# TSTool Training

## Quality Control

Version: 9.07.02, 2010-08-20

Duration: 30 minutes

Level: Introduction







# This Presentation

- Provides an introduction to TSTool quality control features
- Is designed for self-paced training
- Is accompanied by examples, each of which reside in a folder distributed with this presentation
  - See the doc/Training folder under the software installation

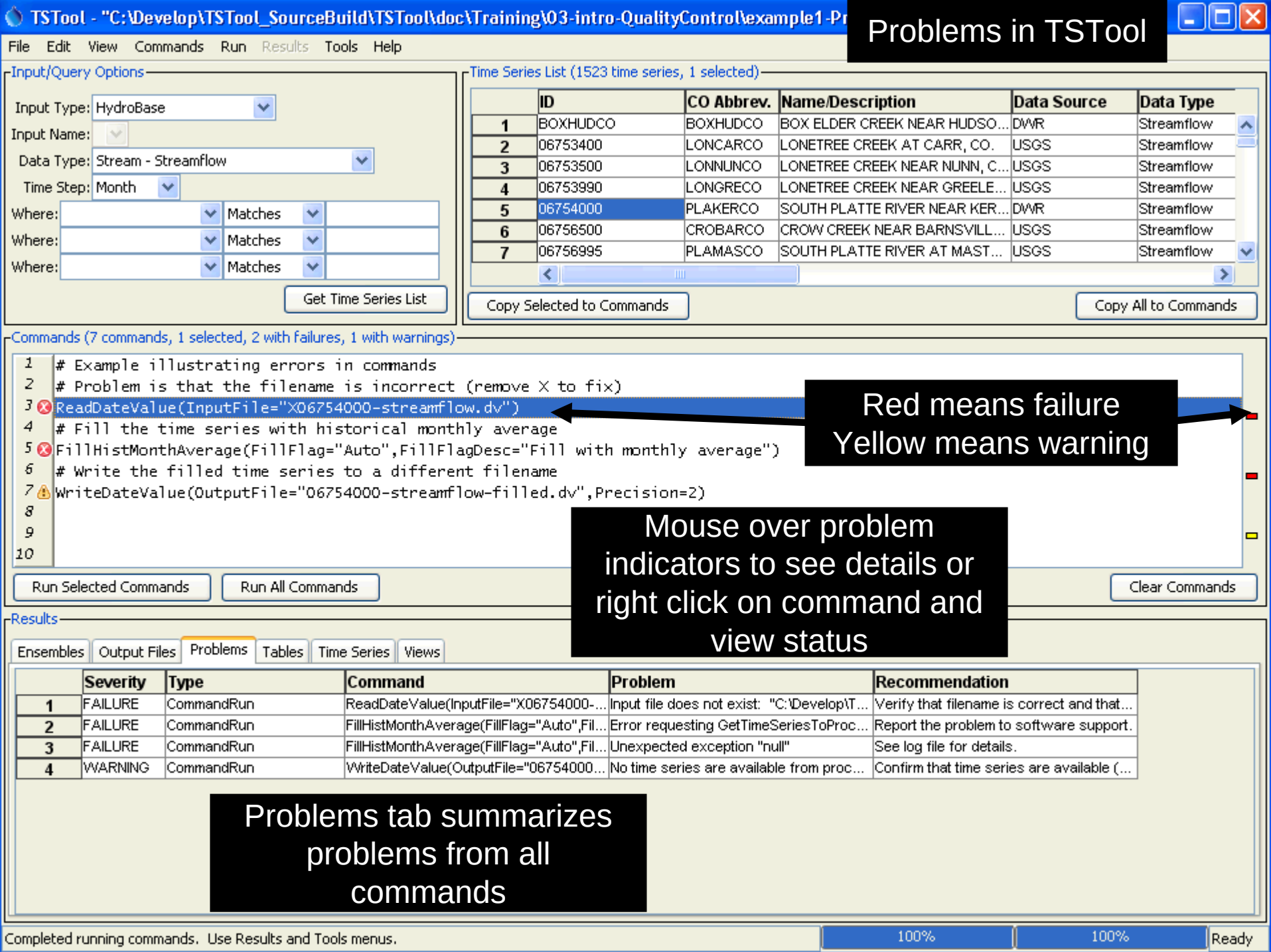
# TSTool Quality Control Features

- Warning and Failure indicators – DO NOT IGNORE THEM
- Automation – use it to increase the amount of quality control checks
- CheckTimeSeries() – check for unexpected values
- Command tests – illustrate how software is tested and also can be applied to your own processes

# Warning and Failure Indicators

- Provided at multiple levels
- TSTool tries to complete command processing so that a complete picture of problems is known – usually fixing the first problem(s) clears up later problems

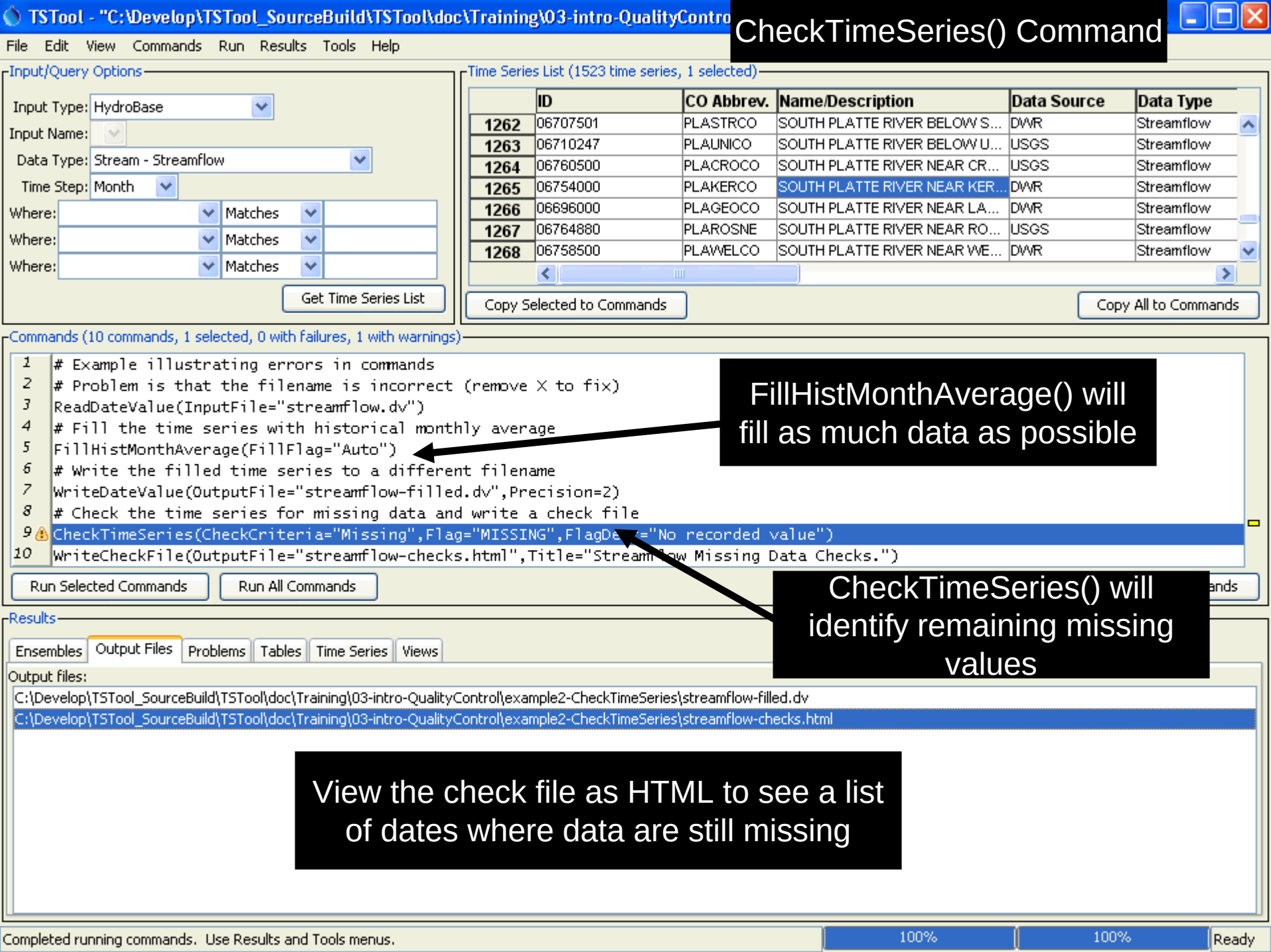
See example: example1-Problems\Problems.TSTool


TSTool - "C:\Develop\TSTool_SourceBuild\TSTool\doc\Training\03-intro-QualityControl\example1-Pr
Problems in TSTool
File Edit View Commands Run Results Tools Help
Input/Query Options
Input Type: HydroBase
Input Name:
Data Type: Stream - Streamflow
Time Step: Month
Where: Matches
Where: Matches
Where: Matches
Get Time Series List
Time Series List (1523 time series, 1 selected)
ID CO Abbrev. Name/Description Data Source Data Type
1 BOXHUDCO BOXHUDCO BOX ELDER CREEK NEAR HUDSO... DWR Streamflow
2 06753400 LONCARCO LONETREE CREEK AT CARR, CO. USGS Streamflow
3 06753500 LONNUNCO LONETREE CREEK NEAR NUNN, C... USGS Streamflow
4 06753990 LONGRECO LONETREE CREEK NEAR GREELE... USGS Streamflow
5 06754000 PLAKERCO SOUTH PLATTE RIVER NEAR KER... DWR Streamflow
6 06756500 CROBARCO CROW CREEK NEAR BARNSVILL... USGS Streamflow
7 06756995 PLAMASCO SOUTH PLATTE RIVER AT MAST... USGS Streamflow
Copy Selected to Commands
Copy All to Commands
Commands (7 commands, 1 selected, 2 with failures, 1 with warnings)
1 # Example illustrating errors in commands
2 # Problem is that the filename is incorrect (remove X to fix)
3 ReadDateValue(InputFile="X06754000-streamflow.dv")
4 # Fill the time series with historical monthly average
5 FillHistMonthAverage(FillFlag="Auto",FillFlagDesc="Fill with monthly average")
6 # Write the filled time series to a different filename
7 WriteDateValue(OutputFile="06754000-streamflow-filled.dv",Precision=2)
8
9
10
Red means failure
Yellow means warning
Mouse over problem indicators to see details or right click on command and view status
Run Selected Commands
Run All Commands
Clear Commands
Results
Ensembles Output Files Problems Tables Time Series Views
Severity Type Command Problem Recommendation
1 FAILURE CommandRun ReadDateValue(InputFile="X06754000-... Input file does not exist: "C:\Develop\T... Verify that filename is correct and that...
2 FAILURE CommandRun FillHistMonthAverage(FillFlag="Auto",Fil... Error requesting GetTimeSeriesToProc... Report the problem to software support.
3 FAILURE CommandRun FillHistMonthAverage(FillFlag="Auto",Fil... Unexpected exception "null" See log file for details.
4 WARNING CommandRun WriteDateValue(OutputFile="06754000... No time series are available from proc... Confirm that time series are available (...
Problems tab summarizes problems from all commands
Completed running commands. Use Results and Tools menus.
100%
100%
Ready

# CheckTimeSeries() Comand

- Check for specific criteria (such as missing data or out of range values)
- Flag detected values
- Use WriteCheckFile() to write summary of check results

See example: example2-CheckTimeSeries\CheckTimeSeries.TSTool


TSTool - "C:\Develop\TSTool_SourceBuild\TSTool\doc\Training\03-intro-QualityContro
CheckTimeSeries() Command
File Edit View Commands Run Results Tools Help
Input/Query Options
Input Type: HydroBase
Input Name:
Data Type: Stream - Streamflow
Time Step: Month
Where: Matches
Where: Matches
Where: Matches
Get Time Series List
Time Series List (1523 time series, 1 selected)
ID CO Abbrev. Name/Description Data Source Data Type
1262 06707501 PLASTRCO SOUTH PLATTE RIVER BELOW S... DWR Streamflow
1263 06710247 PLAUNICO SOUTH PLATTE RIVER BELOW U... USGS Streamflow
1264 06760500 PLACROCO SOUTH PLATTE RIVER NEAR CR... USGS Streamflow
1265 06754000 PLAKERCO SOUTH PLATTE RIVER NEAR KER... DWR Streamflow
1266 06696000 PLAGEOCO SOUTH PLATTE RIVER NEAR LA... DWR Streamflow
1267 06764880 PLAROSNE SOUTH PLATTE RIVER NEAR RO... USGS Streamflow
1268 06758500 PLAWELCO SOUTH PLATTE RIVER NEAR WE... DWR Streamflow
Copy Selected to Commands
Copy All to Commands
Commands (10 commands, 1 selected, 0 with failures, 1 with warnings)
1 # Example illustrating errors in commands
2 # Problem is that the filename is incorrect (remove X to fix)
3 ReadDateValue(InputFile="streamflow.dv")
4 # Fill the time series with historical monthly average
5 FillHistMonthAverage(FillFlag="Auto")
6 # Write the filled time series to a different filename
7 WriteDateValue(OutputFile="streamflow-filled.dv",Precision=2)
8 # Check the time series for missing data and write a check file
9 CheckTimeSeries(CheckCriteria="Missing",Flag="MISSING",FlagDe="No recorded value")
10 WriteCheckFile(OutputFile="streamflow-checks.html",Title="Stream low Missing Data Checks.")
FillHistMonthAverage() will fill as much data as possible
CheckTimeSeries() will identify remaining missing values
Run Selected Commands
Run All Commands
Results
Ensembles Output Files Problems Tables Time Series Views
Output files:
C:\Develop\TSTool_SourceBuild\TSTool\doc\Training\03-intro-QualityControl\example2-CheckTimeSeries\streamflow-filled.dv
C:\Develop\TSTool_SourceBuild\TSTool\doc\Training\03-intro-QualityControl\example2-CheckTimeSeries\streamflow-checks.html
View the check file as HTML to see a list of dates where data are still missing
Completed running commands. Use Results and Tools menus.
100%
100%
Ready

## Command Problem Summary

Check File HTML Report

Total number of failures: 0
Total number of commands with failures: 0
Total number of warnings: 216
Total number of commands with warnings: 1

| # | Time, sec. | Warnings | Failures | Command |
|---|---|---|---|---|
| 1 | 0.000 | 0 | 0 | # Example illustrating errors in commands |
| 2 | 0.000 | 0 | 0 | # Problem is that the filename is incorrect (remove X to fix) |
| 3 | 0.047 | 0 | 0 | ReadDateValue(InputFile="streamflow.dv") |
| 4 | 0.000 | 0 | 0 | # Fill the time series with historical monthly average |
| 5 | 0.016 | 0 | 0 | FillHistMonthAverage(FillFlag="Auto") |
| 6 | 0.000 | 0 | 0 | # Write the filled time series to a different filename |
| 7 | 0.093 | 0 | 0 | WriteDateValue(OutputFile="streamflow-filled.dv",Precision=2) |
| 8 | 0.000 | 0 | 0 | # Check the time series for missing data and write a check file |
| 9 | 0.016 | 216 | 0 | CheckTimeSeries(CheckCriteria="Missing",Flag="MISSING",FlagDesc="No recorded value") |
| 10 | 0.000 | 0 | 0 | WriteCheckFile(OutputFile="streamflow-checks.html",Title="Streamflow Missing Data Checks.") |
| | 0.172 | 216 | 0 | |

List of commands with count of warnings and failures

## Command Problem Details

Details about each warning and failure

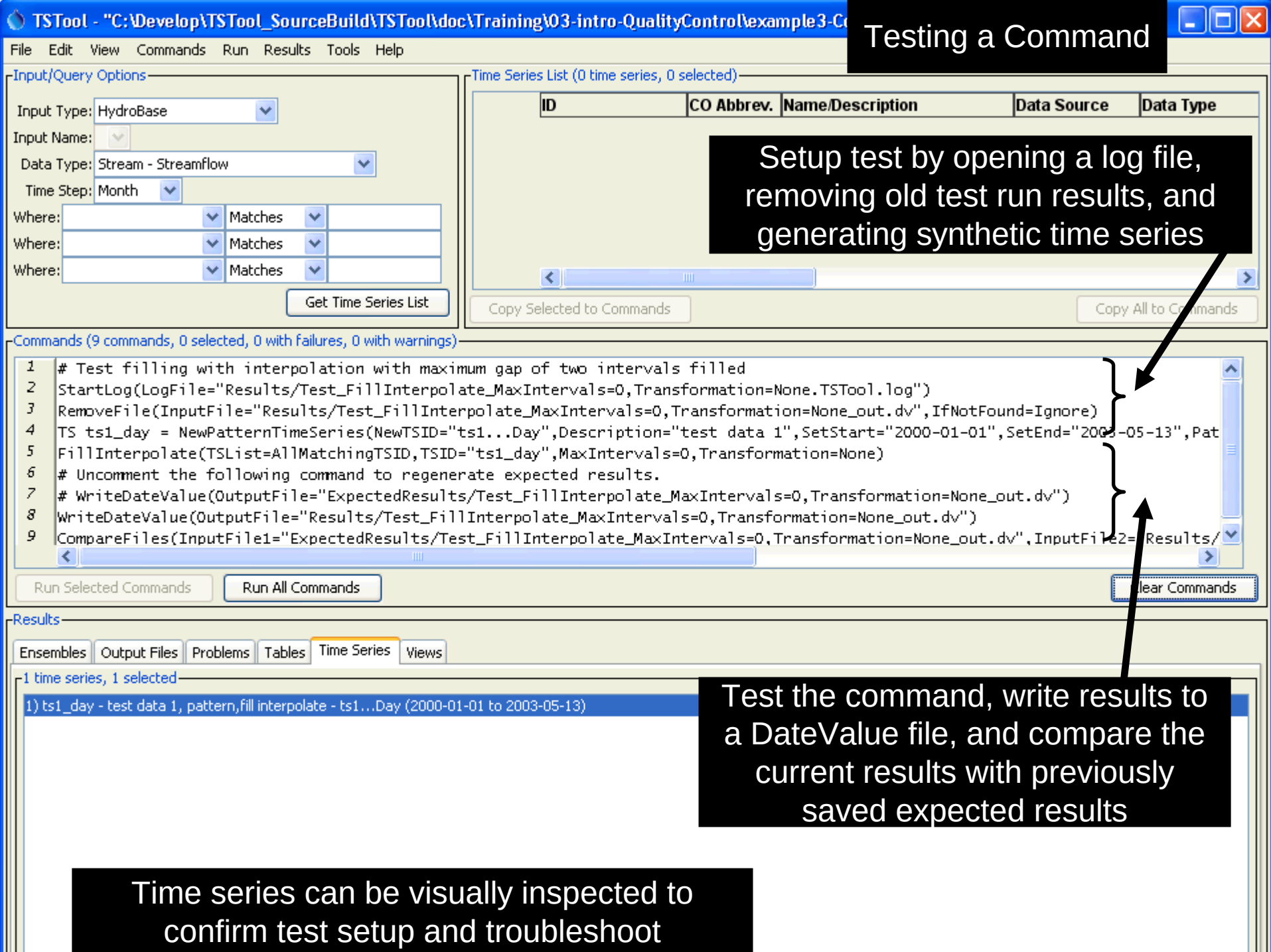
Total number of failures: 0
Total number of commands with failures: 0
Total number of warnings: 216
Total number of commands with warnings: 1

| # | Severity | Type | Command | Problem | Recommen |
|---|---|---|---|---|---|
| 1 | WARNING | Missing | CheckTimeSeries(CheckCriteria="Missing",Flag="MISSING",FlagDesc="No recorded value") | Time series 06711590.USGS.Streamflow.Month value -999.000000 at 1902-01 is missing | |
| | | | | Time series | |

# Command Tests

- Used to verify software functionality
- For new development, users can submit tests and then confirm that enhanced software meets requirements
- Tests can also be used to verify a process, such as whether a model is producing expected results

See example: example3-CommandTest*.TSTool


TSTool - "C:\Develop\TSTool_SourceBuild\TSTool\doc\Training\03-intro-QualityControl\example3-C
Testing a Command
File Edit View Commands Run Results Tools Help
Input/Query Options
Input Type: HydroBase
Input Name:
Data Type: Stream - Streamflow
Time Step: Month
Where: Matches
Where: Matches
Where: Matches
Get Time Series List
Time Series List (0 time series, 0 selected)
ID
CO Abbrev.
Name/Description
Data Source
Data Type
Setup test by opening a log file, removing old test run results, and generating synthetic time series
Copy Selected to Commands
Copy All to Commands
Commands (9 commands, 0 selected, 0 with failures, 0 with warnings)
1 # Test filling with interpolation with maximum gap of two intervals filled
2 StartLog(LogFile="Results/Test_FillInterpolate_MaxIntervals=0,Transformation=None.TSTool.log")
3 RemoveFile(InputFile="Results/Test_FillInterpolate_MaxIntervals=0,Transformation=None_out.dv",IfNotFound=Ignore)
4 TS ts1_day = NewPatternTimeSeries(NewTSID="ts1...Day",Description="test data 1",SetStart="2000-01-01",SetEnd="2003-05-13",Pat
5 FillInterpolate(TSList=AllMatchingTSID,TSID="ts1_day",MaxIntervals=0,Transformation=None)
6 # Uncomment the following command to regenerate expected results.
7 # WriteDateValue(OutputFile="ExpectedResults/Test_FillInterpolate_MaxIntervals=0,Transformation=None_out.dv")
8 WriteDateValue(OutputFile="Results/Test_FillInterpolate_MaxIntervals=0,Transformation=None_out.dv")
9 CompareFiles(InputFile1="ExpectedResults/Test_FillInterpolate_MaxIntervals=0,Transformation=None_out.dv",InputFile2="Results/
Run Selected Commands
Run All Commands
Clear Commands
Results
Ensembles Output Files Problems Tables Time Series Views
1 time series, 1 selected
1) ts1_day - test data 1, pattern,fill interpolate - ts1...Day (2000-01-01 to 2003-05-13)
Test the command, write results to a DateValue file, and compare the current results with previously saved expected results
Time series can be visually inspected to confirm test setup and troubleshoot

# Automating Tests

- Multiple tests can be automated to rapidly test software and processes
- See the CreateRegressionTestCommandFile() to collect tests into a suite of tests
- See the RunCommands() command to run a command file

# More Information

Help…View Documentation to view the TSTool documentation