Texas Water Resources Institute
make every drop count

Goal Seek **Pamphlet**

for

VIDRA© - HCID#1

using

Microsoft® Excel®

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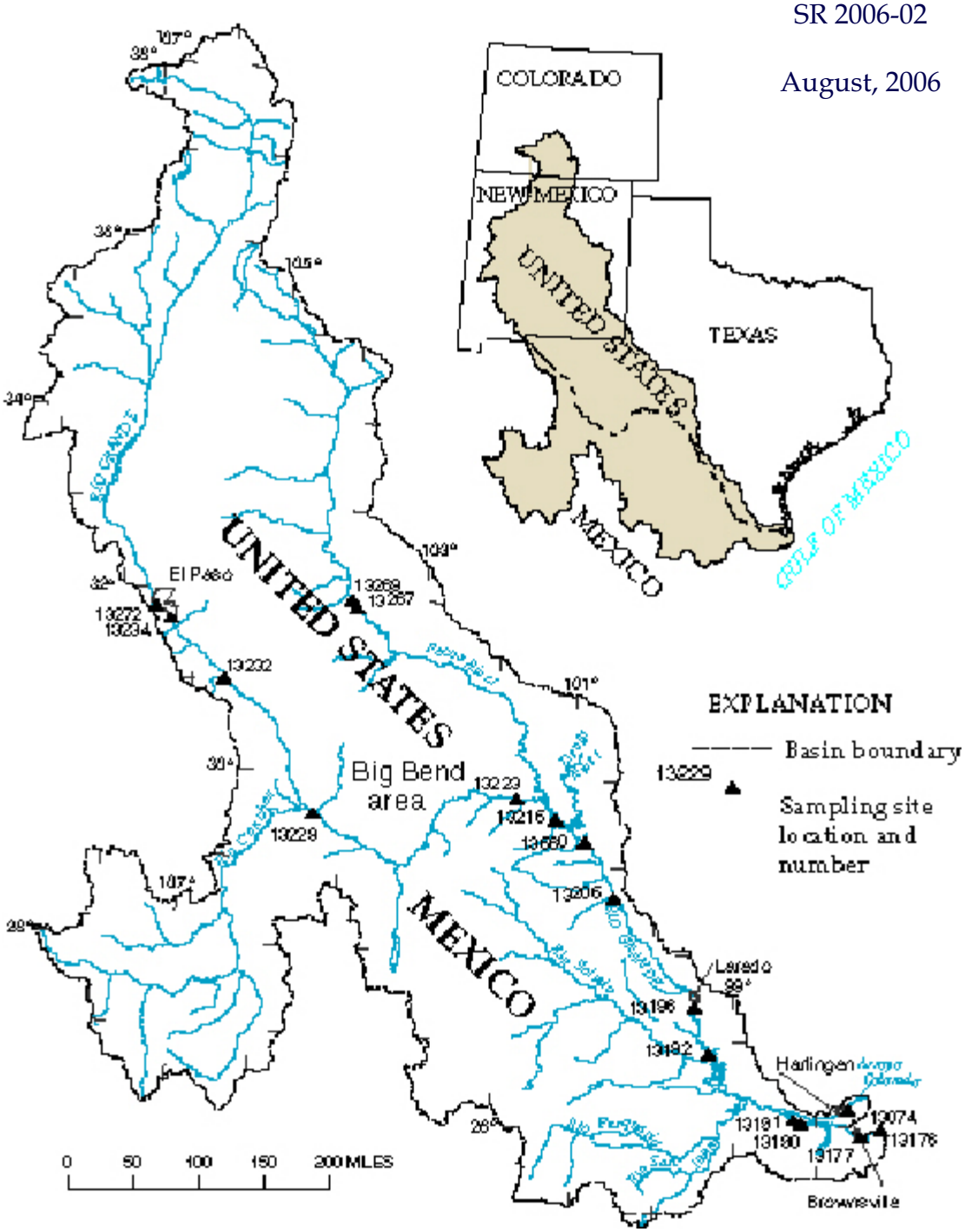

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by

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Basics of Goal Seek

In typical spreadsheet operations, you enter your input data and look at a formula-generated result value for the answer. And, sometimes, it is common to repeatedly change a data-input item until you obtain to a desired result.

Using ***Goal Seek*** is a great way to *cut to the chase* with *what-if* analyses in Excel® when you know your 'desired answer' for a particular formula, but need to know what the input data value is that provides that answer. So, rather than using the ususal 'hit or miss' technique for individual formulae, let's tell the spreadsheet what the answer is and let Goal Seek tell us what the correct data input is/was/should be. In effect, Goal Seek provides a simple sensitivity analysis; i.e., solves for a data input item while holding all other data input values constant.

All Goal Seek scenarios in VIDRA-HCID#1 function independently of the baseline model. As such, consecutive Goal Seek scenarios can be ran in VIDRA -HCID #1 without results from prior Goal Seek scenarios affecting subsequent Goal Seek scenarios, or for that matter, the baseline model solution results.

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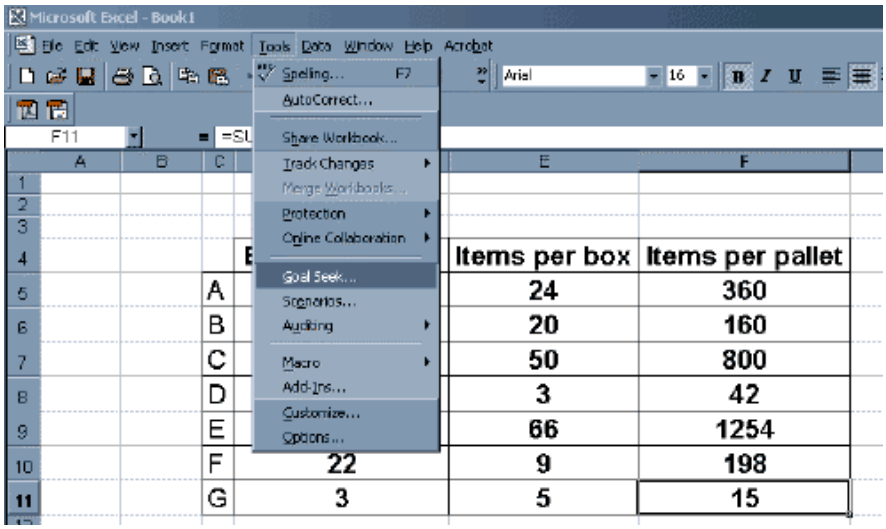
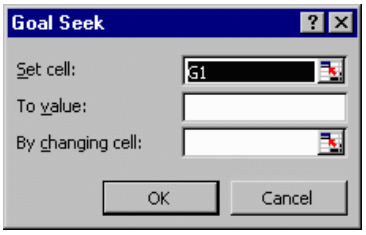
Using Goal Seek (generically)

Step 1: Click ***Tools*** in the Excel® menu bar, and select ***Goal Seek***.

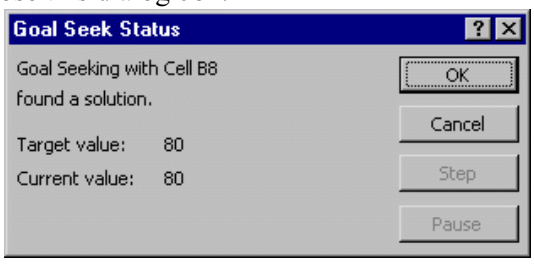


You will see a dialog box like this pop up:



Step 2: - Enter the cell address containing the formula you 'know the answer to' in **Set cell:**
- Enter the 'answer' (or value) you wish to superimpose onto the formula in **To value:**
- Enter the cell address of the data input you wish to know (or change) in **By changing cell:**[3]
- Click **OK**

Step 3: - After a moment the dialog box below will advise you that ***Goal Seek*** is finished.
- Simply click **OK** to close this dialog box.[4]



*Now, look at the cell address you entered in **Set cell**; it contains the value (or 'answer') you specified in **To value**. The 'answer' is also displayed in the dialog box as the Target Value -- the Current Value will likely be the same, but may vary for 'rounding error' reasons. Look at the data-input cell you changed (or 'want to know') in **By changing cell** and you will see the data input level required to obtain the desired answer with that particular formula.*

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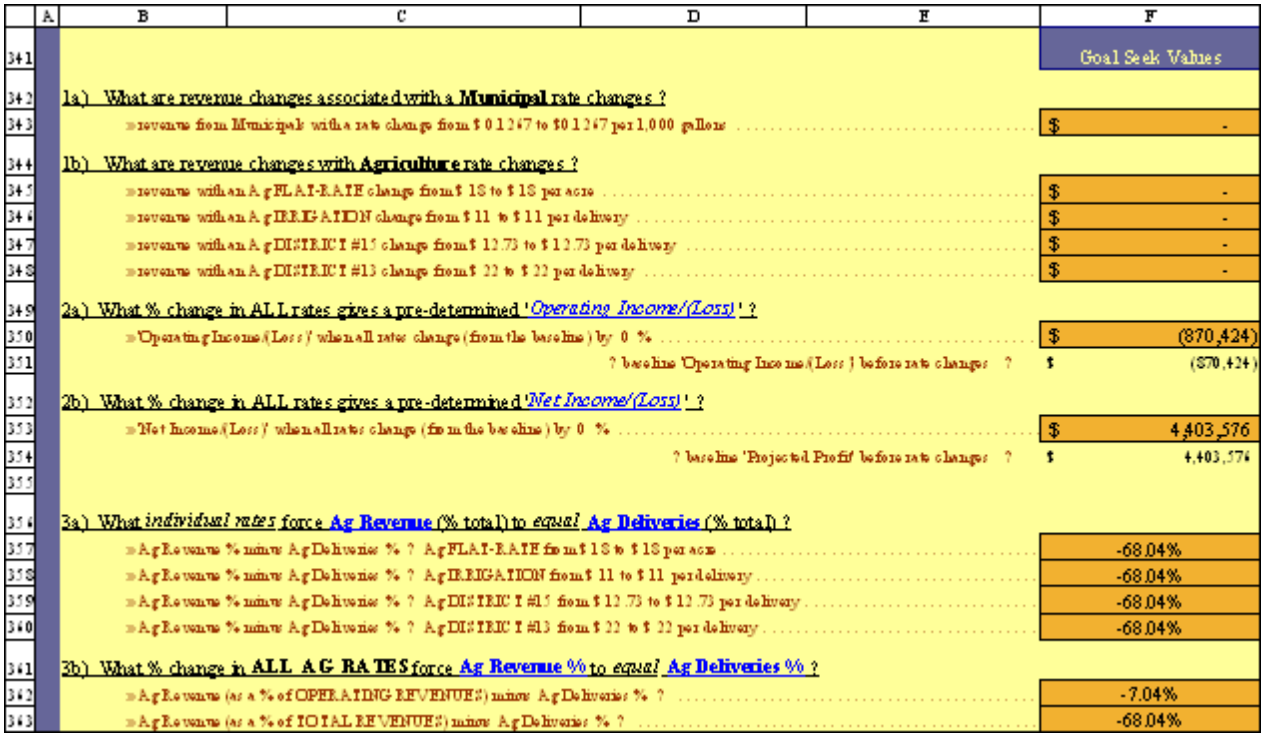
3 This cell cannot contain a formula, only real numbers.

4 If you wish to return **Set cell** (i.e., the answer cell) to its beginning or starting value, simply reset the data-input cell (i.e., **By changing cell**) to its original (prior) value.

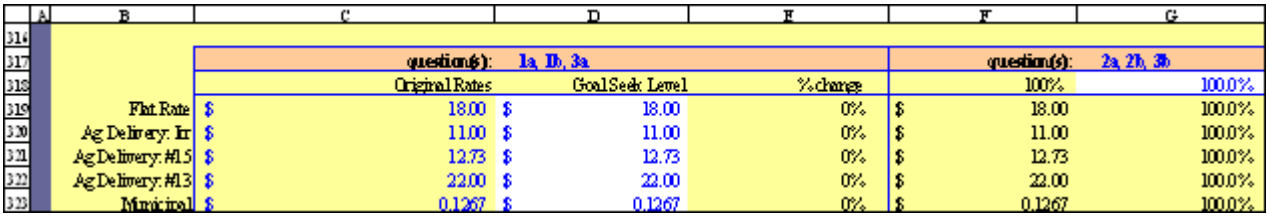
The Goal Seek Area (in VIDRA©- HCID#1)

In the VIDRA© version custom built for HCID#1, you will see several individual formulae which can be subjected to *what-if* analysis using Goal Seek.[5] They are easily identified as the golden colored cells found within the cell range F343:F363. These are the cell addresses you identify (individually) in the dialog box found in Step 2 (i.e., in **Set cell**) as containing the formula you 'know the answer to.'



	A	B	C	D	E	F
341						Goal Seek Values
342		1a) What are revenue changes associated with a **Municipal** rate changes ?				
343		» revenue from Municipals with a rate change from $ 0.1267 to $0.1267 per 1,000 gallons				$ -
344		1b) What are revenue changes with **Agriculture** rate changes ?				
345		» revenue with an Ag FLAT-RATE change from $ 18 to $ 18 per acre				$ -
346		» revenue with an Ag IRRIGATION change from $ 11 to $ 11 per delivery				$ -
347		» revenue with an Ag DISTRICT #15 change from $ 12.73 to $ 12.73 per delivery				$ -
348		» revenue with an Ag DISTRICT #13 change from $ 22 to $ 22 per delivery				$ -
349		2a) What % change in ALL rates gives a pre-determined '*Operating Income/(Loss)*' ?				
350		» 'Operating Income/(Loss)' when all rates change (from the baseline) by 0 %				$ (870,424)
351				? baseline 'Operating Income/(Loss)' before rate changes ?		$ (870,424)
352		2b) What % change in ALL rates gives a pre-determined '*Net Income/(Loss)*' ?				
353		» 'Net Income/(Loss)' when all rates change (from the baseline) by 0 %				$ 4,403,576
354				? baseline 'Projected Profit' before rate changes ?		$ 4,403,576
355						
356		3a) What *individual rates* force **Ag Revenue** (% total) to *equal* **Ag Deliveries** (% total) ?				
357		» Ag Revenue % minus Ag Deliveries % ? Ag FLAT-RATE from $ 18 to $ 18 per acre				-68.04%
358		» Ag Revenue % minus Ag Deliveries % ? Ag IRRIGATION from $ 11 to $ 11 per delivery				-68.04%
359		» Ag Revenue % minus Ag Deliveries % ? Ag DISTRICT #15 from $ 12.73 to $ 12.73 per delivery				-68.04%
360		» Ag Revenue % minus Ag Deliveries % ? Ag DISTRICT #13 from $ 22 to $ 22 per delivery				-68.04%
361		3b) What % change in **ALL AG RATES** force **Ag Revenue %** to *equal* **Ag Deliveries %** ?				
362		» Ag Revenue (as a % of OPERATING REVENUES) minus Ag Deliveries % ?				-7.04%
363		» Ag Revenue (as a % of TOTAL REVENUES) minus Ag Deliveries % ?				-68.04%

The cell address of the data input you wish to know (or change) depends upon (1) the question number, and (2) which sub-item. Cell range B317:G323 is broken up into two major portions – an area for questions 1a, 1b, and 3a, as well as an area for questions 2a, 2b, and 3b.



	A	B	C	D	E	F	G
316							
317			question(s):	1a, 1b, 3a		question(s):	2a, 2b, 3b
318			Original Rates	Goal Seek Level	%change	100%	100.0%
319		Flat Rate	$ 18.00	$ 18.00	0%	$ 18.00	100.0%
320		Ag Delivery: Irr	$ 11.00	$ 11.00	0%	$ 11.00	100.0%
321		Ag Delivery: #15	$ 12.73	$ 12.73	0%	$ 12.73	100.0%
322		Ag Delivery: #13	$ 22.00	$ 22.00	0%	$ 22.00	100.0%
323		Municipal	$ 0.1267	$ 0.1267	0%	$ 0.1267	100.0%

The cells with blue numbers are either *user-input*, or a data-input item you wish to know (or change).

User Input - Goal Seek is easier facilitated with new numbers (i.e., non formula derived). Thus, the user must manually provide the "Original Rates" in cell range C319:C323. These rates must be manually entered, and must be a duplicate of rates in the boxed-in area entitled *Rates and Assessments* in cell F143.

Desired Data Item - Individual data input items correspond with sub items in each question and are found in cell range D319:D323 for questions 1a, 1b, and 3a, and in cell range G318 for questions 2a, 2b, and 3b.

[5] Range is correct for version 2.3.2 dated August 9, 2006.

Using Goal Seek (in VIDRA©- HCID#1)

Currently, a total of thirteen (13) individual Goal Seek scenarios are possible. Below, the steps to three such scenarios are provided. All other scenarios should be self-evident thereafter.

Example 1: You wish to answer **question 1a** ... "What are revenue changes associated with a Municipal rate change? That is, suppose 'the answer' is a $50,000 increase in revenue from a municipal rate increase. So, what is the municipal rate?

1 . . . . go to cell F343 (i.e., place your cell cursor on this cell)
2 . . . . click ***Tools*** in the menu bar, and select ***Goal Seek***
3 . . . . in the dialog box:
- enter F343 in **Set cell:**
- enter 50000 in **To value:**
- enter D323 in **By changing cell:**
- click **OK**

4 . . . . look at cell D323 for what the *Goal Seek Level* is
5 . . . . look at cell E323 to see the % change in the new rate
6 . . . . click **OK** or **Cancel** [6]

Example 2: You wish to answer **question 2b** ... "What % change in ALL rates gives a predetermined Net Income/(Loss)? That is, suppose 'the answer' is a $0.00 net income. So, what is % change in rates?

1 . . . . go to cell F353 (i.e., place your cell cursor on this cell)
2 . . . . click ***Tools*** in the menu bar, and select ***Goal Seek***
3 . . . . in the dialog box:
- enter F353 in **Set cell:**
- enter 0 in **To value:**
- enter G318 in **By changing cell:**
- click **OK**

4 . . . . look at cell range G319:G323 for what the *% change* is
5 . . . . look at cell range H319:H323 to see the new resulting rates
6 . . . . click **OK** or **Cancel** [6]

Example 3: You wish to answer **question 1b, sub-item 1** ... "What are revenue changes associated with Agricultural rate changes? That is, suppose 'the answer' is a change in the flat rate will result in a $23,500 revenue increase. So, what is the flat rate?

1 . . . . go to cell F345 (i.e., place your cell cursor on this cell)
2 . . . . click ***Tools*** in the menu bar, and select ***Goal Seek***
3 . . . . in the dialog box:
- enter F345 in **Set cell:**
- enter 23500 in **To value:**
- enter D319 in **By changing cell:**
- click **OK**

4 . . . . look at cell D319 for what the *Goal Seek Level* is
5 . . . . look at cell E319 to see the % change in the new rate
6 . . . . click **OK** or **Cancel** [6]

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[6] Make sure you have all relevant cells within the screen view – a view of 100% is suggested. IF, at the end of step 3 you are unable to view items noted in steps 4 & 5, either (a) reorient the screen view so you can view all relevant cells, or (b) proceed to step 6 and then to steps 4 & 5.

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All photographic images of Excel® dialog boxes were obtained at http://www.dslimited.biz/excel_tutorials/goalseek.html using Google™ Images at http://images.google.com/imghp

Cover page graphic obtained at http://pubs.usgs.gov/fs/1997/fs-098-97/fig1.htm using Google™ Images at http://images.google.com/imghp

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