Audubon International

Fact Sheet

# Conservation and GIS

Even if you are not a research scientist or computer specialist, you may have heard about "GIS" due to its increasing use in all industries and around the globe. GIS is a revolutionary mapping tool used by government agencies and researchers for conservation and management, but what exactly is it and how does it work? Community members and property managers are using GIS to better understand and manage resources in their regions, and you can too!

## What is GIS?

A Geographic Information System (GIS) is a technological tool—put simply, a map—that displays geographical data in ways that can inform decisions. It allows you to associate data with places. It is used in a wide range of industries, including government, utilities, emergency services, and business, to show spatial information such as point locations, borders, roads, and polygons. Widely used for conservation purposes by wildlife biologists, resource managers, and ecologists, GIS is also used by non-scientists such as property managers, private landowners, farmers, and others who confront critical land and natural resource use decisions.

## What are Some Basic Things You Can Do with GIS?

- Open maps on your computer
- Create unique maps from information you create/generate
- Integrate information from multiple sources
- See how things are related in space (e.g. measure distance between points)
- View data on the landscape in a specific region (county, parcel, etc.)

## GIS Map Data Available to the Public

- U.S. Geologic Survey Topographic Maps
- County and State Highway Maps
- National Wetlands Inventory Maps
- County Soil Surveys
- Floodplain Maps
- County and Local Natural Areas Inventories Map
- Aerial Photography
- Species distributions (http://www.discoverlife.org/mp/20m?act=make_map)


*Using Global Mapper, members from the University of Connecticut mapped areas where* Peponapis pruinosa *(a type of bee) can be found in the United States and Mexico. With this information, conservation measures can now be performed in low-density areas of* P. pruinosa.

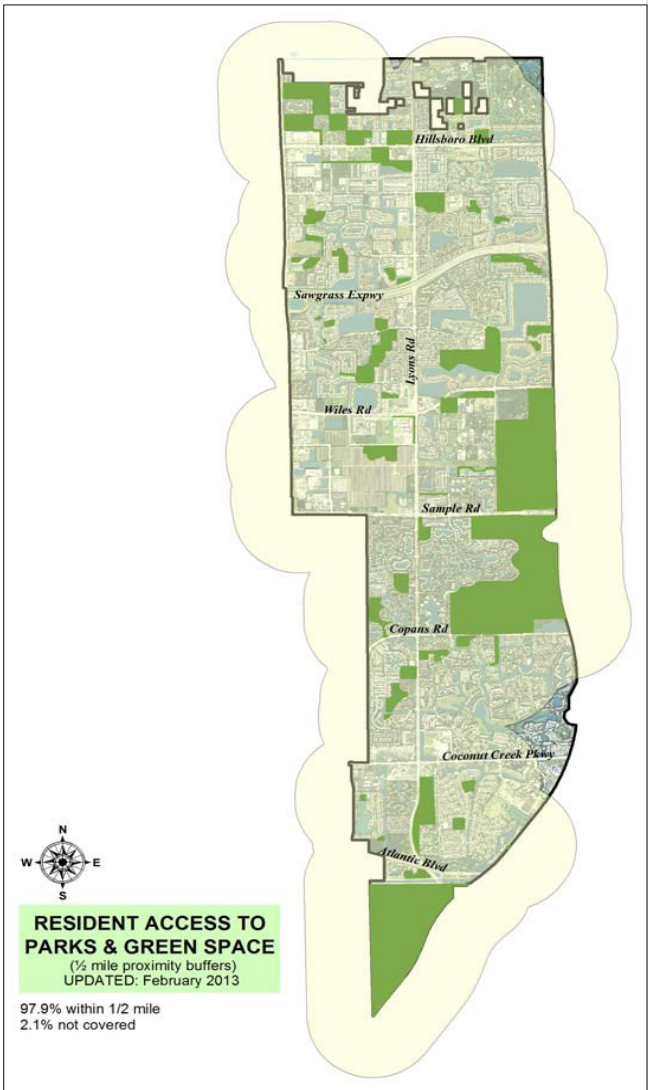
## Conservation & GIS

Conservation refers to the protection, management, and restoration of natural resources including the plant and wildlife communities that inhabit the environment. Conservation efforts focus on addressing threats to the natural environment such as global climate change, habitat loss, pollution and deforestation, which can cause the biodiversity of earth to be threatened through habitat fragmentation and species extinction.

GIS enables conservation professionals to access and utilize current, historical, and time series information relevant to conservation, including data on species occurrences, ecosystem conditions, watershed boundaries, and land-use patterns. When using GIS, data are contained in layers that can be overlaid with one another to identify relationships between wildlife and landscape patterns (see ESRI *GIS for Wildlife Conservation* article for more on this). This enables resource managers and public and private landowners to visualize where sensitive habitats occur, where conservation practices may need to be implemented and ultimately what protection strategies are effective.

### GIS helps users to monitor, visualize, analyze and understand:

- **Species populations and distributions.** Threatened and common wildlife populations, native plant distribution, and invasive or exotic vegetation occurrences are mapped across time and regional scales. GIS aids property managers in protecting sensitive habitat and populations where they occur amidst development, such as on recreational lands (e.g. golf courses). Or by plotting species distribution data over time, species invasions can be analyzed by modeling the rate of a population's expansion.
- **Land use and land change**: The ability to show land cover types with species data over time is critical in assessing wildlife habitat use. For example, GIS allows users to overlay data about species occurrences and habitat use to find out what habitat types are used most often and preferred by various species. This has important implications for planned development and expansions on various property types. Also, mapping how land changes (whether by natural forces or human development) can identify where habitat fragmentation is occurring.
- **Community assets:** Parks, open space, and trails are beneficial to wildlife as well as for human uses. The GIS map at right details residents' access to parks and green spaces in Coconut Creek, FL.
- **Progress of conservation activities**: GIS enables users to identify conservation targets, set conservation goals for particular areas, and monitor the progress of these activities over time. As our population grows, it is crucial to plan our communities and protect green spaces and conserved areas for a healthy environment and sustainable living. GIS helps to track the present status of an area as well as predict or plan the needs of the future. Imagine a small scale example: you notice an area of your property seems to be a good habitat for birds. Using GIS, you can make a map tracking the most visited areas by birds over a series of days' observations. You can use this information later to put bird feeders in highly used areas or in areas you would like birds to become more abundant.




*By combining GIS data on locations of 1) parks and 2) homes, Coconut Creek was able to determine that 97.9% of residents live within 1/2 mile of a park or green space.*

## Get Your Community Using GIS

Whether you manage one property or a whole community, planning is required to address day-to-day maintenance while also preparing for the possible changes of the future. GIS is a platform that helps managers reach their goals of improving quality of life while protecting the environment at multiple scales by visualizing assets and activities over space and time.

## Start Using GIS!

Many assume that GIS can only be used by trained professionals when, in reality, anyone can use GIS with the proper preparation. You do not need to be conducting highly technical analyses to use it to help inform your management. You can use GIS applications powered by powerful desktop systems such as QGIS, Esri's ArcGIS and Global Mapper or simpler, web based systems such as Mango Map. Many systems allow you to upload your own files or use maps already in the program.

Reference the chart below for a detailed description of various types of GIS tools and discover where you can learn more.

## GIS Tools

| GIS Tool | QGIS | Esri's ArcGIS | Global Mapper | Mango Mapper |
|---|---|---|---|---|
| **What You Should Know** | ♦ Allows users to create maps with multiple layers using different map projections.<br>♦ Allows users to download software for free. | ♦ Allows users to create and use maps, compile geographic data, and analyze mapped information.<br>♦ This software is widely used by professionals.<br>♦ Price of this software ranges from $1,500-$7,000. | ♦ Allows users to perform GIS on maps already build-in with the software and/or upload their own files.<br>♦ Price of software for one person ranges from free to $618 depending on the type of package bought. | ♦ Allows users the ability to use maps from any web accessible device: browser, mobile or tablet.<br>♦ Users are billed monthly, yearly, or every two years. Monthly plans start at $29/month and range to $199/month. |
| **Where to Get It** | ♦ http://www.qgis.org/en/site/forusers/index.html | ♦ http://www.esri.com/software/arcgis/arcgis-for-desktop | ♦ http://www.bluemarblegeo.com/products/global-mapper.php | ♦ https://mangomap.com/ |

## Real World Example: *Beyond Conservation to Community Sustainability*

The community of Coconut Creek, Florida has created an array of maps using GIS to better communicate their annual sustainability tracking. They have created map layers showing where the town has green buildings, homes with solar use, water conservation projects, high recycling rates, mobility options, and more. This helps the City of Coconut Creek communicate with residents and prospective businesses about their sustainability achievements in a visual, quickly intelligible way. See the latest reports on their website:

**http://www.coconutcreek.net/sd/city-green-plan**