

# ISLESBORO DEER POPULATION ESTIMATE REPORT

MAY 2010



**PREPARED FOR:**

Islesboro Health Center  
150 Main Road  
Islesboro, ME 04848

**PREPARED BY:**

Stantec  
30 Park Drive  
Topsham, Maine 04086

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## 1.0 INTRODUCTION

Stantec Consulting (Stantec) was contracted by the Islesboro Health Center to conduct a deer population estimate on the island of Islesboro, Maine. This work was completed to better understand the deer population on Islesboro in order that more effective means of controlling deer ticks and associated Lyme disease might ultimately be put into place. This project is a collaborative effort between Stantec, the Town of Islesboro, the Health Center Advisory Board, local volunteers, and students. The ninth grade biology class at Islesboro Central School, under the direction of Heather Sinclair, is using this work as an annual science project. This report summarizes the deer population estimate surveys completed on Islesboro and the subsequent data compilation and population estimate calculations.

## 2.0 SURVEY METHODS AND DATA REVIEW

The field work associated with the Islesboro deer population estimate was completed March 15-18, 2010. Surveys were completed by Stantec biologists, Islesboro biology students, and local volunteers. Stantec completed training for local volunteers and students on May 15 to review the survey methodology. The survey methods and data analysis used are further detailed in the Islesboro Deer Population Estimate Study Plan (Appendix A). Copies of the original field data forms and photographs are available upon request.

The Islesboro biology students compiled the transect data into Excel spreadsheets and completed the original population estimate calculations in accordance with approved study protocols. Initial data quality assurance/quality control was completed by their teacher, Heather Sinclair. Stantec also completed a review of the collected data. Stantec's data review focused on making sure the correct number of pellet groups was entered for each plot and making sure plots that included roads, driveways, open water and beaches were omitted from the data set.

## 3.0 SURVEY RESULTS

A total of 32 transects were complete as part of the deer population study (Figure 1). One of the original proposed transects was omitted due to lack of land owner permission (Transect 30). After the review of the plot data was complete, it was determined that 2,834 plots were suitable to use for population calculations. Stantec used this revised data set to calculate the number of deer per square mile and adjusted this number based on the number of deer taken during the 2009 hunting season (i.e., 9/06/09 to 12/20/09). Using a 95 percent confidence interval, the population density was determined to be 62 (+/- 6) deer per square mile. Based on the size of Islesboro, this calculates to approximately 744 deer on the island.

## 4.0 DISCUSSION

The high deer density on Islesboro also has significant ecological implications in addition to the human health concerns associated with the Lyme disease. Islesboro consists primarily of forested habitats. Most of this forested habitat is softwood stands dominated by red spruce (*Picea rubens*), balsam fir (*Abies balsamea*), and northern white cedar (*Thuja occidentalis*) with scattered eastern hemlock (*Tsuga canadensis*), larch (*Larix laricina*), and white pine (*Pinus strobus*) also present. Some mixed hardwood and softwood stands and hardwood stands are also found on the island. Dominant hardwood species include quaking aspen (*Populus tremuloides*), red maple (*Acer rubrum*), red oak (*Quercus rubra*), paper birch (*Betula papyrifera*), and yellow birch (*Betula alleghaniensis*). Forested wetlands are also common on the island and dominated primarily by eastern white cedar and balsam fir. Browse lines were evident on many of these tree species (Appendix B, Photo 1), creating an open "park like" understory in areas.

Field observations by Stantec indicate that the high deer population is having a significant impact on forest regeneration and the establishment of invasive shrub species. Little or no regeneration of northern white cedar and hardwood tree species<sup>1</sup> is occurring due to the high browsing pressure of the deer. Balsam fir regeneration is being strongly impacted (Photos 2 and 3), and even impacts on red spruce growth, which is not a preferred browse species, are occurring (Photo 4). These impacts from the intense browsing pressure are resulting in a shift in the forest structure from what is currently observed to forest stands that will be primarily red spruce. This high browsing pressure is also creating opportunities for the establishment of invasive shrub species Japanese barberry (*Berberis thunbergii*) and bush honeysuckle (*Lonicera morrowii*) (Photos 6-8). Deer generally do not browse on these invasive shrubs, and they are quickly colonizing areas where tree regeneration is restricted by the browsing deer.

If the browsing pressure on Islesboro remains high, there will be a subsequent loss in forest diversity. With decreased tree diversity in the forest, the diversity of other plants and wildlife in these forests will also be negatively impacted. The establishment of the invasive nonnative shrub species will further limit diversity of native plants and animals in these habitats. The current deer density exceeds the carrying capacity of the local landscape and is not sustainable over the long term.

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<sup>1</sup> The field survey occurred before leaf-out, which made it more difficult to observe hardwood regeneration. However, it appeared to be very limited based on our observations at the time.

## FIGURE



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**Stantec Consulting Services Inc.**  
 30 Park Drive  
 Topsham, ME USA  
 04086  
 Phone (207) 729-1199  
 Fax: (207) 729-2715  
 www.stantec.com

**Legend**

=== Sampling Transect

**Client/Project**  
 Islesboro Deer Survey  
 Islesboro, Maine

**Figure No.**  
 1

**Title**  
 Deer Survey Workplan Map  
 3/8/2010

## Appendix A

### Work Plan

## Islesboro Deer Population Estimate Study Plan

### Introduction

Stantec Consulting (Stantec) has been contracted by the Islesboro Health Center to conduct a deer population estimate on the island of Islesboro, Maine. This work is being completed to better understand the deer population on Islesboro so the population can be more effectively managed in order to control deer ticks and associated Lyme disease. The following work plan covers surveys to be conducted in 2010 and can be used as a template for future work. To best manage the deer population on Islesboro, Stantec recommends completing these surveys annually. This project is a collaborative effort between Stantec, the Town of Islesboro, the Health Center Advisory Board, local volunteers, and students. The ninth grade biology class at Islesboro Central School will use this work as an annual science project.

This work plan has been developed in general accordance with the Maine Department of Inland Fisheries and Wildlife (MDIFW) pellet group survey methods (MDIFW 1988) and additional consultation with Lee Kantar (State deer biologist) at MDIFW.

### Establishing Transects

The layout of Islesboro creates technical challenges for conducting standard MDIFW pellet group survey transects. The standard methodology is typically conducted in large forest blocks and utilizes 0.5-mile transects run in courses at right angles to each other. Because of the shape of Islesboro, it is not possible to complete transects in this manner. Therefore, this work plan revises the standard methodology. A preliminary goal of 3000 plots was established based on MDIFW methodology, recommendations from Lee Kantar, and the layout and acreage of Islesboro. This goal of 3000 plots is based on 0.39 plot per acre and results in approximately 37.5 miles of transects.

For surveys conducted in 2010, transect locations were randomly established (Figure 1). For each transect, pellet group search plots were laid out at 1-chain (66-foot) intervals. Each plot is 25 feet long and 4 feet wide (i.e., 100 square feet), and the long axis of the plot extends along the transect line. There are no permanent plots or transect locations. A new set of random transects will be generated each year.

To establish the 2010 transects, transects running east to west were created in ArcInfo.<sup>1</sup> Transects are spaced north to south across the island and are eight feet apart so that there is no overlap in sampling. The attributes of each transect from ArcInfo have been exported into a transect attribute table in Excel, which contains the transect Feature ID and the length of the transect.<sup>2</sup> A simple script in Excel was used to generate a random number, and this number was used to select a transect. The script keeps track of the total length of all the transects as they are selected until the 37.5 miles target is reached or exceeded. The script copies each transect selected into a results worksheet. The results worksheet and the original transect shapefile are joined to select the transects to be used. From the selected transects, points that are 66 feet apart are used to identify the start point of each plot.

### Field Methods

Surveys will be completed in the spring as soon as snowmelt is complete and before leaf-out begins. It is estimated that the field surveys will be conducted in early March. The Health Center and volunteers will contact landowners along each transect. Transect locations and/or numbers may need to be adjusted based on landowner permission.

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<sup>1</sup> ArcInfo is a geographic information system (GIS) software for performing advanced spatial analysis, managing, creating, and analyzing geographic data, and visualizing results on professional-quality maps.

<sup>2</sup> The Excel spreadsheet containing this script and the associated transect shapefiles will be provided to Islesboro. Transects for future years can be selected by using this script in association with the number of plots (number of transect miles) desired.





Although the overall goal of the project is to complete 3000 plots, it may not be possible to complete all plots in the time allowed. Each transect will be surveyed based on a randomly chosen order, and as many transects will be completed as time allows. The majority of the field work will be completed over a one week period in early March. During this week, two Stantec biologists will work with students and volunteers to complete as many transects as possible. Remaining transects will be surveyed by volunteers and students the following week.

A 25-foot measuring tape or rope will be used to lay out the plot during the field surveys. A four-foot measuring stick will be used by field crews to measure the width of the plot. Transect and plot locations will be uploaded to a handheld Global Positioning System (GPS) receiver for field surveys. The GPS will contain the beginning of each plot. No plots will be completed if they fall within natural obstacles (e.g., ponds or the shoreline) or developed areas (e.g., private homes, roads, gravel pits, cemeteries).

Within the search plot, all fresh deer pellet groups that fell entirely or partially within the plot will be recorded. Individual groups should number  $\geq 30$  pellets. Groups with less pellets should not be counted. Use the size, shape and color differences of pellets to differentiate individual groups in high density locations. Fresh (i.e., since leaf fall) groups will be dark and shiny and will lie atop most forest litter. Old groups will be partially covered by litter. Old groups will also be crumbly, lighter colored and often partially broken apart by weathering. Do not record deer pellet groups that were deposited prior to last fall's leaf-fall.

On the project data form (attached), record the transect number, plot number, and the number of deer pellet groups at each 100-square foot search plot. When no deer groups are found in a search plot, record a zero. Record moose pellet groups, evidence of deer yards, and dead deer in the notes section. Also record the habitat type for each plot location (see data form).

### **Data Analysis and Reporting**

The Islesboro biology students will compile the transect data into Excel spreadsheets and complete the population estimate calculations. Data quality assurance/quality control will be maintained by their teacher, Heather Sinclair, and the lead Stantec biologist. Students will prepare a brief narrative report describing the survey methods, results, and analyses of the results. The report will include map(s) as appropriate of the surveyed transect locations and local deer abundance. Recommended discussion topics for the report include sources of error associated with this survey method and uncertainty associated with the data. Stantec can provide an outline for this report if needed.

Deer density is estimated from deer pellet group plot data. The general formula is as follows:

$$\text{Deer/mi}^2 = (\text{Estimated \# of deer pellet groups per mi}^2 \div \text{Deer defecation rate}) \div \text{Deposition period in days.}$$

The accepted value for defecation rate for deer on fall and winter diets is 13 pellet groups per day. The deposition period will be the number of days since days from leaf-fall to the date of the spring pellet survey. November 1 is the date when leaf-fall is complete in most parts of Maine.

The statistical entity will be the total number of deer pellet groups per plot. From this, the mean number of pellet groups per  $\text{mi}^2 \pm$  with a chosen confidence level can be calculated. Pellet group data can be adjusted for deer removed by legal hunting in November.



**Equipment List**

Data Forms-waterproof paper  
4-foot measuring stick  
25-foot tape or rope  
Field maps  
Handheld GPS  
Rain gear  
Hiking boots/Rubber boots

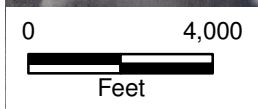
**Attachments**

Figure 1 Transect Locations  
Data Form

**Reference**

Maine Department of Inland Fisheries and Wildlife (MDIFW). 1988. Pellet Group Surveys. Wildlife Resource Assessment Section, Bangor.





195600571



**Stantec Consulting Services Inc.**  
 30 Park Drive  
 Topsham, ME USA  
 04086  
 Phone (207) 729-1199  
 Fax: (207) 729-2715  
 www.stantec.com

**Legend**  
 === Sampling Transect

**Client/Project**  
 Islesboro Deer Survey  
 Islesboro, Maine

**Figure No.**  
 1

**Title**  
 Deer Survey Workplan Map  
 2/2/2010

### Isleboro Pellet Group Data Form

General Information		
Date: _____	Time: _____	Surveyors: _____
Transect Number: _____		

Weather Observations			
Sun/Clear: _____	Overcast/Rain: _____	Wind Direction: _____	Ambient Temp.: _____ (°C / °F)

Plots			
Plot Number	Pellet Groups	Habitat Type *	Notes
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			

**Habitat Types:**

- Softwood forest (S)- Plot dominated by coniferous trees (>75%)
- Mixed Forest (M)- Plot contains a mixture of coniferous and deciduous trees
- Hardwood Forest (H)- Plot is dominated by deciduous trees (>75%)
- Field (F)
- Lawn (L)
- Other (O)- Note habitat

## Appendix B

### Photographs



**Photo 1.** Deer browse line on northern white cedar along edge of road.  
Stantec Consulting, March 2010.



**Photo 2.** Heavily browsed balsam fir with stunted growth  
Stantec Consulting, March 2010.



**Photo 3.** Heavily browsed balsam fir with stunted growth  
Stantec Consulting, March 2010.



**Photo 4.** Browsing on red spruce resulting in abnormal growth.  
Stantec Consulting, March 2010.



**Photo 5.** Mixed hardwood and softwood forest regenerating to a spruce dominated softwood stand due to deer browsing. Stantec Consulting, March 2010.



**Photo 6.** Invasive Japanese barberry. Stantec Consulting, March 2010.





**Photo 7.** Invasive Japanese barberry.  
Stantec Consulting, March 2010.



**Photo 8.** Hardwood forest with regeneration dominated by invasive Japanese barberry and honeysuckle.  
Stantec Consulting, March 2010.