White-Tailed Deer Management Report - 2024

Bald Head Island Conservancy
Beth Darrow, Director of Science darrow@bhic.org

Summary

Background

The Conservancy quantifies the island's white-tailed deer population and analyzes the efficacy of the immunocontraceptive GonaCon for managing the population (current target = 200 deer). These data are then used to provide recommendations for deer population management. Sound population management decisions ensure stable and productive island habitats that continue to provide ecosystem services (e.g., storm protection, positive elevation growth, biodiversity, enhanced tourism, and recreation).

Project Goals

- Monitor the population size of BHI's white-tailed deer herd
- Evaluate potential impacts of deer herbivory on maritime forest ecosystem and determine need for management
- Data determine the Conservancy's recommendations to the Village for renewal of the immunocontraception permit (current management method)
- Combination of both summer spotlight (male:female ratios) and fall camera index (population number of females and fawns) are needed for accurate estimates
- Data analysis and proposal writing for new immunocontraception permit if required

Progress & Significant Findings

- Fall 2024 Camera Index: 221 individuals = 132 does, 39 bucks, 50 fawns (Fig. 1)
- Summer 2024 Spotlight Survey: 147 individuals, female:male ratio of 3.35
- Population size is above the target of 200 deer; there are an estimated 76 unvaccinated does (original immunocontraception permit required ≧ 30 viable does).
- Does that were vaccinated in 2020 and earlier can be assumed to be fully fertile again. We have seen multiple tagged does with fawns in the past few years.
- We recalculated deer habitat on BHI in 2024. With increased development, available habitat for deer has decreased 4.7% from the previous calculations (2016).
- Deer herbivory impacts on the maritime forest are currently unknown. Deer exclosures established in the early 2000s were re-established in 2020 and have been maintained since then. Vegetation in paired fenced and unfenced plots was evaluated by Dr. Jodi Forrester in 2020 prior to the re-establishment of the fences. Forrester is available to re-sample vegetation in 2025 to evaluate deer herbivory impacts.

White-tailed Deer Population on BHI

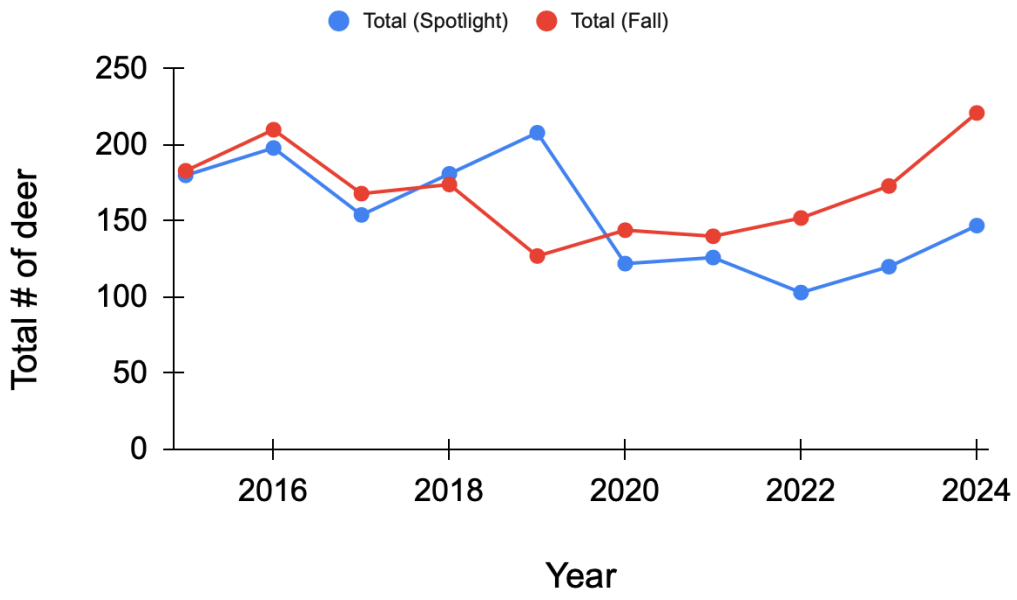

Fig. 1. White-tailed deer population size, 2015 - present. Immunocontraception operations began in 2014. Official population numbers are estimated using camera surveys; spotlight surveys provide sex ratios and a comparison to historical data.

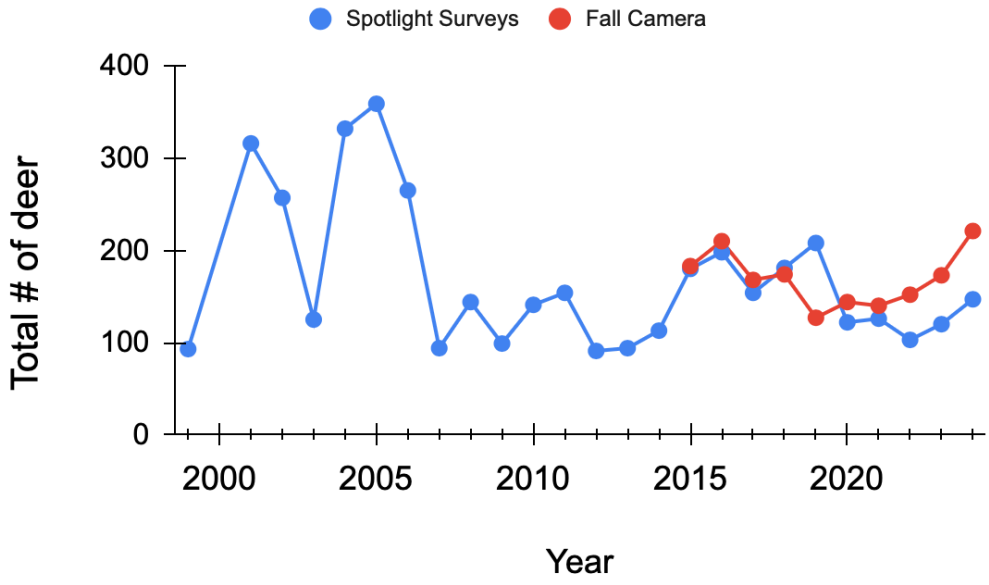

Fig. 2. Historical deer population index using spotlight surveys, 1999 - present.

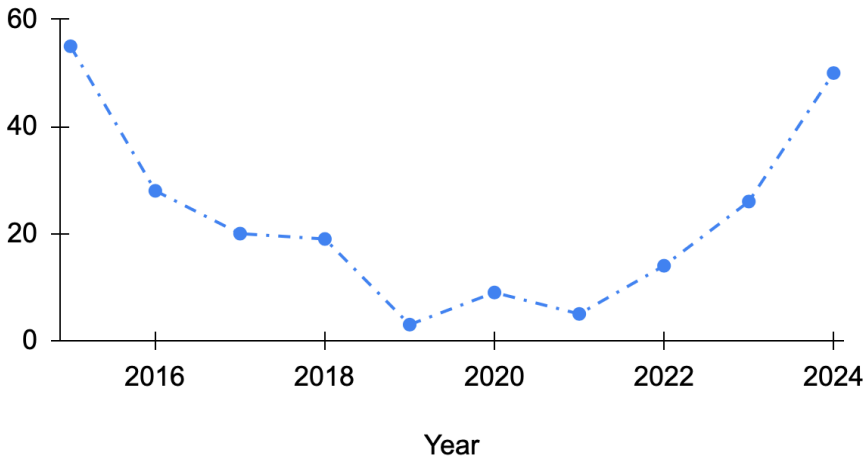

Fig. 3. Fawn population on BHI from fall camera index, 2015 - present.

Future Directions

The Bald Head Island white-tailed deer population has now reached a level (total number of individuals and population density) that management is warranted. The population size is higher than the target established for the island (200 individuals), but also is almost double the recommended population density. We recommend continuing to monitor the deer population size, but also to consider management of population size in some way (either immunocontraception or culling).

Deer Immunocontraception

Background

To manage the white-tailed deer population to <200 individuals, BHI Conservancy led the deer immunocontraception program for the Village from 2014 - 2020 under a research permit through the NC Wildlife Resources Commission. We used GonaCon, a drug manufactured by the USDA, to prevent pregnancy by initiating an immune reaction to female sex hormones. This drug is administered by injection after a female deer is captured through darting with a sedative. This specialized and labor-intensive process is highly regulated, including the seasonal timing of when operations can occur. Under the original permit, darting operations were only allowed after hunting season on the mainland (Feb - April). This meant that the drug was administered after the reproductive season (rut), possibly reducing the drug's efficacy (Fig. 4).

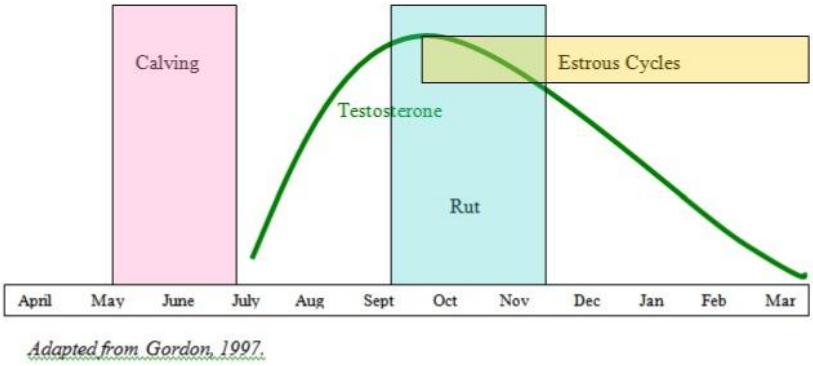

Fig. 4. White-tailed deer reproductive cycle. Reproductive hormones are highest during the rut.

Despite this seasonal constraint, the immunocontraception project was successful at reducing pregnancy rates (reduced pregnancy rates from 100% to 13% in deer with two doses), and is currently the only feasible non-lethal management method that exists for BHI. Deer population numbers remained at or below 200 deer for several years. Based on deer population numbers below the target set by the original NCWRC permit, the Conservancy recommended a pause in the immunocontraception program from 2021 - 2024. However, the Village and the Conservancy agreed to pursue an "operational permit" with NCWRC for any future immunocontraception operations.

In 2023, the Conservancy formally inquired about how to apply for an operational permit, anticipating a long process and effort to write a proposal. However, response from NCWRC was that the process to apply for an operational permit would be relatively simple, consisting only of a form and short project description. NCWRC also indicated that they would no longer require darting operations to occur after hunting season. This means that immunocontraception operations could potentially occur during the fall rut, allowing the drug to be administered at the time of year when it would be most effective (Table 1).

Table 1. Potential seasonal model of immunocontraception operations. Green = deer biology; orange = population studies done by Conservancy; pink = timing of administrative actions; blue = immunocontraception / captures fieldwork.

Month	Reproductive cycle	Previous model	Future model	Future logistics
January	Estrous cycles		Population #	
February		Immuno captures		Permit app
March				
April				
May	Fawning			Budget / Hiring
June		Spotlight survey	Spotlight survey	
July				
August				
September				Training
October	Rut / Estrous cycles		Immuno captures	
November		Camera survey		Camera survey
December				

As shown in Table 1, deer population numbers from the previous fall, made available in January, would be used to decide whether to pursue the immunocontraception program for fall of the same calendar year. An operational permit would need to be used in the same calendar year as it is received, so recruitment of seasonal staff would begin in late spring. The operational budget would be voted on by Village Council in spring, with the fiscal year beginning in June, and seasonal staff hired in early September. Darting operations could begin as early as October.

Target Deer Population Number

The target population of 200 deer was based on a study by Taggart and Long (2015) in the BHI maritime forest in 2011. No observable impacts from deer browsing were found when fenced

plots (excluding deer) and unfenced plots (allowing deer access) were compared for tree density and species composition. At that time, approximately 200 deer were on the island. However, a previous study by Stransky (1969) recommended a capacity of 19 deer km^{-2} for healthy barrier island habitats and Sherrill et al. (2010) recommended managing the BHI deer population to its level in 2007 - 2009, which equated to 15 - 17 deer km^{-2}. As of 2024, Bald Head Island had 28.6 deer km^{-2} of available deer habitat, and habitat continues to decrease as development increases. This is potentially putting more strain on the maritime forest. The Conservancy and partners (Dr. Jodi Forrester, NCSU) are pursuing long-term study about impacts of deer and other stressors on the maritime forest, but currently the data do not exist to allow us to re-evaluate sustainability of the deer population or carrying capacity of the island. A more conservative population target number might be 19 deer km^{-2}, which would be equivalent to a maximum of 118 deer on the total 6.2 km^{-2} of BHI. A new immunocontraception permit proposal could request management of the herd to this new target level, which would take a number of years to obtain without an initial cull. This is a decision that should be made by the Village and Conservancy with input from the Wildlife Resources Commission.

Future Directions

We recommend that the Village returns to some kind of deer population management in 2025. A rough estimate of the cost of re-implementing immunocontraception by the Conservancy is $90-100K for Year 1. We will consult with the NC Wildlife Resources Commission on what the target deer population should be, but we recommend returning to the goal of keeping 30 viable does on the island, and assessing the impacts of deer on forest plots in 2025.