Appendix: TSTool Release Notes

This appendix provides information about changes that have occurred in TSTool versions.

1. TSTool Version History

The following table summarizes the TSTool release history. See the following sections for more detailed information about each version. Only recent versions are documented in detail. Comments for minor versions may be listed under a version that is publicly released. Recent release note items are categorized as follows:

Bug Fix – A bug has been fixed. Users should evaluate whether their work is impacted.

Known Limitation – A known limitation has been documented and may impact the user. The limitation will be addressed in a future release.

Change – An existing feature has been changed.

Remove – A feature has been removed.

New Feature – A new feature has been added, with functionality that was not previously available.

TSTool Version History Summary (most current at top)

TSTool Version	Summary of Changes in Version	Release Date
9.09.00	Add additional commands for table processing. Improve template integration with processor properties and tables.	2010-09-30
9.08.00 – 9.08.01	Support connecting to more than one RiversideDB and introduce the concept of named data stores as an alternative to input type/name. Add `TableMath()` and `TableTimeSeriesMath()` commands.	2010-09-15
9.07.00 – 9.07.02	Add HTML summary, improve data flag handling, improve Python integration, initial support for ColoradoWaterHBGuest web service, include training materials, other maintenance.	2010-08-20
9.06.00 – 9.06.04	Initial support for ColoradoWaterSMS web service, enhance RiversideDB support, various improvements.	2010-05-25
9.05.00 – 9.05.03	Enhancements to support additional time series and ensemble processing, in particular to compute statistics for drought studies.	2009-11-17
9.04.00 – 9.04.02	The following features are now at production level: `ReadTableFromDelimitedFile()`, `WriteTableToDelimitedFile()`, `ResequenceTimeSeriesData()`. The `CalculateTimeSeriesStatistic()` command and additional table processing features have been added.	2009-07-28

TSTool Version	Summary of Changes in Version	Release Date
9.01.00 – 9.03.06	Add `VariableLagK()` and `RunDSSUTL()` commands, fix several bugs, and enhance several commands. Add preliminary `CheckTimeSeries()`, `WriteCheckFile()` commands. Enhance the `ChangeInterval()` command and documentation.	2009-04-29
9.00.00 – 9.00.05	Update from Java 1.4.2 to Java 1.6, various bug fixes.	2009-02-05
8.18.00 – 8.18.02	Initial HEC-DSS support. Improved RiversideDB support.	2008-11-24
8.17.01 – 8.17.02	Bug fixes for 8.17.00. See below. New features include *File…New* to open a new command file and add support for new StateMod 12.29 binary file format.	2008-10-29
8.17.00	All commands are updated to the new error handling and named parameter notation. Many other minor changes have been made for consistency. Many minor user-requested enhancements have been implemented. Several minor bugs reported by users have been fixed. The StateCUB (StateCU binary output file) has been enabled.	2008-10-06
8.16.00 – 8.16.02	Migrate additional commands to new error-handling and named parameter notation. Add `RunPython()` and `FTPGet()` commands.	2008-07-22
8.15.01 – 8.15.03	Fix a number of problems where migration of commands from fixed parameter to named parameter syntax resulted in some old command files not being handled. The command file is also now marked as modified if any commands are automatically updated. Added more error checks, such as in DateValue file reading to help provide better feedback to users.	2008-06-11
8.13.00 – 8.14.02	Add commands to set properties, for use by other commands (e.g., to configure file names). Continue updating commands to utilize the new error handling.	2008-02-20
8.03.00 – 8.12.06	Update many commands to utilize new error handling and consistently handle the TSList parameter. Add ensemble processing to many commands. Enable ability for read commands to run in discovery mode to let other commands know time series identifiers. Add more commands to compute statistics time series.	2008-01-14
8.00.00 – 8.02.00	Update main interface to use new error-handling visualization features. Add several commands to allow TSTool to perform regression tests on itself.	2007-12-03
7.04.00	Various updates for HydroBase including adding support for administrative flow station. Allow reading StateMod rights files and handle new StateCU file formats.	2007-06-22
7.01.00	Support new SFUT(G) coding for HydroBase diversion classes, and allow CIU when filling diversion data. Fix a number of bugs in the `analyzePattern()`, `fillInterpolate()`, and `cumulate()` commands	2007-03-02
7.00.00	Begin distributing software using a new installer. Add CASS livestock data and human population data.	2006-10-31
6.19.00	Update to extend period when filling with diversion comments.	2006-05-19

TSTool Version	Summary of Changes in Version	Release Date
6.18.00	Add the `runCommands()` command to facilitate data processing.	2006-05-02
6.17.00	Add the `compareFiles()` command to facilitate testing.	2006-04-17
6.16.02	Begin adding commands to test data, for alarms.	2006-04-17
6.16.01	Time series to map link is enabled. Improve UNC support. Improve startup performance in batch mode.	2006-02-16
6.16.00	Begin adding support for NDFD (National Digitial Forecast Database) input type, and maintenance.	2006-01-31
6.15.00	Begin adding time series to map link.	2006-01-16
6.14.00	Update some commands to named parameter notation, and maintenance.	2005-12-14
6.13.00	Internal release.	2005-11-13
6.12.00	Improve error handling when running in batch mode with graphs.	2005-10-05
6.11.00	Enable the ColoradoSMS input type for hydrograph annotations and update batch mode features to better utilize the CDSS configuration file.	2005-10-05
6.10.09	Maintenance release – convert some commands to use named parameters.	2005-09-28
6.10.08	Maintenance release – convert some commands to use named parameters. Add the `newStatisticYearTS()` command.	2005-09-22
6.10.07	Maintenance release – convert some commands to use named parameters.	2005-08-24
6.10.06	Release corresponding to the CDSS CD release.	2005-08-04
6.10.05	Respond to CDSS testing feedback.	2005-08-01
6.10.04	Respond to CDSS testing feedback. Add additional query filters for HydroBase stations and structures.	2005-07-20
6.10.03 BETA	Begin phasing in saving time series products to HydroBase and RiversideDB.	2005-07-08
6.10.02 BETA	Update the `openHydroBase()` command to use free-format parameters.	2005-06-28
6.10.01 BETA	Begin enabling data flags for time series to support enhancements to fill commands.	2005-06-03
6.10.00 BETA	Initial release supporting HydroBase stored procedures with initial prototypes of Mixed Station Analysis and related features. Implement new message log viewer and commands to simplify comparison of time series.	2005-06-01
6.09.03	Maintenance release.	2004-12-21
6.09.02	Maintenance release.	2004-10-05
6.09.01	Add NWSRFS FS5Files input type.	2004-09-01
6.09.00	Add `readHydroBase()` commands.	2004-08-27
6.08.02	Documentation made current to include all version 6 changes.	2004-07-27
6.08.01	Allow HydroBase connection to be made at startup.	2004-07-20
6.08.00	Allow wildcards in commands that read from StateCU and StateModB input types.	2004-07-11
	Initial Java version.	1997-10-23

Known Limitation When saving time series product (*.*tsp*) files, the absolute path of files is saved. This is not as portable as saving a path relative to the command file. It may be necessary to edit the product file manually to change file paths from absolute to relative – the relative path will then be converted to absolute when processed and time series files will be found, assuming that the locations are consistent.

Known Limitation The `ReadStateCUB()` command, unlike other read commands, does not provide a discovery mode. Consequently, other commands will not be provided with a list of time series identifiers for the binary file. The reason for this is that StateMod and StateCU binary files can contain a huge number of time series and providing a list could be overwhelming and slow. Alternatives are being evaluated. Currently, commands that reference time series in the binary files must use more generic selection methods such as `TSLIST=AllMatchingTSID` and `TSID` with wildcards.

Known Limitation Plotting features do not know understand the concept of instantaneous, mean, and accumulated time series (referred to as the time scale). All values are plotted at data value date/time. In the future, features may be implemented to automatically determine from the time scale whether to adjust the visual representation based on the time scale.

Changes in Version 9.09.00

- Bug Fix [09.00.00] The `RunCommands()` command was not passing data stores to the processor used for the command file being run. This is now the default and a parameter has been added to not pass the data stores.
- Bug Fix [09.00.00] Fix bug where ***File…Open HydroBase*** was not showing the HydroBase login.
- Change [09.09.00] Several commands have been updated to have Optional/Required language in editors – this will continue until all commands are updated.
- Change [09.09.00] The `ExpandTemplateFile()` command now exposes processor properties set with `SetProperty()` to the template expansion tool. One-column tables are also exposed as lists. This allows template processing to be dynamically controlled.
- Change [09.09.00] The `FillRepeat()` command now accepts a `FillFlag` parameter.
- Change [09.09.00] The `SetTimeSeriesProperty()` command now allows a user-defined property to be set.
- New Feature [09.09.00] Add the `CopyTable()` command, useful for creating one-column tables for lists that can be used to expand templates.
- New Feature [09.09.00] Add the `ManipulateTableString()` command.
- New Feature [09.09.00] Add the `SetTimeSeriesPropertiesFromTable()` command, which can be used to set user-defined properties for a time series.
- New Feature [09.09.00] Add the `ReadTableFromDBF()` command, which reads a table from a dBASE file (e.g., associated with an ESRI GIS shapefile).

Changes in Versions 9.08.00 – 9.08.01

- Bug Fix [09.08.01] HydroBase `AutoConnect` property in TSTool configuration file was not being recognized for non-CDSS configurations. This has been fixed.

- Bug Fix [09.08.01] The `CalculateTimeSeriesStatistic()` command now properly matches time series identifiers in existing records rather than adding new records for output. The statistic column also is automatically added if it does not exist.
- Bug Fix [09.08.00] Data units for HydroBase data were shown as blank in the time series list for many data types – this has been fixed. Units have always been properly set in time series results.
- Bug Fix [09.08.00] Better handle time series with no data in graphs – time series are ignored and warnings are not shown (see also new feature below that highlights such time series in the time series list).
- Change [09.08.01] The RiversideDB query panel now has 6 input filters and choices are editable to allow matching substrings.
- Change [09.08.01] The `CalculateTimeSeriesStatistic()` command now allows the TSID column format to be specified, to allow more control over linking data.
- Change [09.08.00] The *File…Open…RiversideDB* functionality now reads a RiversideDB configuration file rather than the full TSTool or RiverTrak® configuration file and does not prompt for a login (by default data can be read but not written to the database). See the **RiversideDB Data Store** appendix for more information.
- New Feature [09.08.01] Add `TableMath()` command to perform simple math on table columns.
- New Feature [09.08.01] Add `TableTimeSeriesMath()` command to perform simple math on time series using input from a table.
- New Feature [09.08.00] Multiple RiversideDB databases can be opened using data store names. Data stores are suitable for databases and binary files and are an alternative to the input type/name convention. Data store names are now listed above the input types in the *Input/Query* area if data stores are available.
- New Feature [09.08.00] Time series that do not have data are now indicated with red text in the time series results list and are handled better in the graphing tool.

Changes in Versions 9.07.00 – 9.07.02

- Bug Fix [09.07.02] The `RunningAverage()` command was generating errors trying to compute N-year running average values on Feb 29 for daily and finer data. The values are now set to missing.
- Bug Fix [09.07.00] The table display for time series now shows numbers right-justified. The display had been left-justified for awhile.
- Change [09.07.02] The `ReadStateCU(…,AutoAdjust=True,…)` value is now the default to help ensure that TSTool can properly handle StateCU data types that include periods.
- Change [09.07.01] The `ReplaceValue()` command now provides an `Action` parameter to allow setting values to missing (or removing in irregular time series), and an analysis window can be specified to process data in a part of the year.
- Change [09.07.01] The `CheckTimeSeries()` command now provides an `Action` parameter to allow setting values to missing (or removing in irregular time series).
- Change [09.07.00] Period and monthly time series limits now include median, standard deviation, and skew statistics to facilitate additional analysis.
- Change [09.07.00] Status messages now indicate the command being run during processing, in addition to the progress percent estimate.

- ▪ Change [09.07.00] The `WriteSummary()` command now outputs an HTML file if the output file extension is "html", and allows the output year type to be specified in the command. An HTML report is also available from the main window results menu. The HTML report color-codes missing and flagged values and provides notes explaining flags. Additional enhancements to output will be added in the future.

- ▪ Change [09.07.00] The `CompareFiles()` command now has an `AllowedDiff` parameter to indicate that a certain number of lines are allowed to be different, which is useful, for example, for comparing files that have a date/time or software version in output.

- ▪ Change [09.07.00] The `ReadDelimitedFile()` command has improved error handling when invalid column names are specified in parameters.

- ▪ Change [09.07.00] The `FillHistMonthAverage()` command now accepts `FillFlag=Auto` and `FillFlagDesc` to better control flagging of filled values.

- ▪ Change [09.07.00] The `CheckTimeSeries()` command now accepts `Flag` and `FlagDesc` parameters to annotate values that are detected during the check, and the `Change>` and `Change<` check criteria have been added.

- ▪ Change [09.07.00] The `#` comment command now automatically has a status of success after editing, which avoids the "unknown status" indicator next to the command.

- ▪ Change [09.07.00] The `RunPython()` command now uses Jython 2.5.1 (when running the Jython embedded interpreter). Support has also been added for IronPython (the .NET implementation of Python) and additional parameters have been added to facilitate integration in various environments).

- ▪ New Feature [09.07.02] Training materials are included in the *doc/Training* folder under the installation. Additional examples will be added in the future.

- ▪ New Feature [09.07.00] An initial implementation of the ColoradoWaterHBGuest web services has been added, which allows accessing HydroBase via web services (no need for local database install). Initial work focuses on the `DivTotal` data type. Other data types will be handled in the future.

- ▪ New Feature [09.07.00] Flags associated with time series are now handled better. The 1-character limitation has been removed internally and restrictions imposed by commands will be removed over time. Flagged values are automatically noted on the HTML summary report.

- ▪ New Feature [09.07.00] The results area now provides *Views*, which allow more customized ways of listing, viewing time series. An initial version of the `NewTreeView()` command has been implemented to create a tree view. Additional views will be added in the future.

Changes in Versions 9.06.00 – 9.06.05

- ▪ Bug Fix [09.06.02] The `CalculateTimeSeriesStatistic()` command was reporting fraction for the missing and non-missing percent statistics – it has been fixed to report percent.

- ▪ Bug Fix [09.06.02] Running commands with `SetOutputPeriod()` and then loading a command file might display warnings for time series read commands because an attempt was made to change the period even though data values are not available. Running the commands would clear the warnings. This has been fixed so that warnings are not generated when loading the command file.

- ▪ Bug Fix [09.06.02] Commands read from a command file that have invalid parameters were not always generating a visible warning for the user – this has been fixed.

- Bug Fix [09.06.02] The `NewStatisticYearTS(…,SearchStart…)` parameter was disabled in the 9.05.x release but has now been restored. The bug resulted in major errors in calculating frost dates (such as time series having mostly very low or high days in year).
- Bug Fix [09.06.00] Copying a block of time series from the query results area to the command list when a command was selected resulted in the query results order being reversed – this has been fixed.
- Change [09.06.04] The `ReadDelimitedFile()` command has been updated to support reading column headings from the delimited file.
- Change [09.06.02] The `ChangeInterval()` command now includes a `Statistic` parameter that supports computing MAX and MIN statistics for INST (small) to INST (large) interval conversions. For example, use this feature to convert instantaneous temperature data to day maximum and minimum temperatures. Additional statistic support will be added in the future.
- Change [09.06.02] Opening a new HydroBase or RiversideDB database with **File…Open** now refreshes the input filters for the new connection, rather than just relying on startup configuration. A warning is now displayed when the HydroBase or RiversideDB input types are selected but no database connection is available.
- Change [09.06.01] The `WriteCheckFile()` command now includes the execution time for each command – this facilitates evaluation of software performance.
- New Feature [09.06.05] Add viewing capabilities for PNG and JPG output files.
- New Feature [09.06.04] Add `${InstallDir}` global property for processor to facilitate locating supporting files (e.g., Python scripts) in the installed environment. This property is recognized by commands that expand processor properties (see documentation).
- New Feature [09.06.04] Initial support for ColoradoIPP input type in main interface and `ReadColoradoIPP()` command.
- New Feature [09.06.03] The `WebGet()` command has been added to allow downloading content from a website.
- New Feature [09.06.03] The `ReadFromDelimitedFile()` command functionality has been fully enabled and documented.
- New Feature [09.06.02] Querying the time series list from a RiversideDB database now displays a join of time series, station, and location data, and the query can be filtered by the values.
- New Feature [09.06.01] If the TSTool configuration file indicates that the HydroBase input type is enabled and the `HydroBase.AutoConnect=True` property is set, then the HydroBase dialog will not be shown and the information in the CDSS configuration file will be used to make the HydroBase connection. This is useful when TSTool is installed in a server environment and everyone will use the same HydroBase connection.
- New Feature [09.06.00] The ColoradoWaterSMS input type has been added for interactive queries and TSID commands (specialized read commands have not been implemented). This allows TSTool users to access Colorado's real-time data via internet web services and then analyze it with TSTool features. The web services DO NOT provide access to data from external data providers such as the USGS. Additional enhancements will be made in future releases.
- New Feature [09.06.00] The data units that are globally used by TSTool can now be viewed using the **View… Data Units** menu. Data units are important for units conversion and when displaying data.

Changes in Versions 9.05.00 – 9.05.03

- ▪ Bug Fix [09.05.01] The `AnalyzePattern()` command was miscalculating positions of cutoff values, which, depending on the number of values in a sample, sometimes resulted in an edge pattern value being determined as one position to0 low. For example, a value near one of the percentile cutoffs would be reported as AVG when it should have been WET. This behavior resulted in a slight bias towards lower categories having higher values due to the extra value. This has been fixed; however, a `Legacy` parameter has been added to duplicate old behavior, in cases where old behavior needs to be retained.

- ▪ Bug Fix [09.05.00] Time series identifier commands that have invalid time series (e.g., not connected to database or using an invalid file name) generate an error when the command file is loaded. The "discovery" mode would not pass on the identifier to other commands and editors might fail when an empty identifier list is encountered. The identifiers are now passed on to other commands.

- ▪ Change [09.05.03] Update the `ReadStateMod()` and `ReadStateModB()` commands to allow an alias to be assigned time series that are read, and recognize `${property}` values in the input filename. Also update the `ReadStateMod()` command editor to better handle water right files.

- ▪ Change [09.05.03] Update the `NewStatisticTimeSeries()` command to handle year, hour, and minute data interval in addition to previous support for month and day.

- ▪ Change [09.05.02] Update the `NewStatisticYearTS()` to generate the output time series in year type other than calendar and handle other than daily time series (previous limitation).

- ▪ Change [09.05.02] Update the `ChangeInterval()` command to create year interval time series from daily and monthly data, where the output year type is other than calendar year.

- ▪ Change [09.05.02] Update the `ResequenceTimeSeriesData()` command to process output year types other than calendar year.

- ▪ Change [09.05.01] Update the `NewStatisticTimeSeries()` command to include `Min`, `Max`, and `Median` statistics, output period (in particular to allow output to be shortened to one year), and add a parameter to require a minimum sample size for computations.

- ▪ Change [09.05.01] Update the `NewStatisticTimeSeriesFromEnsemble()` command to include `Min`, `Max`, and `Median` statistics, output period (in particular to allow output to be shortened to one year), and add a parameter to require a minimum sample size for computations.

- ▪ Change [09.05.01] Update the `CalculateTimeSeriesStatistic()` command to calculate the following statistics: `DeficitMax`, `DeficitMean`, `DeficitMin`, `DeficitSeqLengthMax`, `DeficitSeqLengthMean`, `DeficitSeqLengthMin`, `DeficitSeqMax`, `DeficitSeqMean`, `DeficitSeqMin`, `Lag-1AutoCorrelation`, `Skew`, `StdDev`, `SurplusMax`, `SurplusMean`, `SurplusMin`, `SurplusSeqLengthMax`, `SurplusSeqLengthMean`, `SurplusSeqLengthMin`, `SurplusSeqMax`, `SurplusSeqMean`, `SurplusSeqMin`, `Variance`.

- ▪ Change [09.05.01] Update the `AnalyzePattern()` command to allow saving output statistics to a new table, which can then be written to a file with another command.

- ▪ Change [09.05.00] Rename the `CreateEnsemble()` command to `CreateEnsembleFromOneTimeSeries()` to reflect the command's specific functionality and to avoid confusion with related commands.

- Change [09.05.00] Allow DateValue format files to be written with no time series. This facilitates software testing and helps troubleshoot production command files. Previously an error was generated.
- New Feature [09.05.01] Add table display to ensemble results – all time series in the ensemble can therefore quickly be displayed.
- New Feature [09.05.00] Add `NewEnsemble()` command to create a new ensemble and optionally insert 1+ time series into the ensemble.
- New Feature [09.05.00] Add `InsertTimeSeriesIntoEnsemble()` command to insert time series into an existing ensemble.
- New Feature [09.05.00] Add `TimeSeriesToTable()` command to copy time series data to a table.
- New Feature [09.05.00] Add `ExpandTemplateFile()` command to implement templates using FreeMarker (http://freemarker.org). This facilitates adding conditional logic, loops, etc., to command files.

Changes in Versions 9.04.00 – 9.04.03

- Bug Fix [09.04.03] Fix bug in `ResequenceTimeSeriesData()` command where the last year in the resequenced time series contained missing values.
- Change [09.04.00] Finalize `ReadTableFromDelimitedFile()` command features for production use.
- Change [09.04.01] Finalize `ResequenceTimeSeriesData()` command for initial production use.
- New Feature [09.04.02] Add `NewTable()` command to create an empty table that can receive output from other commands.
- New Feature [09.04.02] Add `CalculateTimeSeriesStatistic()` command to compute statistics and optionally save in a table.
- New Feature [09.04.02] Add initial Principal Component Analysis (PCA) tool and `FillPrincipalComponentAnalysis()` command – the command will be finalized after additional testing and review.
- New Feature [09.04.01] Enable ability to read RiversideDB information from TSTool configuration file for batch runs.
- New Feature [09.04.00] Add `WriteTableToDelimitedFile()` command. This command is initially being used to test the read command but can be utilized as more table features are enabled.

Changes in Versions 9.01.00 – 9.03.04

- Bug Fix [09.03.05] Update the `ChangeInterval()` command to better handle negative values in some computations.
- Bug Fix [09.03.04] The `SetTimeSeriesProperty()` command was not allowing wildcards in the TSID parameter – this has been fixed.
- Bug Fix [09.03.00] The `CreateFromList()` command now ignores lines in the input that result in empty location identifiers – this was causing unexpected warnings.

- Bug Fix [09.01.01] The `FillRegression()` command was not recognizing the `AnalysisStart` and `AnalysisEnd` parameters – this has been fixed.
- Bug Fix [09.01.00] Fix `WriteSummary()` to output in water year if the year type has been set with `SetOutputYearType()`.
- Bug Fix [09.03.00] Fix several issues with the `ReadHecDss()` and `WriteHecDss()` commands related to hour 23/24 conversions and address feedback about the previous release.
- Change [09.03.06] Update `ChangeInterval()` command documentation to reflect current software capabilities. Also update the dialog to clarify notes about some parameters.
- Change [09.03.04] Update `WriteSHEF()` to provide more override parameters and allow appending to the output file.
- Change [09.03.02] Update `VariableLagK()` to allow negative lag.
- Change [09.03.00] Update `RemoveFile()` to fail if the file was not removed – users will need to check file permissions if the remove did not occur.
- Change [09.03.00] Finalize the `VariableLagK()` command features for release. The `DataUnits` parameter has been changed to `FlowUnits` and comments and command messages now also use "flow".
- Change [09.03.00] Update `RunCommand()` to provide parameters to specify the program name and each command line argument, in addition to the previous single command line – this facilitates handling of spaces in program name and arguments. Add the `ExitStatusIndicator` parameter to allow specification of a string to detect the exit status in output. Allow double quotes to be "escaped" in the program name and arguments by using `\"`. Add the `UseCommandShell` parameter to indicate whether the command shell should be used – disabling the command shell for simple executable calls can increase performance and simplify error handling.
- Change [09.02.00] Change `Lag()` to append "routed" to the scenario, instead of setting the data sub-type – this more cleanly ensures that distinct yet similar time series result from the command.
- Change [09.01.00] Update `WriteSummary()` to offer full `TSList` parameter options similar to other commands.
- New Feature [09.03.06] Use default HTML viewing program for user environment when viewing HTML files (such as check files) and add documentation as ***Help…View Documentation*** menu.
- New Feature [09.03.04] Add preliminary `CheckTimeSeries()` command to test time series for invalid values, perform quality control, etc.
- New Feature [09.03.04] Add preliminary `WriteCheckFile()` command to write a summary of command processing warnings and failures.
- New Feature [09.03.00] Add `RunDSSUTL()` command to run the Army Corps of Engineers' HEC DSSUTL program and other utility programs.
- New Feature [09.01.00] Add output year type `NovToOct`, similar to `WaterYear`, suitable for use with some systems. `WriteStateMod()` and `WriteSummary()` now recognize this year type.
- New Feature [09.01.00] Add the ***Problems*** tab to the results to list all warning/failure messages from running the commands. Additional features will be implemented to facilitate viewing. The listing can be sorted by right-clicking on the column heading and can be copied and saved to a file.

Changes in Versions 9.00.00 – 9.00.05

- Bug Fix [09.00.05] Using the `Exit()` command would not display the results generated prior to the command – this has been fixed.

- Bug Fix [09.00.05] The `ReadHydroBase()` command allowed too many where clauses in queries. A maximum of 6 criteria can be queried based on the current HydroBase interface design, and criteria beyond 6 were being ignored. The command and its editor now only allow up to 6 criteria.

- Bug Fix [09.00.04] Writing time series with missing values to NWS Card format could result in values inappropriate for Card files – the software now converts internal missing data values (e.g., `NaN`) to `-999` when writing Card files.

- Bug Fix [09.00.03] The `Copy()` command was generating an error when operating on time series with hour interval data and data flags – this has been fixed.

- Bug Fix [09.00.03] The `Multiply()` and `Divide()` commands' default behavior is to reset the data units on the modified time series to units*units or units/units, respectively. However, if the second time series has blank units then **, etc. could result – this has been corrected. Additionally, the `NewUnits` parameter has been added to both commands to allow the units to be reset to appropriate values.

- Bug Fix [09.00.00] Reading USGS NWIS time series using a TSID command resulted in null dates in the period – this has been fixed.

- Change [09.00.03] Upgrade the editor for TSID (time series identifier commands) to allow removing/adding the working directory from file names in the identifiers.

- Change [09.00.00] Upgrade Java from version 1.4.2 to 1.6, allowing use of updated third-party components and resulting in an increase in performance.

Changes in Versions 8.18.00 – 8.18.02

- Bug Fix [08.18.02] Fix limitation where the cell selection behavior in many tabular displays was not correct when running with Java 5+. TSTool will continue to be distributed with Java 1.4.2 in the short term but Java 6 will be phased in when tests are complete.

- Bug Fix [08.18.01] Fix the `SetInputPeriod()` and `SetOutputPeriod()` commands – spaces between parameters were not being handled.

- Bug Fix [08.18.01] Fix the uninstaller to remove the python folder used for utility scripts, which results in a complete uninstall.

- Change [08.18.01] Add the `MissingValue` parameter to the `WriteDateValue()` command, in particular to support time series read from formats with very large or small values used for missing data.

- Change [08.18.01] Improve support for the RiversideDB database – all standard time series data tables are now supported.

- New Feature [08.18.02] Begin distributing example data with the installer, starting with DateValue examples. See the *TSTool-Version/examples/data/DateValue* folder.

- New Feature [08.18.02] Add the ***Help…Import Configuration*** menu item, which allows a TSTool configuration file to be merged with the current file (e.g., for use after a new software install).

- New Feature [08.18.00] Add preliminary support for reading HEC-DSS files in the main interface and the `ReadHecDss()` command. Irregular time series are not supported and by default only the first data block is read – use the `ReadHecDSS()` command with a period to read the full period.

Changes in Versions 8.17.01 – 8.17.02

- Bug Fix [08.17.02] When opening HydroBase with **File…Open HydroBase** more than one time, the **Where** filters were not being reset for the new database connection – this has been fixed.
- Bug Fix [08.17.02] When loading command files that had time series identifier commands with extra spaces, the user may have seen an error. The error goes away when running the commands. The software now removes unneeded spaces at load so that they are not considered part of the time series identifiers, and the errors consequently do not occur at load.
- Bug Fix [08.17.01] When run in batch mode, TSTool was not recognizing the default HydroBase connection information in the *CDSS.cfg* configuration file – this has been fixed, allowing TSTool to access HydroBase in batch mode.
- Bug Fix [08.17.01] Fix the bug where no `TSList` parameter for `RunningAverage()` caused an error when running.
- Bug Fix [08.17.01] The following commands were not properly transitioning the `TSID` parameter for older command files to new syntax. The behavior is now to set `TSList=AllMatchingTSID` if the older command TSID parameter includes * and `TSList=LastMatchingTSID` if no wildcard is used. This matches legacy functionality and also supports current conventions. Problems may have occurred if the same TSID was reused in the command file because all `TSList=AllMatchingTSID` was used and more time series would have been operated on than desired. The updated commands are: `AddConstant()`, `AdjustExtremes()`, `ARMA()`, `ConvertDataUnits()`, `FillConstant()`, `FillFromTS()`, `FillInterpolate()`, `FillPattern()`, `FillRepeat()`, `Free()`, `ReplaceValue()`, `RunningAverage()`, `Scale()`, `SetConstant()`, `SetDataValue()`, `SetFromTS()`, `ShiftTimeByInterval()`.
- Bug Fix [08.17.02] Similar to the previous item, the following commands were not properly transitioning the `IndependentTSID` parameter for older command files to new syntax and have been updated: `FillFromTS()`, `SetFromTS()`, `SetToMax()`, `SetToMin()`.
- Change [08.17.02] The `Add()` and `Subtract()` commands now automatically update old syntax to the current syntax – previously a message would be displayed indicating that the command had to be recreated.
- Change [08.17.02] Previously, time series aliases with periods would be treated as full time series identifiers and could only be matched with other full time series identifiers during processing. This may have resulted in no match. Aliases with periods are now allowed to be specified and will result in a match with similar aliases when compared with parameters that use the alias. Care must be taken to NOT specify an alias with periods that is the same as a full time series identifier, and which is not intended to be a match. In general, aliases that use periods should either match the full time series identifier or be different enough to not result in an unintended match.
- Change [08.17.02] When opening a command file, read commands are run in "discovery" mode in order to determine time series identifiers for command editors. Previous versions would do a full read of the data at this point, which was slow – this has been fixed so that only time series metadata are read when loading command files.

- New Feature [08.17.02] Add the **File…New** menu to allow clearing the current commands and starting a new command file.
- New Feature [08.17.02] StateMod binary output files as of version 12.29 had a change in the file header – this version of TSTool is able to read the new format while being backward compatible with old formats.

Changes in Versions 8.16.03 – 8.17.00

- Bug Fix [08.17.00] Fix RiverWare file reading. Because RiverWare dates always include 24:00, even when not needed, parsing some dates was causing roll-over into the next month. The 24:00 is now ignored for day, month, and year interval time series.
- Bug Fix [08.17.00] Fix StateModB file reading – previously an error was occurring when no reservoirs were in the data set.
- Bug Fix [08.16.03] Re-enable the general `ReadTimeSeries()` command in the GUI. It was thought that this command would be phased out in favor of specific read commands. However, it is useful in some cases and provides a companion to the `CreateFromList()` command. Also update the command to allow more control over handling missing time series with the `IfNotFound` parameter.
- Bug Fix [08.17.00] Fix the `FillRepeat()` command – the `MaxIntervals` parameter could not be set in the command editor.
- Bug Fix [08.17.00] Fix many editor dialogs – the TSID entry field was disabled for `TSList=FirstMatchingTSID` and `TSList=LastMatchingTSID`. These parameter values were added for specific commands but became available globally for other commands.
- Bug Fix [08.16.03] When running in batch mode on Linux the menu bar graphic was loaded at startup. This causes an error when an X11 connection is not configured (e.g., for cron jobs). This error may still result if processing graphical products in batch mode – more will be done later including updating the Java version used by TSTool.
- Bug Fix [08.16.03] Fix the `ReadNwsCard()` command to once again enable the `NewUnits` parameter – this bug was introduced in version 08.03.00.
- Bug Fix [08.16.03] Fix so that reading an NWS Card file that is not 24Hour will generate an error if `Read24HourAsDay=True` is specified.
- Change [08.17.00] Update the following commands to have new error handling and convert to named parameter notation (if not previously converted): `AdjustExtremes()`, `ARMA()`, `CreateFromList()`, `Disaggregate()`, `Divide()`, `Exit()`, `FillDayTSFrom2MonthTSAnd1DayTS()`, `FillInterpolate()`, `FillPattern()`, `FillProrate()`, `Multiply()`, `NewDayTSFromMonthAndDayTS()`, `NewEndOfMonthTSFromDayTS()`, `Normalize()`, `ReadDateValue()`, `ReadMODSIM()`, `ReadNwsrfsFS5Files()`, `ReadPatternFile()`, `ReadRiverWare()`, `ReadTimeSeries()`, `ReadUsgsNwis()`, `RelativeDiff()`, `ReplaceValue()`, `SetDataValue()`, `SetToMax()`, `SetToMin()`, `StateModMax()`, `WriteStateCU()`. All commands are now updated to the new error handling and named parameter notation.
- Change [08.17.00] Disable hiding of problem gutter in main GUI. The problem icons will always be shown and mouse over will popup the command status.
- Change [08.17.00] `/*`, `*/` and `Exit()` commands now have command editors even though these commands have no parameters – this provides a consistent handling of all commands.

- Change [08.17.00] Change `SetPatternFile()` to `ReadPatternFile()`. The command will automatically be converted when a command file is read.
- Change [08.17.00] Change `SetMax()` to `SetToMax()`. The command will automatically be converted when a command file is read.
- Change [08.17.00] Change `RemoveFile(WarnIfMissing=…)` to `RemoveFile(IfNotFound=…)` to be consistent with other commands. The command will automatically be converted when a command file is read.
- Change [08.17.00] Update the `FillInterpolate()` command to have the `FillStart`, `FillEnd`, and `FillFlag` parameters.
- Change [08.17.00] Update the `CreateFromList()` command to change the `HandleMissingHow` parameter to `IfNotFound` and change the default to `Warn`. Users can then decide whether missing time series should be a fatal problem, should be ignored, or should result in default empty time series. Also change the default delimiter to comma (was comma and space) to more explicitly handle comma separated value files.
- Change [08.17.00] Update the `ReadNwsrfsFS5Files()` command to allow a relative path for the file.
- Change [08.17.00] Update the `WriteSHEF()` command to include the `DataTypePELookup` parameter, to allow assigning the PE code when running in environments when such information is not automatically initialized.
- Change [08.17.00] Update the `CompareFiles()` command to include the `CommentLineChar` parameter, to allow setting the comment line character to other than the default (#).
- Change [08.17.00] Add full command editor for the `LagK()` command.
- Change [08.16.03] Update the `ReadHydroBase()` commands to have the `IfMissing` parameter, to indicate how to handle missing time series. See also the information about the `OpenCheckFile()` command below.
- Change [08.16.03] Update the `FillFromTS()` and `SetFromTS()` commands to have the `RecalcLimits` parameter, to recalculate the historical data limits as if all the data were observed in the merged time series. This facilitates combining time series from different sources to create one observed time series.
- Change [08.16.03] Update the `SetFromTS()` command to have the `HandleMissingHow` parameter, to allow missing data to be ignored during the transfer.
- New Feature [08.16.03] Add the `ReadStateCUB()` command and ability to read StateCU (State of Colorado Consumptive Use model) binary output files in the main interface.
- New Feature [08.16.03] Add the initial version of the `OpenCheckFile()` command, to facilitate checking results. `ReadHydroBase()` commands that fail will be listed in the check file. Additional checks will be enabled in the future as the command is enhanced. The check file is viewable in the results area. It is expected that formatting of the output file will change.
- New Feature [08.16.03] Add the `WriteTimeSeriesProperty()` command, to facilitate software testing, in particular to write the data limits to test new `FillFromTS()` and `SetFromTS()` command features. In the future this may also be used to save time series information, such as statistics. Additional time series properties will be added over time.

Changes in Versions 8.16.00 – 8.16.02

- **Bug Fix** [08.16.00] TSTool running in batch mode was always exiting with status 0, even if errors occurred. It will now exit with status 1 if any warnings or errors occurred in processing. Refer to the log file for problems or run interactively to fix command input errors.
- **Bug Fix** [08.16.00] In the `Free()` command, the matched time series are now also freed in reverse order from the list in memory – previously the logic may have freed the wrong time series if multiple time series were matched in a pattern.
- **Bug Fix** [08.16.00] The `FillStart` and `FillEnd` parameters were not being recognized by the `FillFromTS()` command – this has been fixed.
- **Change** [08.16.02] Update the `CopyEnsemble()` command to have the `NewAlias` parameter, to allow more flexibility in identifying time series in the copy.
- **Change** [08.16.02] Update the `CreateRegressionTestCommandFile()` command to recognize `@os` and `@testSuite` tags in command file comments, to control collection of test command files.
- **Change** [08.16.00] Reset global properties (except logging levels) to defaults at the start of command processor runs. Previously this was not done and global properties like output period could still be in effect if rerunning commands interactively.
- **Change** [08.16.02] Update the following command to have new error handling and convert to named parameter notation (if not previously converted): `SetAutoExtendPeriod()`, `SetAveragePeriod()`, `SetWorkingDir()`.
- **Change** [08.16.00] Update the following command to have new error handling and convert to named parameter notation (if not previously converted): `DeselectTimeSeries()`, `SelectTimeSeries()`, `SetDebugLevel()`, `SetIgnoreLEZero()`, `SetIncludeMissingTS()`, `SetOutputYearType()`, `SetWarningLevel()`.
- **Change** [08.16.00] Update the `CreateRegressionTestCommandFile()` and `RunCommands()` command to better support testing. The expected status for a command file can now be indicated in a comment. The output report now indicates the expected and actual status and whether the test had an overall pass/fail. See examples of how to use these commands in the documentation.
- **Change** [08.16.00] Update the `Free()` command to use the `TSList` parameter, to allow more flexibility in selecting time series. Also add the `FreeEnsembleIfEmpty` parameter to remove empty ensembles.
- **Change** [08.16.00] Update the `WriteDateValue()` command to have the `Precision` parameter, to allow more flexibility in formatting output. The default is still 4 digits after the decimal.
- **New Feature** [08.16.02] Begin adding Python example scripts to the distribution, located in the *python* folder. Additional scripts will be added over time.
- **New Feature** [08.16.00] Add the `FTPGet()` command to retrieve files from remote systems using file transfer protocol (FTP).
- **New Feature** [08.16.00] Add the `RunPython()` command to run Python/Jython scripts.
- **Remove** [08.16.00] Remove the `SetMissingDataValue()` command, which has not been supported in the GUI for some time. The `SetTimeSeriesProperty()` or another command may be updated to specify the missing data value for the time series.

- Remove [08.16.00] Remove the `SetRegressionPeriod()` command, which has not been supported in the GUI for some time. The regression analysis period can be set in the `FillRegression()` command parameters.

Changes in Versions 8.15.00 – 8.15.03

- Bug Fix [08.15.03] Re-enable the ability to read default HydroBase connection information from the *system/CDSS.cfg* file when running in batch mode. This allows the user to configure HydroBase once and use with any command file that is run.
- Bug Fix [08.15.03] Re-enable the ability to run TSTool in batch mode with `–nomaingui` and have plot windows display until the Close button is pressed. This had been broken in version 8.00.00+.
- Bug Fix [08.15.00] Fix a bug in the `Add()` and `Subtract()` commands introduced after 08.02.00. Additional flexibility was enabled to specify the time series list but the new features were not backward compatible with old command files in all cases, in particular when a list of specified time series identifiers was used. Version 08.15.00 is backward compatible and translates old commands on the fly. A workaround is to use version 08.02.00 and change the command parameters to use `TSList=SelectedTS` (instead of `AddTSList=SelectedTSID` or `TSList=SelectedTSID`).
- Bug Fix [08.15.00] Fix a bug in the `SetConstant()` command introduced after 08.02.00. Additional flexibility was enabled to specify the time series list but the new features were not backward compatible in all cases. In particular the `TSList` parameter default is now `LastMatchingTSID` when updating old command files (was mistakenly defaulted to `AllMatchingTSID`).
- Bug Fix [08.15.00] The ability to right-click on the command list and search for a command was recently broken and has been fixed.
- Bug Fix [08.15.00] Printing the Analysis Details from an XY-scatter plot was broken and has been fixed.
- Bug Fix [08.15.00] Fix so that the obsolete `SetConstantBefore()` command is treated as an unknown command and verify that all unknown commands are loaded, to allow editing and correction. Previously some obsolete commands might be skipped when loading command files.
- Bug Fix [08.15.00] Fix the `ReadNwsCard()` command for ensemble files to handle leap years in the ESP run period (case where ESP run start is Feb 29 is still not handled). Also handle the nonstandard period header produced by the NWS ESPADP software – previously this format error had to be corrected outside of TSTool.
- Bug Fix [08.15.00] Fix the `ReadNwsCard()` command to handle reading ensemble files where ESP was run on the last day of the year. The conversion of 1-24 hour to 0-23 hour was causing the data to be shifted by one full month in this case. Also allow an optional ensemble identifier and name to be specified, which will create an ensemble recognized by TSTool.
- Bug Fix [08.15.00] Fix the `FillUsingDiversionComments()` command (used when processing HydroBase diversions). A bug was present that caused the filling to not occur when operating on only one time series (filling worked when operating on all time series).
- Bug Fix [08.15.00] Fix the `FillMOVE2()` command to properly handle legacy command parameters (prior to named parameter syntax) – this problem only occurred for old command files.
- Bug Fix [08.15.00] Fix the `SetFromTS()` command to properly handle legacy command parameters (prior to named parameter syntax) – this problem only occurred for old command files.

- Change [08.15.03] Change the `Copy()` command to be more forgiving when reading old command files. The required `NewTSID` parameter will now be defaulted to a copy of TSID with scenario "copy". Using an alias for TSID will still require updating the command to specify appropriate `NewTSID` parameter information.
- Change [08.15.02] Change the `ChangePeriod()` command to also operate on ensembles.
- Change [08.15.00] Change DateValue time series file reading to NOT allow multiple adjacent delimiters and do not allow mixing of space and tabs for delimiters. For example, when using commas as the delimiter, ",," would not result in a missing value. The updated software is more strict in order to prevent inadvertent data errors. The default delimiter is a space. If for example, columns are being pasted from Excel using tabs as the delimiter, make sure to add the following line at the top of the DateValue file:
  `Delimiter = " "`
  where a tab character is inside the quotes.
- Change [08.15.00] Change DateValue time series reading to generate a more explicit error if the file does not exist, to facilitate error checks. Command files that reference invalid files may now generate errors at different processing steps.
- Change [08.15.00] Update the `WriteDateValue()` command to recognize ensembles.
- Change [08.15.00] Update the `Blend()` command to current error handling and parameter naming conventions. The old syntax is recognized and will be automatically updated.
- Change [08.15.00] Fix the `WeightTraces()` command – it had been disabled for some time and has now been updated with command parameters and error handling consistent with current standards. The old syntax is no longer recognized because the command now operates on an ensemble identifier (old depended on less robust time series identifier conventions).
- Change [08.15.00] The "REF TS" label shown in the legend for plots, indicating which time series is used in the overview (reference) window under the main plot has been removed. On-screen, saved images, and printed plots should now look the same.
- Change [08.15.00] Improve the startup so that database queries for choices do not cause user interface problems.
- Change [08.15.00] Software is now distributed with installers that install to a versioned folder and indicate the software version in menus. This allows multiple versions of the software to be installed at the same time. Previous versions evaluated this approach without full installers.
- New Feature [08.15.00] Indicate that the command file is modified when reading a command file and changes to command syntax are automatically applied. This will occur with commands that have been fully updated to the new error handling (you are not required to edit the command for its syntax to be updated). The command file can then be saved to accept the automatic changes.

Changes in Versions 8.13.00 – 08.14.02

- Bug Fix Warning dialogs in command editors were inadvertently turned off in a previous release and have been enabled again.
- Bug Fix Fix so that the `TSAlias` is used if specified in time series product files (used with `ProcessTSProduct()`). This allows aliases to be configured in commands and passed to pre-generated product files, to streamline product processing.

- Change The `WriteDateValue()` command has been updated to include a `Delimiter` parameter (e.g., to allow comma to be specified) and the output period can be set in the command. The alias is also now printed in column headings if it has been specified.
- New Feature Continue updating commands to have new error handling and to enable ensemble processing for many commands.
- New Feature Add `SetProperty()` and `SetPropertyFromNwsrfsAppDefault()` commands to set controlling information for processing. In particular, it is envisioned that this capability will be used to set date/time and filename information at the top of a command file, for use in other commands throughout the command file.
- New Feature Add ability to recognize `${Property}` in read/write commands for DateValue, NwsCard, and NwsrfsEspTraceEnsemble commands. This capability will be added to other commands in future releases.
- New Feature Add the ability to set the time series alias dynamically in the `ReadNwsrfsEspTraceEnsemble()` command.
- New Feature Add preliminary capability in the `ReadDelimitedFile()` command – additional work will be completed to fully enable this command.
- New Feature Add the `ComputeErrorTimeSeries()` command, to create a time series indicating the difference between, for example, observed and simulated time series. Percent error is enabled and additional error measures may be added in the future.
- New Feature The `RunPython()` command has been enabled in preliminary fashion, with the goal of implementing full support for calling external Python processing scripts, to support more complex processing.
- New Feature Add the `ResequenceTimeSeriesData()` command to resequence years of data in a time series, given a list of years.

Changes in Versions 8.03.00 – 08.12.06

- Bug Fix Fix NwsrfsEspTranceEnsemble handling to handle leap year and correct bug where time zone was not being handled properly (one hour off).
- Change Many commands have been updated to use the `TSList` parameter, which indicates the time series to be processed by the command. Commands are backward compatible; however, the new parameter will not be recognized by older versions of TSTool. Once this parameter is enabled in a command, it will allow additional values to be recognized in the future (e.g., getting the list of time series from a table may be enabled). A consistent approach for the parameter also promotes consistency between commands.
- Change As much as possible, update commands that read time series to provide the list of time series identifiers to other commands. This facilitates command editing. For example, when a `Read*()` command is inserted, it will partially run (discovery mode) to read time series information, but not the full data. The time series information is then made available to later commands to facilitate editing the commands.
- Change Expand the capabilities of the `SetTimeSeriesProperty()` to include setting whether editable – editable time series will enable editing capabilities in the graph view. Add the `DefaultSaveFile` parameter to the `ProcessTSProduct()` command to help automate saving edited time series.

- ▪ ☐Change☐ Change all results to a tabbed panel of lists, with appropriate mouse actions. For example, a variety of actions can be taken by right-clicking on the time series results. However, for output files, a single click on a file will result in the file being displayed.
- ▪ ☐Change☐ Include most output files in the results tab. Some secondary files are not yet included but will be as additional commands are updated with improved error handling.
- ▪ ☐Change☐ Reorganize general command menus to group related commands and avoid a long list of general commands.
- ▪ ☐Change☐ Reorganize into a separate command menu commands that only apply to ensembles.
- ▪ ☐Change☐ The performance of the `ShiftTimeByInterval()` command has been greatly improved.
- ▪ ☐Change☐ Running "TSTool File.TSTool" will cause the command file to be loaded, but not run. To run in batch mode, continue to run with "TSTool –commands File.TSTool".
- ▪ ☐Remove☐ Remove obsolete commands from menus. Running old command files will warn about the obsolete commands and recommend new commands. Most of these commands have not been used for a long time: `SetConstantBefore()` was previously replaced with `SetConstant()`. `FillCarryForward()` was previously replaced with `FillRepeat()`.
- ▪ ☐New Feature☐ Add the `ReadTableFromDelimitedFile()` and `ResequenceTimeSeriesData()` commands to facilitate generation of stochastic time series.
- ▪ ☐New Feature☐ Add the `CreateEnsemble()` command to create an ensemble of time series from a single time series (e.g., by shifting and overlapping each year of the time series).
- ▪ ☐New Feature☐ Add the `CopyEnsemble()` command, which copies each time series in an ensemble.
- ▪ ☐New Feature☐ Add the `NewStatisticTimeSeriesFromEnsemble()` command, which generates a statistic (e.g., "Mean") time series from an ensemble.
- ▪ ☐New Feature☐ Add a command menu group and results tab for table processing. Add the `ReadTableFromDelimitedFile()` command, for example to read a CSV file. It is envisioned that table commands will be used to further automate and streamline processing.
- ▪ ☐New Feature☐ The `NewStatisticTimeSeries()` command has been added to generate a statistic time series determined from a time series. For example, for the "Mean" statistic, the mean of all Jan 1 daily values are repeated throughout the period for each Jan 1. This allows the mean to be graphed or otherwise used for analysis.

Changes in Versions 8.00.00 – 08.02.00

- ▪ ☐Change☐ The `Copy()` command now requires a new time series identifier to be specified, in order to avoid confusion with the original time series identifier. Old commands will fail if a valid new identifier is not specified. A simple workaround is to use the same location and interval as the original time series and "copy" for the scenario. Because an alias is assigned to the copy, this full time series identifier will likely only be used for displays about time series details.
- ▪ ☐Change☐ Begin distributing TSTool such that when installed the software lives in a separate versioned folder with a name similar to "TSTool-08.02.00". This allows different versions of the software to be installed at the same time, in case a specific version must be used and to allow for transition to new versions without conflicts with other software that may share components. A zip file install is available and a full installer is being created, similar to previous versions.

- New Feature Initial implementation of new error-handling features, which display graphics to the left and right of the command area indicating warnings and failures. The intent is to provide users with more immediate and accessible feedback and minimize the need to review the log file. Black dots after running indicate commands that have not been updated to the new error handling. Right click on a command and select "Show Command Status" to see useful information about resolving a problem. A command has 3 phases: initialization, discovery, and run, each with a status of unknown, success, warning, or failure.
- New Feature Process commands on a separate thread. This allows the GUI to remain responsive and show command progress during running. Features are being implemented to cancel processing.
- New Feature Add `CreateRegressionTestCommandFile()`, `RemoveFile()`, and `StartRegressionTestResultsReport()` commands to facilitate creating command test suites, to allow regression testing. Use these commands to create test suites for testing, to automate testing for future releases.
- New Feature Add the `WriteProperty()` command to write a processor property (e.g., the output start date) to a file, primarily for use in testing.
- New Feature Add the `RemoveFile()` command for use in testing, and can also be used in normal processing.
- New Feature Add the `NewPatternTimeSeries()` command, which can be used to generate test data for other commands, and can also be used for normal processing.

Changes in Versions 7.02.00 – 07.04.00

- Remove checkbox for stored procedures from HydroBase login – the transition to stored procedures has been complete for some time.
- Allow the `readStateMod()` command to read water rights files – this was implemented to verify CDSS StateDMI software processing.
- Add support for HydroBase administrative flow stations.
- Add the `setToMin()` command similar to `setMax()`.
- Update the TSTool PDF documentation to include navigation.
- Update the HydroBase `fillUsingDiversionComments()` command to optionally fill with the CIU (currently in use) flag.
- Improve the sizing of the time series query list table.
- Change installer so that when TSTool is run in batch mode from the command line, the working directory is the starting location, rather than the software installation home.
- Update to allow the `readNWSRFSFS5Files()` command to work in batch mode.
- Update to handle new StateCU file formats.

Changes in Version 7.01.00

- HydroBase 20061003 and later has a G: at the end of the SFUT and the F: has been expanded to seven characters. This version of TSTool handles the new identifiers and is backward compatible with older databases and commands files. Old commands files using SFUT should return the same results as before.
- The time series list area now has a minimum height consistent with the HydroBase input type – lists of time series from StateMod or other files are now more readable.
- The `analyzePattern()` command dialog now correctly forces the user to use percentiles in the range of 0 to 1. The command has also been updated to use the output period from `setOutputPeriod()` and the year type from `setOutputYearType()` to write the pattern file.

Consequently, the input time series are no longer required to be the specific water year period to
control output. The previous version added "_pattern" on the location part of the TSID, but the
current version instead sets the data type to "Pattern" – this will allow the pattern file output to be
directly used with `fillPattern()`, using standard locations.

- When saving commands files, the "TSTool" file extension is automatically added. This is compatible
  with the new installer, which lets the operating know that the extension should be associated with
  TSTool.
- Fix the `fillInterpolate()` command to allow time series identifiers with space.
- Fix the `cumulate()` command to allow the HandleMissingHow parameter to not be specified – it
  will default to `SetMissingIfMissing`.
- The `fillUsingDiversionComments()` command has been updated to use the CIU HydroBase
  data to provide more zeros.
- Update to support new StateCU file formats with longer crop names, consistent with similar
  StateDMI software updates.
- The installer includes several improvements, including more ability to configure the HydroBase
  information, and displaying previously set HydroBase configuration information as defaults.

Changes in Version 7.00.00

- Begin using the Nullsoft Scriptable Install System (NSIS) to build software installers.
- Begin distributing TSTool as an executable file *TSTool.exe*, which starts up the Java Runtime
  Environment. This allows for simpler configuration of the **Start** menu and gives users a more
  traditional executable to run.
- The software organization is slightly different from the previous releases in order to recognize clearer
  boundaries between components. Several new Jar files are provided, rather than being merged with
  other Jar files. The **Installation and Configuration Appendix** lists the files.
- Add support for Colorado Agricultural Livestock Statistics and human population time series in
  HydroBase.

Changes in Version 6.19.00

- Update `fillUsingDiversionComments()` to extend time series with diversion comments
  available outside the normal diversion records period, if no query or output period has been specified.

Changes in Version 6.18.00

- Add `runCommands()` to allow a controlling commands file to run other commands files.

Changes in Version 6.17.00

- Add `compareFiles()` to help with regression testing, to verify current and expected results.

Changes in Version 6.16.02

- Begin adding data test commands in development mode – these commands will evaluate time series
  for critical conditions.
- Reenabled `fillMove2()`, which was unintentionally disabled in a previous release.

Changes in Version 6.16.01

- First version that includes operational features to support link between time series and map interface.

- Increase performance at startup when no main GUI is shown, for cases when TSTool is being used to provide graphs for other software.
- Add support for Universal Naming Convention (UNC) for software home in startup files.
- Change *View…Map Interface* to *View…Map*.

Changes in Version 6.16.00

- Implement hooks for the NDFD input type.
- Improve handling of NWS Card file extensions in commands and *File…Save* menu choices.
- Add map interaction features. See the **Installation and Configuration Appendix** for more information about configuring links with maps.

Changes in Version 6.15.00

- Begin implementing link between time series and map interface.
- Reorder general command menus to be more consistent with other software.
- Add warning if time series cannot be retrieved from the RiversideDB input type.

Changes in Version 6.14.00

- Change the setQueryPeriod() command to setInputPeriod() to be consistent with other software nomenclature. The old command is still supported.
- The readNwsCard() and TS Alias = readNwsCard() commands both now use the named-parameter notation and have the new Read24HourAsDay parameter.
- Blank lines in commands files now display properly.
- Fix bug where time series table sometimes showed half-drawn rows.
- Fix bugs where StateMod binary and StateCU input type file chooser prompt would not allow a cancel of the file select to occur. Cancel now results in the previous file that was selected being displayed.

Changes in Version 6.12.00

- Improve error handling for processing time series products. In particular, TSTool now returns a non-zero exit status if there is an error processing a product. This can be detected by external software that is running TSTool.

Changes in Version 6.11.00

- Enable the ColoradoSMS input type and begin adding alert annotations for streamflow graphs.
- Fix bug so that if a commands file is specified using a relative path, the working directory is interpreted correctly to determine the full path to the commands file.
- Add the ability to accept Parameter=Value command line parameters. This will allow override of configuration file information.
- Convert processTSProduct() to use named parameters and ensure that output can be viewed even if in batch mode with no main GUI.
- Update so that for batch runs, the *CDSS.cfg* file information for HydroBase is used to make the initial connection. Phase out the HydroBase database properties in the *TSTool.cfg* file.

Changes in Version 6.10.09

- Convert cumulate() to use named parameters and begin development of a new Reset parameter.

- Convert `readStateModB()` to use named parameters and add the Version parameter to allow reading of old files. The features associated with the Version parameter are under development.
- Update the `newStatisticYearTS()` to support calculation of maximum and minimum values in a year and count of values in a year above/below a test value. Also update the command to better handle incomplete data at the end of the analysis period.
- Update the `openHydroBase()` command to check the *CDSS.cfg* information and provide database server and database name choices to the user, to minimize errors in use.

Changes in Version 6.10.08

- Convert `fillConstant()` to use named parameters.
- Convert `newTimeSeries()` to use named parameters.
- Add the `newStatisticYearTS()` command, in particular to support calculation of frost date time series.
- Update `openHydroBase()` to accept the database name parameter.
- Double-clicking on a command will now cause the editor for the command to be displayed.
- Add a Command Glossary to the documentation and begin to standardize command parameter names to be consistent.

Changes in Version 6.10.07

- Convert `scale()` to use named parameters.
- Change `TS X = ...` to `TS Alias = ...` in menus. Start to change notation in documentation and command dialogs.
- Convert `copy()` to use named parameters and add the ability to assign a new TSID to the copy.
- Convert `writeStateMod()` to use named parameters and add ability to select time series to write.
- Convert `readStateMod()` to use named parameters and add parameters for the input period..

Changes in Version 6.10.06

- Official release to support stored procedures.
- Documentation made current to reflect changes since the last documentation issue.
- Respond to feedback from previous 6.10.x incremental releases.
- Fix bug where XY-Scatter graph was not working due to changes in the 6.10.00 BETA release.

Changes in Version 6.10.05

- Add the `lagK()` command.
- Update the `fillProrate()` command `InitialValue` parameter to support `NearestForward` and `NearestBackward`.

Changes in Version 6.10.04

- Add additional input filter choices for HydroBase structures and stations, consistent with the StateView software.
- Update the `fillProrate()` command to include the `ComputeFactorHow` parameter to allow computing the proration factor based on an average of ratios. Update the command to support free-format parameters.
- Update the `selectTimeSeries()` command to allow combinations of selection filters, to allow more flexibility.
- Add the ability to query HydroBase infrequent diversion and reservoir release time series.

Changes in Version 6.10.03 BETA

- Input filters for HydroBase well structures and stations are now handled properly.
- Add initial support for saving time series products to HydroBase and RiversideDB.

Changes in Version 6.10.02 BETA

- Update the `openHydroBase()` command to use free-format parameters.

Changes in Version 6.10.01 BETA

- Enable ability to have data flags for daily and monthly data.
- Update the `writeRiverWare()` command to handle time steps other than hourly.

Changes in Version 6.10.00 BETA

- Begin releasing support for HydroBase stored procedures.
- Begin development of generic `changeInterval()` command and update to free-format parameters.
- Begin work on the Mixed Station Analysis tool and `fillMixedStation()` command.
- Update the `fillRegression()` command to support free-format parameters.
- Begin work on the `analyzePattern()` command.
- Add the ***Commands…Analyze Time Series*** menu for analysis commands.
- Add the ***Commands…Models*** menu for more complicated modeling commands.
- Add the ***Tools…Analysis*** menu for analysis tools.
- Begin implementing the generic log file viewer, which allows links between commands and log messages.
- Change defaults to NOT display messages to the console, to improve performance.
- Add the point graph type.
- Add the predicted value graph type.
- Add the predicted value residual graph type.
- Add the `sortTimeSeries()` command.
- Add the ability for the `readNWSCard()` command to read 1+ time series.
- Add the `startLog()` command.
- Add the `compareTimeSeries()` command.
- Update the `fillHistMonthAverage()` and `fillHistYearAverage()` commands to have fill flag and free-format parameters.
- Add a warning in the `add()` command when frost date time series are added and indicate more appropriate commands.

Changes in Version 6.09.03

- Fix bug where initial directory with spaces in name was causing errors.

Changes in Version 6.09.02

- Added release notes to documentation.
- Fix bug in NWSRFS FS5Files input type where identifiers with underscores were not being handled.
- StateModB input type reservoir data types (and some well types) had ? for data groups – this has been resolved using StateMod 10.27 HTML documentation.

Changes in Version 6.09.01

- Added NWSRFS FS5Files input type support, for use with the National Weather Service River Forecast System (NWSRFS).
- Fix summary reports (daily totals and means) to handle minute data.

Changes in Version 6.09.00

- Add the `readHydroBase()` command to read one or more HydroBase time series while filtering based on location, ID, etc.

Changes in Version 6.08.02

- Documentation updated to reflect all version 6 changes.
- Minor corrections to interface based on documentation review.

Changes in Version 6.08.01

- For the HydroBase input type, allow the ODBC DSN to be specified in the TSTool configuration file, to allow a HydroBase connection to be made at startup without prompting. This supports the CDSS CD distribution.

Changes in Version 6.08.00

- Allow StateCU input type time series read commands to allow wildcards.
- Allow StateMod input type time series read commands to allow wildcards.

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