COMMONWEALTH of VIRGINIA

Todd P. Haymore
Secretary of Agriculture and Forestry

Office of Governor

September 30, 2015

The Honorable Walter Stosch
Co-Chairman, Senate Finance Committee
Innsbrook Centre
4551 Cox Road, Suite 110
Glen Allen, Virginia 23060
District12@senate.virginia.gov

The Honorable Charles S. Colgan
Co-Chairman, Senate Finance Committee
10660 Aviation Lane
Manassas, Virginia 20110
District29@senate.virginia.gov

The Honorable S. Chris Jones
Chairman, House Appropriations Committee
P.O. Box 5059
Suffolk, VA 23435
DelCJones@house.virginia.gov

Dear Chairmen:

In accordance with Item 85 in Chapter 665 of the 2015 Virginia Act of Assembly, the Secretary of Agriculture and Forestry submits the following report outlining the findings of the 2015 Lyme Disease Task Force to the Chairmen of the House Appropriations and Senate Finance Committees.

Sincerely,

Todd P. Haymore

Commonwealth of Virginia

Task Force on Lyme Disease "Point of Disease" Prevention Strategies

FINAL REPORT

September 30, 2015

Introduction

Item 85 in Chapter 665 of the 2015 Virginia Acts of Assembly directs the Secretary of Agriculture and Forestry to report to the Chairmen of the House Appropriations and Senate Finance Committees the findings of a task force assembled to address certain discrete issues related to Lyme disease "point of disease" prevention strategies ("Task Force"). The Task Force's mandate is to conduct the following:

1. Identify areas in Virginia with the highest prevalence of Lyme disease. In the event that a "point of disease" prevention strategy is adopted, the legislation contemplates that these identified areas would serve as implementation sites.

2. Determine estimated costs of implementing a "point of disease" prevention program in the identified areas.

3. Identify sources of revenue to fund a "point of disease" prevention program. Specifically, the Task Force was directed to review potential federal grants, local funding, private foundations, and state sources.

The legislation directed that the Task Force be convened by the Secretaries of Agriculture and Forestry and Health and Human Resources, and include representatives from the Department of Health ("VDH"), the Department of Health Professions ("DHP"), the Department of Agriculture and Consumer Services ("VDACS"), the Department of Game and Inland Fisheries ("DGIF"), and the Department of Forestry ("DOF"). In addition, relevant local agencies, medical professionals, and representatives of organizations of affected citizens were to be included.

Prior Efforts

In October 2010, Governor Robert F. McDonnell and Secretary of Health and Human Resources William A. Hazel, Jr. convened a task force ("2011 Task Force") to study and make recommendations in the following areas related to Lyme disease: (1) diagnosis, (2) treatment, (3) prevention, (4) impact on children, and (5) public education. The 2011 Task Force adopted its final report on June 30, 2011 ("2011 Report"). The 2011 Report does not address the issues of special concern to the Task Force's mission; however, the report does provide a foundation upon which the Task Force's analysis builds.

The following members of the 2011 Task Force benefit from the background and experience of that exercise and bring with them a reservoir of knowledge:

- Secretary William A. Hazel, Jr., MD, Secretary of Health and Human Resources to both Governor Terence R. McAuliffe and Governor McDonnell

- Monte Skall, Executive Director of the National Capital Lyme and Tick-Borne Disease Association

- Robert W. Duncan, Executive Director of the Department of Game and Inland Fisheries since 2008

In addition to these members, the 2011 Task Force also included the State Epidemiologist and the Director of the Department of Health Professions.

Membership

The following individuals served on the 2015 Task Force:

- Secretary Todd P. Haymore, Secretary of Agriculture and Forestry

- Secretary William A. Hazel, Jr., MD, Secretary of Health and Human Resources

- Robert W. Duncan, Executive Director of the Department of Game and Inland Fisheries

- Laurie Forlano, DO, MPH, State Epidemiologist

- Richard Wilkes, DVM, State Veterinarian, Virginia Department of Agriculture and Consumer Services

- David E. Brown, DC, Director of the Department of Health Professions

- Bettina Ring, State Forester, Virginia Department of Forestry

- Monte Skall, Executive Director of the National Capital Lyme and Tick-Borne Disease Association

- David Goodfriend, MD, MPH, Director of the Loudoun County Health Department

The work of the Task Force was helped immeasurably by the efforts of a few additional individuals. Dr. David N. Gaines, the Public Health Entomologist in the Virginia Department of Health's Office of Epidemiology, provided a wealth of knowledge regarding both Lyme disease and the blacklegged tick. Kyle Rosner and Ian Baxter, the 2015 Governor's Fellows assigned to the Secretariat of Agriculture and Forestry, performed invaluable research and drafting services. This product is a testament to their hard work.

Initial Observations

With respect to Lyme disease, point of disease prevention mechanisms are still in developmental stages. However, to the extent that their efficacy is established, they may provide another tool to those jurisdictions particularly beset by Lyme disease. This report provides background and a roadmap regarding the potential use of these point of disease prevention strategies.

Analysis

Per the enabling legislation in the budget language, the mission of the Task Force is divided into three substantive areas: (1) the identification of areas in Virginia suffering from the highest incidence of Lyme disease, (2) estimating the cost of implementing a "point of disease" prevention program, and (3) the identification of sources of funding for such a prevention program. Accordingly, the Task Force determined that this report would focus primarily on existing data sets, and that knowledgeable state and local staff and advocacy groups would be most useful in leveraging their knowledge base regarding contacts in the "point of disease" prevention community and nontraditional sources of potential funding.

Background

Disease Description:

Lyme disease, an illness caused by the bacteria *Borrelia burgdorferi*, is an infectious disease carried by and transmitted to humans via the blacklegged tick. Symptoms of the disease may include a fever, chills, body and joint pains, swollen glands, an erythema migrans ("EM") rash, and fatigue. Symptoms associated with later stages of illness may include multiple EM rashes, shooting pains or numbness in the extremities, Bell's palsy, heart palpitations, meningitis or encephalitis, cognitive deficiencies, and arthritis in one or more major joints. While patients infected with the disease generally respond favorably to treatment with antibiotics, a subset of patients treated for Lyme disease may endure lingering late stage symptoms.

Over 36,000 cases of Lyme disease were reported in the United States in 2013, making it the most commonly reported vector-borne disease in the nation. In 2014, there were 1,346 reported cases of Lyme disease in Virginia, a three percent increase over the 2013 figure. Even these figures may be underestimating the scale of the issue. According to the Centers for Disease Control and Prevention ("CDC"), it is estimated that only 1 in 10 cases of Lyme disease are actually reported to the health department and meet case definition.

Transmission:

Lyme disease is transmitted to humans through a vector species, or an organism that transmits infectious disease to other organisms. The vector in the case of Lyme disease is *Ixodes scapularis*, commonly known as the blacklegged tick. Among the three tick species that most commonly bite humans in Virginia, the blacklegged tick is the only vector for Lyme disease. Blacklegged ticks, formerly known as deer ticks, have a four stage life-cycle: (1) eggs that hatch into (2) larvae, which then transition to (3) the nymph stage and finally to (4) the adult stage. Each of the last three stages of the tick's life cycle requires a blood meal, which the ticks achieve by feeding on other organisms. While both nymph and adult stage ticks can bite humans, the main vector for Lyme disease to people is the nymph stage blacklegged tick. Nymph stage blacklegged ticks are the main vectors not only because of their open feeding preferences, but also because they are active during the spring and summer months when people are more likely to enter their forest habitats. Additionally, their minute size, approximately the size of a poppy seed, makes their detection difficult.

The blacklegged tick is the vector species that transmits Lyme disease to humans, but other animals remain important in the disease transmission cycle. Animals that serve as tick hosts play important roles in the disease transmission cycle and in tick reproduction: disease reservoirs are infected by ticks and pass the disease on to other ticks, and other host animals are key to tick reproduction because they provide a blood meal to nourish eggs in reproductive adult females and provide a location where ticks can mate. Lyme disease can be transmitted to select mammals (reservoir hosts) that are competent for becoming infected with the Lyme disease agent and then infecting other ticks that feed on them. While some organisms, such as raccoons, are not competent reservoirs and play almost no role in Lyme disease transmission, other animals are highly competent and can harbor the disease for months. Among these, the white-footed mouse is the most competent reservoir host and after it is infected, it can infect feeding ticks over a period of up to six months. The most important animal for tick reproduction is the white-tailed deer. While deer do not infect and cannot be infected by blacklegged ticks, deer serve as a site where male and female ticks can mate and where mated female ticks can obtain a blood meal to nourish the eggs they will lay. Any one deer may have dozens to hundreds of adult blacklegged ticks attached during the fall and winter season. Each blood-fed, mated female tick that drops off a deer into a backyard or forest has the potential to lay up to 3,000 eggs.

Environmental Factors:

The catalyst for the transmission of Lyme disease is the environment itself. In an undisturbed forest there is more species diversity, meaning that not every organism will be a competent reservoir and Lyme disease becomes diluted. However, in fragmented forests, or forests that have been partitioned due to development, species diversity is diminished and competent reservoirs predominate other tick host species and amplify the disease. The white-footed mouse thrives in fragmented forests due to its ability to nest in man-made structures, such as sheds and wood piles. White-tailed deer, the tick host that is crucial for most tick reproduction, also flourish in fragmented forest because of their preference for eating forest-edge vegetation. The sum of all these factors is that Lyme disease is often associated with suburbanization. Heavily suburbanized areas, such as northern Virginia, experience the state's highest number of infections. Lyme disease is also emerging in areas that are rapidly suburbanizing, such as counties in northwest and southwest Virginia.

"Point of Disease" Prevention Definition:

The best currently available method for reducing Lyme disease infections is to avoid exposure to vector ticks. By avoiding habitats where blacklegged ticks exist, individuals reduce the opportunity for vector-to-human transmission. However, given the environmental dynamics outlined above, avoidance is not always a matter of choice. The fractured forest profiles that result from suburban and exurban development of historically forested land can lead to a concentration of disease-carrying blacklegged ticks in the very areas that Virginians inhabit. When exposure is unavoidable, measures recommended to reduce the risk of infection include the use of both protective clothing and tick repellents, checking the body for ticks after spending time in tick habitats, and prompt removal of attached ticks before transmission can occur.

Another strategy is to control the vector species. In the case of Lyme disease, this would most commonly involve the destruction or mitigation of the blacklegged ticks living and breeding in close proximity to humans. While this continues to be a viable strategy for small areas, efforts to target the blacklegged tick population over large areas are economically untenable and impact on non-target organisms is a concern. The blacklegged tick's small size and reproduction habits also make direct control challenging.

One step removed from direct control of the vector species is "point of disease" prevention. This mechanism operates on transmission prevention at the reservoir host species level rather than directly on the vector species itself or on the vector species to human link. In the case of Lyme disease, this can mean introducing a vaccine into white-footed mice, the Lyme disease reservoirs. Vaccinated mice would then be a disease-free food source for blacklegged ticks. In this way, the point of disease prevention mechanism has the ability to expand geometrically within the vector/reservoir community without directly involving the human population.

<u>Topic No.1: Incidence Rate</u>

The Task Force is charged with identifying areas in Virginia with the highest prevalence of Lyme disease. Incidence and prevalence are both measures of the burden of disease in a population. Incidence is limited to new cases, while prevalence includes both new cases and those who still have disease. In order to implement this mandate, the Task Force has to determine how to measure "prevalence" and how to define "areas." Because the historical data for incidence

of Lyme disease is categorized by city/county, the Task Force determined that this jurisdiction-level distinction was the most useful definition of "area." More discretion was required, however, with respect to the term "prevalence."

The Virginia Department of Health has collected incidence data on Lyme disease since 1990; prevalence data is not collected by VDH. Cases are reported from the infected person's county of residence, not the place where they were infected. However, incidence data can be a useful marker for estimating where Lyme disease exists, where it is growing, and forecasting where it may be heading. Lyme disease levels had been relatively consistent until calendar year 2007, when the incidence rate more than doubled. Since 2007, the rates have only been growing, alarmingly in some localities. Listed below are the localities most affected by Lyme disease. Higher incidence rates can also be partially attributed to enhanced awareness in the community.

Lyme disease is most commonly reported in Fairfax and Loudoun Counties (Table 1). Incidence rates, or number of new confirmed and probable cases reported per 100,000 people, are highest in Floyd and Clarke Counties (Table 2). Five localities are listed in both tables, indicating high numbers of reported cases and high incidence relative to other Virginia localities. These five counties are Loudoun, Frederick, Floyd, Warren, and Montgomery. Considering both numbers of reported cases and incidence rates, one could interpret these data as indicating these five counties as the most affected areas in Virginia, but the Task Force recognizes policy-makers may come to different conclusions.

Table 1: Virginia localities with highest reported number of confirmed and probable Lyme disease cases, 2010-2014

	2010	**2011**	**2012**	**2013**	**2014**	**5-yr average**
Fairfax County	256	146	149	257	284	218.4
Loudoun County	223	261	219	168	193	212.8
Frederick County	88	53	70	33	33	55.4

Montgomery County	39	13	44	57	72	45.0
Prince William County	46	34	30	55	55	44.0
Albemarle County	54	52	40	30	32	41.6
Augusta County	42	44	32	18	27	32.6
Floyd County	15	8	33	53	48	31.4
Warren County	42	26	34	25	28	31.0
Fauquier County	44	26	29	31	23	30.6

Table 2: Virginia localities with the highest Lyme disease incidence rates, 2010-2014*

	2010	**2011**	**2012**	**2013**	**2014**	**5-yr average**
Floyd County	99.9	52.4	214.6	344.4	309.1	204.1
Clarke County	185.1	121.1	56.1	104.7	76.7	108.7
Warren County	114.4	69.2	90.1	65.7	72.4	82.4

* Incidence rate calculated per 100,000. To the extent possible, rates by locality are calculated based on residence of the patient. When address is neither reported by the provider nor ascertained by the health department, the location of the reporting source, such as the hospital or laboratory, is used.

Rappahannock County	99.5	54.3	134.3	80.5	40.1	81.7
Pulaski County	68.5	8.6	60.7	83.5	121.7	68.6
Loudoun County	74.0	83.6	67.3	49.9	55.2	66.0
Frederick County	86.9	50.7	65.9	41.1	40.6	57.0
Carroll County	3.4	36.6	30.0	83.7	113.8	53.5
Radford	92.7	6.1	54.8	47.9	52.4	50.8
Montgomery County	42.8	13.8	46.6	59.9	74.8	47.6

Based on absolute numbers from 2010 through 2014, it is the determination of the Task Force that Fairfax County yields the greatest number of newly diagnosed Lyme disease cases in Virginia, and therefore should be targeted as a potential site to implement a point of disease prevention program. Because Loudoun County experienced the second-highest number of cases over this timeframe, western Fairfax County may be the preferred target area. Given the type of development in that part of the county, as well as the resulting fragmented forestation, environmental factors suggest a high population of potentially disease-carrying blacklegged ticks in that area.

Topic No. 2: Estimated Costs of Implementing a Prevention Program

Estimated costs of implementing point of disease prevention programs vary depending on the strategies employed. Public education programs that include information about recognizing tick habitats, appropriate dress and repellant use, and prompt removal of ticks are important in preventing tick-borne disease at the individual level. Environmental strategies, such as animal exclusion and landscaping, deer control, and tick control, as well as novel strategies such as interventions that target other wildlife important in the Lyme disease transmission

cycle, such as white-footed mice, may also be considered as part of a broad strategy to reduce the environmental burden of *B. burgdorferi*. Surveillance for human cases as well as tick surveillance and testing of collected ticks to determine their *B. burgdorferi* infection rates should be used to help inform disease prevention strategies and be considered when measuring their success.

After researching companies that market these novel Lyme disease prevention strategies that specifically target wildlife, two companies' programs stood out in terms of closest possible starting date, cost effectiveness, research capacity, and market presence. These two are US Biologic's LymeShield Pellet program, and Ventria Bioscience's vaccine bait box program.

In its program, US Biologic seeks to stop the transmission of Lyme disease by targeting competent Lyme disease reservoirs, specifically the white-footed mouse, by dispersing small pellets attractive to mice coated with a Lyme disease vaccine around fragmented forest areas or other areas where mice, ticks, and deer frequently interact.

The estimate given by US Biologic is that the total product and distribution costs will be approximately $100/acre. This cost is split between $30 for distribution and $70 for the product itself. US Biologic recommends for their product a phased distribution approach that begins with the areas with the most interaction of mice, ticks, and humans. These areas are referred to as "hot zones." It is important to note that the $100 estimate includes each separate distribution phase of the program. The potential costs associated with the use of US Biologic's LymeShield Pellets depend upon the area in which they are being broadcast. For example, the $30 distribution component could be phased out altogether if the location or locality in which it is being used decides to recruit volunteers or others who could spread the pellets in the appropriate areas. For this reason, and the fact that they are much more adept at identifying "hot zones" for Lyme disease, it is important to note that localities should be actively engaged in deciding where to implement the point of disease prevention program.

The LymeShield has undergone five years of CDC-sponsored field trials which suggest a 76 percent drop in the prevalence of bacteria in ticks that transmit Lyme disease. No studies have yet been published as to whether this drop in bacteria prevalence is correlated with a decrease in human Lyme disease cases. The product is currently in the USDA approval process.

Ventria Bioscience's point of prevention program uses bait boxes to transport a vaccine to the reservoir species. Bait boxes are typically small and plastic, and hold a certain amount of the vaccine. The bait boxes draw in the white-footed mice and enable them to ingest the vaccine. The targeted areas where these bait boxes would be primarily scattered would be areas where there is high Lyme disease prevalence. Around 8-10 bait boxes would be used per acre, and would be renewed 3 times per year.

For the first year of treatment using a single bait box, the cost per acre appears to be comparable to US Biologic. This figure is variable, however, because the product is still in development, and the amount of years required for the vaccine to successfully diminish the pathogen is unknown.

Should implementation occur in the relatively small geographic area of a single jurisdiction or locality, the most effective means of determining whether the program is having an effect on Lyme transmission is to collect ticks in a systematic manner from proximate treatment and control plots and monitor for changes in the local tick infection rates in these treatment and control areas before and after treatment implementation. It will likely take several years to obtain meaningful measurements. The first year's tick survey (the treatment year) would require a survey of nymph stage ticks to determine the baseline nymph infection rate. Nymph tick surveys are best conducted between mid-May or and early June. In the second year, a nymph survey would also be conducted in the same May-June timeframe to determine if the treatment reduced nymph infection rates by preventing larval tick infections.

The survey and testing work from treatment and control plots that would be required to determine the efficacy of any treatment effort is likely to account for a substantial proportion of program implementation costs. Surveillance will require the action of dedicated, trained tick surveillance personnel and a well-controlled testing laboratory with high throughput (robotic) extraction capability and polymerase chain reaction (PCR) capability as well as access to appropriate primers for *B. burgdorferi*. Most universities do not have molecular labs capable of doing PCR analyses on a large scale, and tick testing by PCR is costly (typically $15 to $20 per sample) and prone to contamination. Accordingly, testing likely should occur at a professional laboratory (*e.g.*, a State or County lab) that has significant PCR experience and well-established protocols for contamination prevention. In the absence of a particularized proposal, these implementation and testing costs cannot be forecast accurately. However, they would likely compose the bulk of the program costs.

Topic No. 3: Identifying Sources of Revenue to Fund a Prevention Program

Identifying sources of funding, both public and private, make up part of this Task Force's mission. Below are the results of inquiries made by the Task Force and others regarding the funding of a "point of disease" prevention program.

Local Sources:

Local funding for insect-borne diseases is a locality-by-locality decision. Counties and municipalities with greater resources are more likely to have the ability to target programs for specific diseases. Furthermore, localities that have historically encountered Lyme disease among their citizenry may be more likely to have established recurring funding mechanisms for this particular disease. While individuals can always advocate for funding at the local level for point of disease prevention strategies, such advocacy is likely to enjoy a greater response in those jurisdictions that already include budget line items focused on insect-borne diseases.

The Fairfax County budget includes Fund 40080, the Integrated Pest Management Program. Funded by general property taxes, interest on investments, and past years' balances, the Integrated Pest Management Program has expended between $2 million and $3 million over the last few years. Note, however, that this fund is not dedicated exclusively to Lyme disease; other pests of concern include the emerald ash borer, the gypsy moth, and mosquitos (with respect to the West Nile Virus).

State Sources:

There is no identified funding stream of state dollars directly tied with point of disease prevention programs regarding Lyme disease. In the 2015 General Assembly Session, $125,000 was allocated in the FY 2016 budget for "Lyme Disease research and medical test development." This funding, identified as Item 164, is for Financial Assistance for Educational and General Services at George Mason University. Public reports indicate that George Mason University's Center for Applied Proteomics and Molecular Medicine is receiving the funding to roll out the Nanotrap-based Lyme Antigen Test, which was developed jointly with Ceres Nanosciences. That is the only Lyme-specific budget item tied to funding.

Task Force members were asked to review their own budgets for opportunities for funding Lyme disease point of disease prevention strategies. There was no existing capacity in the budgets of the Department of Forestry, the Department of Health Professions, the State Veterinarian, the Department of Health (beyond funding currently allocated to existing Lyme disease efforts), or the Department of Game and Inland Fisheries.

Although there is no existing dedicated funding stream for point of disease prevention strategies currently in the existing state budget, 2016 begins the start of a new budget cycle. Accordingly, the upcoming General Assembly Session presents an opportunity, should policy and resources warrant, to establish a dedicated funding mechanism.

Federal Grants:

Given the size and scope of the federal government and its attendant programs, the extent to which there may be funding for a Lyme disease point of prevention program is unclear. The Task Force is composed primarily of state actors, and while these members have relationships and knowledge about a host of federal programs within their areas of expertise, that expertise does not cover the full breadth of possible federal programs. Accordingly, the information below is predicated exclusively on the background knowledge of Task Force Members:

- Department of Game & Inland Fisheries: DGIF most often interacts with the U.S. Fish and Wildlife Service. No funding relevant funding opportunities were identified from this source.

- Department of Agriculture and Consumer Services/State Veterinarian: VDACS and the State Veterinarian most often interact with the U.S. Department of Agriculture. No funding relevant funding opportunities were identified from this source.

- Department of Forestry: DOF most often interacts with the U.S. Forest Service. No funding relevant funding opportunities were identified from this source.

- Department of Health: VDH most often interacts with the U.S. Health and Human Services Department. No funding relevant funding opportunities were identified from this source.

- Department of Health Professions: DHP does not have a federal analog.

Private Sources:

The following private sources of funding were identified by Task Force members as being those types of foundations or other sources of funding whose mission aligns with disease prevention. Note that no particular funding was identified for point of disease prevention with respect to any of these sources.

- Magalen O. Bryant: Noted conservationist and private investor whose interest lies in incorporating conservation and environmental practices into business processes. Ms. Bryant serves on, or has served on, the Board of Directors at the Carlisle Corporation, Dover Corporation, O'Sullivan Corporation, National Fish & Wildlife Foundation (Chairperson), and the National Wildlife Federation.

  Contact information: P. O. Box 247, Middleburg, Virginia, 20118. Tel: 540.687.6296. Fax: 540.687.6151.

- Doris Duke Charitable Foundation (DDCF): The mission of the Doris Duke Charitable Foundation is to improve the quality of people's lives through grants supporting the performing arts, environmental conservation, medical research, child well-being, and through preservation of the cultural and environmental legacy of Doris Duke's properties.

  Contact information for DDCF Headquarters and Grant-making Programs: 650 5th Avenue, 19th Floor, New York, New York 10019. Tel: 212.974.7000. Fax: 212.974.7590.

- Virginia Conservation Legacy Fund (VCLF): A nonprofit organization which seeks to conserve Virginia's natural resources to address climate change, educate the public, especially school children, and provide for public access and enjoyment of the outdoors. VCLF is a member of Kissito Healthcare's portfolio of companies. Kissoto is a Roanoke-based nonprofit charity working both domestically and internationally in health, aging, nutrition, natural resources, and human development.

Contact information for Kissito Healthcare: 5228 Valleypointe Parkway, Building B, Suite 1, Roanoke, Virginia 24019. Tel: 540.265.0322. Fax: 540.265.0305.

- Gannett Foundation: The Gannett Foundation supports projects that address neighborhood improvement, community problem solving, environmental conservation, and education.

  Contact information: 7950 Jones Branch Drive, McLean, Virginia 22107. Tel: 703.854.6000. Attention: Meg Kennedy.

- The Alleghany Foundation: The Foundation focuses on improving the quality of life in the Alleghany Highlands of Virginia with a focus on health and welfare.

  Contact information: Post Office Box 11764, 214 Main Street, Suite 4, Covington, Virginia 24426. Tel: 540.962.0970. Fax: 540.962.1770.

- Gordon and Betty Moore Foundation: This group invests in the development of new technologies, supports top research scientists, and brings together cutting-edge scientific partnerships.

  Contact information: 1661 Page Mill Road, Palo Alto, California 94304. Tel: 650.213.3003. Fax: 650.213.3003.

- Wegmans Food Markets, Inc.: A family-owned 85-store supermarket chain, founded in 1916, that has made environmental commitments to protect land and waters.

  Contact information: 45131 Columbia Place, Sterling, Virginia 20166. Tel: 703.421.2400.

- Toll Brothers American Luxury Home Builders: They contribute to regional and national organizations such as American Cancer Society, Habitat for Humanity, and others. They maintain a social awareness and often contribute to the communities in which they build homes. Regional office located in Ashburn, Virginia.

Contact information: 250 Gibraltar Road, Horsham, Pennsylvania 19044. Tel: 215.938.8000.

- Bass Pro Shops: A leading North American retailer of hunting, fishing, camping, and boating equipment as well as a leading corporate supporter of conservation.

  Contact information: 11550 Lake Ridge Parkway, Ashland, Virginia 23005. Tel: 804.496.4700.

- American Rod and Gun: Distributor of hunting, fishing, camping, and general sporting goods products.

  Contact information: Post Office Box 280, Springfield, Missouri 65801. Tel: 800.685.1575. Attention: Linda Ford.

- Insect Shield: Insect Shield is a clothing manufacturer that produces insect repellent apparel and gear.

  Contact information: 14 West Market Street, Greensboro, North Carolina 27401. Tel: 866.712.7110.

- Clongen Laboratories: A commercial laboratory that strives to improve health worldwide by providing clinical testing services in the areas of microbiology and molecular diagnostics of more than 95 pathogens, with a special interest in tick-borne illnesses, particularly Lyme disease.

  Contact information: 211 Perry Parkway, Suite 6, Gaithersburg, Maryland 20877. Tel: 301.916.0173. Fax: 301.916.0175.

- Alfred P. Sloan Foundation: Makes grants in support of original research, education in science and technology. Interested in research that results in a strong benefit to society.

  Contact information: 630 5th Avenue, Suite 3200, New York City, New York 10111. Tel: 212.649.1649. Fax: 212.757.5117.

- Mars, Incorporated: A diverse privately owned global business focused on a variety of food for people and animals.

Contact information: 6885 Elm Street, McLean, Virginia 22106. Tel: 703.821.4900.

- Cabela's: A premier outfitter of hunting, fishing and outdoor gear. Dedicated to conserving the fish, game, and wildlife.

  Contact information: 1 Cabela Drive, Sidney, Nebraska 69160. Tel: 308.254.5505. Fax: 308.254.4800.

- National Capital Lyme & Tick-Borne Disease Association: A multi-purpose organization focused on tick-borne diseases committed to funding scientific research, education, public policy and legislation related to tick-borne illnesses.

  Contact information: Post Office Box 8211, McLean, Virginia 22106. Tel: 703 821-8833. Fax: 202. 857.4441.

- International Lyme and Tick Associated Disease Society: A multi-disciplinary medical society promoting the understanding of Lyme disease through research and education. Supports physicians dedicated to advancing the standard of care for Lyme and its associated diseases.

  Contact information: Post Office Box 34146, Bethesda, Maryland 20827-1461. Tel: 301.263.1080. Fax: 301.560.5799.

- Bay Area Lyme Foundation: An organization that focuses on making Lyme disease easy to diagnose and simple to cure by supporting innovative technologies to find new breakthroughs in tick ecology as well as diagnosis and treatment.

  Contact information: 884 Portola Road, Suite A7, Portola, California 94028. Tel: 650.530.2439. Fax: 855.229.5963.