

ANALYSIS OF VERMONT'S FOOD SYSTEM

Food Production: Honey

What role do honeybees play in Vermont's food system? How much honey is produced in Vermont?

Animal pollinators—domesticated exotic honeybees, bats, birds, and other insects—are the unsung heroes of food systems, traveling thousands of miles to fertilize fruits, vegetables, nuts, grasses, and seeds. Honeybees alone are said to account for 80% of all insect pollination in the United States.¹ When honey bees gather up nectar and pollen for sustenance, pollen sticks to the hairs on their bodies. As they move from plant to plant, they deposit pollen (the male gamete)

on the stigmas, or tips, of carpels (the egg-producing region of plants), leading to fertilization and fruit production. Beyond pollination services, honey- bees produce a variety of products enjoyed by humans since ancient times, including honey, beeswax, pollen (used as a food supplement), propolis (a resin-like mixture used as a medicine), and royal jelly (used as a supplement and in beauty



Jarring Honey.

products). Humans have also turned honeybee products into mead (an alcoholic beverage), candies, soap, candles, cosmetics, and medicines.

With a market value estimated at \$396,000 in 2011 by the USDA [National Agricultural Statistics Service](#) (NASS), the economic contribution of honey production in Vermont is a small component of the value of the state's total food system. However, this figure misses small-scale honey production and value-added products (e.g., candles), and undercounts the essentially free ecosystem services provided by domesticated exotic honey bees and native bees for agricultural crops, gardens, and wildlife habitats.²

GETTING TO 2020

Goals 7 and 13 of the F2P Strategic Plan focus on increasing food production, including honey production, for local, regional, national, and even international markets.

Goal 7: Local food production—and sales of local food—for all types of markets will increase.

Goal 13: Local food will be available at all Vermont market outlets and increasingly available at regional, national, and international market outlets.

CURRENT CONDITIONS

Approximately 2 million honeybee colonies³ are transported to states such as California, Florida, Minnesota, Montana, North Dakota, and South Dakota every year to pollinate alfalfa, almonds, apples, avocados, blueberries, cantaloupes, cherries, cranberries, cucumbers, pears, plums, sunflowers, watermelons, and many other crops.⁴ Almond production in California alone requires upwards of 1 million colonies for pollination.

In 2010, NASS recorded 176 million pounds of honey from American producers with five or more colonies, up 20% from 146 million pounds in 2009. North Dakota is the largest honey-producing state, with over 46 million pounds produced in 2010. Most of this honey (between 60 and 80%) is destined for food manufacturing (e.g., as a sweetener in cereals), while the remainder is characterized as “table honey.” **Corn syrup and sugar (cane or beet) account for about 99% of sweeteners used in food manufacturing, while honey makes up less than 1%.**



Bee on purple coneflower.

Nationwide, the number of honeybee colonies decreased from 4.6 million in 1965 to 2.68 million in 2010 (note that NASS surveys only beekeepers with five or more colonies). **Peak honey production in the United States occurred in 1969.** The decrease in honeybee colonies has been attributed to mites, viruses, and other environmental factors, as well as increased honey imports.⁵ Imports now account for over 50% of the honey consumed in the United States.

The market value of U.S. honey production was estimated to be \$282 million in 2010. The average yield of the 2.68 million honey-producing colonies in the United States tracked by NASS was about 65.5 pounds per colony in 2010.⁶ The average national price for all honey in 2010 was \$1.60 per pound in 2010, up from \$1.47 per pound in 2009.⁷ Hobbyists, or small-scale producers, on the other hand, can sell honey for \$5 to \$8 a pound through direct markets.⁸

🍯 Honey Laundering

China is the leading producer of honey in the world. Since December 2001, the United States has maintained an “antidumping” tariff on Chinese honey (i.e., a \$2.63 duty for every kilogram of Chinese honey imported into the United States) to protect domestic producers. The U.S. [Immigration and Customs Enforcement](#) arm of the *Department of Homeland Security* has investigated many instances of black market honey illegally imported into the United States. For example, the United States does not have tariffs on honey from Taiwan, South Korea, or Thailand. Some honey producers have been prosecuted for “laundering” their Chinese product through these countries. Additionally, other individuals and businesses have been investigated and/or prosecuted for importing tainted honey or for mislabeling their honey to avoid the duty.⁹

A recent posting on the [American Honey Producers Association](#) website charges that Chinese honey is being laundered through India on an epic scale: nearly 63 million pounds of honey were imported from India (i.e., China) from March to June 2011, despite reports from Indian media that national honey production could be down in 2011. The previous three-month import high from China was 19 million pounds.¹⁰ As a point of comparison, In June 2010 the European Union started banning honey imports from India due to contamination (e.g., lead, animal medicine). [Food Safety News](#) also reports that “some of the largest and most long-established U.S. honey packers are



Beekeepers at Applecheek Farm, Hyde Park.

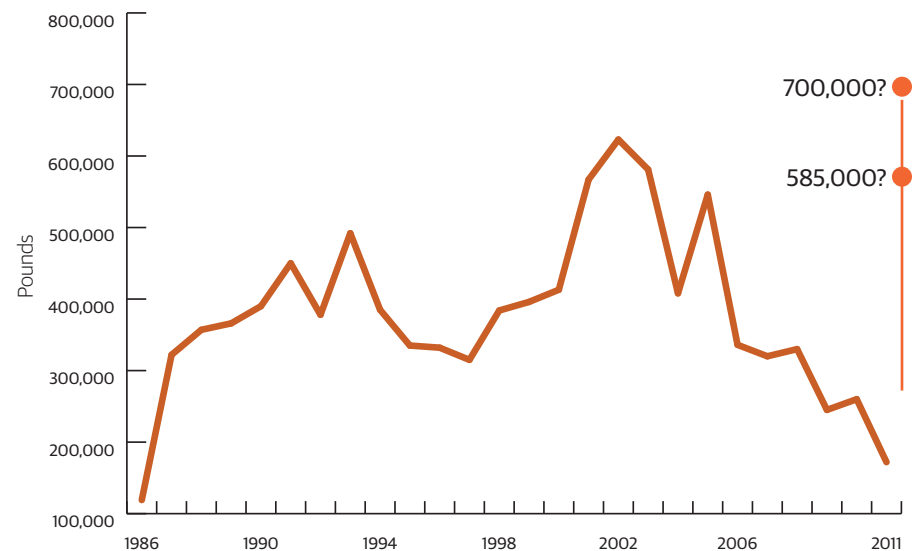
knowingly buying mislabeled, transshipped or possibly altered honey so they can sell it cheaper than those companies who demand safety, quality and rigorously inspected honey.”¹¹

A recent investigation by *Food Safety News* found that most of the honey sold in U.S. grocery stores is ultra-filtered to remove pollen. Honey with pollen removed is not considered honey by the U.S. Food and Drug Administration. The World Health Organization, the European Commission, and other organizations have ruled that, without pollen, it is not possible to determine that honey came from safe and legitimate sources. The *Food Safety News* investigation found that 76% of samples bought at grocery stores (e.g., *Safeway*, *Stop and Shop*), 100% of the honey sampled from drugstores like *Walgreens* and *Rite-Aid*, 77% of the honey sampled from big box stores like *Costco*, *Sam's Club*, and *Walmart*, and 100% of the honey packaged in individual service portions from *Smucker's*, *McDonald's*, and *KFC* had the pollen removed. The implication of this investigation is that pollen was removed from this honey to disguise the fact that it illegally entered the country from China. In contrast, the investigation also found that honey sampled from farmers' markets, co-ops, and natural food stores like *Trader's Joes* had the expected amount of pollen.¹²

🍯 Honey Production in Vermont

Vermont has about 2,000 registered beekeepers with about 11,000 hives, according to state apiculturalist Stephen Parise at the *Vermont Agency of Agriculture, Food and Markets* (VAAFAM).¹³ Several commercial beekeepers and apiaries operate in Vermont (e.g., *Champlain Valley Apiaries* in Middlebury, in operation for 80 years), but most beekeepers do it for “love and honey,” according to the *Vermont Beekeepers Association* (VBA). There are approximately 400 VBA members, ranging from commercial producers to hobby beekeepers. VBA provides education and access to other resources to support start-up and existing beekeepers and honey producers in Vermont.

Figure 3.3.1: Vermont Honey Production



Source: USDA NASS, <http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1191>

According to NASS, Vermont produced 172,000 pounds of honey in 2011 (about 0.12% of U.S. production), down from a historic record high of 623,000 pounds in 2002-2003 (Figure 3.3.1). NASS indicates that the number of honey-producing colonies in Vermont decreased from 5,000 to 4,000 from 2009 to 2011 (4,000 colonies is one of the lowest per-state totals; NASS only counts producers with five or more colonies).¹⁴ VBA reports that Vermont has 9,000 hives that produce about 700,000 pounds of honey per year.¹⁵

Honey Gardens Apiary

Todd Hardie is quiet, but when asked about his favorite subject—bees—he is eloquent and full of great information. Todd has been keeping bees since he was a young boy. His knowledge about bees, honey, and apitherapy—the age-old tradition of therapy from the beehive—seems boundless.

And his passion and commitment to sharing that knowledge with others comes through in his business, [Honey Gardens Apiaries](#).



Jars of Honey Garden's Raw Honey

Started by Todd 30 years ago, *Honey Gardens* on Route 7 in Ferrisburgh has been selling raw honey since its inception. Although it's not as popular as the "runny" honey found in those plastic bear-shaped containers, thick, raw honey is thought to aid the digestive system, strengthen the immune system, promote overall respiratory health, and help fight seasonal allergies. At first, Todd had more raw honey than he could sell, so he was forced to heat some of it and turn it into the liquid honey that many consumers want. However, he hated ruining the health benefits of his honey by heating, so he was pleased when the demand for raw honey finally caught up with the supply.

Now, Todd sells only raw honey, except when it becomes so crystallized that there is no other way to get the honey out and into jars than to heat it into a more liquid form. Because Todd does not like heating his honey, it must all be packed into jars before it gets too crystallized; the *Honey Gardens* staff can sometimes be packing honey as much as 20 hours a day in busy periods—not as convenient as spacing the work out over the year, but well worth the effort for the extra flavor and health benefits.

Honey Gardens also makes and sells Elderberry Honey syrup to combat colds and flu and to strengthen the immune system. The syrup includes echinacea and propolis in its pleasantly short list of ingredients. Propolis is used as an antibiotic, a viricide, and a fungicide. *Honey Gardens* sells a propolis spray for use on sore throats, inflamed gums and mouth sores, cuts, burns, and stings.

From "Sweet Honey in the Raw," *Vermont's Local Banquet*, Spring 2008, www.localbanquet.com/issues/years/2008/spring08/honey_sp08.html

However, 9,000 colonies producing 700,000 pounds of honey per year would equal a 77.78-pound-per-colony average, well above Vermont's 2010 per-colony average (65 pounds), the national average (65.5 pounds), and the per colony averages for most states as measured by NASS. It is more than likely that honey production in Vermont is larger than NASS estimates, but the order of magnitude is not clear. If the 5,000 colonies estimated by VBA, but not counted by NASS, produced the 2010 Vermont per-colony average yield, then an additional 325,000 pounds of honey would have been made in 2010 (for a total of 585,000 pounds). Accurate colony numbers and honey-production accounting methods need to be established to clarify the NASS and VBA estimates.

Honeybees are valuable to Vermont agriculture for two main reasons: They are important pollinators for crops (e.g., forage crops, apples), and they produce honey, a natural sweetener used in many food and nonfood products. Because Vermont produces small amounts of honey compared to the rest of the nation, it is assumed that most Vermont honey is table honey. The average price for a pound of Vermont honey was \$2.21 in 2010, up from \$2.01 in 2009.¹⁶ According to Kim Greenwood of the [Central Vermont Beekeeping Club](#), honey sales in Vermont are strong, even with yearly production fluctuations, and most keepers can't keep up with the demand for their product.¹⁷

Some Vermont companies, particularly [Honey Gardens](#) in Ferrisburgh, have developed "apitherapy" medicinal products focusing on strengthening immune systems and providing cold remedies. The venom of honeybees, called apitoxin, has been used to treat autoimmune diseases, and was made famous by the late [Charles Mraz](#), who lived in Middlebury (his family runs *Champlain Valley Apiaries*).¹⁸ Many companies have also begun using honey in soaps, oils, and moisturizers. The wax produced in hives has many uses, including candle making, a common product at farmers' markets in Vermont. Several Vermont businesses also raise bees and sell beekeeping equipment. The value of these other honeybee and honey-based products is not captured by NASS.

By purchasing local honey, consumers can support local beekeepers, and can be sure that the honey products they consume are pure because they come from trusted sources. Additionally, the costs of pollination services are paid for by

honey sales: if the price of honey is low as a result of honey imports, then the ability of beekeepers to provide essential pollination services to the food system is impacted.¹⁹

We rent approximately 140 colonies from [Singing Cedars Apiaries](#) in Orwell. This service ensures that pollination of our apple crop occurs. There are years when the sun is shining full and temperatures are consistently in the 80s and everything is in bloom when perhaps this may not be necessary. However, in years like this year, for instance, we had cool, wet weather except for one six-hour period one afternoon. During this time the bees worked en masse and for the most part pollinated the entire orchard. It is times like this that we are glad we paid the money we did. Given the unpredictability of the weather, it is necessary to rely on the bee services of professional beekeepers for our pollination.

—Barney Hodges, [Sunrise Orchards](#)

🍯 Meeting the Demand?

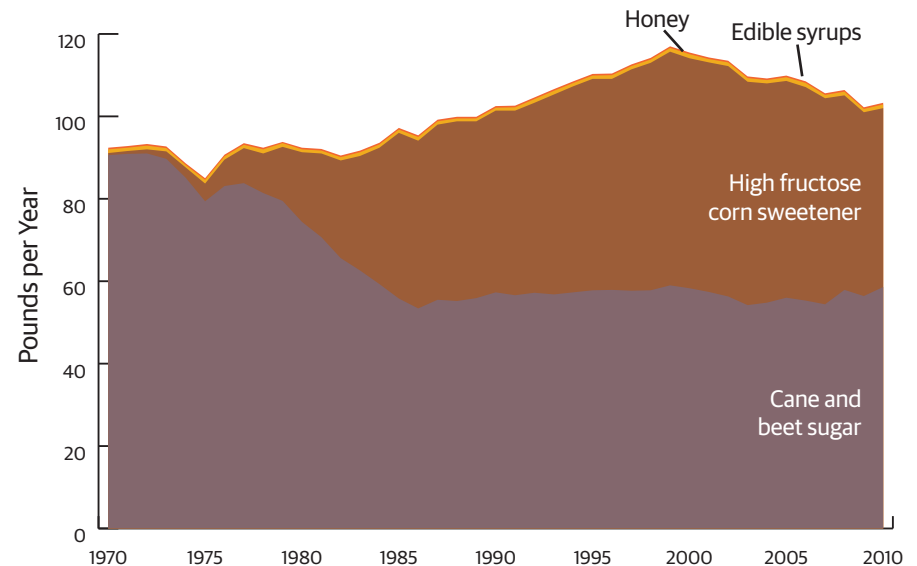
Consumer demand for natural sweeteners such as honey is significant²⁰ and many Vermonters are interested in increasing in whether we can feed ourselves with local food production. Unfortunately, no comprehensive data exist to indicate exactly how much and what type of food—including honey—is currently being consumed by Vermonters. While we do not know how much of the honey produced in Vermont is consumed in Vermont, throughout the F2P Strategic Plan we use the [food availability per capita estimates](#) of the [USDA Economic Research Service](#) (ERS) and the [MyPlate dietary guidelines](#) of the USDA to contextualize current Vermont production.

Food availability per capita is commonly used as a proxy for food consumption, even though it does not measure actual consumption. The ERS calculates food availability per capita by adding total annual national production, imports, and beginning stocks of a particular commodity and then subtracting exports, ending stocks, and nonfood uses. This number is then divided by population estimates for the area of interest to arrive at per capita estimates of available food for any particular year. The ERS also attempts to account for food losses, from farms to retailers to consumers (e.g., spoilage and waste). Across the F2P Strategic Plan we use the **consumer weight** to reflect the state of a product at the time of purchase.

The USDA dietary guidelines recommend avoiding “[empty calories](#)” from sugars and solid fats. Nevertheless, the national per capita availability of sugars *increased* 10.5% from 1970 to 2010, from 106.0 pounds to 117.2 pounds (Figure 3.3.2). Cane and beet sugar, high fructose corn sweetener, honey, and edible syrups account for 88.2% (103.3 pounds) of sugar and sweetener availability in 2010, and 87.1% (92.4 pounds) in 1970. **The ubiquity of high fructose corn syrup, cane sugar, and beet sugar far outweigh the contribution of honey as a sweetener: For example, the per capita availability of high fructose corn syrup increased 8,802% from 1992 to 2010, while per capita availability of honey remained the same.** On a per capita basis, over 27 million pounds of high fructose corn syrup were available to the citizens of Vermont in 2010.

ERS indicates that the real benefit of per capita availability estimates is to see long-term trends. The per capita availability estimates for honey have stayed constant over the past 40 years, averaging 0.8 to 0.9 pounds per person (i.e., as domestic production has declined and the U.S. population has grown, honey imports have increased). Although we do not know how much honey Vermonters consume, if every Vermonter

Figure 3.3.2: U.S. Per Capita Availability of Selected Sweeteners, 1970-2010



Source: USDA ERS, [Food Availability \(Per Capita\) Data System](#).

Table 3.3.1: Comparing Food Availability Data and Dietary Guidelines with Vermont Honey Production

	U.S. per capita availability (consumer weight adjusted for loss) (2010)	Amount required if Vermont matched per capita availability	How much does Vermont produce? (2011)	Vermont per capita availability
	Pounds	Pounds	Pounds	Pounds
Total Caloric Sweeteners	117.2	73,336,845	>12,894,400*	>20.6
Selected sweeteners	0.9	563,167	≈172,000	≈0.3
Honey	0.9	563,167	≈172,000	≈0.3
USDA MyPlate dietary guidelines	Annual recommendations	Amount required if Vermont matched guidelines	How much does Vermont produce? (2011)	Surplus or deficit?
	Pounds	Pounds	Pounds	Pounds
Honey				
Males (ages 20 - 49)	55.8 to 69.5	7,271,685	≈172,000	≈21,175,809 deficit
Males (ages 50+)	54.8	6,055,405		
Females (ages 20 - 49)	33.7 to 54.8	4,914,044		
Females (ages 50+)	25.3	3,106,675		
Subtotal		21,347,809	≈172,000	≈21,175,809 deficit

Note: Chapter 3, Section 1: Understanding Consumer Demand used 2007 per capita availability data for all food categories since more recent data was not available for some food categories (e.g., fruits and vegetables). Since annual data is available for honey we use that information here. * Includes maple syrup production.

consumed exactly the per capita amount of honey available per year, approximately 563,167 pounds would be needed to meet the state's demand. This amount is triple the NASS estimate of honey production in Vermont in 2011. On the other hand, this amount is equal to 80% of VBA's estimate of Vermont honey production (i.e., 700,000 pounds).

The dietary guidelines of the USDA provide another lens for looking at this question. The USDA recommends limiting the amount of *"empty calories"* from added sugars and it provides a range of recommended calories from empty calories by age and gender. As indicated in Table 3.3.1, over 21 million pounds of added sugars would be need to match the per capita needs of Vermonters.

Of course, it is unrealistic to expect all Vermonters to consume the per capita amount of honey available to them or to meet the USDA recommendations for empty calories just with honey. Honey production will never displace high fructose corn syrup, corn syrup, and other refined sugars: 43.4 pounds of high fructose corn syrup and 58.6 pounds of refined sugar were available to every American in 2010, whereas less than 1 pound of honey was available per capita. Given the scale of Vermont honey production, it is unlikely that very much Vermont honey makes it to food manufacturing— the number one use of honey in the United States.

Caloric Sweeteners (Honey) Per Capita Availability**Deficit: ≈ 73,164,845 pounds****MyPlate Dietary Guidelines for Empty Calories****Deficit: ≈ 21,175,809 pounds**

However, with the growing interest in local food, growing skepticism of artificial ingredients and flavors in food products, and concerns about contaminated honey products from other countries, Vermont can explore market expansion for table honey by touting its natural and pure characteristics.

NASS recorded 7,000 Vermont colonies and 623,000 pounds of honey produced in 2002, so we know that Vermont at one time produced more than double the 2010 honey production levels measured by NASS. In addition to producing a natural sweetener, beekeeping generates many other products (e.g., candles) with markets that could be further developed.

The limiting factor for honey production is the available nectar resource (e.g., Vermont cannot return to 2002 levels of honey production without a matching nectar resource). Parise indicates that as the number of Vermont dairy farms decrease, the state could also be losing valuable honeybee forage habitat: White clover, yellow trefoil, alfalfa, and other plants commonly used as pasture crops are magnets for honeybees. Many people are concerned about the contamination threat posed by genetically modified (GMO) alfalfa, especially because honeybees will spread GMO alfalfa beyond where it is planted, potentially contaminating the alfalfa of organic producers. Additionally, the nectar of GMO alfalfa will get converted into honey.²¹ The USDA recently approved unrestricted commercial cultivation of GMO alfalfa, despite an earlier compromise that would have limited cultivation.²²

To strengthen and grow honey production in Vermont, bee habitat needs to be maintained and expanded; the technical assistance infrastructure needs more personnel to provide expertise, including the ability to monitor and disseminate best practices for colony health; and marketing of Vermont honey as a safe, pure, natural sweetener needs to be ramped up.

🐝 Colony Collapse Disorder

Because honey-bees forage over such a wide area (up to a 1.5-mile radius from the hive) and have such a high number of individuals out in the field (a populous colony in midsummer may have upwards of 25,000 or more foragers), they are often studied like canaries in coal mines to determine the health of the environment. Honeybees visit thousands of flowers and collect both nectar and pollen from many plant species. An analysis of the nectar and pollen returned to the colony can reveal a wide range of possible contaminants such as pesticides, heavy metals, air pollutants, and radiation. The beeswax that the bees produce in their bodies to build their combs acts as an environmental sponge. The chemical makeup of the beeswax allows numerous environmental contaminants to accumulate over time and these can also be studied.²³

Incidences of colony collapse disorder (CCD), a sudden decline in honey-bees, have recently generated a lot of concern for food system stakeholders. One study estimates that between 651,000 and 875,000 of the nation's 2.4 million honey-bee colonies were lost to CCD in the winter of 2006-2007.²⁴ At the request of the Vermont

Legislature, Parise provided testimony on the impact of CCD on Vermont's honey-bee colonies in December 2007. Parise indicated that there was no "precipitous decline" in the Vermont honey bee population, which has remained pretty consistent in size since 1999. Paradoxically, the VBA benefitted from concern over CCD by seeing an unprecedented increase in membership.

The USDA CCD Steering Committee reports that no single factor is responsible for CCD. Rather, CCD is a "syndrome of stress, caused by many different factors working individually, but more likely in combination." Based on research to date, the CCD Steering Committee has found higher numbers of viruses, pathogens, pesticides, and parasites present in CCD colonies compared to non-CCD colonies.²⁵



Bees at a Vermont Beekeepers Association workshop.

PHOTO CREDIT: Meghan Dewald

A series of recent studies have focused on the impact of a commonly used class of pesticides called neonicotinoids. In particular, researchers have found that neonicotinoids lead to high mortality rates because they impair the ability of bees to find their way home and reduce the production of new queens.²⁶ In April 2013 the European Union placed a two-year ban on the use of neonicotinoids.

Disease, honey prices, weather, stress, pests, management issues, and many other factors can lead to changes in honey production. For example, Parise explained that rises in colony numbers were due to a higher price for wholesale honey, leading to a more favorable climate for an increase in production, but such events have been subdued as a result of the rise in imported honey from outside the United States. Hive pests, such as mites, continue to be an economic burden for beekeepers. According to Parise, the introduction of *tracheal* and *varroa mites* in the 1980s have led to a far greater loss in hives than CCD did. Before these mites showed up in the 1980s, Vermont beekeepers experienced winter losses of 5 to 10% per colony. With the mites, Vermont beekeepers can now experience winter losses of 20 to 30% per colony. The cost of treatment for varroa mites, which is rarely completely effective, is between \$5 and \$10 per hive, not including other costs such as labor and transportation.

The USDA CCD Steering Committee is working on mitigation and management measures to combat CCD, including developing varroa mite resistant honeybee stocks and increasing technical assistance to beekeepers.

☀ Climate Change and Pollinators

Two recent reports from the [U.S. Department of Agriculture \(USDA\)](#) and a draft report from the [U.S. Global Change Research Program](#) indicate detrimental effects on most crops, livestock, and ecosystems that will vary somewhat by region.²⁷ For example:

- 🍏 Rising temperatures and altered precipitation patterns will affect agricultural productivity. Crop sector impacts from weather are likely to be greatest in the Midwest, and these impacts will likely expand due to damage from crop pests.

- 🍏 Climate change will exacerbate current stresses from weeds, diseases, and insect pests on plants and animals.
- 🍏 Ecosystem services (e.g., maintenance of soil and water quality, flood control) that food systems depend on will be damaged.
- 🍏 Increased incidences of extreme weather events will impact food production around the world. Tropical Storm Irene—viewed as a harbinger of things to come—flooded 20,000 acres of farmland and impacted 463 Vermont producers when it struck in 2011.

Taken together, climate change can “alter the quality of the floral environment and increase or reduce colony harvesting capacity and development. It can define new honey bee distribution ranges and give rise to new competitive relationships among species and races, as well as among their parasites and pathogens.”²⁸

Bees and beekeepers adjust their behavior and apiculture methods based on weather and it seems likely that both will have to display an even higher level of adaptability in the years ahead.

ANALYSIS

🔑 Research Strategies

Best Practices to Protect Vermont Honeybee Population from Threats: The Vermont honeybee population has not been seriously threatened by recent disease and parasite threats (i.e., colony collapse disorder). However, the risk does exist and there is an increased need for disease and pest vector research and monitoring, especially as the climate changes. In addition, as pests increase, the use of chemical treatments is likely to increase as well. Consequently, research into sustainable pest treatments and integrated pest management should be seriously addressed.²⁹ To provide research, monitoring, and best practices to protect against a variety of threats, more inspection support from the state and increased technical assistance for beekeepers is necessary.

— Natural Resource, Physical Infrastructure, and Technology Strategies

Expanding Honeybee Habitat: The USDA is funding research into pesticide-free wildflower “bee pastures” to support honeybee populations. For the past several years, USDA entomologist James H. Cane has been researching the use of pesticide-free flower fields on various pasturelands in California and Utah to serve as a sanctuary in which bees can multiply rapidly.³⁰ Results so far have been promising: two businesses in California are using this research to propagate more bees. The USDA [Natural Resources Conservation Service](#) (NRCS) is also exploring ways to improve pollinator habitat. Additionally, the [Highway BEE Act](#) was introduced into the U.S. House of Representatives in June 2011 to improve habitat for pollinators along roads and right-of-ways. A similar research agenda could be established in Vermont to examine the optimal mix of wildflowers on state-owned right-of-ways, conservation easements, and set-aside lands for supporting honeybee populations.

— Marketing and Public Outreach

Although Vermont honey and maple syrup are already highly regarded by consumers, a joint marketing campaign by the VBA, [Vermont Maple Sugar Makers' Association](#), VAAFM, and others could further distinguish Vermont's pure, natural sweeteners in local and regional markets, while augmenting the reach and limited resources of these two trade associations. Vermont honey producers should also consider gaining third-party source verification from [True Source Honey](#) as a way of further differentiating their products in the marketplace.

— Technical Assistance Strategies

Return State Apiculturalist Position to Full-Time or Hire Part-Time Assistants:

At one point not too long ago, Vermont had a full-time state apiculturalist, or bee inspector. As priorities shifted within VAAFM, that position was cut to half time, leaving keepers without the inspection support they need. Steve Parise explains that the other part of his work at VAAFM involves Good Agricultural Practices (GAP) audits for farms selling to large retail chains. Many stores like Hannaford and Price Chopper now require growers selling their products in their stores to be GAP certified. Because Parise is currently the only licensed auditor in the state for GAP audits, his bee work has been

cut down.³¹ Unfortunately, the bulk of his audit work takes place during the height of the bee season, so he is unable to meet the demand for hive inspections.

Artesano Mead

Mark Simakaski and his wife, Nichole Wolfgang, found their calling while serving in the Peace Corps in Paraguay as beekeeping teachers in 2005. Upon their return to the states, the couple decided to settle in Vermont, opening a local ice cream business in 2008. After several years



Bottles of Artesano Mead made with Vermont honey.

of product development, they introduced [Artesano](#), their line of semi-sweet mead. Mead, a wine made from honey that has been enjoyed by humans for thousands of years, is gaining a lot of attention from those interested in local foods. The two learned how to make the beverage from native Paraguayans, who made their delightful libation from an old village recipe. Though the drink is made with honey, it is far less sweet than its main ingredient and can be mixed with other flavors (e.g., raspberries). Each bottle is made with about one third of a pound of honey, and takes about 14 months to mature.

In the interest of supporting the local food system, Artesano mead is made with all local ingredients, including 5,000 pounds of honey per year. Even though the wholesale price for local honey may be three to five times higher than that of imported brands, the indirect benefits from Artesano's purchases ripple throughout the entire economy. When the business opened, the husband and wife team worked alone, but in their third season as a business, they now have four employees. Artesano mead can be found at their Groton store, as well as farmers' markets and stores throughout the state.

It is currently very difficult for a half-time apiculturalist to address the entire state's needs. **VAAFM should increase the state apiculturalist position to full time, or it should fund part-time technicians to assist the state apiculturalist from May 1 through November 1.** With the support of a full-time bee specialist and certified technicians, Vermont can better meet its current needs, while laying the groundwork for an expansion in honey production.

The VBA conducts a lot of education and outreach for beekeepers, but VBA president Bill Mares says there is not nearly enough support to ensure their sustained engagement. One of the biggest issues with beekeeping is turnover, because the learning curve is higher than some people expect. Mares suggests stronger technical assistance for beginning keepers to reduce the high rate of first-year dropouts. Despite the public discourse on hive loss from CCD, Mares is confident that adequate support can mitigate such losses, and that most hives are lost to mismanagement. Mares suggests developing a network of beekeeping mentors who can train potential keepers as apprentices before starting their own colonies.³²

🔑 Education Strategies

Information Sharing: Currently, no honeybee specialists work within the *University of Vermont Extension* system. Aside from VAAFM's specialist and VBA, few opportunities for education and outreach exist in Vermont. VBA and VAAFM should explore opportunities for collaboration with UVM Extension, NRCS, and other food system organizations whose personnel regularly spend time on farms (e.g., providing Extension personnel with educational material about optimal honeybee habitat to share with farmers during farm visits or networking events, or going with Extension personnel on site visits). If farmers are regularly introduced to the value of pollination services or honey production on their farm as a diversification strategy, Vermont could likely see a growing interest in bee pastures and beekeeping.

GETTING TO 2020

Honey production in Vermont contributes a small portion of the economic value of agricultural products, but honeybees provide invaluable pollination services to farms, gardens, and wildlife habitat throughout the state. Honey imports now account for over 50% of the honey in the United States, but Vermont honey can be distinguished and marketed as a pure, natural alternative to Chinese imports. Bee habitat and the technical assistance support structure for beekeepers need to be maintained and enhanced to strengthen honey production in Vermont.

Table 3.3.2: Objectives and Strategies for Honey Production

OBJECTIVE	STRATEGY
Research Strategies	
To help Vermont beekeepers and technical assistance providers adapt to climate change.	Climate change is expected to alter the quality of the floral environment and increase or reduce colony harvesting capacity and development; define new honey bee distribution ranges; and give rise to new competitive relationships among species and races, as well as among their parasites and pathogens. Environmental impact studies, including plant and honeybee phenology research, should be initiated in Vermont.
To establish and promote best practices for protecting Vermont's honeybee population from environmental threats, including colony collapse disorder.	Expand apiary information available at VAAFM and the VBA by researching, compiling, revising, and disseminating information to all members of VBA.
Natural Resource, Physical Infrastructure, and Technology Strategies	
To promote the establishment of bee pastures on state-owned right-of-ways, conservation easements, and underused lands.	Identify partners, including VBA, VAAFM, the Vermont Agency of Transportation, and the Vermont Land Trust, to explore locations for bee pastures, and research wildflowers suitable for bee habitat in Vermont.
Marketing and Public Outreach Strategies	
To develop a marketing campaign to encourage local and regional consumers to buy local honey.	VBA should work with VAAFM, the maple syrup industry, and other stakeholders to market Vermont honey and maple syrup as pure, natural alternatives to imported honey, high fructose corn syrup, and other artificial sweeteners.
Technical Assistance Strategies	
To return state apiculturalist position to full-time	Identify funding sources to return the state apiculturalist position to full-time and/or to hire technicians to assist the apiculturalist (or identify mentors from the VBA willing to assist other beekeepers).
Education and Outreach Strategies	
To increase educational opportunities for Vermont farmers on beekeeping and honey production through collaboration with UVM Extension, NRCS, and other food system organizations.	Compile educational materials on honeybee habitat needs and share with UVM Extension, NRCS, and other organizations whose personnel regularly spend time on Vermont farms or hold education and networking events. Encourage farmers to plant white clover, non-GMO alfalfa, and other bee-friendly crops.

End Notes

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ANALYSIS OF VERMONT'S FOOD SYSTEM

Food Production: Honey

Credits

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