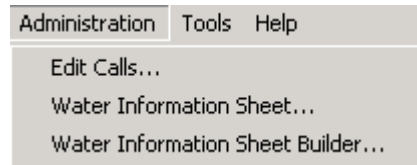

5 Administration Tools

Version 03.06.05, 2005-08-05, Color, Acrobat Distiller

The CWRAT **Administration** menu provides access to water administration tools. This menu is not available in StateView.



Menu_Administration

CWRAT Administration Menu

The following sections describe the features available for each menu item:

- | | |
|--|--|
| 5.1 Edit Calls | Set and release calls and edit data for existing calls. |
| 5.2 Water Information Sheets | Use existing Water Information Sheets for administration, and display stream network diagrams. |
| 5.3 Water Information Sheet Builder | Create and modify Water Information Sheets and associated diagrams. |

Earlier versions of CWRAT relied on local Microsoft Access databases to store real-time streamflow and administrative data. This information could then be synchronized with the central SQL Server database. Due to advances in network communications, administration performed with CWRAT should now occur using the central SQL Server database. The overall performance of this approach is better and simplifies the software tools.

5.1 Edit Calls

The **Administration...Edit Calls** menu allows river call data to be viewed and edited. The interface serves as a record-keeping mechanism for calls but currently does no analysis to help determine when calls should be placed. The viewing features are similar to those available from the **Data...Call Chronology** menu (the latter being non-editable). Users with a valid login and permissions for the water district of the call can edit the call data (guest users are not allowed to edit calls).

The following figure illustrates the **Edit Calls** interface.

Colorado Water Rights Administration Tool - Administration - Edit Calls

Time Period: 2005-07-31 13:45 to 2005-08-03 13:45 Set Period

Main Stem Calls: (5 records returned for division 1):

	START DATE/TIME	END DATE/TIME	WATER SOURCE	WDID	STRUCTURE NAME
1	2005-07-10 08:00	ACTIVE	SOUTH PLATTE RIVER	6499999	SOUTH PLATTE RIVER COM
2	2005-07-15 08:00	ACTIVE	SOUTH PLATTE RIVER	6400511	HARMONY DITCH 1
3	2005-07-30 08:00	ACTIVE	SOUTH PLATTE RIVER	0100518	LOWER PLATTE BEAVER C
4	2005-07-30 08:00	ACTIVE	SOUTH PLATTE RIVER	6400528	STERLING IRR CO DITCH 1
5	2005-07-31 08:00	ACTIVE	SOUTH PLATTE RIVER	0200826	JAY THOMAS DITCH

Tributary Calls: (9 records returned for division 1):

	START DATE/TIME	END DATE/TIME	WATER SOURCE	WDID	STRUCTURE NAME
1	2005-07-04 08:00	ACTIVE	LITTLE THOMPSON CR	0400602	SUPPLY LATERAL DITCH
2	2005-07-29 06:00	ACTIVE	CACHE LA Poudre RIV	0300915	CACHE LA Poudre DITCH
3	2005-07-29 08:00	ACTIVE	CLEAR CREEK	0700549	COLO AGRICULTURAL I
4	2005-07-31 08:00	ACTIVE	ST VRAIN CREEK	0500527	ROUGH READY DITCH
5	2005-07-31 08:00	ACTIVE	BIG THOMPSON RIVER	0400530	LOUDEN DITCH
6	2005-07-31 08:00	ACTIVE	BOULDER CREEK	0600533	HIGH AND S SIDE DITCH

Set Call Release Call Copy Call Remove Call Reactivate Released Call Edit Comments

Graph Print Export Close Refresh

Call Chronology query completed. 14 records returned in 0.371 seconds.

Admin_EditCalls

Edit Calls Interface

The calls that are initially displayed have been active during the display period listed at the top of the window. The period shown defaults to the period set in the **Tools...Options...Time Period** settings. The calls are divided into **Main Stem Calls** (those occurring on streams that are not a tributary) and **Tributary Calls**. Recent calls are listed at the top of each list. The following sections describe how to set and release calls. Use the **Refresh** button to requery the database without setting the period (e.g., use this feature when others may have set calls after the current session has started).

5.1.1 Setting a Call

To set a new call, first press the **Set Call** button on the bottom of the **Edit Calls** interface, which will display a view as illustrated in the following figure.

Colorado Water Rights Administration Tool - Set Call

Structure List (from Call Information):
Currently-selected structure: 6400511 - HARMONY DITCH 1

Available Calls (using Admin. Number):
6400511 - HARMONY DITCH 1

2302908 - JEFFERSON CREEK GAGE
2303904 - ANTERO RES
2304013 - SPINNEY MTN RESERVOIR
6400503 - SOUTH RESERVATION DITCH
6400504 - PETERSON DITCH
6400511 - HARMONY DITCH 1
6400515 - HARMONY DITCH 2

16554.00000
19765.00000
55882.00000
BYPASS

Select Structure from Database

Call for 6400511 - HARMONY DITCH 1

Administration Number: Appropriation Date: Decreed Amount: Adjudication Date: Priority Number:

Date/Time that Call is Set: 2005-08-03 13:56 Set Date/Time

Districts Affected:

Set Comment:

OK Cancel

Finished Retrieving Water District Water Data.

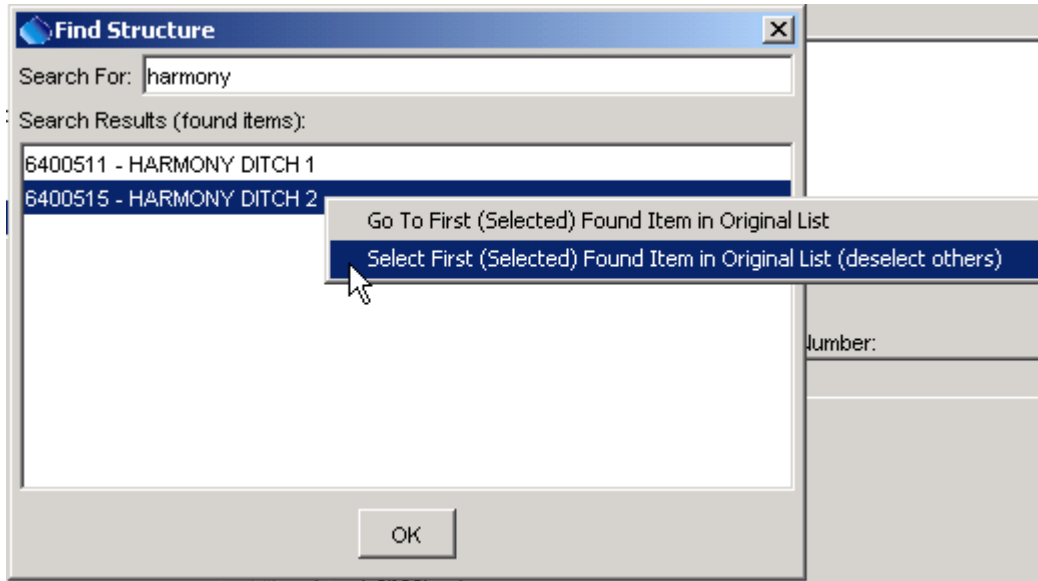
Admin_EditCalls_SetCall_StructureBlank

Set Call Dialog - Before Entering Call

Calls are set by first selecting a structure using its water district identifier (WDID) and then selecting a net amount water right for the structure. The first structure in the list will be selected by default. Because there are a large number of structures in the HydroBase database, it is difficult to provide a selectable list containing all structures. Additionally, only structures that are actually administered need to be listed. Consequently, the list of structures that is initially displayed is generated either from available Water Information Sheets or previous calls (see the **Tools...Options...Administration** settings to control which method is used by default). If the desired structure is not in the list, press the **Select Structure from Database** button to make a general database query, which will display the **Structure Data** view as described in **Section 4.5** – when done selecting a single structure, press **OK** and the structure will be added to the **Structure List** as shown in the above figure.

To set a call for a structure using the **Set Call** interface:

1. Select the calling structure's name from the **Structure List**. As discussed above, the list of structures can be listed from available WIS, previous calls, or from a HydroBase query. The structures are sorted by water district identifier. You can also right-click on the list and select **Find Structure** to display a search dialog for the list, as shown in the following figure.



Admin_EditCalls_SetCall_FindStructure

Find Structure Dialog

To use the search dialog, enter a string in the **Search For** text field and press the **Enter** key. All matching structures in the structure list will be listed in the search dialog. To select a structure in the original list, select the structure in the **Find Structure** dialog, then right-click on the list and indicate to select the first found item in the original list. The item will be selected in the original list as if you had selected it directly. Press **OK** to close the **Find Structure** dialog. The currently selected structure will be indicated with a label above the **Structure List**.

2. Based on the structure that is selected, a list of all the available water rights for the structure will be displayed (see **Available Calls** in the **Set Call** interface). The list is sorted in ascending order. The content of the list is set by the **Tools...Options...General** settings and can be the administration number, appropriation date, decree amount, adjudication date, or priority number. When a calling right is selected, all of the values related to the call are displayed in the center of the **Set Call** interface.
3. Set the **Date/Time that Call is Set** for the call to start (defaults to the current time) using the **Set Date/Time** button.
4. List the **Districts Affected**, separated by commas. You must enter these manually (the list is not automatically generated).

5. Enter a **Set Comment**, if desired. The completed call information in the **Set Call** window will look similar to that shown in the following figure.

Colorado Water Rights Administration Tool - Set Call

Structure List (from Call Information):
Currently-selected structure: 6400511 - HARMONY DITCH 1

Available Calls (using Admin. Number):
6400511 - HARMONY DITCH 1

2302907 - MICHIGAN CREEK GAGE
2302908 - JEFFERSON CREEK GAGE
2303904 - ANTERO RES
2304013 - SPINNEY MTN RESERVOIR
6400503 - SOUTH RESERVATION DITCH
6400504 - PETERSON DITCH
6400511 - HARMONY DITCH 1

16554.00000
16554.00000
19765.00000
55882.00000
BYPASS

Select Structure from Database

Call for 6400511 - HARMONY DITCH 1

Administration Number: 16554.00000 Appropriation Date: 1895-04-28 Decreed Amount: 252.0000 Adjudication Date: 1896-07-20 Priority Number: CA0304

Date/Time that Call is Set: 2005-08-03 13:56 Set Date/Time

Districts Affected: 64

Set Comment:

OK Cancel

Finished Retrieving Water District Water Data.

Admin_EditCalls_SetCall_Complete

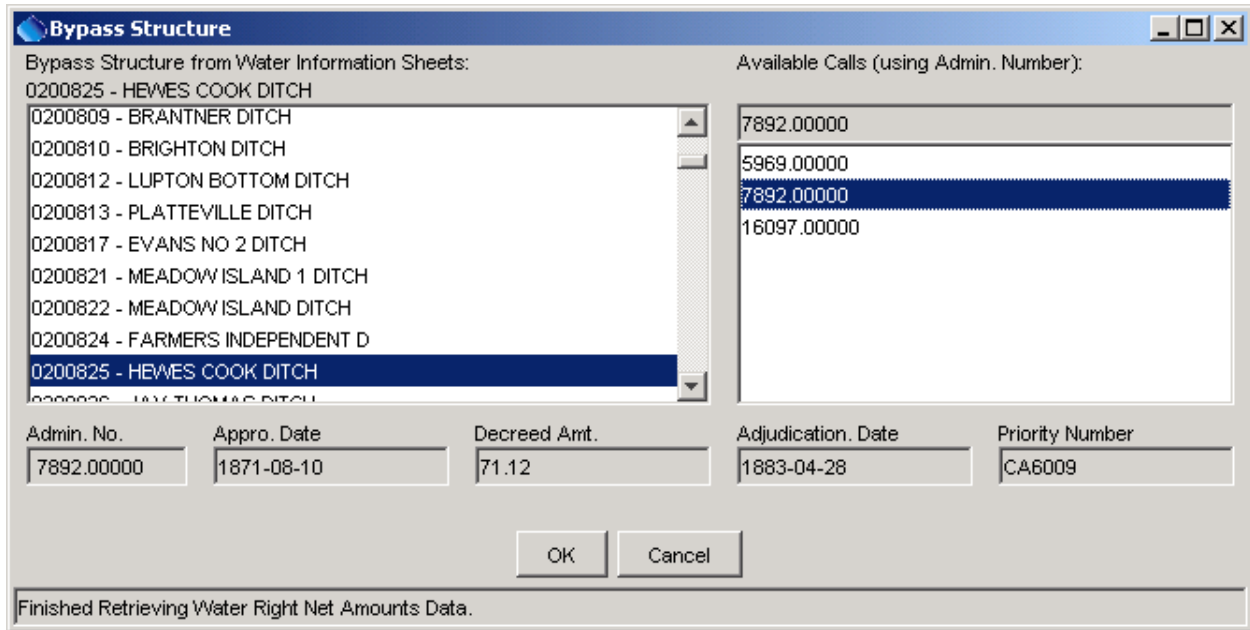
Completed Call Data

6. Press the **OK** button to set the call. The call will then be listed in the **Edit Calls** screen. The call will be available for viewing by other system users.

5.1.1.1 Setting a Bypass Call

Bypass calls are used in Division 1 and involve using water rights for a secondary structure. The procedure for setting a bypass call is as follows:

1. Select the calling structure's name from the **Structure List**, as described above. This will display the available rights for the structure in the **Available Calls** list.
2. Rather than selecting a water right for the structure, select **BYPASS** under the **Available Calls**. This will display a window similar to the following:



Bypass Structure

Bypass Structure from Water Information Sheets:

- 0200825 - HEWES COOK DITCH
- 0200809 - BRANTNER DITCH
- 0200810 - BRIGHTON DITCH
- 0200812 - LUPTON BOTTOM DITCH
- 0200813 - PLATTEVILLE DITCH
- 0200817 - EVANS NO 2 DITCH
- 0200821 - MEADOW ISLAND 1 DITCH
- 0200822 - MEADOW ISLAND DITCH
- 0200824 - FARMERS INDEPENDENT D
- 0200825 - HEWES COOK DITCH
- 0200826 - JAY THOMAS DITCH

Available Calls (using Admin. Number):

- 7892.00000
- 5969.00000
- 7892.00000
- 16097.00000

Admin. No.: 7892.00000 Appro. Date: 1871-08-10 Decreed Amt.: 71.12 Adjudication Date: 1883-04-28 Priority Number: CA6009

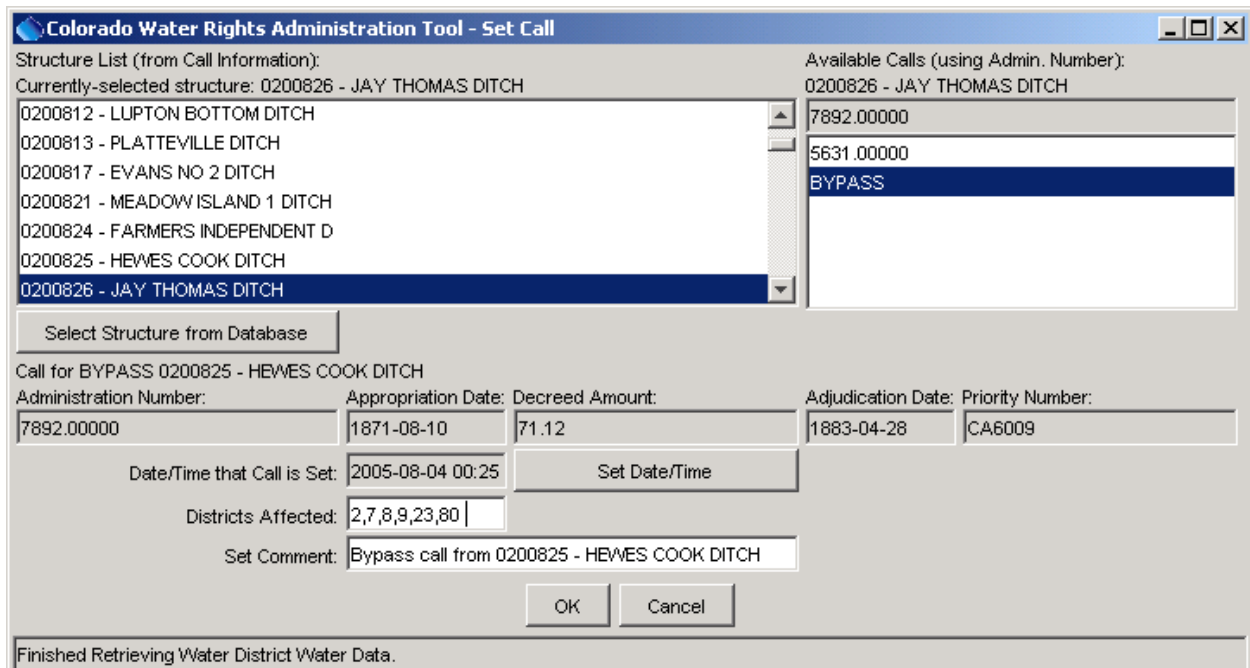
OK Cancel

Finished Retrieving Water Right Net Amounts Data.

Admin_EditCalls_SetCall_BypassStructure

Selecting the Bypass Structure and Associated Calling Right

- The list of bypass structures is determined by listing structures in water information sheets. Select the bypass structure and the water right to use for the call and then press **OK**. The bypass structure will be indicated in the **Set Comment** for the call, as shown in the following figure. The **Set Comment** is used later when copying calls; therefore, any additional comments should be added at the end of the default comment. Note that the information in the lower part of the **Set Call** window is labeled as being related to the bypass structure.



Colorado Water Rights Administration Tool - Set Call

Structure List (from Call Information):

Currently-selected structure: 0200826 - JAY THOMAS DITCH

- 0200812 - LUPTON BOTTOM DITCH
- 0200813 - PLATTEVILLE DITCH
- 0200817 - EVANS NO 2 DITCH
- 0200821 - MEADOW ISLAND 1 DITCH
- 0200824 - FARMERS INDEPENDENT D
- 0200825 - HEWES COOK DITCH
- 0200826 - JAY THOMAS DITCH

Available Calls (using Admin. Number):

- 0200826 - JAY THOMAS DITCH
- 7892.00000
- 5631.00000
- BYPASS

Select Structure from Database

Call for BYPASS 0200825 - HEWES COOK DITCH

Administration Number: 7892.00000 Appropriation Date: 1871-08-10 Decreed Amount: 71.12 Adjudication Date: 1883-04-28 Priority Number: CA6009

Date/Time that Call is Set: 2005-08-04 00:25 Set Date/Time

Districts Affected: 2,7,8,9,23,80

Set Comment: Bypass call from 0200825 - HEWES COOK DITCH

OK Cancel

Finished Retrieving Water District Water Data.

Admin_EditCalls_SetCall_Bypass

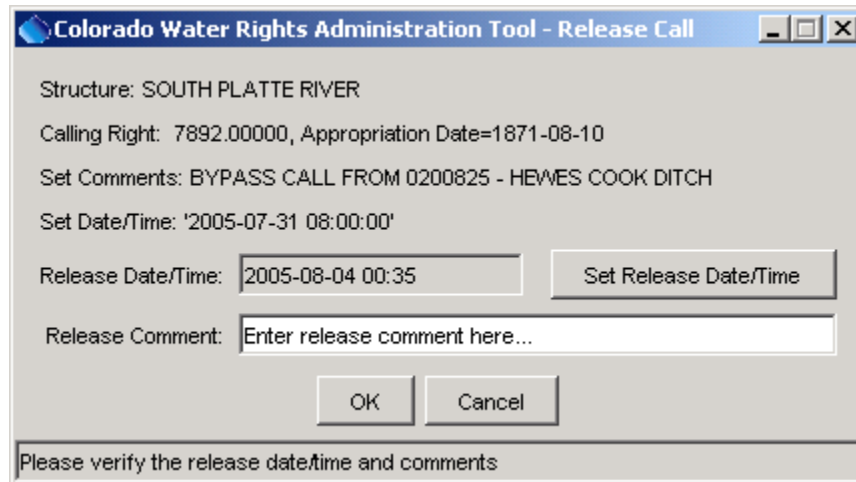
Final Bypass Call Information

- Press **OK** to set the bypass call.

5.1.2 Releasing a Call

A call is released when the conditions for the call no longer apply and therefore the call is no longer needed. Releasing a call releases the call in the database but does not delete it from the database. A call that has been released can be reactivated (discussed in subsequent section). To release a call:

1. Select the desired call from the **Main Stem Calls** or **Tributary Calls** list in the **Edit Calls** interface and press the **Release Call** button. This displays the dialog similar to the following:



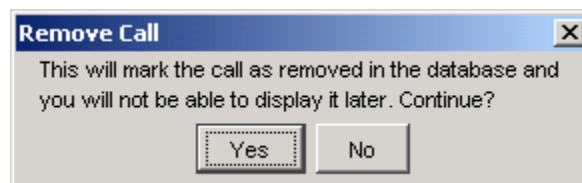
Admin_EditCalls_ReleaseCall

Release Call Dialog

2. If appropriate, edit the **Release Date/Time**.
3. If appropriate, enter a **Release Comment**.
4. Press the **OK** button. The main **Edit Calls** display will be updated to reflect the release.

5.1.3 Removing a Call

In cases where a call was set by mistake, it can be removed by selecting the call in the **Edit Calls** window and pressing the **Remove Call** button. The following figure shows the warning that is issued before the call is removed.



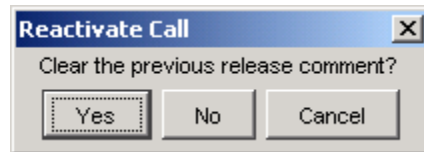
Admin_EditCalls_RemoveCall

Warning Issued when Removing a Call

To confirm the delete, press the **OK** button. The main **Edit Calls** display will be updated to reflect the removal of the call.

5.1.4 Reactivating a Released Call

To reactivate a released call, select the call in the **Edit Calls** window and press the **Reactivate Released Call** button, which will display the following dialog:



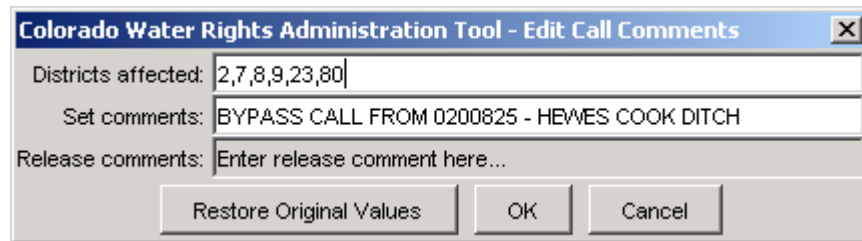
Admin_EditCalls_ReactivateCall

Reactivating a Released Call

This dialog provides the choice of retaining the original release comment or clearing it so that a new release comment can be added later. You may need to change the time period in the **Edit Calls** window to be able to see the call.

5.1.5 Editing a Call's Comments

Call comments may need to be edited if the information for the call has changed. To edit call comments, select a call in the main **Edit Calls** window and press the **Edit Call Comments** button. A dialog similar to the following will be shown:



Admin_EditCalls_EditComments

Editing Call Comments

Press **OK** to save edits, or **Cancel** to cancel the edit. The **Restore Original Values** button can be used to restore the original comment information, if an error was made in the dialog.

5.1.6 Copying a Call

To streamline setting calls, previous calls can be copied. To copy a call:

1. Select a call in the main **Edit Calls** window and press **Copy Call**. The **Set Call** window will then be displayed with the same information as the original call, with the **Set Date** being the current date/time. If the original call was a bypass call, the labels in the **Set Call** window will display the bypass structure and right.
2. Edit the call information as desired and press **OK** to set the call. The main **Edit Calls** window will be updated to reflect the change.

5.1.7 Graphing Calls

Calls can be graphed to see when calls are on/off over a time period. See **Section 4.1 - Call Chronology** for more information.

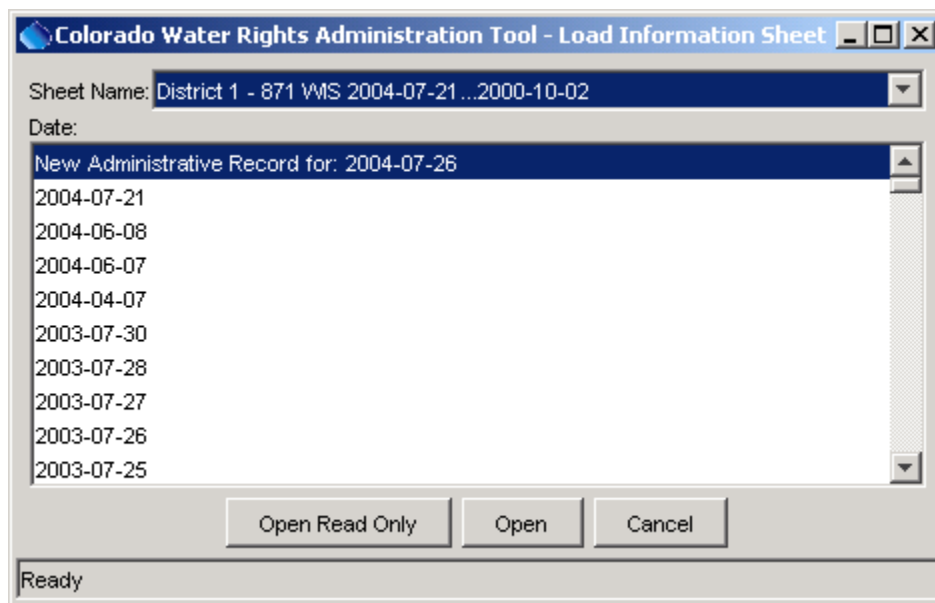
5.1.8 Displaying Calls on the WIS Diagram

Calls that are set can be displayed on a diagram representation of the river system. To do so, use the **Administration...Water Information Sheet** menu, select an appropriate WIS, and then use the **Display Diagram** button – see **Section 5.2.2 – WIS Diagram**. Note that this feature can be used even if daily data in the WIS are not actively being maintained (although the format of the WIS must be reasonably accurate).

5.2 Water Information Sheet

The WIS (Water Information Sheet) is a useful administration tool in CWRAT. Using the WIS, you can submit or view vital information regarding the condition of the river. Before loading a WIS, the format of the WIS must be defined (see **Section 5.3 - Water Information Sheet Builder** for a complete discussion of WIS capabilities). Water information sheets are typically defined by State of Colorado staff familiar with the **WIS Builder**.

Once a WIS has been built, load it using the **Administration...Water Information Sheet** menu, which will display a selection dialog as shown in the following figure.



Admin_WIS_Load

Load Information Sheet Dialog

The **Sheet Name** choice lists available WIS. The first part of each choice is the sheet name. The number of sheets that have been saved and the period for the saves is also shown. This gives an indication of the amount of data that are available for viewing, including graphing of decisions over time.

Typically, water commissioner information in HydroBase is configured to allow a water commissioner to edit administrative data only for districts for which they are responsible. However, WIS can be viewed (not edited) by all CWRAT users.

To load a WIS, select a **Sheet Name** from the drop-down list. The list of administrative dates available for the selected sheet name will be shown. Select an administrative **Date**, which is the date for which the data applies (selecting a new sheet name will refresh the list of administrative dates), and press:

1. **Open Read Only** – to view the WIS but not be able make changes. This is useful when an old sheet needs to be reviewed in order to make current administrative decisions.
2. **Open** – to load the WIS for full functionality.

If a sheet is not saved for the current date, you have the option of loading a sheet that will be treated as a new administrative record (as shown in the above figure). **When a new administrative record date is selected, the sheet will initially be filled with data from the previous sheet, regardless of the amount of time that has passed since a WIS was previously saved.** A sheet for a previous date can be selected and then archived with a new date (e.g., when setting information for weekends). During the week, sheets will normally be edited for a new administration record. **Only one sheet per day can be saved – the last sheet saved for the day will remain in the database.**

Once a sheet and date are selected, the WIS will be displayed as shown in the following figure.

Colorado Water Rights Administration Tool - Water Information Sheet: District 1

Administrative data for: 2003-04-22 00:00 Set Date

Row Label	Point Flow	Natural Flow	Delivery Flow	Gain Loss	Releases	Priority Diversion	Delivery Diversion	Trib. Natural	Trib. Delivery	Comments
South Platte River										
PLAKERCO	459.0	459.0	0.0							
EMPIRE DITCH	459.0	459.0	0.0							Bypassing 10 cfs f
Crow Creek	464.0	464.0	0.0					5.0		
RIVERSIDE CANAL	336.0	336.0	0.0			128.0				
ILLINOIS DITCH	320.0	320.0	0.0			16.0				
BIJOU CANAL	205.0	205.0	0.0			115.0				
PUTNAM DITCH	205.0	205.0	0.0							
CORONA RANCH DITCH	202.6	202.6	0.0			2.4				
JACKSON LAKE INLET DITCH	202.6	202.6	0.0							
WELDON VALLEY DITCH	79.6	79.6	0.0			123.0				
Jackson Lake Outlet	79.6	79.6	0.0							
FT MORGAN CANAL	-55.4	-55.4	0.0			135.0				
PLAWELCO	457.0	457.0	0.0							
Weldon Valley Return	457.0	457.0	0.0							
Bijou Creek	459.0	459.0	0.0					2.0		
DUEL SNYDER CANAL	459.0	459.0	0.0							
UPPER PLATTE BEAVER CNL	306.0	306.0	0.0			153.0				

Comments:

Status: Sheet has been modified Gain Method: None

Save Clear Dry River

Print Export Summary Display Diagram Close Cancel

Finished performing calculations.

Admin_WIS_Initial

Water Information Sheet after Loading

Each tributary (or stream) is represented by rows on the sheet and links between streams can be made. See **Section 5.3 – Water Information Sheet Builder** for more information about configuring sheets.

If the sheet has never been used, it will be blank and/or contain zeros. If a previous archive exists, then the sheet will display the previous data values, with current data imports superimposed in the appropriate cells. During normal operation, the previous sheet's values will be carried forward to the current sheet, minimizing the need for data entry.

WIS cell formats are as follows:

Gray Cell

Contents are view-only and have their values computed automatically.

blue
contents

Real-time flow data imported according to the import definition in the WIS builder (some gaged diversions are also imported). **Blue cells change to black after initial computations are complete.** You can enter values in any of the white cells, and can override imported values if desired (for example, if a real-time stream gage value is inaccurate, a different value can be entered).

red
contents

Cell is computed based on a formula, as defined in the WIS builder. You can enter values in any of the white cells.

black
contents

When initially loaded, cells with black contents are carried forward from a previous sheet. After the WIS is computed, black contents in gray cells are computed. Values in white cells can be entered.

WIS columns are described in the following table.

WIS Columns (left to right)

WIS Row	Description
Row Label	A (generally) verbose row label. If the row is a structure or station from HydroBase, the label is the station/structure name. Otherwise, the label is defined in the WIS Builder .
Point Flow	<p>The point flow on the river. The point flow is determined by one of the following methods:</p> <ol style="list-style-type: none"> 1. Imported from a stream gage 2. Computed as the upstream point flow + Gain/Loss + Trib. Natural + Trib. Delivery + Releases – Priority Diversions – Delivery Diversions <p>The point flow also is the sum of Natural Flow and Delivery Flow.</p>
Natural Flow	The portion of the point flow that has not been allocated to human use. It is free river water (other than it is can be checked against minimum flow requirements). This is either set with a formula (defined in the WIS Builder) or is computed as Point Flow – Delivery Flow .
Delivery Flow	<p>The portion of the point flow that is allocated to human use. For the most upstream node in a tributary, it is determined as:</p> <ol style="list-style-type: none"> 1. User-supplied (enter a user-supplied value in the releases column), or 2. Define a formula using the WIS Builder <p>For other nodes, it is the upstream point's Delivery Flow + Trib. Delivery + Releases – Delivery Diversion.</p>
Gain Loss	The gain or loss that occurs from the upstream point on the stream. It is computed as the gain/loss between base (gaged) flow locations on the reach, prorated by stream mile or weight, depending on the gain method that is used (selected in the lower right of the Water Information Sheet window).
Releases	A release made at the structure (typically only for reservoirs or to set the initial flow at the top of a tributary).
Priority Diversion	A priority diversion, which subtracts from the natural flow.
Delivery Diversion	A delivery diversion, which subtracts from the delivery flow.
Trib. Natural	For confluence rows (defined in the WIS Builder), this is the natural flow that is contributed from the upstream tributary.
Trib. Delivery	For confluence rows (defined in the WIS Builder), this is the delivery flow that is contributed from the upstream tributary.
Comments	Comments for the row (e.g., to explain an administrative decision).

Flow values shown in rows are immediately downstream of the point for the row. For streamflow gage rows, this is essentially the value at the gage. For rows that have diversions or releases, the flow is that after the diversions and releases have been accounted for.

Additional information about the Water Information Sheet interface is listed below, from top to bottom and left to right in the interface:

Administrative data for (top of window)	Sets the date for which the WIS applies. To save sheets for the weekend, load a previous sheet and then save using the date that corresponds to the weekend day.						
Comments (below worksheet)	Comments that apply to the entire sheet (comments can also be set for each row).						
Status (below comments)	Indicates whether the sheet has been modified, which will be the case if editing a new sheet or when an existing sheet is loaded and edited.						
Gain Method (below comments)	Indicates the gain method to be used when calculating the cell contents. The following options are available: <table> <tr> <td>None</td><td>Flows between points are essentially carried forward with no adjustment for the overall gain/loss between known point flows (stream gages). This method is the simplest.</td></tr> <tr> <td>Stream Mile</td><td>Gain/loss between known point flows (stream gages) is distributed based on the stream mile of the points. This method is not often utilized because the stream mile for all points is not typically known.</td></tr> <tr> <td>Weights</td><td>Gain/loss between known point flows (stream gages) is distributed based on a simple proration factors defined in the WIS Builder. This method allows hydrologic conditions of the basin to be recognized in each stream reach.</td></tr> </table>	None	Flows between points are essentially carried forward with no adjustment for the overall gain/loss between known point flows (stream gages). This method is the simplest.	Stream Mile	Gain/loss between known point flows (stream gages) is distributed based on the stream mile of the points. This method is not often utilized because the stream mile for all points is not typically known.	Weights	Gain/loss between known point flows (stream gages) is distributed based on a simple proration factors defined in the WIS Builder . This method allows hydrologic conditions of the basin to be recognized in each stream reach.
None	Flows between points are essentially carried forward with no adjustment for the overall gain/loss between known point flows (stream gages). This method is the simplest.						
Stream Mile	Gain/loss between known point flows (stream gages) is distributed based on the stream mile of the points. This method is not often utilized because the stream mile for all points is not typically known.						
Weights	Gain/loss between known point flows (stream gages) is distributed based on a simple proration factors defined in the WIS Builder . This method allows hydrologic conditions of the basin to be recognized in each stream reach.						
Save	Save the current sheet contents. The sheet is automatically recomputed before saving. You will be warned if the archive date is in the past or the future. You will also be warned if negative flow values are detected. You should consider correcting negative flow values because they indicate a problem with water balance. Negative flows may be the result of the gain method (see above).						
Clear	Clear all the cell contents. This action is used primarily during development and is typically not used by water commissioners. You will be prompted to verify the clear.						
Dry River	The Dry River button will be highlighted if you have selected a row that is of type Diversion, Reservoir, Minimum Flow, or Other. If you press this button on a selected row, the Point Flow is set to zero and is labeled as "DRY". The row is then treated as a known point flow row (similar to a stream gage) during subsequent computations. If a dry row is selected, the button will change to UN-Dry River and you have the option of restoring the original condition. You can select multiple dry rows in a stream reach in which case the point flow is interpolated between the dry points. The effects of gains and losses in a reach may result in negative flows when dry rows are used. It is your responsibility to adjust for negative flows before archiving the sheet.						

<i>Print</i>	Print a text version of the WIS.
<i>Export</i>	Export the WIS to a file, in either text or HTML formats.
<i>Summary</i>	Similar report as the <i>Export</i> but includes a diversion coding summary at the bottom.
<i>Display Diagram</i>	Display a diagram of the basin (see Section 5.2.2 – WIS Diagram for more information)
<i>Close</i>	Close the WIS. You will be prompted to determine if you want to save the sheet.
<i>Cancel</i>	Close the WIS without saving changes.

5.2.1 Displaying WIS Cell Attributes

To display a WIS cell's attributes, right-click on the cell (if necessary, first select the cell with the left mouse button). This results in a dialog similar to that shown in the following figure.

The screenshot shows a dialog box titled "Colorado Water Rights Administration Tool - WIS Cell Properties". It contains the following fields and controls:

- Row JLabel: RIVERSIDE CANAL
- Internal Identifier: wdid:0100503 (with a "Full Info" button next to it)
- Column: Priority Diversion
- Row Type: Diversion
- Stream for Row: SOUTH PLATTE RIVER (wis_format.wdwater_num = 6351)
- Stream Mile: 144.0
- Is Baseflow: N
- Current Cell Contents: 128.0
- Downstream Row Label: ILLINOIS DITCH
- Downstream Internal Identifier: wdid:0100504
- Gain/Loss Coefficient. (using Stream Mile): Does not apply.
- Gain/Loss Coefficient. (using Weight): $1.0/12.0 = 0.08$
- Import: IMPORT TYPE: Real Time Satellite Data
IMPORT METHOD: AVE
END TIME: 600 TIME OFFSET: 0
ORIGINAL IMPORT VALUE: No Import Value available
- Formula: CELL DOES NOT CONTAIN A FORMULA
- An "OK" button at the bottom center.

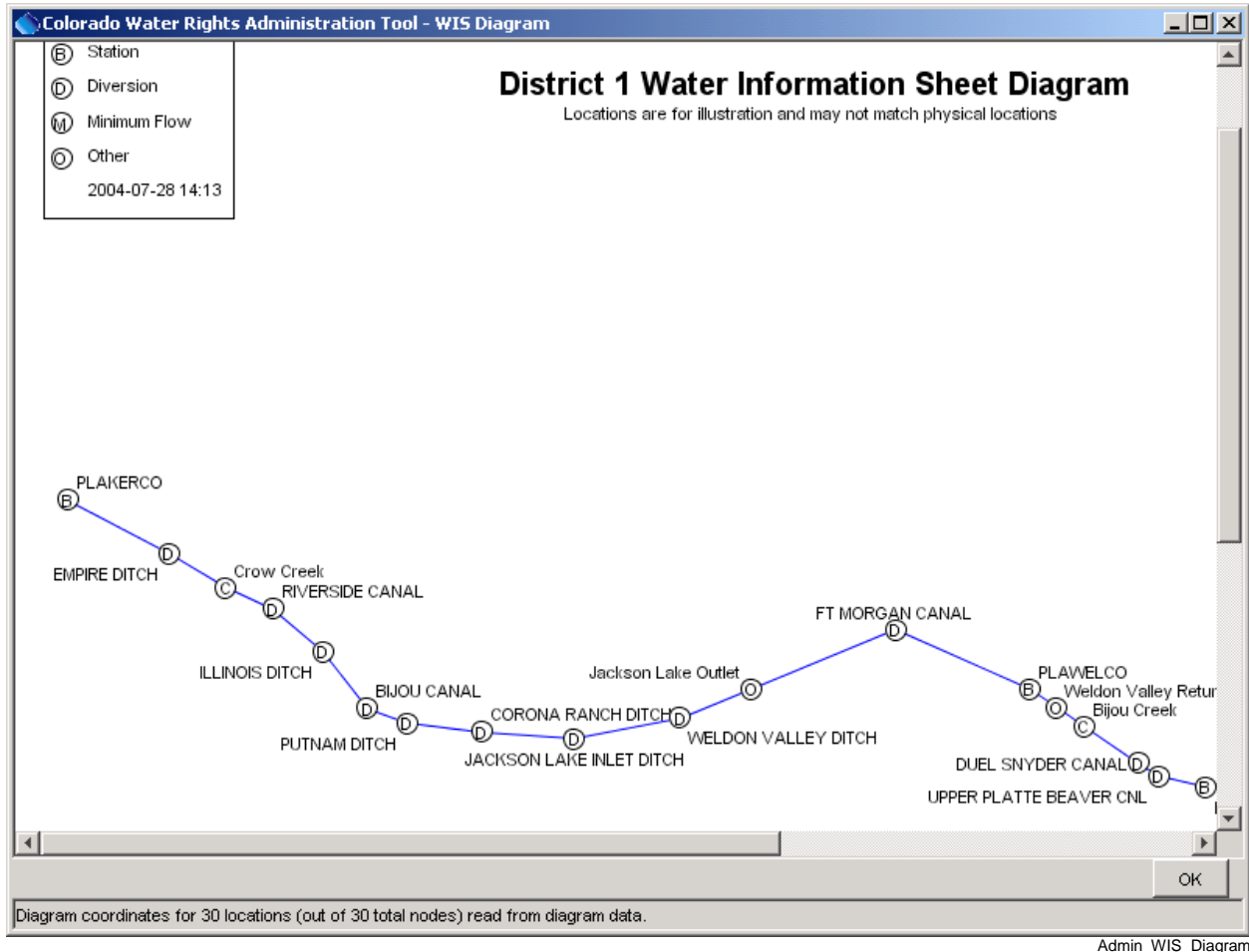
Admin_WIS_CellProps

WIS Cell Properties Dialog

The information that is shown is consistent with the cell properties shown by the WIS Builder.

5.2.2 WIS Diagram

The **WIS Diagram** is a simple schematic representation of the basin that is described by the WIS and is displayed using the **Display Diagram** button on the main WIS window. A sample diagram is shown below:



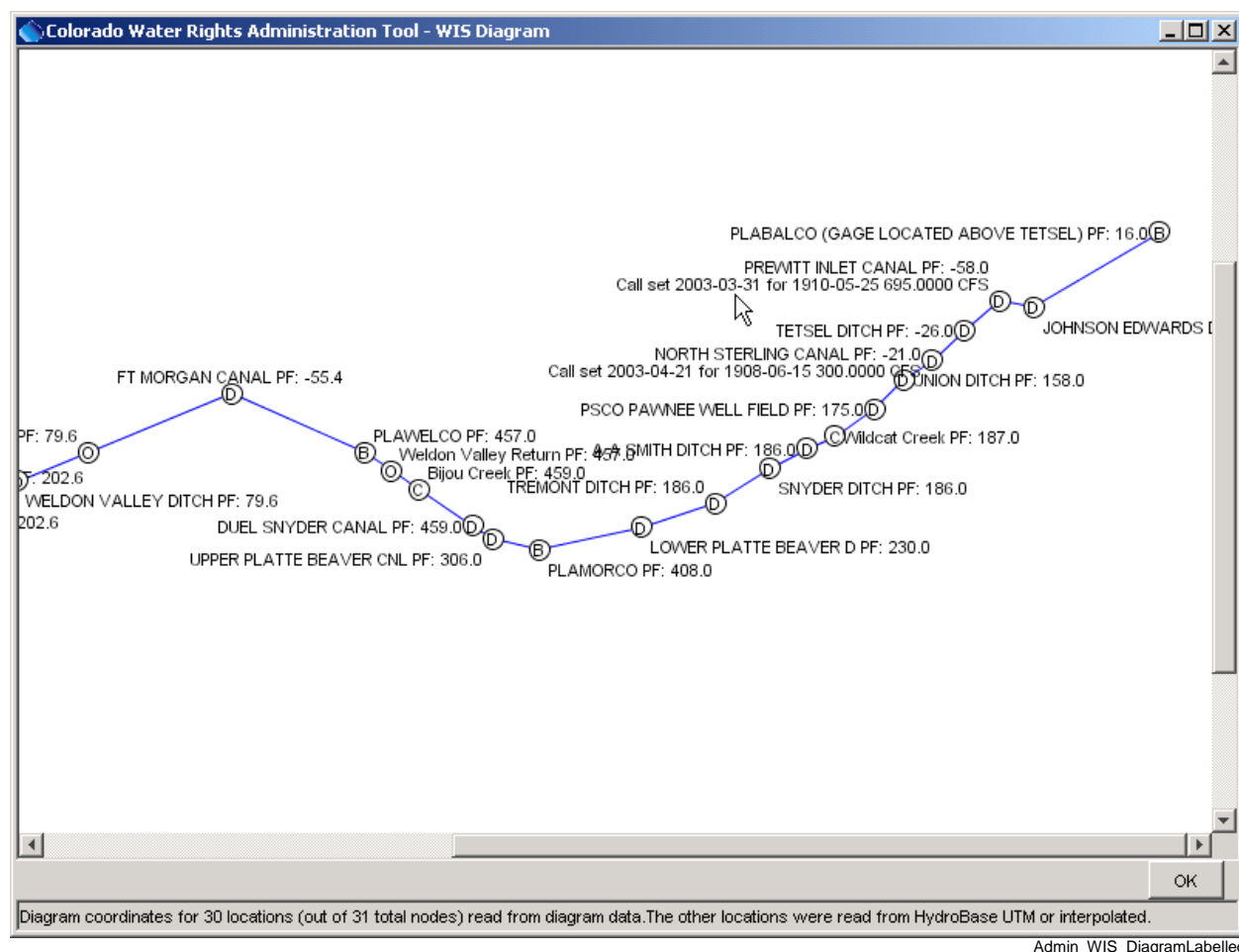
WIS Diagram for District 1

The layout of the river system is not meant to match traditional line diagrams or physical locations. The layout is configured in the **WIS Builder** to allow display of location names and other information, without information overwriting itself. The basic display provides a visual representation of the order of the river, in order to better understand data values shown in the WIS.

Right-clicking on the diagram displays a menu with the following choices:

Show Flow Data	Label the diagram with point flows from the WIS.
Show Calls	Label the diagram with calls, as of the time of the WIS.
Show Rights	Label the diagram with water rights for structures in the WIS.
Print on Letter in Landscape	Print the diagram as shown, on letter-sized paper, in landscape orientation.

The following figure illustrates an example of the **WIS Diagram** showing point flows and calls:



District 1 WIS Diagram with Point Flows and Calls

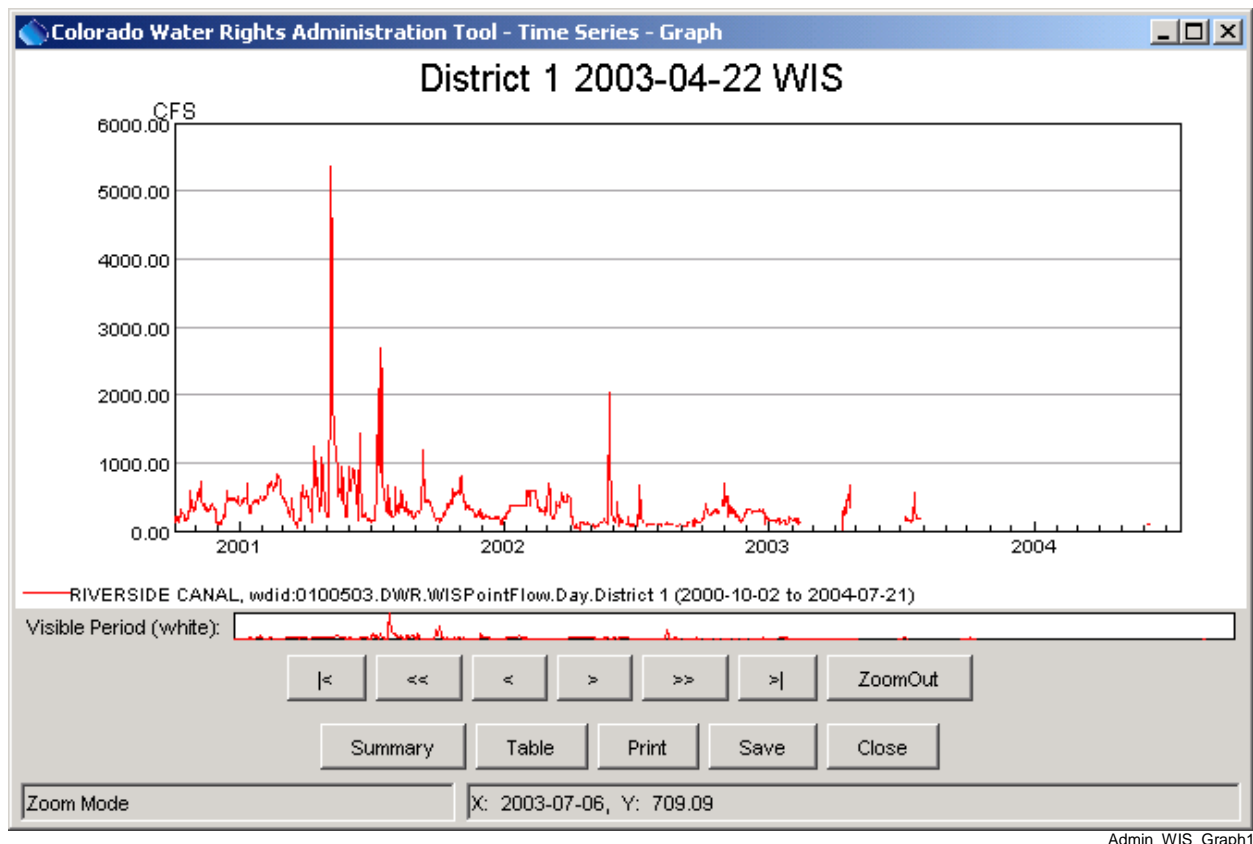
The above figure illustrates that it is difficult to fully control the display of labels so that they do not overwrite (displaying rights adds additional labels to the diagram). The intent of the **WIS Diagram** is not to provide publication-quality graphics but to present data in a concise and reasonable layout. If necessary, the **WIS Builder** can be used to fine-tune the diagram representation.

WIS Diagram data are stored in the HydroBase database. Consequently, any user that is able to display a WIS can also view the diagram. Additionally, it is not a requirement to have actively-maintained WIS to use the diagram. If a WIS is defined for a water district and minimal configuration has been done to import real-time gage values, then a diagram can be shown to display the real-time point flow values. Calls that have been set with the **Administration...Edit Calls** interface will also be shown, even if the WIS is not actively maintained. Consequently, the **WIS Diagram** is a useful tool for viewing administrative data in a spatial representation.

5.2.3 Graphing Cell Contents

Any data cell in a Water Information Sheet can be graphed, as follows:

1. Left-click in the cell to select the cell. Only data cells (cells with numerical information) can be graphed.
2. Right-click in the cell to show the popup menu and select the **Graph** menu item. All of the available data period for the cell will be used to create a graph, similar to the following (graphing from an old WIS may show data after the WIS was saved):



Graph of Natural Flow Column for a WIS

3. Interact with the graph as described in the **TSView Time Series Viewing Tools Appendix**. For example, use the **Table** and **Summary** buttons to view different data formats. The data can also be saved in DateValue format, for import into a spreadsheet or other tool.

It is also possible to graph all of the data for a row. To do so, select the row by clicking on the **Row Label** column. Then follow steps 2 and 3 above.

Using the above approach, there is currently no way to create a graph with cells from different rows. The TSTool software will allow data from different WIS cells to be graphed on the same page.

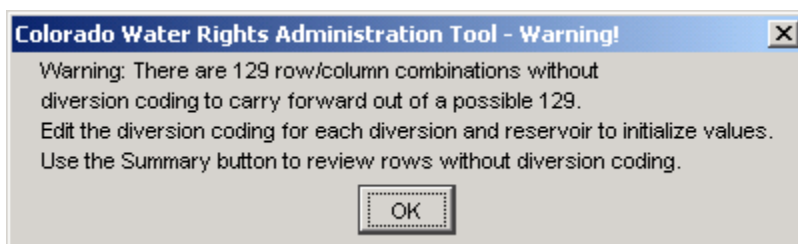
5.2.4 Diversion Coding

Diversion coding indicates the diversion records for a structure, including the water source (e.g., Natural Stream Flow), the structure from which the water is taken (e.g., a reservoir water district identifier), water use (e.g., irrigation), and type (e.g., Released to River), collectively known as SFUT (Source, From, Use, Type). See the **State of Colorado Water Commissioner Manual** for more information. The WIS can be used to perform diversion coding so that electronic diversion records are available for review in the winter off-season (when diversion records are transferred from water commissioners to the Denver offices and are entered in HydroBase as official diversion records). WIS diversion coding data are not saved in HydroBase in the same data tables as official diversion coding records and therefore do not take the place of official records – the WIS diversion coding values are meant as a data entry and verification aid. Because diversion coding is a somewhat laborious process, the WIS tool tries to help by using carry-forward logic, similar to the WIS data values. Diversion coding using the WIS is an optional activity and is turned on using the **Tools...Options...Administration** menu.

WIS diversion coding saves the SFUT information for each appropriate cell, using a convention similar to normal SFUT diversion coding conventions. The specific data that are saved are explained below.

The following steps are executed when using the diversion coding features.

1. When a WIS is loaded, WIS diversion coding records are queried from the database. For each structure, a query is executed to determine the nearest previous date when diversion coding was entered. If data are found on the WIS's date, then the observation flags are left as is. If data are found on an earlier date, then the data values are used but the observation flags are set to C to indicate that the data are being carried forward. The first time that a WIS is loaded with diversion coding turned on, a warning like the following will be displayed:



Admin_WIS_DivCoding_Warning

WIS Load Warning when Diversion Coding is Enabled

The above warning indicates that the carry-forward procedure used by the diversion coding logic cannot be completed because there were no previous diversion coding values to carry forward. Once initial values are entered, the warning should not appear. Use the **Summary** feature of the Water Information Sheet interface to list cells that do not have diversion coding.

2. Edit diversion coding information by first left-clicking on a white cell for **Priority Diversion**, or **Delivery Diversion**. Then select the **Diversion Coding** item in the popup menu. This will display a dialog similar to the following.

Colorado Water Rights Administration Tool - Diversion Coding for WELDON VALLEY DITCH (2004-07-26 - Priority Diversion)

Diversion coding total from WIS cell: 120.0
 Source: enter code or right-click on selected cell to see choices.
 From: enter structure identifier (no WD), if appropriate, for source.
 Use: enter code or right-click on selected cell to see choices.
 Type: enter code or right-click on selected cell to see choices.
 Obs: enter code or right-click on selected cell to see choices. W indicates default assigned by WIS. C indicates that values are carried forward.
 The total amount from this dialog will override the WIS value if OK is pressed.
 See the DWR Water Commissioner Manual for diversion coding information.

	STRUCTURE ID	SOURCE	FROM (ID)	USE	TYPE	OBS	AMOUNT (CFS)
1	TOTAL						0.00

Add Row Delete Row View History OK Cancel

Admin_WIS_DivCoding_Blank

Example Diversion Coding Dialog with No Data

The above example illustrates the case where previous diversion coding data for the structure are not available. In this case, you must enter the diversion coding that will be used until changed. In cases where diversion coding records are available (either because they were previously entered for the date or because they are being carried forward), those records will be displayed. To enter diversion coding values, first add a row using **Add Row** and then left-click in a cell to be edited. Select appropriate values from available choices or type in values where choices are not available (see the **Water Commissioner Manual** for more information). The **Obs** flag indicates whether the diversion value is observed by a water commissioner (*), is user-supplied (U), or is carried forward (C). If any value is changed from its original value and the **Obs** flag is C, then the **Obs** flag is automatically changed to *. If a record is added or deleted, the observation flag is automatically changed from C to *, if necessary. The flag should be verified because U might be the correct flag. See also **Section 5.2.5 – Diversion Coding when Previous Coding Exists** for an explanation of the W flag, which the WIS will use in some cases.

3. Press the **OK** button in the **Diversion Coding** dialog to save the diversion coding information to the Water Information Sheet. This does not save the information to HydroBase (see below for that step). Press the **Cancel** button to ignore changes that you made in the **Diversion Coding** dialog. When diversion coding information is saved with **OK**, the following occurs:
 - The total amount from the **Diversion Coding** dialog is entered in the WIS in the appropriate cell,
 - The diversion coding records from the **Diversion Coding** dialog replace those that were initially read and will consequently be saved if the WIS is saved.
4. When the Water Information Sheet **Save** button is pressed (or **Close** with a confirmation to save), the diversion coding records are saved to HydroBase.

Note that if you re-edit a WIS from a previous date, the changes that are made in that sheet do not automatically propagate to later sheets. Consequently, later values that indicate a carry-forward **Obs** flag of C will not agree with values that are edited (the C flag will not be accurate). However, no feature is

currently in place to propagate a change forward in time as this would likely compromise the validity of decisions made when those sheets were saved.

5.2.5 Diversion Coding when Previous Coding Exists

When diversion coding has been enabled in a WIS, it may be difficult to consistently edit the coding for every cell. Consequently, default behavior has been implemented to streamline diversion coding.

If a cell value in the main sheet is changed, the associated diversion coding records (if available), are changed as follows:

1. If the cell has a single diversion coding SFUT combination, then the total value for the record is immediately updated to the value in the main WIS and the observation flag is set to *****. Opening the **Diversion Coding** dialog will display the new total value and observation flag. The **Diversion Coding** dialog must be used if the observation flag should be set to something other than *****.
2. If the cell has multiple diversion coding SFUT combinations, no immediate action is taken to adjust the associated diversion coding records. Ideally the **Diversion Coding** dialog should be used for the cell to enter SFUT combinations that add to the total in the main display (note that if the **Diversion Coding** dialog is used, the total is always transferred back to the WIS). However, if the diversion coding is not entered, then when the WIS is saved, a diversion coding record will be saved with empty SFUT values and an observation flag of **W**, indicating that unknown diversion coding has occurred and the WIS is making an assumption. This case will be carried forward in future WIS (the **W** flag will be changed to **C** in future records). A warning is printed before the save to allow you to enter diversion coding for cells where default SFUT has been assumed.

In most cases, diversion coding will consist of a single SFUT record and no assumptions will need to be made by the WIS. In cases where multiple SFUT combinations are used, it will generally be best to edit the diversion amount using the diversion coding interface, rather than by only entering a total in the main WIS.

In summary, using the diversion coding feature allows more detail to be recorded about administrative decisions. However, it also adds additional data entry requirements. The carry-forward logic that has been implemented ideally minimizes the day to day data entry requirements.

5.2.6 Examples of WIS Use

A water commissioner typically uses the WIS as follows:

1. Login to CWRAT using the HydroBase login.
2. Load the WIS for the region of interest (typically a water district) using the **Administration...Water Information Sheet** menu. Typically a new administrative record is used, which carries forward the previously WIS values.
3. Real-time data (e.g., streamflow gage point flows) are reviewed, and if necessary, corrected. This may also involve using the **Data...Stations** interface or previously configured time series plots to view real-time streamflow hydrographs.
4. Administrative data (e.g., release, diversion, delivery flows) are reviewed and are updated as appropriate. If appropriate, use the **Dry River** feature. If enable, use the diversion coding feature to enter detailed diversion record information.
5. Display the **WIS Diagram** to review overall basin flows and calls.
6. When satisfied, save the sheet using the **Save** (or **Close**) buttons.

The use of gain/loss information is the main option that can be exercised when using Water Information Sheets. The following examples illustrate features of the WIS using actual data.

The following example uses no gain method (gain method: **None**), in which the gain or loss between known point flows is not computed.

Colorado Water Rights Administration Tool - Water Information Sheet: District 1

Administrative data for: 2004-07-26 14:41 Set Date

Row Label	Point Flow	Natural Flow	Delivery Flow	Gain Loss	Releases	Priority Diversion	Delivery Diversion	Trib. Natural	Trib. Delivery	Comments
South Platte River										
PLAKERCO	150.0	150.0	0.0							
EMPIRE DITCH	150.0	150.0	0.0							
Crow Creek	155.0	155.0	0.0					5.0		
RIVERSIDE CANAL	99.0	99.0	0.0			56.0				
ILLINOIS DITCH	97.0	97.0	0.0			2.0				exchange w bijou
BIJOU CANAL	DRY	0.0	0.0			69.0				
PUTNAM DITCH	0.0	0.0	0.0							
CORONA RANCH DITCH	0.0	0.0	0.0							Putnam
JACKSON LAKE INLET DITCH	0.0	0.0	0.0							
WELDON VALLEY DITCH	-120.0	-120.0	0.0			120.0				
Jackson Lake Outlet	-120.0	-120.0	0.0							, 28.26, 1.9 UP&B, :
FT MORGAN CANAL	-288.0	-288.0	0.0			166.0				
PLAYWELCO	150.0	150.0	0.0							
Weldon Valley Return	170.0	150.0	20.0		20.0					
Bijou Creek	172.0	152.0	20.0					2.0		
DUEL SNYDER CANAL	142.0	122.0	20.0			30.0				
UPPER PLATTE BEAVER CNL	114.0	122.0	-8.0				28.0			Jackson 28.26, 1.9

Comments:

Status: Sheet has been modified Gain Method: None

Save Clear Dry River

Print Export Summary Display Diagram Close Cancel

Finished performing calculations.

Admin_WIS_Gains_None

Example WIS Using Gain Method "None"

The above figure illustrates a WIS that does not use gains. Consequently, if no diversion, release, or confluence occurs, flows are just carried forward from one row to the next. Note that negative flows may result because losses are not distributed in this approach.

The following example uses the weights gain method, in which the gain or loss between known point flows is distributed using a simple weighting method, as illustrated by the constant value in the **Gain Loss** column.

Colorado Water Rights Administration Tool - Water Information Sheet: District 1

Administrative data for: 2004-07-26 14:41 Set Date

Row Label	Point Flow	Natural Flow	Delivery Flow	Gain Loss	Releases	Priority Diversion	Delivery Diversion	Trib. Natural	Trib. Delivery	Comments
South Platte River										
PLAKERCO	150.0	150.0	0.0	0.0						
EMPIRE DITCH	144.4	144.4	0.0	-5.6						
Crow Creek	143.8	143.8	0.0	-5.6				5.0		
RIVERSIDE CANAL	82.2	82.2	0.0	-5.6		56.0				
ILLINOIS DITCH	74.6	74.6	0.0	-5.6		2.0				exchange w bijou
BIJOU CANAL	DRY	0.0	0.0	-5.6		69.0				
PUTNAM DITCH	62.6	62.6	0.0	62.6						
CORONA RANCH DITCH	125.1	125.1	0.0	62.6						Putnam
JACKSON LAKE INLET DITCH	187.7	187.7	0.0	62.6						
WELDON VALLEY DITCH	130.3	130.3	0.0	62.6		120.0				
Jackson Lake Outlet	192.9	192.9	0.0	62.6						, 28.26, 1.9 UP&B,
FT MORGAN CANAL	87.4	87.4	0.0	62.6		168.0				
PLAYWELCO	150.0	150.0	0.0	62.6						
Weldon Valley Return	190.0	170.0	20.0	20.0	20.0					
Bijou Creek	212.0	192.0	20.0	20.0				2.0		
DUEL SNYDER CANAL	202.0	182.0	20.0	20.0		30.0				
UPPER PLATTE BEAVER CNL	194.0	202.0	-8.0	20.0			28.0			Jackson 28.26, 1.9

Comments:

Status: Sheet has been modified

Gain Method: Weights

Save Clear Dry River

Print Export Summary Display Diagram Close Cancel

Finished performing calculations.

Admin_WIS_Gains_Weights

Example WIS Using Gain Method "Weights"

Because a gain or loss can occur between each point in the stream, the point flow values are adjusted at each point, even if no diversions, releases, or confluences occur. Consequently, negative flows shown in the previous example are removed.

The following example illustrates the **Dry River** feature (see the **UNION DITCH** and **TETSEL DITCH** rows), which essentially sets the known point flow to zero at the specified location(s).

Colorado Water Rights Administration Tool - Water Information Sheet: District 1

Administrative data for: 2004-07-26 14:41 Set Date

Row Label	Point Flow	Natural Flow	Delivery Flow	Gain Loss	Releases	Priority Diversion	Delivery Diversion	Trib. Natural	Trib. Delivery	Comments
PLAWELCO	150.0	150.0	0.0	62.6						
Weldon Valley Return	190.0	170.0	20.0	20.0	20.0					
Bijou Creek	212.0	192.0	20.0	20.0				2.0		
DUEL SNYDER CANAL	202.0	182.0	20.0	20.0		30.0				
UPPER PLATTE BEAVER CNL	194.0	202.0	-8.0	20.0			28.0			Jackson 28.26, 1.9
PLAMORCO	214.0	222.0	-8.0	20.0						
LOWER PLATTE BEAVER D	131.1	139.1	-8.0	-18.9		64.0				bypass 10.6 at 2pn
TREMONT DITCH	112.3	120.3	-8.0	-18.9						
SNYDER DITCH	93.4	101.4	-8.0	-18.9						
A. A. SMITH DITCH	54.6	62.6	-8.0	-18.9		20.0				
Wildcat Creek	37.7	45.7	-8.0	-18.9				2.0		
PSCO PAVNEE WELL FIELD	18.9	26.9	-8.0	-18.9						
UNION DITCH	DRY	8.0	-8.0	-18.9						
NORTH STERLING CANAL	7.5	15.5	-8.0	7.5						
TETSEL DITCH	DRY	8.0	-8.0	7.5		15.0				
PREVITT INLET CANAL	54.7	62.7	-8.0	54.7						
JOHNSON EDWARDS DITCH	109.3	117.3	-8.0	54.7						
PLABALCO (GAGE LOCATED AB...	164.0	172.0	-8.0	54.7						

Comments:

Status: Sheet has been modified Gain Method: Weights

Save Clear UN-Dry River

Print Export Summary Display Diagram Close Cancel

Finished performing calculations.

Admin_WIS_DryRiver

WIS Illustrating Dry River Feature

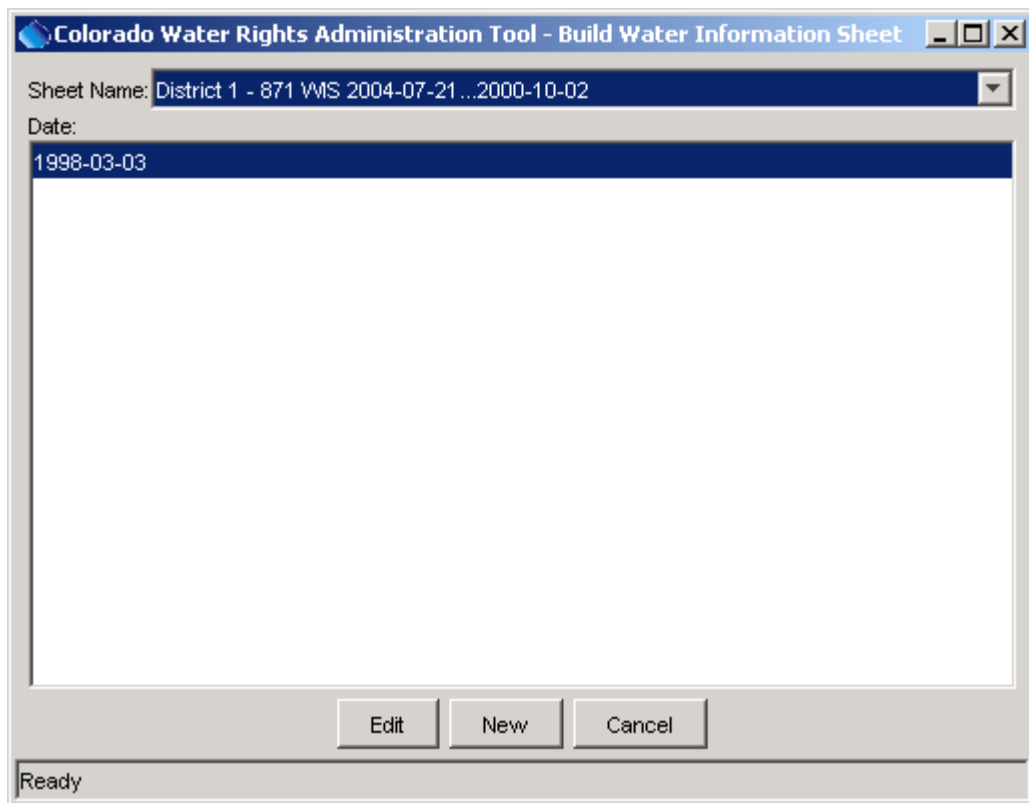
The **Dry River** feature influences how the gain/loss is computed in a reach because it introduces new known point flow locations in a stream. In the above example, the weights gain method is used and therefore negative point flows are minimized.

5.3 Water Information Sheet Builder

The **WIS Builder** provides tools to build or edit a Water Information Sheet and is intended for infrequent use. A WIS must first be built in order to populate the operational WIS with data and allow curtailment, depletion, and point flow analyses to be performed (see **Section 5.2 – Water Information Sheet** for information about the operational WIS).

Important: The **WIS Builder** relies on information in HydroBase in order to build a sheet. In particular, water sources for structures are used to form lists of structures on a stream and stream tributary information is used to help indicate how confluences should be treated. HydroBase data are not always accurate or complete. Consequently, the **WIS Builder** provides several ways to specify some information. Additional quality control of HydroBase location data and enhancements to the **WIS Builder** will improve are occurring to improve overall functionality.

The **WIS Builder** is displayed using the **Administration...Water Information Sheet Builder** menu item. The initial dialog as shown below prompts you to select a WIS sheet name.



Admin_WISBuilder_Load

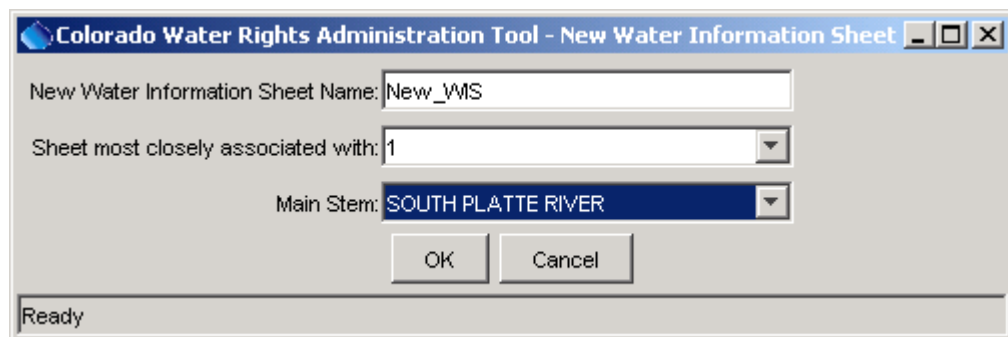
Build Water Information Sheet – WIS Selector

A list of existing sheet names is displayed, and the archive dates for the selected sheet formats are displayed.

The following options are available when loading a sheet:

Edit Select an existing sheet name and date, and **Edit**. The edited sheet can be saved with a new date and optionally a different name. See subsequent sections for information about editing the sheet. **Most water districts have had baseline sheets created and can be modified if necessary.**

New Select **New** to create a new blank sheet. You are first prompted for main sheet information, as shown below.



Admin_WISBuilder_New

Enter appropriate information and then press **OK**. Then refer to subsequent sections for how to add information to the sheet. **It is important that the first row added to the sheet is a *Stream* row.**

When creating a new sheet or editing an existing sheet, the **WIS Builder** interface will be displayed, as shown in the following figure (this example is for an existing sheet).

Colorado Water Rights Administration Tool - Water Information Sheet Builder

Sheet Name: District 1 Date: 1998-03-03 Gain Method: None

Row Label	Point Flow	Natural Flow	Delivery Flow	Gain Loss	Releases	Priority Diversion	Delivery Diversion	Trib. Natural	Trib. Delivery	Comments
South Platte River (1, Stream, str...										
PLAKERCO (2, Station, stat:0675...										
EMPIRE DITCH (3, Diversion, wldi...										
Crow Creek (4, Confluence, conf:...										
RIVERSIDE CANAL (5, Diversion, ...										
ILLINOIS DITCH (6, Diversion, wdi...										
BIJOU CANAL (7, Diversion, wldi...										
PUTNAM DITCH (8, Diversion, wdi...										
CORONA RANCH DITCH (9, Diver...										
JACKSON LAKE INLET DITCH (10,...										
WELDON VALLEY DITCH (11, Div...										
Jackson Lake Outlet (12, Other, o...										
FT MORGAN CANAL (13, Diversi...										

Buttons: Add Row, Delete Row, Add Formula, Delete Formula, Add Import, Delete Import, Display Gains

Water Districts: 1 - South Platte: Greeley to Balzac Row Type: Stream Unique Identifier: strm:6351 Stream for Current Row: South Platte River (strm:6351)

Stream (Stream Number): SOUTH PLATTE RIVER (6351) Row Label (Select Stream at left if possible): South Platte River

Buttons: Show as Text, Edit WIS Diagram, Save, Close

Ready

Admin_WISBuilder_Initial

Water Information Sheet Builder after Loading a WIS

When a new row is added, the information on the bottom of the display should be filled out appropriately for the row. In most cases, this consists of making simple selections from choices but in some cases (e.g., when data from HydroBase are incorrect or unavailable), additional information may need to be entered.

The following sections describe the components of a Water Information Sheet and the builder.

5.3.1 WIS Format Description

The **WIS Builder** displays rows and columns similar to a spreadsheet; however, the columns have been pre-selected (and are fixed) and the rows correspond to stations and structures that have data in the HydroBase database. Special rows used for managing the sheet are also available. The WIS is not a full-featured spreadsheet like Microsoft Excel, although it has many features like a spreadsheet. The rows and columns of the sheet (along with formulae and imports, as discussed in subsequent sections) describe the format of the sheet. This format can be reused each day as new data are entered. Changing the WIS format changes the nature of the sheet. Each row has a row label that is typically a structure, stream, or station name. The streams that are entered in the sheet should be entered upstream to downstream, with each tributary's rows grouped together. The WIS row types are as shown in the following table.

WIS Row Types

Row Type	Description
Confluence	A point where tributaries meet.
Diversion	A diversion structure.
MinFlow	A minimum flow point (at this time, minimum flow reaches are not fully implemented – only a minimum flow point is enabled).
Other	A point used as a base flow node for computations.
Reservoir	A reservoir structure.
Station	A streamflow station, possibly with real-time data.
Stream	Indicates the top of a stream reach (used to keep track of streams). A stream must always be present in the sheet.
String	A row that only has a label but which can contain formulas.

The WIS columns are described in the following table.

WIS Columns (left to right)

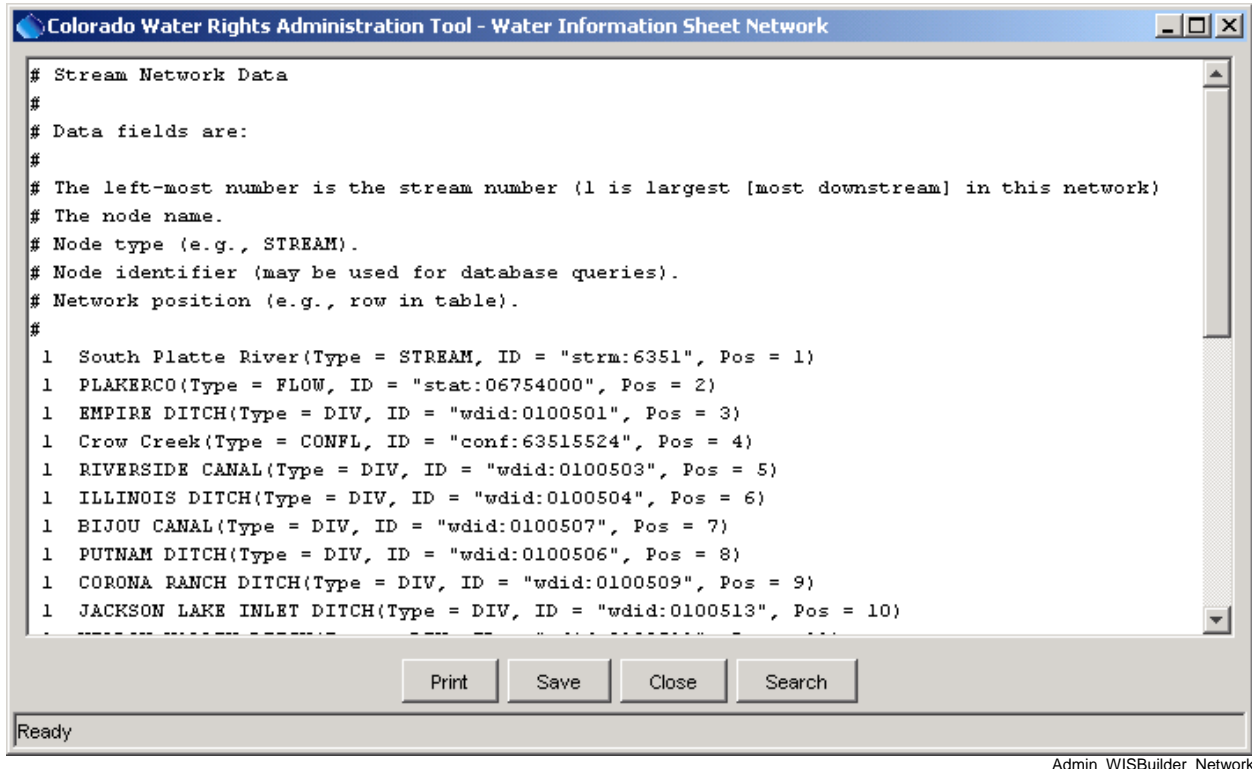
WIS Row	Description
Row Label	A (generally) verbose row label. If the row is a structure or station from HydroBase, the label is the station/structure name. Otherwise, the label is defined in the WIS Builder .
Point Flow	<p>The point flow on the river. The point flow is determined by one of the following methods:</p> <ol style="list-style-type: none"> 1. Imported from a stream gage 2. Computed as the upstream point flow + Gain/Loss + Trib. Natural + Trib. Delivery + Releases – Priority Diversions – Delivery Diversions <p>The point flow also is the sum of Natural Flow and Delivery Flow.</p>
Natural Flow	The portion of the point flow that has not been allocated to human use. It is free river water (other than it is can be checked against minimum flow requirements). This is either set with a formula (defined in the WIS Builder) or is computed as Point Flow – Delivery Flow .
Delivery Flow	<p>The portion of the point flow that is allocated to human use. For the most upstream node in a tributary, it is determined as:</p> <ol style="list-style-type: none"> 1. User-supplied (enter a user-supplied value in the releases column), or 2. Define a formula using the WIS Builder <p>For other nodes, it is the upstream point's Delivery Flow + Trib. Delivery + Releases – Delivery Diversion.</p>
Gain Loss	The gain or loss that occurs from the upstream point on the stream. It is computed as the gain/loss between base flow nodes on the reach, prorated by stream mile or weight, depending on the gain method that is used (selected in the lower right of the Water Information Sheet window).
Releases	A release made at the structure (typically only for reservoirs or to set the initial flow at the top of a tributary).
Priority Diversion	A priority diversion, which subtracts from the natural flow.
Delivery Diversion	A delivery diversion, which subtracts from the delivery flow.
Trib. Natural	For confluence rows (defined in the WIS Builder), this is the natural flow that is contributed from the upstream tributary.
Trib. Delivery	For confluence rows (defined in the WIS Builder), this is the delivery flow that is contributed from the upstream tributary.
Comments	Comments for the row (e.g., to explain an administrative decision).

Flow values shown in rows are immediately downstream of the point for the row. For streamflow gage rows, this is essentially the value at the gage. For rows that have diversions or releases, the flow is that after the diversions and releases have been accounted for.

Once a WIS has been loaded, information about the row can be displayed and edited by selecting the row. The information for the row is displayed at the bottom of the **WIS Builder**.

5.3.2 The Stream Network

The rows of the WIS, along with some behind-the-scenes data, allow rows in the WIS to be represented as nodes in a stream network. Being able to represent the WIS as a stream network allows efficient traversal of the data for computations and output. The **Show as Text** button at the bottom of the **WIS Builder** displays the network in a text fashion, as illustrated in the following figure.



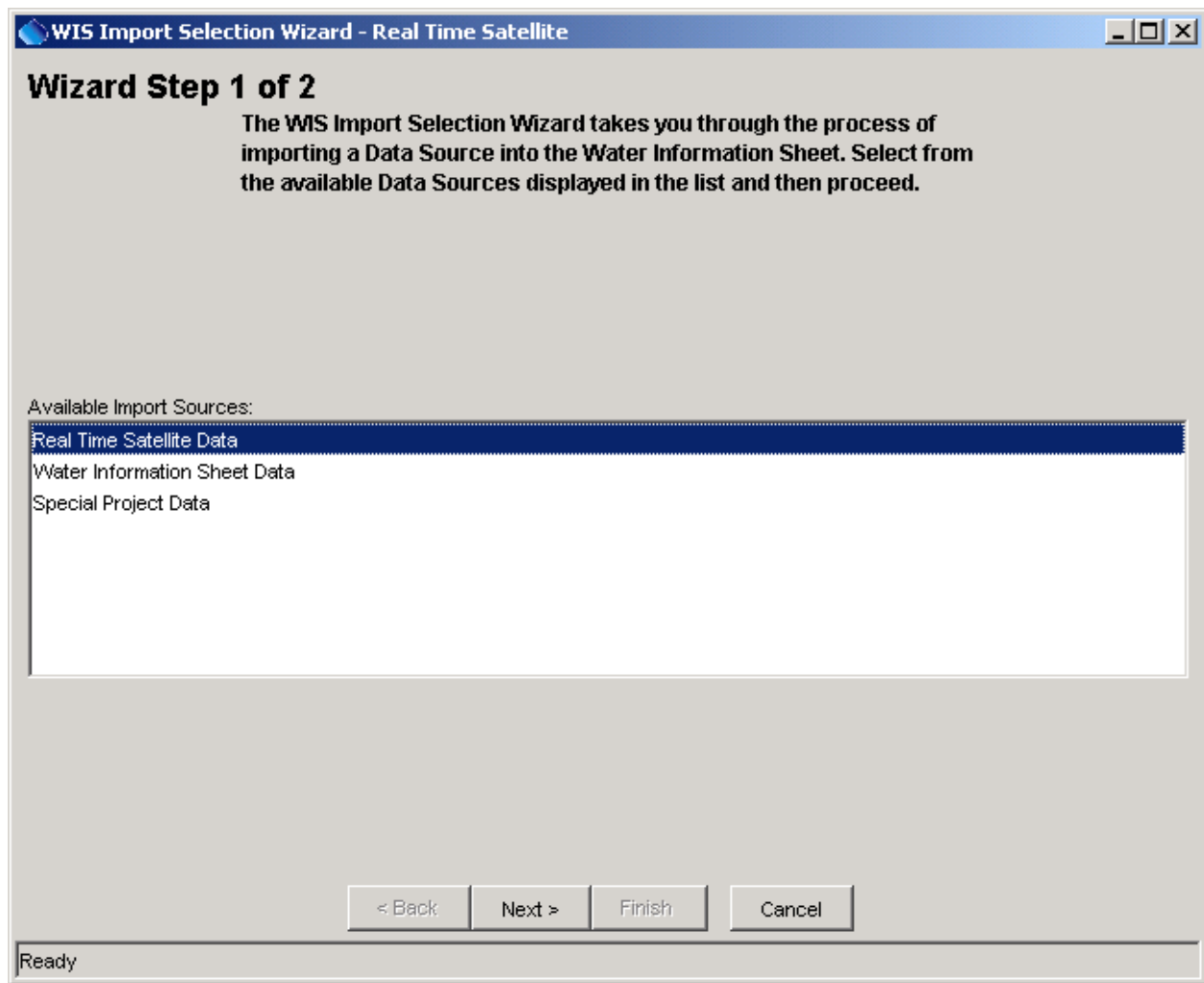
WIS River Network

The stream network display illustrates how tributaries join each other and eventually meet with the main stem. Some of the information in this interface is for developers. The numbers on the left indicate the tributary level, with one being the most downstream (main stem) and the highest number being the most removed from the main stem. Indentations are used as appropriate to reinforce the stream ordering concept. See also **Section 5.3.7 – WIS Diagram** for information about the graphical network display.

The relationship of the rows (nodes) to each other is currently controlled by a stream table in the database. Base flow nodes are known flow points, rather than being computed from water passed from upstream. In the WIS, base flow nodes are restricted to the Streamflow and Other node types. These nodes provide necessary known data that are used in computations. Currently, baseflow nodes are required at the headwater and mouth of each tributary. **Section 5.2 – Water Information Sheet** describes the concept of drying the river, which allows you to dynamically treat a row as a known point of zero, when appropriate during dry periods.

5.3.3 Data Imports

The WIS has several features that allow data sharing and manipulation. The data import feature can be used to add an import (e.g., gaged streamflow or diversion value) to any editable cell. The **Add Import** button at the bottom of the **WIS Builder** is used to add import information for a selected cell, as illustrated in the following initial import dialog:



Admin_WISBuilder_ImportGage1

Import Dialog to Select Import Data Type

An import can be applied in any editable cell and transfers data from the specified data source to the WIS. If an import fails during operation, the cell value from the previous archive will be used.

The following figures illustrate imports of different data types.

The following figure illustrates the dialog used to import real-time data (streamflow).

WIS Import Selection Wizard - Real Time Satellite

Wizard Step 2 of 2

Select a Data Source from the list and then proceed.

Step 1: Select a desired Reference Time: Most Recent Transmission

Step 2: Number of hours to include in the average: 0000

Step 3: Select the desired Water Division/District: Division 1: South Platte

Step 4: Select the correct Station

	STATION NAME	VAX FIELD
1	ALVA B. ADAMS TUNNEL AT EAST PORTAL NEAR ESTES PARK	DISCHRG
2	AUGUST P. GUMBLICK TUNNEL NEAR JONES PASS	DISCHRG
3	AURORA HOMESTAKE PIPELINE TO SPINNEY RESERVOIR	DISCHRG
4	BEAR CREEK ABOVE BEAR CREEK LAKE NEAR MORRISON	DISCHRG
5	BEAR CREEK ABOVE EVERGREEN	DISCHRG
6	BEAR CREEK AT MORRISON	DISCHRG
7	BEAR CREEK AT SHERIDAN	DISCHRG
8	BEAR CREEK RESERVOIR (OUTFLOW)	DISCHRG
9	BEAVER CREEK ABOVE BEAVER CREEK RESERVOIR	DISCHRG
10	BERTHOUD PASS DITCH AT BERTHOUD PASS	DISCHRG
11	BIG DRY CREEK AT MOUTH NEAR FORT LUPTON	DISCHRG
12	BIG THOMPSON RIVER ABOVE LAKE ESTES	DISCHRG
13	BIG THOMPSON RIVER AT HILLSBOURH DIVERSION	DISCHRG
14	BIG THOMPSON RIVER AT LOVELAND	DISCHRG
15	BIG THOMPSON RIVER AT MOUTH NEAR LA SALLE	DISCHRG
16	BIG THOMPSON RIVER AT MOUTH OF CANYON NEAR DRAKE	DISCHRG
17	BIG THOMPSON RIVER BELOW LAKE ESTES	DISCHRG

< Back Next > Finish Cancel

Ready

Admin_WISBuilder_ImportGage2

WIS Import for Real-time Data

Select a reference time (***Most Recent Transmission***, or a military time for the time of day corresponding to the end of the observation period). If a time is selected, select the number of hours (again, military time) to include in the average prior to the reference time. For example, pick a reference time of 0600 and 2400 hours to return the average flow in day ending at 0600. Also select the real-time measurement to import from the station list. Only data that are available in the central HydroBase can be imported.

The following figure illustrates an import of data from a WIS.

WIS Import Selection Wizard - Water Information Sheet

Wizard Step 2 of 2

Select a Data Source from the list and then proceed.

Step 1: Select the desired WIS: District 1

Step 2: Select a desired Data Type: Point Flow

Step 3: Select the correct Row Label

	ROW LABEL	DETAIL	WIS NUMBER	ROW NUMBER
1	South Platte River	strm:6351	1	1
2	PLAKERCO	stat:06754000	1	2
3	EMPIRE DITCH	wdid:0100501	1	3
4	Crow Creek	conf:63515524	1	4
5	RIVERSIDE CANAL	wdid:0100503	1	5
6	ILLINOIS DITCH	wdid:0100504	1	6
7	BIJOU CANAL	wdid:0100507	1	7
8	PUTNAM DITCH	wdid:0100506	1	8
9	CORONA RANCH DITCH	wdid:0100509	1	9
10	JACKSON LAKE INLET DITCH	wdid:0100513	1	10
11	WELDON VALLEY DITCH	wdid:0100511	1	11
12	Jackson Lake Outlet	othr:1	1	12
13	FT MORGAN CANAL	wdid:0100514	1	13
14	PLAWELCO	stat:06758500	1	14
15	Weldon Valley Return	othr:2	1	15
16	Bijou Creek	conf:63515369	1	16
17	DUEL SNYDER CANAL	wdid:0100517	1	17
18	UPPER PLATTE BEAVER CNL	wdid:0100515	1	18

< Back Next > Finish Cancel

Ready

Admin_WISBuilder_ImportWIS

Import Dialog for WIS Data

This is used, for example, to import the outflow from an upstream WIS (if used operationally, this requires that WIS data be saved on an appropriate schedule so that downstream WIS can use data from upstream WIS). The value for the administration date will be imported when used operationally. If not available, the cell value from the last archive will be carried forward. To complete the import, select a WIS, column, and row. Note that only WIS that are available in HydroBase can be imported.

The following figure illustrates an import of Special Project data.

WIS Import Selection Wizard - Special Project Data

Wizard Step 2 of 2

Select a Data Source from the list and then proceed.

Step 1: Select the desired Project Name: CBT

Step 2: Select a desired Data Type: Depletions

Step 3: Select the correct Identifier

WIS NUMBER	IDENTIFIER	UNITS
---------------	------------	-------

< Back Next > Finish Cancel

Ready

Admin_WISBuilder_ImportSP

WIS Import Dialog for Special Project Data

To import data, select a special project sheet and the data type for the special project. The import value for the administrative date. If not available, the cell value from the last archive will be carried forward.

Special project have been used on a limited basis with the Division 5 Workbook and data may not be available.

5.3.4 Formulas

The formula editor allows formulas to be assigned to an editable cell. Formulas have three primary purposes in the WIS:

1. Transfer tributary mouth flows to a confluence node. For example, select the **Tributary Delivery** cell for a confluence row and then add a formula where the cell value equals that of the tributary mouth delivery flow.
2. Transfer flow to a baseflow point. For example, there may be a gaging station downstream in the basin but not at the headwater. In order to provide some flow at the headwater, either a release has to be made or a known streamflow has to be prorated to the headwater. A formula can be used to set the **Natural Flow** of the headwater node to a fraction of the downstream natural flow.
3. Implement a summary-type formula. For example, summarize all the tributary mouth natural flows.

To add a formula, select a cell and then press the **Add Formula** button at the bottom of the **WIS Builder**. An interface similar that shown in the bottom of the following figure will appear.

Colorado Water Rights Administration Tool - Water Information Sheet Builder

Sheet Name: District 1 Date: 1998-03-03 Gain Method: None

Row Label	Point Flow	Natural Flow	Delivery Flow	Gain Loss	Releases	Priority Diversion	Delivery Diversion	Trib. Natural	Trib. Delivery	Comments
South Platte River (1, Stream, str...										
PLAKERCO (2, Station, stat:0675...										
EMPIRE DITCH (3, Diversion, wldid...										
Crow Creek (4, Confluence, conf...										
RIVERSIDE CANAL (5, Diversion, ...										
ILLINOIS DITCH (6, Diversion, wld...										
BIJOU CANAL (7, Diversion, wldid...										
PUTNAM DITCH (8, Diversion, wldi...										
CORONA RANCH DITCH (9, Diver...										
JACKSON LAKE INLET DITCH (10, ...										
WELDON VALLEY DITCH (11, Div...										
Jackson Lake Outlet (12, Other, o...										

Add Row Delete Row Add Formula Delete Formula Add Import Delete Import Display Gains

Water Districts: 1 - South Platte: Greeley to Balzac Row Type: Diversion Unique Identifier: wldid:0100507 Stream for Current Row: South Platte River (strm:6351)

Formula Editor: Formula for BIJOU CANAL Point Flow

= 0.5
* PLAKERCO.Point Flow

Delete + - / *

Show as Text Edit WIS Diagram Save Close

Select a cell or specify a constant value...

WIS Builder Formula Editor

The selected cell will be highlighted in red. The formula wizard at the bottom of the interface steps you through building a formula. **Note that at this time, the formula builder does not support complicated formulas, such as those requiring parentheses.** Formulas can occur in the following cells:

1. Known base flows (e.g., real-time station).

2. Releases, Priority Diversion, Delivery Diversion, Tributary Natural, Tributary Delivery, regardless of row type.
3. Any cell of a String row type.

To delete a formula, select a cell with a formula and press the **Delete Formula** button.

To identify cells as they are being added to formulas, a verbose cell location notation is used. This consists of the cell row and column being displayed as the row label and column heading. To enter terms of a formula, either enter a constant (**followed by Return**) or an operator, then select a cell of interest. String row types can have formulas in any cell and are ignored during network computations. Formula cells are displayed in red.

5.3.5 Computations

When building a WIS, data values are not present in the sheet because the WIS format and the WIS data are stored separately. However, it is valuable to discuss here the sequence of events that occur when the WIS is loaded and solved because this sequence must be kept in mind when building the WIS. The flow values and gain/loss information for a row consider the releases, diversions, and tributary contributions for the row. Therefore, the flow values are shown immediately downstream of the structure (essentially at the structure for gages).

The following steps occur in order to calculate the current values in a WIS.

1. The WIS format is loaded to define the relationship of rows and columns.
2. If a previous archive date for the WIS data is available, load the data into the current sheet. Only data from a WIS format matching the current format can be loaded.
3. Next, apply data imports. For example, if valid real-time data exists, import and display in the sheet in a blue font. The data import value can be reset by the user if the field is editable.
4. Solve the network:
 - a) Solve for **Delivery Flow** throughout.
 - b) Compute **Natural Flow** for user-entered **Point Flow** (**Point Flow** is known).
 - c) Compute the base flow node flows. If **Natural Flow** is a formula, then process the formula first and compute the **Point Flow** second. If **Point Flow** is a user-entered formula, process the formula first and compute the **Natural Flow** second.
 - d) Loop over the network nodes, going from upstream to downstream and compute the **Gain/Loss**, then the **Point Flow**, and then the **Natural Flow**.
 - e) Compute the **Gain/Loss** for all base flow nodes.
 - f) Evaluate string formulas.

Turn on gains information in the builder by selecting the **Gain Method** in the upper right corner of the **WIS Builder** interface. Then press the **Display Gains** button in the middle of the interface to recompute gains. The gain weight for a row is editable in the bottom of the interface when a row is selected (the default weight is 1). A similar approach is used for stream mile data (stream mile is from the Colorado border).

Colorado Water Rights Administration Tool - Water Information Sheet Builder

Sheet Name: District 1 Date: 1998-03-03 Gain Method: Weights

Row Label	Point Flow	Natural Flow	Delivery Flow	Gain Loss	Releases	Priority Diversion	Delivery Diversion	Trib. Natural	Trib. Delivery	Comments
South Platte River (1, Stream, str...										
PLAKERCO (2, Station, stat:0675...										
EMPIRE DITCH (3, Diversion, wdi...				1.0/12.0 = 0.08						
Crow Creek (4, Confluence, conf: ...				1.0/12.0 = 0.08						
RIVERSIDE CANAL (5, Diversion, ...				1.0/12.0 = 0.08						
ILLINOIS DITCH (6, Diversion, wdi...				1.0/12.0 = 0.08						
BIJOU CANAL (7, Diversion, wdi...				1.0/12.0 = 0.08						
PUTNAM DITCH (8, Diversion, wdi...				1.0/12.0 = 0.08						
CORONA RANCH DITCH (9, Diver...				1.0/12.0 = 0.08						
JACKSON LAKE INLET DITCH (10, ...				1.0/12.0 = 0.08						
WELDON VALLEY DITCH (11, Div...				1.0/12.0 = 0.08						
Jackson Lake Outlet (12, Other, o...				1.0/12.0 = 0.08						
FT MORGAN CANAL (13, Diversi...				1.0/12.0 = 0.08						

Add Row Delete Row Add Formula Delete Formula Add Import Delete Import Display Gains

Water Districts: 1 - South Platte: Greeley to Balzac Row Type: Confluence Unique Identifier: conf:63515524 Stream for Current Row: South Platte River (strm:6351)

Confluence (Stream Number): ☒ On Stream ☐ In Water District 1 Row Label (Select Confluence at left if possible): Crow Creek

Stream Mile: Weight: 1.0

Show as Text Edit WIS Diagram Save Close

Ready

Admin_WISBuilder_Gains

WIS Builder Illustrating Gain Information

5.3.6 Editing Rows

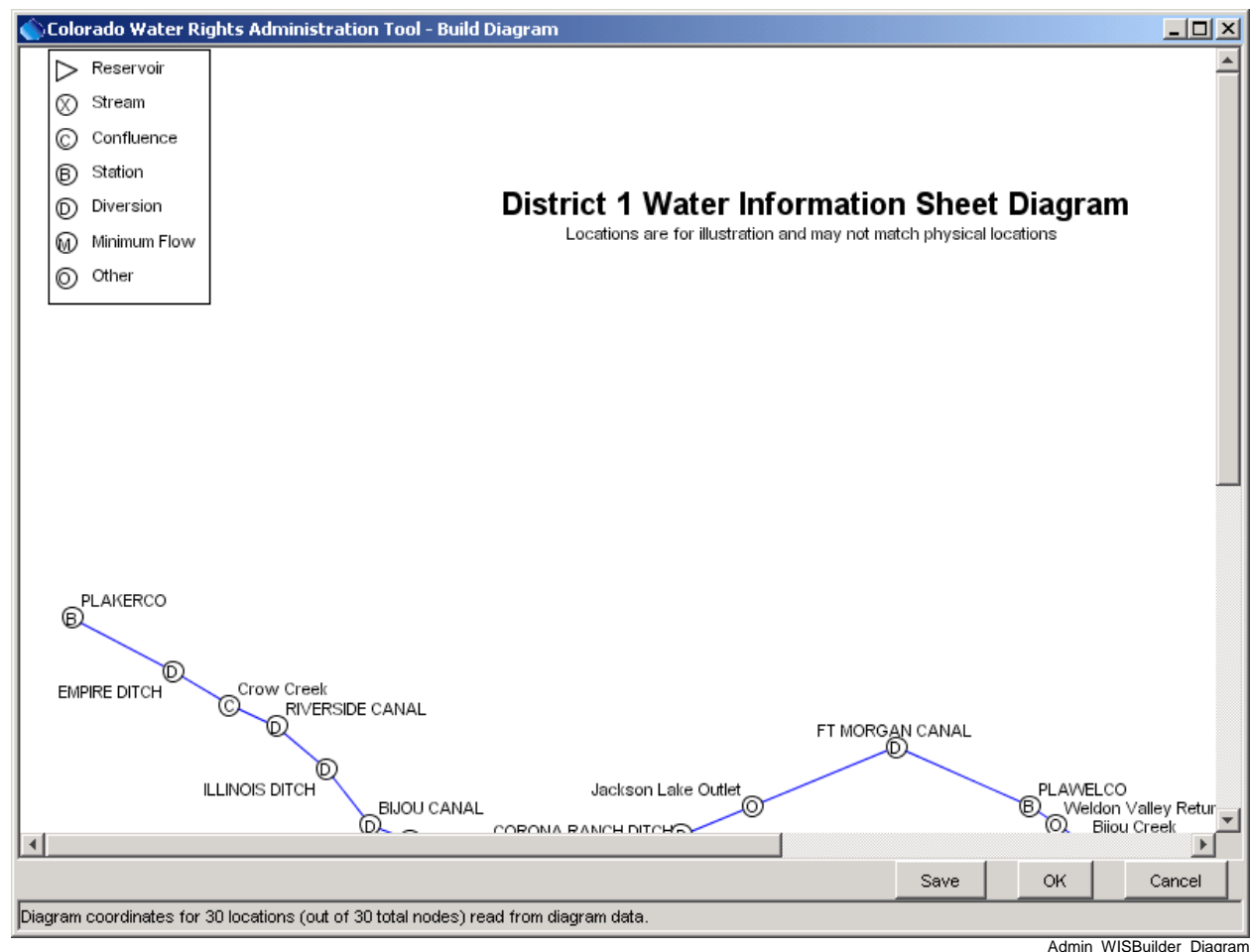
To add a row to a WIS, use the **Add Row** button. The lower part of the screen will then allow data entry for the row. The row will always be inserted above the selected row. If the selected row is the last row in the WIS, you will be prompted to answer whether the insert should be before or after the last row. **It is important that groups of rows in the WIS associated with a stream have a top row that is of type Stream.** Information for the row should adhere to the guidelines specified in earlier sections of this documentation. After adding a row, you can apply imports and formulas as necessary.

To delete a row, select a cell in the row and then press **Delete Row**.

5.3.7 WIS Diagram

The **Edit WIS Diagram** button on the **WIS Builder** displays the **WIS Diagram**, which provides a visual representation of the WIS stream network. The first time that a **WIS Diagram** is opened for a WIS, the software will try to use UTM location information in HydroBase to position the nodes in the network, and will interpolate or extrapolate missing coordinates. After loading the data, the network representation can be edited (as explained below), and saved to HydroBase. Subsequent displays of the network will use the information that was previously saved.

The following figure illustrates the appearance of a **WIS Diagram**, showing an existing diagram.



WIS Diagram Editor

Characteristics of the diagram are as follows:

- The page size for the diagram is pre-selected as letter. Currently this page size cannot be changed. The screen representation of the diagram closely matches the hard copy representation.
- A standard legend is automatically drawn in the upper-left of the diagram and indicates the symbols used for each node type.
- Nodes are labeled with the row label from the WIS and a symbol is drawn for each node.
- Only rows with a physical representation are drawn. String and stream row types are not drawn on the diagram.
- The first time the network diagram builder is opened, node positions are automatically determined, but they can be repositioned interactively (see below). If a node has been added since the last time the nodes were manually positioned in the network diagram, it may be automatically placed inaccurately, and will likely need to be repositioned to fit the rest of the diagram.
- The WIS Builder and WIS Diagram communicate with each other, so that if a node is deleted from the WIS it will be automatically deleted from the diagram (if the diagram editor is open at the same time). Likewise, if a node is added to the WIS, it will automatically be placed into the diagram using default coordinates.

The buttons on the bottom of the **WIS Diagram** are as follows:

Save	Save the diagram representation to HydroBase, associating the diagram with the WIS that is being edited.
OK	Save changes and close the WIS Diagram editor.
Cancel	Cancel any edits to the WIS Diagram and close the WIS Diagram editor.

Additionally, right-clicking on the diagram will display a popup menu with the following menu items:

Add Annotation	Add an annotation (e.g., title) to the diagram. See the explanation below.
Delete Diagram Data from Database	Delete the WIS Diagram data from HydroBase. A confirmation dialog will be displayed before deleting the data. This action is useful if updates to the spatial data in HydroBase have occurred that allow a better default representation of the diagram to be regenerated (when the diagram is reopened again). However, label positions for each node will likely need to be reset to optimize the display.
Print on Letter in Landscape	Print the WIS Diagram on letter size paper in landscape orientation.

The following sections provide details on using specific features of the diagram editor.

5.3.7.1 Moving Nodes on the Diagram

Nodes can be repositioned on the diagram as follows:

1. Click on the node to be moved.
2. While holding the mouse button down, drag the mouse to a new location. When dragging a node, the node will not display any information and the river connection lines will not be redrawn.
3. Release the mouse button. The associated connecting lines on the diagram will redraw.

If for some reason it is difficult to select the proper node (e.g., several nodes have very similar coordinates), it may be necessary to first spread out the nodes and then reposition each node.

5.3.7.2 Editing Node Properties

To edit the properties for a node, right-click on a node symbol and select the **Properties** menu item, which will display a dialog similar to the following:

Admin_WISBuilder_Diagram_NodeProperties

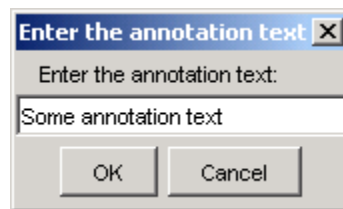
WIS Diagram Node Properties Dialog

Node properties include only properties that impact the visual representation of the node. All other properties are defined in the main **WIS Builder** tool (including node/row type, whether a baseflow, etc.). Node properties include:

Label	The label for the node – same as the WIS row label.
Row/Node Type	The row/node type – same as the WIS row type.
Label Position	Indicates the position of the node label, relative to the symbol. An appropriate position should be selected to minimize the condition where labels overwrite.
X, Y Position	The coordinate of the node on the diagram. Initially this will be the same as Alternate X, Y , but values will reflect nodes being moved in the diagram editor.
Alternate X, Y	The alternate coordinate is initially set to the UTM coordinates from HydroBase, or the interpolated coordinates.

5.3.7.3 Adding Annotations

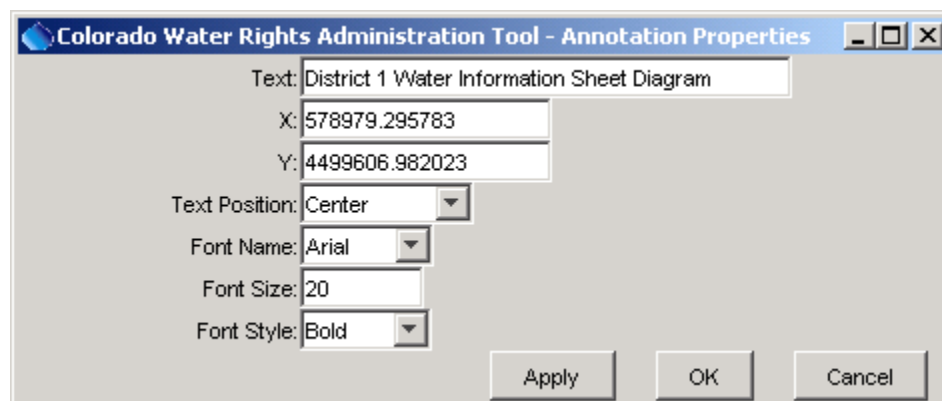
Annotations can be added by right clicking on the **WIS Diagram** and then selecting the **Add Annotation** menu item. Initially, the following dialog will be shown:



Admin_WISBuilder_Diagram_AddAnnotation

After pressing **OK**, the text will be displayed on the diagram centered on the location that the mouse was clicked.

Once the annotation has been added, it can be moved by selecting and dragging the text. Additionally, right-click on the annotation and select **Delete** to delete the annotation, or select **Properties** to change the appearance of the annotation, using the following dialog:



Admin_WISBuilder_Diagram_AnnotationProperties

The meaning of the specific properties is as follows:

Text	Text for the annotation.
X, Y	Coordinate for the annotation – not usually hand edited.
Text Position	Indicates the position of the annotation text, relative to the X, Y coordinates.
Font Name	Font to use for the annotation.
Font Size	Font size (points) to use for the annotation.
Font Style	Font style for the annotation.