EDEN Transect Plotter Tool (v. 1.2)
User's Guide
12/3/08, revised 12/20/07, 7/24/08

What is EDEN Transect Plotter?

EDEN Transect Plotter is a program for plotting daily water level surfaces and ground elevation profiles for user-specified transects across the Everglades. The water surface can be animated over a user-specified time period and the water surface slope is calculated and displayed along the transect for user-specified distances.

Location of nearby water level gaging stations can be indicated on the transect plot. The location of the gage in meters perpendicular to the transect line provides users with information about data that may have been used in development of the transect plot. The daily median output files must be reviewed to determine if gage data were available for the period of interest.

Additionally, user-provided observations of water level and water depth can be plotted on the transect for comparison with the EDEN water surface. The user-specified distance perpendicular to the transect identifies a selection criteria for observations that are plotted on the transect plot.

All water level and ground elevation data are output in units of North American Vertical Datum of 1988 (NAVD88).
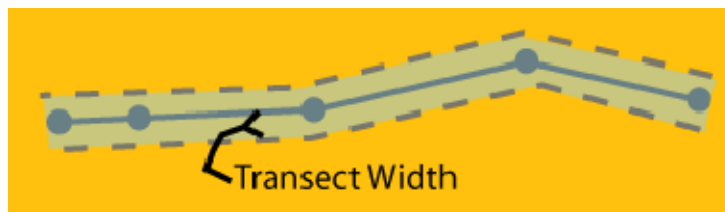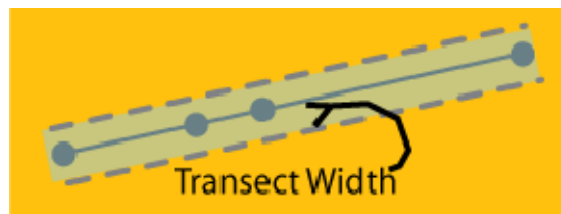
(Above) Plan view showing an example transect (solid line), points (solid circles), and transect width (shaded area bordered by dashed lines) for a straight and crooked transect. Note that the transect width (entered in step 6) is only half of the total width.

Installation Instructions

Required for execution of the program:

1. **EDEN Transect Plotter.exe** (currently at v. 1.2)

    Available for download as **EDENTransectPlotter.zip** at
    http://sofia.usgs.gov/eden/edenapps/transectplotter.php
    Executable file can be copied to any location on your computer.

2. **List of EDEN stations and locations**
    a. Used to incorporate nearby gage locations on the transect plot
    b. Filename must be stations.txt
    c. Must be copied to folder containing the **Transect Plotter.exe** file
    d. Included as part of the **EDENTransectPlotter.zip** file download.

3. **netCDF dll (NetCDF data library files)**

    Extract files from http://sofia.usgs.gov/eden/edenapps/programs/netcdf-3.6.1-win32.zip.
    Extract all files in the .zip and copy them to c:\windows\system32.

4. **.NET Framework 2.0**

    EDEN Transect Plotter requires the .NET Framework 2.0. If you receive an error message telling you that it is missing, you will need to download it from http://www.microsoft.com and install it. Accept the default settings.

User Input

Required files:

1. **EDEN DEM file for ground elevation**
    a. NetCDF file format (.nc)
    b. Units of centimeters
    c. Available for download at
       http://sofia.usgs.gov/eden/data/dem/eden_dem_cm_nov07.zip.

2. **EDEN daily water level surfaces**
    a. NetCDF format file(s) (.nc) containing daily water level surfaces
    b. Multiple one-quarter-year files can be used for requested time series (be sure that continuous data files are present for accurate time series calculations)
    c. Available for download at
       http://sofia.usgs.gov/eden/models/watersurfacemod.php.

3. **Transect points file** (see example screenshot below)
    a. Plain text file (ASCII or Unicode)
    b. Tab- or comma-delimited
    c. Header row required

       d. Each row contains one point that defines the transect line. Each row contains, in order:
          i. Name/Point ID
          ii. X coordinate (UTM, zone 17N, NAD83)
          iii. Y coordinate (UTM, zone 17N, NAD83)
       e. Note: the points will be mapped on the transect in the order that they are listed in the transect points file.
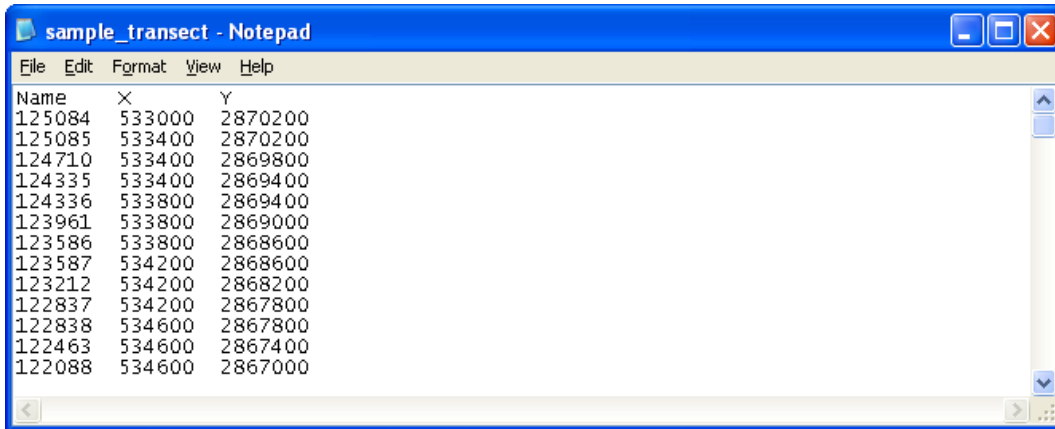
Sample transects points file

Optional Files:

1. Observations of water level file (see example screenshot below)
       a. Plain text file (ASCII or Unicode)
       b. Tab- or comma-delimited
       c. Header row required
       d. Each row contains one observation of water level. Each row contains, in order:
          i. Date of observation (YYYY/MM/DD)
          ii. Observer name (Note: there is no limit on name length)
          iii. X coordinate (UTM, zone 17N, NAD83)
          iv. Y coordinate (UTM, zone 17N, NAD83)
          v. Measured water level (units of centimeters, NAVD88)

Sample observations of water level file

2. Observations of water depth file (see example screenshot below)
   a. Plain text file (ASCII or Unicode)
   b. Tab- or comma-delimited
   c. Header row required
   d. Each row contains one observation of water level. Each row contains, in order:
      i. Date of observation (YYYY/MM/DD)
      ii. Observer name (Note: there is no limit on name length)
      iii. X coordinate (UTM, zone 17N, NAD83)
      iv. Y coordinate (UTM, zone 17N, NAD83)
      v. Measured water depth (units of centimeters)
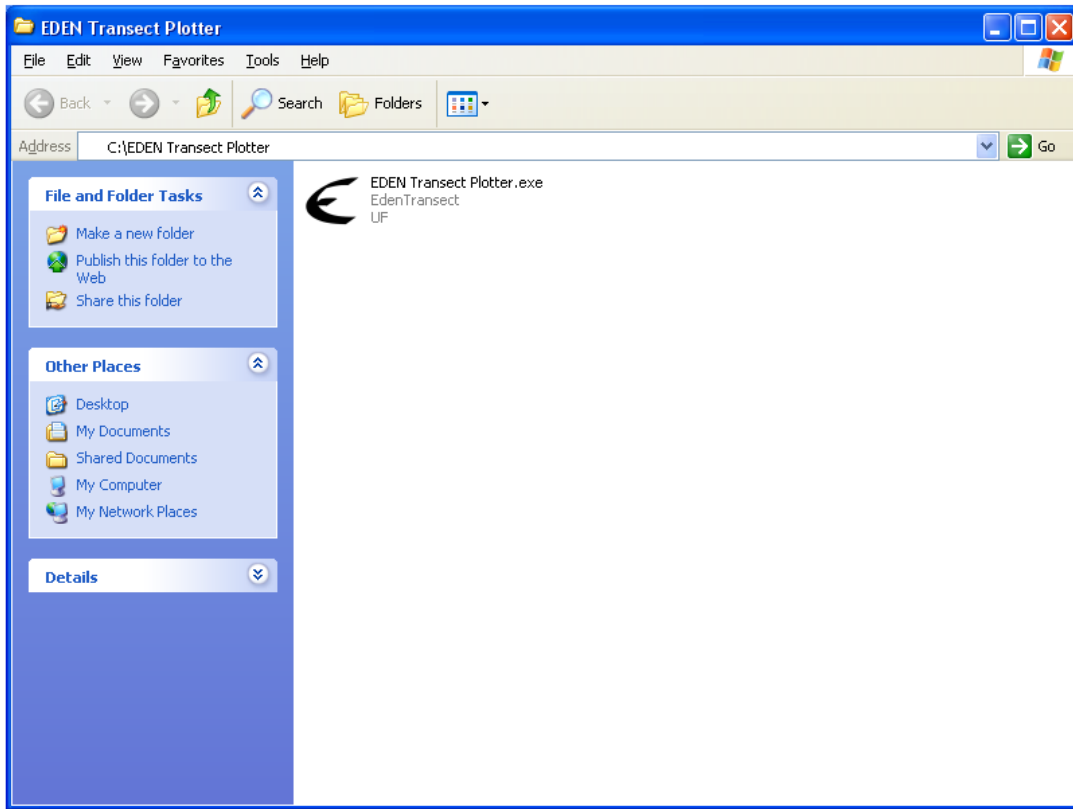

Sample of observations of water depth file

User Instructions

1. Open the application. To do this, navigate to the application and double-click on the icon.
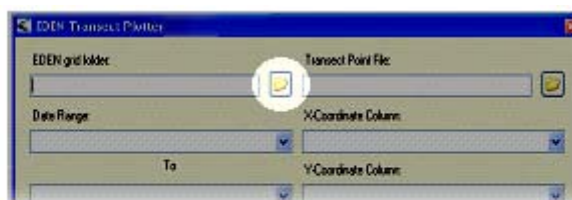

The application will open to the following window.

2. Type the folder path to the EDEN data files stored on your hard drive. This folder must contain one or more EDEN daily water level surface files (netCDF, .nc) and the EDEN DEM file for the ground elevation (netCDF, .nc).

Alternatively, you may click the browse button and browse to the appropriate folder.

3. Select the date range for which you want transect data. The information in the **date range** will auto-populate from the dates contained in the water surface files. If there are multiple water surface files, then the dates will extend from the earliest date to the latest date.

    If no dates are listed in the boxes, ensure that the correct folder has been selected in step 2.

    You can modify the dates, if necessary, simply by selecting the dates in the pull-down list.
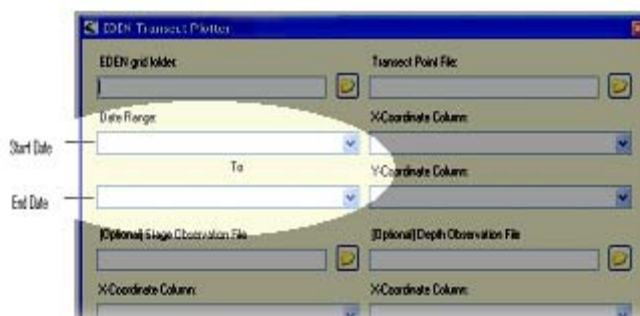
4. Type the file path to the file containing the transect points that define the transect location. (See the example transect points file in the "User Input" section above.)

You may also browse to this file. Simply click the browse button and select the appropriate file.
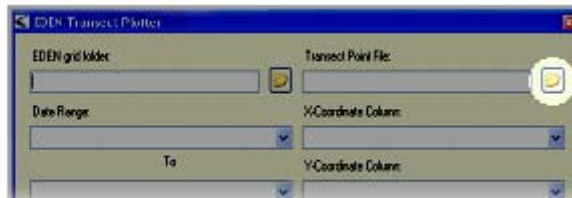
5. Fields from the transect points file will auto-populate the next 2 fields. Verify that the data are correctly being read by the program. You can reselect the correct column by using the drop-down menu.

6. **To incorporate nearby gage locations and/or observed values of water level or water depth:**
Enter the transect width distance in meters in the **transect width distance** text box. This distance is the distance perpendicular from the transect line used as a selection criteria for nearby gages and observations of water level and water depth, if this option is selected. The transect width distance is the distance on each side of the transect plot, therefore the full width is twice the transect width distance. For example, if you enter a transect width of 500, the total width will be 1000. (See plan views of the transect plots on page 1.)

If no gage locations or observations will be plotted on the transect plot, enter 0.
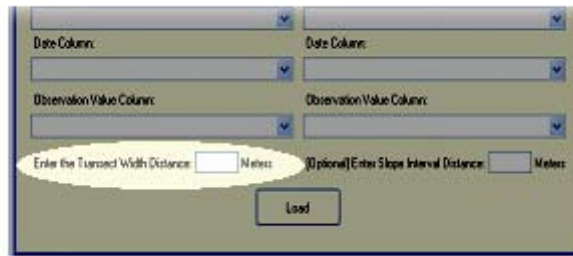
Note: Gages and observed data will be selected for inclusion on the transect plot based on location, regardless of whether the data locations are in areas that are hydrologically similar to the transect location (*i.e.* same subarea).

7. **To compute and view water surface slope along the transect plot:**
   Enter the distance in meters in the **slope interval distance** text box. This distance is the distance over which the transect slope will be calculated and displayed on the transect plot.

   If no slope computation is requested, leave this field blank.

   Note: If the transect plot crosses a hydrologic boundary, the computed slope may not represent the water surface slope for that reach. The slope will represent the slope between the beginning and ending points.

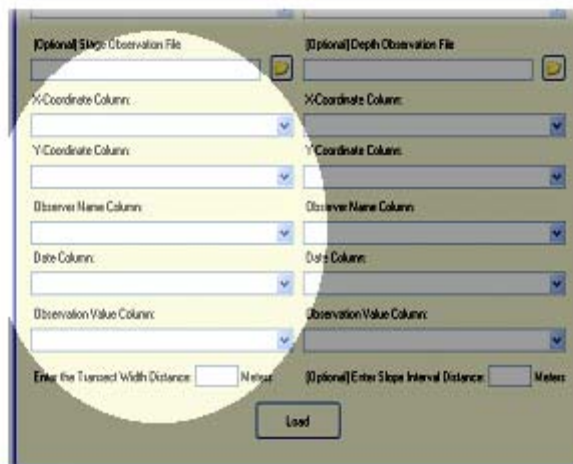8. **To compare user-provided observations of water level on the transect plot:**

   Type the file path to the file containing the observations of water level.

You may also browse to this file. Simply click the browse button and select the appropriate file.
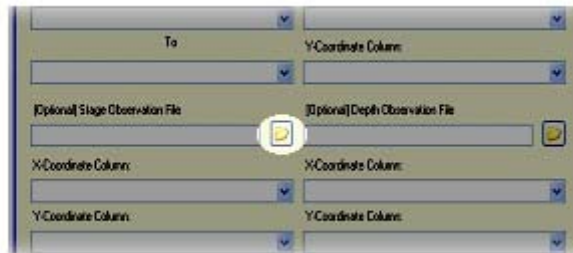
Fields from the observations file will auto-populate the next 5 fields. Verify that the data are correctly being read by the program. You can reselect the correct column by using the drop-down menu.

9. To compare user-provided observations of water depth on the transect plot:

Type the file path to the file containing the observations of water level.

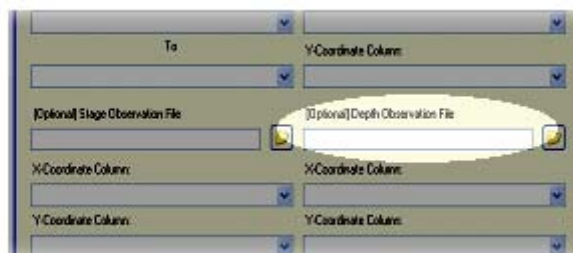You may also browse to this file. Simply click the browse button and select the appropriate file.

Fields from the observations file will auto-populate the next 5 fields. Verify that the data are correctly being read by the program. You can reselect the correct column by using the drop-down menu.
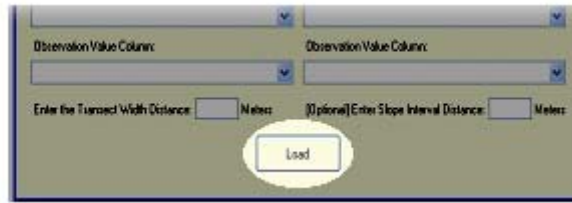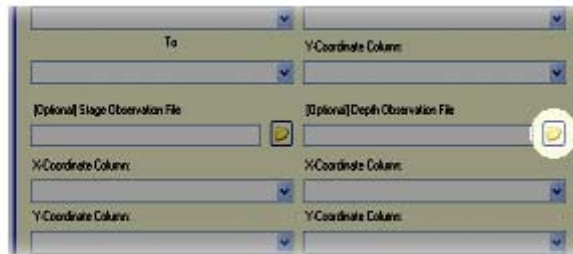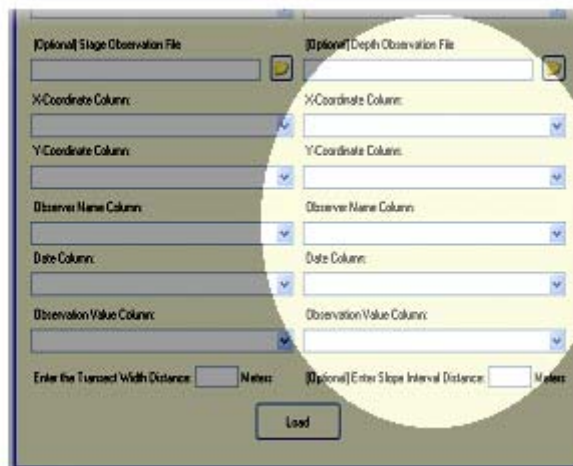
10. Click the **Load** button to process the data and create the plot.

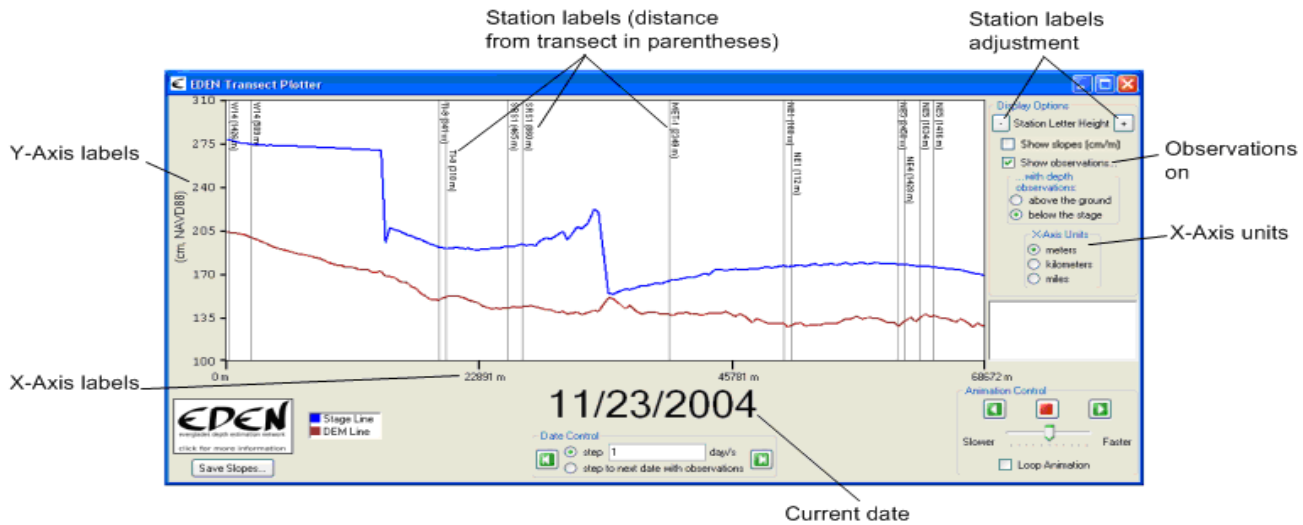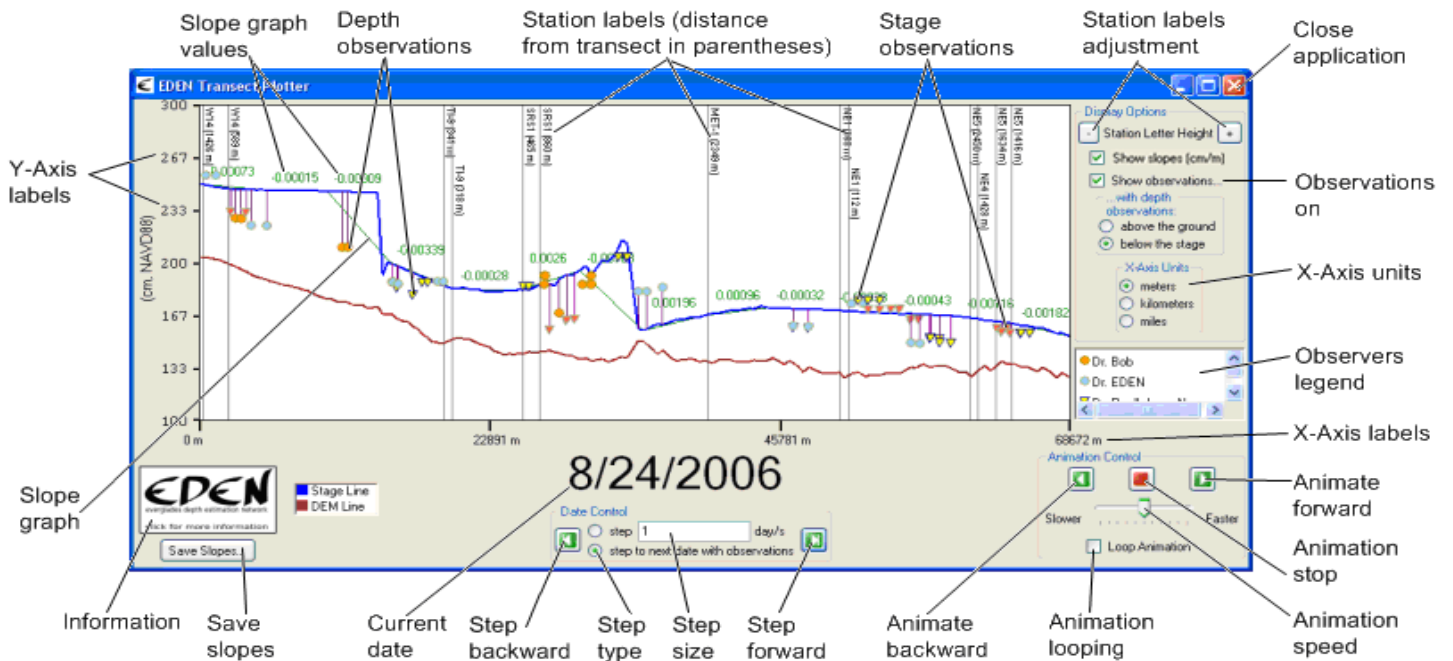   If any information on the form is incomplete, a box will notify you to make the necessary correction.

    A window will keep you apprised of the program's progress.

11. When the transect plot is complete, the **Transect Plotter** window will display.

Station labels (distance from transect in parentheses)

Station labels adjustment

Y-Axis labels

X-Axis units

Observations on

X-Axis labels

Current date

11/23/2004

If you requested incorporation of nearby gage locations and/or observations of water level and water depth, the transect plot will appear as below:

Slope graph values

Depth observations

Station labels (distance from transect in parentheses)

Stage observations

Station labels adjustment

Close application

Y-Axis labels

Observations on

X-Axis units

Observers legend

X-Axis labels

Slope graph

Animate forward

Animation stop

Information   Save slopes   Current date   Step backward   Step type   Step size   Step forward   Animate backward   Animation looping   Animation speed

8/24/2006

Transect Plot Features

1. **Show slopes**
   If you provided a slope interval distance (step 7 above), you can display the interval slopes (in centimeters/meters) on the transect plot by clicking the **Show slopes** check box in the **Display Options** group box.

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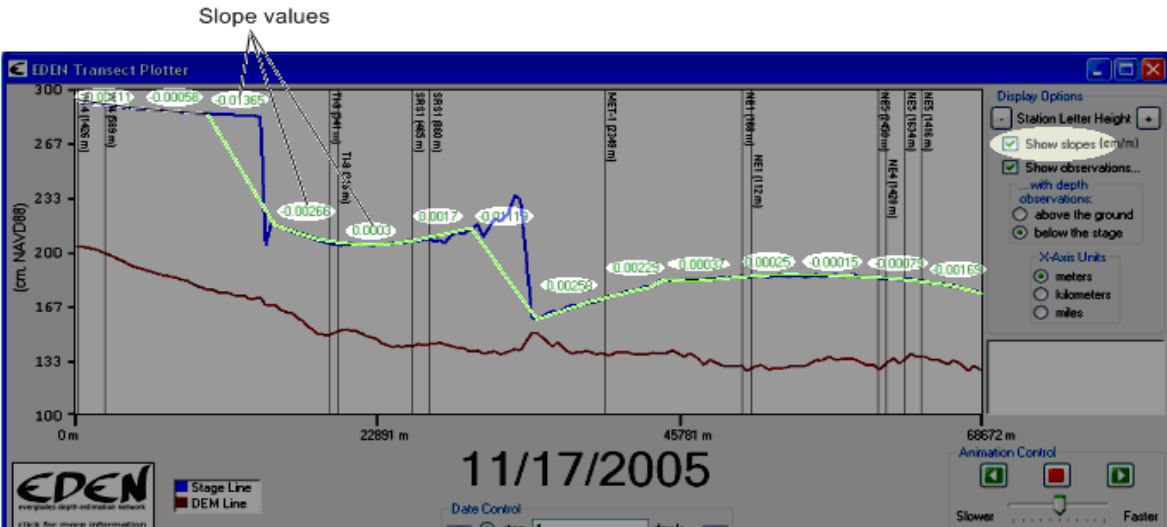
The slope graph will be displayed with the value of each slope interval along the length of the transect.

Click on the **Show slopes** check box again and the slope graph and values will be removed from the graph.

2. **Save slopes**
   To save the computed slopes, click on the **Save Slopes** button below the EDEN logo on the bottom left. Select a folder to export the slope information, and a file named "slopes.txt" will be created. If a file containing the same name already exists there, the user will be informed that a file with that name already exists and asked if they wish to overwrite it. Note that the output file contains information on what value was used for the slope interval distance.

   Information on how the transect segments are calculated can be found in Appendix A.

Sample slopes.txt output file

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3. **Show observations**

If you provided water level and/or water depth data (steps 8 and 9 above), you can display the data on the transect plot by clicking the **Show observations** check box in the **Display Options** group box. For observations of water depth, these measurements can be displayed above the ground elevation for comparison with the EDEN water surface or below the water elevation (stage) profile for comparison with the EDEN ground elevation model.
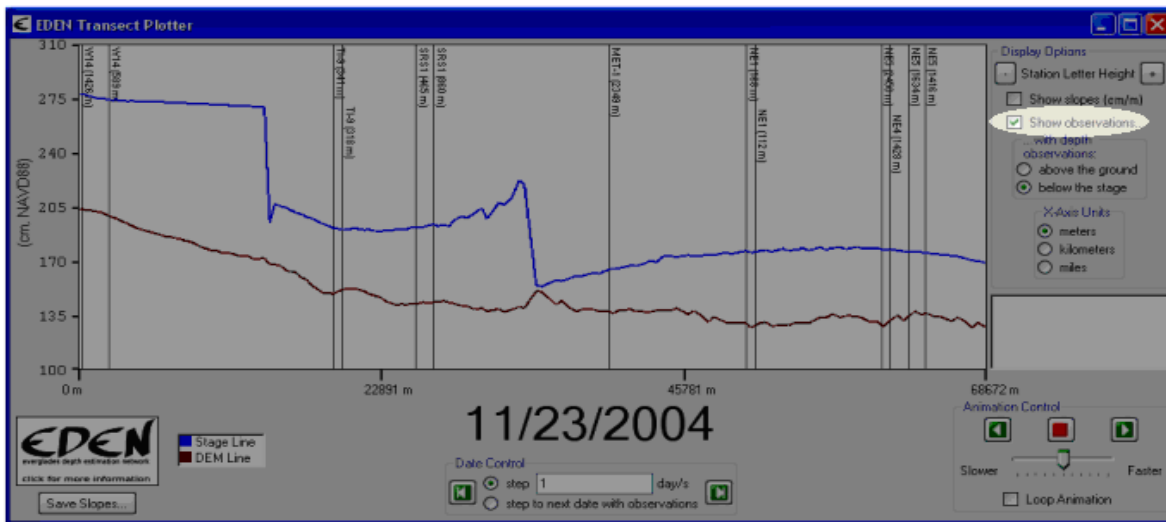
4. **Select x-axis units**

The units of the x-axis can be modified for meters, kilometers, or miles by selecting the units on the transect plot.

Note: The units of slope are displayed in centimeters/meters regardless of the x-axis units.

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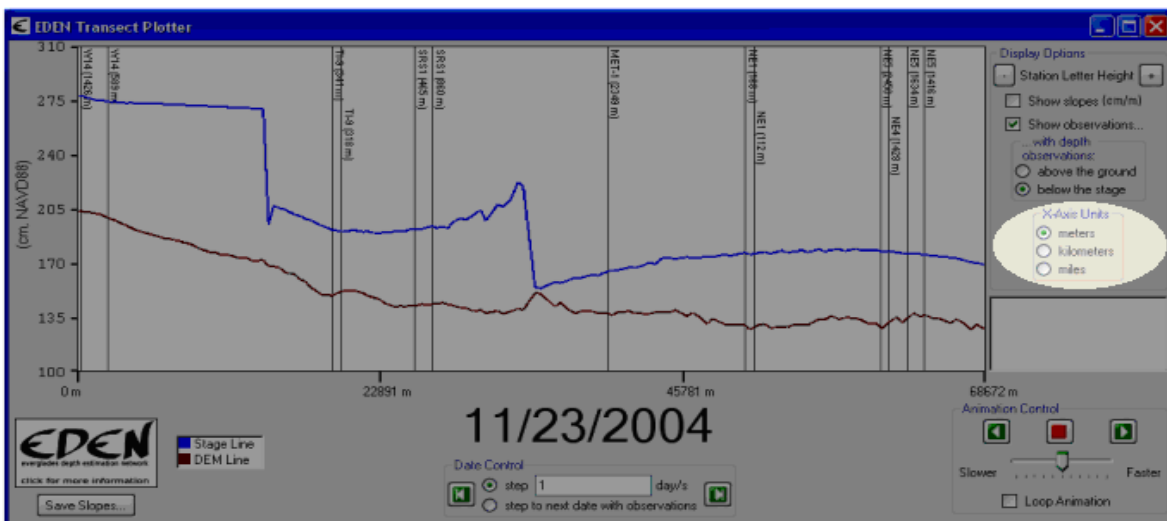
5. **Animation of the transect plot over user-specified time period**
   View the time series animation of transect water levels by clicking the **animate forward/backward** buttons in the **Animation Control** box.
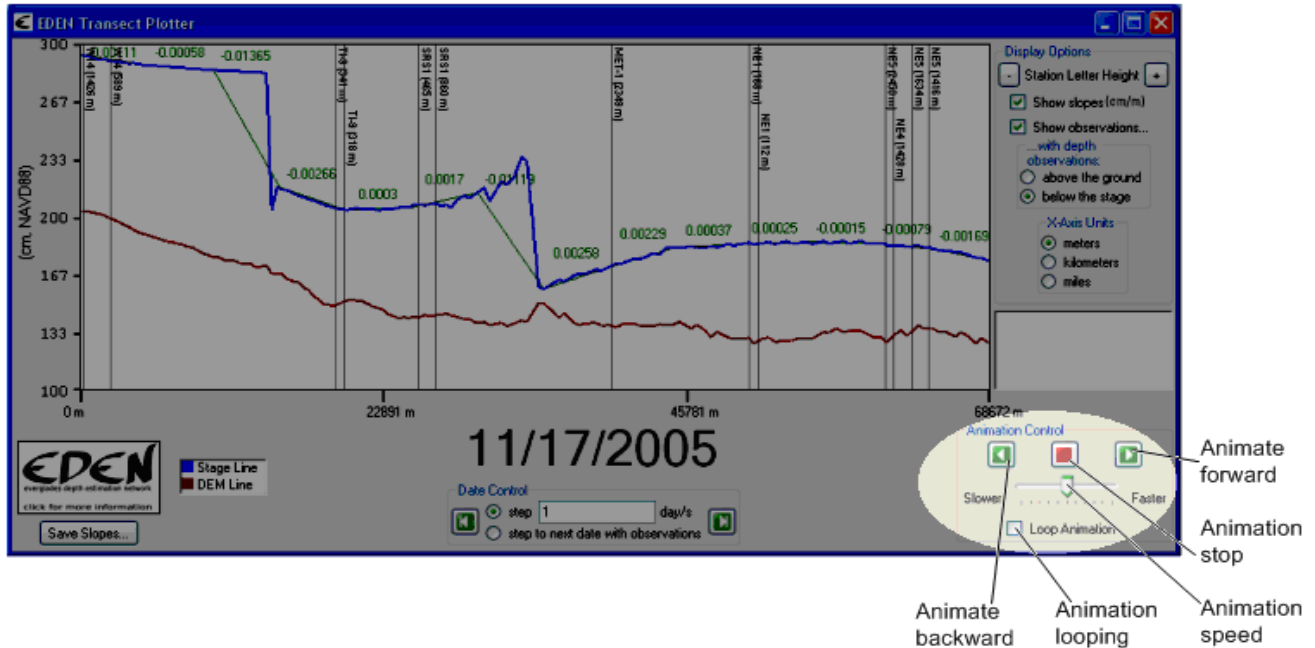

   The animation will begin playing, at the current date, in the direction determined by pressing the **animate forward** or **animate backward** button and will continue forward to each successive day or backward through each previous day until the end or beginning of the time series is reached.

   When the final date in the animation is reached (which is either the first or the last date in the time series, depending on the direction of animation), the animation will stop unless the **animation looping** button is activated. If the **animation looping** button is activated, the animation will continue to loop until it is stopped manually by clicking the **animation stop** button. The **slider bar** controls the speed of the animation, slower or faster.

6. **Manual review of transect plots**
   Manually view the transect plot through the time series by clicking the **step forward** or **step backward** button in the **Date Control** box. The current date for each transect plot is prominently displayed.
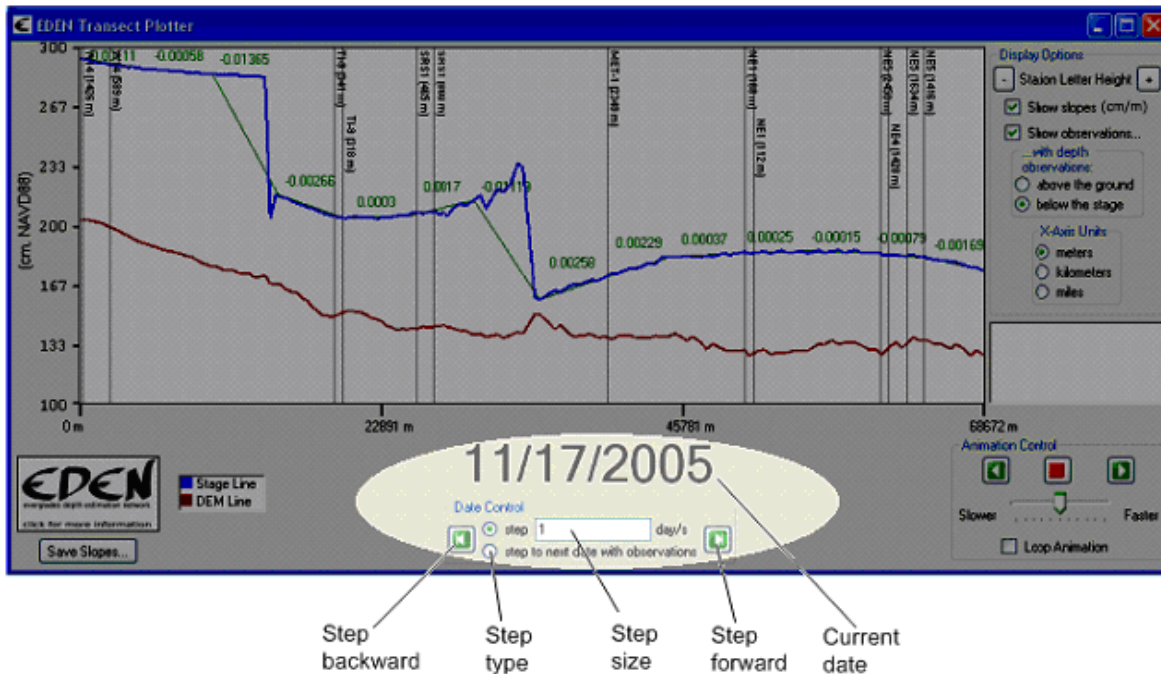
To change the step size (the number of days that are advanced or decremented when the **step forward** or **step backward** buttons are pressed), type the number into the **step size** input box.

If the **step forward** button is pressed and the end of the time series is reached, the last date in the time series is displayed. Likewise, if the **step backward** button is pressed and the beginning of the time series is reached, the first date in the time series will be displayed.

> For example: If you were to load the month of December into the Transect Plotter, the days of the month loaded would be 1-31. If you were to choose a step length of 11 days and were to move forward, the dates that would show would be: 12/1, 12/12, 12/23, and 12/31.

If observations of water level and/or water depth data were input, you can sequentially step through the transect plots only for the days with observations by selecting the **step to next date with observations** button.

7. **Save transect plot**
   To save the transect plot for a selected day, press **Alt PrntScrn** to copy the image to the clipboard, then paste the image into the program of your choice (such as Word, Excel, or Photoshop).

8. To close the application, click on the close button in the upper-right corner of the window.
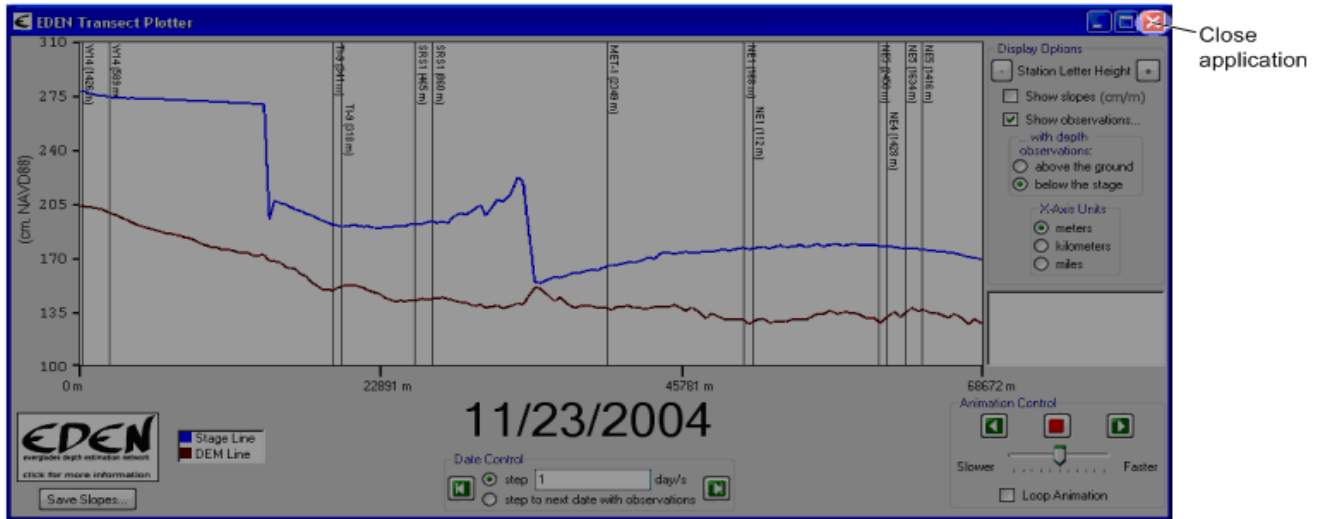
Developed for Everglades Depth Estimation Network (EDEN), November 2007.
Joint Ecosystem Modeling, A DOI (USGS/USFWS/NPS)/ Universities/others Partnership based at IFAS, University of Florida, Fort Lauderdale Research Center.

For more information, contact Pamela Telis, patelis@usgs.gov.

http://sofia.usgs.gov/eden

Appendix A - Creation of Transect Segments Used in Slope Calculations

The slope calculation is described using a simple Cartesian plane coordinate system, similar to the UTM coordinate system.

Consider a transect of four points. These points are (0, 0), (10, 0), (13, 4), and (15, 4). Following is a graphical depiction of this transect with the points and segment lengths labeled.
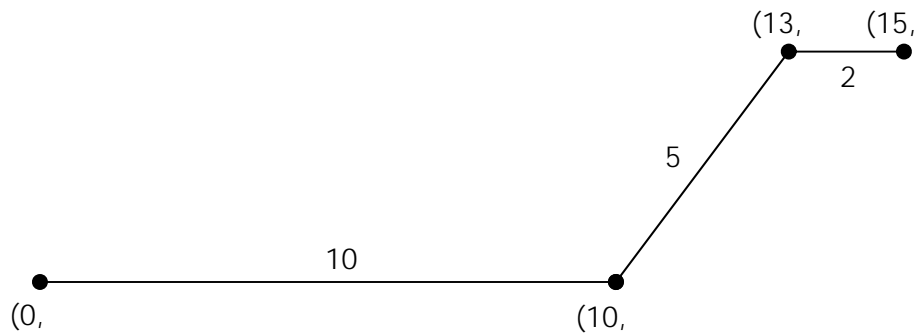
Now, let's consider a sampling interval (slope interval) of 7 along this transect. Since 7 does not divide evenly into 17, the final sampling interval will be truncated to a length of 3. Let's look at this over the previous graphic; the sampling points are blue dots, and distances are shown in red.
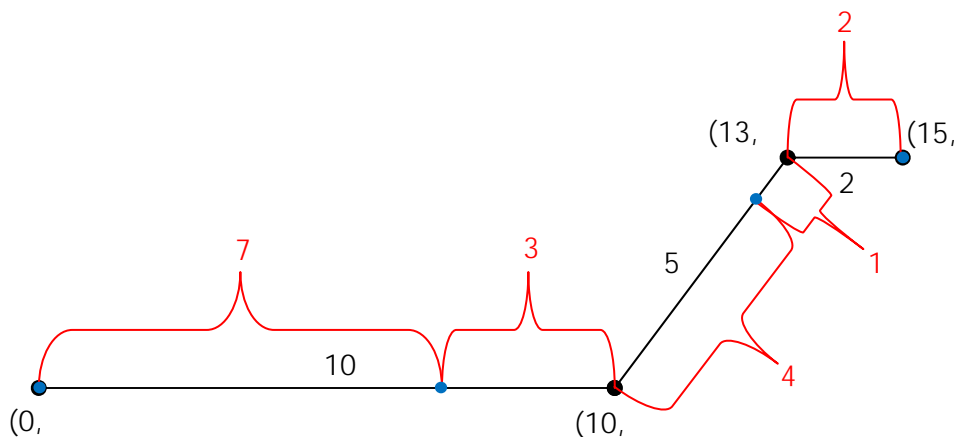
The first sampling interval is simple to determine. It begins at the first point on the transect (0, 0), and it ends along the first transect segment at point (7, 0). The second sampling interval is a bit more complicated, as this interval is split across two transect segments. The remaining

length of the first transect segment is only 3, so a further length of 4 is required from the next transect segment. This places the endpoint of the second sampling interval at (12.4, 3.2). For the final sampling interval, a length of only 1 remains from the second transect segment, and the third transect segment's length is only 2, so the final sampling interval, as previously noted, must be truncated to a length of 3, and its endpoint is placed at (15, 4).

So, the sampling intervals are defined by the following points:

First interval: (0, 0) to (7, 0)
Second interval: (7, 0) to (12.4, 3.2)
Third interval: (12.4, 3.2) to (15, 4)

The following shows these points on the original transect. The distances have been removed, the transect points and labels are shown in black, and the sampling interval endpoints and labels are shown in blue.