NATL without borders: a community approach for management of invasives.

Final Report

August 2009

Gerardo Celis
School of Natural Resources and Environment & School of Forest Resources and Conservation
University of Florida, Gainesville, Florida
Email: celis@ufl.edu

Corrie Pieterson
School of Natural Resources and Environment & School of Forest Resources and Conservation
University of Florida, Gainesville, Florida
Email: cpieterson@ufl.edu

Summary

We surveyed the hardwood hammock area within NATL for four invasive exotic species: coral ardisia (*Ardisia crenata*), Japanese climbing fern (*Lygodium japonicum*), air potato (*Dioscorea bulbifera*), and skunk vine (*Paederia foetida*). We also surveyed neighboring properties for these and other invasive exotic species. Locations of individuals were mapped in GIS layers. Within NATL, we controlled for *Ardisia* and *Lygodium* by physically removing above- and belowground plant material. *Ardisia crenata* is the most problematic invasive exotic species within NATL, while *Dioscorea bulbifera* is the most problematic species in the surrounding properties. We recommend continued and frequent monitoring to prevent reinvasion within NATL, especially reinvasion of *Ardisia*. We also recommend continued interaction with neighboring landowners to monitor and remove invasive plants, which will benefit the natural areas within and outside of NATL.

Table of contents

Introduction

One of the major challenges in managing invasive exotic species in natural areas is reinvasion, which necessitates multiple control treatments to eradicate the undesired species. In landscapes with multiple landowners within a small area (such as urban areas), treatment within a single property may be less effective due to the fact that treatment of adjacent properties does not occur. Therefore, an integrative and collaborative approach to management of invasive species in natural areas is necessary. The purpose of this project is to enhance previous efforts to remove problematic invasive species at NATL by treating and working with adjacent properties, which are potential sources of reinvasion. More specifically, this project aims to: a) treat populations of problematic invasive species that may have reinvaded NATL; b) remove problematic invasives from surrounding land to prevent reintroduction of these species to NATL, and c) provide education and outreach to neighboring landowners. For this project we focused on four problematic invasive species at NATL: coral ardisia (*Ardisia crenata*), Japanese climbing fern (*Lygodium japonicum*), air potato (*Dioscorea bulbifera*), and skunk vine (*Paederia foetida*).

Materials and Methods

Invasive species mapping

We used a GPS to record the location of infestations found within and outside of NATL for any follow-up treatments. We focused monitoring and treatment efforts in the hardwood hammock area of NATL because infestations of the four species above were most severe within this habitat. We experienced some difficulties with the two GPS units that we used; in particular, it was often difficult to acquire or maintain a good signal within the dense vegetation of the hardwood hammock. Therefore, within NATL we used the existing grid to establish sampling blocks of 50m x 50m. Each block was created with 4 grid points and was indentified by the northwestern grid point. We then created GIS maps using summarized data collected from each block. Outside of NATL we worked on the properties within a 100m buffer of the NATL border. Property lines and ownership were determined from the Alachua County Property Appraiser 2008.

Invasive species treatments

We used mechanical control methods (plant above- and belowground biomass was bagged and properly disposed) to remove populations of *Ardisia crenata* and *Lygodium japonicum*. We used a combination of hand pulling and cutting (with a hand shovel or machete) to remove *Ardisia* and *Lygodium* plants. *Ardisia* seedlings were removed by hand. Bags were weighed prior to disposal of the plant material in order to estimate the total biomass removed. *Paederia foetida* and *Dioscorea bulbifera* individuals were located and recorded, but not treated.

In order to compare current *Ardisia crenata* infestations to 2001 data collected by Dr. Alison Fox and Dr. Kaoru Kitajima we sampled using a similar method. All individuals within a 1 m diameter circle were quantified and separated into two categories: adults and juveniles/seedlings. Adults were those plants greater than 20 cm in height and juveniles/seedlings were plants below this height.

Public outreach

We designed a 3-fold brochure with information about the four exotic species in this study, other common exotic species in the area, and general information about the problems and challenges associated with exotic species. The target audience for the brochure is the neighboring landowners as well as the general public and other users of NATL.

Results

Neighboring properties

There are 28 indentified landowners within a 100m buffer of the NATL boundary, including University of Florida lands that are not part of NATL. *Dioscorea bulbifera* (air potato) was present in the properties of the south and southeast borders of NATL (Figure 1). *Albizia julibrissin* (mimosa tree), *Cinnamomum camphora* (camphor tree) and *Lantana camara* (lantana) were also present in some of the adjacent properties, including areas within the UF campus but not within NATL.

The available landowners were contacted and informed about our project (flyers were distributed). All neighbors we contacted were willing to concede access to their properties. They were, however, hesitant as to what type of removal method was to be applied; in particular there was concern with using herbicides.

Ardisia crenata (coral ardisia) infestation

Ardisia comprised the main infestation at NATL. We removed 1297 adults and 8397 juveniles/seedlings weighing a total of 373 lbs. While we were surveying the hardwood hammock, our initial impression was that the infestation was less severe in previously treated areas. However, the GIS maps (Figures 2 & 3) indicate that in comparison to the 2001 inventory there was no apparent difference in number of individuals present between areas where *Ardisia* had been treated previously and other areas (Figures 4 & 5).

Dioscorea bulbifera (air potato) infestation

A total of 7 individuals of air potato were found within NATL, mostly concentrated in the eastern and south portion of the property. The southern and southeastern infestations were probably propagated from the neighboring properties (Figures 1 & 6).

Lygodium japonicum (Japanese climbing fern) infestation

We indentified a central area of infestation in block G10 that was probably the source of spores for other areas (Figure 7). A total of 21 individuals were removed.

Paederia foetida (skunk vine) infestation

We indentified one area infested with skunk vine. We were unable to indentify how many individuals were present; however, it was a considerable infestation that was not treated (Figure 8).

Additional products

- Database of neighboring landowners including contact information; whether the property was assessed; which invasive species (if any) were located on the property; dates of removal/replacement; and the native species used to replace the invasive species.
- GIS map files indicating the location of the four problematic invasive species found and treated within and outside of NATL.
- An educative brochure for landowners that includes information on problematic invasive species and their impacts. The brochure and list could also be provided at existing kiosks to educate NATL users.

Observations and recommendations

Timing of inventories and removals

- *Ardisia* is easier to spot in the winter/early spring when it is fruiting and also when other vegetation has died back. *Lygodium*, air potato, and skunk vine are easier to spot in late spring/early summer since they also tend to die back in the wintertime.

- We found *Ardisia* plants underneath very dense vegetation, in areas that appeared from the outside to be unlikely to have any vegetation underneath (under large mats of *Vitus* and other vines, for example). These plants may be particularly challenging to control because they are so difficult to access. However, in these areas we often found large plants which were seed sources for infestations in other areas.

Removal techniques

- Regrowth appears common from plants where only the aboveground biomass was removed. Removing the entire biomass of these plants is difficult, because the regrowth tends to break off at ground level.

- Removal of *Ardisia* seedlings by hand was time-consuming; however, because the seedlings could potentially grow into reproductive adults and thereby become another seed source, we feel it is worth the effort to try to remove all seedlings. Generally, seedlings and small plants were easier to remove because at these stages the root system is not as well-established as it is in larger plants.

- It is extremely difficult to remove all the root material from large *Ardisia* plants. However, we at least removed the central portion of the root mass and as much other belowground material as possible. Cutting the root material with a machete (inserting the machete point-first into the ground and then cutting the roots vertically) aided in removal of the root material.

- Although we did not find a large number of Japanese climbing fern plants, those that we did find were generally not in close proximity to one another. This suggests that the spores are able to disperse over a wide area.

- We feel that physical removal of above- and belowground biomass is the most thorough method for removing both *Ardisia* and *Lygodium* plants.

- For collecting plant material we used bags made of Tyvek insulation material. The material is lightweight yet holds up much better than plastic bags in areas with dense, thorny vegetation.

Management recommendations

- The degree of *Ardisia* infestation indicates a need for frequent (at least annual) and thorough monitoring to prevent new infestations. Clearly a large portion of the hardwood hammock is able to support *Ardisia* populations.

- We recommend frequent (at least annual) monitoring for *Lygodium* plants and treatment/removal of these plants before they produce spores. New plants can begin producing spores within one growing season.

- Treatment of the skunk vine and air potato populations should be high priority in order to prevent further spread of these invasive species.

- Continued work with neighboring property owners will benefit the natural areas within and outside of NATL, and will help to increase public awareness of invasive exotic species. Removal of exotics from NATL and the surrounding properties is important in preventing reinfestation in both areas.

Budget and Expenses

Initial budget		$500
Expenses:		
Field/safety supplies (gloves, Tecnu, sunscreen)	$ 63	
Batteries for GPS receiver	$ 18	
Printing – color brochure (50 copies)	$ 56	
Total expenses		$137
Remaining budget		$363

Appendix

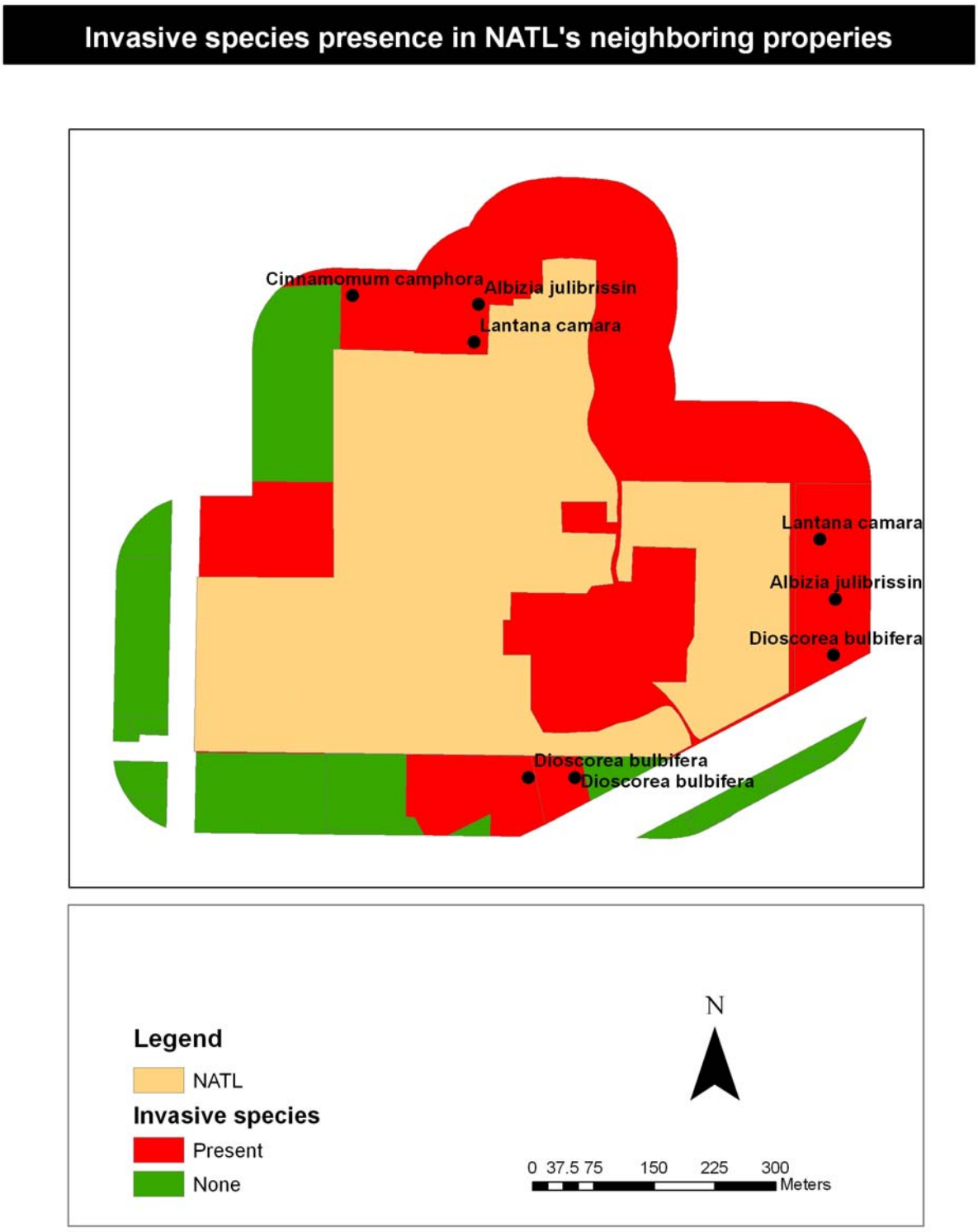

Figure 1. Invasive species presence in the properties neighboring Natural Area Teaching Lab (NATL) based on property ownership from the Alachua County Property Appraiser data.

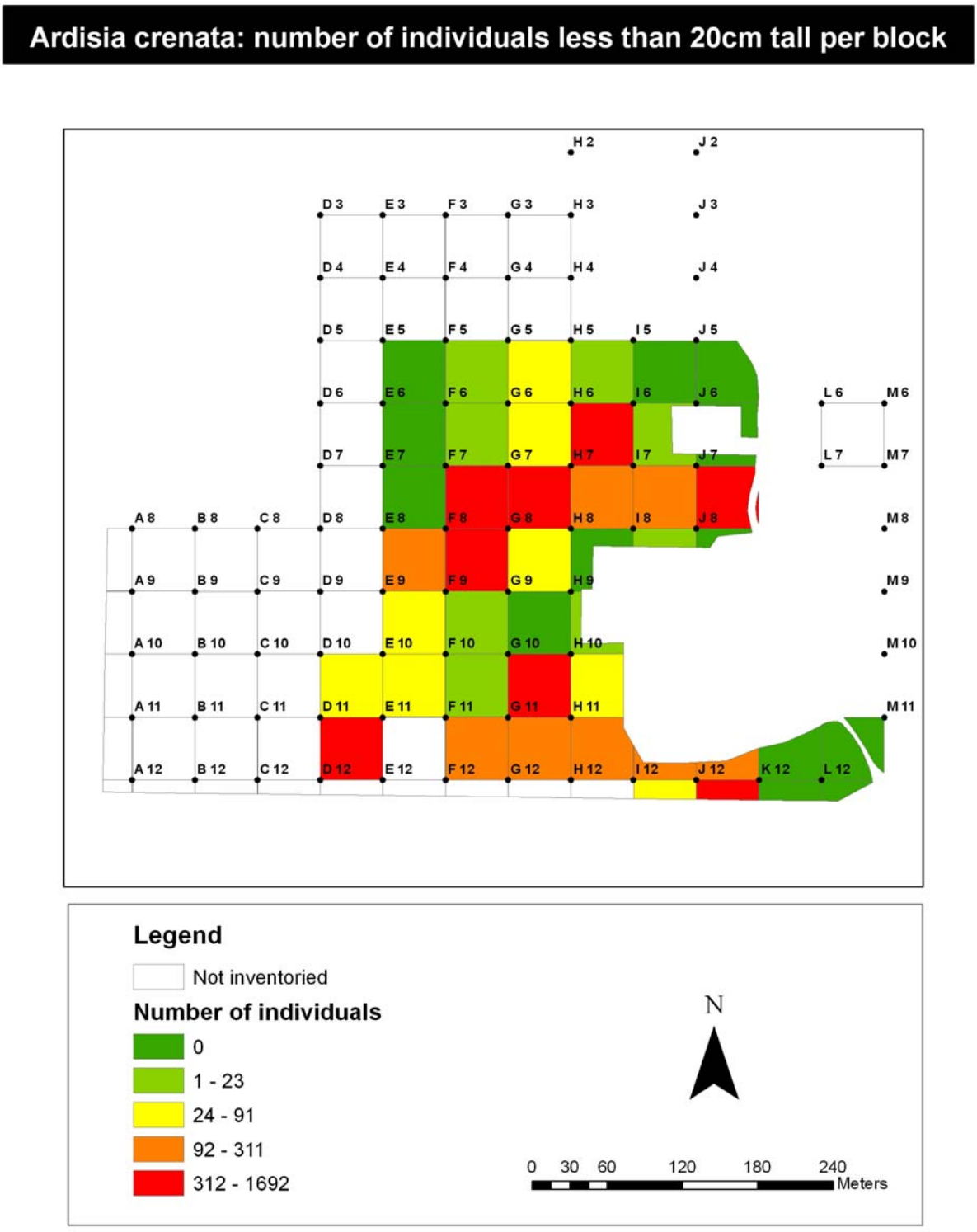

Figure 2. Distribution of *Ardisia crenata* juvenile/seedlings infestation in the Natural Area Teaching Lab (NATL) based on number of individual plants less than 20cm in height within a block (50m x 50m) based on the established grid.

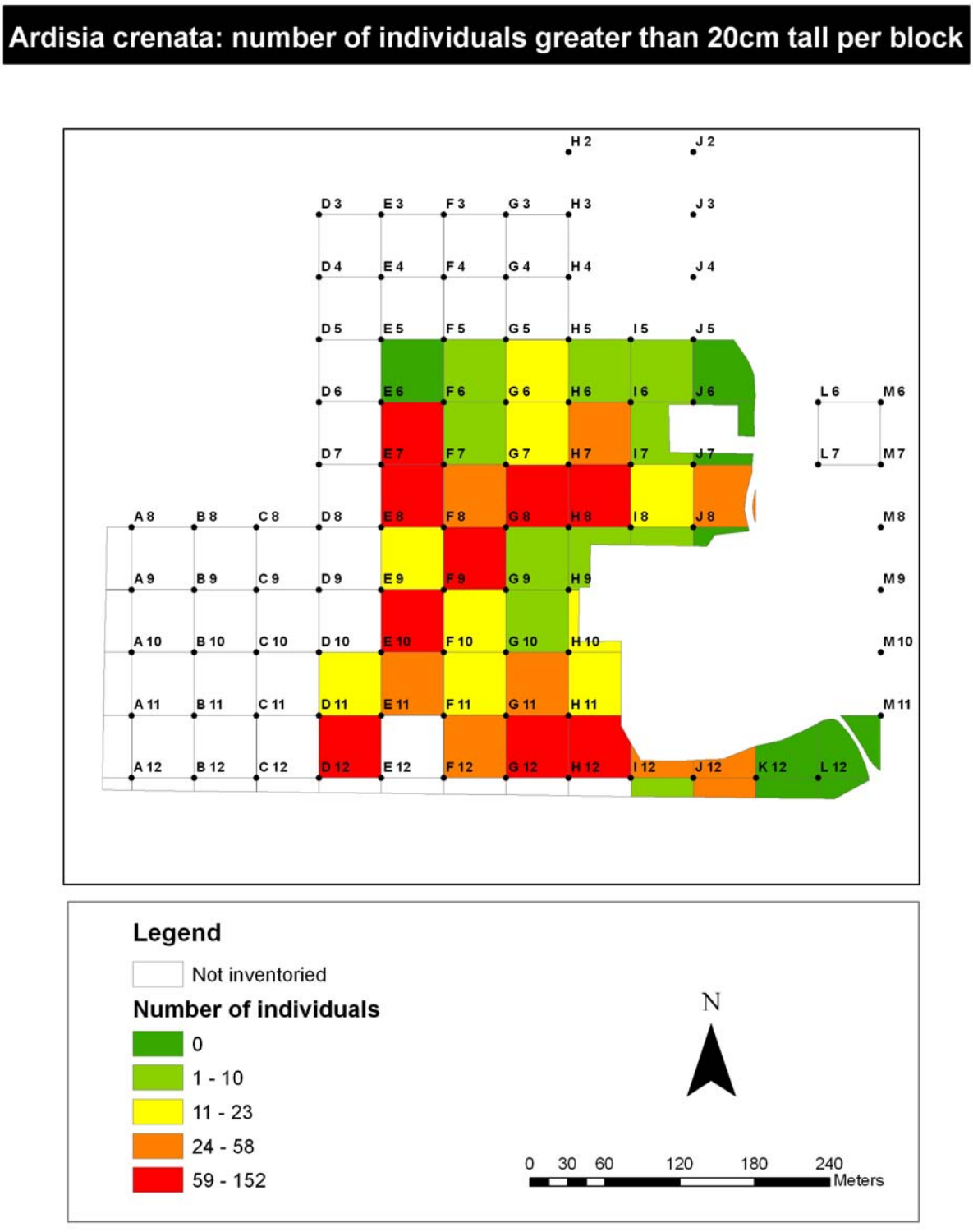

Figure 3. Distribution of *Ardisia crenata* adult infestation in the Natural Area Teaching Lab (NATL) based on number of individual plants greater than 20cm in height within a block (50m x 50m) based on the established grid.

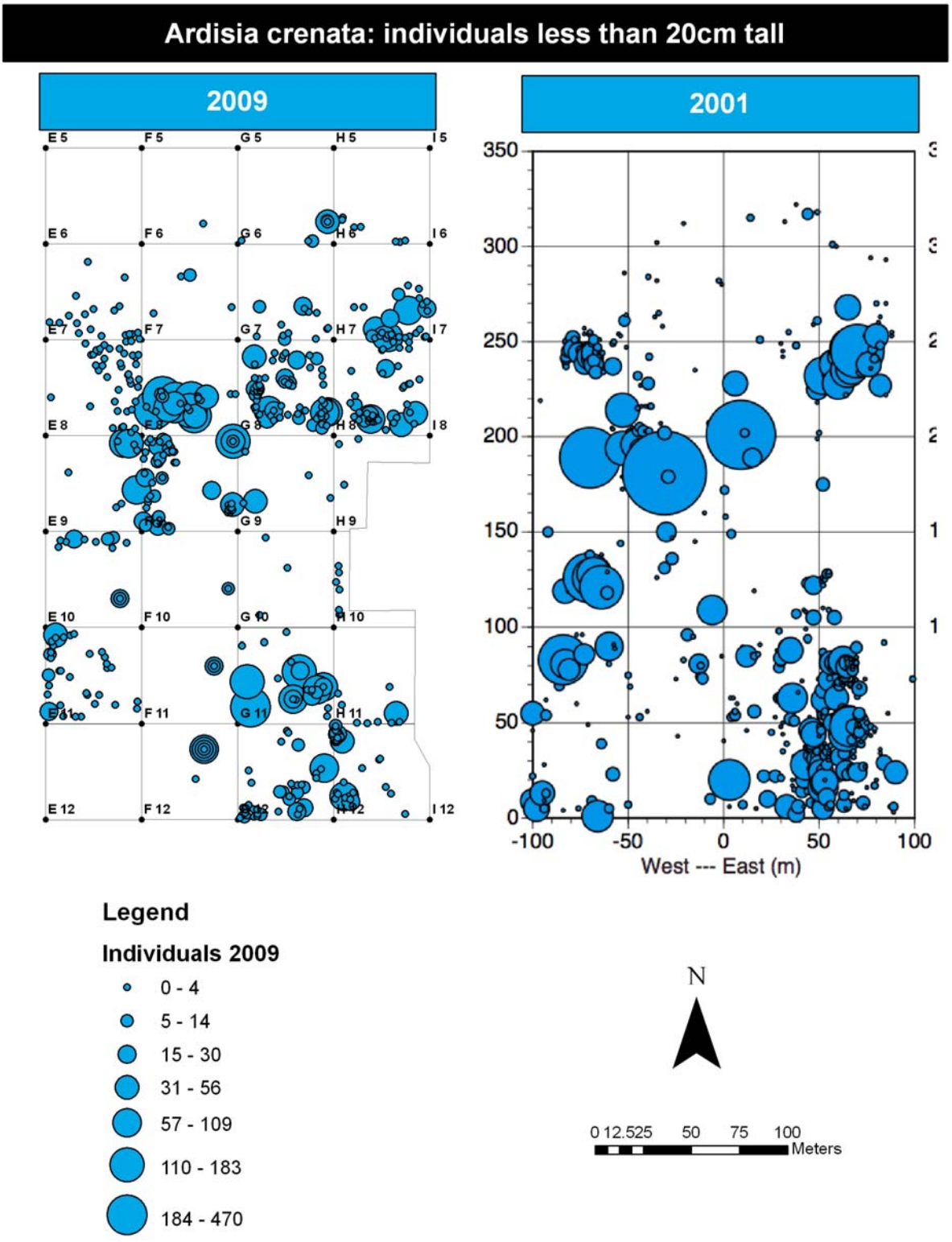

Figure 4. Density of *Ardisia crenata* individuals less than 20 cm tall per m^2 for the year 2009 and 2001 inventories (Data for 2001 from Fox & Kitajima report).

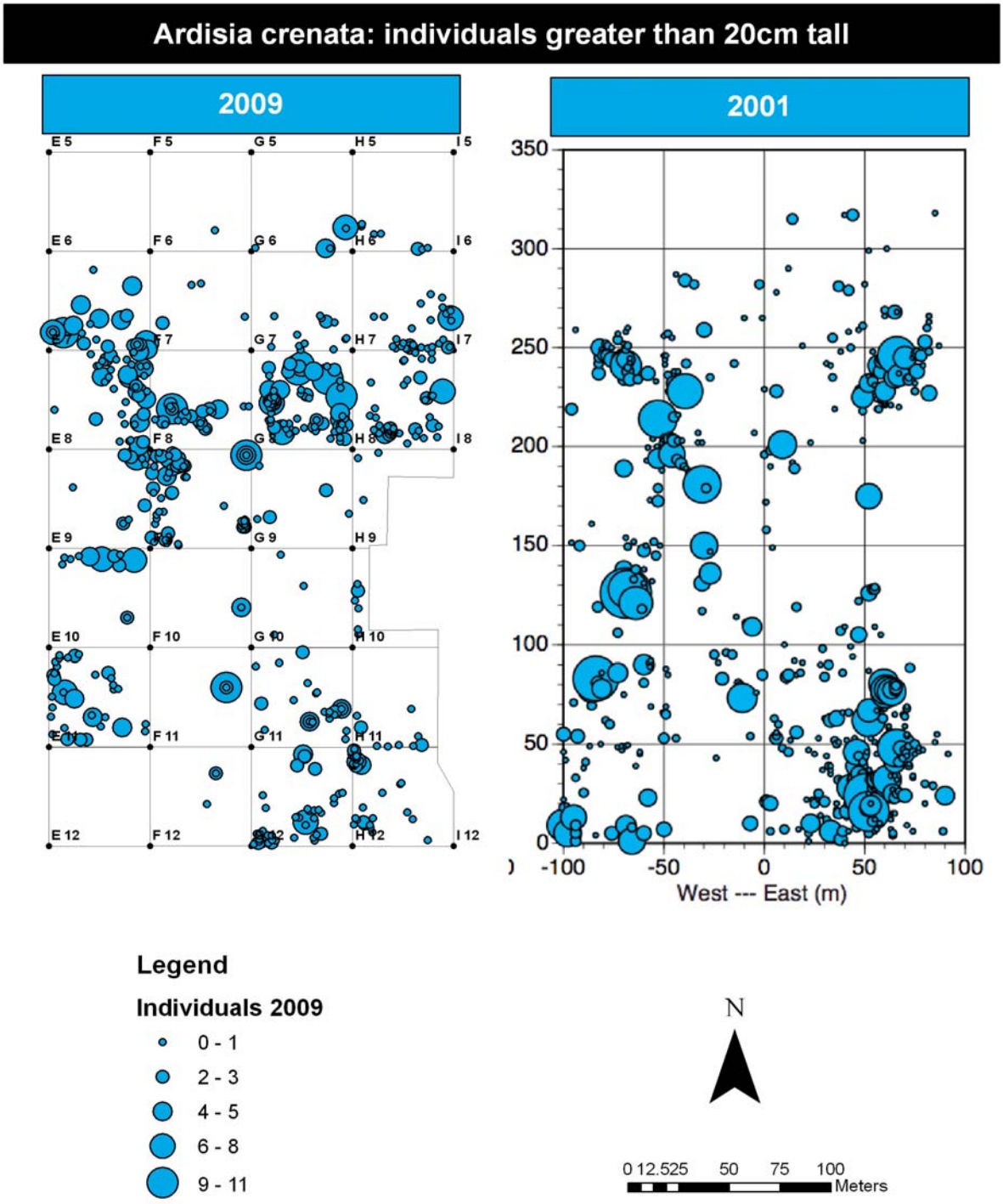

Figure 5. Density of *Ardisia crenata* individuals less than 20 cm tall per m^2 for the year 2009 and 2001 inventories (Data for 2001 from Fox & Kitajima report).

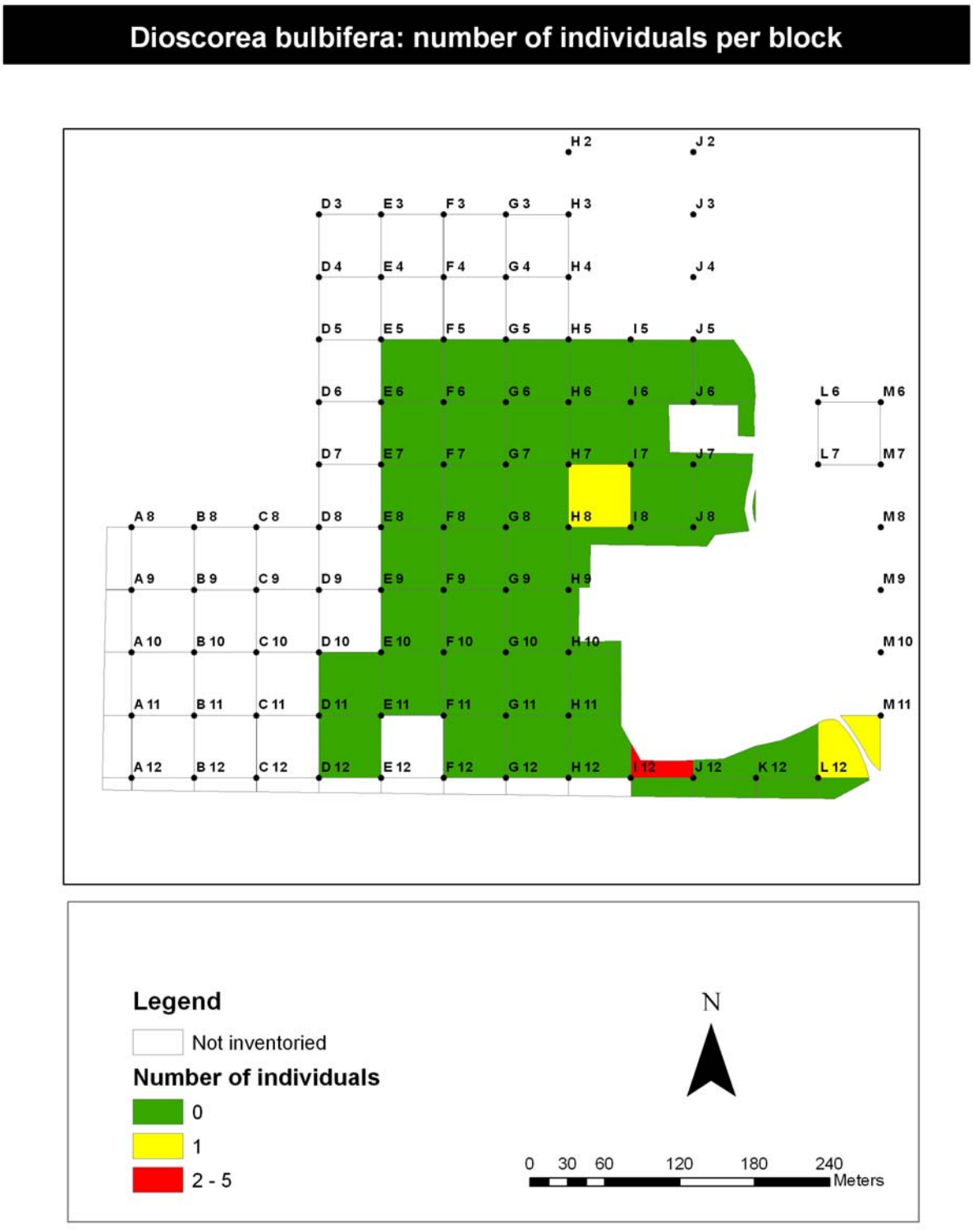

Figure 6. Distribution of *Dioscorea bulbifera* infestation in the Natural Area Teaching Lab (NATL) based on number of individual plants within a block (50m x 50m) based on the established grid.

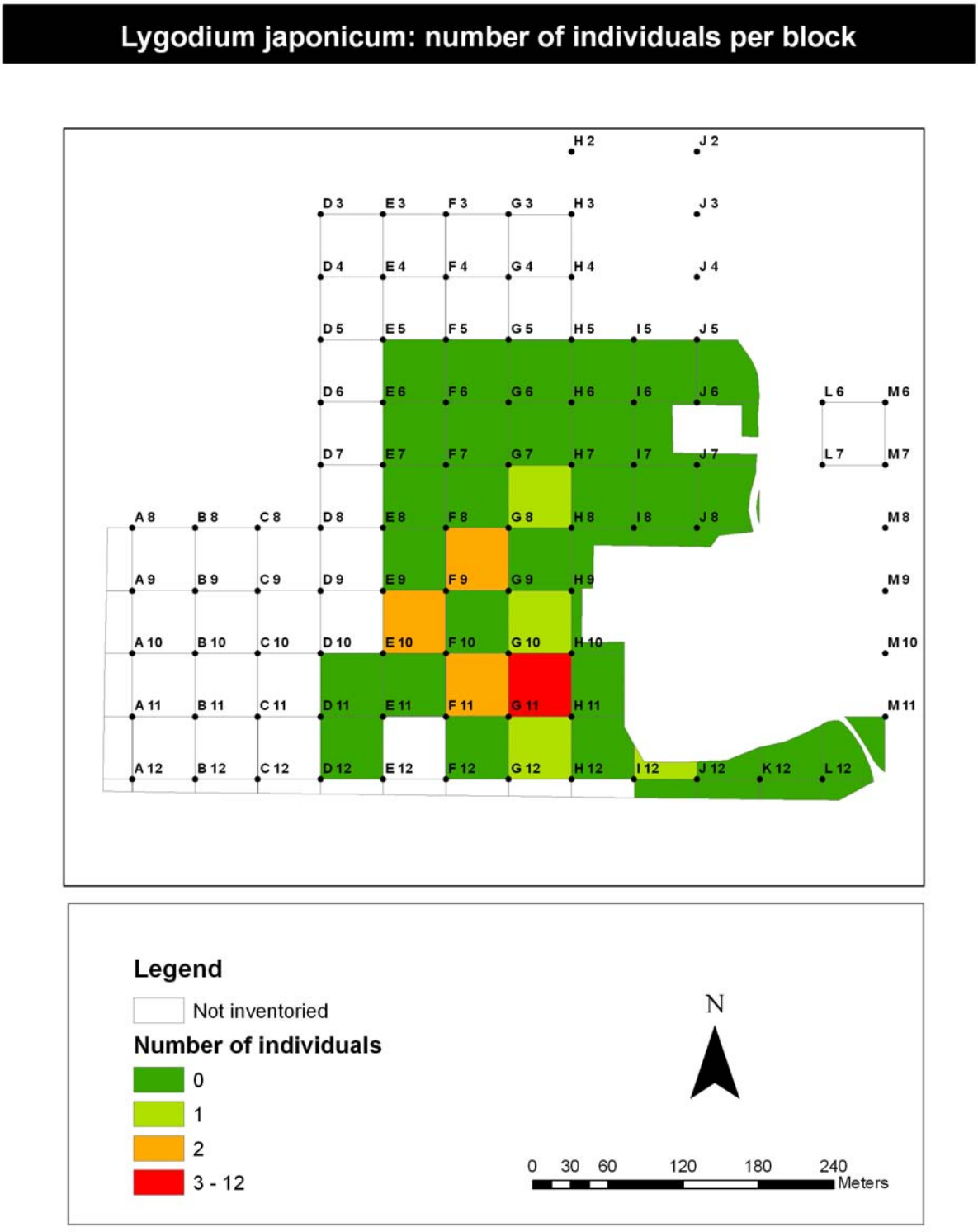

Figure 7. Distribution of *Lygodium japonicum* infestation in the Natural Area Teaching Lab (NATL) based on number of individual plants within a block (50m x 50m) based on the established grid.

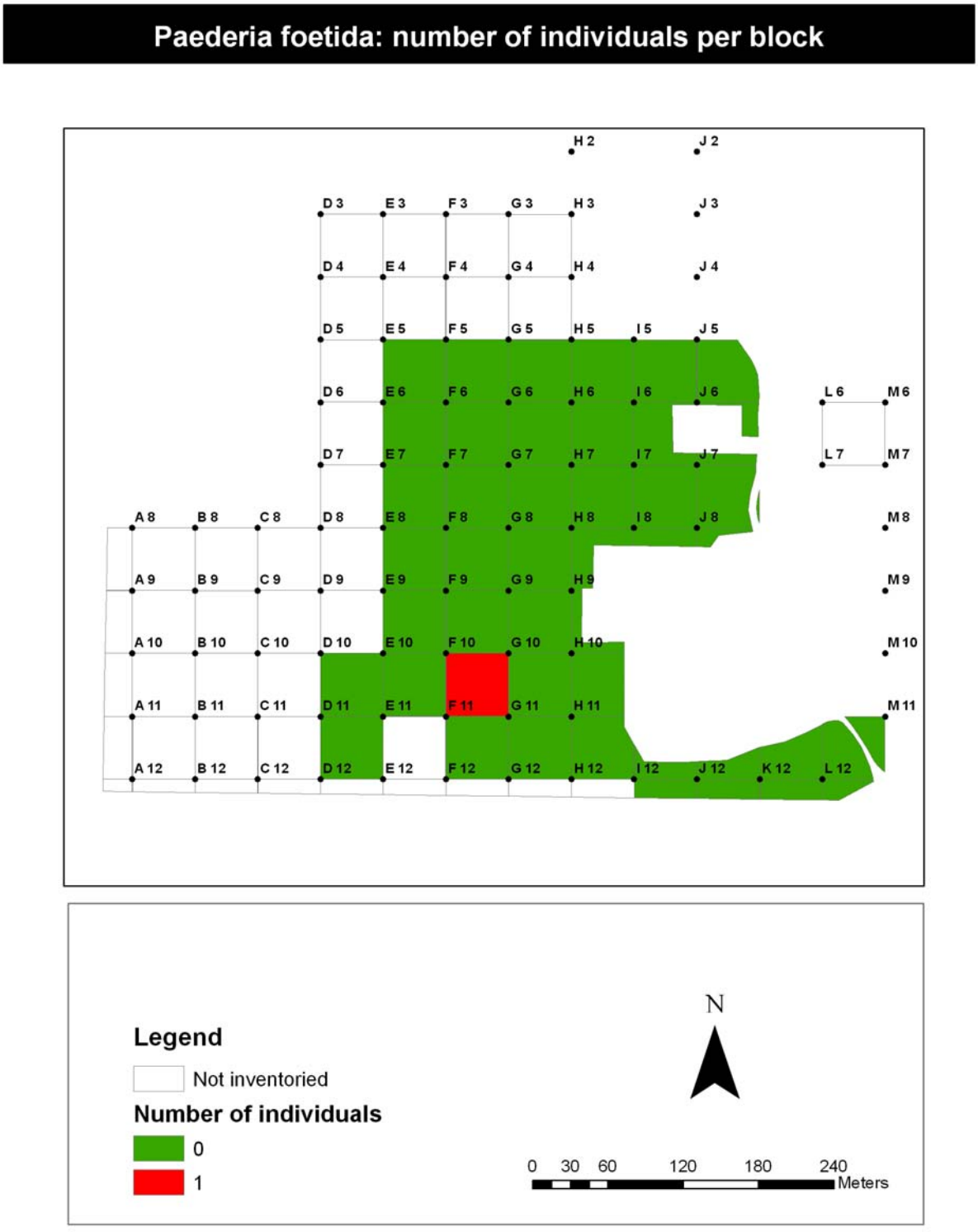

Figure 8. Distribution of *Paederia foetida* infestation in the Natural Area Teaching Lab (NATL) based on number of individual plants within a block (50m x 50m) based on the established grid.