5 Resource Tracking Using 'Geoindex' at Estero Bay Aquatic and State Buffer Preserves

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Abstract

The Estero Bay Geoindex System is designed to provide site managers with a resource inventory, planning, and tracking tool using conventional global positioning system (GPS) technology on common personal computer-based office computers. As used at Estero Bay Aquatic and State Buffer Preserves, it creates a spatially-oriented database that can incorporate work tasks, site features, and species data into a grid-based database format. It is able to store data, track field work progress, and report resource management information. This system fixes site features and tasks to "locations" within the database that mimics their real-world spatial relationships. The principal feature of the Estero Bay Geoindex System is a geographic information system (GIS) mapping grid spread over both the Aquatic and State Buffer Preserves. This map grid is the organizational basis for assigning a location point, a "spatial identity", to a variety of resource locations and work assignments in the management area. Survey information is entered into a master site database. The resulting mapped database fixes many kinds of resources and tasks to specific locations that can be sorted and compiled on the basis of location, type of work, species or datafield characteristics.

Introduction

Several common threads weave through all natural resource management strategies; concepts such as best management practices, watersheds, inventories, and habitat seem to find their way into all management plans whether they deal with forests or fish. One reason for this may be an imbedded and fundamental need for consistency and predictability. Some factors that characterize this common working fabric are (1) the need to describe and report on a large variety of resources, (2) a need to track changes of highly dynamic components of natural systems, (3) a need for accountability, as in the Florida Department of Environmental Protection's (DEP) "performance based budgeting" process, and (4) an obligation

to accurate reporting for the historic record.

This paper describes a resource inventory and database tracking system that is spatially-oriented and rather easy to use. We call it Geoindex and have found it useful for planning, inventory, and reporting a wide variety of information. The system lends itself particularly well to invasive plant management in the Estero Bay Buffer Preserve. The preserve primarily consists of land acquired under the Conservation and Recreation Land (CARL) Program since 1986. These lands total 6346 ac (as of June 1998). A CARL project boundary has been set around the Estero Bay watershed lands important to the bay's water quality, its native plants and animals, the region's archeological sites, and the outdoor recreation opportunities important to people living in the rapidly growing Lee County coastal area.

Geoindex Basics

The Estero Bay Geoindex System is designed to provide site managers with a resource inventory, planning, and tracking tool using conventional global positioning system (GPS) technology on common personal computer-based office computers. As used at Estero Bay Aquatic and State Buffer Preserves, it creates a spatially-oriented database that can incorporate work tasks, site feature descriptions, and species data into a grid-based data format. It is able to store data, track field work progress, and report resource management information. This system fixes site features and tasks to "locations" within the database in a structure that mimics their real-world spatial relationships.

The principal feature of the system is a geographic information system (GIS) based mapping grid spread over both the Aquatic and State Buffer Preserves. This mapping grid is the organizational basis for assigning a location point, a "spatial identity", to a variety of resource locations and work assignments in the management area. The grid system is based on the metric Universal Transverse Mercator (UTM) divisions found on USGS topographic maps. These are spaced at one kilometer intervals in both and east-west and north-south axes. The resulting metric gridwork is easy to manipulate due to the ten-base mathematics (no seconds/minutes/degrees manipulations), and the kilometer square units are large enough to accommodate most southern coastal features without being too numerous. A further division of the grid by ten results in one hectare units that are well-proportioned for on-the-ground working projects (Fig. 1).

North-south grid lines are labeled alpha (A-Z) and east-west numeric (1-16), allowing grid intercies to be plotted and identified as E6 or J5, and so on. It takes 127 one kilometer square grids, registered to UTM points, to cover the Estero Bay management area. Features like dominant vegetation cover types or road and channel lengths within each grid are cataloged in database fields labeled by the identification number of the northwest corner of the grid in which it occurs.

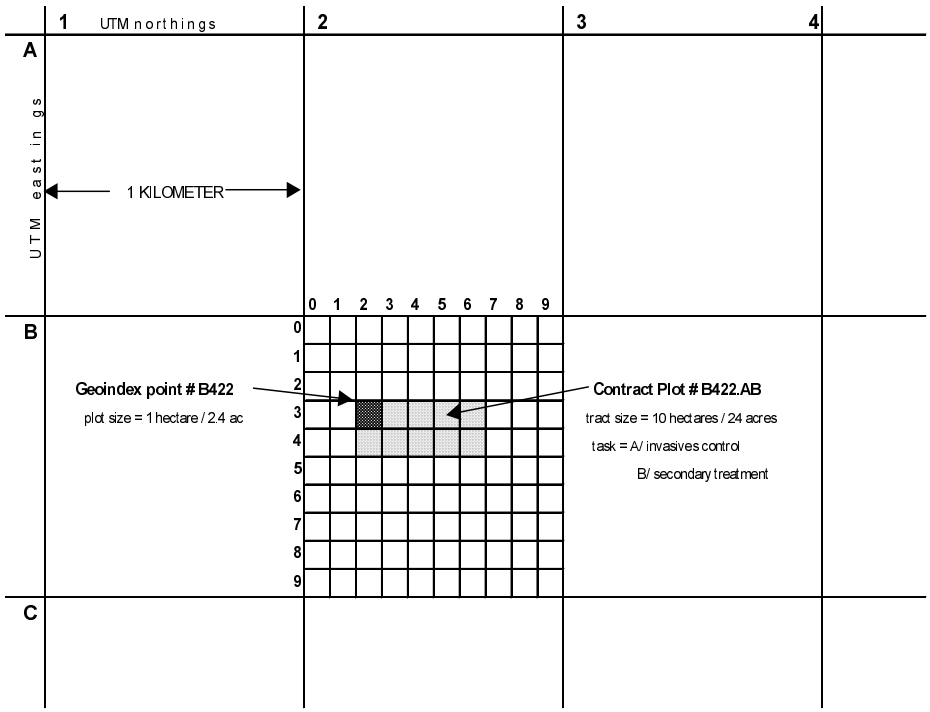

Figure 1. The Geoindex mapping grid for assigning a location point to resource locations.

The resulting mapped database can fix many kinds of resources and tasks to specific locations. These can be sorted and compiled on the basis of location, type of work, species, or other datafield characteristics.

Applications

When databasing smaller features, the grid is further subdivided into one hectare plots. When recording features like wading bird colonies, doing research monitoring, or recording listed plant species inventories, the 1 ha size plots, and multiples of this unit, have proved to be a practical base unit. These plots are also named and cataloged using their most northwestern corner grid identifications, with the addition of a decimal place to denote a specific hectare, i.e., J5.2 or B422 (dropping the decimal for convenience) (Fig. 1).

At Estero Bay, Geoindex is used to lay out and track work plots for invasive plant removal. Geoindex grid points are located in the field with a GPS unit and are marked with orange topped polyvinyl chloride (pvc) poles labeled with the location

identification. These posts are set over rebar stakes with a metal tag to enable quick relocation in case of fire.

When used to layout and track invasive plant control projects, Geoindex allows the user to locate a project work plot at a specific map position and to tag that plot with a suffix code denoting a particular fieldwork treatment. The northwest corner identification is again used to identify the project but is augmented with a task suffix. The resulting project label, e.g., B422.AB, carries information about a single contract or project and a particular work treatment or application on a site at a specific known location or area (Fig. 1).

The project label itself acts as a reference to a particular contract document that contains all pertinent work stipulations and other inventory information. Geoindex organizes and stores information with a spatial emphasis, mimicking the real-world structural layout of the resources.

Contractor work plots are referenced to the Geoindex grid when possible, but sometimes fall at points not on the grid. When this occurs, orange-topped rebar stakes are set at the work plot corners. The work is tracked and progress recorded in the database and on paper documents by the location identification and project label.

Compiling and reporting Geoindex information uses the "report" function of ArcView's d-Base data storage system. The database can be structured using a data dictionary to accept and report the kinds of datafields that will respond with usable information. Florida DEP's "performance based budgeting" process evaluates budget and staffing priorities, in part, on the basis of reported inventories, work projections, and tallied accomplishments. The Geoindex database structure records and retrieves budgeting statistics in lists that would anticipate information requests; cross-referencing of fields connects the databases.

The Geoindex system requires a significant commitment to data input and system management. The payoff will come with a greatly expanded ability to recognize and describe changes in our landscape, and to accurately respond to increased requests for management information.

Geoindex can provide an accurate and very versatile mapping and databasing ability for land managers with limited staffing and large tracking and reporting requirements.