

# Chattahoochee River National Recreational Area



Exotic plant management technician treating kudzu in CHAT's Sope Creek area.

## “EXOT”: A Spatial Approach to Exotic Vegetation Management

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### *Integrating Spatial Tools with Standardized Field Methods*

This report outlines Chattahoochee River National Recreation Area’s new approach to the management of terrestrial exotic vegetation. In particular, the purpose of this report is to summarize a package of spatial tools, collectively referred to as ‘EXOT’, that have been recently developed to facilitate accurate and efficient prioritization, tracking, and reporting of exotic vegetation efforts at the park.

## EXECUTIVE SUMMARY

The Chattahoochee River National Recreation Area (CHAT) has prepared this document in order to share with other interested parties the park's developments in improving exotic plant management. The primary goal of this report is to provide a concise summary of CHAT's new approach, which has allowed CHAT Resource Managers to begin to accurately and efficiently prioritize, track, and report consistently on exotic vegetation efforts.

### *PROBLEM*

*NPS is directed by Executive Order 13112 and NPS Management Policies to prevent the introduction and spread of invasive species.*

Like many units of the National Park system, CHAT struggles with an array of exotic species that are displacing natives, and may ultimately lead to ecosystem replacement. Ten invasive exotic plant species of significant concern have been identified by park staff (Kudzu, Privet, Japanese Honeysuckle, English Ivy, Wisteria, Mimosa, Autumn Olive, Stiltgrass, Bradford Pear, Oriental Bittersweet), with seventeen additional exotic species known to occur in the park that have the potential to become significant invaders, and additional species not yet known to occur that may pose threat. The introduction, establishment, and spread of invasive species have received heightened attention because of their associated negative effects on global biotic integrity. Likewise, the incursion of invasive plant species has become a challenge to the protection and management of resources in National Parks throughout the United States. The invasive nature of these species alters ecosystem function, reduces viewsheds, and creates a significant economic impact on the park. Ecological effects depend on the infestation rate and amount of spread, site characteristics, and the biology of organisms in infected areas. For these reasons, EXOT was developed to offer CHAT's Resource Managers an effective tool to better organize and target exotic plant mitigation efforts.

*Repeated treatment efforts are necessary to achieve success.*

With the fiscal reality of decreasing park budgets, many parks like CHAT have little ability to mount full-scale exotic plant control efforts on a repeated and consistent basis. However, cyclic and repetitious efforts are absolutely necessary if an initial investment in an infested area is to have a chance of resulting in effective control. To operate within such a fiscal reality, managers must become adept at maximizing the value of available resources only where they are needed most, and ensure a commitment to follow-up efforts.

In the past, CHAT typically engaged in haphazard exotic plant removal on an occasional basis; no systematic approach was used. A solution was first conceptualized to improve upon these past efforts in a systematic way.

### CRITERIA FOR A DESIRED SOLUTION

*These criteria are what we envisioned our solution to include.*

The solution must include a coordinated and systematic approach that facilitates the identification and prioritization of park areas that are both important to resource management and that are infested with the most problematic exotic species. Further, the solution needs to provide the following:

- 1) A decision system for prioritizing specific areas of the park for treatment
- 2) GIS resources to display polygons representing exotic infestations and to track treatments against infestations
- 3) Appropriate data dictionaries and databases that integrate with on-the-ground work flow
- 4) A simple monitoring method, that provides meaningful information to guide follow-up treatment needs, but that can be executed quickly
- 5) A built-in process to update follow-up treatment needs

### 'EXOT' PROJECT DESCRIPTION

Two general components were developed in order to produce an effective project. The first was a collection of standardized field methods. This component was developed with the benefit of expert guidance and documented references and was modified for CHAT's particular circumstances from sound, well-precedented field methods originally developed elsewhere. The second component was data management, including the development and handling of both tabular and spatial data. Unlike the field methods, no existing approach to data management could be identified that fulfilled the needs of the project in a comprehensive manner.

Using the ArcGIS platform, we created a package containing the elements necessary to manage spatial and tabular information on exotic species and treatment efforts, and visually display field-mapped park areas containing infestations. We developed all necessary map needs, a Geodatabase, and a collection of tools to automate the field information package preparation, infested sites prioritization, and an array of data reporting needs.

The specific features of EXOT are presented in detail in the following sections of this report.

*EXOT integrates spatial tools with standardized field methods for a comprehensive project.*

*EXOT includes maps, database, and automated data import and reporting tools.*

## PROJECT FEATURES

### *MANAGE SPATIAL AND TABULAR DATA COMPREHENSIVELY:*

EXOT offers a number of importing tools that allow the user to efficiently bring in different forms of data from the field. In this way, spatial, image, and tabular data are all handled comprehensively.

Spatial files can be imported from project-assigned Trimble and hand-held Garmin GPS devices by selecting the *Trimble* and *GPS* tool sets from the *Import Data* toolbox. The user attaches a device, selects the appropriate files, and populates the tool parameters with any tabular data recorded at a project site. The tool then imports the spatial files and, in an automated fashion, sets data to the same datum and coordinate notation, and updates all table relationships to ensure data integrity. These tools also archive the original source files, ensuring that a backup exists for all project data.

Images taken for photo-monitoring of project efforts are imported using the *GPX to New Image Data* tool from the *Import Data* toolbox. The user attaches a device, copies the images to an import folder, and populates the tool parameters. The images are then associated with points corresponding to each project site. The images and associated data can be viewed directly within the EXOT map document.

A series of tools housed in the *Data Management* toolbox allows for expansion for future project needs. For example, one tool allows the user to enter a new exotic plant species into the system to be tracked, another tool allows for a new type of herbicide to be added into the system, a third tool is used for deleting projects if necessary, and so on.

### *IDENTIFY THE INFESTATIONS TO BE TREATED:*

Understanding where to send sparse resources is paramount for managers. To help managers decide which infested areas should be treated, the *Priority Ranking* tool assigns a value to each infestation site in the system. Sites with higher values are higher priorities for receiving control treatment as compared to sites with lower values. The value for each site is determined by an algorithm that takes into account a number of relevant variables, including: proximity of the site to known important natural resources, proximity of the site to known cultural resources, date of last treatment effort, and how invasive the exotic plant species is that infests the site. A user can choose to include or exclude any of these variables from the priority algorithm when running the tool. With a click of a button a user can produce a map with all infestation sites ranked and a description of each provided.

### *AUTO-GENERATE FIELD PACKETS FOR FIELD CREW LEADERS:*

On-the-ground field effort is the keystone step in managing exotic species. For field efforts to be executed in a consistent manner and for field crews to be effective, detailed field instructions and site information is essential. Using the *Create Field Packet* tool, the user can produce automated field packet materials to be given to Crew Leaders. Field packet materials generated by this tool

include auto-populated tabular data forms for tracking of treatment efforts, auto-populated image data forms and previous images for site photo-monitoring, site-specific project information (e.g. directions, site size, treatment prescription), and maps for accessing the site.

**GENERATE INDIVIDUAL AND SUMMARY DATA REPORTS:**

Managing exotic plant species in a systematic way using a science-based approach entails the collection of large amounts of data. To evaluate project efforts and report results, Resource Managers need to distill these large data sets into easy-to-comprehend summaries. Using the suite of tools in the *Reports* toolbox, EXOT offers automated tools to aggregate data and create comprehensive summary reports. Interpreting results is made easy, because *Report* tools produces Excel file outputs, graphs, and geodatabases. The following tools are available for generating reports:

*Project Report*: Follow the life cycle of each infestation polygon in the system by tracking its change in area and associated treatment areas.

*Exotic Report*: Summarize total areas of exotic species by project, park unit, or park total.

*Treatment Report*: Find total treatment areas by project, species, park unit, or park total.

*Herbicide Report*: Find total volumes and areas of application herbicide types used by project, park unit, or park total.

*Labor Hours Report*: Find total of hours worked by project, species, park unit, or park total.

**ADDITIONAL NOTES**

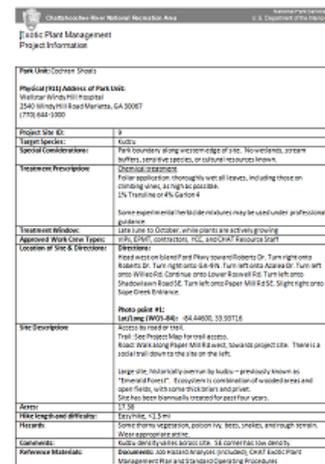
EXOT currently functions using polygons individually created to represent project infestation sites that have been surveyed by Resources staff. A park-wide exotic vegetation inventory mapping effort would provide sufficient information to serve as a basis for identifying and populating EXOT with project sites park-wide.



Auto-generated map of Kudzu infestation.



Auto-generated summary of Photo Documentation.



Auto-generated project info form.