase Access. <https://ctb.ku.edu/en/table-of-contents/implement/access-barriers-opportunities/outreach-to-increase-access/main>

Conservation via Food

Page 14: Massachusetts vision and strategy to insure food equity and security through affordable, locally grown food <https://mafoodsystem.org/>

Page 14: New England Food Vision. Planning to increase percentage of New England's local food. https://www.foodsolutionsne.org/sites/default/files/LowResNEFV_0.pdf

Agriculture Consideration in Municipal Land Use Planning

Page 15: Voices from the Land. Harvard Forest -page 5

<https://www.dropbox.com/s/2q7nqn3bkmctaf2/Voices%20REV%20LR.pdf?dl=0>

Farm Viability

Page 16 - The Market Gardener. Jean-Martin Fortier, A Successful Growers Handbook for Small-Scale Organic Farming

A very interesting account of an experienced market gardener who clearly documents over \$100,000 revenue per acre.

Page 16: Components of the Food Dollar clearly showing 50% distribution cost. USDA. <https://www.ers.usda.gov/data-products/food-dollar-series/>

Page 16- Greenhouse production rate more than 10 times field grown.

<https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/greenhouse-production>

Conservation of Watersheds, Wetlands and Forested Lands

Page 16: Wetland Details. US Fish and Wildlife Service. Wetlands of the Northeast. https://www.nawm.org/wetlandsonestop/northeast_wetlands_final_report.pdf

Page 16: Forested Land Details. UMass Amherst. Mass Woods. <https://masswoods.org/massachusetts-forests>

Providing Technical Assistance.

Page 17: Conservation Assistance. NRCS Conservation Tech Assistance https://www.nrcs.usda.gov/wps/portal/nrcs/detail/ma/technical/cp/cta/?cid=nrcs144p2_013978

Page 17: Technical Assistance Avail other than Conservation. Ag Management Assistance (AMA), Conservation Stewardship Program (CSF), Environmental Quality Incentives Program (EQIP). Ag Conservation Easement Program (ACEP), Healthy Forest Reserve Program (HFRP)
<https://www.nrcs.usda.gov/wps/portal/nrcs/main/ma/programs/>

Pollinator Protection

Page 17-18: Pollinator Partnership Home page. <https://www.pollinator.org/about>

Page 17-18: MDAR Pollinator Protection Plan. <https://www.mass.gov/doc/massachusetts-pollinator-protection-plan/download>

Page 17-18: Xerces Society Pollinator Conservation Program. <https://xerces.org/pollinator-conservation/pollinator-friendly-plant-lists>

Page 17-18: Xerces Society Publication Library. <https://xerces.org/publications>

Appendix A: Conservation Related Organizations of Middlesex County

Middlesex County Land Trusts (Source: MA land Trust Coalition https://massland.org)	
Trust Name	Contact info
Middlesex Conservation District	https://middlesexconservation.org/
Acton Conservation Trust (ACT)	http://www.actonconservationtrust.org
Sudbury Valley Trustees (SVT)	http://www.sudburyvalleytrustees.org
Boxboro Conservation Trust (BCT)	http://bctrust.org
Concord Land Conservation Trust (CLCT)	http://www.concordland.org
Walden Woods Project (WWP)	http://www.walden.org/
Stow Conservation Trust (SCT)	http://www.stowconservationtrust.org
Littleton Conservation Trust (LCT)	http://littletonconservationtrust.org/
Westford Conservation Trust (WCT)	http://www.westfordconservationtrust.org
Carlisle Conservation Foundation (CCF)	http://www.carlisleconservationfoundation.org
Weston Forest & Trail Association (WFTA)	http://www.westonforesttrail.org
Nashoba Conservation Trust, Inc (NCTI)	http://www.nashobatrust.org
Nashua River Watershed Association (NRWA)	http://www.nashuariverwatershed.org
Groton Conservation Trust (GCT)	http://www.gctrust.org
Dunstable Rural Land Trust (DRLT)	http://www.drlt.org
Lincoln Land Conservation Trust (LLCT)	http://www.lincolnconservation.org
Rural Land Foundation of Lincoln (RLFL)	http://www.lincolnconservation.org
Lowell Parks & Conservation Trust (LPCT)	http://www.lowelllandtrust.org
Chelmsford Land Conservation Trust (CLCT)	http://www.clct.org
Hudson Land Trust (HLT)	https://hudsonlandtrust.org/
Upper Charles Conservation Land Trust (UCCLT)	http://www.uppercharles.org
Friends of Marry Cummings Park (FMCP)	http://cummingspark.org
Waltham Land Trust (WLT)	http://www.walthamlandtrust.org
Arlington Land Trust (ALT)	http://www.arlingtonlandtrust.org
Ashby Land Trust (ALT)	http://www.ashbylandtrust.org
North Country Land Trust Inc (NCLTI)	http://www.northcountylandtrust.org
Townsend Land Conservation Trust (TLCT)	http://www.townsendconservationlandtrust.org
Nashoba Conservation Trust, Inc (NCTI)	http://www.nashobatrust.org
Sherborn Rural Land Foundation (SRLF)	http://www.sherbornruralland.org
Hopkinton Area Land Trust (HALT)	http://www.hopkintonlandtrust.org
Friends of Whitehall (FW)	http://friendsofwhitehall.org/
Dracut Land Trust (DLT)	P.O. Box 762, Dracut, MA 01862
Reading Open Land Trust (ROLT)	http://www.rolt.org
Newton Conservators (NC)	http://www.newtonconservators.org
Med-Ford Brooks Estate Land Trust (MBELT)	http://www.brooksestate.org

State Land Trusts and Partner Organizations (Source: MA land Trust Coalition https://massland.org)	
American Chestnut Foundation, MA/RI Chapter	http://www.acf.org
American Farmland Trust New Eng Office	http://www.farmland.org
Appalachian Mountain Club Main Office	https://www.outdoors.org/
Environmental League of Massachusetts	http://www.environmentalleague.org
Mass Dept of Fish and Game	http://www.mass.gov/dfg
Mass Division of Ecological Restoration	https://www.mass.gov/orgs/division-of-ecological-restoration
Mass Department of Fisheries and Wildlife	http://www.mass.gov/eea/agencies/dfg/dfw/
Manomet Center for Conservation Scientists	http://www.manomet.org
Mass Association of Conservation Commissions	http://www.maccweb.org
Mass Audubon	http://www.massaudubon.org/Nature_Connection/landprotection/index.php
Mass Native Plant Trust	http://www.newfs.org
New England Forestry Foundation	http://www.newenglandforestry.org
Orenda Wildlife Plant Trust	http://www.orendalandtrust.org
The Conservation Fund Loan Program	http://www.conservationfund.org/what-we-do/land-conservation-loans
The Trust for Public Land	http://www.tpl.org
The Trustees of Reservations	http://www.thetrustees.org
University of Mass Amherst- Mass Woods	http://www.masswoods.net/

Massachusetts Watershed Organizations (Source: https://massriversalliance.org/members-orgs)	
Charles River Watershed Association (CRWA)	https://www.crwa.org/
The Charles River Conservancy (CRC)	https://thecharles.org/
Mystic River Watershed Association (MRWA)	https://mysticriver.org/
Nashua River Watershed Association (NRWA)	http://www.nashuariverwatershed.org/
The Sudbury, Assabet and Concord Wild and Scenic River Stewardship Council	http://www.sudbury-assabet-concord.org/
OARS (Assabet, Sudbury, Concord Rivers)	https://www.oars3rivers.org/
Mass Sierra Club	https://www.sierraclub.org/massachusetts
Environmental League of Massachusetts	https://www.environmentalleague.org/
Clean Water Action Massachusetts	https://www.cleanwateraction.org/states/massachusetts
Friends of the Middlesex Fells Organization	https://www.friendsofthefells.org/visitor-information/
Merrimack River Watershed Council	https://merrimack.org/
Friends of the Malden River	https://maldenriver.wordpress.com/
Friends of the Assabet River National Wildlife Refuge	http://farnwr.org/
Other Organizations Related to Conservation in Massachusetts	
Environmental Massachusetts	https://environmentmassachusetts.org/
Mass Org of State Engineers and Scientists	https://moses-ma.org/

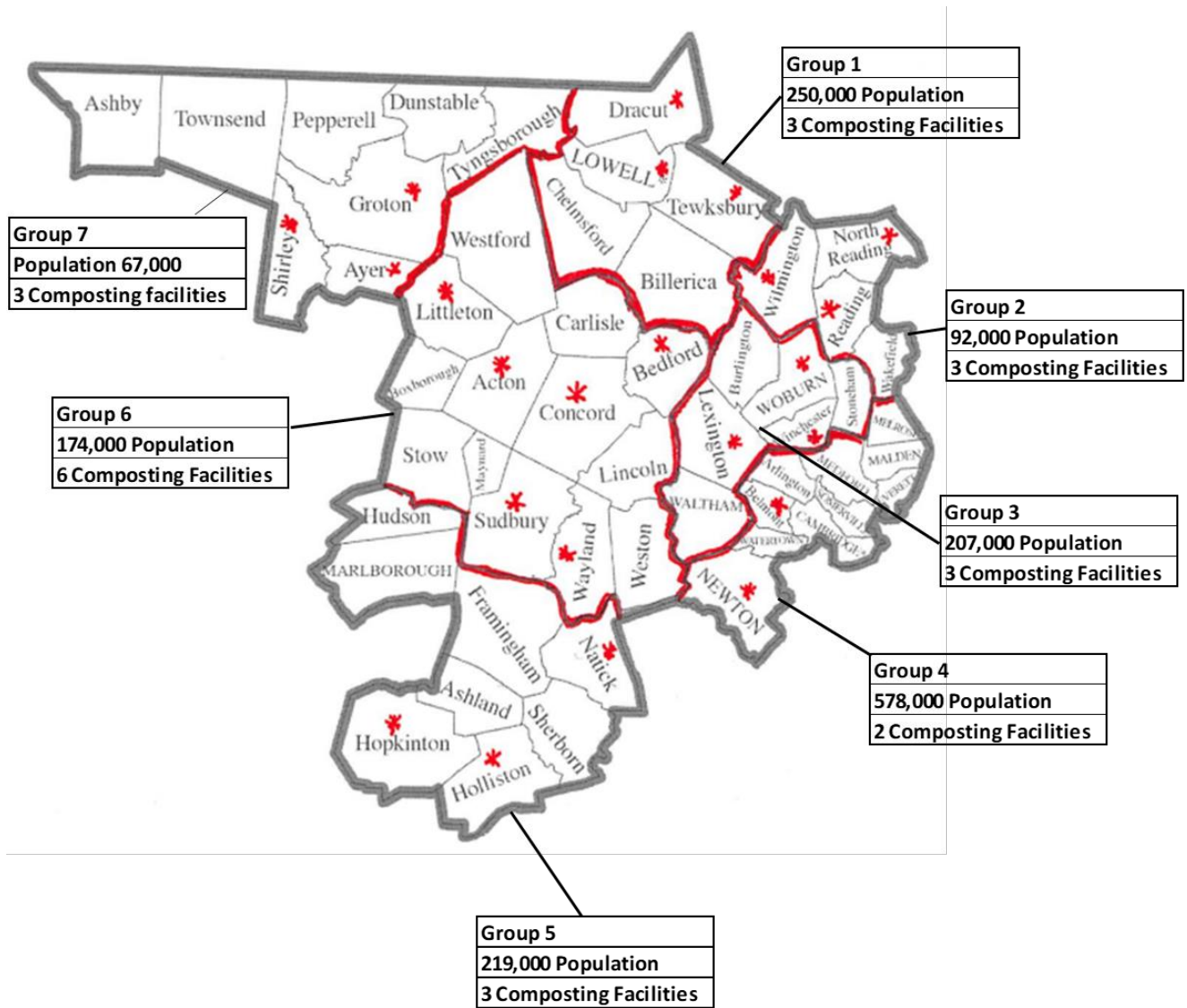
Middlesex County Conservation Minded Organizations by Town					
	Municipality	Trusts (*1)	Conservation Commission (*2)	Agricultural Commission (*3)	Community Preservation Act (*3)
1	Acton	ACT, SVT	Yes	Yes	Yes
2	Arlington	ALT	Yes	No	Yes
3	Ashby	ALT, NCLTI, NRWA	Yes	Yes	No
4	Ashland	SVT	Yes	No	Yes
5	Ayer	NRWA	Yes	No	Yes
6	Bedford	SVT	Yes	No	Yes
7	Belmont	No Local Land Trusts	Yes	No	Yes
8	Billerica	SVT	Yes	No	Yes
9	Boxboro	BCT	Yes	Yes	Yes
10	Burlington	FMCP	Yes	No	No
11	Cambridge	No Local Land Trusts	Yes	No	Yes
12	Carlisle	CCF, SVT	Yes	Yes	Yes
13	Chelmsford	CLCT, SVT	Yes	No	Yes
14	Concord	CLCT, SVT, WWP	Yes	Yes	Yes
15	Dracut	DLT	Yes	Yes	Yes
16	Dunstable	DRLT, NCTI, NRWA	Yes	Yes	Yes
17	Everett	No Local Land Trusts	Yes	No	Yes
18	Framingham	SVT	Yes	Yes	Yes
19	Groton	GCT, NCTI, NRWA	Yes	Yes	Yes
20	Holliston	SVT, UCCLT	Yes	Yes	Yes
21	Hopkinton	HALT, SVT, UCCLT, FW	Yes	No	Yes
22	Hudson	HLT, SVT	Yes	No	Yes
23	Lexington	No Local Land Trusts	Yes	No	Yes
24	Lincoln	LLCT, RLFL, SVT, WWP	Yes	Yes	Yes
25	Littleton	LCT, SVT	Yes	Yes	Yes
26	Lowell	LPCT, SVT	Yes	No	Yes
27	Malden	No Local Land Trusts	Yes	No	Yes
28	Marlboro	SVT	Yes	No	No
29	Maynard	SVT	Yes	No	Yes
30	Medford	MBELT	Yes	No	Yes
31	Melrose	No Local Land Trusts	Yes	No	Yes
32	Natick	UCCLT, SVT	Yes	No	No
33	Newton	NC	Yes	Yes	Yes
34	North Reading	No Local Land Trusts	Yes	No	No
35	Pepperel	NRWA, NCTI	Yes	Yes	No
36	Reading	ROLT	Yes	No	No
37	Sherborn	SRLF, SVT, UCCLT	Yes	Yes	No
38	Shirley	NRWA	Yes	No	No
39	Stoneham	No Local Land Trusts	Yes	No	No
40	Stow	SCT, SVT	Yes	Yes	Yes
41	Sudbury	SVT	Yes	Yes	Yes
42	Summerville	No Local Land Trusts	Yes	No	No
43	Tewksbury	SVT	Yes	No	Yes
44	Townsend	TLCT, NCTI, NCLTI, NRWA	Yes	No	No
45	Tyngsboro	No Local Land Trusts	Yes	No	Yes
46	Wakefield	No Local Land Trusts	Yes	No	No
47	Waltham	WLT	Yes	No	Yes
48	Watertown	No Local Land Trusts	Yes	No	Yes
49	Wayland	SVT	Yes	No	Yes
50	Westford	WCT, SVT	Yes	Yes	Yes
51	Weston	WFTA, SVT	Yes	Yes	Yes
52	Wilmington	No Local Land Trusts	Yes	No	No
53	Winchester	No Local Land Trusts	Yes	No	No
54	Woburn	FMCP	Yes	No	No
*1	Source: MA land Trust Coalition https://massland.org (viewed on 10/11/21)				
*2	Source: https://www.maccweb.org/page/AboutConCommMA (viewed on 10/11/21)				
*3	Source: Map of Ag Comms and RTF https://www.massagcom.org/AgComs.php (viewed on 10/11/2021)				
*4	Source: https://www.communitypreservation.org/map (viewed on 10/11/21)				

Appendix B: Rate of Population, Environmental and Cultural Change of Past 38 Years

Population, Environmental and Cultural Changes of Past 38 Years (1982-2020)			
	1982	2020	% change
World Population in (Billions)	4.6	7.8	70%
US Population (Millions)	232	331	43%
Massachusetts Population (Millions)	5.77	6.89	19%
Middlesex County Population (Millions)	1.37	1.62	18%
Massachusetts Harvested Cropland per Capita 1982 and 2017 (sq ft /person) <i>Source: 1982 MA Ag Census https://agcensus.library.cornell.edu/census_parts/1982-massachusetts/</i>	1430	894	-37%
Middlesex County Harvested Cropland per Capita 1982 and 2017 (sq ft/person) <i>Source: 1982 MA Ag Census https://agcensus.library.cornell.edu/census_parts/1982-massachusetts/</i>	493	249	-49%
US Pesticide Use (millions lbs/year) <i>Source: https://www.epa.gov/sites/default/files/2017-01/documents/pesticides-industry-sales-usage-2016_0.pdf</i>	580	1000	72%
US Miles Driven/Year (Trillions) <i>Source: https://afdc.energy.gov/data/10315</i>	1.54	3.23	110%
World Fossil Fuel Carbon Emissions/Year (Billion Tons) <i>Source: https://www.epa.gov/ghgemissions/global-greenhouse-gas-emissions-data</i>	5.5	10	82%
Atmospheric CO2 (cycled at less than 300ppm for 800,000 years preceding 1920) <i>Source: https://www.climate.gov/news-features/understanding-climate/climate-change-atmospheric-carbon-dioxide</i>	340 ppm	> 400 ppm	
Average Global Temperature Change (Deg C) <i>Source: https://www.climate.gov/news-features/understanding-climate/climate-change-global-temperature#:~:text=Earth's%20temperature%20has%20risen%20by,land%20areas%20were%20record%20warm.</i>	Baseline	+0.7	
Annual Frequency of Billion Dollar Climate Events in US Adjusted to Present Dollars <i>Source: https://www.ncdc.noaa.gov/billions/</i>	1	22	
US Cell Phone Subscribers (per 100 people) <i>Source: https://fredblog.stlouisfed.org/2015/04/going-mobile/?utm_source=series_page&utm_medium=related_content&utm_term=related_resources&utm_campaign=fredblog</i>	0	99	
Number of Worldwide Internet Users	Hundreds	Billions	

Appendix C: Middlesex Towns, Population and DEP Composting Facilities

**Marks DEP Composting Facility*



Group	Name of Town or City	Population	Composting Facility	% of Middlesex Population			
1	Lowell	110,964	Yes				
	Dracut	31,113	Yes				
	Chelmsford	35,067					Group 1
	Billerica	42,271					250,000 Population
	Tewksbury	30,666	Yes				3 Composting Facilities
	Group Total	250,081			16%		
2	Wilmington	23,538	Yes				Group 2
	North Reading	15,598	Yes				92,000 Population
	Reading	25,769	Yes				3 Composting Facilities
	Wakefield	26,823					
	Group Total	91,728			6%		
3	Waltham	62,832					Group 3
	Lexington	33,339	Yes				207,000 Population
	Woburn	39,500	Yes				3 Composting Facilities
	Winchester	22,579	Yes				
	Burlington	26,103					
	Stoneham	22,729					
	Group Total	207,082			13%		
4	Cambridge	110,893					Group 4
	Sumerville	79,983					578,000 Population
	Everett	46,212					2 Composting Facilities
	Medford	57,700					
	Watertown	34,553					
	Newton	88,479	Yes				
	Malden	61,212					
	Belmont	25,965	Yes				
	Arlington	44,992					
	Melrose	28,132					
Group Total	578,121			36%			
5	Framingham	71,232					Group 5
	Marlborough	39,771					219,000 Population
	Natick	35,957	Yes				3 Composting Facilities
	Hudson	19,843					
	Ashland	17,478					
	Sherborn	4,302					
	Hopkinton	16,270	Yes				
	Holliston	14,480	Yes				
	Group Total	219,333			14%		
6	Stow	7,061					Group 6
	Boxborough	5,546					174,000 Population
	Littleton	9,754	Yes				6 Composting Facilities
	Westford	24,087					
	Carlisle	5,160					
	Bedford	14,105	Yes				
	Lincoln	6,696					
	Weston	12,027					
	Wayland	13,700	Yes				
	Sudbury	18,697	Yes				
	Concord	16,481	Yes				
	Maynard	10,560					
	Acton	23,455	Yes				
Lincoln	6,696						
Group Total	174,025			11%			
7	Ashby	3,199					Group 7
	Townsend	9,418					Population 67,000
	Peperell	12,049					3 Composting facilities
	Dunstable	3,337					
	Tyngsboro	12,232					
	Groton	11,282	Yes				
	Ayer	8,014	Yes				
	Shirley	7,572	Yes				
	Group Total	67,103			4%		
Middlesex Total	1,587,473						

This plan is approved by the Middlesex District Board and signed as follows:

Date Signed

Katherine Becker – Chair

Andrew Mintz – Treasurer

Patrick Hearn – Supervisor

Elizabeth Austin- Supervisor

Benee Hershon- Supervisor

Julie Weiss- Supervisor
