



## **HydroXC Workshop Session**

### **Demo: Data Adapter Proof of Concept**

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## Workshop Agenda

- Welcome
- Data Adapter Background
- Proof of Concept (POC)
  - ▶ Design
  - ▶ Technical Specifications
  - ▶ Demonstration
    - SHEF Message to HydroXC XML
    - HydroXC XML to SHEF Message
- Next Steps
  - ▶ Data Adapter Development
  - ▶ HydroXC
- Open Discussion

## Data Adapter Background

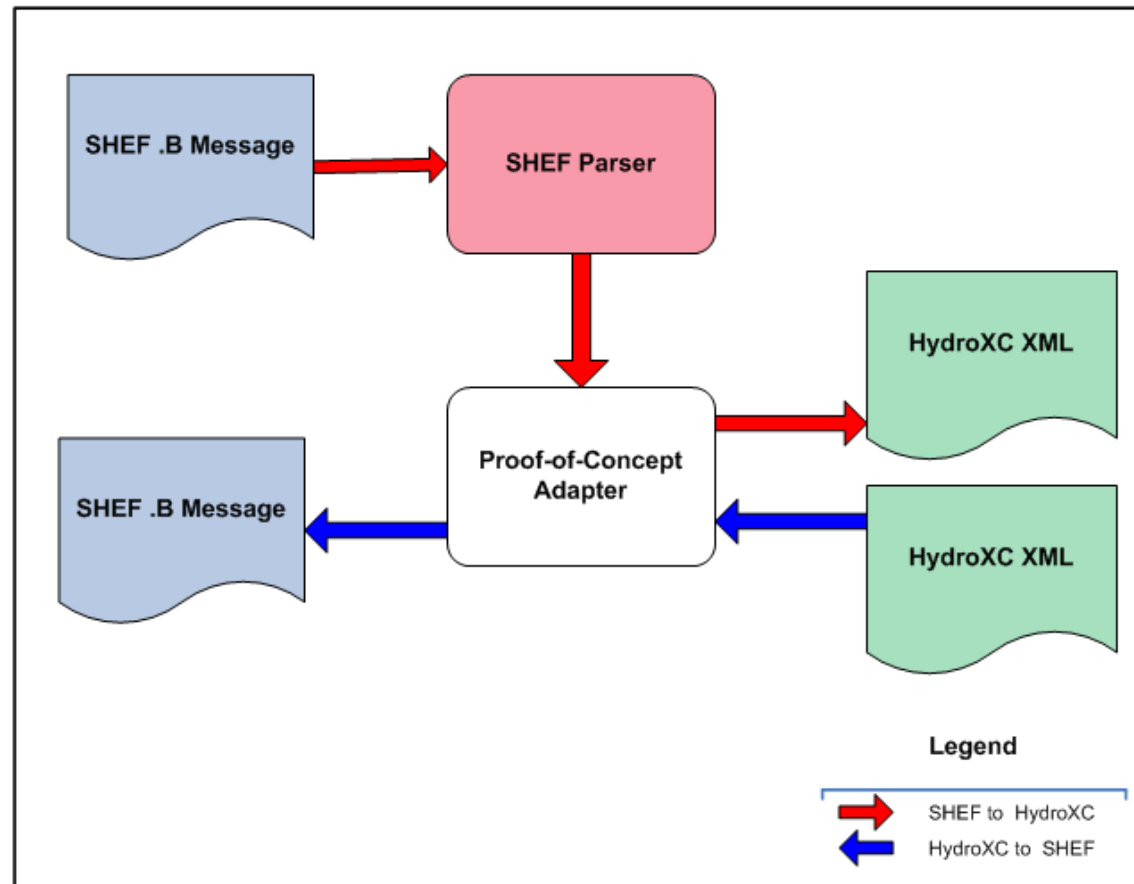
- What is a data adapter?
  - ▶ A tool built to transform data between HydroXC-compliant XML and a specified proprietary hydrologic data format
  - ▶ A programmatic tool that simplifies hydrologic data exchange
- Why do we need data adapters?
  - ▶ Hydrologic data has no standard format
  - ▶ It takes a lot of time and effort to either build the infrastructure to read another group's data format or transform data between two existing formats
- Why a proof of concept?
  - ▶ To provide an example data adapter with underlying code
  - ▶ To demonstrate the configuration file possibilities that can help to simplify data exchange

## Proof of Concept: Design

- The purpose of the Proof of Concept (POC) is to demonstrate how we might create a tool to transform data between a proprietary hydrology data format and HydroXC, and vice-versa.
- For this example, we selected NOAA's SHEF .B unpacked message type.
- The POC intends to show the following:
  - ▶ How a SHEF .B data producer can convert data into a HydroXC standard, to share with other users who can read the HydroXC format directly or transform it into their own proprietary format (SHEF -> HydroXC)
  - ▶ How a hydrologic data consumer can convert HydroXC compliant XML data into the SHEF .B format, demonstrating how users can read data in their own formats, even though the data originated in a completely different format (HydroXC -> SHEF)

## Proof of Concept: Design

### ➤ POC Data Adapter Process Flow



## Proof of Concept: Technical Specifications

### ➤ Operating environment:

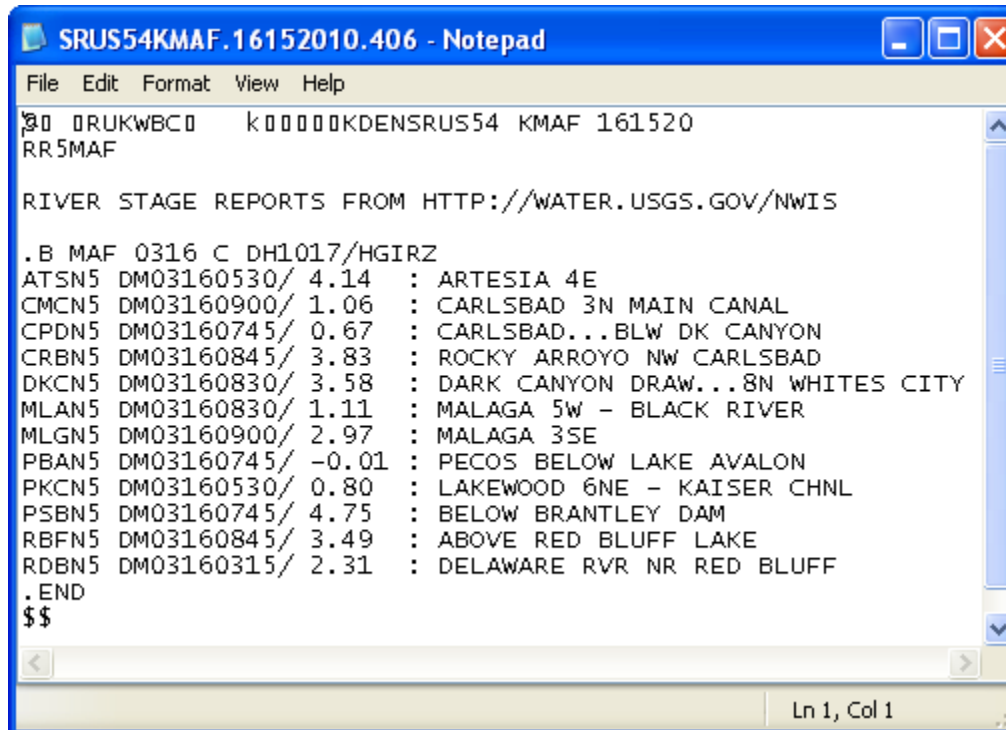
- ▶ Existing SHEF parser (required to create the binary SHEFOUT file, which serves as input to the POC data adapter)
- ▶ JRE 1.6.0, including JAXB 2.0 standard
- ▶ HP/UX/LINUX operating system
- ▶ Mapping files
  - Location mapping XML file
  - Parameter mapping XML file
- ▶ Command-line execution of the SHEF -> HydroXC portion of the data adapter
- ▶ Command-line execution of the HydroXC -> SHEF portion of the data adapter

### ➤ Development environment:

- ▶ JDK 1.6.0 (advertised as Java 6.0), including JAXB 2.0

## Proof of Concept: SHEF to HydroXC - Basic

- Original SHEF message
  - ▶ 12 data points



```
SRUS54KMAF.16152010.406 - Notepad
File Edit Format View Help
$0 DRUKWBC0 k00000KDENSUR54 KMAF 161520
RR5MAF

RIVER STAGE REPORTS FROM HTTP://WATER.USGS.GOV/NWIS

.B MAF 0316 C DH1017/HGIRZ
ATSN5 DM03160530/ 4.14 : ARTESIA 4E
CMCN5 DM03160900/ 1.06 : CARLSBAD 3N MAIN CANAL
CPDN5 DM03160745/ 0.67 : CARLSBAD...BLW DK CANYON
CRBN5 DM03160845/ 3.83 : ROCKY ARROYO NW CARLSBAD
DKCN5 DM03160830/ 3.58 : DARK CANYON DRAW...8N WHITES CITY
MLAN5 DM03160830/ 1.11 : MALAGA 5W - BLACK RIVER
MLGN5 DM03160900/ 2.97 : MALAGA 3SE
PBAN5 DM03160745/ -0.01 : PECOS BELOW LAKE AVALON
PKCN5 DM03160530/ 0.80 : LAKEWOOD 6NE - KAISER CHNL
PSBN5 DM03160745/ 4.75 : BELOW BRANTLEY DAM
RBFN5 DM03160845/ 3.49 : ABOVE RED BLUFF LAKE
RDBN5 DM03160315/ 2.31 : DELAWARE RVR NR RED BLUFF
.END
$$
Ln 1, Col 1
```

## Proof of Concept: SHEF to HydroXC - Basic

### ➤ Resulting HydroXC-compliant file, Location Set

```

<?xml version="1.0" encoding="UTF-8" standalone="yes" ?>
- <Dataset xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:noNamespaceSchemaLocation="HydroXC.xsd">
- <Header>
  <MeasurementSystem Name="English" Code="E" />
  <TimeZone Name="Greenwich Mean Time" Code="GMT" />
</Header>
- <Report>
- <CoverageSet>
  - <Coverage ID="MAF">
    - <LocationSet Count="12">
      - <LocationDataElement ID="0">
        - <OtherIdentifier>
          <Station ID="ATSN5" Domain="NOAA" />
        </OtherIdentifier>
      </LocationDataElement>
      - <LocationDataElement ID="1">
        - <OtherIdentifier>
          <Station ID="CMCN5" Domain="NOAA" />
        </OtherIdentifier>
      </LocationDataElement>
      - <LocationDataElement ID="2">
        - <OtherIdentifier>
          <Station ID="CPDN5" Domain="NOAA" />
        </OtherIdentifier>
      </LocationDataElement>
    </LocationSet>
  </CoverageSet>
</Report>
</Dataset>
  
```

```

RIVER STAGE REPORTS FROM HTTP
.B MAF 0316 C DH1017/HGIRZ
ATSN5 DM03160530/ 4.14 : ART
CMCN5 DM03160900/ 1.06 : CAR
CPDN5 DM03160745/ 0.67 : CAR
CRBN5 DM03160845/ 3.83 : ROC
DKCN5 DM03160830/ 3.58 : DAR
MLAN5 DM03160830/ 1.11 : MAL
MLGN5 DM03160900/ 2.97 : MAL
RBAN5 DM03160745/ -0.01 : REC
  
```

Original SHEF message,  
for comparison



## Proof of Concept: SHEF to HydroXC - Basic

- Resulting HydroXC-compliant file, Parameter Set

```
RIVER STAGE REPORTS FROM HTTP://WATER.USGS.GOV/NWIS
.B MAF 0316 C DH1017/HGIRZ
ATSN5 DM03160530/ 4.14 : ARTESIA 4E
CMCN5 DM03160900/ 1.06 : CARLSBAD 3N MAIN CANAL
CPDN5 DM03160745/ 0.67 : CARLSBAD BLW DK CANYON
```

Original SHEF message,  
for comparison

- ▶ Duration converted to seconds

```
- <CoverageSet>
- <Coverage ID="MAF">
+ <LocationSet Count="12">
- <ParameterSet>
- <DataElementSet Count="1">
- <DataElement>
- <DataElementArrayDefinition>
  <Item Name="Data Qualifier" />
  <Item Name="Revision Code" />
  <Item Name="Full P EDTSEP Parameter" />
  <Item Name="Time Series Indicator" />
  <Item Name="Physical Element Code" />
  <Item Name="Duration" />
  <Item Name="Type Code" />
  <Item Name="Source Code" />
  <Item Name="Extremum Code" />
  <Item Name="Probability" />
  <Item Name="Data Value" />
  <Item Name="Duration In Seconds" />
</DataElementArrayDefinition>
- <DataElementArray Count="12">
- <DataElement StartingDateTime="2007-03-16T11:30:00" ID="0"
  CreateDateTime="2007-06-19T09:06:49.298-04:00">
  <Comment />
  <Item Value="Z" Name="Data Qualifier" />
  <Item Value="0" Name="Revision Code" />
  <Item Value="HGIRZZZ" Name="Full P EDTSEP Parameter" />
  <Item Value="0" Name="Time Series Indicator" />
  <Item Value="HG" Name="Physical Element Code" />
  <Item Value="0" Name="Duration" />
  <Item Value="R" Name="Type Code" />
  <Item Value="Z" Name="Source Code" />
  <Item Value="Z" Name="Extremum Code" />
  <Item Value="-1.0" Name="Probability" />
  <Item Value="4.14" Name="Data Value" />
  <Item Value="0" Name="Duration In Seconds" />
</DataElement>
```



## Proof of Concept: SHEF to HydroXC – Location Mapping

- Same SHEF message
- With Location Mapping file

```
- <locationMapping xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:noNamespaceSchemaLocation="LocationMapping.xsd">
- <location observationLocation="MAF" station="ATSN5">
- <coordinateReference>
  <latLong latitude="32.841" longitude="-104.323" />
</coordinateReference>
</location>
- <location observationLocation="MAF" station="CMCN5">
- <coordinateReference>
  <latLong latitude="32.490" longitude="-104.252" />
</coordinateReference>
</location>
- <location observationLocation="MAF" station="CPDN5">
- <coordinateReference>
  <latLong latitude="32.410" longitude="-104.216" />
</coordinateReference>
</location>
- <location observationLocation="MAF" station="CRBN5">
- <coordinateReference>
  <latLong latitude="32.506" longitude="-104.374" />
</coordinateReference>
</location>
- <location observationLocation="MAF" station="DKCN5">
- <coordinateReference>
  <latLong latitude="32.295" longitude="-104.351" />
</coordinateReference>
</location>
- <location observationLocation="MAF" station="MLAN5">
- <coordinateReference>
  <latLong latitude="32.220" longitude="-104.151" />
```

# Proof of Concept: SHEF to HydroXC – Location Mapping

## ➤ Resulting HydroXC file

```

- <locationMapping xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:noNamespaceSchemaLocation="LocationMapping.xsd">
- <location observationLocation="MAF" station="ATSN5">
- <coordinateReference>
  <latLong latitude="32.841" longitude="-104.323" />
</coordinateReference>
</location>
- <location observationLocation="MAF" station="CMCN5">
- <coordinateReference>
  <latLong latitude="32.490" longitude="-104.252" />
</coordinateReference>
</location>
- <location observationLocation="MAF" station="CPDN5">
- <coordinateReference>
  <latLong latitude="32.410" longitude="-104.216" />
</coordinateReference>
</location>
- <location observationLocation="MAF" station="CRBN5">
- <coordinateReference>
  <latLong latitude="32.506" longitude="-104.374" />
</coordinateReference>
</location>
- <location observationLocation="MAF" station="DKCN5">

```

Location mapping file,  
for comparison

```

<?xml version="1.0" encoding="UTF-8" standalone="yes" ?>
- <Dataset xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:noNamespaceSchemaLocation="HydroXC.xsd">
- <Header>
  <MeasurementSystem Name="English" Code="E" />
  <TimeZone Name="Greenwich Mean Time" Code="GMT" />
</Header>
- <Report>
- <CoverageSet>
- <Coverage ID="MAF">
- <LocationSet Count="12">
- <LocationDataElement ID="0">
- <Coordinates SRS="unknown">
- <Point>
  <Latitude>32.841</Latitude>
  <Longitude>-104.323</Longitude>
</Point>
</Coordinates>
- <OtherIdentifier>
  <Station ID="ATSN5" Domain="NOAA" />
</OtherIdentifier>
</LocationDataElement>
- <LocationDataElement ID="1">
- <Coordinates SRS="unknown">
- <Point>
  <Latitude>32.49</Latitude>
  <Longitude>-104.252</Longitude>
</Point>
</Coordinates>
- <OtherIdentifier>
  <Station ID="CMCN5" Domain="NOAA" />
</OtherIdentifier>
</LocationDataElement>

```

## Proof of Concept: SHEF to HydroXC - Location Mapping

- Resulting HydroXC-compliant file, Parameter Set
  - ▶ same as the resulting HydroXC file from the Basic Example

```

- <CoverageSet>
- <Coverage ID="MAF">
+ <LocationSet Count="12">
- <ParameterSet>
- <DataElementSet Count="1">
- <DataElement>
- <DataElementArrayDefinition>
  <Item Name="Data Qualifier" />
  <Item Name="Revision Code" />
  <Item Name="Full P EDTSEP Parameter" />
  <Item Name="Time Series Indicator" />
  <Item Name="Physical Element Code" />
  <Item Name="Duration" />
  <Item Name="Type Code" />
  <Item Name="Source Code" />
  <Item Name="Extremum Code" />
  <Item Name="Probability" />
  <Item Name="Data Value" />
  <Item Name="Duration In Seconds" />
</DataElementArrayDefinition>
- <DataElementArray Count="12">
- <DataElement StartingDateTime="2007-03-16T11:30:00" ID="0"
  CreateDateTime="2007-06-19T09:06:49.298-04:00">
  <Comment />
  <Item Value="Z" Name="Data Qualifier" />
  <Item Value="0" Name="Revision Code" />
  <Item Value="HGIRZZZ" Name="Full P EDTSEP Parameter" />
  <Item Value="0" Name="Time Series Indicator" />
  <Item Value="HG" Name="Physical Element Code" />
  <Item Value="0" Name="Duration" />
  <Item Value="R" Name="Type Code" />
  <Item Value="Z" Name="Source Code" />
  <Item Value="Z" Name="Extremum Code" />
  <Item Value="-1.0" Name="Probability" />
  <Item Value="4.14" Name="Data Value" />
  <Item Value="0" Name="Duration In Seconds" />
</DataElement>

```

```

RIVER STAGE REPORTS FROM HTTP://WATER.USGS.GOV/NWIS
.B MAF 0316 C DH1017/HGIRZ
ATSN5 DM03160530/ 4.14 : ARTESIA 4E
CMCN5 DM03160900/ 1.06 : CARLSBAD 3N MAIN CANAL
CPDN5 DM03160745/ 0.67 : CARLSBAD BLW DK CANYON

```

Original SHEF message, for comparison

## Proof of Concept: HydroXC back to SHEF - Basic

- Content is the same, but with 12 distinct messages instead of the one original message
  - ▶ Resulting SHEF file →
  - ▶ Original SHEF file ↓

```

SRUS54KMAF.16152010.406 - Notepad
File Edit Format View Help
00 DRUKWBC0 k00000KDENSUS54 KMAF 161520
RR5MAF

RIVER STAGE REPORTS FROM HTTP://WATER.USGS.GOV/NWIS

.B MAF 0316 C DH1017/HGIRZZ
ATSN5 DM03160530/ 4.14 : ARTESIA 4E
CMCN5 DM03160900/ 1.06 : CARLSBAD 3N MAIN CANAL
CPDN5 DM03160745/ 0.67 : CARLSBAD...BLW DK CANYON
CRBN5 DM03160845/ 3.83 : ROCKY ARROYO NW CARLSBAD
DKCN5 DM03160830/ 3.58 : DARK CANYON DRAW...8N WHITES CITY
MLAN5 DM03160830/ 1.11 : MALAGA 5W - BLACK RIVER
MLGN5 DM03160900/ 2.97 : MALAGA 3SE
PBAN5 DM03160745/ -0.01 : PECOS BELOW LAKE AVALON
PKCN5 DM03160530/ 0.80 : LAKEWOOD 6NE - KAISER CHNL
PSBN5 DM03160745/ 4.75 : BELOW BRANTLEY DAM
RBFN5 DM03160845/ 3.49 : ABOVE RED BLUFF LAKE
RDBN5 DM03160315/ 2.31 : DELAWARE RVR NR RED BLUFF
.END
$$
    
```

```

shefin_hydroxc - Notepad
File Edit Format View Help
.B MAF 20070316 DT20070316113000/DC200706190906/HGIRZZ
ATSN5 4.14
.END

.B MAF 20070316 DT20070316150000/DC200706190906/HGIRZZ
CMCN5 1.06
.END

.B MAF 20070316 DT20070316134500/DC200706190906/HGIRZZ
CPDN5 0.67
.END

.B MAF 20070316 DT20070316144500/DC200706190906/HGIRZZ
CRBN5 3.83
.END

.B MAF 20070316 DT20070316143000/DC200706190906/HGIRZZ
DKCN5 3.58
.END

.B MAF 20070316 DT20070316143000/DC200706190906/HGIRZZ
MLAN5 1.11
.END

.B MAF 20070316 DT20070316150000/DC200706190906/HGIRZZ
MLGN5 2.97
.END

.B MAF 20070316 DT20070316134500/DC200706190906/HGIRZZ
PBAN5 -0.01
.END

.B MAF 20070316 DT20070316113000/DC200706190906/HGIRZZ
PKCN5 0.8
.END

.B MAF 20070316 DT20070316134500/DC200706190906/HGIRZZ
PSBN5 4.75
.END

.B MAF 20070316 DT20070316144500/DC200706190906/HGIRZZ
RBFN5 3.49
.END

.B MAF 20070316 DT20070316091500/DC200706190906/HGIRZZ
RDBN5 2.31
.END
    
```

## Proof of Concept: HydroXC to SHEF – Location Mapping

- Looks exactly the same as basic example
  - ▶ Started from the same SHEF file
  - ▶ Location mapping adds data to the HydroXC file, but does not change the resulting SHEF files



```
shefin_hydroxc - Notepad
File Edit Format View Help
.B MAF 20070316 DT20070316113000/DC200706190906/HGIRZZZ
ATSN5 4.14
.END

.B MAF 20070316 DT20070316150000/DC200706190906/HGIRZZZ
CMCN5 1.06
.END

.B MAF 20070316 DT20070316134500/DC200706190906/HGIRZZZ
CPDN5 0.67
.END

.B MAF 20070316 DT20070316144500/DC200706190906/HGIRZZZ
CRBN5 3.83
.END

.B MAF 20070316 DT20070316143000/DC200706190906/HGIRZZZ
DKCN5 3.58
.END

.B MAF 20070316 DT20070316143000/DC200706190906/HGIRZZZ
MLAN5 1.11
.END

.B MAF 20070316 DT20070316150000/DC200706190906/HGIRZZZ
MLGN5 2.97
.END

.B MAF 20070316 DT20070316134500/DC200706190906/HGIRZZZ
PBAN5 -0.01
.END

.B MAF 20070316 DT20070316113000/DC200706190906/HGIRZZZ
PKCN5 0.8
.END

.B MAF 20070316 DT20070316134500/DC200706190906/HGIRZZZ
PSBN5 4.75
.END

.B MAF 20070316 DT20070316144500/DC200706190906/HGIRZZZ
RBFN5 3.49
.END

.B MAF 20070316 DT20070316091500/DC200706190906/HGIRZZZ
RDBN5 2.31
.END|
Ln 47, Col 5
```

## Proof of Concept: HydroXC to SHEF – Parameter Mapping

- HydroXC source file
  - ▶ Shows parameters that do not directly map to SHEF

```
<?xml version="1.0" encoding="UTF-8" standalone="yes" ?>
- <Dataset xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:noNamespaceSchemaLocation="HydroXC.xsd">
- <Header>
  <MeasurementSystem Name="English" Code="E" />
  <TimeZone Name="Greenwich Mean Time" Code="GMT" />
</Header>
- <Report>
- <CoverageSet>
  - <Coverage ID="ABC">
    - <LocationSet Count="6">
      - <LocationDataElement ID="0">
        - <OtherIdentifier>
          - <StationID GazetteerURL="http://noaa.gov/NWSLI/StationResolver" Domain="NOAA">
            - <ParameterElement Count="2">
              <ValueElement Value="ABC" Name="Message Source" />
              <ValueElement Value="BB0063" Name="Id" />
            </ParameterElement>
          </StationID>
        </OtherIdentifier>
      </LocationDataElement>
      + <LocationDataElement ID="1">
      + <LocationDataElement ID="2">
      + <LocationDataElement ID="3">
      + <LocationDataElement ID="4">
      + <LocationDataElement ID="5">
    </LocationSet>
    - <ParameterSet>
      - <DataElementSet Count="1">
        - <DataElement>
          - <DataElementArrayDefinition>
            <Item Name="PEC" />
            <Item Name="D" />
            <Item Name="probably" />
            <Item Name="datapoint" />
          </DataElementArrayDefinition>
          - <DataElementArray Count="6">
            - <DataElement StartingDateTime="1987-12-07T12:00:00" ID="0">
              CreateDateTime="2007-05-09T15:44:43.230-04:00">
              <Comment />
              <Item Value="SNOWDEPTH" Name="PEC" />
              <Item Value="0" Name="D" />
              <Item Value="0.5" Name="probably" />
              <Item Value="4.5" Name="datapoint" />
            </DataElement>
            - <DataElement StartingDateTime="1987-12-06T12:00:00" ID="1">
```



## Proof of Concept: HydroXC to SHEF – Parameter Mapping

### ➤ Parameter Mapping definition file

#### ▶ Shows examples of more sophisticated and varied mapping options

- Ignore capability
- Direct mapping
- Algorithm invocation

```
- <Parameters xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:noNamespaceSchemaLocation="ParameterMapping.xsd">
- <Parameter source="PEC" target="Physical Element Code" targetinvocationclass="">
  <ValueMappingItem source="SNOWDEPTH" target="SD" />
  <ValueMappingItem source="STAGEHEIGHT" target="HG" />
</Parameter>
- <Parameter source="D" target="Duration Code" targetinvocationclass="" ignore="true">
  <ValueMappingItem source="0" target="D" />
</Parameter>
- <Parameter source="probably" target="Probability Code" targetinvocationclass="">
  <ValueAlgorithm class="gov.noaa.ProbabilityCodeConversion"
    algorithm="ConvertToSHEFProbabilityCode" />
</Parameter>
- <Parameter source="datapoint" target="Data Value" targetinvocationclass="java.lang.Double">
  <ValueAlgorithm class="gov.noaa.MetricConversion"
    algorithm="ConvertToInchesFromMillimeters" />
</Parameter>
</Parameters>
```



## Proof of Concept: HydroXC to SHEF – Parameter Mapping

### ➤ Direct mapping

```

shefin_hydroxc_data_mapping - WordPad
File Edit View Insert Format Help
[Icons]
|.B ABC 19871207 DT19871207120000/DC200705091544/SDIRZZ5
BB0063 0.17716535433070868
.END

|.B ABC 19871206 DT19871206120000/DC200705091544/SDIRZZJ
BB0063 0.21259842519685043
.END

|.B ABC 19880205 DT19880205120000/DC200705091544/SDIRZZX
BB0063 0.12992125984251968
.END

|.B ABC 19871207 DT19871207120000/DC200705091544/HGIRZZ5
BB0127 1.358267716535433
.END

|.B ABC 19871206 DT19871206120000/DC200705091544/HGIRZZJ
BB0127 1.3937007874015748
.END

|.B ABC 19880205 DT19880205120000/DC200705091544/HGIRZZX
BB0127 1.311023622047244
.END
For Help, press F1
NUM
  
```

```

- <DataElementArray Count="6">
- <DataElement StartingDateTime="1987-12-07T12:00:00"
  ID="0" CreateDateTime="2007-05-09T15:44:43.230-04:00">
  <Comment />
  <Item Value="SNOWDEPTH" Name="PEC" />
  <Item Value="0" Name="D" />
  <Item Value="0.5" Name="probably" />
  <Item Value="4.5" Name="datapoint" />
</DataElement>
- <DataElement StartingDateTime="1987-12-06T12:00:00"
  ID="1" CreateDateTime="2007-05-09T15:44:43.246-04:00">
  <Comment />
  <Item Value="SNOWDEPTH" Name="PEC" />
  <Item Value="0" Name="D" />
  <Item Value="0.0013" Name="probably" />
  <Item Value="5.4" Name="datapoint" />
</DataElement>
- <DataElement StartingDateTime="1988-02-05T12:00:00"
  ID="2" CreateDateTime="2007-05-09T15:44:43.246-04:00">
  <Comment />
  <Item Value="SNOWDEPTH" Name="PEC" />
  <Item Value="0" Name="D" />
  <Item Value="0.996" Name="probably" />
  <Item Value="3.3" Name="datapoint" />
</DataElement>
- <DataElement StartingDateTime="1987-12-07T12:00:00"
  ID="3" CreateDateTime="2007-05-09T15:44:43.246-04:00">
  <Comment />
  <Item Value="STAGEHEIGHT" Name="PEC" />
  <Item Value="0" Name="D" />
  <Item Value="0.5" Name="probably" />
  <Item Value="34.5" Name="datapoint" />
</DataElement>
- <DataElement StartingDateTime="1987-12-06T12:00:00"
  
```



## Proof of Concept: HydroXC to SHEF – Parameter Mapping

- Algorithm invocation – Probability
  - ▶ SHEF Probability values (from SHEF manual)

SHEF Version 2.1 NWSM 10-944 OCT

Table 6. Probability Codes - PEDTSE.P

<u>CODE</u>	<u>EXPLANATION</u>
A .002	Chance value is at or below the specified value
B .004	" " " " " " " "
C .01	" " " " " " " "
D .02	" " " " " " " "
E .04	" " " " " " " "
F .05	" " " " " " " "
1 .1	" " " " " " " "
2 .2	" " " " " " " "
G .25	" " " " " " " "
3 .3	" " " " " " " "
4 .4	" " " " " " " "
5 .5	" " " " " " " "
6 .6	" " " " " " " "
7 .7	" " " " " " " "
H .75	" " " " " " " "
8 .8	" " " " " " " "
9 .9	" " " " " " " "
T .95	" " " " " " " "
U .96	" " " " " " " "
V .98	" " " " " " " "
W .99	" " " " " " " "
X .996	" " " " " " " "
Y .998	" " " " " " " "
J .0013	Chance value below specified: -3 standard deviations
K .0228	" " " " " " " "

## Proof of Concept: HydroXC to SHEF – Parameter Mapping

### ➤ Algorithm invocation – Probability

```

shefin_hydroxc_data_mapping - WordPad
File Edit View Insert Format Help
| .B ABC 19871207 DT19871207120000/DC200705091544/SDIRZZ5
BB0063 0.17716535433070868
.END

.B ABC 19871206 DT19871206120000/DC200705091544/SDIRZZJ
BB0063 0.21259842519685043
.END

.B ABC 19880205 DT19880205120000/DC200705091544/SDIRZZX
BB0063 0.12992125984251968
.END

.B ABC 19871207 DT19871207120000/DC200705091544/HGIRZZ5
BB0127 1.358267716535433
.END

.B ABC 19871206 DT19871206120000/DC200705091544/HGIRZZJ
BB0127 1.3937007874015748
.END

.B ABC 19880205 DT19880205120000/DC200705091544/HGIRZZX
BB0127 1.311023622047244
.END
  
```

```

- <ParameterSet>
- <DataElementSet Count="1">
- <DataElement>
- <DataElementArrayDefinition>
  <Item Name="PEC" />
  <Item Name="D" />
  <Item Name="probably" />
  <Item Name="datapoint" />
</DataElementArrayDefinition>
- <DataElementArray Count="6">
- <DataElement StartingDateTime="1987-12-07T12:00:00"
  ID="0" CreateDateTime="2007-05-09T15:44:43.230-04:00">
  <Comment />
  <Item Value="SNOWDEPTH" Name="PEC" />
  <Item Value="0" Name="D" />
  <Item Value="0.5" Name="probably" />
  <Item Value="4.5" Name="datapoint" />
</DataElement>
- <DataElement StartingDateTime="1987-12-06T12:00:00"
  ID="1" CreateDateTime="2007-05-09T15:44:43.246-04:00">
  <Comment />
  <Item Value="SNOWDEPTH" Name="PEC" />
  <Item Value="0" Name="D" />
  <Item Value="0.0013" Name="probably" />
  <Item Value="5.4" Name="datapoint" />
</DataElement>
- <DataElement StartingDateTime="1988-02-05T12:00:00"
  ID="2" CreateDateTime="2007-05-09T15:44:43.246-04:00">
  <Comment />
  <Item Value="SNOWDEPTH" Name="PEC" />
  <Item Value="0" Name="D" />
  <Item Value="0.996" Name="probably" />
  <Item Value="3.3" Name="datapoint" />
</DataElement>
- <DataElement StartingDateTime="1987-12-07T12:00:00"
  
```

## Proof of Concept: HydroXC to SHEF – Parameter Mapping

➤ Algorithm invocation –  
Millimeters to inches

▶ 1 inch = 25.4 mm

```

shefin_hydroxc_data_mapping - WordPad
File Edit View Insert Format Help
| .B ABC 19871207 DT19871207120000/DC200705091544/SDIRZZ5
BB0063 0.17716535433070868
.END

. B ABC 19871206 DT19871206120000/DC200705091544/SDIRZZJ
BB0063 0.21259842519685043
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BB0063 0.12992125984251968
.END

. B ABC 19871207 DT19871207120000/DC200705091544/HGIRZZ5
BB0127 1.358267716535433
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BB0127 1.3937007874015748
.END

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BB0127 1.311023622047244
.END
  
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  <Comment />
  <Item Value="SNOWDEPTH" Name="PEC" />
  <Item Value="0" Name="D" />
  <Item Value="0.5" Name="probably" />
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</DataElement>
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  ID="1" CreateDateTime="2007-05-09T15:44:43.246-04:00">
  <Comment />
  <Item Value="SNOWDEPTH" Name="PEC" />
  <Item Value="0" Name="D" />
  <Item Value="0.0013" Name="probably" />
  <Item Value="5.4" Name="datapoint" />
</DataElement>
- <DataElement StartingDateTime="1988-02-05T12:00:00"
  ID="2" CreateDateTime="2007-05-09T15:44:43.246-04:00">
  <Comment />
  <Item Value="SNOWDEPTH" Name="PEC" />
  <Item Value="0" Name="D" />
  <Item Value="0.996" Name="probably" />
  <Item Value="3.3" Name="datapoint" />
</DataElement>
- <DataElement StartingDateTime="1987-12-07T12:00:00"
  
```

## Proof of Concept: HydroXC to SHEF – Parameter Mapping

- As shown, the parameter mapping definition does not take into account that files can contain multiple types of parameters (such as SnowDepth and StageHeight)
  - ▶ Needs to be updated to handle different algorithms per parameter type and will be addressed before posting to the HydroXC website

```
- <Parameters xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xsi:noNamespaceSchemaLocation="ParameterMapping.xsd">
  - <Parameter source="PEC" target="Physical Element Code" targetinvocationclass="">
    <ValueMappingItem source="SNOWDEPTH" target="SD" />
    <ValueMappingItem source="STAGEHEIGHT" target="HG" />
  </Parameter>
  - <Parameter source="D" target="Duration Code" targetinvocationclass="" ignore="true">
    <ValueMappingItem source="0" target="D" />
  </Parameter>
  - <Parameter source="probably" target="Probability Code" targetinvocationclass="">
    <ValueAlgorithm class="gov.noaa.ProbabilityCodeConversion"
      algorithm="ConvertToSHEFProbabilityCode" />
  </Parameter>
  - <Parameter source="datapoint" target="Data Value" targetinvocationclass="java.lang.Double">
    <ValueAlgorithm class="gov.noaa.MetricConversion"
      algorithm="ConvertToInchesFromMillimeters" />
  </Parameter>
</Parameters>
```

## Next Steps: Data Adapter Development

### ➤ HydroXC Phase 3

- ▶ Update parameter mapping to support handling per type of parameter
- ▶ Publish POC code and files on the HydroXC website

### ➤ Future

- ▶ Further develop the SHEF to HydroXC proof of concept to support operational use
- ▶ Develop additional data adapters for other hydrologic message formats
- ▶ Expand parameter mapping file capabilities
- ▶ Create a general framework for users to easily configure and run selected data adapters

## Next Steps: HydroXC

- Publish the finalized proof of concept data adapter and user manual to the [www.hydroxc.org](http://www.hydroxc.org) website, in the third quarter of 2007
- Issue a final report summarizing the work completed in Phase 3 of HydroXC, in the third quarter of 2007
- Encourage HydroXC members to use the SHEF data adapter POC and create additional data adapters
- Continue to expand the HydroXC schema



**APEX**



## Open Discussion





## For More Information

- Visit the [www.hydroxc.org](http://www.hydroxc.org) website
  
- Contact the HydroXC Coordinator
  - ▶ Alexis Karnauskas
    - Email: [akarnauskas@apexds.com](mailto:akarnauskas@apexds.com)