Updated interim ESPA transfer tool

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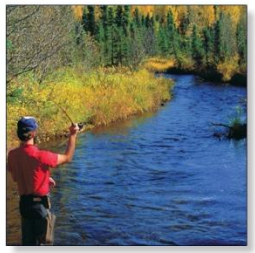
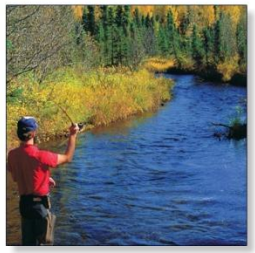
March 17, 2015

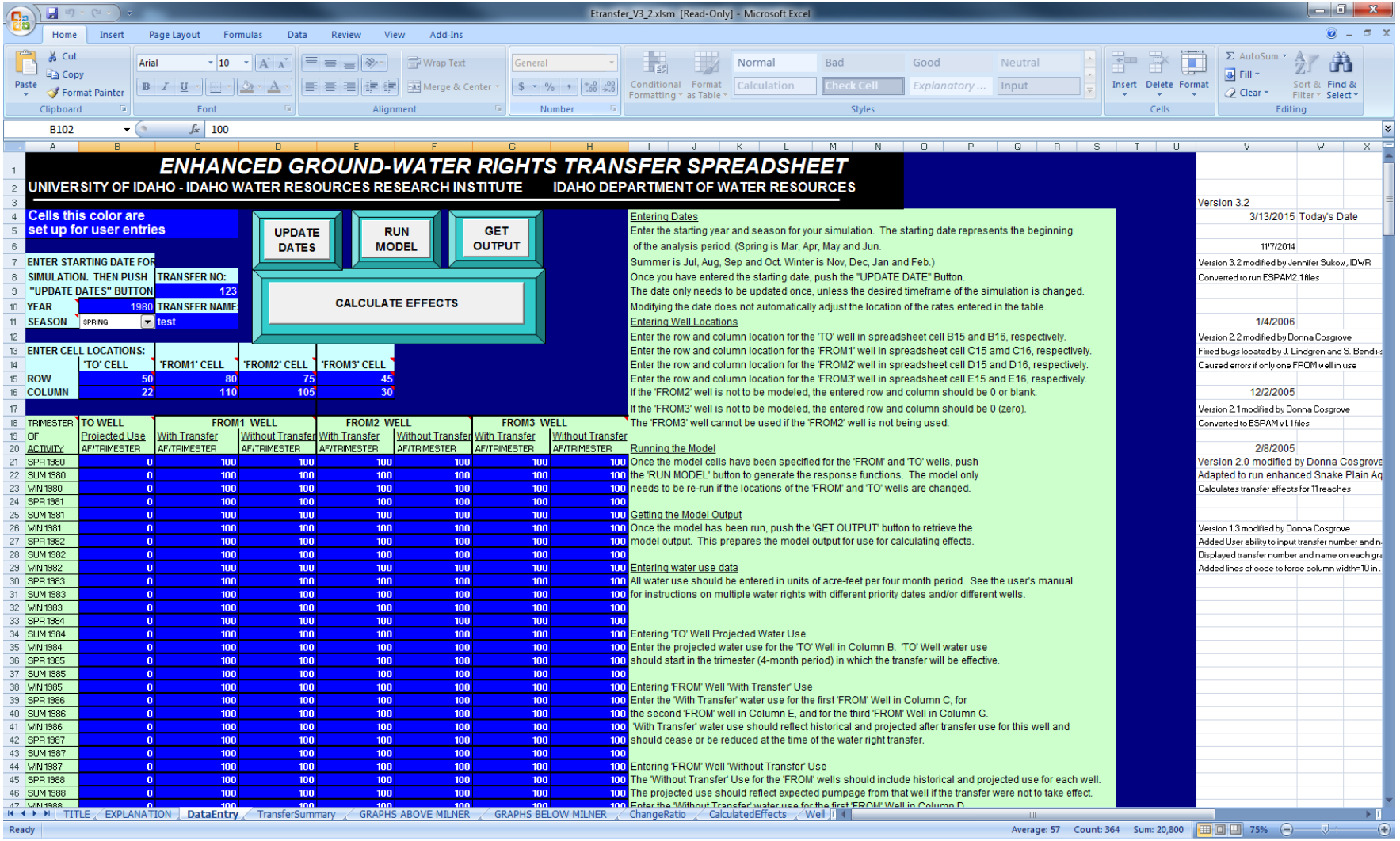
Outline

- Overview of transfer tool
- Updated interim transfer tool
- Testing of interim transfer tool

Overview of spreadsheet tool



- ESPA transfer spreadsheet developed by IWRRI as a tool for non-modelers to analyze predicted impacts of proposed water right transfers
- Excel spreadsheet user interface
- Visual Basic macros
  - construct input data files for MODFLOW
  - initiate batch files that run MODFLOW
  - retrieve and process model results
  - present results in the spreadsheet in tabular and graphical format
- Distributed with associated files
  - needed to pre-process model input, run model, and post-process model output
  - user does not access directly, run in background



Etransfer_V3_2.xlsm [Read-Only] - Microsoft Excel

ENHANCED GROUND-WATER RIGHTS TRANSFER SPREADSHEET

UNIVERSITY OF IDAHO - IDAHO WATER RESOURCES RESEARCH INSTITUTE IDAHO DEPARTMENT OF WATER RESOURCES

Cells this color are set up for user entries

UPDATE DATES | RUN MODEL | GET OUTPUT

CALCULATE EFFECTS

ENTER STARTING DATE FOR SIMULATION. THEN PUSH "UPDATE DATES" BUTTON	TRANSFER NO: 123
YEAR	1980
SEASON	SPRING
	TRANSFER NAME: test

ENTER CELL LOCATIONS:	'TO' CELL	'FROM1' CELL	'FROM2' CELL	'FROM3' CELL
ROW	50	80	75	45
COLUMN	22	110	105	30

TRIMESTER OF ACTIVITY	TO WELL Projected Use AF/TRIMESTER	FROM1 WELL With Transfer AF/TRIMESTER	FROM1 WELL Without Transfer AF/TRIMESTER	FROM2 WELL With Transfer AF/TRIMESTER	FROM2 WELL Without Transfer AF/TRIMESTER	FROM3 WELL With Transfer AF/TRIMESTER	FROM3 WELL Without Transfer AF/TRIMESTER
SPR 1980	0	100	100	100	100	100	100
SUM 1980	0	100	100	100	100	100	100
WIN 1980	0	100	100	100	100	100	100
SPR 1981	0	100	100	100	100	100	100
SUM 1981	0	100	100	100	100	100	100
WIN 1981	0	100	100	100	100	100	100
SPR 1982	0	100	100	100	100	100	100
SUM 1982	0	100	100	100	100	100	100
WIN 1982	0	100	100	100	100	100	100
SPR 1983	0	100	100	100	100	100	100
SUM 1983	0	100	100	100	100	100	100
WIN 1983	0	100	100	100	100	100	100
SPR 1984	0	100	100	100	100	100	100
SUM 1984	0	100	100	100	100	100	100
WIN 1984	0	100	100	100	100	100	100
SPR 1985	0	100	100	100	100	100	100
SUM 1985	0	100	100	100	100	100	100
WIN 1985	0	100	100	100	100	100	100
SPR 1986	0	100	100	100	100	100	100
SUM 1986	0	100	100	100	100	100	100
WIN 1986	0	100	100	100	100	100	100
SPR 1987	0	100	100	100	100	100	100
SUM 1987	0	100	100	100	100	100	100
WIN 1987	0	100	100	100	100	100	100
SPR 1988	0	100	100	100	100	100	100
SUM 1988	0	100	100	100	100	100	100

Entering Dates
Enter the starting year and season for your simulation. The starting date represents the beginning of the analysis period. (Spring is Mar, Apr, May and Jun. Summer is Jul, Aug, Sep and Oct. Winter is Nov, Dec, Jan and Feb.)
Once you have entered the starting date, push the "UPDATE DATE" Button.
The date only needs to be updated once, unless the desired timeframe of the simulation is changed.
Modifying the date does not automatically adjust the location of the rates entered in the table.

Entering Well Locations
Enter the row and column location for the 'TO' well in spreadsheet cell B15 and B16, respectively.
Enter the row and column location for the 'FROM1' well in spreadsheet cell C15 amd C16, respectively.
Enter the row and column location for the 'FROM2' well in spreadsheet cell D15 and D16, respectively.
Enter the row and column location for the 'FROM3' well in spreadsheet cell E15 and E16, respectively.
If the 'FROM2' well is not to be modeled, the entered row and column should be 0 or blank.
If the 'FROM3' well is not to be modeled, the entered row and column should be 0 (zero).
The 'FROM3' well cannot be used if the 'FROM2' well is not being used.

Running the Model
Once the model cells have been specified for the 'FROM' and 'TO' wells, push the 'RUN MODEL' button to generate the response functions. The model only needs to be re-run if the locations of the 'FROM' and 'TO' wells are changed.

Getting the Model Output
Once the model has been run, push the 'GET OUTPUT' button to retrieve the model output. This prepares the model output for use for calculating effects.

Entering water use data
All water use should be entered in units of acre-feet per four month period. See the user's manual for instructions on multiple water rights with different priority dates and/or different wells.

Entering 'TO' Well Projected Water Use
Enter the projected water use for the 'TO' Well in Column B. 'TO' Well water use should start in the trimester (4-month period) in which the transfer will be effective.

Entering 'FROM' Well 'With Transfer' Use
Enter the 'With Transfer' water use for the first 'FROM' Well in Column C, for the second 'FROM' well in Column E, and for the third 'FROM' Well in Column G. 'With Transfer' water use should reflect historical and projected after transfer use for this well and should cease or be reduced at the time of the water right transfer.

Entering 'FROM' Well 'Without Transfer' Use
The 'Without Transfer' Use for the 'FROM' wells should include historical and projected use for each well. The projected use should reflect expected pumpage from that well if the transfer were not to take effect.
Enter the 'Without Transfer' water use for the first 'FROM' Well in Column D

Version 3.2
3/13/2015 Today's Date

11/7/2014
Version 3.2 modified by Jennifer Sukow, IDWR
Converted to run ESPAM2.1 files

1/4/2006
Version 2.2 modified by Donna Cosgrove
Fixed bugs located by J. Lindgren and S. Bendix
Caused errors if only one FROM well in use

12/2/2005
Version 2.1 modified by Donna Cosgrove
Converted to ESPAM v1.1 files

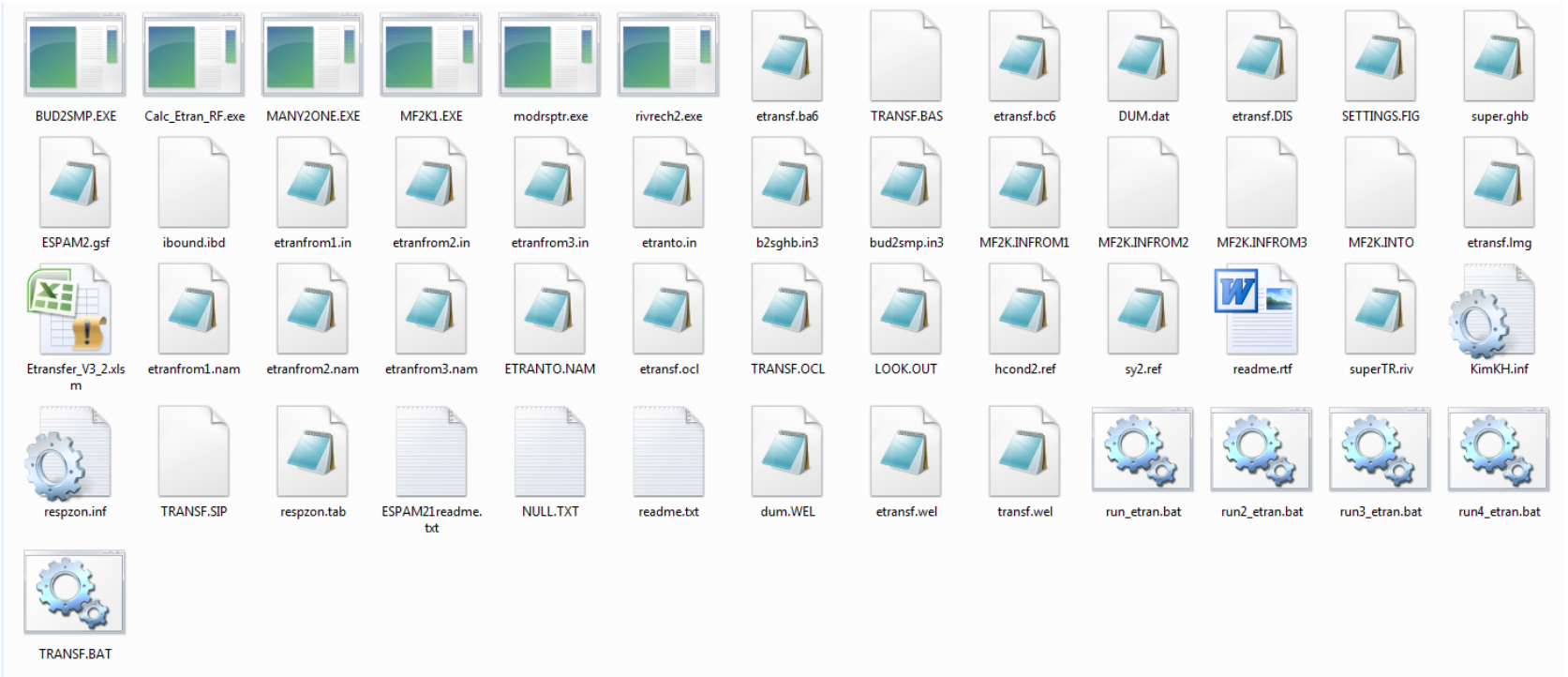
2/8/2005
Version 2.0 modified by Donna Cosgrove
Adapted to run enhanced Snake Plain Aq
Calculates transfer effects for 11 reaches

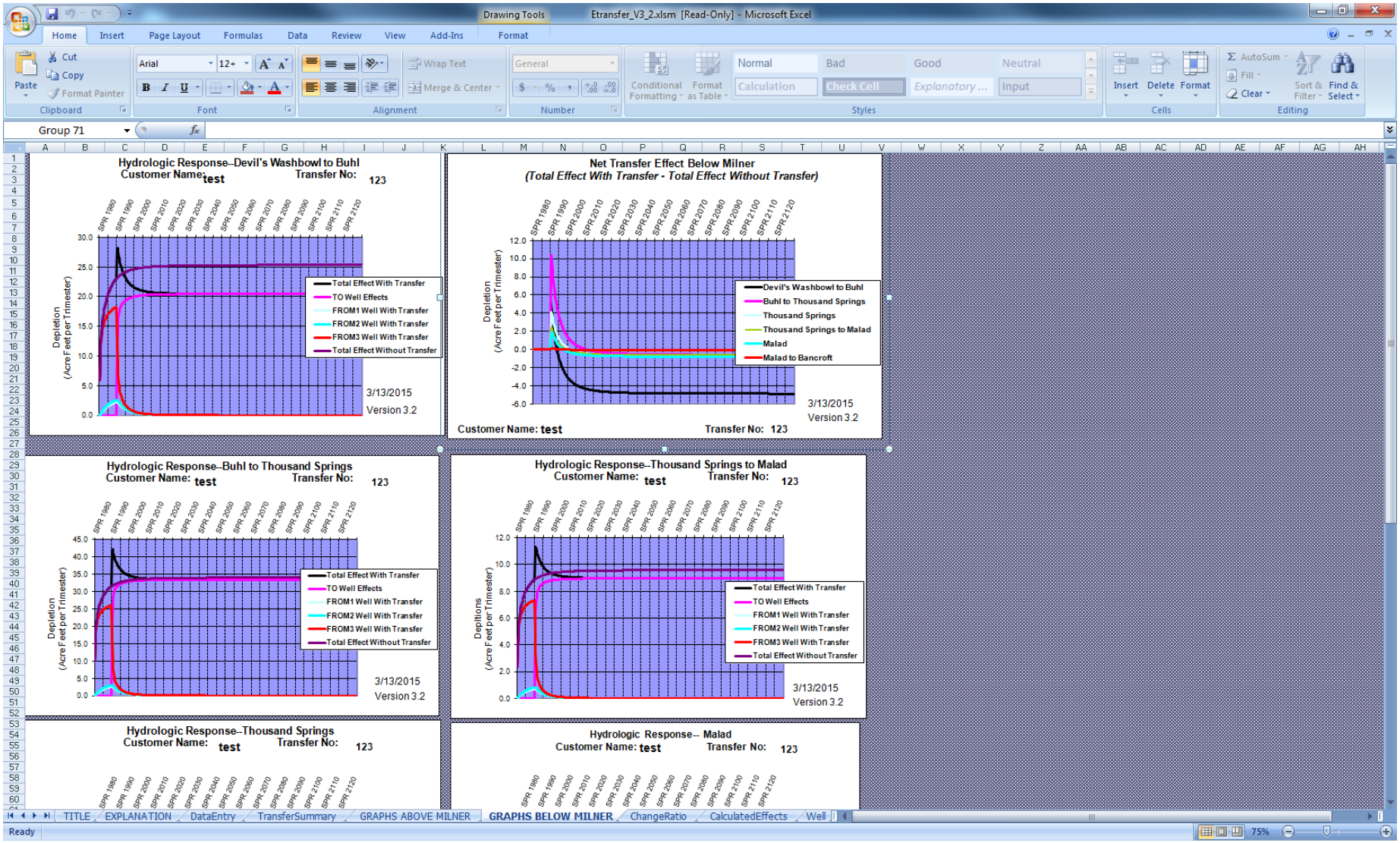
Version 1.3 modified by Donna Cosgrove
Added User ability to input transfer number and n
Displayed transfer number and name on each gra
Added lines of code to force column width=10 in

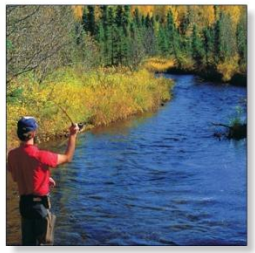
TITLE | EXPLANATION | DataEntry | TransferSummary | GRAPHS ABOVE MILNER | GRAPHS BELOW MILNER | ChangeRatio | CalculatedEffects | Well

Ready Average: 57 Count: 364 Sum: 20,800 75%

Associated files



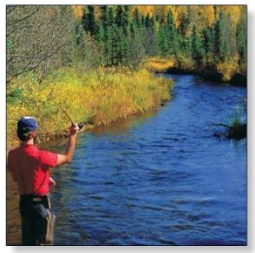

Etransfer_V3_2.xlsm [Read-Only] - Microsoft Excel
Hydrologic Response--Devil's Washbowl to Buhl
Customer Name: test Transfer No: 123
Depletion (Acre Feet per Trimester)
Total Effect With Transfer
TO Well Effects
FROM1 Well With Transfer
FROM2 Well With Transfer
FROM3 Well With Transfer
Total Effect Without Transfer
3/13/2015
Version 3.2
Net Transfer Effect Below Milner
(Total Effect With Transfer - Total Effect Without Transfer)
Depletion (Acre Feet per Trimester)
Devil's Washbowl to Buhl
Buhl to Thousand Springs
Thousand Springs
Thousand Springs to Malad
Malad
Malad to Bancroft
3/13/2015
Version 3.2
Customer Name: test Transfer No: 123
Hydrologic Response--Buhl to Thousand Springs
Customer Name: test Transfer No: 123
Depletion (Acre Feet per Trimester)
Total Effect With Transfer
TO Well Effects
FROM1 Well With Transfer
FROM2 Well With Transfer
FROM3 Well With Transfer
Total Effect Without Transfer
3/13/2015
Version 3.2
Hydrologic Response--Thousand Springs to Malad
Customer Name: test Transfer No: 123
Depletions (Acre Feet per Trimester)
Total Effect With Transfer
TO Well Effects
FROM1 Well With Transfer
FROM2 Well With Transfer
FROM3 Well With Transfer
Total Effect Without Transfer
3/13/2015
Version 3.2
Hydrologic Response--Thousand Springs
Customer Name: test Transfer No: 123
Hydrologic Response-- Malad
Customer Name: test Transfer No: 123
TITLE
EXPLANATION
DataEntry
TransferSummary
GRAPHS ABOVE MILNER
GRAPHS BELOW MILNER
ChangeRatio
CalculatedEffects
Well
Ready

Updated interim spreadsheet tool

- ETRAN Version 3.1 runs ESPAM Version 1.1 in background
- ESPAM Version 1.1 superseded by ESPAM Version 2.1
- Considerations for future transfer tool development
  - Should IDWR policy regarding the reaches and time periods used in the spreadsheet tool be reconsidered?
  - Should a new tool be developed with a different user interface?
  - Need interim solution to facilitate use of ESPAM Version 2.1 while policy and user interface considerations are being addressed
- ETRAN Version 3.2 is an updated interim version of the spreadsheet tool which runs ESPAM Version 2.1 in background

ETRAN Version 3.2



- Replaced ESPAM1.1 MODFLOW input files with ESPAM2.1 MODFLOW input files
- Edited batch files to refer to new files
- Retained MODFLOW version and solver used with ETRAN3.1 to minimize run time
- User interface and Visual Basic macros were not changed
  - Trimester model stress periods retained
  - Impacts aggregated into five river reaches and six spring reaches
  - Impacts to baseflow between Kimberly and King Hill are calculated by MODFLOW but are not presented in the user interface

ESPAM21readme.txt - Notepad

File Edit Format View Help

Version 3.2 of the ESPA Transfer Tool was updated in November 2014 to run ESPAM version 2.1.

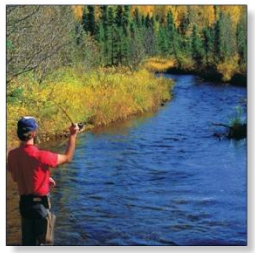
Changes:

1. Replaced ibound.ibd with ESPAM2.1 ibound.ibd
2. Replaced sy.ref with ESPAM2.1 sy2.ref
3. Replaced transm.ref with ESPAM2.1 hcond2.ref
4. Modified etransf.bc6, updated storage and transmissivity file names
5. Replaced super.riv with ESPAM2.1 superTR.riv, added additional -1's to exceed 450 stress periods
6. Added ESPAM2.1 super.ghb
7. Modifed etranto.nam, changed river file name, added ghb file name
8. Modifed etranfrom1.nam, changed river file name, added ghb file name
9. Modifed etranfrom2.nam, changed river file name, added ghb file name
10. Modifed etranfrom3.nam, changed river file name, added ghb file name
11. Replaced BIGRID.GSF with ESPAM2.gsf, and deleted METRIC.GSF
12. Modified bud2smp.in3, changed grid specification file name
13. Added b2sghb.in3 for post-processing baseflow response (general head boundary flux), bud2smp will write baseflow.dat and baseflow.rec
14. Added KimKH.inf to delineate Kimberly to King Hill baseflow reach
15. Modified run_etran.bat, added BUD2SMP <b2sghb.in3 and COPY BASEFLOW.DAT
16. Modified run2_etran.bat, added BUD2SMP <b2sghb.in3 and COPY BASEFLOW.DAT
17. Modified run3_etran.bat, added BUD2SMP <b2sghb.in3 and COPY BASEFLOW.DAT
18. Modified run4_etran.bat, added BUD2SMP <b2sghb.in3 and COPY BASEFLOW.DAT
19. Renamed Excel file to Etransfer_V3_2.xlsm
20. Added annotation to TITLE, EXPLANATION, and DataEntry worksheets
21. Changed Transfer Tool Version in TransferSummary worksheet to Version 3.2
22. Modified respzon.inf to move drain cell 1037015 to Zone 9 (Thousand Springs to Malad). This cell was not an active drain cell in ESPAM1.1.

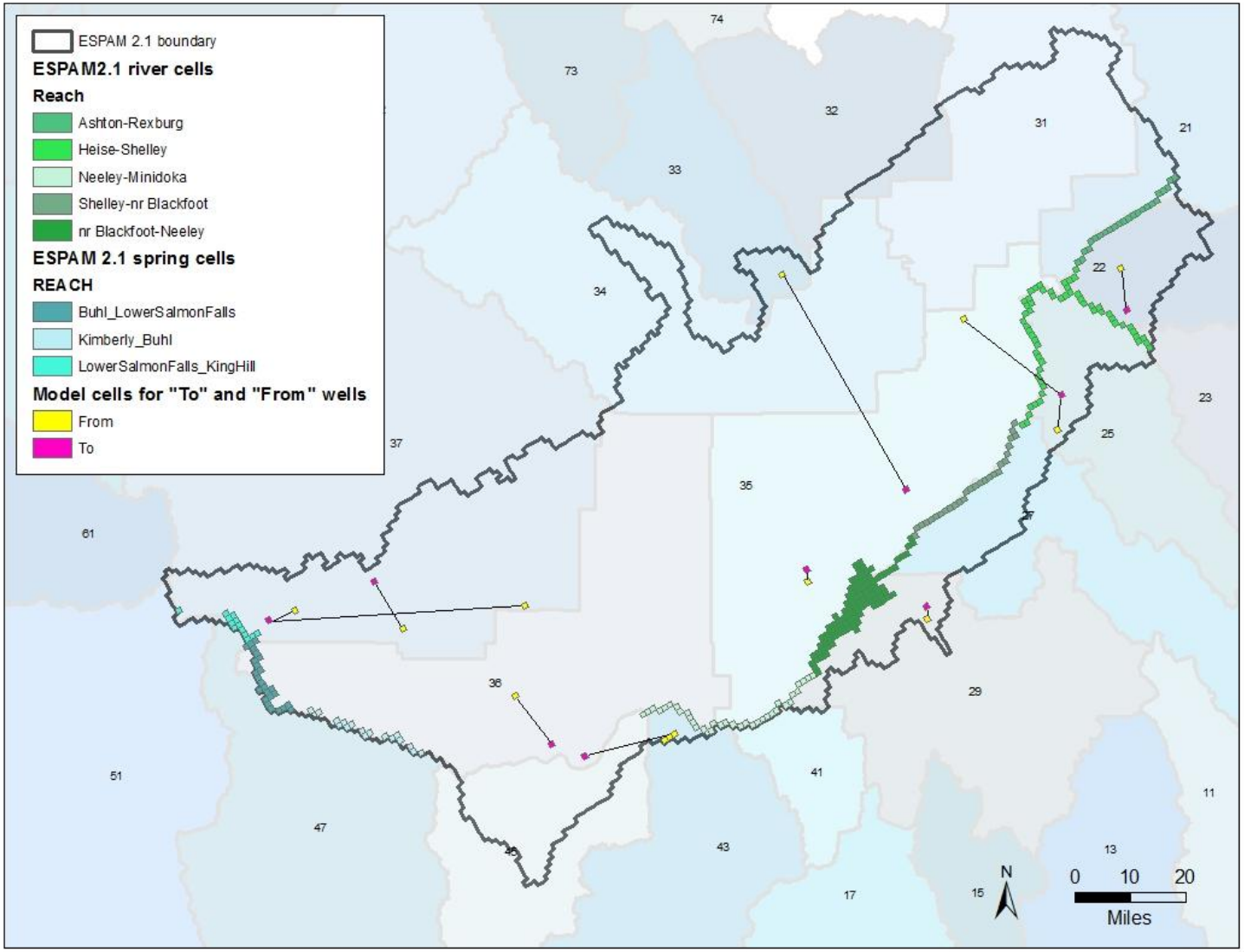
Tried using MODFLOW 1.19.01 with PCG solver. PCG solver performance was undesirable because of small input stresses. With RCLOSE = 1e-5 "Run Model" tool took 15 minutes and had 0.19% cumulative water budget error at 150 years. Recommend continued use of MODFLOW 1.10 with LMG solver for interim tool.

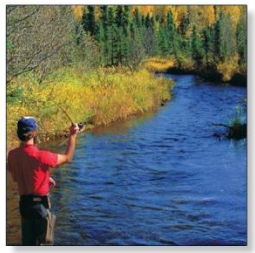
Note: Impacts to baseflow discharge to the Snake River between Kimberly and King Hill are not included in the predicted impacts to spring reaches and are not shown in the spreadsheet tool. Impacts to baseflow discharge between Kimberly and King Hill can be viewed in the file baseflow.dat. Values are in cubic feet per day.

Testing of interim spreadsheet tool

- 10 sample transfers
  - Analyzed with spreadsheet tool
  - Analyzed with two independent ESPAM Version 2.1 MODFLOW runs (with and without transfer)
  - MODFLOW runs used same stress periods and time steps as spreadsheet tool
  - MODFLOW runs used same MODFLOW version and solver settings as spreadsheet tool
  - Compared impacts calculated by ESPAM Version 2.1 MODFLOW runs with results in “CalculatedEffects” worksheet of spreadsheet tool


ESPAM 2.1 boundary
ESPAM2.1 river cells
Reach
Ashton-Rexburg
Heise-Shelley
Neeley-Minidoka
Shelley-nr Blackfoot
nr Blackfoot-Neeley
ESPAM 2.1 spring cells
REACH
Buhl_LowerSalmonFalls
Kimberly_Buhl
LowerSalmonFalls_KingHill
Model cells for "To" and "From" wells
From
To
74
73
32
31
21
33
22
34
23
25
37
35
61
36
29
51
41
11
47
43
13
17
15
N
0 10 20
Miles



Questions?