

## **Status Report**

**Period Covered:** October 1, 2011 through September 30, 2012

**Project:** South Florida Surface Water Monitoring Network for Support of MAP Projects

**Agency:** U.S. Geological Survey (USGS)

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**Agreement:** USGS IA#28 under MOA between USGS and USACE

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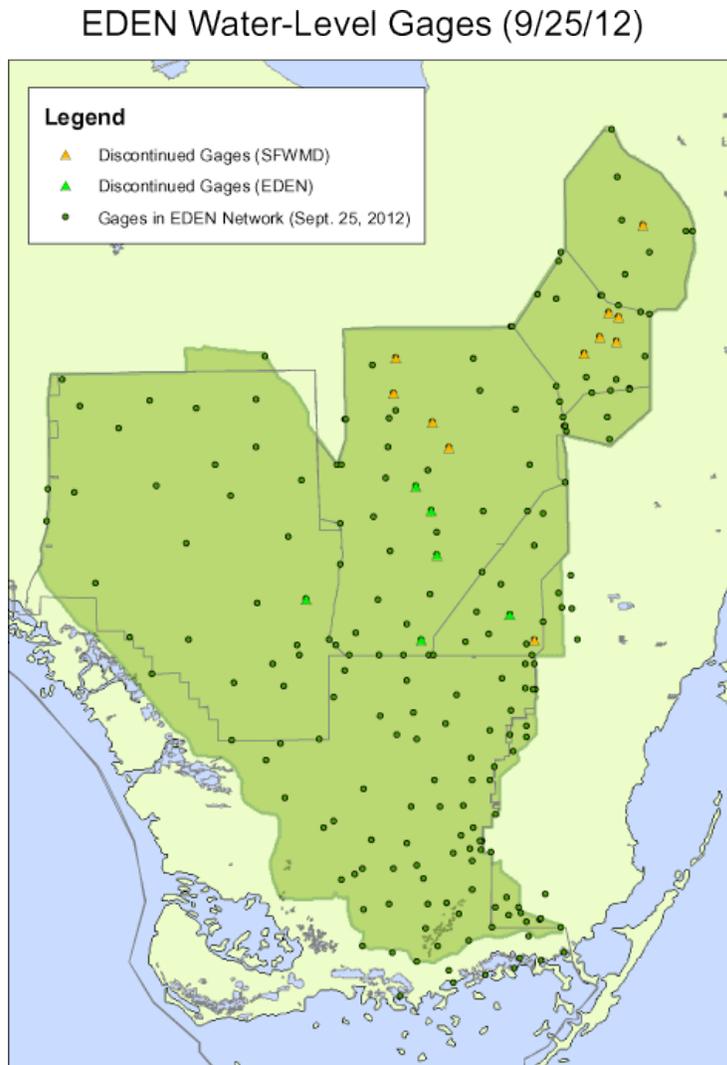
This annual report for 2012 summarizes the major accomplishments, lists deliverables and reports, and outlines the work plan for 2013 for the EDEN project. The EDEN's primary deliverable and product continues to be the EDENweb (<http://sofia.usgs.gov/eden>); the project website that provides all data, results, documentation, and other project information for EDEN users.

### **I. MAJOR ACCOMPLISHMENTS**

- **Real-time, provisional, and final EDEN surfaces** are being produced and posted to EDENweb on schedule. Surfaces currently posted on the EDENweb include:
  - Final for 1/1/2000 through 9/30/2011
  - Provisional for 10/1/2011 through 6/30/2012
  - Provisional for 1/1/1991 through 12/31/1999
  - Real-time for 7/1/2012 through current
- Converted processing of real-time EDEN daily water-level surfacing using **V2 surface-water model**:
  - Includes automated use of **ADAM software** for screening bad or missing data and for filling data gaps with estimates using nearby gage data
  - Includes newly formatted daily median files that tell users whether data for each gage is measured, estimated, missing, or dry.
- With the support of USGS Greater Everglades Priority Ecosystem Science (GEPES) funds, maintained **operation of all 25 EDEN-funded gages and 9 coastal water-level gages** originally established for Tom Smith's SET project. GEPES funds filled the funding gap when the EDEN budget was cut by 30% this FY.
- Generated EDEN daily water-level surfaces for 1/1/91 through 12/31/99 using **hindcasted datasets** completed in FY11.
  - Due to extreme low-water conditions in 1990, datasets need more analysis prior to surfacing.

- Users are cautioned about the quality of the water-level surfaces in the vicinity of several gages where data is not consistent with previous datasets.
- The **confidence index** by Pearlstine and others (2007) was tested using the newly revised V2 modeled surfaces. None of the parameters, such as distance from a gage, were strongly correlated with water-level differences measured at the benchmark network. Although a confidence index map would provide users with a general guideline about the accuracy of water levels modeled by EDEN, the parameters that define the areas with lower confidence are not yet clear.
- A **network analysis** was conducted in FY12 to evaluate whether selected water-level gages could be removed with limited impact to the EDEN daily water-level surfaces. This analysis was necessitated because the EDEN budget was cut by 30% in FY12 and expected at this level in FY13 and beyond. Because the EDEN surface-water model interpolates between water levels at gages, the confidence of the surfaces depends on the location, distribution, and accuracy of the gage network. The EDEN network analysis was coordinated with the SFWMD which conducted an agency network analysis for the purpose of reducing their monitoring budget for FY13.
  - On 9/6, the EDEN project provided SFWMD and USACE with final recommendations for gages that can be discontinued by SFWMD and gages to be discontinued by EDEN.
    - 11 SFWMD-funded gages and 10 EDEN-funded gages are proposed for discontinuing that would not significantly impact the EDEN water-level surfaces
    - The EDEN project has secured sufficient funding for FY13 ONLY to maintain 4 additional gages that would otherwise have to be discontinued as a result of funding cuts.
  - The final list of 6 EDEN-funded gages to be discontinued starting 10/1/12 are:
    - 3A5
    - W14
    - W15
    - W5
    - EDEN1
    - TI8
  - The SFWMD has coordinated their list of potentially discontinued gages based on the EDEN gage list above. See figure 1.

Figure 1. Location of water-level gages in EDEN showing gages discontinued or potentially discontinued in FY13.



- At the request of the USACE, generated and posted **water-level percentile plots for gages and tree islands** in WCA3A and 3B, and ENP to compare water levels under the Everglades Restoration Transition Plan (ERTP) with water levels under the Interim Operational Plan (IOP). The Tribes in the Everglades wanted to ensure that the ERTP would not excessively overtop tree islands under the new operational plan for the C&SF project. The daily water-level percentile plots allow stakeholders to monitor water levels and a daily email alert system informs them when current water levels reach specified elevations at one or more gages or tree islands.
  - See figures 2 and 3.

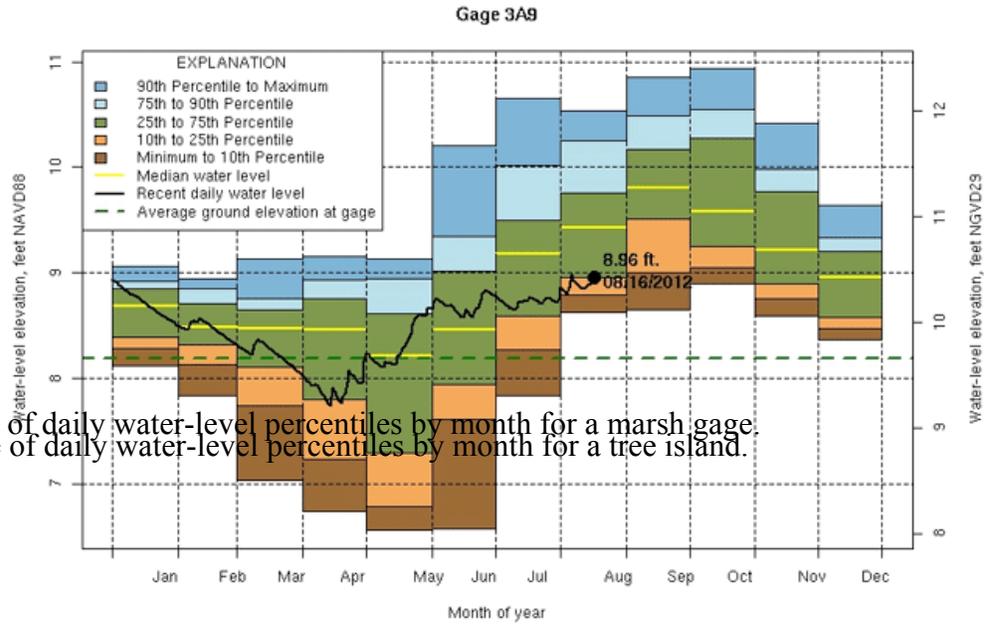
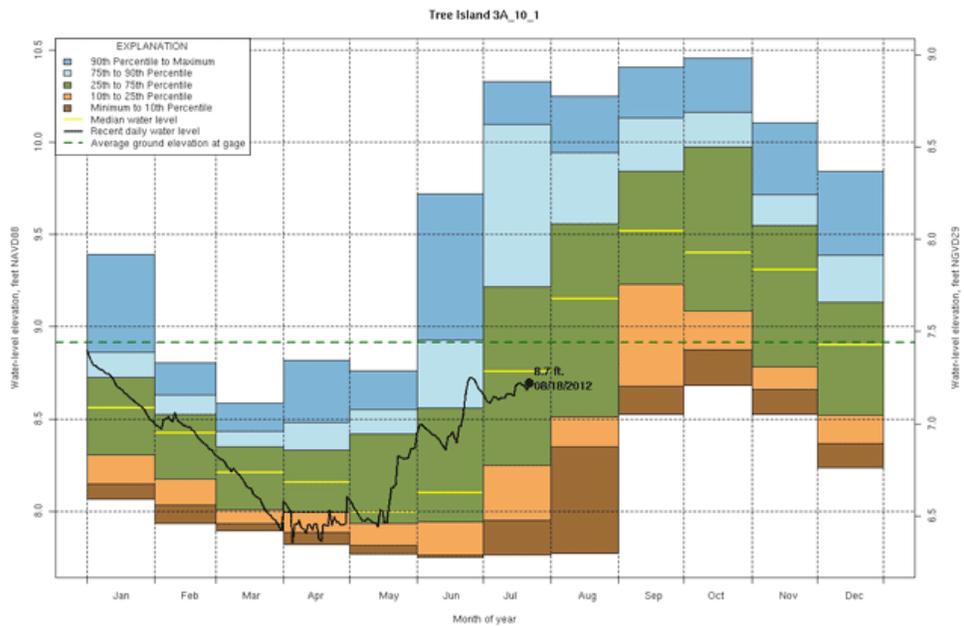


Figure 2. Example of daily water-level percentiles by month for a marsh gage.  
Figure 3. Example of daily water-level percentiles by month for a tree island.



- Provided **support to several RECOVER principal investigators** and agencies representatives for EDEN data.
  - Examples of support include:
    - Calculated water depths for over 300 alligator sample sites for Laura Brandt, USFWS.
    - Calculated discontinuous ponds of greater than 5 centimeters for 20-year period for selected sampling locations for Joel Trexler, FIU.
    - Provided days since dry data to Rick Robbins, USDA, NRCS for wetlands soil analysis.
    - Provided rainfall data for selected ENP sample locations to Jay Sah, FIU.
  - The member list for the EDEN newsletter is 132 and includes participants from federal government agencies (such as DOI, ENP, USGS, FWS, EPA), State agencies (such as SFWMD, FDEP), many local and other universities and several international affiliations.
- Continued to maintain **EDENweb** (<http://sofia.usgs.gov/eden>) to provide data, metadata, and documentation to RECOVER PIs, water-resource managers, and others.

## II. SUPPORT FROM OTHER PROGRAMS AND FUNDING SOURCES

Greater Everglades PES funds continue to support the EDEN project by funding efforts by Paul Conrads (USGS-SC), Heather Henkel (USGS-St. Pete), Bryan McCloskey (USGS-St. Pete), and Matt Petkewich (USGS-SC). Additionally, GEPES provides some funds for Pamela Telis (USGS-Jacksonville) in her role as project coordinator and liaison with the USACE.

- Greater Everglades PES funds -- The **EDENapps tools** continue to offer EDEN users capabilities such as data viewing, data retrieval, and data access and manipulation. Expansion of the EDEN datasets and increased digital requirements require that the EDENapps tools be upgraded to 64-bit processing on a Java-based platform. To take advantage of the work funded by other GEPES funds, the National Wetlands Research Center (NWRC) in Lafayette, LA is working with EDEN to improve capabilities of the existing tools.
  - Revisions of two EDENapps tools (xyLocator and Depth&DaysSinceDry) were posted to the EDENweb.
  - Work continued on the EDEN DataViewer and TransectPlotter.
- Greater Everglades PES funds -- **Rainfall and evapotranspiration (ET)** data continue to be updated regularly for the EDEN gage network and posted to the EDENweb. Currently, rainfall data is available for 2002 to August 2012 and ET data is available for 1995 to 2011.

- Greater Everglades PES funds -- Developed prototype application to generate **synthetic hydrographs (EDEN-Syn)** for input into an EDEN model for subareas. The application will allow users to create hypothetical hydrologic conditions for use in biological models.
- Greater Everglades PES funds -- Initiated development and testing of **subarea models** for water-level surfacing; may be used to improve daily surfaces and allow for more efficient testing of scenarios by users.
- Greater Everglades PES funds – Initiated development of a prototype Web application for the display of current conditions and the change in conditions for coastal water-level data described as **Coastal EDEN**. Presented at INTECOL/GEER 2012 conference to gain feedback from users.

### III. SIGNIFICANT MEETINGS/WORKSHOPS/CONFERENCES

- 9<sup>th</sup> INTECOL Conference (Orlando, FL)
  - PRESENTATION – **Everglades Depth Estimation Network (EDEN): Providing Hydrologic Data for the Restoration of the Everglades**; Pamela Telis and Zhixiao Xie
  - POSTER – **Development of a Synthetic Hydrograph Application to Generate Inputs to the Everglades Depth Estimation Network (EDEN)**; Paul Conrads, Matthew Petkewich, Ruby Daamen, and Edwin Roehl, Jr.
  - POSTER – **Everglades Depth Estimation Network (EDEN) Performance-Measure Products for the Evaluation of Everglades Restoration**; Paul Conrads, Bryan McCloskey, and Pamela Telis
  - POSTER – **Water-Level Record Extension of the Everglades Depth Estimation Network (EDEN)**; Paul A. Conrads, Bryan McCloskey, and Andrew O'Reilly
  - POSTER – **Development of Sub-area Surface-Water Models within the Everglades Depth Estimation Network (EDEN) Model Domain**; Paul Conrads, Zhixiao Xie, Bryan McCloskey, and Pamela Telis
  - POSTER – **Using Inferential Sensors for Quality Control of the Everglades Depth Estimation Network (EDEN)**; Matthew D. Petkewich, Paul A. Conrads, Ruby C. Daamen, and Edwin A. Roehl
  - POSTER - **Confidence Index Computation for the Everglades Depth Estimation Network (EDEN) Water-Level Surfaces**; Pamela A. Telis and Bryan McCloskey

- **POSTER – Determining Changes in Hydrologic Behaviors in the Florida Everglades**; Paul Conrads and Stephen Benedict
- American Geophysical Union (San Francisco, CA)  
**Everglades Depth Estimation Network (EDEN): Providing Hydrologic Data for the Restoration of the Everglades**; Paul Conrads, Pamela Telis, and Heather Henkel
- National Water Monitoring Meeting (Portland, OR)
  - **Everglades Depth Estimation Network (EDEN): Providing Hydrologic Data for the Restoration of the Everglades**; Paul Conrads, Pamela Telis, and Heather Henkel
- Florida Water Resources Monitoring Council Statewide Council Meeting (St. Petersburg, FL)
  - **The South Florida Information Access (SOFIA) System and Everglades Depth Estimation Network (EDEN)**; Heather Henkel and Bryan McCloskey
- USGS National Groundwater Meeting (Golden, CO)
  - **Using Inferential Sensors for Quality Control of the Everglades Depth Estimation Network (EDEN)**; Matthew D. Petkewich, Paul A. Conrads, Ruby C. Daamen, and Edwin A. Roehl

#### **IV. ADMINISTRATIVE (Contractual and Budgetary)**

- As a result of significant cuts to the RECOVER budget, the EDEN project received a 30% reduction in the original budgeted amount for FY12. The FY12 funded amount was reduced from \$587,912 to \$411,540.
- Several of the recent EDEN products and developments, such as the ADAM software and the new surface-water model, are expected to make handling of the data and generation of water surfaces more efficient. The greatest impact of the budget reduction is the discontinuance of water-level gages in the Everglades.
- Florida Atlantic University (FAU, Dr. Zhixiao Xie) was funded by the EDEN project through a CESU agreement in FY12 for:
  - Testing methods and modeling schemes for sub-domain models for the EDEN study area

#### **V. FY12 DELIVERABLES/REPORTS**

- EDENweb has been updated throughout the year to provide data, metadata, and documentation to MAP PIs and others.
- Quarterly Reports have been submitted on time to the RECOVER MAP coordinators.

#### **VI. FY13 WORKPLAN**

This plan includes work elements funded from both RECOVER MAP and USGS GEPES:

- Continue to generate and post daily water-level surfaces of the Everglades for users.
- Document all the new work via USGS series reports and journal articles.
- Revise EDEN data management plan.
- Implement ERTTP email alert.
- Complete and test subarea models.
- Implement webpage for EDEN oligohaline zone (Coastal EDEN).
- Provide hydrologic analyses and results for 2013 System Status Report to Congress.
- Collaborate with National Wetlands Research Center for revisions to several of the EDENapps tools; the EDEN DataViewer and TransectPlotter
- Develop EDEN-Syn and have selected PIs test applications.
- Participate in the 2013 National Conference on Ecosystem Restoration (NCER) and present recent EDEN analyses and results.
- Continue to work with agencies that are monitoring water levels and develop a plan for creating EDEN daily surfaces with fewer surface-water gages as funding cuts reduce the network.

## **VII. ANTICIPATED NEEDS AND ISSUES**

- The challenge for the EDEN project, as with all RECOVER-funded projects, is to maintain a viable effort despite the significant reduction in funding in 2012 and beyond. Several of the recent products, such as the ADAM software and new surface-water model, are expected to make the handling of the data and creation of water surfaces more efficient. The anticipated reduction in the gage network is likely to have significant impact on the EDEN process, however it our hope that the data estimation programs and quality-assurance tools previously developed will limit loss of confidence in the EDEN water-level surfaces and other EDEN products.

## **VIII. FUNDING STATUS**

- The EDEN project budget was cut by 30% for FY12 starting 10/1/11.
- As of 9/30/12, all of the FY12 funding under USGS IA #28 has been expended or obligated. Invoices will be electronically submitted to the USACE within the next few months.
- USGS Priority Ecosystem Science (PES) funding in FY12 was approximately \$300,000 to multiple principal investigators in support for EDEN research efforts. This level of support is expected to be continued in FY13 with a potential 10-20% cut.