KISTERS Australia News

April 2019

Contents

From The GM's Desk

By Bill Steen, General Manager, KISTERS Pty Ltd

This is probably my last newsletter as the General Manager of KISTERS Australia and CEO of HyQuest Solutions. As some of you already know I will be retiring in early July after 40 years in the industry and will be handing over the GM position to a very capable successor, Paul Sheahan, who is currently the Assistant Manager.

I commenced in 1979 with the then named NSW Water Conservation and Irrigation Commission (WC&IC). This department, like many worldwide, has gone through many iterations. The department was good at training young Hydrographic Assistants and exposing them to the variety or roles from looking after hydrometric instrumentation, flow measurement, surveying, site selection and construction of monitoring sites through to data processing and chart digitising. This was my first exposure to data management.

As a Hydrographic Assistants we use to manually process the daily read cards sent in by gauge observers. Every time the rating changed we had to reprocess the cards! The cards were then sent to a lady who created punch cards and

we'd walk up the road to a computer facility with the punch cards and three days later we'd receive a printout that we would then check!

The Department also had the old chart digitisers, which we were trained to operate. I spent about a year in the Departments "Electronic Data Processing" (EDP) group digitising charts and assisting with the development of the daily river report.

In 1986 I took up a Technical Assistant (Hydrology) job with the Commonwealth Department of Housing and Construction Hydrology Unit (DHC) in Canberra. It was that same year I first met Peter Heweston during the infancy of the HYDSYS development. At that time Trevor Magnusson also worked for the Department. Whilst working for the Department I underwent the Commonwealth Governments Surface Water Hydrology Certificate, prior to which I was enrolled and undertaking the Hydrographic Certificate. Passing the SWH Certificate reclassified my position to Technical Officer (Hydrology).

Again this Department underwent many iterations and finally handed over to the newly formed ACT Government in 1989 and the Hydrology Unit became part of the ACT Electricity and Water Authority (ACTEWA). By 1995 it was renamed to ACT Electricity & Water (ACTEW). It was around 1996 that ACTEW carved off the Hydrology Unit into Ecowise Environmental. By this time I had been promoted to the Assistant Manager Hydrographic Group working directly under John Skinner.

We had employed a young Assistant Hydrographer by the name of Debbie O'Brien (now Cockburn), who later became fully qualified as a Hydrographer. Paul Sheahan also joined Ecowise Environment around this time.

Around 1992 I became involved with data quality assurance and implemented the first Australian NATA ISO 9002 accredited system for hydrographic data collection. This also involved undertaking and obtaining qualifications in both Quality Management and becoming a NATA certified Lead Assessor.

It was through working with DHC and Ecowise that I first started undertaking hydrographic work globally. This was an interesting experience to work with people from a variety of different cultures, backgrounds, and experience. This included work in throughout the Asia-Pacific, the Americas, and Turkey.

In 1999 Peter Heweston asked me to join Hydsys Pty Ltd. I commenced undertaking Hydsys support and moved into sales and marketing. In 2003 KISTERS took over the company and Klaus Kisters offered me the General Manager position.

My role was extended in 2008 when KISTERS purchased iQuest from New Zealand and later in 2015 Hydrological Services in Sydney. Through a company re-structure we merged the two companies into HyQuest Solutions and it has been an amazing journey being the CEO of HyQuest Solutions.

Personally the merge with KISTERS has been amazing. I have said this multiple times, KISTERS is a family oriented company and you feel part of the family. This extends to the customer base, KISTERS treat the customer as a family member and it's that loyalty and friendship that I will miss the most.

Throughout my career I have been involved with the Australian Hydrographers Association for decades and held the AHA Presidents role for 10 years. This role was very rewarding and had its challenges as well.

I have met some amazing people throughout my career and have formed many lasting friendships.

I feel very privileged to have worked with the staff at KISTERS and HyQuest Solutions.

I believe my farewell dinner will be organised as part of this year's KISTERS User Group Meeting.

Bill Steen
General Manager

KISTERS Pty Ltd

New Zealand Workshop

By Paul Sheahan

The New Zealand Hydrological Society recently held their technical workshop in Blenheim. The workshop consisted of 3 days of presentations and a field day held on day two. The workshop was themed 'Water Quality Monitoring for the Future' and had great attendance numbers, there were over 100 participants.

The conference key note speaker was Pat Rasmussen, a USGS Water Quality Specialist from Kansas. Pat spoke extensively on the development and evolution of water quality monitoring protocols across the USA. Pat placed a high level of importance in the establishment of national protocols as the USA does not have a national water quality monitoring network. National coverage is achieved through a patchwork of state programs so agreement on methods and protocols is essential for data analysis to be completed across jurisdictional boundaries.

Pat spoke of an increasing interest in the use of monitoring surrogates, which whilst not a new approach is one that is being revisited. E.g. monitoring turbidity as a surrogate to nitrogen. My quote of the workshop came from Pat's first presentation: '*to me the most important water quality parameter is stream flow*'.

The conference had quite a few papers on innovative approaches to flow measurement, some experimental and some thrilling new commercial solutions:

Rising bubble method

Jeremy Bullied presented on research work that looked to measure depth and velocity across the cross section by releasing bubbles are regular intervals across the section and performing video analysis in the time and location of the bubbles surfacing.

AutoSalt – Salt dilution gauging from Fathom Scientific

Evan Baddock presented on the successful application of the salt dilution method at a site that had constantly changing ratings due to the dynamic gravel bed stream.

Android gauging app 'discharge'

Shane Sullivan presented on a novel android app 'discharge' that uses the phones camera and accelerometer and user input on the cross section. Shane will publish a paper on his work but initial results were not encouraging.

Space Time Image Velocimetry

Mark Randall flew drone observations during the field day and presented the data collection and talked through how the data would be reviewed and edited. Whilst the stream was quite small for the application of the STIV approach the results were a clear demonstration that this is an approach of value.

As per the conference, the field day was a well organised event including the provision of a barista and the arrival of a pie van for lunch. Unfortunately the long white cloud decided to dump on us and the day was called off after pies, before we could move onto the larger river.

The conference dinner was fun with the Kiwis going late and hard. Special mention to Michael Cook, a founding father to data logging and acquisition in New Zealand. Mike was awarded the 'Achievement award for Achievement in Operational Hydrology'.

Farewell Mike Cook

By Paul Sheahan

Mike Cook from HyQuest Solutions has recently retired. Many KISTERS customers will know Mike as the original developer of the HydroTel telemetry and iRis data loggers.

Mike started developing software as a hobby interest, which became Dia-Sys Developments when he and his wife, Desma, were living in the UK, back in 1989. In 1993 in partnership with Owen Mooney they established Mooney Cook Technologies (MCT), later becoming iQuest in 1998. KISTERS purchased iQuest in 2008.

Recently the New Zealand Hydrological Society honoured Mike with an Award for Achievement in Operational Hydrology. This was a well-deserved award that recognised Mike's involvement with not only the New Zealand hydrology but his global contribution.

From KISTERS we wish Mike and Desma a long and health retirement.

KISTERS User Group Meeting 2019

The next KISTERS User Group meeting will be held in Canberra on July 30 and 31 this year at the Hellenic Club in Canberra City (the same as previous years). For more information and registrations please see http://kisters.com.au/user_group_aus2019.html .

We welcome contributions from you, our user community. Without your input the two days is hard to fill, so please contact Peter Heweston or Chris Michl with your ideas for a presentation.

Python Training Course

Hydstra V13 will have full support for Python as well as Perl, and even in V12 some Python support is available as an optional download (basically HYSCRIPT jobs and pre- and post-processors). If there is sufficient interest we will put on a free one-day Python training course the day afte KUG (1 August) at our office in Canberra. The course will be aimed at existing programmers who wish to learn Python. The course will be suitable for both WISKI and Hydstra users. Please email support registering your interest if you wish to attend.

As part of the support for Python there is a Python module equivalent for all major Hydstra Perl modules distributed with V12.

Vietnam Central Data Hub

Central Data Hub (CDH) for the Vietnam Meteorological and Hydrological Administration (VNMHA)

The Vietnamese government is taking a leading role in the SE-Asia region in developing mechanisms to prevent, respond and mitigate natural hazards. This activity is supported by the World Bank project '*Vietnam Managing Natural Hazards Project (VN-Haz)*'. KISTERS partnering with Jeremy Benn Associates from GB (JBA) and HarmonyEV from Vietnam was granted the project part '*Strengthen the Weather Forecasting and Early Warning Systems*'.

Key objectives of the assignment are to improve weather forecasting and early warning systems by building a central data hub (CDH) for hydro-meteorological data supporting :

(i) the standardization of modelling tools,

(ii) increasing hydro-meteorological monitoring station automation and

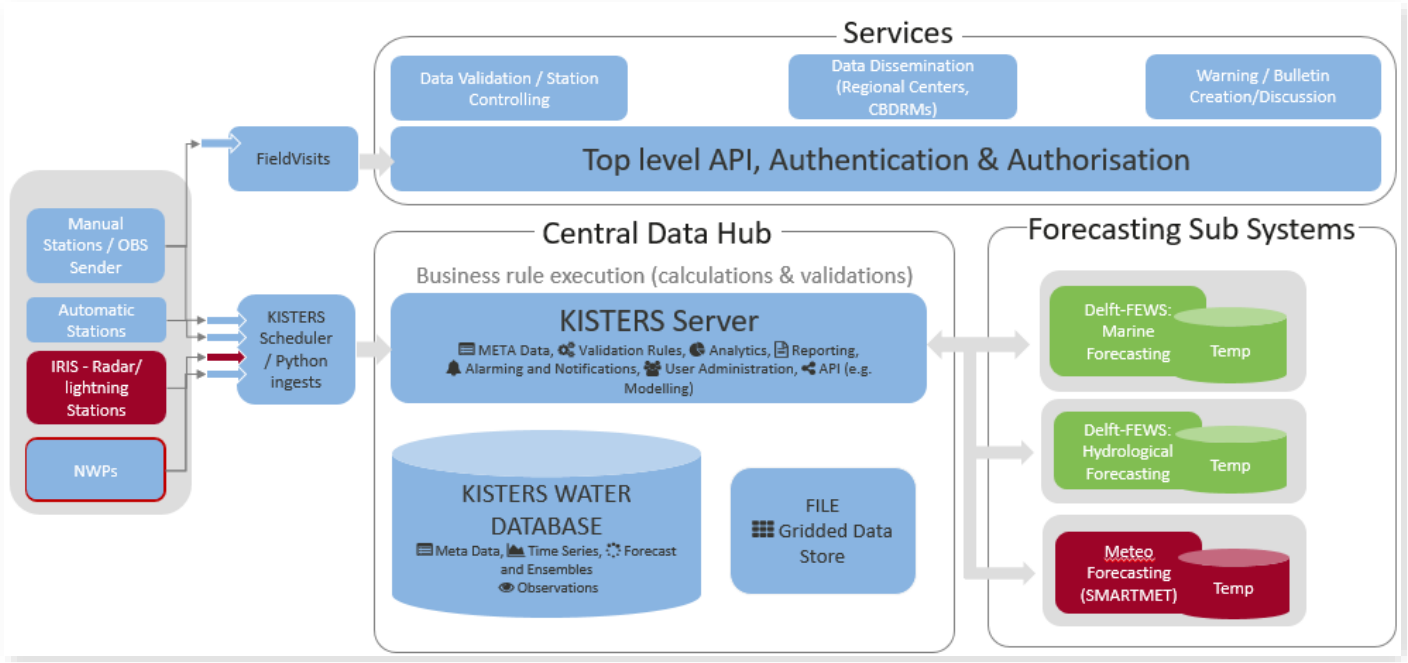
(iii) consolidating forecasting in Regional Hydro-Meteorological Centers and the National Centre in Hanoi.

The project was started at the beginning of 2018 and is now in the implementation phase. KISTERS is the lead partner of the project, deploying the following key components (i) the KISTERS water server, (ii) the newly developed file-based array storage and the (iii) Water Portal framework (see Central data Hub and Services in figure below).

The high level architecture below shows the key components of the system. All blue components are solutions from KISTERS.

- The collection layer is built by the KISTERS scheduling server in combination with Perl and Python scripting. Data from the automatic and manual stations of the meteorological and hydrological networks in Vietnam are integrated using Perl converters. The gridded data from NWPs (global and regional), satellite data (like Himawari), radar and lightning data are extracted, transformed and ingested using Python scripts. Manual entry of observed data by local field staff is achieved using the KISTERS' FieldVisits application which was made available in Vietnamese.
- The storage uses an Oracle RDBMS for all station and time series based data as known by many of our customers. The file-based array storage for all gridded products is a new solution and saves the data to NetCDF4 format after the conversion of the raw data (mainly grib2). The gridded data is stored on the SAN of the high performance clusters (CRAY environment). The station, time series and gridded data is distributed to regional locations using KISTERS' data harvesting and synchronization techniques.
- The data of the CDH is used by the forecasting components of SmartMet from the Finish Meteorological Institute (meteorological forecasting) and the FEWS framework from Deltares (hydrological and marine forecasting). In the project our partner JBA is integrating the existing models NAM, Mike11 plus reservoir representation as well as the marine models ROMS, SuWAT and SWAN (see forecasting sub system in figure below). The results of the models are stored back in the CDH infrastructure.
- The main user interface for the early warning and forecasting services is a web-based service layer using KISTERS water portal technology. The service layer will utilise the KISTERS applications: the Water Data

Viewer, the Raster Data Viewer and the Data Validation. All three applications will be further developed during the project. Additionally, new applications are under development to ensure that the complete forecasting process can be achieved within the service layer. This will allow, for example, features to select the best forecast and to create forecasting bulletins automatically.



High level architecture of the system for VNMHA (see description above)

Once the system is completely developed, integrated and operational, the complete forecasting process will be done solely in the service layer. Only specialists,in order to manage and control the observational data, add additional quality control mechanisms or to calibrate the hydrological and marine models, will be required to use the expert interfaces of the WISKI or FEWS client. The system is planned to be operational by end of 2019.

Chris presented the status of the project from the 22nd to the 24th of March at the Vietnam International Water Week 2019 (http://viww.vaci.org.vn/2019/conference/water-forecasting-and-early-warning-solutions/) to government stakeholders, private industry and the scientific community. The content was well received, as it is the first time a central repository for hydrological and meteorological data will be built in Vietnam and to integrate the data repository with the forecasting systems for meteorology and hydrology.

Early warning specialists from the National Centre for Water Resource Planning and Investigation of Vietnam (NAWAPI), HarmonyEV, Deltares, DHI and KISTERS

Chris explaining the need and advantage of a central data hub for observational and forecasting data

The KISTERS team also had a booth with partner HarmonyEV presenting the software profile of the company and the project at VNMHA. Our expertise in water and environmental data management as well as data collection was well received by many officials, scientists and students from universities.

Chris explaining KISTERS work in Vietnam, also giving insight in KISTERS software solutions

Layout of KISTERS booth

Team of KISTERS (Chris and Lenard from KISTERS AG) and HarmonyEV (Thuy, Nam and Duc) present at the conference

Hydstra Product News

Hydstra V12 Released August 2017

Hydstra V12 was released over a year and a half ago, and is available on the web site. Please plan to upgrade soon if you haven't already, as V13 is already waiting to spread its wings.

Please contact support for a V12 HYACCESS file, and plan to do an offline test upgrade first if at all possible. The upgrade from V11 to V12 is quite routine now, but can be time consuming as all time-series files need to be upgraded.

Problem with large DBFLOG table for v12.00 SQL Server users

We have discovered a bug in the way the DBFLOG table was updated, that was causing it to grow very large for some users.

To refresh your memory: SQL Server users need to set the HYCONFIG DBFLOG=Yes, and run HYDBUTIL DBFLOGTRIM and TEMPCLEANUP from time to time.

The bug we just uncovered had three consequences:

- the DBFLOG table would grow uncontrollably, and in some cases generate warnings about SQLPAGE.INI
- HYDBUTIL DBFLOGTRIM would have no effect
- HYDBUTIL TEMPCLEANUP would delete more files than intended (not serious)

This bug has been fixed in all V12 patches dated 20190315 or later.

After applying the patch with this fix (for the first time) you should run HYDBUTIL ZAP DBFLOG SCREEN, to get rid of the problem data in DBFLOG and start with a fresh slate.

LOGPOLL table and datasource obsolete?

We believe that the LOGPOLL table is no longer used by any current user processes, and is a candidate for deletion in V13, along with its corresponding DATASRC.INI entries etc. If anyone is still using LOGPOLL in production please contact us about your usage ASAP.

Time Series Indexes in V12

In Version 12 we hold index files at the start of the time-series file, so instead of having *.A* and *.AX* files as we did in V11, in V12 we simply have everything in the *.A* file. This simplifies copying of files using Robocopy, for example, in that you can't get the components out of sync.

Furthermore internal indexes are optional in work files, and usually not necessary if the files are reasonably small (a few months or years of data). If you have very large work files you may improve performance somewhat by applying indexes using HYFILER INDEX, but curiously if the files are small you're better off without indexes. Archive files always have an index, and by default other files do not. You can find out if a TS file has an index using HYREP INDLIST - you will see one of the following at the top of the report:

```
Index Listing of F:\hyd\dat\hyd\HYDSYS01.A          10:49_09/04/2019
Index block present and current, index read from it
```

or

```
Index Listing of F:\hyd\dat\work\HYDSYS01.B          10:52_09/04/2019
Index block not present, index read from fast block-scan
Since are only 3 blocks, block-scan indexes are considered adequate
```

We have previously discussed how keeping your SRVIMP files small makes everything go faster.

Running HYSECPIC under HYBATCH

Sometimes HYBATCH can be a difficult beast to wrangle into submission. We recently had a case where a user wanted to run HYSECPIC, but only if the STNINI configuration keywords were set up for the site. In the absence of the correct keywords, HYSECPIC would abort, littering the HYDLOG files with errors and making HYWOTSUP output more difficult to read.

We have added a new facility REQUIRED to HYBATCH (and patched it back as far as V11) to interrogate whether a STNINI keyword exists - if it does not, the job section is skipped. This does not cause a HYDLOG error.

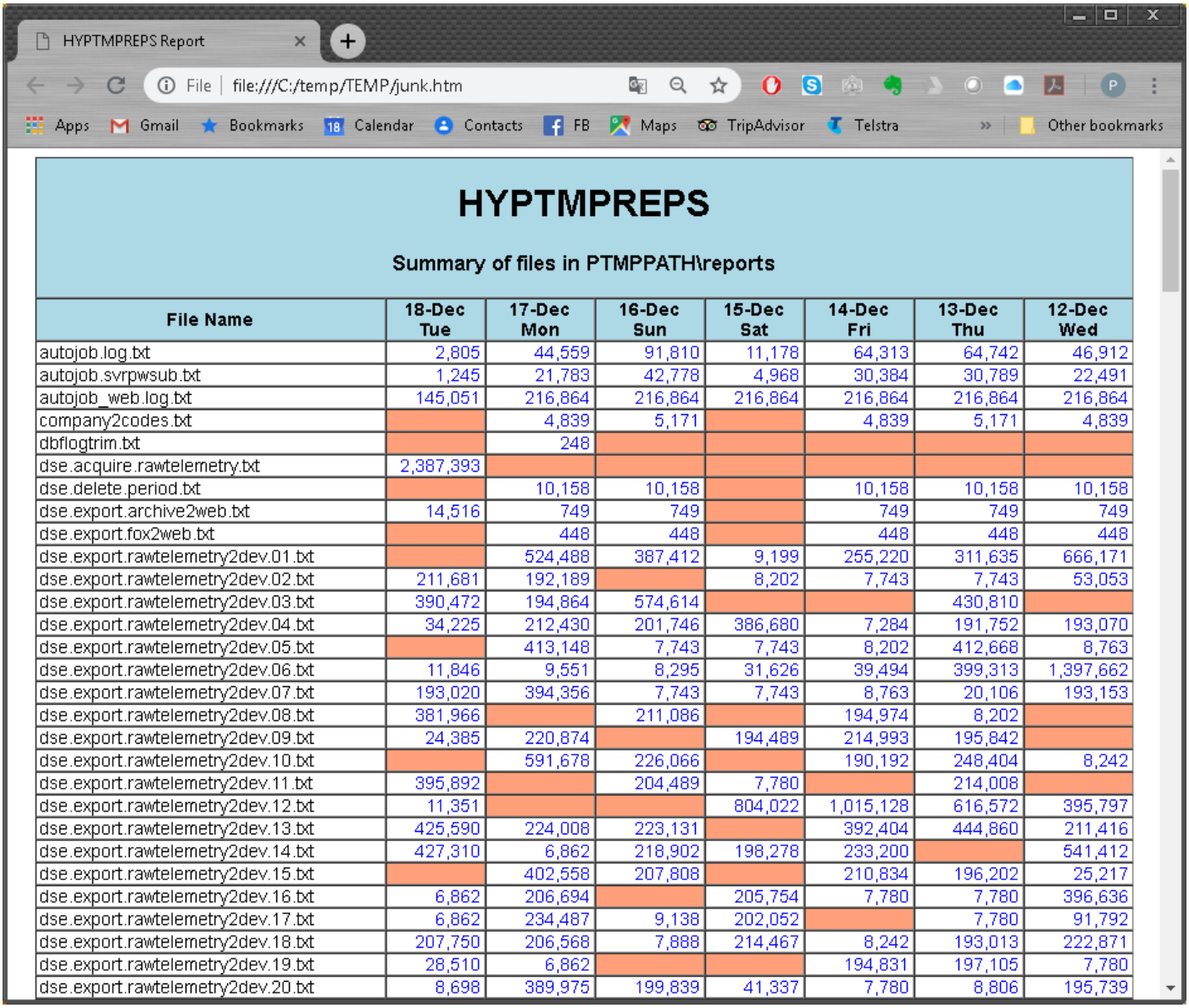
The following example checks not only that the config keywords are set up in STNINI, but also confirms that a cross section exists at the site, and doesn't attempt to run HYSECPIC until all conditions have been met.

```
[HYSECPIC]
Required = %stnini.secpic_comm%
Required = %stnini.secpic_hkey%
Required = %stnini.secpic_sect%
If = %LatestSection% > -1
Params = %SITE% A 23:59_%VPEND(100.00)% 999999 %PLOTDEV%
Program = HYSECPIC
```

HYPTMPREPS - Summarise Reports in PTMPPATH Dated Folders

In a highly automated Hydstra environment processes leave their report files in dated folders under PTMPPATH\reports. HYPTMPREPS summarises the size of whatever files are found for each of the last N days. The resulting HTML report contains links back to the corresponding report file. Missing cells are highlighted in red, which may suggest that the corresponding process did not run on that day for some reason. Cells in blue show the file size, with a hot link to the actual file.

Missing or small files may indicate a problem that needs chasing up.



HYPTMPREPS

Summary of files in PTMPPATH\reports

File Name	18-Dec Tue	17-Dec Mon	16-Dec Sun	15-Dec Sat	14-Dec Fri	13-Dec Thu	12-Dec Wed
autojob.log.txt	2,805	44,559	91,810	11,178	64,313	64,742	46,912
autojob.svrpwsub.txt	1,245	21,783	42,778	4,968	30,384	30,789	22,491
autojob_web.log.txt	145,051	216,864	216,864	216,864	216,864	216,864	216,864
company2codes.txt		4,839	5,171		4,839	5,171	4,839
dbflogtrim.txt		248					
dse.acquire.rawtelemetry.txt	2,387,393						
dse.delete.period.txt		10,158	10,158		10,158	10,158	10,158
dse.export.archive2web.txt	14,516	749	749		749	749	749
dse.export.fox2web.txt		448	448		448	448	448
dse.export.rawtelemetry2dev.01.txt		524,488	387,412	9,199	255,220	311,635	666,171
dse.export.rawtelemetry2dev.02.txt	211,681	192,189		8,202	7,743	7,743	53,053
dse.export.rawtelemetry2dev.03.txt	390,472	194,864	574,614			430,810	
dse.export.rawtelemetry2dev.04.txt	34,225	212,430	201,746	386,680	7,284	191,752	193,070
dse.export.rawtelemetry2dev.05.txt		413,148	7,743	7,743	8,202	412,668	8,763
dse.export.rawtelemetry2dev.06.txt	11,846	9,551	8,295	31,626	39,494	399,313	1,397,662
dse.export.rawtelemetry2dev.07.txt	193,020	394,356	7,743	7,743	8,763	20,106	193,153
dse.export.rawtelemetry2dev.08.txt	381,966		211,086		194,974	8,202	
dse.export.rawtelemetry2dev.09.txt	24,385	220,874		194,489	214,993	195,842	
dse.export.rawtelemetry2dev.10.txt		591,678	226,066		190,192	248,404	8,242
dse.export.rawtelemetry2dev.11.txt	395,892		204,489	7,780		214,008	
dse.export.rawtelemetry2dev.12.txt	11,351			804,022	1,015,128	616,572	395,797
dse.export.rawtelemetry2dev.13.txt	425,590	224,008	223,131		392,404	444,860	211,416
dse.export.rawtelemetry2dev.14.txt	427,310	6,862	218,902	198,278	233,200		541,412
dse.export.rawtelemetry2dev.15.txt		402,558	207,808		210,834	196,202	25,217
dse.export.rawtelemetry2dev.16.txt	6,862	206,694		205,754	7,780	7,780	396,636
dse.export.rawtelemetry2dev.17.txt	6,862	234,487	9,138	202,052		7,780	91,792
dse.export.rawtelemetry2dev.18.txt	207,750	206,568	7,888	214,467	8,242	193,013	222,871
dse.export.rawtelemetry2dev.19.txt	28,510	6,862			194,831	197,105	7,780
dse.export.rawtelemetry2dev.20.txt	8,698	389,975	199,839	41,337	7,780	8,806	195,739

First Static Hydstra/WEB Installation

Traditionally Hydstra/WEB runs in a dynamic way, generating much of its output by calling back to Hydstra on the web server each time a user requested some output - a plot or a report - using the HYDDLLP REST service. What became clear from this approach was that the web server quickly runs out of steam as the number of users rose, as Hydstra is quite CPU intensive. We are not the only ones to learn this the hard way - nearly every major web interface can be overwhelmed by a spike in load, and you don't have to look far to see a number of recent ticketing fiascos for example.

We now offer an alternative mode of operating Hydstra/WEB in which most outputs are pre-generated by a big back-end server, requiring a more light-weight web server to display the output. The result is a much more responsive web site, allowing for many times more users to be served quickly and efficiently.

There are pros and cons to the static approach. For a static web site with five outputs (plots and reports) for each site, and 1000 sites, with data being updated every 15 minutes, the back-end needs to re-generate 5000 outputs every 15 minutes. Chances are most of these won't be looked at before they are built again. However the load on the backend server can be fairly easily quantified, and once running satisfactorily the load won't change unless the number of sites is significantly increased, or the polling frequency is increased, or the number of outputs is increased.

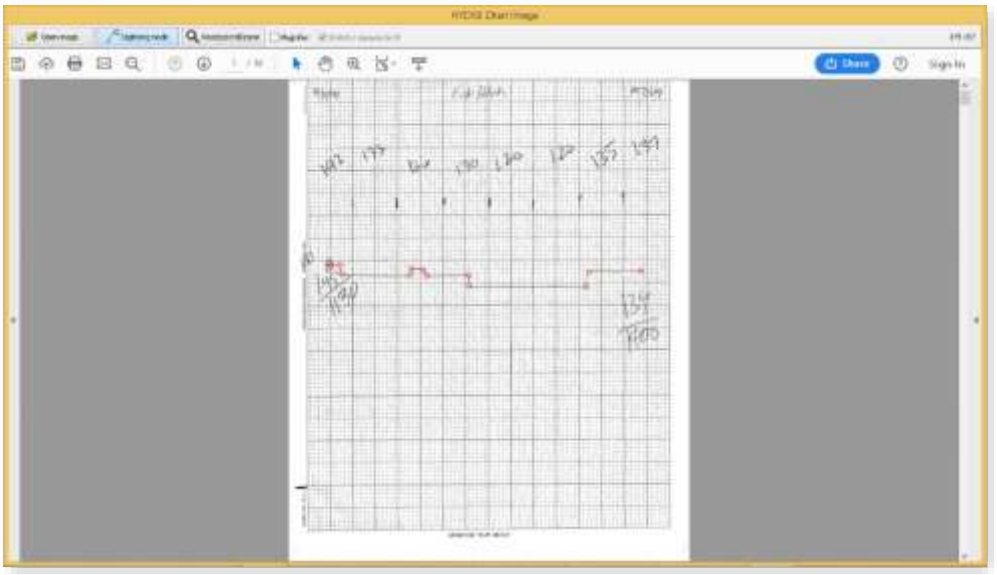
On the other hand, if you have hundreds of thousands of groundwater sites which hardly anyone ever looks at, perhaps the dynamic approach might be more appropriate. Hydstra/WEB can run a mix of static and dynamic products simply by configuring the various sub-sections of the web site differently.

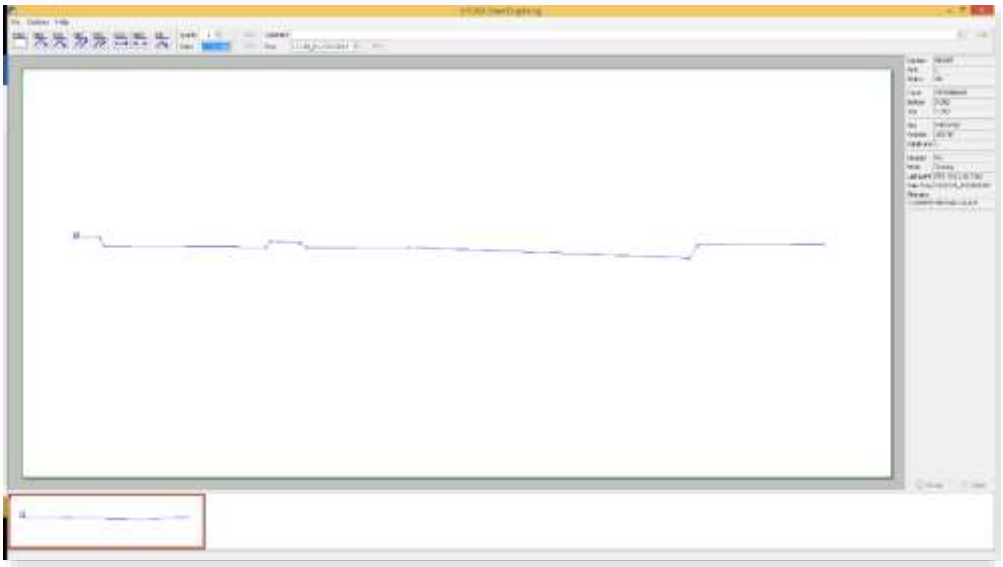
We recently brought up a major client with a static web site, and it does indeed perform very well. The back-end is quite powerful, with a 36 core CPU doing all the heavy lifting, but the web front end is rarely stressed and performs briskly. For an example of a static Hydstra/WEB site, have a look at http://data.water.vic.gov.au/static.htm .

HYDIGI - Digitising Images

HYDIGI, the chart digitising component of Hydstra, has been enhanced to allow you to digitise images directly from the screen. Many organisations have microfilmed their old charts, and until recently you were obliged to print them out again before you could digitise them. You can now digitise using the mouse or pen directly from an image displayed on a second screen. Images can be .JPG, .PNG, .BMP or .PDF images, and in the case of PDF you can scroll a document containing many images and digitise each one in turn.

The screenshots below show digitising in progress on two screens, one holding a PDF image, and the other showing the HYDIGI screen with a partially completed trace.





This facility is available in Hydstra V12.

Missing time-series data returned from HYDLLP

HYDLLP time-series access returns the quality code associated with every value, but some users may not understand or use the quality code system correctly, To simplify matters we have added an extra optional parameter

```
"bad_value":-99999
```

Which will ensure that all bad quality data has value -99999 (or whatever you specify, including perhaps a string like "BAD").

This is not default behaviour as it risks breaking existing usage of the DLL, but new users should be encouraged to add the *bad_value* parameter if they don't want to engage with the complexities of Hydstra quality codes.

HYTSDLL - Write Time Series Files using the DLL

We have developed a Perl module to simplify the writing of time-series files from Perl using the DLL. The module can write new files, and replace data in existing files. It minimises block splitting when replacing data, making it ideal for processes such as manual data entry where you may wish to go back and fill a missing month, for example.

The simplest example of usage would be something like:

```
Use HyTsDll;
my $ts=HyTsDll->new({datasource=>'Z'});
while generating data points {
  $ts->write(['HYDSYS01',100.00,201801010000,12.3,1,1,'Comment']); #add a time-series point
}
$ts->close;
```

HYTSDLL.PM is delivered in recent V12 patches, and is documented in the Perl help tree. See HyDbDll.pm for an equivalent tool for writing database records using the DLL.

Running PSC Programs from Hydstra/WEB

Most Hydstra analytical and presentation programs and scripts run in a semi-batch mode, whereby a parameter screen collects parameters, the job is run and output is presented back to the user with no further interaction.

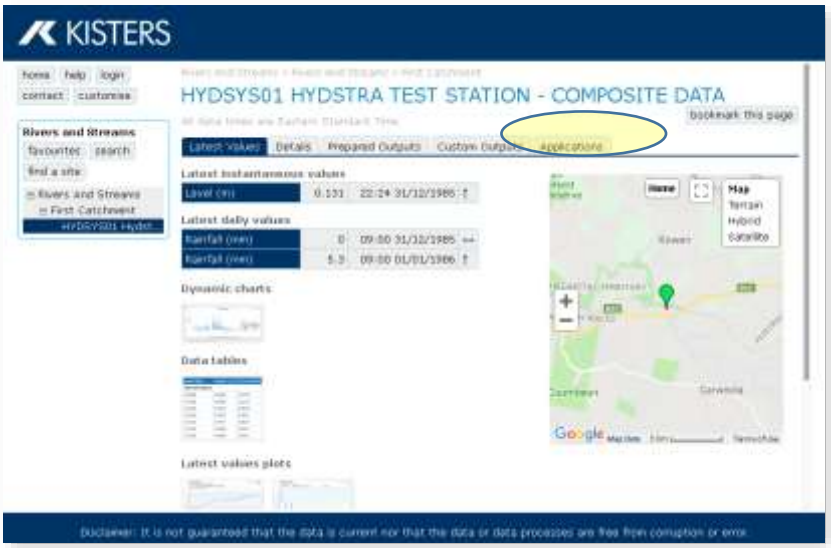
Since the .PSC or .HSC parameter screen has a text representation we were able to transfer the representation of a parameter screen to the web in JSON format, and render the screen in JavaScript from within Hydstra/WEB. Using the DLL and some automation facilities we were then able to collect the parameters on the web and pass them from the web to the backend using a REST call, run the program on the server, and return the output back to the web user. Various configuration processes ensure that only selected and safe programs can be run, and in read-only mode at this stage.

Bottom line - hundreds of Hydstra .PSC (Delphi programs) and .HSC (Perl scripts) become available to offer advanced users directly from the web.

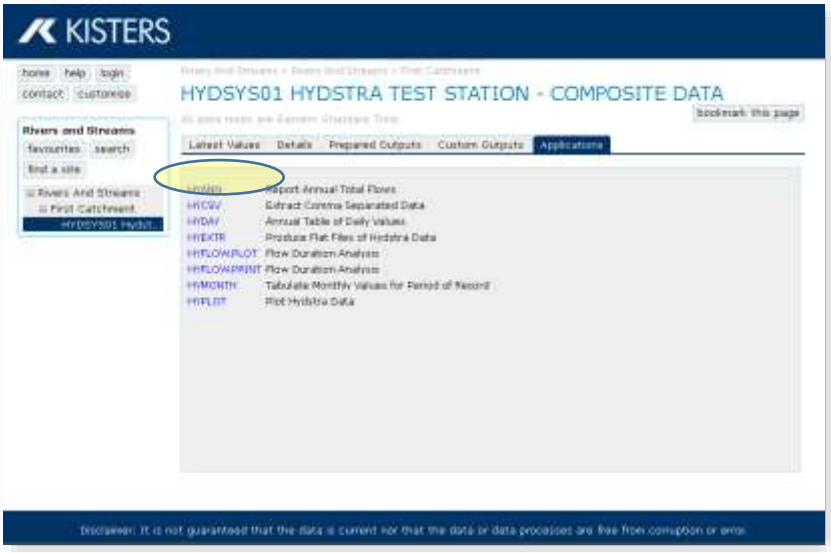
At present all web users run with TS=0, so only analytical programs can be run and nothing can change data. The parameter templating system is used in conjunction with the DLL to tightly control what programs can be run.

Please contact Denby Angus in the first instance if you are interested in adding the Applications tab to your V12 Hydstra/WEB portal. This facility is not available under earlier versions of Hydstra.

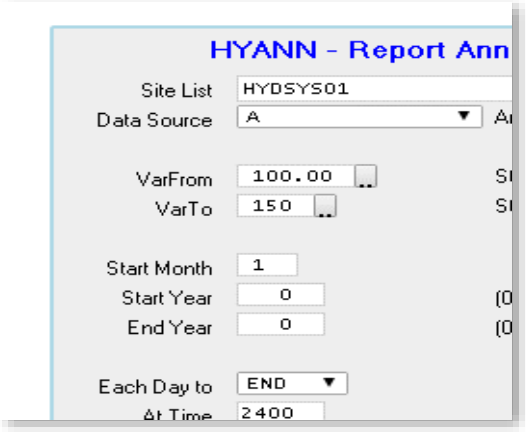
The following images show how an additional page can be interpolated into the Site page of a V12 Hydstra/WEB site providing a curated list of application programs to advanced users.



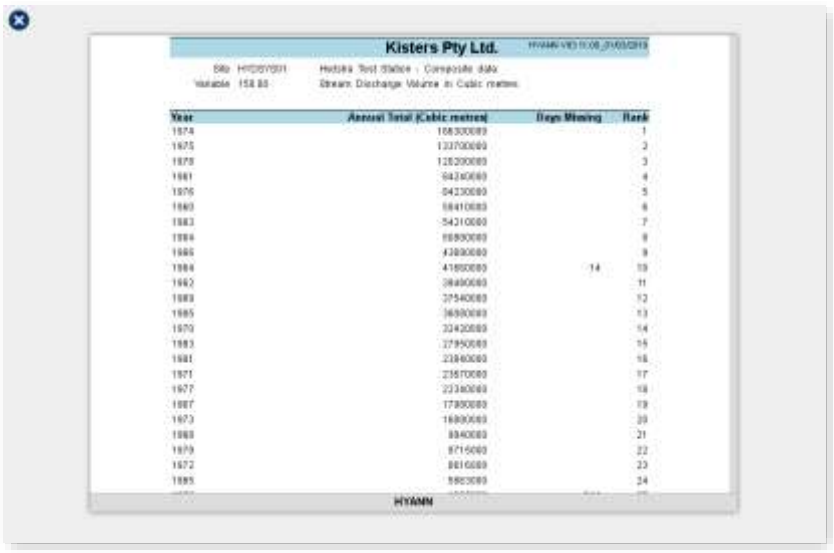
Applications tab



List of available Hydstra applications



HYANN Parameter Screen in a browser



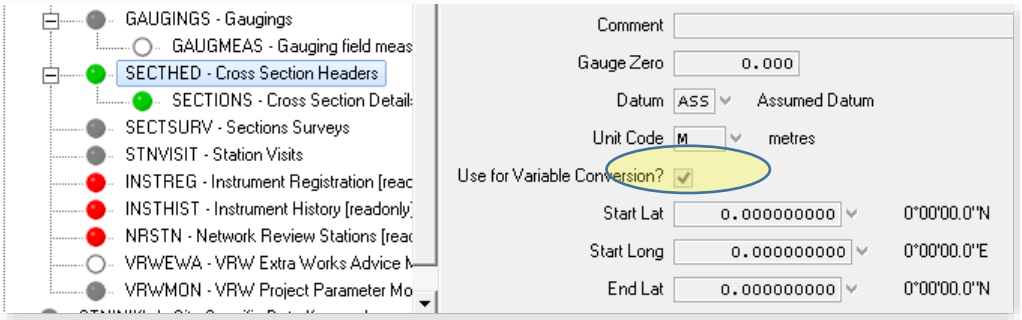
HYANN Results in a browser

Cross Sections and the VARCON System

It is worth remembering that in Hydstra V12 the SECTIONS subsystem can participate in the Variable Conversion system. This means that once set up correctly you can use a VARCON method to directly convert between stage and section area, section width, wetted perimeter, hydraulic radius, and coefficient of discharge (SigmaAD to the half). These are computed using VARCON method codes of SECTAREA, SECTWIDTH, SECTWETPER, SECTHYDRADIUS and SECTSIGAD12 respectively.

This facility may be useful in various water accounting and modelling applications to estimate reach capacity, evaporation, etc.

In order for a section to participate in the VARCON system you need to check the 'Use for Variable Conversion' field in SECTHED for each section that applies. Linear interpolation will be used between section times, and the first section will be extended backwards and the last section extended forwards in time.



Python Preview for Hydstra v12.00

In Version 13 we plan to comprehensively support Python alongside Perl within Hydstra. While full Python support will not be available until then because of various interface breaking issues, we have released a limited Python preview in v12.00 for people who are interested in learning about Python and experimenting with the Hydstra Python libraries.

Since the Python runtime is an extra 240MB, we are not forcing it upon everyone in a patch - if you want use the Python preview, you need to download the additional files (and instructions on how to install them) from the Hydstra Downloads web page http://kisters.com.au/downloads.html .

The preview only contains a subset of the full support coming in v13.00, namely:

- Python HYSCRIPT jobs
- Python filters / post-processors for text file outputs

GDA2020 and MGA2020 datums supported

The new GDA2020 (Geocentric Datum of Australia 2020) and MGA2020 (Map Grid of Australia 2020) datums are now offered as options in the “Lat/Long Datum” and “Grid Datum” fields in the SITE table.

Hydstra will automatically convert GDA2020 coordinates to MGA2020 coordinates, and vice versa, but will not convert coordinates in older datums, such as GDA94/MGA94, into the new datums. You will need to engage with your geospatial group to assist in the conversion, probably via CSV files and HYCLIPIN.

You can find a number of products to assist in the transformation at https://www.icsm.gov.au/datum/gda-transformation-products-and-tools/software-and-plugins . In particular GDay3.0 may be of interest - https://github.com/icsm-au/GDAy3.0 .

Opening INI Files in your preferred editor

For some time now Hydstra has had the option to open INI files using your preferred editor via a setting in HYCONFIG.INI. By default we open INI files in a built-in editor called HYTXTED. It has pretty basic editing facilities, but does know to save a MISCPATH INI file back to either INIPATH or TEMPPATH.

If you set up the PREFTEXTEDIT setting in the [SYSTEM] section of HYCONFIG you can use Notepad or Notepad++ or whatever other editor you happen to prefer. Some examples include:

Open with Notepad++:

```
PREFTEXTEDIT="%ProgramFiles%\Notepad++\Notepad++.exe"
```

Open with Notepad:

```
PREFTEXTEDIT="%ProgramFiles%\Notepad++\Notepad++.exe"
```

We often use a batch job called *e.bat* that we place into RUNPATH which uses the best editor available.

```
@echo off
if not "%ECHO%"=="" echo on
@rem Edit a file or files in the current directory
echo Edit %1
@rem ***keyword-flag***     "Version %v  %f"
@rem "Version 14  08-Feb-12,11:44:54"
if "%hyosenv%"=="" call hyosenv


@rem Notepad++ can't take a pattern
if exist "%ProgramFiles%\Notepad++\notepad++.exe" (
  for %%a in (%1 %2 %3 %4 %5 %6 %7 %8 %9) do (
    set file=%%a
    call dequote file
    if not "%echo%" == "" cmd /v:on /c echo file=!file!
    if not "%echo%" == "" cmd /v:on /c echo start "Notepad++"  "%ProgramFiles%\Notepad++\notepad++.exe"
"!file!"
    cmd /v:on /s /c start "notepad++" "%ProgramFiles%\Notepad++\notepad++.exe" "!file!"
  )
  goto :EOF
)
@rem 64 bit version
if exist "%ProgramFiles(x86)%\Notepad++\notepad++.exe" (
  for %%a in (%1 %2 %3 %4 %5 %6 %7 %8 %9) do (
    set file=%%a
    call dequote file
    if not "%echo%" == "" cmd /v:on /c echo file=!file!
    if not "%echo%" == "" cmd /v:on /c echo start "Notepad++"
"%ProgramFiles(x86)%\Notepad++\notepad++.exe" "!file!"
    cmd /v:on /s /c start "notepad++" "%ProgramFiles(x86)%\Notepad++\notepad++.exe" "!file!"
  )
  goto :EOF
)

if exist "%ProgramFiles%\textpad 4\textpad.exe" (
  start "Textpad %1" "%ProgramFiles%\textpad 4\textpad.exe" %1 %2 %3 %4 %5 %6 %7 %8 %9
  goto :EOF
)

@rem Notepad can't take a pattern either
for %%a in (%1 %2 %3 %4 %5 %6 %7 %8 %9) do (
  set file=%%a
  call dequote file
  cmd /v:on /c start "Notepad %%a"  "notepad.exe" "!file!"
)
goto :EOF
```

And then use that batch job:

```
PREFTEXTEDIT=&hyd-runpath.e.bat
```

Note that INI files opened from MISCPATH will always use HYTXTED until they are save elsewhere.

HYIMPEXP Changes in V12

In Hydstra V12 we changed the format of files used by HYIMPEXP. In V11 time-series files are moved in native Hydstra/TS file format, and database tables are moved as Foxpro files. In V12 all data will generally move as text, with TS files in HYEXPORT format, and tables in CSH format. Not ethta in a recent patch we have restored the capability in V12 to send Hydstra/TS files in native format.

What this means is that users who exchange data between different systems need to either upgrade together, or take special care.

For the benefit of V11 users who need to send data to V12 users or received data from V12 users we have developed a specially patched V11 version of HYIMPEXP, called **HYIMPEXP_V12.EXE** that exports and imports V12 format files. HYIMPEXP_V12 is a V11 program available in patches of V11 after 25/05/2017.

If you are massaging HYIMPEXP files in any way (changing variables, filtering files, etc) during interchange you will need to revisit the processes. Please contact KISTERS for advice.

One by-product of this change is that both the import and export phases of a HYIMPEXP interchange are likely to take somewhat longer because of the conversion to and from back from text format.

Querying XML Data in SQL Server

Note - this material does not apply to the Foxpro version of Hydstra.

Some tables in Hydstra contain XML data, for example the XMLDATA field in STNINI. If you are running Hydstra over SQL Server you can use SQL Server's ability to parse XML and dig down into the XML fields.

The first problem to overcome is that Hydstra simply uses a VARCHAR field to hold the XML data, so you need to CAST it to XML before you can use the XML facilities. Once you have an XML field you can then use XML query language to analyse the field you require.

As an example, you may have loaded percentiles of water level into the PERCILE100 STNINI entry using program HYSTNPRC. The XML looks something like this:

```
<?xml version="1.0" standalone="yes"?>
<percentiles>
  <percentile p="0" v="-0.055" />
  <percentile p="1" v="-0.040" />
  <percentile p="2" v="-0.029" />
  <percentile p="3" v="-0.009" />
  <percentile p="4" v="-0.007" />
  <percentile p="5" v="-0.007" />
  <percentile p="6" v="-0.007" />
  <percentile p="7" v="-0.004" />
  <percentile p="8" v="-0.000" />
  <percentile p="9" v="0.002" />
  <percentile p="10" v="0.005" />
  <percentile p="11" v="0.013" />
  <percentile p="12" v="0.021" />
  <percentile p="13" v="0.028" />
  <percentile p="14" v="0.036" />
  <percentile p="15" v="0.044" />
  <percentile p="16" v="0.049" />
  <percentile p="17" v="0.051" />
  <percentile p="18" v="0.054" />
  <percentile p="19" v="0.056" />
  <percentile p="20" v="0.059" />
  <percentile p="25" v="0.072" />
  <percentile p="30" v="0.084" />
  <percentile p="35" v="0.095" />
  <percentile p="40" v="0.104" />
  <percentile p="45" v="0.115" />
  <percentile p="50" v="0.126" />
  <percentile p="55" v="0.137" />
  <percentile p="60" v="0.150" />
  <percentile p="65" v="0.166" />
  <percentile p="70" v="0.185" />
  <percentile p="75" v="0.209" />
  <percentile p="80" v="0.242" />
  <percentile p="81" v="0.251" />
  <percentile p="82" v="0.259" />
  <percentile p="83" v="0.267" />
  <percentile p="84" v="0.277" />
  <percentile p="85" v="0.287" />
  <percentile p="86" v="0.298" />
  <percentile p="87" v="0.312" />
  <percentile p="88" v="0.330" />
  <percentile p="89" v="0.348" />
  <percentile p="90" v="0.369" />
  <percentile p="91" v="0.395" />
  <percentile p="92" v="0.423" />
  <percentile p="93" v="0.457" />
  <percentile p="94" v="0.502" />
  <percentile p="95" v="0.552" />
  <percentile p="96" v="0.614" />
  <percentile p="97" v="0.698" />
  <percentile p="98" v="0.797" />
  <percentile p="99" v="0.939" />
  <percentile p="100" v="2.916" />
</percentiles>
```

To extract the 50% median value you need the 27th value in this list, starting from 1. A HYDBSQL query to extract the median value would be:

```
select
       STATION,
       KEYWORD,
       CAST(XMLDATA as XML).value('(/percentiles/percentile/@v)[27]','varchar(max)') as Median
from
       STNINI
where
       STATION='HYDSYS01' and KEYWORD='PERCILE100'
```

which returns

```
STATION  | KEYWORD    | MEDIAN |
-------  | -------    | ------ |
HYDSYS01 | PERCILE100 | 0.126  |
```

What if the median value was not the 27th value in the list? Perhaps a more robust query would be to select the row where p="50":

```
select
    STATION,
    KEYWORD,
    CAST(XMLDATA as XML).value('(/percentiles/percentile[@p="50"]/@v)[1]','varchar(max)') as
Median
from
    STNINI
where
    STATION='HYDSYS01' and KEYWORD='PERCILE100'
```

which returns exactly the same output.

Finally, you might wish to report *all* the percentile values. This requires use of the CROSS APPLY construct, as follows:

```
SELECT
  STATION,
  KEYWORD,
  x2.col.value('(@p)[1]','varchar(100)') as Percentile,
  x2.col.value('(@v)[1]','varchar(100)') as Value
FROM
  STNINI
CROSS APPLY
  (select cast(XMLDATA as xml)) as x1(col)
CROSS APPLY
  x1.col.nodes('/percentiles/percentile') as x2(col)
WHERE
  STATION = 'HYDSYS01.UPSTR' and KEYWORD = 'PERCILE100'
```

which returns

```
STATION        | KEYWORD    | PERCENTILE | VALUE  |
-------        | -------    | ---------- | -----  |
HYDSYS01.UPSTR | PERCILE100 | 0          | -0.055 |
HYDSYS01.UPSTR | PERCILE100 | 1          | -0.040 |
HYDSYS01.UPSTR | PERCILE100 | 2          | -0.029 |
HYDSYS01.UPSTR | PERCILE100 | 3          | -0.009 |
HYDSYS01.UPSTR | PERCILE100 | 4          | -0.007 |
HYDSYS01.UPSTR | PERCILE100 | 5          | -0.007 |
HYDSYS01.UPSTR | PERCILE100 | 6          | -0.007 |
HYDSYS01.UPSTR | PERCILE100 | 7          | -0.004 |
HYDSYS01.UPSTR | PERCILE100 | 8          | -0.000 |
HYDSYS01.UPSTR | PERCILE100 | 9          | 0.002  |
...etc
```

Hydstra has the ability to store XML in a number of tables, namely HISTORY, INSTCAL, INSTREPR, INSTSER, RESDFLT, RESULTS, SAMPDFLT, SAMPLES and STNINI. It is possible to develop a parameter screen (.PSC) to present and edit the data in an XML field, see HYPSCBLD for more details. This means that an XML field can have a nice dialog to enter

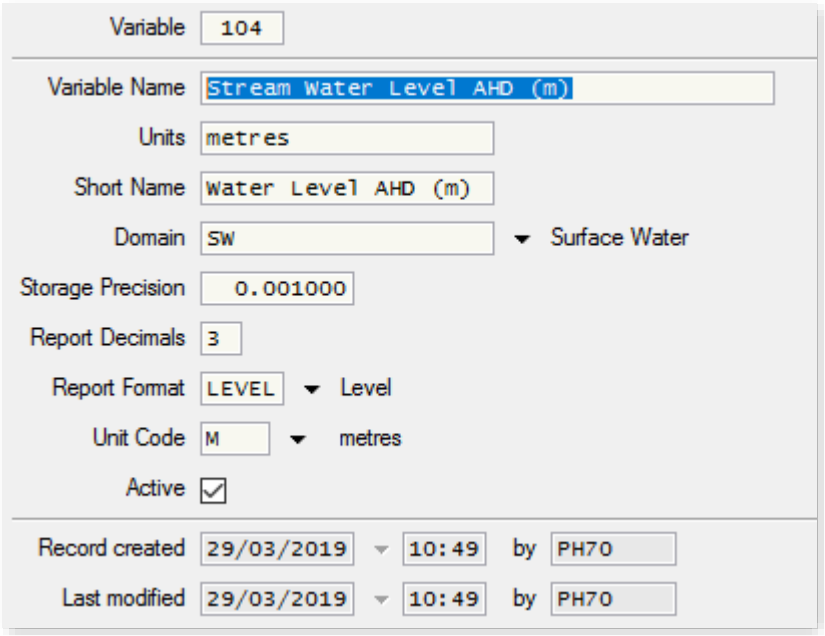
data into it, and using the SQL Server XML facilities you can retrieve data from the field. In summary this makes for an elegant way of extending a table with arbitrary additional data. We are open to adding an XML field to other tables in the next version on request.

There are lots of resources on the web discussing parsing XML data in SQL Server, and Google is your friend. Just because your data is in an XML field doesn't mean you can't get to it using SQL calls.

Converting Water Level to a different height datum

A user had a requirement to analyse stream water level in AHD datum (Australian Height Datum, or level above sea level). Typically stream water level is stored in local gauge datum, but the STATION table contains information on the level of gauge zero, and the datum in which gauge zero was measured. If the datum is correctly set to AHD then it is a fairly simple process to convert variable 100 (water level in relative gauge datum) to some other variable, say 104 (water level in AHD datum). This may be useful in flood and inundation studies for example.

The process starts by allocating a new variable in the VARIABLE table for water level in AHD datum (we used 104, you can choose any free variable):

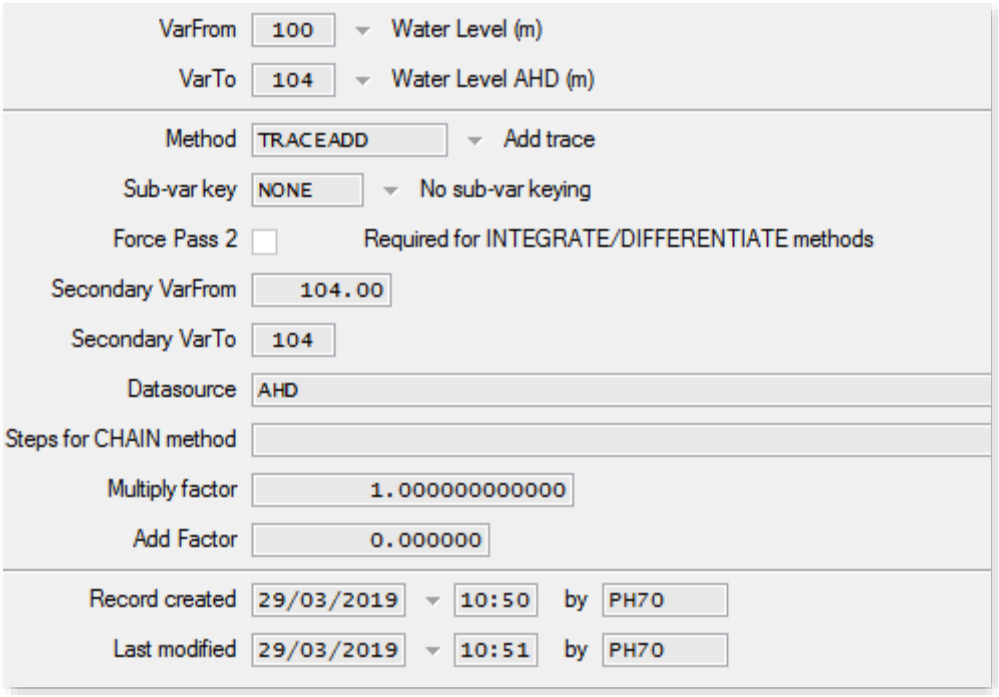


You can then implement an AHD datasource in DATASRC.INI, using the GAUGE field in STATION, provided STATION.DATUM='AHD':

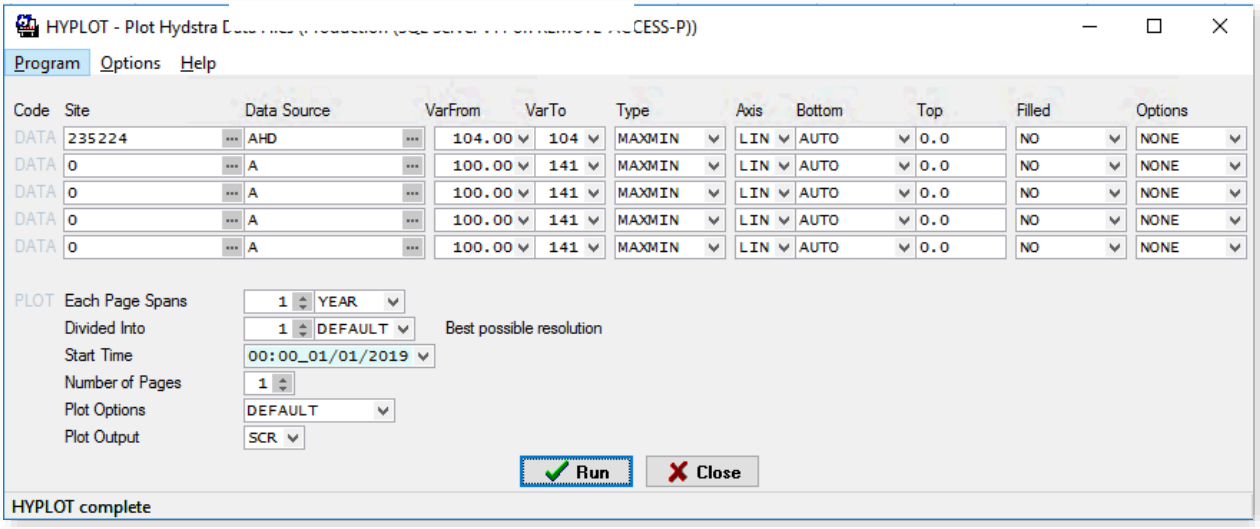
```
[AHD]
; Return AHD of GAUGE zero from STATION

Type           = CONST
ExpressionType = NORMAL
Desc           = AHD of Gauge Zero
Value          = 0.0
Table          = STATION
Field          = GAUGE
FilterFields   = DATUM
FilterValues   = AHD
Deprecated     = No
```

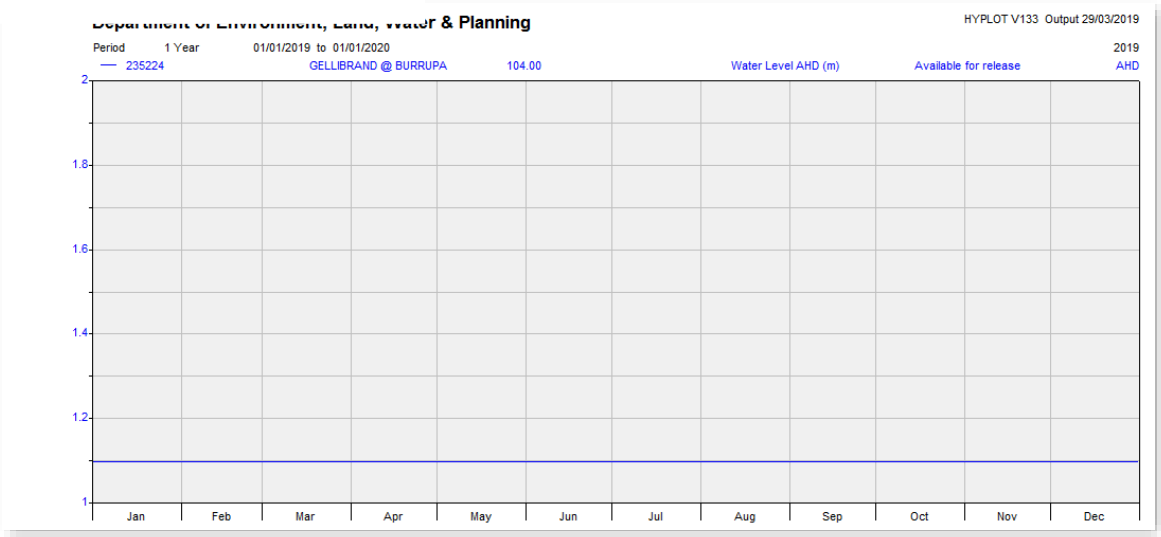
Now you can implement a variable conversion from 100 to 104, which will convert water level in gauge datum to water level in AHD datum provided the STATION fields have been set up correctly. The conversion simply adds the AHD level to the water level in gauge datum, to produce water level in AHD datum:



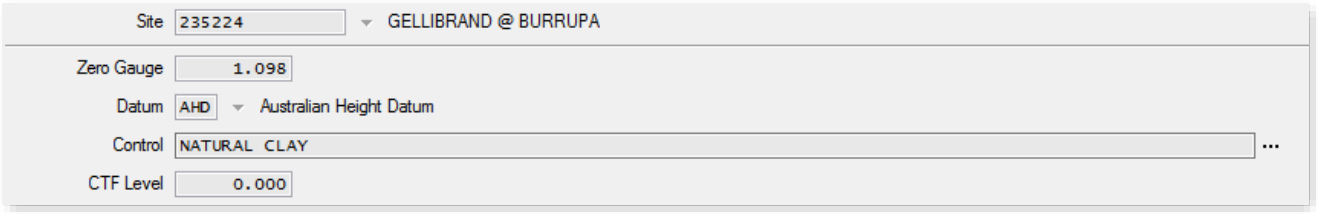
The result of all this magic is that you can plot the AHD datasource on its own:



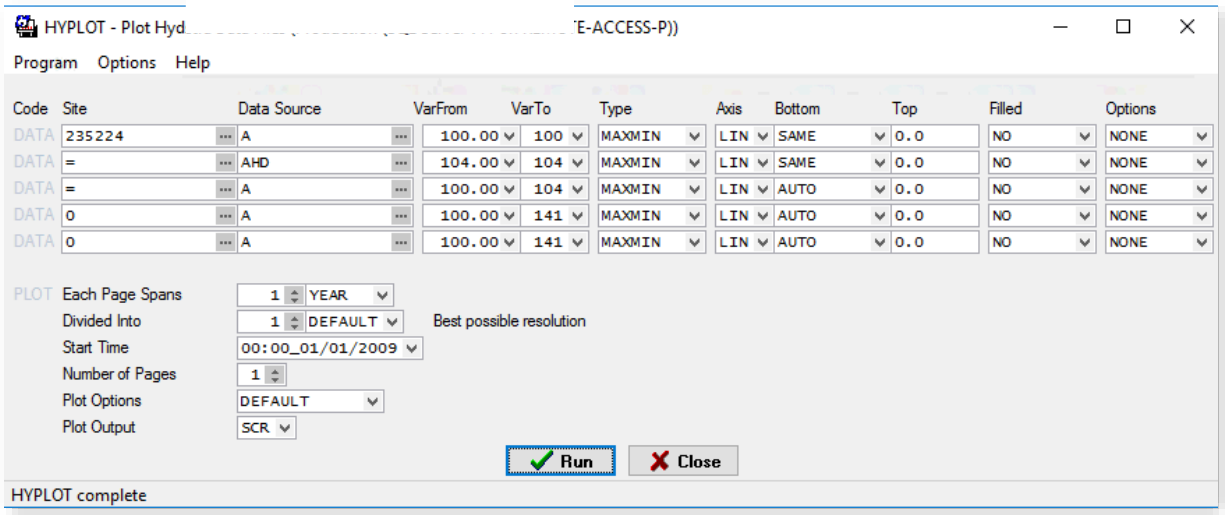
which produces the plot



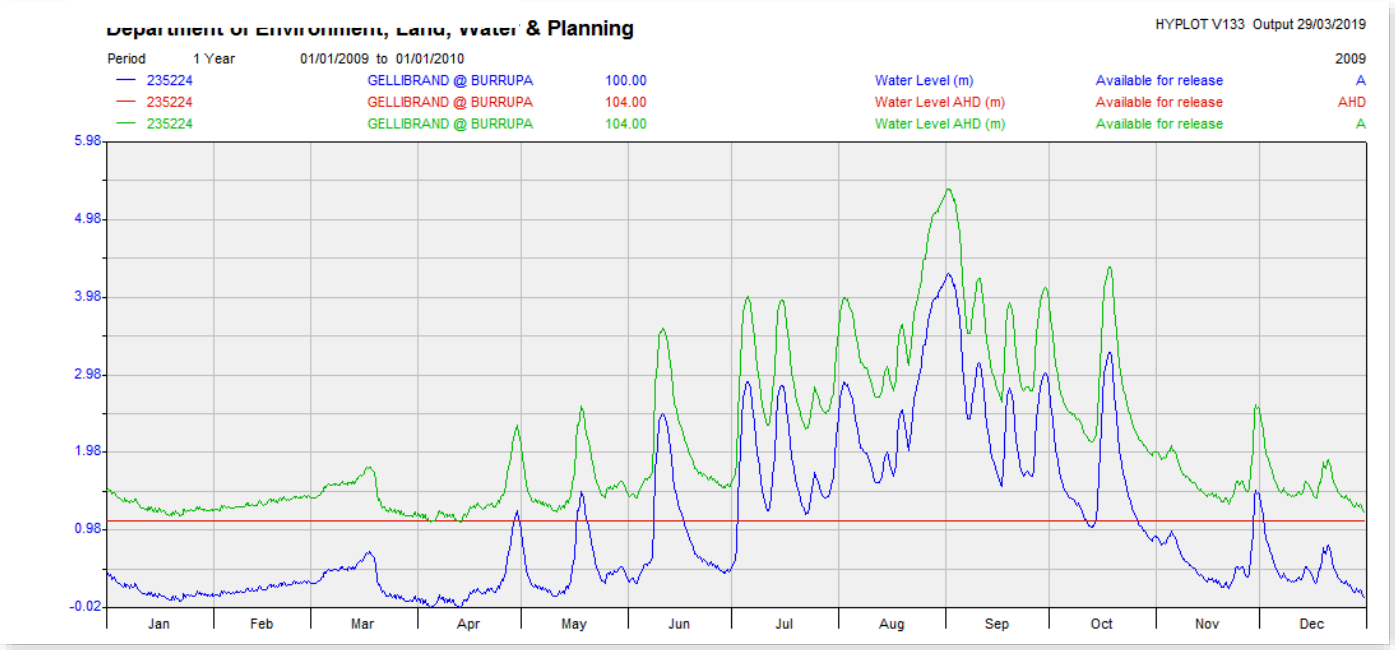
which roughly right since the AHD is 1.098:



and now you can use the variable conversion as well:



which produces



You can now use 100->104 in any application to produce water level in AHD.

Note that the AHD datasource itself has an infinite period of record and can't be used in applications that work on period of record - you need to specify a specific period of interest. Note also that the AHD returns whatever variable you ask for, though we recommend you always ask for 104 to avoid confusion in labelling in plots etc.

WISKI Product News

Release Management and Client Base

The current software version is WISKI 7.4.9, which has many further functional developments for the water ecology package KiEco and performance improvements for WISKI server. WISKI 7.4.9 uses the Open JDK Java release which removes the dependency on Oracle Java, with all its consequent licencing issues. WISKI 7.4.9 will be the recommended WISKI release for the rest of 2018. Most WISKI customers have recently upgraded to WISKI 7.4.7 or have upgrades pending.

WISKI Support Email and Help Desk

Contacts for the WISKI team at KISTERS in Australia:

Vicky, Chris, Markus and Callum (web developments) offer specialised support for the KISTERS products WISKI, KiWQM, KiEco, KiDSM, KiALM, Water Portal, WDO and KiWIS in Australia and New Zealand.

The phone number for support is +61 2 6154-5200, and the email address is wiski-support@kisters.com.au.

If you are engaging in a particular dialog with Chris, Vicky, Markus or Callum please cc the support box so a central register of issues can be maintained.

The latest WISKI releases can be found on our download portal at http://kisters.com.au/downloadswiski.html, or can be accessed by navigating through to the support page from http://kisters.com.au.

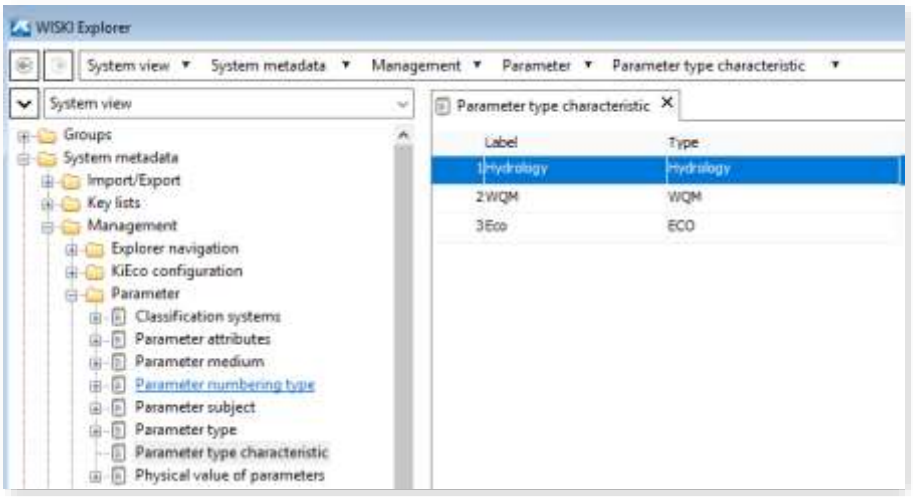
To acquire a username and password to access the download portal please contact the KISTERS support team over the phone at (02) 6154 5200 or email at Wiski-Support@kisters.com.au

What's new in 7.4.9

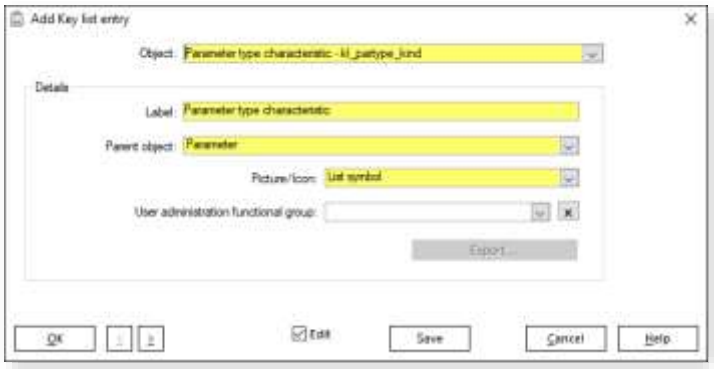
Additional attribute system for Parameter Types

From 7.4.9 Parameter Types now come with a flexible additional attribute system similar to the familiar additional attribute systems for other data entities (sites, stations, measuring programs, samplings etc.). Attributes can be added for the 3 different Parameter Type characteristics i.e. Hydrology, Water Quality and Ecology (corresponding to the 3 modules WISKI, KiWQM and KiEco). This is useful if you wish to store additional descriptive information, properties or identifiers for a Parameter Type. These attributes can then be used for filtering and reporting. To add a new additional attribute, go to:

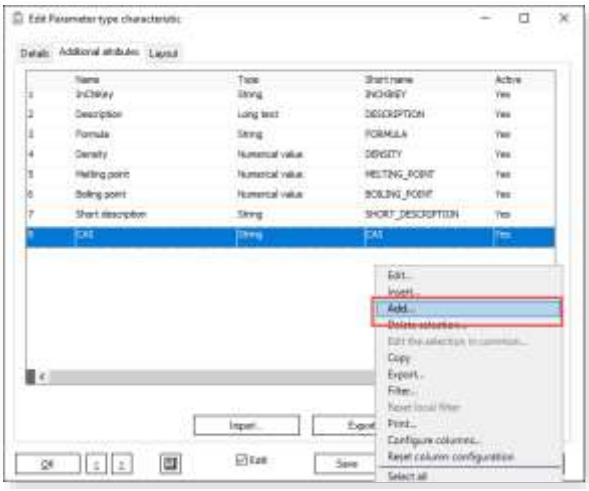
System View > System metadata > Management > Parameter > Parameter type characteristic

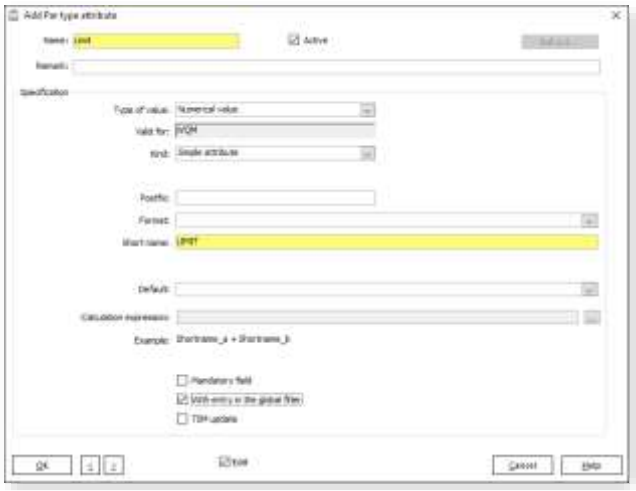


NOTE: If this menu item is not available then right click under Parameter and add as follows:

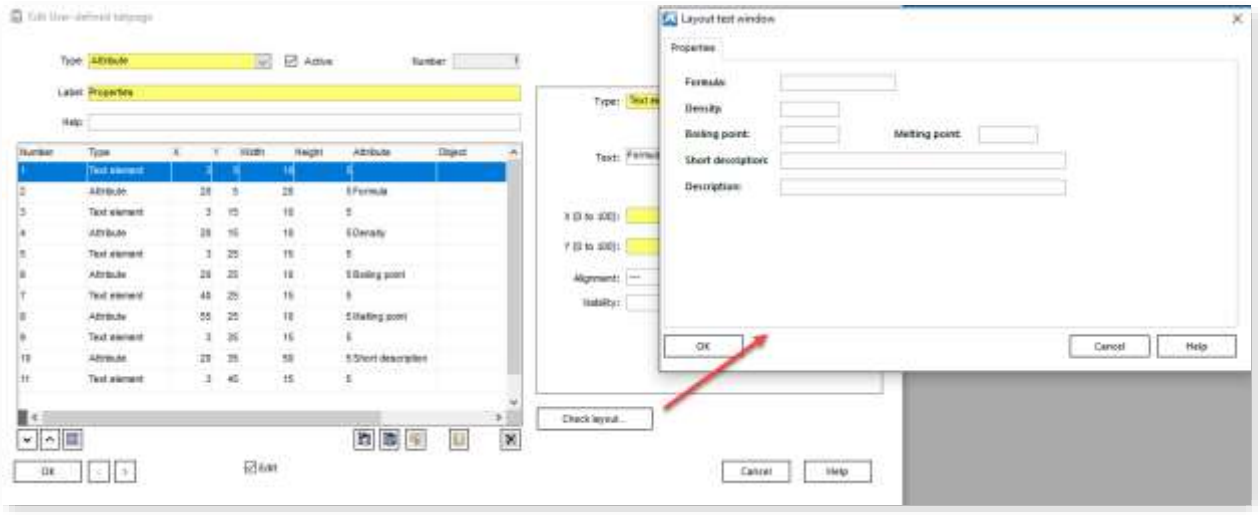


Double click on WQM for example and add additional attributes as follows:



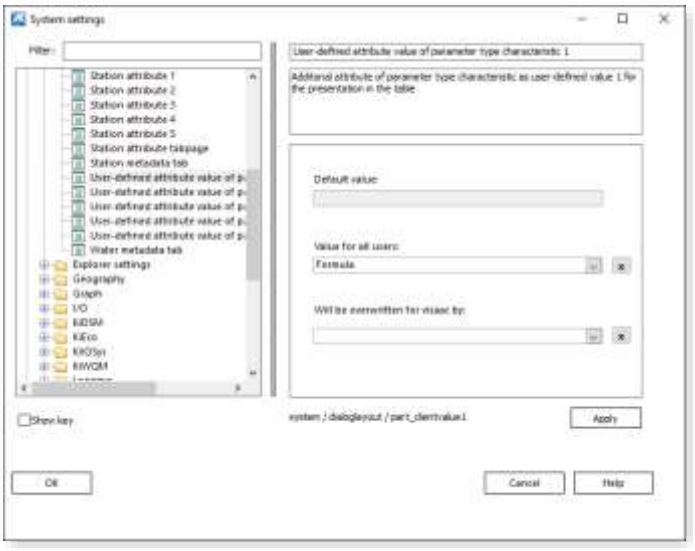


You can optionally create a layout for the attributes:



The attributes and layout will now appear when opening a Parameter type that is used as a WQM Sampling parameter, for example:

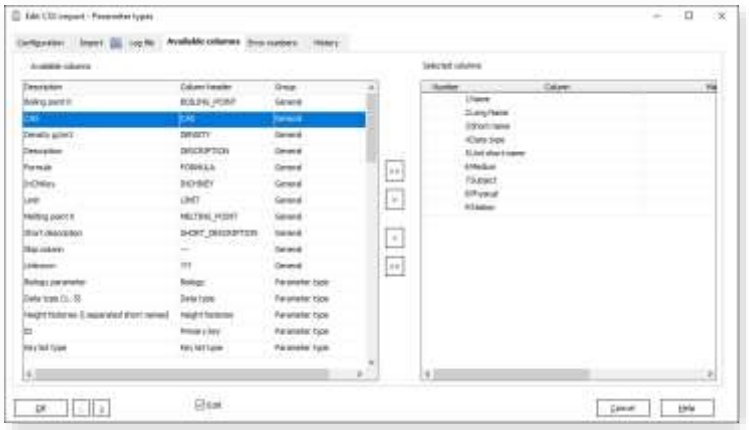
In addition up to 5 of these attributes can then be displayed in the Parameter Type table, by editing the following system settings:



The fields will then appear here:

If the 'With entry in the global filter' check box has been ticked then the additional attributes will also appear in the WISKI filter, for example:

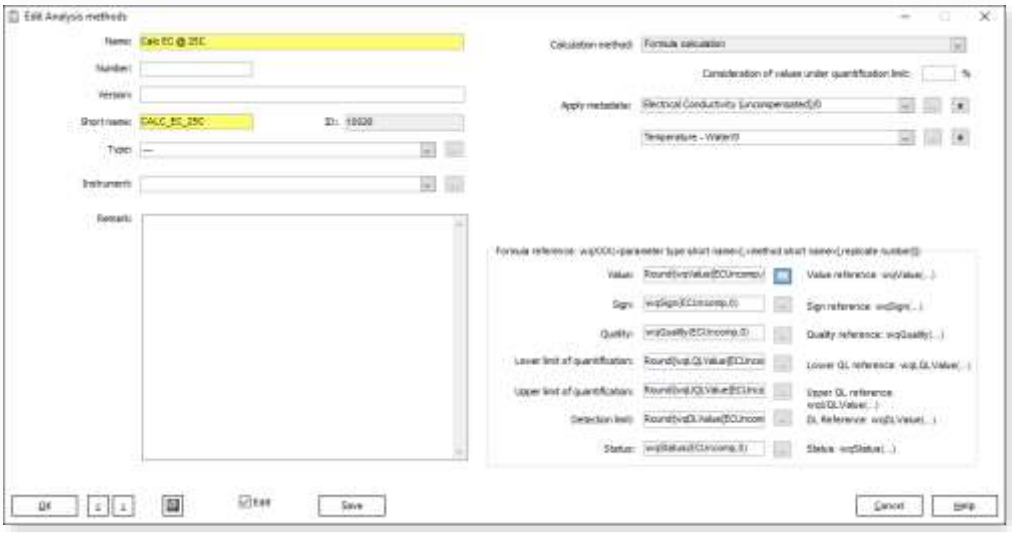
All additional attribute fields will be available in the Parameter type csv Importer/Exporter.



KiWQM – Enhancements to the Analysis methods with a Formula calculation

There are now many additional options when using a calculation formula within an Analysis method. In addition to calculating the Value, Sign and Quality you can now also calculate Lower limit of quantification, Upper limit of quantification, Detection limit and Status fields of the calculated result. In addition up to 2 parameters can be selected for applying metadata information to the calculated results.

For example, the following method is converting Uncompensated Electrical Conductivity to Electrical Conductivity @ 25C using the measured Water temperature.



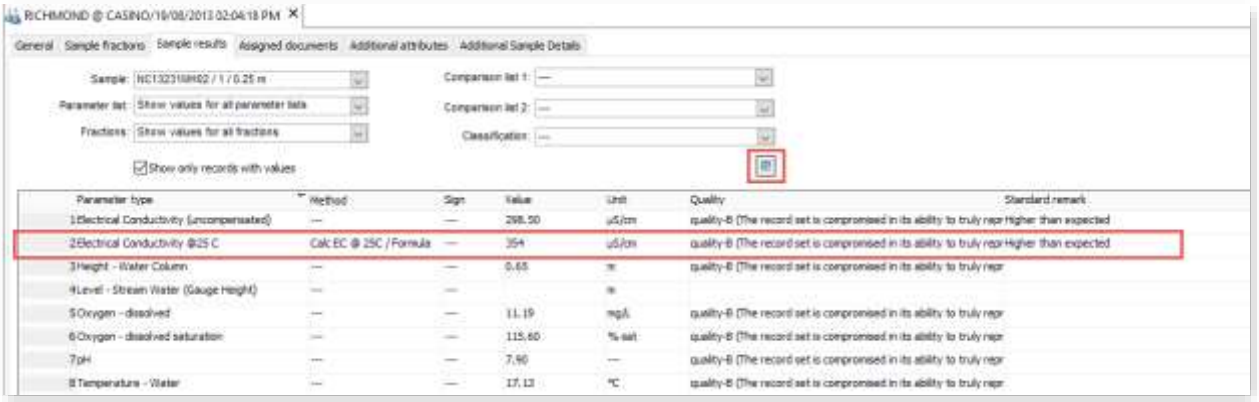
The formulas can use the following built in formula reference functions to include source fields in the calculation: wqValue(), wqSign(), wqQuality(), wqLQLValue(), wqUQLValue(), wqDLValue() and wqStatus()

The calls are in the form: wqXXX(<parameter type short name>[,<method short name>[,replicate number]])

For example: Round(wqValue(ECUncomp,0)/(1+0.02*(wqValue(TempWater,0)-25)),0)

When using the Apply metadata fields - if the first parameter is not measured, the second parameter is used. If both parameter types do not contain values, no metadata is copied.

To calculate for an individual sampling simply click on the Calculate samplings button in the results tab.



News from KISTERS Overseas

You can keep up with news from other KISTERS offices via the following links:

https://water.kisters.de/en/press-room/

https://water.kisters.de/en/news/

https://www.kisters.net/NA/news/

Staff News

Farewell to Damian Skinner

We recently farewelled Damian Skinner after a long and distinguished career with KISTERS. Damian first joined HYDSYS Pty Ltd (as it was then) as a student in late 1992 and subsequently left in December 2003 to travel the world. He re-joined KISTERS Pty Ltd in March 2008 and ended up leading the Hydstra consulting group until his departure at the end of 2018. During that time he led significant projects in Pakistan and Mozambique as well as major upgrades and migrations within Australia.

His new position is with the Murray Darling Basin Authority as Assistant Director, Water Information and Data Analytics, where his water industry and water data skills will be put to good use.

Damian has accumulated decades of experience with Hydstra, and he will be sadly missed and difficult to replace. We wish him well in his future endeavours.

Farewell to Song Guo

We also farewelled Song Guo at the end of last year. Song joined KISTERS in 2016 to help develop the market for KISTERS energy products in Australia. He has decided to spend time taking up parenting duties to allow his wife's career to advance. We wish them both well, and we will miss Song's cheerful and happy disposition around the office.

Information

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Homepage:
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