Everglades Depth Estimation Network (EDEN) Applications:
Tools to View, Extract, Plot, and Manipulate EDEN Data

The Everglades Depth Estimation Network (EDEN) is an integrated system of real-time water-level monitoring, ground-elevation data, and water-surface elevation modeling to provide scientists and water managers with current on-line water-depth information for the entire freshwater part of the greater Everglades. To assist users in applying the EDEN data to their particular needs, a series of five EDEN tools, or applications (EDENapps), were developed. Using EDEN's tools, scientists can view the EDEN datasets of daily water-level and ground elevations, compute and view daily water depth and hydroperiod surfaces, extract data for user-specified locations, plot transects of water level, and animate water-level transects over time. Also, users can retrieve data from the EDEN datasets for analysis and display in other analysis software programs. As scientists and managers attempt to restore the natural volume, timing, and distribution of sheet-flow in the wetlands, such information is invaluable. Information analyzed and presented with these tools is used to advise policy makers, planners, and decision makers of the potential effects of water management and restoration scenarios on the natural resources of the Everglades.

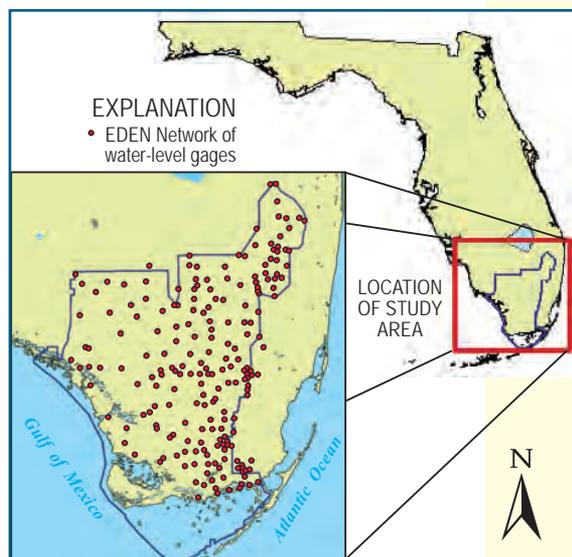### Background—The Everglades Depth Estimation Network

EDEN is a primary product of the hydrology module of the Restoration Coordination and VERification (RECOVER) Monitoring and Assessment Plan (MAP), and provides much of the hydrologic data that underpins many of the MAP's restoration hypotheses (RECOVER, 2004; Telis, 2006). EDEN offers a consistent and documented dataset of ground-elevation measurements and continuous water-level data for the greater Everglades. The dataset can be used by scientists and managers to: (1) guide large-scale field operations, (2) integrate hydrologic and ecological responses, and (3) support biological and ecological assessments that measure the way the ecosystem responds to the implementation of the Comprehensive Everglades Restoration Plan (CERP) (U.S. Army Corps of Engineers, 1999).

Surface water-level data have been collected daily since 1999 at up to 253 wetland and canal gaging stations operated by the Big Cypress National Preserve, Everglades National Park, the South Florida Water Management District, and the U.S. Geological Survey (USGS) (fig. 1). Data are entered into the USGS National Water Information System (NWIS) database daily, with a 1-day delay from the date of collection. Once in NWIS, the data are available at *http://sofia.usgs.gov/eden/stationlist.php*. EDEN water-level data are accessed through an interactive map showing the location of gaging stations in the network, which provides "clickable" access to gage data on a near real-time basis.

Ground-elevation data for the greater Everglades and the digital ground-elevation models (DEM) derived from them form the foundation for all EDEN water depth and associated ecological/hydrologic modeling. Ground-surface elevation data were collected by the USGS (Desmond, 2003) at more than 50,000 sites with an approximate spacing of 400 meters and covering almost the entire greater Everglades. Using the North American Vertical Datum of 1988 (NAVD 88) allows for comparing of water-level data and for computing of accurate water depths across the greater Everglades.

A water-surface elevation model uses the daily median values of up to 240 of the EDEN network water-level gages in the freshwater Everglades to create spatially continuous interpolations of the water-surface elevation. EDEN's daily water-level surfaces are georeferenced gridded surfaces that can be viewed with the EDEN Data Viewer and most georeferencing programs, such as ArcGIS. More information regarding EDEN is provided in Telis (2006) and on the EDEN website, *http://sofia.usgs.gov/eden*. These water-level surfaces are posted on the website daily, with the following specifications:

• Daily water surfaces are generated from daily median water-level gage data from January 1, 2000 to current (Pearlstine and others, 2007; Palaseanu and Pearlstine, 2008);

• Surfaces are created on a 400 × 400 meter grid (Jones and Price, 2007a);

• Water-level surfaces are in centimeters;

• Vertical datum is North American Vertical Datum of 1988 (NAVD 88);

• Surfaces are available as NetCDF and GeoTiff files;

• There is a 4-day delay to allow the collecting agencies to address initial quality control issues with provisional real-time data.

Figure 1. Location of EDEN domain and water-level gages.