

ENHANCED EASTERN SNAKE PLAIN AQUIFER GROUND-WATER RIGHTS TRANSFER SPREADSHEET

Version 3.1

USERS MANUAL

by

Donna M. Cosgrove
cosgrove@if.uidaho.edu

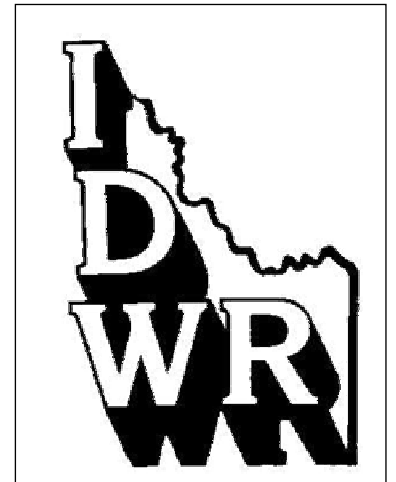
Gary S. Johnson
johnson@if.uidaho.edu

Bryce A. Contor
bcontor@if.uidaho.edu

Idaho Water Resources Research Institute
University of Idaho

for the
Idaho Department of Water Resources

May, 2007



PURPOSE

The purpose of this spreadsheet and accompanying programs is to provide water users and managers with a common tool for the analysis of hydrologic impacts of ground-water right transfers within the Eastern Snake River Plain aquifer on gains and losses of the Snake River. The analysis describes how hydrologic impact (not necessarily injury) varies over time in eleven reaches of the Snake River defined by gaging stations and major spring locations: 1) Ashton to Rexburg, 2) Heise to Shelley, 3) Shelley to Near Blackfoot, 4) Near Blackfoot to Neeley, 5) Neeley to Minidoka, 6) Devil's Washbowl to Buhl, 7) Buhl to Thousand Springs, 8) Thousand Springs, 9) Thousand Springs to Malad, 10) Malad, and 11) Malad to Bancroft. These reaches have been identified as hydraulically connected with the aquifer through previous modeling studies. This tool is based on the enhanced Snake River Plain Aquifer Model.

The spreadsheet is intended for comparison of hydrologic impacts from existing uses with those that would result from a ground-water right transfer. A transfer may require that the use under the water right be limited in quantity so that the estimated impacts do not exceed those resulting from continuing the current water use. The spreadsheet allows users to experiment with the rate of use in a proposed transfer in order to achieve the desired balance of impacts between continued pumping at an existing location (or locations) to pumping at a proposed transfer site.

WHAT'S NEW IN VERSION 3.1

Version 3.1 of the Water Rights Transfer Tool has been updated to use Version 1.1 of the Eastern Snake Plain Aquifer Model (ESPAM), the most recent version of the ground-water model on the eastern Snake River Plain. The basic functionality of the Transfer Tool has not been modified.

When running the Transfer Tool, the user is no longer warned that old 'well' files exist. The old files are deleted prior to running the tool. Additionally, a definition of which months are included in Spring, Summer and Winter has been added. Some cosmetic changes were made to the graphics and several graphs were added to enhance tool use. Additionally, a Transfer Summary worksheet was added for use in reporting the transfer results to IDWR. The user's manual has been updated to describe all of these changes.

BASIC CONCEPTS

As ground water is pumped from an aquifer, aquifer water levels decline. Water levels decline most in the area immediately surrounding the well, and less in more distant areas. This decline in aquifer water levels allows water to be released from storage in the aquifer. As time progresses, the effects of the pumping event propagate outward from the pumping well in all directions, influenced only by the properties of the aquifer and influence of interconnected surface-water sources. As the effects reach surface-water bodies such as rivers and lakes, they may change the rate of exchange of water between the aquifer and the surface-water source, if the surface-water body is in hydraulic connection with the aquifer.

A surface-water body will be in hydraulic connection with an aquifer if the bed of the lake or river is near, or below the top of the aquifer. In most cases, we do not have an exact value of how "near" the bed needs to be relative to the top of the aquifer in order to

establish a hydraulic connection. Models of the Snake River Plain aquifer have assumed that if the water table is within about 30 feet of the surface of the Snake River, then the two are hydraulically connected. Hydraulic connection always occurs when the river is gaining water from the aquifer through the discharge of springs and seeps.

The Enhanced Snake River Plain Aquifer Model has been calibrated to simulate gains and losses in eleven hydraulically connected reaches of the Snake River. These reaches are defined by gaging stations and major springs and are: 1) Ashton to Rexburg, 2) Heise to Shelley, 3) Shelley to Near Blackfoot, 4) Near Blackfoot to Neeley, 5) Neeley to Minidoka, 6) Devil's Washbowl to Buhl, 7) Buhl to Thousand Springs, 8) Thousand Springs, 9) Thousand Springs to Malad, 10) Malad, and 11) Malad to Bancroft. The model has been used to evaluate the effects of aquifer pumping or recharge on the gains or losses of these reaches of the Snake River. Other segments of the river are believed to be perched above the aquifer and losses should be unaffected by aquifer pumping or recharge.

Simulations of the eastern Snake River Plain aquifer model are used to develop response functions that describe how aquifer pumping or recharge at any location impacts gains and losses of the eleven hydraulically connected reaches of the Snake River. The response functions are multiplied by the magnitude of the recharge or pumping events to determine the magnitude of impact on the river reaches. These results are then additive for multiple pumping or recharge events. More information on surface and ground water interactions and on response functions can be found at the web site:

<http://www.if.uidaho.edu/~johnson/ifiwri/sr3/home.html>

OBTAINING AND LOADING THE SPREADSHEET AND ASSOCIATED FILES

The spreadsheet and all required files can be obtained from the following web site: <http://www.if.uidaho.edu/~johnson/ifiwri/projects.html#prj%20rpt> or directly from Idaho Department of Water Resources. The Transfer spreadsheet and all associated files must be located in a directory (all files in the same directory) on your hard drive, immediately off the root directory. For example, a user may wish to create a directory c:\Transfers in which to place all the related files. It is assumed that the user has a personal computer running Microsoft Windows98 or later and that you have Microsoft EXCEL 97 or later. It is further assumed that the user has some familiarity with using Microsoft EXCEL spreadsheets.

OPERATION

Users must specify a) the location that a ground-water right is being transferred from and the location to which it is being transferred, and b) the rate of water use before and after the transfer. These items are discussed below. The user performs steps of the analysis by clicking buttons on the spreadsheet that run Visual Basic and Fortran programs. No knowledge of Visual Basic or Fortran is required to run the application.

The spreadsheet is arranged in a series of worksheets, or pages. These worksheets are identified by labeled tabs on the bottom of the screen. Clicking each tab changes the page or worksheet. The worksheets that users should become familiar with include:

TITLE – This worksheet contains contact information for the spreadsheet authors.

EXPLANATION – This worksheet contains some brief background information for the user and a large-scale map of the model grid.

DATA ENTRY – This worksheet is where users enter all data and initiate the program calculations.

TRANSFER SUMMARY – This worksheet is where users enter a summary of the proposed transfer for submittal to IDWR. The worksheet includes the transfer name, number, the model cells for the TO and FROM well(s) and a summary of historical and projected pumping. The user is referred to IDWR for specific reporting requirements.

GRAPHS ABOVE MILNER – This worksheet contains a graphical display of output. One graph is plotted for each of the five hydraulically connected reaches of the Snake River above Milner and one graph shows the net effect on all reaches above Milner.

GRAPHS BELOW MILNER – This worksheet contains a graphical display of output. One graph is plotted for each of the six hydraulically connected reaches of the Snake River below Milner and one graph shows the net effect on all reaches below Milner.

PERCENT CHANGE – This worksheet contains a graphical display of the ratio of the condition after transfer to the condition if no transfer occurs. Graphs are presented for both the above and below Milner reaches.

CALCULATED EFFECTS – This worksheet presents tabulated values that are presented graphically in the GRAPHS worksheet.

Other worksheets are included but will not need to be viewed by the user in normal evaluations and are hidden from the users. Some areas of the spreadsheet are also protected to avoid inadvertent changes of calculations.

PROCEDURE FOR USING THE SPREADSHEET

Open the spreadsheet either by double-clicking on the name or icon for the spreadsheet or by starting EXCEL via the Start Menu and then selecting File Open option. On some systems, you will receive a warning about opening a spreadsheet which contains macros, if this happens, select the ‘Enable Macros’ option.

Begin by selecting the DATA ENTRY tab and following the step-by-step procedure described below.

1. Enter Transfer Name and Number (Spreadsheet Cells C11 and C9)

The transfer name is for the convenience of the user. The transfer number is the number assigned by IDWR. Both the transfer name and number will appear on all of the resulting simulation graphs, as well as the current date. Because IDWR will typically not assign a transfer number until after the application is complete, the user may wish to leave the “Transfer Number” field empty, or enter a brief text descriptor.

2. Enter Simulation Start Date (Spreadsheet Cells B10 and B11)

Users must enter the starting year and season for their simulation. The simulation start date should reflect the year and season of the earliest water use being simulated using the spreadsheet. The starting year may be any four-digit year and is entered on the Data Entry Worksheet in cell B10. The user selects the starting season in cell B11 using a pull-down menu. The valid season selections are: Spring, Summer, Winter. Spring is defined to include March, April, May and June. Summer is defined to include July, August, September and October. Winter is defined to include November, December, January and February. Once the starting year and season are selected, the user clicks on the UPDATE DATES button (also labeled as button number 1) and the simulation dates are automatically entered into the worksheet. **DO NOT ALTER THE DATES AFTER WATER USE DATA ARE ENTERED.** The water use data will not shift with a change in dates. If you want to change the dates of your simulation, be sure that the entered water use data are also changed to correspond to the new dates.

3. Enter Location (Spreadsheet Cells B15 and B16 through E15 and E16)

Users must enter the grid cell(s) of the aquifer model that the water right is being transferred from (point of diversion) and the cell that contains the proposed location for the new diversion. These are referred to as the FROM and TO locations on the DATA ENTRY worksheet. As many as three FROM wells may be involved in a transfer. If fewer FROM wells are needed, the FROM2 and/or FROM3 locations should have a value of zero entered for the row and column or the row and column numbers should be left blank. Figure 1 shows the model grid, reach locations and row and column numbering. The model grid is also displayed on the EXPLANATION worksheet. Users can also determine the appropriate model grid cells for the locations by contacting IDWR. If two FROM wells are to be represented, the user must use FROM1 and FROM2. If FROM2 is left blank and FROM3 is used, an error will result.

Entry of a non-numeric or invalid row or column number will result in an error message. Valid row numbers range from 1 to 104 (for the FROM2 and FROM3 wells, 0 is a valid entry). Valid column numbers range from 1 to 209 (for the FROM2 and FROM3 wells, 0 is a valid entry). Not all combinations of row/column numbers are active model cells. The map on the EXPLANATION Worksheet shows the model boundary in red. Active model cells lie within this boundary. Response functions cannot be generated for locations outside the active model boundary (inactive cells). The user will receive an error message if a selected model cell

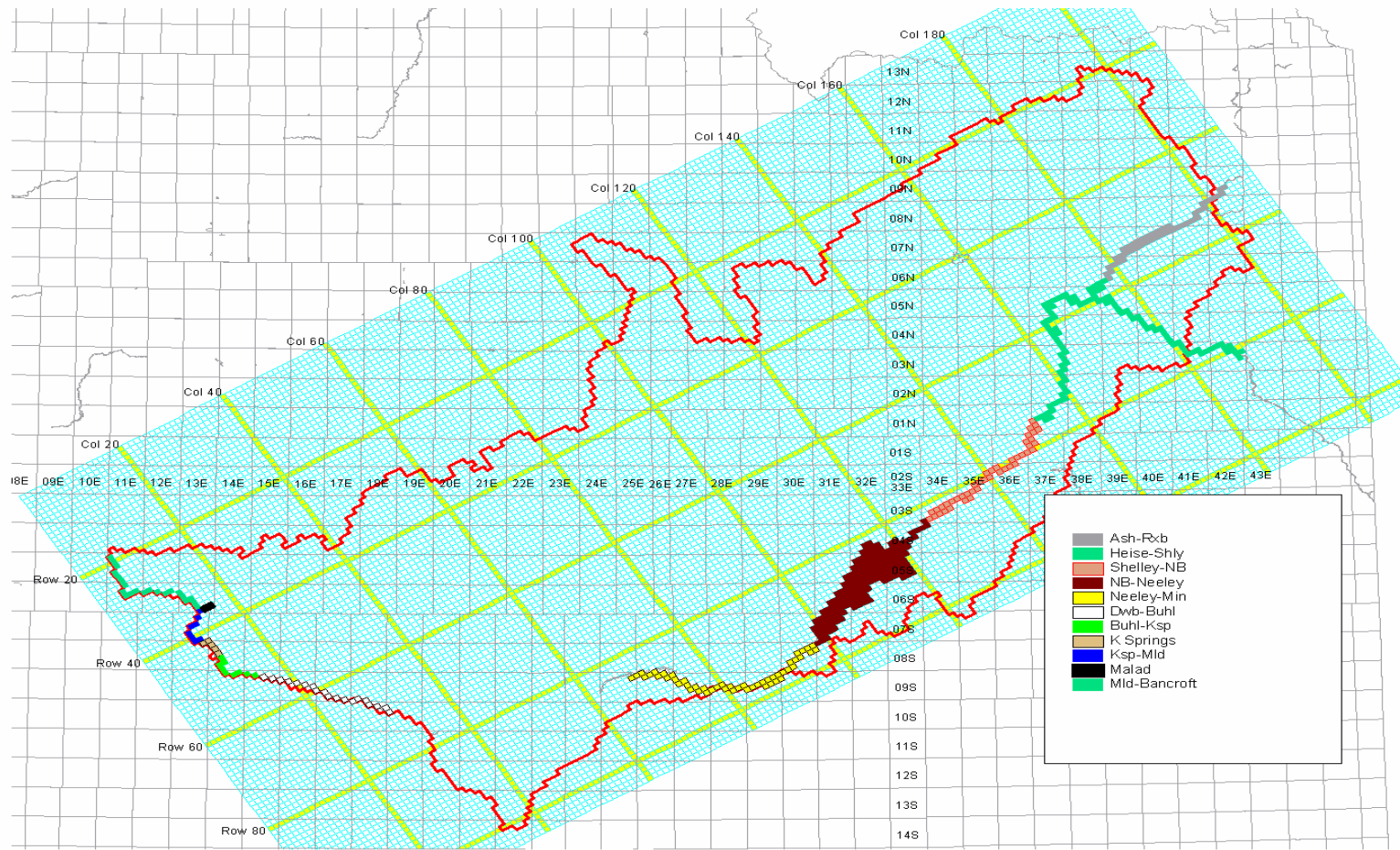


Figure 1. Model grid, reach locations and row and column numbering.

location is outside the model grid. When “Run Model” is selected, (as described below), the model cell will be tested to determine if it is within the active region.

4. Run Model

By clicking the RUN MODEL button (button number 2), response functions are generated for the locations entered in Step 2. A DOS window will open while a Fortran program generates the response functions. The DOS window may close automatically after the program has run, or it may stay open. If it does not close automatically, a note will appear in the DOS window telling you when you should close it. The window can be closed by clicking on the X in the upper right hand corner of the DOS window. Note: depending on the speed of the processor being used and the number of wells being analyzed, the model could take as long as 10-15 minutes to run.

If any of the cell locations (Step 2) are inactive model cells, an error message will appear and the program will terminate. Correct the row and column number as required (refer to the map on the EXPLANATION worksheet or Figure 1) and click RUN MODEL again.

5. Get Output

By clicking the GET OUTPUT button (button number 3), the response functions just generated by the Fortran program are brought into the spreadsheet. You must click this button in order to have results that represent the locations you have provided. If you forget to push the GET OUTPUT button, the response functions will all be zero.

Note: the UPDATE DATES button, the RUN MODEL button and the GET OUTPUT button (buttons 1 through 3) need only be pushed once (unless the locations of the FROM and TO wells are changed). After these three buttons have been activated, the user can test out different pumping scenarios by changing the pumping data and selecting the CALCULATE EFFECTS button (button number 4) as many times as desired, as described below.

Note 2: if the user returns to a given transfer analysis after running different analyses, pressing GET OUTPUT will corrupt the underlying response-function data in the older analysis, if the older analysis is stored in the same directory as the model-run results of the later analyses.

6. Entering Water Use Data (Spreadsheet Cells B21 through H470)

Water use data must be entered for all wells involved in the transfer and identified in the location data specified in Step 2 above. The data are entered for each of the four-month time periods (trimesters) extending over a duration of 150 years (450 time periods). If no water was used at one or more of the wells in a given time period then a value of zero (0) should be entered for that period. For example, in most

simulations, water use for the FROM wells will pre-date water use from the TO well. This would be accomplished by having 0 for pumpage in the TO well until the projected time of the transfer.

Non-numeric characters (i.e. letters and symbols) are not allowed in this table. Water use should be entered in units of acre-feet. This is the volume of water used in each four-month period. If water use is, or will be, seasonal, this should be reflected in the entered data (for example, for irrigation occurring only in the summer season, winter and spring use should be set to zero). Please consult the IDWR transfer processing guidelines for the appropriate volume of water to report.

Water use data must be entered for a TO well and between one and three FROM wells. Water use data must always be entered in the FROM1 column. The use of two FROM wells would require use of the FROM1 and FROM2 columns. The use of three FROM wells (combining all or part of three existing water rights at a new location) requires use of the FROM1, FROM2, and FROM3 columns. Water use values of zero (0) should be entered for any FROM wells that are not being used.

Each of the FROM wells has two columns in which to enter water use data: the WITH TRANSFER and WITHOUT TRANSFER columns. In all cases, water use is entered as a rate (acre-feet/four month period). Water use data entered in the WITH TRANSFER column represents the historic water use back to when the right was perfected and estimates of future use (if any) at the original point of diversion after the transfer occurs. If no water use is anticipated at the original point of diversion after the transfer, then future water use values in this column should be zero (0). The WITHOUT TRANSFER column represents the historic water use back to when the right was originally perfected and projects into the future the expected water use at the original location if no transfer takes place. Normally, the future expected use will be similar to the historic use, and cannot be greater than the original water right. These data must be entered for each of the FROM wells involved in a transfer.

The TO well has one column in which to enter water use data. Users should enter the proposed rate (AF/trimester) of water use at the new pumping location (where the right is being transferred to) beginning with the date pumping is proposed to begin (after the transfer is complete) and continuing for the remainder of the 150 years of the spreadsheet. For all trimesters prior to the effective date of the transfer, zeros should be entered for water use at the TO well.

7. Calculating Effects of the Transfer

After FROM and TO locations have been specified, the model has been run, the GET OUTPUT button has been clicked, and water use data have been entered; then users must click the CALCULATE EFFECTS button (button number 4). This implements a Visual Basic macro that multiplies the entered water use values times the response functions determined by the model. This calculation provides estimates of the effects of the previous use and continued water use at the FROM sites and the proposed

water use at the TO sites on each of the eleven hydraulically connected reaches of the Snake River. These are presented graphically on the GRAPHS ABOVE MILNER and GRAPHS BELOW MILNER worksheets and in tabular form on the CALCULATED EFFECTS worksheet. There will be a pause while the spreadsheet makes the necessary calculations. Depending on the processor speed, this could take a few minutes. When the calculations are complete, the spreadsheet will automatically change to the GRAPHS ABOVE MILNER worksheet.

As many as six lines may be presented on the graphs for each river reach, depending upon how many FROM wells are involved in a transfer. The graph shown below has only four lines apparent because only the TO and FROM1 wells were involved in this example. The example shown in Figure 2 is the depletion of the springs in the Buhl to Thousand Springs reach of the Snake River when a ground-water right originally perfected in 1950 (100AF every four months) is transferred to a new location in 2003 without reducing the volume of water use. In this example, the whole right is transferred, so water use in the FROM1 well drops to 0 in 2003 in the “With Transfer” data column. The example graph shown is one of the eleven graphs presented representing individual river reaches. The lines on the graphs (and corresponding columns in the table on the CALCULATED EFFECTS worksheet) represent the following:

Light blue line (*FROM1 With Transfer*): represents the depletion of the reach resulting from past pumping at the original location of the water right. Notice that even though pumping has ceased at this location in 2003, residual depletion effects continue for many years. These residual effects must be added to the effects of pumping from the TO well to determine the total effect resulting from the transfer (this computation results in the TOTAL EFFECT WITH TRANSFER line discussed below).

Red line (*TO Well Effects*): represents the effect of pumping only the TO well at the prescribed rate after the transfer. In this case, the TO well is located nearer to the Buhl to Thousand Springs reach and the effects of pumping are more acute than apparent in the FROM1 well.

Black line (*Total Effect With Transfer*): is the sum of the two lines described above (*FROM1 With Transfer + TO Well Effects*). This is the net depletion effect on this reach resulting from accomplishing the transfer. This should be compared to the effect of not performing the transfer and maintaining historical discharge at the FROM well, which is shown by the purple line.

Purple line (*Total Effect Without Transfer*): is the result of water use entered in the FROM1 Without Transfer column. It should represent the combination of effects from past water use at the original point of diversion and the effects of continued water use at similar rates in the future. If the *Total Effect With Transfer* (black line) is greater than the *Total Effect Without Transfer* (brown line) then the transfer will result in an increased depletion of this reach of the river, as it does in

this example. The user may then modify the rates or delay pumping from the TO well or include other FROM wells to create a more favorable balance.

If additional FROM wells are involved in the transfer, then one additional line appears for each additional FROM well. The additional lines represent the effect of the past pumping (With Transfer column in the DATA ENTRY) for the respective wells. The *Total Effect With Transfer* and *Total Effect Without Transfer* lines will now show the total effects of all FROM wells. The objective is still to achieve a condition where the effects after a transfer are no greater in a given reach than before the transfer.

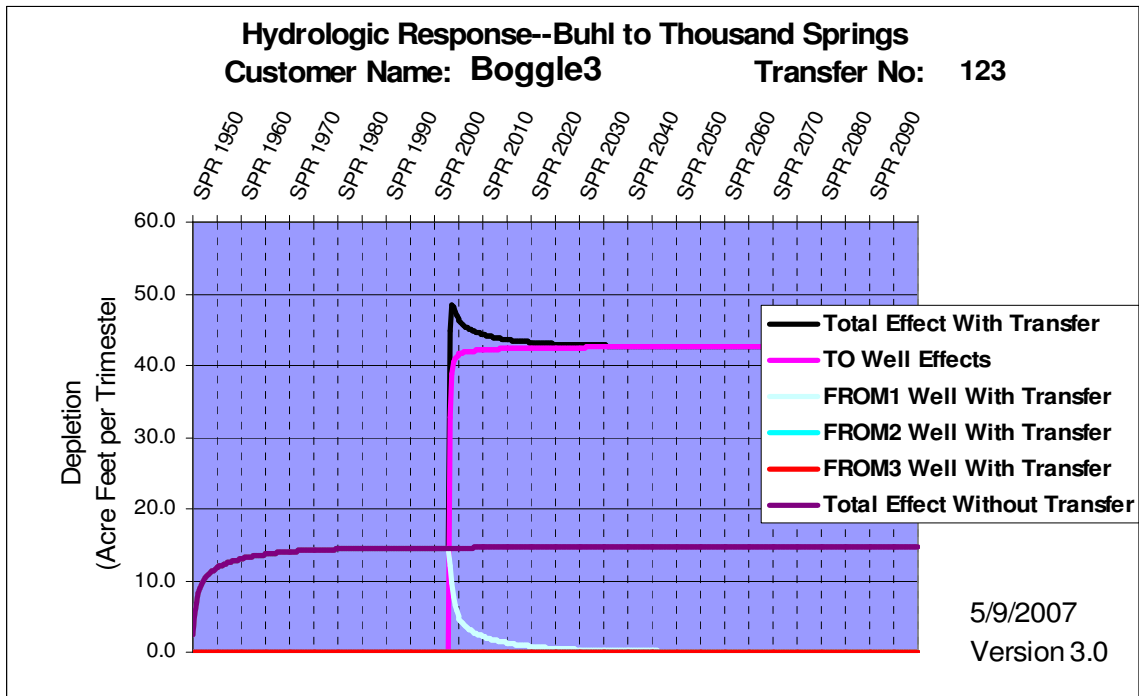


Figure 2. Impacts to Buhl to Thousand Springs Reach from example.

The GRAPHS ABOVE MILNER worksheet contains graphs for the Ashton to Rexburg, Heise to Shelley, Shelley to Near Blackfoot, Near Blackfoot to Neeley and Neeley to Minidoka reaches as well as a graph representing the net impact for each of these reaches. The GRAPHS BELOW MILNER worksheet contains graphs for the Devil’s Washbowl to Buhl, Buhl to Thousand Springs, Thousand Springs, Thousand Springs to Malad, Malad and Malad to Bancroft reaches, as well as a graph of the net impacts for each of these reaches.

Samples of the net impacts above and below Milner for the same example used to generate Figure 2 are shown in Figures 3 and 4. These figures show that the greatest depletion resulting from the transfer occurs in the Buhl to Thousand Springs reach. Figure 3 shows that for reaches above Milner, the transfer causes a reduction in the impact, indicating that the transfer moves the point of diversion further from these reaches.

When interpreting these graphs, the user should note that a large positive value indicates a greater depletion of the reach due to the transfer. A negative value indicates a beneficial effect on flow of a reach (greater spring discharges or decreased seepage from the river).

In addition to the reach graphs, two graphs are provided which show the change in impact to each reach as a ratio of the impact after the change to the impact prior to the change. Figure 5 shows the change ratio for the same example for reaches above Milner. Figure 6 shows the change ratio for the example for reaches below Milner. The user should be cautioned that for some reaches which are distant from the points of use, the impacts to the reach may be so small that expressing the change in impact as a percentage of the original impact may be misleading. The percentage change may be very large despite the overall impact being almost negligible.

The example described above is contained in the file UserETransferExample.XLS. The reader is encouraged to open this example and experiment with the data.

8. Balancing Impacts

Most often users will want to eliminate increased depletions to reaches of a water rights transfer on some or all of the river reaches. This can be accomplished by adjusting rates for the TO well or reducing future pumping at the FROM well and again clicking the CALCULATE EFFECTS button. It is not necessary to click the RUN MODEL or GET OUTPUT buttons unless the user has changed grid locations specified in Step 2 above.

Typical transfer mitigation involves considering long-term implications of the total magnitude of “FROM” and “TO” pumpage, as well as temporary implications of a short-term increase in transient effects at one or more reaches. An efficient methodology for designing a mitigation plan is to look at the very last time period of the ‘percent change’ graphs and adjust the “FROM” and “TO” volumes to bring the final values within IDWR requirements. Then, if transient effects in earlier time periods exceed guidelines, the implementation of delayed “TO” pumping and temporary “FROM” foregone pumping may be added to mitigate for these temporary transient effects.

9. Transfer Summary

A worksheet (TransferSummary) has been provided for summarizing the proposed transfer for submittal to IDWR. Figure 7 shows the transfer summary for the example transfer shown in Figures 2-6. The following fields are automatically filled in by the software: Transfer Number, Transfer Name, Row and Column Locations for all wells. These fields are highlighted in Yellow. Fields highlighted in green are meant to be field descriptors and should not be changed. Fields highlighted in blue are meant to be filled in by the user.

Many of the fields are self-explanatory (Prepared by, Date, Water Rights Involved and Historical Beneficial Use). For each well involved in the proposed water rights transfer, the user summarizes the annual and trimester water use, each time water use has changed (or is expected to change).

For the example transfer, the TO well is expected to come on-line in Spring 2003, with a trimester rate of 100 AF/trimester and an annual rate of 300 AF/yr. The end date of pumping for the TO well is Winter 2099.

Only one FROM well exists in this example. The FROM 1 well commenced pumping in Spring, 1950. If the right is not transferred, the FROM1 well is expected to continue pumping at the same rate indefinitely, hence the end date of pumping without the transfer is Winter 2099. If the transfer is completed, the FROM1 well will cease pumping when the TO well comes on-line in Spring 2003.

The Mitigation Notes field is where the user would explain any special circumstances of the transfer. For example, if the user intends to reduce the impact to the river of the proposed transfer by reducing or ceasing pumping for a few years before the TO well comes on-line, this should be described in the Mitigation Notes field.

The user is referred to IDWR if questions exist regarding filling out this summary form.

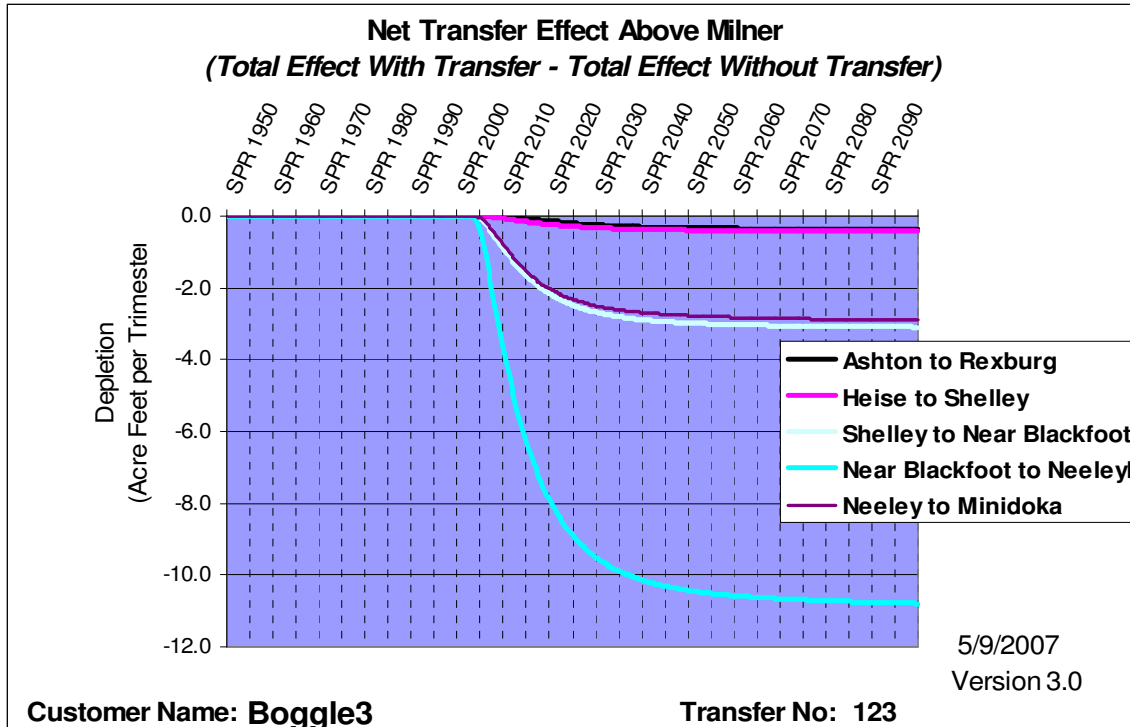


Figure 3. Net transfer effects for reaches above Milner for example.

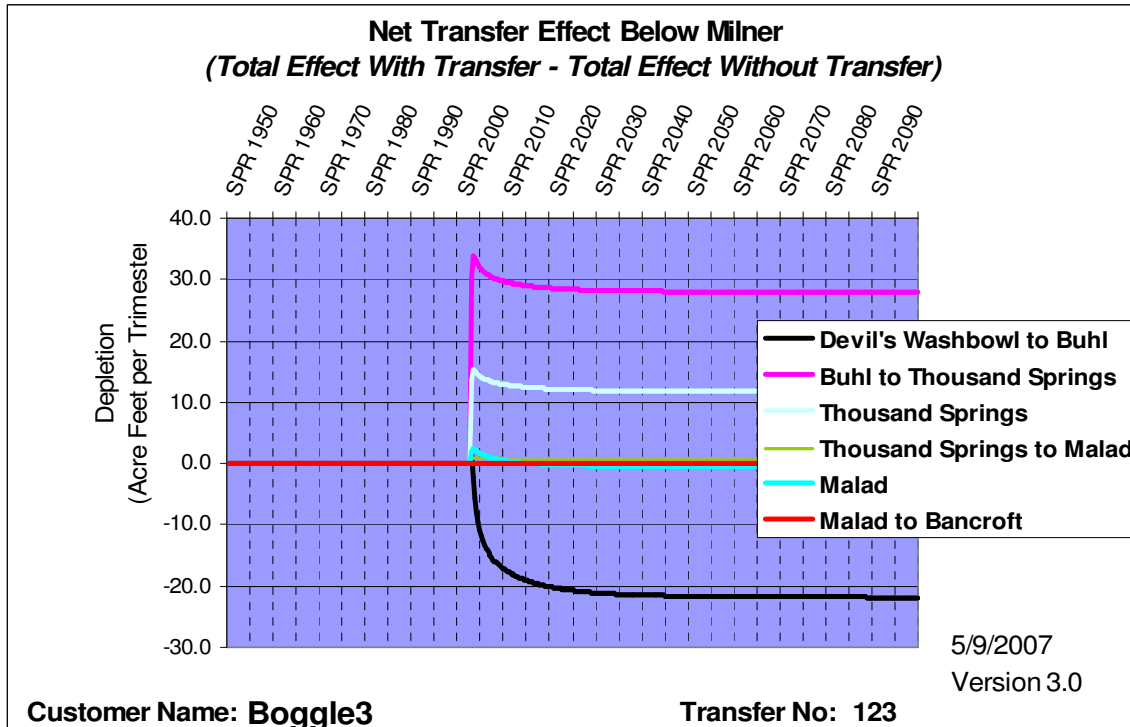


Figure 4. Net transfer effects for reaches below Milner for example.

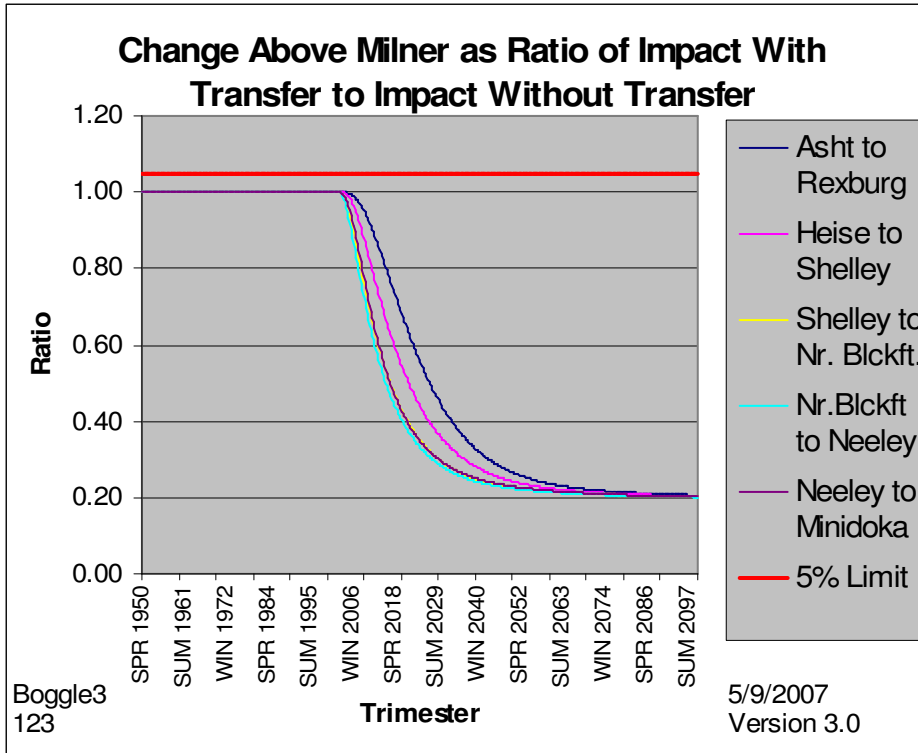


Figure 5. Example graph of change above Milner expressed as a ratio of the impact after the transfer to the impact prior to the transfer.

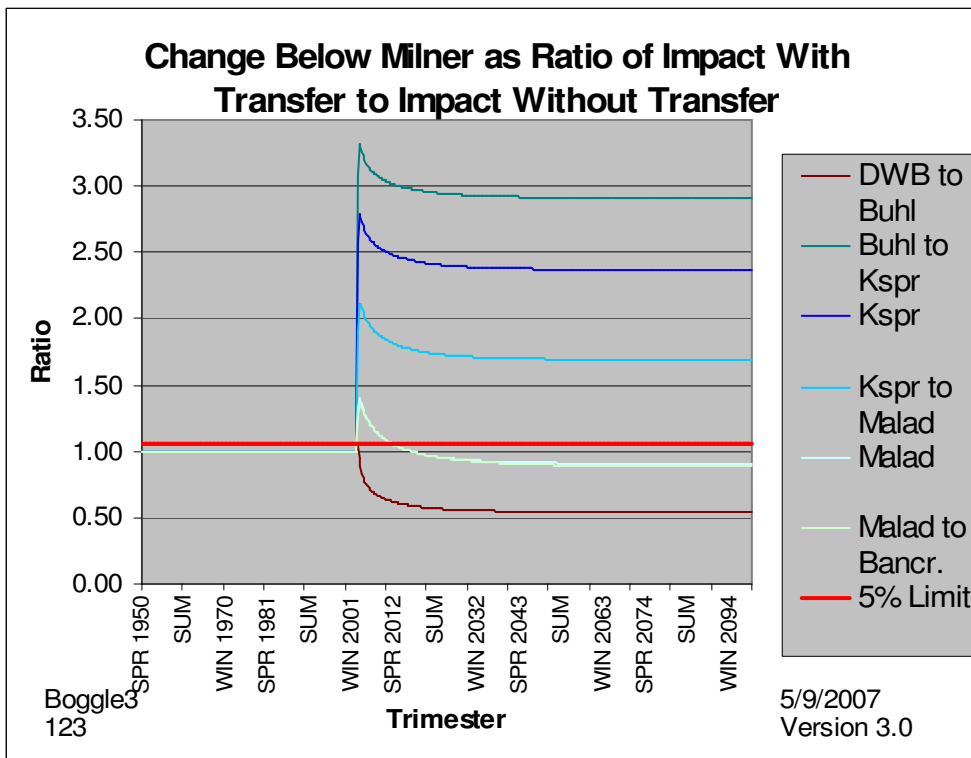


Figure 6. Example graph of change above Milner expressed as a ratio of the impact after the transfer to the impact prior to the transfer.

ESPA Ground Water Rights Transfer Spreadsheet Data Summary

TRANSFER NO: 123
 TRANSFER NAME: Boggle3
 PREPARED BY: IWRI
 DATE: May, 2007
 Transfer Tool Version: Version 3.0

BLUE CELLS ARE SET UP FOR USER ENTRIES

WATER RIGHTS INVOLVED:

Group 1 Transfer Rights		Group 2 Additional Mitigation Rights	
Right No.	Priority Date	Right No.	Priority Date

HISTORIC BENEFICIAL USE:

Trans/Mit. Rights (group no.)	Acres to Dry Up (ac)	Beneficial Use (af/yr)	Total (af/yr)

MITIGATION NOTES:
 FROM1 well will be completely retired in Spring, 2003, when the TO well comes on-line.

MODEL CELL LOCATIONS:

	TO WELL	FROM1 WELL	FROM2 WELL	FROM3 WELL
ROW	48	58	0	0
COLUMN	15	28	0	0

	Start Date		End Date		Annual (af/yr)	Water Use		Acres Authorized (acres)	Notes
	Season	Year	Season	Year		Trimester (af/trimester)			
TO Well (Projected Use)	Spring	2003	Winter	2099	300.0	100.0	0.0		
FROM1 Well (With Transfer)	Spring	1950	Spring	2003	0	0.0			
FROM1 Well (Without Transfer)	Spring	1950	Winter	2099	300	100.0			
FROM2 Well (With Transfer)									
FROM2 Well (Without Transfer)									
FROM3 Well (With Transfer)									
FROM3 Well (Without Transfer)									

Figure 7. Transfer Summary worksheet for example.

FREQUENTLY ASKED QUESTIONS

1. **PROBLEM:** After clicking the CALCULATE EFFECTS button, no lines appear on the output graphs.

POSSIBLE CAUSE:

- a. The user forgot to hit the GET OUTPUT button, so the newly generated response functions were not brought in to the spreadsheet. Or
- b. All of the entered water use data is zero. Check the historical and projected water use data for the TO well and any desired FROM wells to be sure that some non-zero data have been entered.

2. **PROBLEM:**

The entered row and column numbers are in the allowable ranges (row is between 1 and 104 and column is between 1 and 209), but when the RUN MODEL button is clicked, the following error message appears: 'Model Cell Specified for xxx Well Not Valid'.

POSSIBLE CAUSE:

The ground water model has 104 rows and 209 columns, but not all model cells (identified by a row/column pair) are active. The map at the bottom of the EXPLANATION worksheet shows the active cells in the model grid within the red boundary. In order to run the model, the user must specify a row and column number for a cell which is active (Figure 1).

3. **QUESTION:**

If the user forgot to click the UPDATE DATES button before clicking the RUN MODEL button, does the user need to start over?

ANSWER:

No. It is OK to hit the UPDATE DATES button at any time. It has no effect on the model results (it does, however, have an effect on the graph axis labels). The dates are included for the user's reference. The simulation start date can be changed (and the UPDATE DATES button selected) at any time. However, updating the dates will not correspondingly move the water use data. The user will have to manually change the water use data.

4. **QUESTION:**

Is it possible to transfer from two water rights with two separate wells?

ANSWER:

Yes. The simulation start date should be set to when the first FROM well was first put into use. Let's say that you have a FROM1 well with a priority date of January, 1950 and a FROM2 well with a priority date of June 1964. You would set up your simulation start date at Spring 1950. You would enter your historical (and projected future) pumping for the FROM1 well starting in Spring 1950. The historical pumping

for the FROM2 well would be all zeros until Summer 1964, at which time actual historical and projected future pumping and would be entered for the FROM2 well.

5. QUESTION:

Is it possible to save the input data and/or results for one analysis and set up a second evaluation using the spreadsheet?

ANSWER:

The spreadsheet has been designed to make this very easy for the user. Suppose that you are testing out several different scenarios, one of which you will use when applying for the water right transfer. Use the spreadsheet to design your first scenario. Once you have the historical and projected pumping set up the way you want them for the FROM and TO wells and have performed the RUN MODEL and GET OUTPUT steps, save the simulation using the following set of commands: File → SaveAs → enter your desired filename (for example, Dairy1). *Consider placing this result in a separate results directory (please see Note 2, below).*

You can now re-open the Transfer.XLS spreadsheet and set up your second simulation. Once you have it set up the way you want it, run the model, and extracted output, you repeat the SaveAs operation, with a new file name (for example, Dairy2).

You can always go back to the file Dairy1.XLS and change the historical and projected pumping and select the CALCULATE EFFECTS button to continue refining your simulation. The calculation program will run (using the stored response functions) even once you have changed the spreadsheet name.

Note 1: you are advised to keep careful track of assumptions you have made when setting up your historical and projected pumping. It is easy to make assumptions and then later forget those assumptions. By re-naming the spreadsheet application, you can have multiple spreadsheets, each containing simulations with different assumptions, which should make it easier to keep track of what you are doing.

Note 2: if repeated analyses are stored in the transfer directory (the directory that contains the supporting software and files), a user can inadvertently obtain incorrect results when working back and forth between alternate analyses. For instance, returning to a prior analysis and pressing the GET OUTPUT button after a new analysis has been performed would corrupt the response functions in the original spreadsheet. Similarly, if one created a new spreadsheet and ran the model but *failed* to GET OUTPUT, the new spreadsheet would still contain old response functions and would also give false output.

To avoid such inadvertent results, the following procedure is strongly recommended:

- a) In the directory which contains the supporting files and programs, create the new transfer with appropriate dates, names, and cell locations, using file TRANSFER.xls or a working copy.

- b) Select RUN MODEL, and (upon completion of the model run) select GET OUTPUT.
- c) Using the SaveAs function as described above, save the spreadsheet with an appropriate new name in a "results" folder that DOES NOT contain the supporting files and programs.
- d) Select CALCULATE EFFECTS.
- e) As many different analyses as desired may be saved in this results folder. The time series and/or magnitude of pumping may be altered as desired in each of these analyses and updated with the CALCULATE EFFECTS button, without danger of inadvertently using the wrong response functions.
- f) With this procedure, the effect of inadvertently selecting RUN MODEL or GET OUTPUT is simply an error message; the response functions within the spreadsheet retain their integrity.

Note 3: Changing the row and column values in the DataEntry worksheet, without re-running the model, extracting output, and calculating effects, will NOT update the results.

6. QUESTION:

Is it possible to transfer a partial water right?

ANSWER:

Yes. To represent transfer of a partial water right, just input the desired amounts for both the FROM well and the TO well.

7. QUESTION :

Is it possible to represent transfer of two separate water rights from the same well?

ANSWER:

Yes. Just increment the amount of pumping on the FROM1 well at the time of the second priority date.

8. QUESTION:

I tried to select one of the buttons but nothing happened.

ANSWER:

If you have just entered new data on the spreadsheet, be sure to hit the ENTER button prior to selecting one of the command buttons.

9. I entered water use data for a second (or third) FROM well, but it does not show up on the graphs

ANSWER:

Check to be sure that you have correctly entered row and column numbers for the additional well. Then you should have clicked the RUN MODEL, GET OUTPUT, and CALCULATE EFFECTS buttons.

10. When I select the RUN MODEL button, a black screen appears and it just sits there.

ANSWER:

Be patient. The model is running while that black screen is displayed. On some computers, it can take several minutes to run, especially if more than one FROM well is used.

11. When I select the RUN MODEL button, it used to ask me about deleting 'well' files, now it does not ask. Is this OK?

ANSWER:

Yes. The software was modified to delete the old well files (used by the model) before the new files are generated. This was done for the user's convenience and to eliminate that question about deleting existing files.