



Draft

Ridgefield Controlled Deer Hunt Fact Sheets



May 14, 2019

RIDGEFIELD CONSERVATION COMMISSION

Preface

Since 2006 Ridgefield has endorsed an annual controlled deer hunt on town open space land. The 13th consecutive hunt is now complete and consistent with a decade-long trend, fewer deer were taken during the 2017-2018 hunting season than any year since 2001. With growing concern among residents about the current need for the hunt - balanced against restricting public access to open space land, the Board of Selectman (BOS) has decided to hold a public hearing this spring on the future of the hunt. Based on the concerns expressed in 2005-2006 at the inception of the hunt, the Ridgefield Conservation Commission (RCC) has considered whether there are direct links between the hunt and deer/auto accidents, rates of Lyme Disease infection in humans, neighborhood horticulture, and the condition of our local forest understory, crucial for a variety of animal species.

In order to assist the public in assessing factors affecting the hunt, the RCC has prepared this series of fact sheets discussing the history of the hunt, deer hunt statistics, deer biology, auto/deer collisions, open space understory, Lyme disease, and horticulture. These fact sheets can be viewed in form of a complete report or individually. All are presented in PDF format on the RCC web site at <https://www.ridgefieldct.org/conservation-commission>.

We have tried to present the facts and opposing professional opinions, as we understand them, from current literature and discussions with experts in the field of deer management and related issues. The commission wishes to express its thanks to:

- Stefano Zandri, Head of the Deer Management Implementation Committee and Hunt Master, who contributed the bulk of the statistics relating to deer numbers and hunt statistics.
- Edward Faison of Highstead who contributed his expertise throughout these fact sheets.
- Jennifer Reid of the Ridgefield *blastlyme* office.
- Howard Kilpatrick (CT Department of Energy and Environmental Protection (DEEP)) deer population and related data.
- William H. Schlesinger of the Cary Institute of Ecosystem Studies.
- Yale University – Dr. Oswald Schmitz, Dr. Mark Ashton, Kevin Barrett, for information on deer population and related management topics.
- Ridgefield Police Department for data on deer/auto accidents.

The members of the Conservation Commission and staff that contributed to this effort are:

- Susan Baker
- Eric Beckenstein
- James Coyle
- Jack Kace
- Colleen Lake
- Daniel C. Levine
- Kitsey Snow

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List of Acronyms and Abbreviations

BOS	Board of Selectmen (Ridgefield)
DEEP	Department of Energy and Environmental Protection (Connecticut)
DMIC	Deer Management Implementation Committee (Ridgefield)
HGA/HGE	Human Granulocytic anaplasmosis/ehrlichiosis
MFS	Master of Forest Studies
NSFIH	Naval Support Facility Indian Head
P&R	Parks and Recreation Department (Ridgefield)
PZP	Porcine Zona Pellucida
RCC	Ridgefield Conservation Commission
RMSF	Rocky Mountain Spotted Fever
SUNY	State University of New York

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Fact Sheet 1.1

What is the history of the deer hunt in Ridgefield?

In 2004, the Board of Selectmen (BOS) considered several issues associated with the perceived overpopulation of white-tailed deer in Ridgefield. Of central concern to town voters were deer ticks and Lyme disease, car accidents involving deer, destruction of landscaping and the costs associated, and damage to the woodland “understory” and related adverse impacts to flora and fauna.

The Ridgefield Deer Committee was appointed by the BOS to investigate deer management and to study ways to manage the deer population in Ridgefield. The committee had 16 meetings and invited expert speakers on the topic. The committee issued its report to the BOS with its findings and several major recommendations. On June 27, 2005, the 19-member deer committee voted nearly unanimously to approve recommendations including controlled hunting on town open space lands. On July 6, 2005, a report was presented to the BOS.

On May 31, 2006, the Town of Ridgefield passed the Controlled Hunt Ordinance, by a vote of 531 to 94. This ordinance was voted on at a special town meeting following an extensive study and report by the Ridgefield Deer Committee. The ordinance (Section 4-75, Controlled Hunting) states:

“On open space lands under the jurisdiction of the Conservation Commission and owned by the Town, the Board of Selectmen, after written referral to and response by the Conservation Commission and after the Board of Selectmen’s review and approval of the procedures, practices and safety measures to be followed by the Deer Management Committee, may from time to time authorize the Deer Management Committee to initiate and supervise a controlled hunt of deer on open space lands.”

Note that Section 4-75 clearly states that the “Board of Selectmen...may from time to time authorize the Deer Management Committee to initiate and supervise a controlled hunt of deer on open space lands.” The ordinance does not require that the hunt be conducted annually.

After the ordinance was passed, the BOS created the Deer Management Implementation Committee (DMIC) to implement the controlled hunting recommendations, and Ridgefield had its first controlled hunt in the 2006-2007 season. Expanding in scope during 2007-2008 to include additional Ridgefield open space parcels and state-owned parcels, the hunt has remained in place for 13 consecutive years.

Key Findings from the 2005 Report

The findings of note included:

- Ridgefield does have a serious problem with deer overpopulation.
- Estimates of existing deer densities range from 40 to 80 per square mile in Ridgefield. Only one aerial survey had been conducted along the southeast boundary of the town, and DEEP estimated that there were 79 deer per square mile in that area.
- It was decided that 20 or fewer deer per square mile be the target density for Ridgefield. The report also states that for natural reforestation to take place, the deer population should be between 18 and 25 per square mile.
- The problem manifests itself in elevated rates of Lyme disease, unacceptably large numbers of auto accidents involving deer, and extensive damage to the plant life and, as a result, to the ecology and environment in the community.

- At this time (2006), the only effective tool to reduce the deer population is hunting.

Key Recommendations from the 2005 Report

The recommendations of note included:

- The town should establish a system of monitoring open spaces to determine the effect of reduced deer populations on vegetation. This would help determine the success of the proposed culling and/or hunting, and whether additional killing will be needed.
- The town should conduct an aerial survey to more accurately estimate deer densities in town, in order to help locate “hot spots,” and to help in assessing the effectiveness of culling efforts which will allow for a more focused and effective (hunting) program.
- The town should follow up with Yale University regarding their offer to identify areas of particularly high deer densities. In the event Yale University is unable to work with Ridgefield, such a survey should be pursued through other institutions. With information depicting areas with denser populations, the implementation committee could be more effective in educating residents and facilitating herd reduction in key locations.

The Deer Hunt Today

Over the last several years, there has been an increased interest on the part of the town as to the effectiveness and efficacy of the annual deer hunt to address the original set of deer-related problems that it was hoped would be remedied by implementing the hunt – auto accidents, ticks and Lyme disease, effects on open space understory, etc. Also, there is the key question of just how many deer are in Ridgefield and what is a good number to maintain.

The results of deer hunting are addressed in more detail in Fact Sheet 2.2.





Fact Sheet 1.2

What are other towns doing with respect to deer hunts?

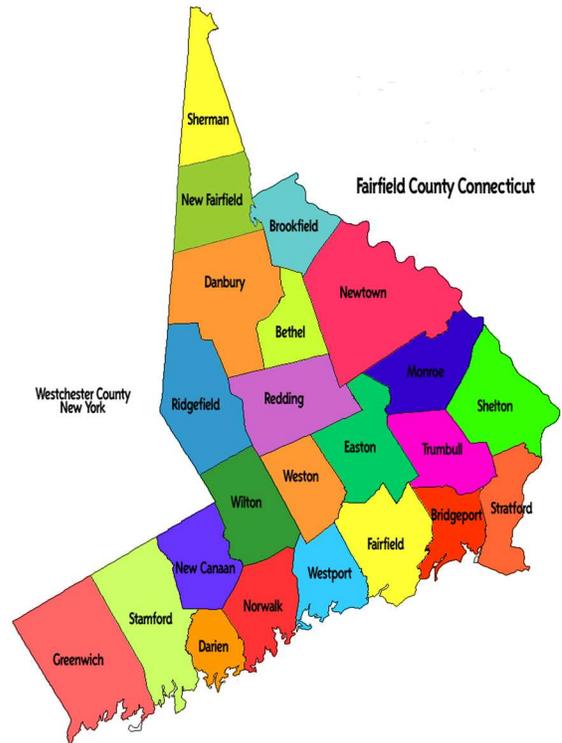
To get a better perspective on what other nearby towns are doing with respect to deer hunts, contact was made with 23 towns in Fairfield County and with four Westchester towns bordering Ridgefield. Our research into Fairfield County towns is presented in Table 1.2-1. Highlights include:

- Out of 23 towns in Fairfield County, six towns (including Ridgefield) sponsor a controlled hunt on town lands.
- Ridgefield and Wilton are the only towns that use “all implements” on some of the hunted parcels. The other four are bow only.
- Among the six towns hunting parcels with trails, Ridgefield and Wilton are the only towns that close specific trails during the hunt.
- Weston began their hunt in 2018 specifically to target Lyme. They take only 20 deer/year and close the hunt when that number is reached.
- Weston’s hunt is supervised by the Animal Control officer.
- Brookfield’s hunt is run by their Deer Committee, with input from the Conservation Commission.
- Ridgefield’s and Wilton’s hunts are approved by the BOS (with input from Conservation Commission) and run by the Deer Management Committees.
- Bethel & Redding hunts are supervised by the First Selectman/BOS.

Westchester County

Controlled hunts in Westchester County are by archery only, no baiting is allowed, and parks remain open during the hunt. The 2018 Westchester County Adaptive Deer Management Program managed controlled hunts

in Cross River, North Salem, Somers, Yorktown and Yorktown Heights.



Of the four Westchester towns bordering Ridgefield (Lewisboro, Brewster, Pound Ridge, North Salem), only Pound Ridge has a controlled hunt on town lands. It is managed by the Police Department. Only one parcel has hiking trails and it remains open.

The Bottom Line

Out of 23 towns in Fairfield County, only six sponsor a controlled hunt on town land. Four of those towns restrict hunting to bow only. Only Ridgefield and Wilton close trails.

Table 1.2-1

Deer Hunt Data for Fairfield County Towns

Fairfield County	Town-sponsored deer hunt?	Hunting on State/Land Trust/Utility land	Specifics
Bethel	Yes	Yes	two town parcels, bow only, no trails
Bridgeport	No		
Brookfield	Yes		Six town parcels, bow only, trails stay open
Danbury	No	Yes	
Darien	No		Deer Committee disbanded in 2012
Easton	No	Yes	
Fairfield	No		
Greenwich	No	Yes	
Monroe	No	Yes	
New Canaan	No		
New Fairfield	No	Yes	
Newtown	No	Yes	
Norwalk	No		
Redding	Yes	Yes	15 town parcels, bow only, trails stay open
Ridgefield	Yes	Yes	
Shelton	No	Yes	
Sherman	No	Yes	
Stamford	No		
Stratford	No	Yes	
Trumbull	No	Yes	
Weston	Yes	Yes	five town parcels, bow only, no trails
Westport	No		
Wilton	Yes	Yes	four town trails, all implements, no trails



Fact Sheet 2.1 How many deer are there in Ridgefield?

Probably the biggest outstanding question related to the deer hunt is just how many deer there are in Ridgefield. The 2005 Deer Committee report estimated 40-80 deer per square mile and recommended a goal of 20 deer per square mile.

At a 2017 RCC/DMIC meeting, Howard Kilpatrick (CT Department of Energy and Environment, or DEEP) estimated that Ridgefield is probably very close to that number. At a subsequent meeting between the RCC and DMIC, Mr. Zandri stated that the number is likely lower than 20 per square mile at this point, stating that the hunters have done an excellent job.

We now have more recent estimates of the deer population, as outlined below.

From Stefano Zandri email (April 9, 2019)

“When we started the hunt the state had us at 70 plus deer per square mile; this year we were at 40 deer per square mile. I believe the most important information I can give you is that the control hunt accounts for approximately 28-30% of the total deer taken in Ridgefield. That is a significant number, especially because our hunters take mostly does... I certainly cannot, and believe no one can, accurately estimate the deer herd size in our town.”

From Andrew Labonte, DEEP, email (May 10, 2019)

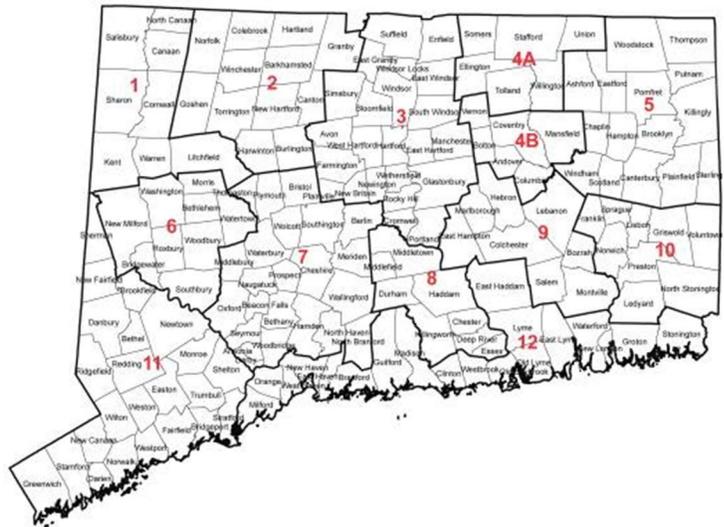
“Fifteen transects (150 miles) were flown in total in Fairfield County DMZ 11 over 3 days in 2019. Based on the actual number of deer observed, the minimum estimate was 20.27 deer/square mile, with a corrected estimate (0.50 suggest observation rate based on Kilpatrick et al.) of 40.53 deer/square mile. Based on the most recent sightability model calculated in 2018

(Kilburn et al. 2018), the estimate would be 38.24 deer/square mile.

Based on the actual number of deer observed back in 2015, the minimum estimate was 25.9 deer/square mile, with a corrected estimate (0.50) of 51.8 deer/square mile, indicating the population may be declining.

Corrections are applied as aerial surveys result in an incomplete detection of animals. The factors used are based on more comprehensive studies of animal populations.

Connecticut's Deer Management Zones, 2008



The Bottom Line

The issue of just how many deer there are in town still remains a question. Recent data and opinions indicate that it is in the neighborhood of 38-40 deer per square mile compared to the goal of 20 per square mile posed in the 2005 Deer Committee report.



Fact Sheet 2.2

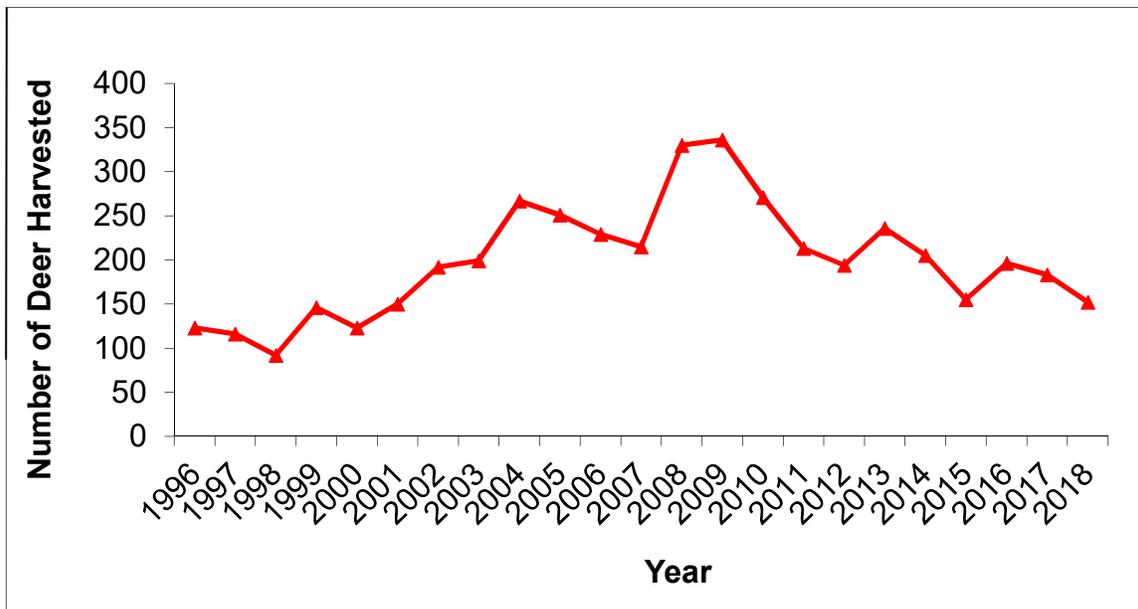
How many deer are harvested in Ridgefield?

Results of the deer harvest in Ridgefield since 1996 are presented in Figure 2.2-1 and Table 2.2-1. This data was provided by DEEP in an email from Andrew Labonte to Stefano Zandri (February 7, 2019). Since about 2009 or 2010 (the peak annual harvest) the number of deer harvested has been on a fairly continuous decline.

Data from DEEP for 2014, 2015, and 2016 for Ridgefield show the following total harvest:

Archery	97
Landowner	0
State	0
Private Land (Shotgun/Rifle)	32
Total	129

Figure 2.2-1



Some people suggest only hunting on properties where large populations of deer have been reported (referred to as “hot spots”). There is little supporting evidence that suggest that this method of hunting is effective. Dr. Ed Faison (PhD in Environmental Conservation from

University of Massachusetts, Amherst) states, “Deer are mobile and responsive to hunting pressures, so if certain areas are hunted, the deer will quickly move to other areas. Hot spots would be a moving target.”

The Bottom Line

Since about 2009 or 2010 (the peak annual harvest) the number of deer harvested has been on a fairly continuous decline. Archery accounts for the most deer kills.

Table 2.2-1

Results of Deer Harvest in Ridgefield from 1996 to 2018

Year	Archery	Shotgun/Rifle	Land-owner	Muzzle-loader	Crop Damage	Hunting (only) Total	Roadkill	Other	Roadkill and other	Total
1996	70	43	0	10	0	123	124	25	149	272
1997	67	41	0	8	0	116	107	26	133	249
1998	55	29	0	8	0	92	122	50	172	264
1999	93	43	0	10	0	146	122	35	157	303
2000	59	51	1	12	0	123	113	35	148	271
2001	90	51	0	9	0	150	106	22	128	278
2002	127	58	0	7	0	192	99	22	121	313
2003	143	45	0	11	0	199	89	36	125	324
2004	219	39	0	9	0	267	89	37	126	393
2005	213	35	0	3	0	251	84	28	112	363
2006	184	38	1	6	0	229	73	7	80	309
2007	176	30	0	9	0	215	37	16	53	268
2008	274	47	0	9	0	330	30	5	35	365
2009	253	67	0	15	1	336	61	19	80	416
2010	236	24	0	11	0	271	72	10	82	353
2011	177	27	0	9	0	213	56	9	65	278
2012	143	20	0	31	0	194	28	1	29	223
2013	164	33	0	39	0	236	19	0	19	255
2014	146	31	0	28	0	205	24	5	29	234
2015	113	37	0	5	0	155	9	4	13	168
2016	151	36	0	9	0	196	9	2	11	207
2017	138	23	0	22	0	183	14	0	14	197
2018	111	30	0	11	0	152	3	0	3	155



Fact Sheet 2.3

How is town open space affected by the hunt?

It is the responsibility of the Conservation Commission to protect and maintain most of the open space in Ridgefield, including spaces with and without trails. The Parks and Recreation Department oversees athletic fields, school and municipal properties and the public golf course.

Approval for hunting on open spaces begins with the DMIC meeting to decide on properties they would like to hunt. These are presented to the RCC and P&R, who approve or deny those properties, based on past experience, the property deed (if applicable), and use. The RCC and P&R make their recommendations to the BOS, for approval. The RCC also has input into the signage that indicates the hunt on each property. Private properties are also hunted, but not as part of the town-sponsored hunt.

The 2018-2019 hunt was the town's 13th consecutive year of hunting town open spaces. During that time, the number of spaces hunted per year has ranged on the order of 10-15 properties and the number of deer taken from 92 in 1998 to 336 in 2009.

During the 2018-2019 hunting season, 15 open spaces were included in the hunt. Eight of the properties were in Ridgebury, three were on the western edge of town, two were east of Route 7, and two were nearer the town center.

Table 2.3-1 identifies the open spaces used since 2008 and the harvest related to each one. Data for 2011-12 is not available. The hunting season allows bows and guns, including muzzleloaders, depending on the season. The hunting season for the 2018-19 hunt had the following dates, which are typical from year to year:

- Archery: October 15 – January 31
- Firearms: November 14-December 4
- Muzzleloader: December 5 – December 31

The approved properties are closed while being hunted, for safety, so in reviewing the list of proposed properties, the RCC tries to minimize the use of open spaces that are more heavily

used by the public and to direct the hunt to properties that have few or no trails. The desire to keep open spaces "open" must be weighed against the need to protect the understory in those areas. Of course, deer don't stay in one place, and hunting in one area doesn't mean it won't be browsed again.



The value of being able to enjoy town open spaces in all seasons must be weighed against the benefits to be gained from the hunt. It is important to note that our open spaces (including the golf course) are used extensively in the fall and winter, not just in the warmer weather. We should continue to monitor the forest conditions and conduct understory studies in order to make informed decisions regarding properties that should be hunted.

The Bottom Line

Ten to 15 town open spaces have been closed to the public each year for the controlled hunt.

Table 2.3-1

Deer Hunt Harvest by Open Space Property

Hunt Years	2008-09	2009-10	2010-11	2012-13	2013-14	2014-15	2015-16	2017-18	2018-19	Total
Hemlock Hills	12	18	4							34
Pine Mtn	3	7								10
Shadow Lake	38	28	4	7	27	13	12	5	12	146
Spectacle	10	6		8	4	0				28
Levy Park	9	13	9	6	7	7	3			54
Canterbury	8	14								22
Keeler	23	24	2	8	1	3	0	3	2	66
Golf Course	8	4	7	16	23	22	7	3	3	93
Perry Lane	2									2
Reed		4		7	8	3	3			25
Lynch Brook		7	1							8
Powdermaker		6	4							10
Laurel Lane			6	3	13	4	1	0	2	29
Old Sib			6							6
Limestone			14							14
Old Trolley			14							14
George Washington			3							3
Linden			11	5	2	2	0	2	1	23
Scoden			2	5	9	2				18
Shadow Lake 2				6	9	7	1	8	4	35
Schlumberger				5						5
Ledges					15	8	7	6	6	42
Stonecrest							1	6	0	7
Prospect Ridge							4			4
Ridgebury Farm							7	7	8	22
Turtle Ridge								2	1	3
Sarah Bishop								12	7	19
Bobby's Court								3	2	5
Colonial Heights								3	5	8
Number of Kills	113	131	87	76	118	71	46	60	53	755
Number of Properties	9	11	14	11	11	11	12	13	13	NA
Note: a blank entry means that property was not available to hunt. A zero means no kills at that site.										



Fact Sheet 3.1

Are there conflicting population theories?

There are conflicting theories regarding the relationship between deer population and hunting.

Howard Kilpatrick (DEEP biologist)

Mr. Kilpatrick espouses a “balloon theory,” which predicts a sudden increase in the deer population should a town’s hunt be paused. Kilpatrick cites, “how quickly a deer population can grow if unchecked by hunting” in just one season. Kilpatrick has created a series of charts and graphs demonstrating that each surviving doe produces a specific number of fawns and within a season or two the deer population will exponentially “balloon.” Below are two of Mr. Kilpatrick’s tables, which are often distributed to communities that are undergoing hunt reassessments.

Table 3.1- 1

Impact on Population – Ridgefield Open Space Most recent 3 years						
Open Space Hunters				Recruitment Rate (Fawns per Doe)	Fawn Recruitment	
Past 3 years	Kills	Bucks	Does		Spring 2017	Fawns of Fawns
2016-17	54	8	46	0.75	35	
2015-16	45	11	34	0.75	26+26	10
2014-15	72	19	53	0.75	40+40+40	15+15
3 - year total	171	38	133			

If hunting did not occur during last 3 years on open space – How Many Deer?

Killed 171 Fawns + 247 Population = 418

Table 3.1-2

CT DEEP Deer Population Model for Redding, applied to Ridgefield herd (as estimated above); IF NO Hunting.				
	Does:	New F Fawns:	Total Fem.:	Gr rate: %
Ridgefield:				
Current:	612	150	761	25% NOTE: DEEP model assumes approx. 90%
1	684	155	839	23% of Does & New Female Fawns
2	757	169	926	22% Survive & Breed the next year.
3	836	186	1022	22%
4	1020	205	1225	20%
5	1126	227	1353	20%
6	1243	250	1493	20%

Table 3.1-2 provides an example of how quickly a deer population can grow if unchecked by hunting (assuming normal mortality) using the estimated size of the Ridgefield doe population in Table 3.1-1.

Dr. Edward Faison (Highstead)

Dr. Faison disagrees with Mr. Kilpatrick’s theory, as follows: “The first table assumes that all of the adult does that were killed in the hunt would have otherwise been available to reproduce (i.e., 46 does were killed in 2016-2017, so 46 is multiplied by 0.75). But the likelihood that all 46 of those does surviving the winter, crossing the roads of Ridgefield, disease, and coyote and bobcat attacks is very low.

The second table assumes a 90% survival rate of does and female fawns to breed the following year. However, survival rates of fawns are typically much lower (30-40%). I don’t understand why a 90% survival rate was used.”

Dr. Faison continues: “If the hunt is suspended for a year, you might see a modest increase in deer the next year, but I doubt there would be “population explosion” as a result. Does have 1-3 babies per year. It would be interesting and probably worthwhile to test the effects of stopping a hunt on deer numbers. Statewide and in Southwest CT, deer populations peaked between 2000 and 2005 and have since declined by about 1/3, and have stabilized. Deer populations are not continuing to rise, but have actually declined over the past 15 years, independent of management (hunting).”

Dr. Oswald Schmitz (Professor of Population and Community Ecology, Yale University School of Forestry and Environmental Studies)

Dr. Schmitz says, “The *balloon theory* is merely a restatement of a classic, well-known principle in population biology in which species populations when low in abundance (far below their carrying capacity) rapidly rise in abundance because they are able to survive and reproduce well (due to low competition).

It’s equivalent to compound interest growth of capital. But as with compound interest growth, the available capital (principle and interest) takes some time to increase in amount. The capital (in this case deer) cannot explode or balloon in a single year. It takes 3-4 years for that to happen. So, it is possible to have longer intervals between deer hunts (say 2-3 years between hunts).”



The Bottom Line

While DEEP puts forth the position that a lull in the Ridgefield controlled hunt would result in an exponential surge in deer population (balloon effect), other scientists contest this position stating that there could be 2-3 years between hunts before this would happen.



Fact Sheet 3.2

What other methods of deer control are there?

While hunting is the most effective method of rapidly reducing a deer population, one must consider the various methods used to hunt. As shown on page 2.2-2 of this report, Ridgefield's controlled hunt allows hunters to hunt using shotgun, rifle, muzzleloader, and archery.

A 2008 study (Pedersen et al) showed that 18% of deer shot by archers (bowhunting/archery) are wounded and not killed. The study states, "The overall 18% wounding rate is similar to wounding rates reported in more recent studies for hunters using modern bowhunting equipment."

Howard Kilpatrick (DEEP biologist and Ridgefield hunter) reported a "17% wounding rate over a two-year bowhunting program within a residential Connecticut neighborhood." The report cites, "We found bowhunters with modern archery equipment were able to hit 89% of the deer that they shot at on Naval Support Facility Indian Head (NSFIH), Maryland. Kilpatrick and Walter (1999) reported an accuracy of 75%."

Many hunters prefer a bow and arrow over a gun (for hunting) due to the challenge bow hunting provides. A 2015 *Police One* article stated, "If you are talking about legally hunting an animal, a bow and arrow would be preferable to a gun if you believe in giving the animal a fair chance at survival. The bow method requires more skill on the hunter's part, is the fair way to hunt game."

It is important to remember that Ridgefield implemented a hunt not for "sport" but rather to decrease the population in a safe, efficient, and effective manner.

There are, however, other methods to control deer populations that have been tried in other communities. Their effectiveness, cost, and implementability vary greatly depending on site-specific conditions.

Immunocontraception

Westport, CT's Deer Management Committee recommended that the Town of Westport offer a deer contraception program be developed using an experimental PZP (Porcine Zona Pellucida) vaccine. One of the attractions of this program is that it would allow interested residents to participate without committing or affecting the town as a whole. In addition, the Committee felt that a contraception program would be more accepted by the town than other types of deer population control programs.

Over the last few years PZP techniques have recently made deer contraception much more effective (a single vaccination lasting two to three years or more), simpler (deer can now be darted and marked simultaneously from as little as 35 yards away) and significantly more affordable (as low as \$70.00 per deer in a recent study Rutberg, et al., 2012).

The PZP vaccine works by producing antibodies to sperm, blocking fertilization. The PZP vaccine is safe for residents as well as the deer and poses no threat to animals or humans who might later consume a vaccinated doe (Miller et al., 2001).



The Committee discussed such a plan with Dr. Alan Rutberg of Tufts University who has successfully implemented similar programs in

other areas and has expressed interest in implementing a similar program in Westport (Rutberg, 2012). An implementation committee would be essential in facilitating collaboration between town government, interested residents, and Dr. Rutberg to manage this project (Town of Westport CT, Deer Management Committee Final Report).

From 2005 to 2010, 258 adult and yearling female deer on Fripp Island, South Carolina, were treated with one of several PZP preparations designed to produce 2+ years of effective contraception with a single treatment. Most vaccine preparations tested reduced fawning rates by 75% to 95% for at least 1 yr. From 2005 to 2011, deer density on Fripp Island declined by 50%.

In Hastings (NY), the town will be using the standard form of PZP supplemented with timed-release long acting PZP pellets. Therefore, annual booster injections will not be necessary; longer intervals between the dosing of individual animals will be possible.

Repellents

A variety of repellent products, used singly or in combination, can create an effective multi-sensory deterrent to repel deer. Commercial repellents work by creating unpleasant tastes or odors, gastrointestinal discomfort, or a sense of pain (hot pepper or peppermint) when the active ingredient comes in contact with the eyes, nose, or mucous membranes of the deer. Some of the more effective repellents contain a sulphurous odor, believed to induce fear by giving off smells that deer associate with a predator.

Selecting Deer-Averse Plants

Planting deer-resistant flowers and ornamental varieties will bring the best results. There is a wide variety of less tasty yet equally beautiful flower and ornamental options that deer do not usually eat. Also see Fact Sheet 7.

Physical Barriers

Fencing (wire or other) will keep deer out of larger areas, plastic netting can be used over particular bushes, and individual protective “tubes” and fencing can be placed around prized seedlings until they grow out of reach of the deer. There are also various options with electric fences. Some contain scent attractants (to ensure quick contact with electrified material).

Scare-Based Devices

Motion-sensing “Scarecrow” sprinkler devices (hooked up to a hose and blasts any animal moving within a set range with a strong burst of water) can be effective. Other devices pose a mild electric shock or emit deer distress calls.

The Bottom Line

While hunting is the most effective method of rapidly reducing a deer population, there are other methods to control deer populations that have been tried in other communities. However, their effectiveness, cost, and implementability vary greatly depending on site-specific conditions and their applicability to Ridgefield would need to be studied.



Fact Sheet 3.3 Do deer have natural predators?

When the Ridgefield hunt was originally being discussed in 2004, a common topic brought up was the idea that deer populations must be controlled by hunting due to the fact that deer's natural predators were negligible.

Dr. Mark Ashton (Yale Professor Forest Ecology and Director of School Forests) states, "CT has gained back many of our meso-to-macro scale predators: bobcat, bear, and coyote. All predate fawns, young deer and infirm or older individuals. Studies are now beginning to suggest that in the wilder parts of Connecticut, the deer populations are largely regulated by these predators - one such informal study by DEEP suggested of the 22 fawns recorded and followed, only 2 made it to maturity".

Coyotes, bobcats, and bears all prey on deer. Coyotes have been shown to prey on deer just as much as wolves do. All are present in CT (Dr. Ed Faison, MFS in Forest Science from Harvard University, and PhD in Environmental Conservation from the University of Massachusetts).

A coyote's diet consists predominantly of mice, woodchucks, squirrels, rabbits, deer, some fruits, carrion, and when available, garbage (CT DEEP). With an estimated population of 3,000 to 5,000, coyotes are seen in every town in CT, and there is no dispute that coyote sightings, as with bears, have spiked in recent years.

Experts state that coyotes help to keep the state's wildlife populations in balance, and residents need to learn to live alongside the creatures. "The coyote population may be expanding even more," said Chris Vann, a wildlife biologist and the state's top coyote expert, "most Connecticut coyotes have litters of between 5-9 pups, and that 4-5 might manage to survive into late summer." Studies have shown that coyote

survival rates in some suburban areas are as high as 70 percent.

It seems more than likely that coyotes are now a permanent part of Connecticut's wildlife scene. A study several years ago by the State University of New York (SUNY) College of Environmental Science and Forestry estimated there were then about 14,500 breeding pairs of coyotes spread all across the state of New York.



Coy-Wolf (?) at the Hickories, April 2019

The Bottom Line

Deer in Ridgefield do have natural predators including coyotes, bobcats, and bears. CT has gained back many of these meso-to-macro scale predators.



Fact Sheet 3.4 What have we learned from Yale University?

As mentioned on page 1.1-2 of this report, one of the 2005 key recommendations from the Deer Management Committee to the BOS was to “follow up with Yale University (or other institutions).” As part of the RCC effort to prepare this report, we followed up with Yale and others.

Angela Rutherford (Yale School of Forestry and Environmental Studies)

“By treating deer as an independent variable in our statistical analysis, we explicitly assumed that deer are the direct determinant of environmental impacts. However, it may be that deer impacts are an indirect consequence of other factors that encourage deer effects...land management and land development.... habitat fragmentation can create habitat that is attractive to deer, leading to local impacts.

That is, deer would be a proximate cause of damage, not the ultimate cause, which is attractive habitat created by human land use... We are not trying to imply that deer cannot have significant environmental impacts. However, the evidence from our study in comparison to other published studies suggests that deer densities anywhere on the western Connecticut landscape may be below levels needed to cause strong impacts on the environment.” (Rutherford et al, 2010).

Dr. Oswald Schmitz, Professor of Population and Community Ecology (Yale School of Forestry and Environmental Studies)

“It is possible to have longer intervals between deer hunts (say 2-3 years between hunts). This would mean that individual hunters should have higher success rates than if they kept populations low by hunting every year. Authorizing a controlled hunt every 2 to 3 years should keep the deer population at similar numbers as an annual hunt.”

Yale SCHOOL OF FORESTRY & ENVIRONMENTAL STUDIES



Dr. Ed Faison, PhD in Environmental Conservation from the University of Massachusetts, Amherst

“I think there are a lot of advantages to letting nature takes its course. It avoids the very challenging process of establishing objectives for a deer management program that are actually measurable. How do you decide the state of the ecosystem that you want to manage towards? It is ultimately arbitrary. It's important to remember that herbivory by deer is a fundamental ecological process, so we should not be alarmed if we see browsing by deer in the woods. Deer are part of a forest and they eat plants.”

Ed Faison, with Kevin J. Barrett, M.F.S. in Forest Science (from Yale School of Forestry & Environmental Studies)

“We found minimal evidence that deer activity density consistently affects forest plant communities. ... Instead of using conventional deer management strategies to meet forest regeneration objectives, it may be more effective to implement forest management strategies to address the effects deer herbivory has on forest regeneration... Forest management can mitigate browse impact.” (Barrett et al, 2013).

The Bottom Line

Authorizing a controlled hunt every 2 to 3 years should keep the deer population at similar numbers as an annual hunt.



Fact Sheet 4 What is the history of deer/automobile collisions?

A leading factor in advocating the hunting of deer has been the history of deer/automobile accidents.

From the Fairfield County Deer Management Alliance web site

This introductory material is extracted from an article that is one of a series by the 17-town Fairfield County Deer Management Alliance. The alliance aims to increase public understanding of the hazards posed by an overabundant deer population, and to support legal hunting in the interests of public health and safety and ecological balance.

While vehicle accidents involving deer occur all year round, the greatest likelihood of such collisions is after dark on rural roads during November. This coincides with the height of the deer mating season.

The cost of vehicle repairs is enormous, totaling over \$1.1 billion in the USA. In the average front-end collision, a deer causes \$4,500 to \$7,500 worth of repairs. This leads to inflated

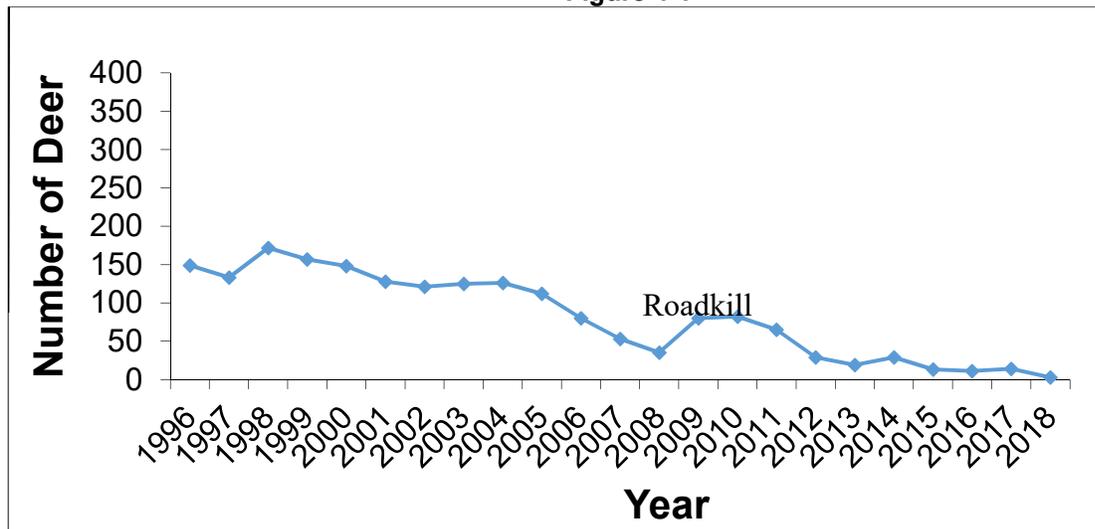
insurance premiums for all motorists living in areas of high density deer populations.

During the past 5 years, there were over 3,000 vehicle accidents resulting in deer deaths on Fairfield County roads reported to the state DEEP--although Howard Kilpatrick the DEEP's deer expert, estimates the actual total to be 8.6 times higher, based on a 2003 study in eight towns across CT.

From Andrew Labonte (DEEP) email to Stefano Zandri (February 7, 2019)

Data on the number of roadkills from 1996 to 2018 is presented in Figure 4-1. Basically the graph shows a continuing decrease in the number of accidents over the 22 years. It should be noted that the number of accidents was decreasing before the town hunt started in Ridgefield in 2006. This suggests that there are a variety of factors that the deer population and thus the amount of accidents. For example, the amount of food (e.g., acorns) and climate conditions could be having as much of an effect as the hunt.

Figure 4-1



The Ridgefield Police Department has provided more details regarding deer/auto accidents for 2016 through 2018 as shown in Table 4-1. At

least in 2016 and 2017, a higher proportion of accidents occurs in the October to November timeframe.

Table 4-1
Deer/Auto Accidents by Month in Ridgefield

Year	2016	2017	2018
January			2
February	1	2	3
March	2		
April		2	1
May			2
June	2	3	3
July		2	1
August	2	1	1
September			
October	1	3	1
November	8	4	3
December	2	4	2
Total for Year	18	21	19



The Bottom Line

Deer/auto accidents have been on the downturn for at least 20 years. The controlled hunt in Ridgefield started in 2006 suggesting that there are other factors that affect the number of accidents than the hunt itself such as the availability of food.



Fact Sheet 5

How have deer affected the open space forest understory?

One of the outstanding issues regarding data needed to evaluate the future of the deer hunt is the condition of the vegetative understory in the town's open spaces. To this end, the RCC undertook the task of reviewing the 2010 Natural Resource Inventory data, focusing on seedling counts performed on specified plots of town open space land nearly a decade ago. The RCC gathered new data (May – July 2018) at the Bennett's Pond and Hemlock Hills open spaces to compare to the 2010 numbers.

Based on the results of this limited study, the condition of tree seedlings in Ridgefield open space appears good. There appear to be more ferns, skunk cabbage, and bare spots on the forest floor and fewer bushes, but this observation was not quantified. Thus, there seems to be no strong rationale to either continue or stop the hunt based on this study alone.

However, the understory will need to be regularly monitored going forward because deer density will likely change and a myriad of other factors also impact forest health (e.g., tree diseases, insects, climate change, etc.). Studies of the impact of deer have shown other forest impacts like higher levels of invasive plants like barberry and stilt grass, but lower levels of multi-flora rose, bittersweet, honeysuckle and burning bush.

Deer browsing contributes to a more diverse herb layer (e.g., grasses, ferns, wildflowers, and other ground cover). Shrub and mid-canopy bird diversity is often reduced by heavy deer browsing, but these birds are generally replaced by canopy feeders, bark feeders, and species that like open ground, which maintains total bird diversity.

Foliage insect diversity may also decline with browsing, but ground-dwelling predators such as

wolf spiders and ants, and in some cases salamanders and snakes, may increase with a more open forest floor from deer browsing. Ironically, deer like to browse oak seedlings (among others) but they are dependent on acorns for a part of their food supply.



Just because more tree seedlings were observed in a forest that has been hunted doesn't necessarily mean that the forest should then continue to be hunted or that the unhunted forest should be opened for hunting. That decision is outside of the realm of science, and rather a question of

values that the people of Ridgefield should decide upon.

The RCC takes its responsibility of maintaining and protecting Ridgefield's open spaces and trails seriously. We understand that Ordinance Section 4-75 allows for a controlled hunt of deer on open space. However, because open space land is under the jurisdiction of the RCC, we want to make certain that if we are to close open space (and trails) to allow for hunting (essentially banning the public from enjoying open space and trails for a period of time), then there must be continued assessment of the efficacy of the hunt and also whether the focus of the hunt should be changed in light of the current reduction in the deer population toward maintenance rather than reduction of the numbers.

The Bottom Line

The results of the understory study were not conclusive in that the data could be interpreted to support or to discontinue the controlled hunt.



Fact Sheet 6

What is the relationship between deer and Lyme disease?

From the CT DPH website via Jennifer Reed of blastlyme:

Ticks found in Connecticut carry a variety of disease-causing agents including rickettsia, bacteria, and protozoa. People can become infected with more than one disease with one tick bite. When multi-infection transmission occurs, diagnosis and treatment can be difficult. Symptoms and treatment for each condition may vary. Besides Lyme disease, ticks in Connecticut can also transmit the following reportable diseases:

- Babesiosis.
- Human granulocytic anaplasmosis/ehrlichiosis (HGA/HGE).
- Rocky Mountain spotted fever (RMSF).

From Dr. Ed Faison of Highstead

Deer are typically the principal host for adult ticks in this landscape, but deer do not pass the Lyme bacterium to ticks. Mice, and to a lesser extent other rodents, do that. Still, deer play an important role in the life cycle of ticks.

However, reducing the deer population generally has little or minor effect on the tick population unless the deer population is drastically reduced, say below 8 deer per square mile or eliminated altogether. For example, a study on Great Island reduced the deer population by 70% to about 9-11 deer per square mile, and there was no effect on the tick population. But after eliminating deer, the tick numbers dropped. The problem is that it is not at all feasible (or desirable) to reduce the deer population in Ridgefield to numbers that low. You risk extirpating the species altogether, and it would require a sustained effort with sharpshooters that would likely be very unpopular.

Regarding the connection between deer control and Lyme disease, here is a quote from a recent paper (Kugeler et al. 2016):

“the scientific evidence to support the effectiveness of deer control as a means of preventing human Lyme disease is weak. While complete elimination of deer in an ecologically isolated setting with few alternative hosts for adult ticks may substantially reduce the blacklegged tick population, results have been mixed in circumstances where deer are not eliminated. Furthermore, evidence linking deer reduction to reduced human Lyme disease risk is lacking.”

From Dr. William H. Schlesinger, Cary Institute of Ecosystem Studies

Scientists say that white-footed mice are posing a particularly high risk to humans this year. A bountiful acorn harvest a couple of years ago gave them the sustenance needed to reproduce in greater numbers and climate change may be pushing them to expand their range toward the north. "That's something of a worry because where the mice go, so too go the infected ticks," said Richard Ostfeld, who is co-heading the Cary Institute's Tick Project, along with his wife, Felicia Keesing, a biology professor at Bard College in New York. Ostfeld said there are areas in the United States where Lyme disease is rare and, in those places, few or none of the white-footed mice are infected. But in an endemic area such as one that extends from Virginia to Maine, at least half and sometimes up to 90 percent of the mice are infected with Lyme bacteria. “



From Cary Institute of Ecosystem Studies

“Increases in Lyme disease in the northeastern and midwestern United States over the past three decades are frequently uncorrelated with deer abundance and instead coincide with a range-wide decline of a key small-mammal predator, the red fox, likely due to expansion of coyote populations. Further, across four states we find poor spatial correlation between deer abundance and Lyme disease incidence, but coyote abundance and fox rarity effectively predict the spatial distribution of Lyme disease in New York. These results suggest that changes in predator communities may have cascading impacts that facilitate the emergence of zoonotic diseases, the vast majority of which rely on hosts that occupy low trophic levels. ...With white-footed mice and eastern chipmunks being the

most competent reservoirs of these tick-borne diseases.” Ostfeld explains, “It’s not uncommon to see mice with fifty feeding ticks attached. They can carry huge tick burdens without having their fitness compromised. This is bad news for us, because these rodents are also very efficient at harboring and transferring pathogens to feeding ticks.”

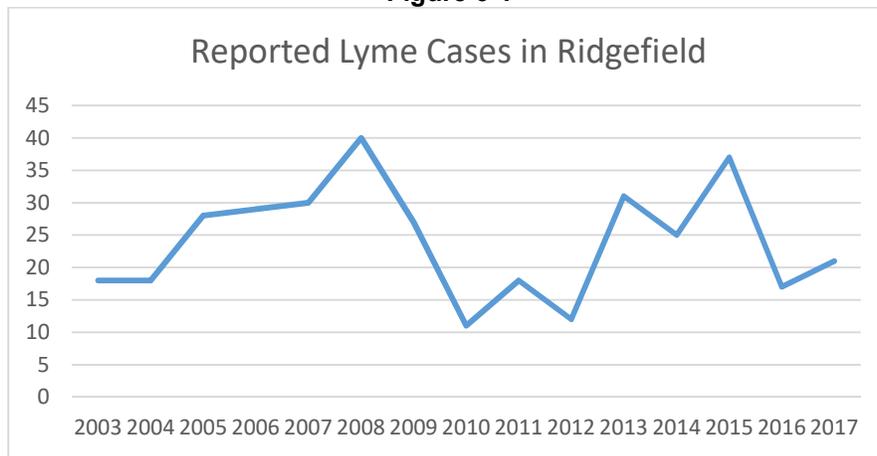
From the CT DPH website via Jennifer Reid of blastlyme:

Jennifer Reid has provided Lyme disease numbers from the state; however, the level of under reporting by Lyme-weary physicians in Connecticut makes using these statistics unreliable. Here is the website where the state records them:

<https://portal.ct.gov/DPH/Epidemiology-and-Emerging-Infections/Lyme-Disease-Statistics>

The state data is presented in the Figure 6-1.

Figure 6-1



Given the typical level of underreporting, the numbers can be adjusted by a factor of 10 based on Centers for Disease Control methodology.

The hunt in Ridgefield started in 2006. Several years later there was a sharp reduction in Lyme cases. However, from about 2010, Lyme cases have generally been on the increase but still well below the peak in 2008.

The Bottom Line

The reduction of deer in Ridgefield, unless brought to very low levels, would not have a significant impact on the incidence of Lyme.



Fact Sheet 7

How have deer affected horticulture?

When dealing with the environment, nothing lives in a vacuum. The plant population is affected by the animal population, the insect population, disease, the condition of the soil, the climate, and, the humans. Any one of these, or a combination of them, can change the fauna.

Deer are native to our area and some browse is advantageous. The way to strike a balance between a desirable-sized deer population, humans and plant life is to recreate the native environment (Linske, 2018).

The greatest contributors to the decline of plant numbers and diversity are climate change and human manipulation of the land. As we divide the landscape through development, we push deer out of their habitat (woodlands, wetlands, stream banks and meadows) and into our yards and roads.

However, deer are not the only factor that can affect local vegetation. A very visible change to our landscape over the last few decades has been the invasion of non-native plants. Some were introduced through shipping containers but many were originally planted here as ornamentals.

In addition, the presence of non-native worms (earth, jumper, night crawler, etc.) has changed the composition of our soils by degrading leaf litter faster than it would normally decompose. This adds nutrients to the soil, making it richer and more conducive to the growth of non-native species and less so for our natives (Gorres, 2014).

One particular species of invasive plant plays a significant role in the understory/deer/Lyme disease cycle: Japanese barberry (*Berberis thunbergii*), which can increase the tick population in an area by 12 times. One recent study found that eliminating it in our yards and



open spaces can reduce the tick population by up to 80%.

It is the first plant to leaf out in the spring (late March/early April), providing the perfect habitat for the white footed mouse (the primary blood meal for black-legged tick nymphs). The mice make their nests under the barberry, the nymphs emerge and climb onto the plant and find a willing host for their next meal when a deer, fox, chipmunk, dog, or human walks by.

Because the deer find the barberry unpalatable, they leave it alone and browse the native understory (if there is any) or find their way into our yards (Williams, 2010, 2017, 2018).

The Bottom Line

Deer are only one of many factors that affect the local horticulture. The greatest contributors to the decline of plant numbers and diversity are climate change and human manipulation of the land.

Plants that Deer Like

- Dahlia, Hosta, Impatiens, Lilies
- Chrysanthemum, Roses, Tulips, Azalea
- Rhododendron, Apples, Arbovitae Firs
- Pears, Yew

Plants that Deer Rarely Browse

- Aster, Allium, Astilbe, Baptisa, Begonia
- Boxwood, Crocus, Columbine, Daffodils
- Hellebores, Marigolds, Salvia
- Tiarella (Foam flower), Yarrow
- Ferns, Herbs, Grasses
- Most trees (once established)

What Can We do to Keep Deer out of Our Yards?

- Eliminate invasive plants and encourage the return of natives to woodlands and wetlands. This will keep deer in the woods.
- Populate your yard with plants deer don't like.
- Bird feeders attract deer. Use seed they don't like—nyjer, safflower and those treated with hot pepper. Or feed the birds in the colder months only.
- Support the creation of large areas of open space in town. Deer prefer large tracts of unfragmented land to urban and suburban landscapes.



Aster



Yarrow



Hellebore



Columbine



Fact Sheet 8 What is the way forward?

Town Ordinance 4-75 provides that, with input from the RCC, the BOS may from *time to time* authorize a controlled hunt of deer on open space lands. Neither the town ordinance nor the BOS suggest that the hunt be held annually but rather as needed and subject to review. Thus, the purpose of these fact sheets is to provide the background information that the public will need to know to make the decision whether to continue, stop, or modify the hunt going forward. First, in summary, what do we know? Then, how do we move forward?

What do we know?

- Out of 23 towns in Fairfield County, only six sponsor a controlled hunt on town land. Four of those towns restrict hunting to bow only. Only Ridgefield and Wilton close trails (Fact Sheet 1.2).
- After 13 consecutive years of controlled hunting, the Deer Committee in conjunction with DEEP estimates that deer populations in Ridgefield have declined from 40-80 per square mile in 2005 to approximately 20 at present (as reported by DEEP biologist Howard Kilpatrick during a 2017 RCC meeting), which is the often cited “goal.” However, current deer numbers in Ridgefield are likely to be more like 40 per square mile based on a 2019 aerial survey for Fairfield County (Fact Sheet 2.1). In fact, no one can really say for sure what the current deer density is.
- Fewer and fewer deer are being taken each year in the controlled hunt. In 2006 when Ridgefield approved the controlled hunt, 309 deer were removed from town open space parcels. The number of deer fluctuated over the next few years, first dropping to 268 in 2007, before increasing sharply to 365 in 2008. After reaching a high of 416 in 2009, for nearly a decade this number has steadily declined, reaching a low point of 155 in 2018 (Fact Sheet 2.2; Table 2.2-1). Anecdotal reports from local residents of fewer deer sightings in Ridgefield and neighboring Fairfield County towns are consistent with these findings.
- Despite recommendations in the 2005 Deer Committee report outlining the conditions for controlled hunting, several fundamental conditions have been left unmet. Ridgefield lacks a recent aerial survey upon which to accurately estimate local deer density (although there is one for Fairfield County). The Deer Committee has not consulted with Yale School of Forestry or another research institution in an effort to assess the relative success or failure of the controlled hunt and to locate current high density deer “hot spots” as outlined in the 2005 report.
- The current low point in the Ridgefield annual deer harvest coincides with a significant number of approved open space hunting sites. (Table 2.3-1). The BOS approved 15 parcels for the 2018-2019 hunting season, a slightly larger number of parcels relative to prior years. The 14th consecutive year of controlled hunting on town open space land in Ridgefield included closing off from public use a larger proportion of our open space land – while fewer deer are being removed.
- Culling is often viewed and utilized as last resort measure, typically part of a comprehensive 2- to 5-year plan based on current deer population numbers rather than an ongoing annual event.
- Since 2006 when the hunt commenced, the number of motor vehicle accidents and deer harvested in Ridgefield are both dramatically down (Fact Sheet 4). It should be noted, however, this downward trend in

accidents started 10 years before the controlled hunt commenced.

- A growing body of scientific research shows that deer numbers *per se* in a given region are unrelated to incidents of Lyme disease in humans (Fact Sheet 6).
- Consistent with the foundational 2005 report, closing open space from public access requires continued assessment.

How should the town move forward?

With the hunt in its 13th year, and in the context of (1) fewer deer taken in the 2017/18 hunt (and some public reports of “fewer deer”) and (2) with growing concern about restricting public access to public open space, the BOS has decided to hold a public hearing in the Spring 2019 timeframe on the future of the hunt.

There are several possible alternatives regarding the future of the hunt:

- Keep the annual controlled hunt essentially as it is today – the status quo.
- Permanently stop the hunt.
- Continue the hunt but reduce its intensity. This could be accomplished in a number of ways, including but not limited to:
 - Conducting the hunt every 2-3 years, instead of annually.
 - Reducing the number of open space properties allowed for hunting.
 - Reducing the length of the hunting season.
 - Restricting the type of weaponry allowed (e.g., archery only).

Ridgefield Conservation Commission Recommendation

Based on the information available, the RCC recommends continuing the hunt but in a modified form, preferably (as suggested by Yale), conducting the hunt every 2-3 years. Modifying the hunt should result in fewer closures of open spaces for shorter periods of

time, allowing residents more time to enjoy use of our natural resources. Deer management decisions and changes to deer hunting protocols on town open space impact hikers and wildlife enthusiasts alike - and therefore must reflect the interests and perspectives of these groups.

However, as they say, the devil is in the details and the procedures for continuing the hunt must be formulated into a short-term (say, 5-year) deer management plan for the town. The Deer Committee needs to develop this plan and oversee annual assessments and ongoing objectives.

Furthermore, objectives to consider going forward include:

- Promoting safe and careful recreational hunting on state land as a “first choice” tool to manage deer populations.
- Encouraging participation in venison donation programs and similar mechanisms to foster local use of the deer resources.
- Educating hunters on their potential role impacting local deer populations and herd composition.
- Guiding hunters in making harvest decisions that are appropriate for current town needs and goals. This may include discouraging the harvest of bucks.
- Promoting landowner-hunter cooperatives for voluntary implementation of specialized deer management programs on private land. (See *Dept. of Environmental Conservation Management Plan for White Tailed Deer in New York State 2012 – 2016*. https://www.dec.ny.gov/docs/wildlife_pdf/derplan2012.pdf.)



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Resumes of Key Contributors

Dr. Mark Ashton

Professor Ashton conducts research on the biological and physical processes governing the regeneration of natural forests and on the creation of their agroforestry analogs. In particular, he seeks a better understanding of regeneration establishment among assemblages of closely related trees. His long-term research concentrates on tropical and temperate forests of the Asian and American realms. The results of his research have been applied to the development and testing of silvicultural techniques for restoration of degraded lands and for the management of natural forests for a variety of timber and nontimber products.

Dr. Oswald Schmitz

Dr. Oswald Schmitz is the Oastler Professor of Population and Community Ecology, in the Yale University School of Forestry and Environmental Studies. He studies the linkage between two important components of natural systems: biodiversity and ecosystem services. These issues are examined using field experimentation guided by formal mathematical theory of species interactions. His research explains how predator and herbivore species determine the species composition and productivity of plants in ecosystems, and ensuing ecosystem processes such as nutrient and carbon cycling. Research also focuses on elucidating how important environmental disturbances, such as global climate change and natural resource exploitation, alter the nature and strength of species interactions in ecosystems and ensuing ecosystem services. The scientific insights aid efforts to conserve vital services that species in ecosystems provide to humankind. His research evaluates how to rethink conservation strategies by considering species as part of a natural portfolio. This portfolio represents a wealth of potential alternatives to contemporary technologically intensive and expensive approaches in environmental management. His book “The New Ecology: Rethinking a Science for the Anthropocene” encapsulates much of his thinking about biodiversity and ecosystems and, heavily inspired by the writings of Aldo Leopold, makes ecological science accessible to a broader readership.

Dr. Edward Faison

Dr. Faison has been a senior ecologist at Highstead since 2006 and plays a lead role in formulating and implementing wildlands and woodlands communications and outreach strategies. He holds an MFS in Forest Science from Harvard University and a PhD in Environmental Conservation from the University of Massachusetts, Amherst. Dr. Faison's work focuses on deer & moose interactions with forests, the study and conservation of wildlands and intact forests, and forest history and long-term ecological change. He also advises conservation groups, educators, and land trusts about stewardship and forest monitoring and synthesizes and communicates ecological topics to the general public.

Cary Institute of Ecosystem Studies:

Founded in 1983, the Cary Institute of Ecosystem Studies is one of the world's leading independent environmental research organizations. Areas of expertise include disease ecology, forest and freshwater health, climate change, urban ecology, and invasive species. Studies by our scientists have been instrumental in informing the Clean Air Act, the Intergovernmental Panel on Climate Change, and environmental management practices throughout the Northeast, including the Hudson River, New York's Catskill and Adirondack forests, and the watershed of Baltimore, Maryland. Hallmark projects include studies of the impact of acid rain on forests and freshwater ecosystems, unraveling the relationship between biodiversity loss and emerging infectious diseases, and tracking how climate change influences the spread of invasive species.