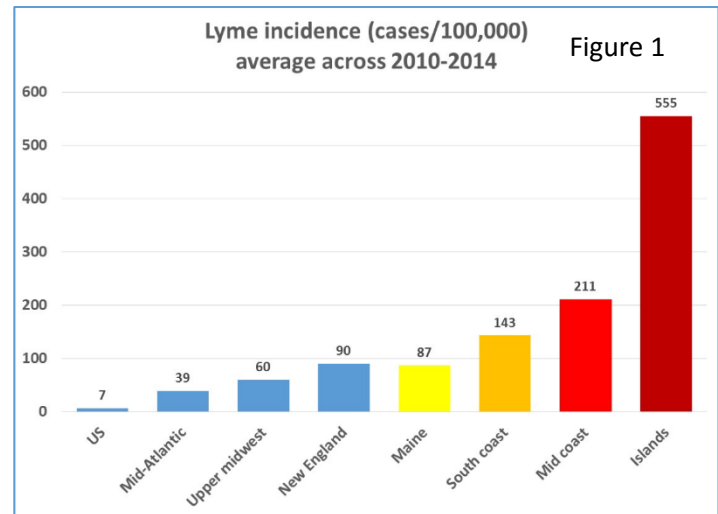


2016 Island Tick Survey, Preliminary Report, March 3, 2017

Vector-borne Disease Lab, Maine Medical Center Research Institute

The Maine Medical Center Vector-borne Disease Lab has been assisting island communities with their concerns about deer ticks since work began on Monhegan Island in the early 1990s. With the exception of Matinicus and Monhegan Islands, Lyme disease is serious issue on the islands. Figure 1 compares Lyme incidence (cases per 100,000 people) across the US, the upper Midwest and New England, Maine overall, and Maine's south coast, mid-coast, and islands. It is clear that Lyme incidence on islands is exceptionally high, averaging 555 cases/100,000 across 2010-14, compared to Maine's (87/100,000) and New England overall (90/100,000). The data in this chart came from data freely available to the public at the US Centers for Disease Control and Prevention and the Maine Center for Disease Control. As of May 2016, Lyme disease incidence and deer tick data are now available for hundreds of Maine towns¹.



To better understand islanders' concerns about deer ticks, we opened the Island Tick Survey on May 16, 2016. The survey ran through 2016. We have a few preliminary results to share based on electronically received responses. Survey responses on paper still need to be entered into the computer. The survey was not intended to be a random sample but rather an open invitation for islanders to express their experiences and opinions about ticks and tick control. All responses were anonymous.

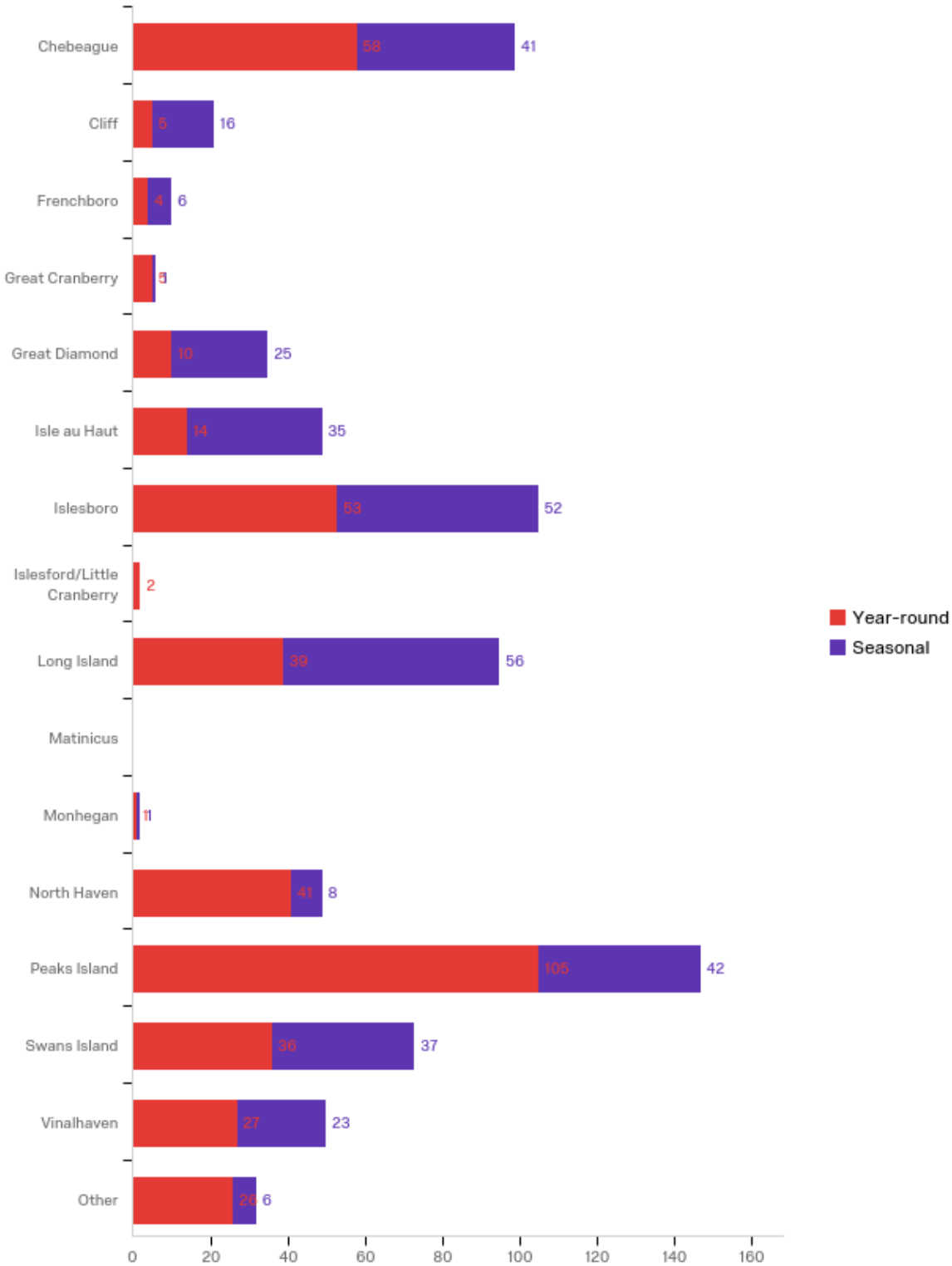
We received 772 responses from 14 of the 15 unbridged islands (Fig. 2) and several responses not from the 15 unbridged islands. We wanted to hear from anyone, however, the following analysis pertains just to those from the unbridged islands. Fifty-four percent of respondents were year-round residents and 46% seasonal, nearly all of whom stayed on-island for a month or more. Based on the number of year-round residents responding and the population of year-round residents (2010 census), response rate ranged from 2% to 17%. Seventy percent of respondents were female, which was not surprising since in the US, women tend to be the managers of health care in their households². Eighty-three percent of respondents thought Lyme disease was a problem on their island, whereas 2% did not, and 15% were ambivalent (Fig. 3). The opinion that Lyme disease was a problem was consistently high and did not differ by age, gender, income, education, or year-round vs. seasonal residency.

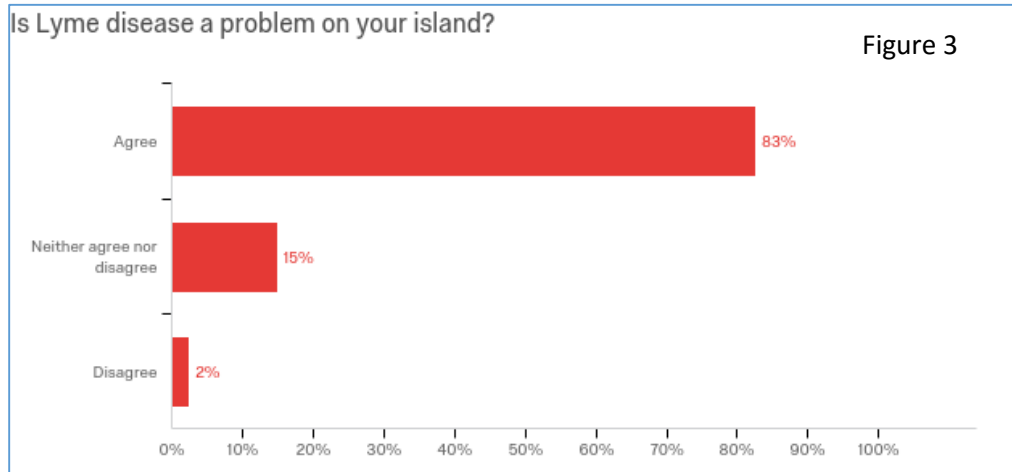
¹ <https://data.mainepublichealth.gov/tracking/lyme-content>

² U.S. Department of Labor. 2005. General facts on women and job based health. Washington, DC: U.S. Department of Labor www.dol.gov/ebsa/newsroom/fshlth5.html; Grant KR et al. eds. 2004. Caring for/caring about: women, homecare, and unpaid caregiving. Aurora, Canada: Garamond Press, Ltd.

Responses by island and resident type.

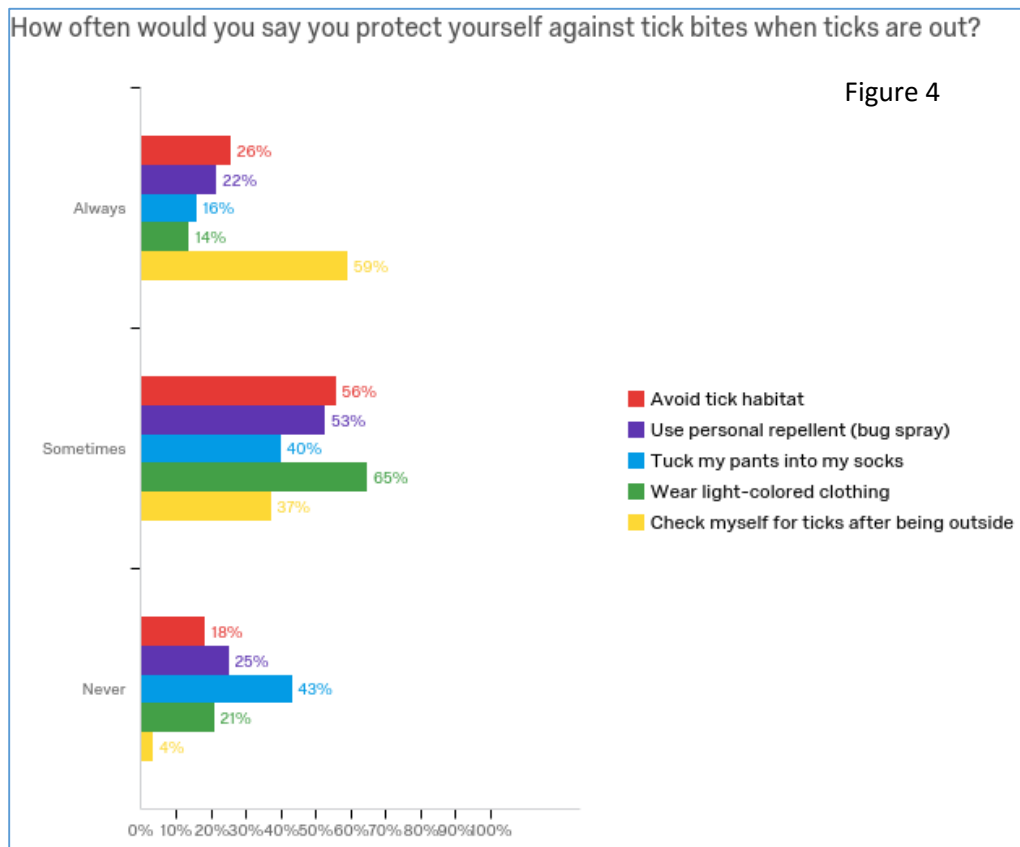
Figure 2





Over half (57%) of respondents had personally contracted a tick-borne illness, or had a family member who had contracted tick-borne illness. Lyme disease was the most

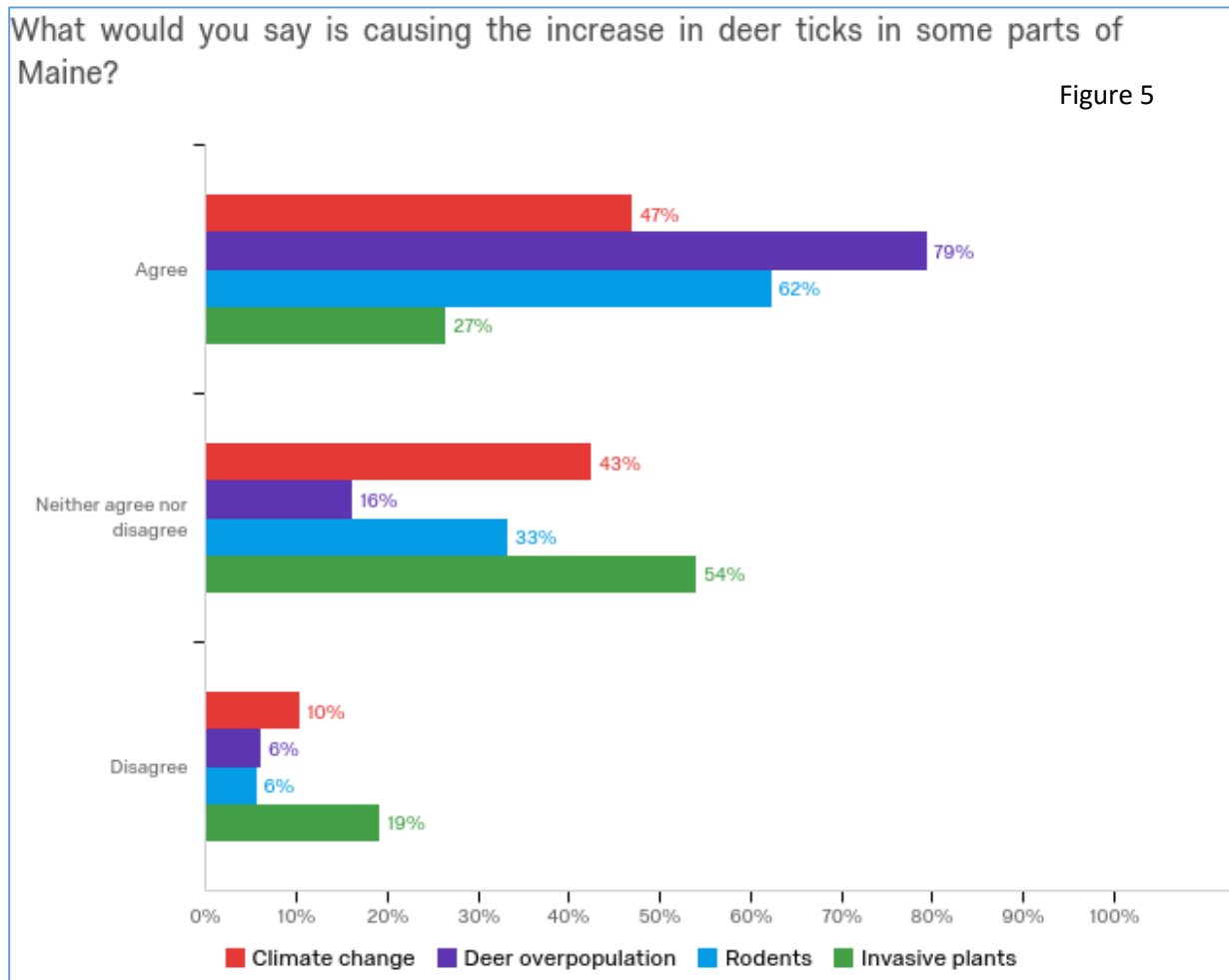
common tick-borne illness, though a few had contracted anaplasmosis and/or babesiosis as well (and/or had family members who had). According to those surveyed, 78% of tick-borne illnesses were island-acquired. With over half of respondents citing direct experience with Lyme disease, it was not surprising that most considered Lyme disease a problem on their islands. It is probably safe to say that having had experience with tick-borne illness was a motivation for responding to the survey. Proportion of people who had contracted tick-borne illness did not differ by age, gender, income, education, or resident status.

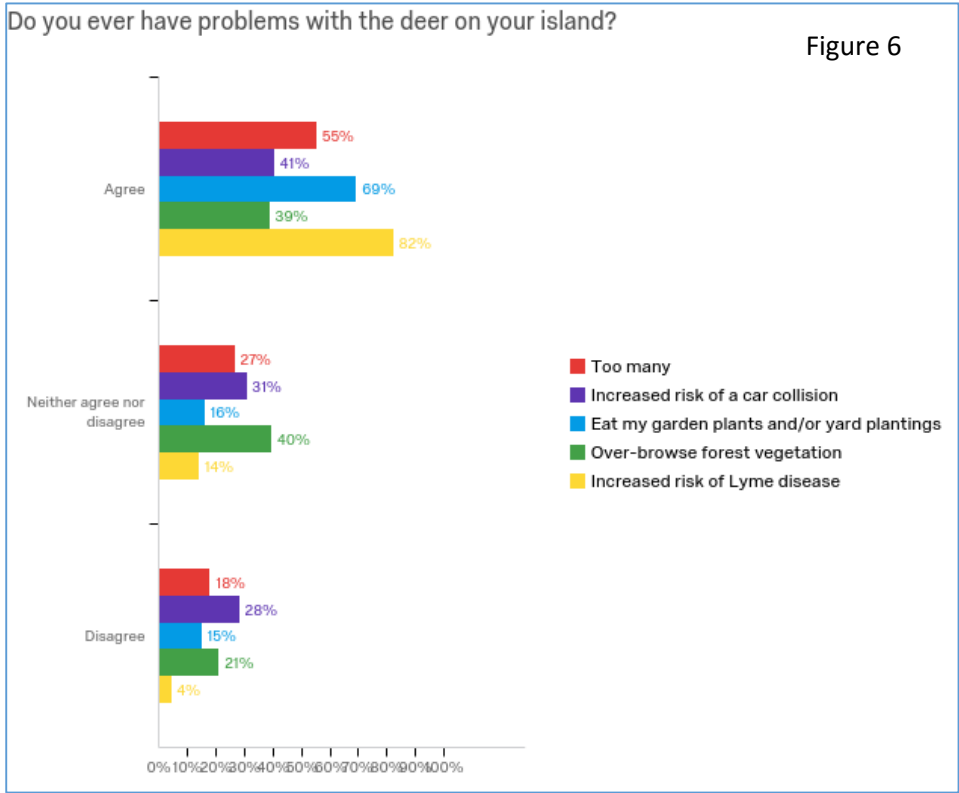


In terms of personal protection measures taken to prevent tick bite, the most common was the tick check (96% always or sometimes performed, Fig. 4). While all preventive measures are important, we think the tick check is the most important. Salience of the issue seems to be a motivator of tick personal

tick checks: for those agreeing Lyme disease is a problem on their island, only 2% never performed a tick check, but for those who did not think Lyme is a problem, 21% never did a tick check.

A key question in the survey was “What would you say is causing the increase in deer ticks in some parts of Maine?” Respondents could pick any of four possibilities: climate change, white-tailed deer overabundance, rodents, and invasive plants. Figure 5 indicates that deer overpopulation was the most frequently cited cause (79% agreeing), followed by rodents (62%), followed by climate change (47%), and finally, invasive plants (27%). More than half (54%) neither agreed nor disagreed that the increase in ticks was associated with invasive plants. When considering combinations of choices (climate change, deer, rodents, invasive plants), the most common choice combinations were deer/rodents pair (22%), followed by the trio of climate change/deer/rodents (15%), followed by deer (13%), followed by climate change/deer/rodents/invasive plants (13%). This is of great interest because the ecology of infectious disease entails looking at the entire landscape to understand how all the pieces of the ecological puzzle fall into place.



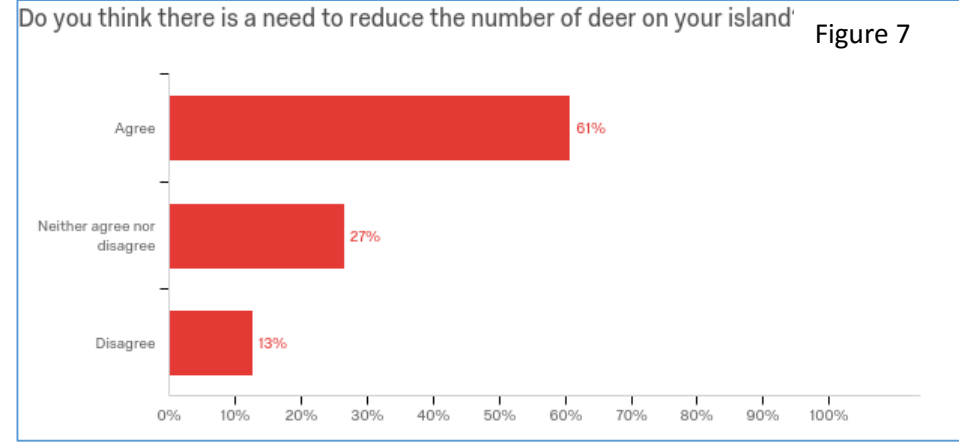


Eighty-two percent of respondents felt that deer were a problem because they are associated with Lyme disease. Deer were associated with other issues such as destruction of yard plantings (Fig. 6). Deer biologists speak of social carrying capacity; these responses suggest deer have exceeded the social carrying capacity of the landscape.

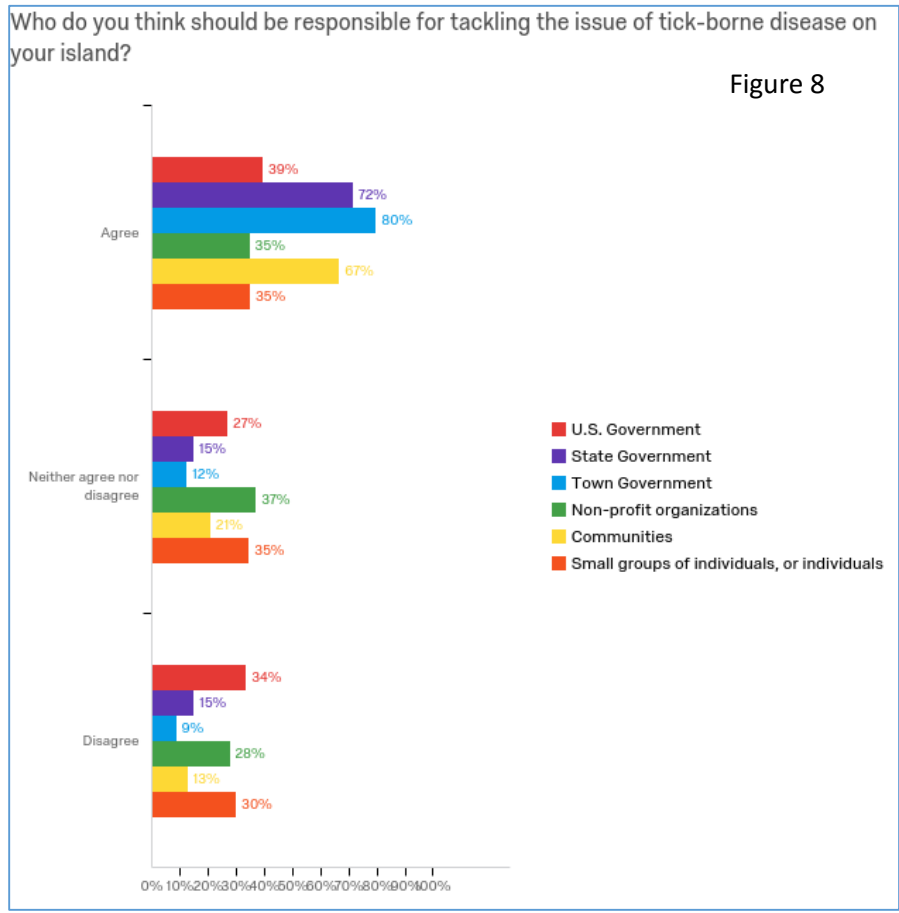
Thus it was not surprising that a majority (61%) agreed there is a need to

reduce deer (Fig. 7). This was higher for those who had contracted tick-borne illness (66%). In fact, those who had contracted tick-borne illness were twice as likely to agree there is a need to reduce deer than those who had only been bitten or never bitten by a deer tick. Only on Islesboro were seasonal residents more likely to favor deer reduction (90%) than year-round residents (47%). The method or methods by which to reduce deer (increased doe permits, expanded archery and riflery seasons, and sharpshooting) did not

differ by year-round versus seasonal residency, except for on Islesboro where more seasonal residents (87%) were in favor of sharpshooting than year-round residents (59%). In terms of responsibility for tackling the issue of tick-borne diseases on



islands, opinion leaned toward a combination of state, town, and community responsibility (Fig. 8).



This report merely scratches the surface of the Island Tick Survey results. Respondents wrote hundreds of thoughtful comments which we must go through and summarize. For example, some respondents said they would consider a botanical pesticide to kill ticks if the spray truly harmed nothing else. Some respondents commented that they knew invasive plants harbored ticks, and others said they had not heard of this connection and wanted to learn more. All in all, it is encouraging to see that respondents are aware that high deer tick abundance is a multi-faceted problem.

A concept known as “One Health” communicates that human and veterinary health depends on the health of the environment. It is our sense that a suite of factors (including climate change and deer, white-footed mouse, and invasive plants) have a role in the increase in deer ticks in some locations in Maine. Specifically, deer and mice may be locally overabundant. We also know that dense thickets of invasive plant species like Japanese barberry are great habitats for deer ticks and mice. Meanwhile, a trend of warmer winters is likely improving tick survival, or put another way, warming winters may serve to exacerbate conditions already favoring ticks. What can be done? With knowledge from past work and this survey, we hope to help island communities (if our help is requested) plan ways to reduce risk of tick bite by attaining the best possible ecological balance in the landscape. Balance means the mosaic of plants and animals in the landscape promotes human health and remains sensitive to island cultures and budgetary constraints. We look forward to reporting comprehensively on the Island Tick Survey before the close of 2017, and are happy to visit island communities well before then.

We deeply thank all respondents for taking the time to fill out the Island Tick Survey.

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