Technical Specifications for accessing SPINE Forecast Web Service

Version 3.0

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Canadian Hydrographic Service

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Contents

Introduction

This document describes the Web service giving direct access to SPINE water level forecasts calculated by the Canadian Hydrographic Service (CHS) of Fisheries and Oceans Canada.

The *Service Web de prévisions et d'interpolation des niveaux d'eau* (water level forecast and interpolation Web service - also called **SPINE**) is a system allowing one to obtain water levels at any time on the St. Lawrence navigation channel between the Port of Montreal and Saint-Joseph-de-la-Rive.

Access and support

Access to the Web service is available to general public, free of charge. Further information can be obtained by communicating with the Canadian Hydrographic Service at chsinfo@dfo-mpo.gc.ca. This address should also be used to get support for using the CHS's Web services.

Requests of information on water level data will answered as soon as possible, within current CHS level of service.

Meteorological conditions can cause differences (time and height) between the predicted and the observed tides. These differences are mainly the result of atmospheric pressure changes, strong prolonged winds or variations of freshwater discharge.

Address

The Web service entry points is :

- **SPINE** Web service: https://ws-shc.qc.dfo-mpo.gc.ca/spine

Technologies

The Web service use SOAP and XML and communicate in English. The service has a WSDL description (i.e. : https://ws-shc.qc.dfo-mpo.gc.ca/spine&wsdl) to help generate code using tools such *WSDL2Java* from *Apache Axis*.

Furthermore, the service faithfully respects the *Web Data Service WDS* standard established by the St. Lawrence Global Observatory (SLGO). Details about the *WDS* standard can be found at:

http://weds.sourceforge.net/cookbook/en/index.html

Available Methods

The *WDS* standard describes ten methods offering information about the service itself and one method to search data. The detailed description of each method and its objects are available on the *WDS* standard website. Exceptionally, the **SPINE** Web service adds one search method called `interpolate` that is described later in this section.

getStatus

Gives the status of the Web service. With the WDS up and running, the status should read « *ok »,* and when something is wrong the status gives « *error »*.

getName

Gives the name of the Web service.

getInfo

Gives the description of the Web service.

getVersion

Gives the version number of *WDS* standard used by the Web service.

getBoundaryDate

Gives the time interval data is available for (all dates and times are in UTC).

It is important to note that a search with temporal limits outside this time interval will not result in an error but an empty set.

getBoundaryDepth

Gives the depth interval data is available for. Water levels are always considered to be at the surface and thus at a depth of zero (0.0). Values are in meters.

It is important to note that a search with depth limits outside this depth interval will not result in an error but an empty set.

getBoundarySpatial

Gives the latitudes and longitudes inside of which data is available. Latitude and longitude values are in decimal degrees and follow the ISO 6709 standard (a positive latitude is North, a negative longitude is West).

It is important to note that a search with spatial limits outside this bounding box will not result in an error but an empty set.

getDataInfo

Gives the list of data type and their description.

SPINE has a single value :

spine : water level forecast in meters

getMetadata

Gives a list of metadata alongside their values.

SPINE has six (6) metadata :

Name of the metadata	Value
contact	Gives information about the person to contact in case of trouble.
language	Gives the language of messages exchanged between the server and the client.
name	Gives the name of the Web service.
abstract	Gives the description of the Web service.
reference_date	Gives a textual representation of temporal limits. A more standard way is to call `getBoundaryDate`.
max_results	Gives the maximum number of elements returned by a query to `interpolate`.

getMetadataInfo

Gives a list describing the each metadata.

It is important to note that there are three levels of metadata :

- Service level metadata and given by method `getMetadata`.
- Result level metadata, metadata about the set of data given by a search.
- Data level metadata, metadata about a single value.

search

Makes a search and gives back data points and their metadata inside an object of type `ResultSet` (see Appendix A).

This method requires many parameters: one data type, one spatial interval, one depth interval, one temporal interval, the 1-based index for the start of the data, the number of data, the flag to include data-level metadata, the metadata selection and the sort order (example are given later).

This method is available in **SPINE** but has been deprecated, use `interpolate` instead.

interpolate

Makes a search of forecast water levels and gives back data points and metadata inside an object of type `ResultSpine` (see Appendix B). This method only works in **SPINE** and is much more simple than `search`, only needing three arrays :

- One array of real numbers for latitudes
- Another array of real numbers for longitudes
- A last array of strings for dates.

Values at the same index in the arrays represent a set of coordinates and arrays must have the same length.

References

To learn more about technologies used by the web services :

SOAP :

- http://www.w3.org/TR/soap/
- http://en.wikipedia.org/wiki/SOAP

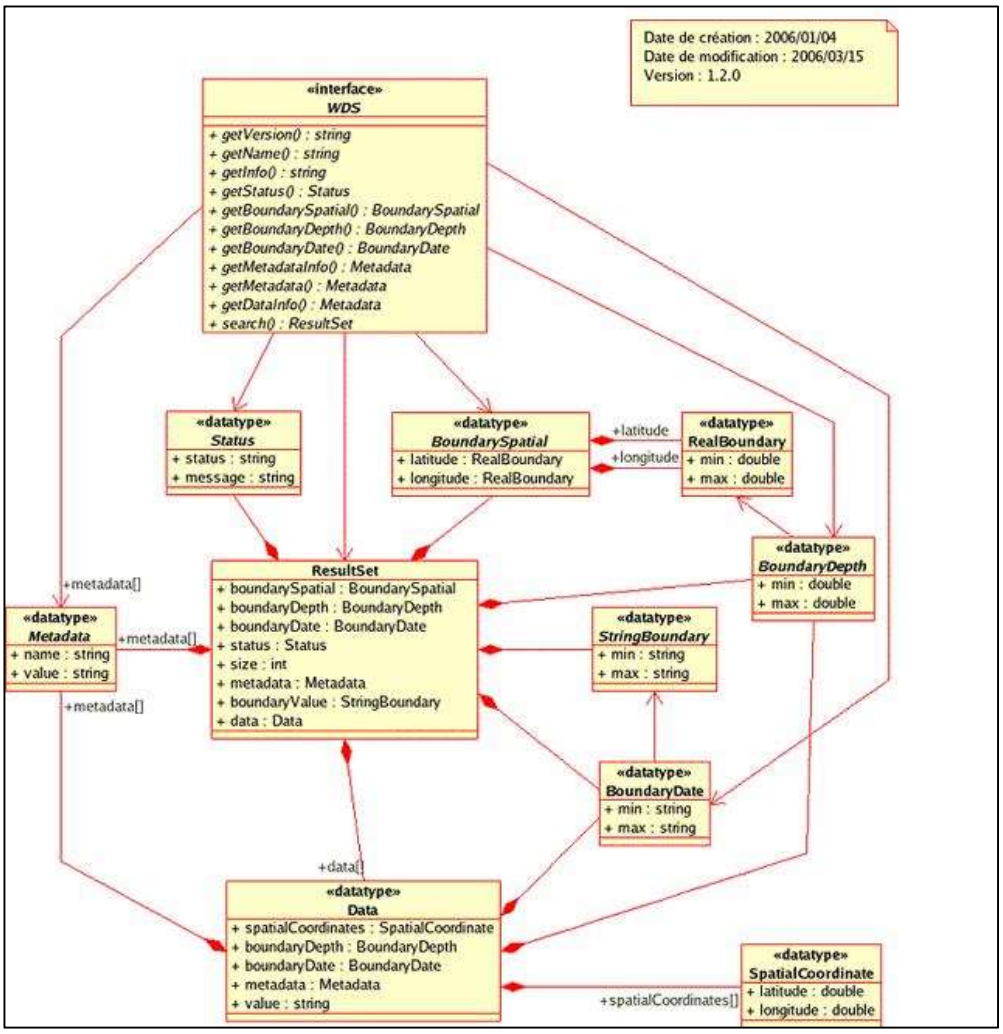
WDS Standard:

- http://weds.sourceforge.net/cookbook/fr/index.html
- http://weds.sourceforge.net/cookbook/en/index.html

WSDL :

- http://www.w3.org/TR/wsdl
- http://en.wikipedia.org/wiki/Web_Services_Description_Language

Appendix A – Class Diagram of the *WDS* Standard



Extrait du document « WDS Cookbook » (http://weds.sourceforge.net/cookbook/fr/index.html)

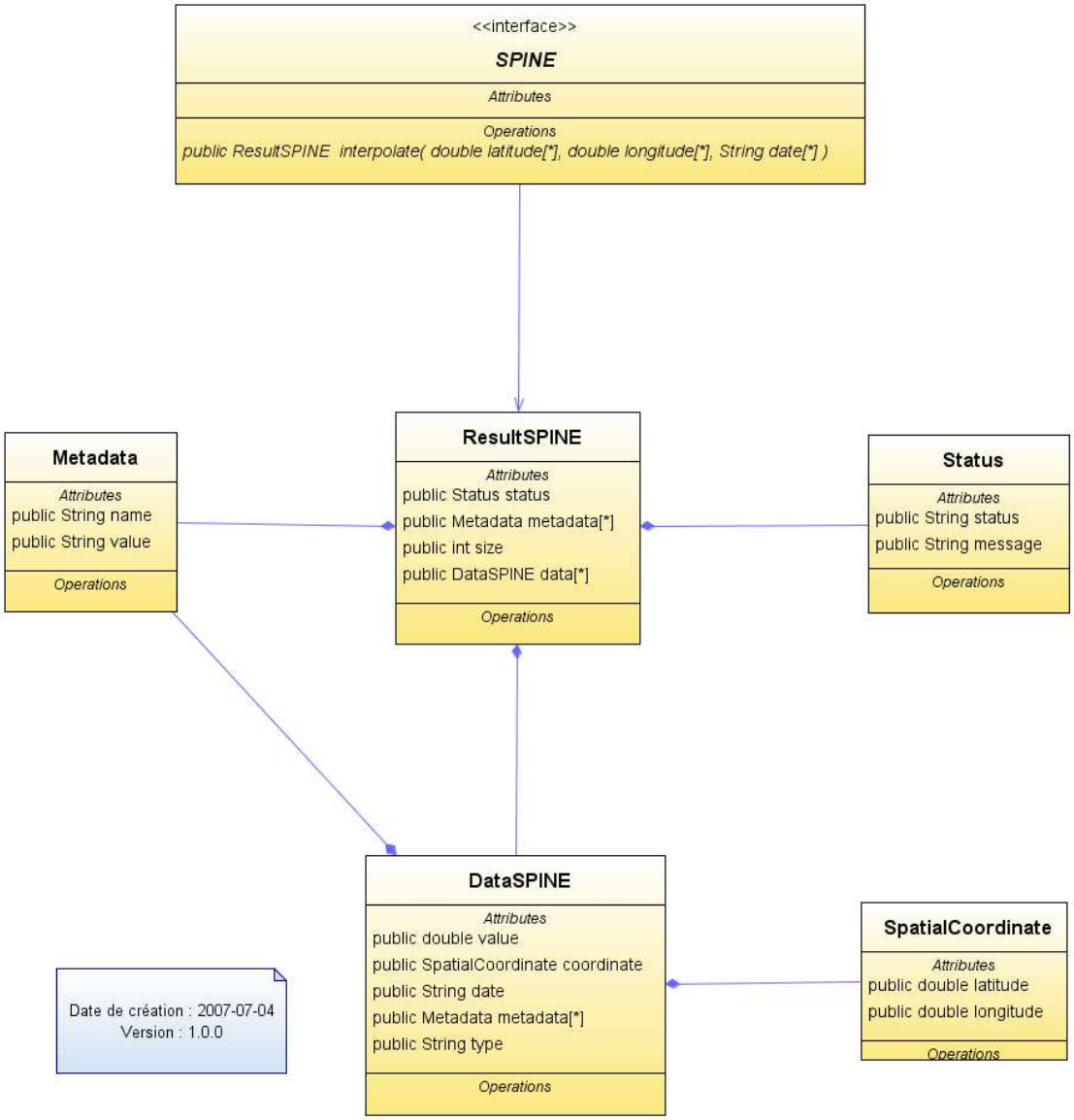
`ResultSet`

An instance of class `ResultSet` is given back as results to a search. This object, drawn at the center of the diagram, contains an array of data in its property *data* of size *size*. Other properties are :

- *boundarySpatial* : the spatial limits of the data inside the results,
- *boundayDepth* : the depth limits of the data inside the results,
- *boundaryDate* : the temporal limits of the data inside the results,
- *boundaryValue* : the limits of the values themselves,
- *status* : the status of the request
- *metatada* : other metadata about the request

Values themselves are instances of class `Data`. Properties *spatialCoordinates*, *boundaryDepth* and *boundaryDate* indicate the location of the sensor and property *metadata* gives more information (see the section about method `search`). The value itself is in property *value*.

Appendix B – Class Diagram of Method `interpolate` of Web service SPINE



`ResultSpine`

An instance of class `ResultSpine` is given as a result to a call to an interpolation. This object, drawn at the center of the diagram contains an array as property *data* of size *size*. Other properties are :

- *status* : the status of the request
- *metatada* : other metadata about the request

Values themselves are instances of class `DataSpine`. Properties *coordinates* and *date* indicate the location and time of the forecast, properties *metadata* and *type* give more information (see the section on interpolate). The value itself is in property *value*.

DataSpine

An instance of class `DataSpine` contains values and metadata about a water level forecast:

- *value*: the water level in meters w.r.t chart datum
- *coordinate*: spatial coordinate moved to be at the closest St. Lawrence channel center-line
- *date*: the date for which the forecast is for
- *type*: the type of data: it can be `forecast` for a forecast or begin with `error` to indicate an error.
- *metadata*: metadata about the forecast, including `age_forecast` indicating the age in minute of the forecast (that is the interval between the moment the forecast was made and the moment the forecast was requested) and `precision_index` indicating the margin of error in meters

Any other type or metadata available at the moment does not have any significant value and are placeholders for future changes

Appendix C – Error Messages

If there are errors in a search request or if the service itself has errors, the property *status* in the `ResultSet` will have one of these messages :

Valeur :	Ce que cela signifie :
The Web service is currently unavailable. Please, try later.	Self explanatory.
Invalid date format	The date has an incorrect format. The correct format is *yyyy-MM-dd HH:mm:ss* in UTC.
Invalid order	The order is incorrect, the correct orders are *asc* or *desc.*
Invalid datatype	The type in parameter *dataname* is incorrect. See `getDataInfo` for a list of correct values.

If there are errors in a call to `interpolate` from **SPINE** or if the service itself has errors, property *status* of `ResultSpine` will have one of these messages :

Valeur	Ce que cela signifie :
The **forecast** web service is currently unavailable. Please, try later.	Self explanatory.
error, Out of Date Boundary	Self explanatory.
error, Out of Spatial Boundary	Self explanatory.
error, Wrong date format	The date has an incorrect format. The correct format is *yyyy-MM-dd HH:mm:ss* in UTC.

Data of class `DataSpine` from **SPINE** can also have the following message instead of a value:

error, The geographic coordinate must be closer to the center of the St. Lawrence river.	The coordinates are inside the spatial limits but too far from the center of St. Lawrence River channel.