CHyF REST Web Service Design, v1.0

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1 Overview

The CHyF REST web service is primarily intended to support the web-based demo app. However, it has become apparent that the REST service may be of use outside of the scope of this project and thus its design may be of interest to others.

2 REST Service Structure

2.1 Content

The REST services will return a representation of the requested feature(s) in the requested content type. The content of a feature includes at a minimum the geometry and associated attribute values. An exception to this is when a list of features is returned, it may be of use to return only the list of ID values, rather than the complete content. A more verbose option would include links (in HTML) or IDs (in other formats) to enable traversal of the backing graph structure, eg.

- Lists of the immediate upstream and downstream connections.
- Link from elementary flowpath to containing elementary catchment and reverse

A parameter could be used to specify what level of verbosity is requested; the *idOnly* parameter described below is a basic example of such a parameter.

Note that depending upon the service, what is returned may not have an id. For example, the watershed determined as upstream of a given point or elementary flowpath may be represented as a collection of primary catchment or as single catchment based on amalgamating the relevant elementary catchments.

The content would be output appropriately in the requested format, using available data structures, eg. JSON format would use GeoJSON, HTML would display a table of attributes and values, etc.

2.2 Services

There will be an HTTP REST service endpoint such as:

`http://chyf.ca/chyf/`

Within this service endpoint, there would be various services returning elementary flowpaths, elementary catchments, and other features.

In the future we may wish to support multiple variants of the data (numbered versions or other named variations of the data). Such variants might have a service endpoint such as:

`http://chyf.ca/chyf/<variant>/`

The “variant” placeholder is intended to allow for a version number or other named “variation” of the CHyF dataset. Its purpose is to allow the existing and/past URLs into the REST service to be accessible into the future even as the data is updated and ID values are changed. This would allow Linked Open Data or other links into the data to continue to be accessible; however to access new, updated data, such links would need to be re-built against the new data - which would be easily done using the REST services described here. Maintaining access to historic data through such URLs would require that the past data sets were also stored and made available through the service.

2.2.1 Nexus

Nexus features would be available under the service URL:

`http://chyf.ca/chyf/nexus`

Including the following features:

`/nexus/<nexus-id>.<format>`

Returns a single nexus feature based on its ID, which is provided as nexus-id.

`/nexus/within.<format>?bbox=<minx>,<miny>,<maxx>,<maxy>`

Returns a list of the nexuses intersecting a given spatial bounding box defined by bbox.

`/nexus/near.<format>?point=<x>,<y>&maxDistance=<dist>&maxFeatures=<n>`

Returns a list of the nexuses near the given point in increasing order of distance, up to the maximum number and/or distance requested.

2.2.2 Elementary Flowpath

Elementary flowpath features would be available under the service URL:

`http://chyf.ca/chyf/eflowpath`

Including the following services:

`/eflowpath/<eflowpath-id>.<format>`

Returns a single elementary flowpath feature based on its ID, which is provided as eflowpath-id.

`/eflowpath/within.<format>?bbox=<minx>,<miny>,<maxx>,<maxy>`

Returns a list of the elementary flowpaths intersecting a given spatial bounding box defined by bbox.

`/eflowpath/near.<format>?point=<x>,<y>&maxDistance=<dist>&maxFeatures=<n>`

Returns a list of the elementary flowpaths near the given point in increasing order of distance, up to the maximum number and/or distance requested.

`/eflowpath/flowsFrom.<format>?point=<x>,<y>`

Returns the elementary flowpath nearest the given point and associated with the same elementary catchment as the point.

`/eflowpath/upstreamOf.<format>?point=<x>,<y>`

Returns a list of including elementary flowpath that the given point would flow into, and all elementary flowpaths upstream of it.

`/eflowpath/downstreamOf.<format>?point=<x>,<y>`

Returns a list of including the elementary flowpath that the given point would flow into, and all elementary flowpaths downstream of it.

`/eflowpath/<eflowpath-id>/upstream.<format>?maxFeatures=<n>`

Returns a list of the elementary flowpaths upstream of the specified elementary flowpath.

/eflowpath/<eflowpath-id>/downstream.<format>?maxFeatures=<n>

Returns a list of the elementary flowpaths downstream of the specified flowpath.

/eflowpath/filter.<format>?property=<propertyName>
&predicate=<equals|greaterThan|lessThan>&value=<value>

Returns a list of the elementary flowpaths which meet the filter criteria. The propertyName must match a property name in the “properties” object in the GeoJSON feature, eg. name, nameId, type, rank, strahleror, hortonor, hackor, or length.

This is intended to provide a basic way to query a subset of the elementary flowpaths; more complicated filtering would likely be better handled using WFS and the OGC filter encoding standard.

2.2.3 Elementary Catchment

Elementary catchment features would be available under the service URL:

http://chyf.ca/chyf/ecatchment

Including the following services:

/ecatchment/<ecatchment-id>.<format>

Returns a single elementary catchment feature based on its ID, which is provided as ecatchment-id.

/ecatchment/containing.<format>?point=<x>,<y>

Returns the elementary catchment containing the specified point.

/ecatchment/within.<format>?bbox=<minx>,<miny>,<maxx>,<maxy>

Returns a list of the elementary catchments intersecting a given spatial bounding box defined by bbox.

/ecatchment/near.<format>?point=<x>,<y>&maxDistance=<dist>&maxFeatures=<n>

Returns a list of the elementary catchments near the given point in increasing order of distance, up to the maximum number and/or distance requested.

/ecatchment/upstreamOf.<format>?point=<x>,<y>

Returns a list including the elementary catchment containing the given point, and all elementary catchments upstream of it.

/ecatchment/downstreamOf.<format>?point=<x>,<y>

Returns a list including the elementary catchment containing the given point, and all elementary catchments downstream of it.

/ecatchment/<ecatchment-id>/upstream.<format>?maxFeatures=<n>

Returns a list including the specified elementary catchment and all elementary catchments upstream of it.

/ecatchment/<ecatchment-id>/downstream.<format>?maxFeatures=<n>

Returns a list including the specified elementary catchment and all elementary catchments downstream of it.

Note that filtering based on property values is not supported at this time for elementary catchments. It could be added in the future if warranted.

2.2.4 Drainage Area

Drainage Area features would be available under the service URL:

http://chyf.ca/chyf/drainageArea

Drainage area features are aggregates of the requested elementary catchments. As they are dynamically created features, the do not have an ID or other attributes.

This includes the following services:

/drainageArea/upstreamOf/ecatchment/<ecatchment-id>.<format>

Returns a feature representing the drainage area upstream of the specified elementary catchment.

/drainageArea/downstreamOf/ecatchment/<ecatchment-id>.<format>

Returns a feature representing the drainage area downstream of the specified elementary catchment.

/drainageArea/upstreamOf/eflowpath/<eflowpath-id>.<format>

Returns a feature representing the drainage area upstream of the specified elementary flowpath.

/drainageArea/downstreamOf/eflowpath/<eflowpath-id>.<format>

Returns a feature representing the drainage area downstream of the specified elementary flowpath.

/drainageArea/upstreamOf/location.<format>?point=<x>,<y>

Returns a feature representing the drainage area upstream of the specified point location.

/drainageArea/downstreamOf/location.<format>?point=<x>,<y>

Returns a feature representing the drainage area downstream of the specified point location.

All of the above services support an additional parameter “removeHoles”, which, if set to the value “true”, will return the drainageArea polygon with any interior holes removed. Eg:

/drainageArea/upstreamOf/location.<format>?point=<x>,<y>&removeHoles=true

2.3 Parameters

In addition to the parameters identified in the above examples services, some parameters would be generally available:

- srs
  - An OGC-style SRS specification such as “EPSG:4326”. Features returned will be reprojected into the requested SRS, and any spatial parameters (point or bbox) will be interpreted in the requested SRS.
- maxFeatures
  - Limits the number of returned features. Where possible and reasonable, the most relevant features are returned in order of decreasing relevance.
- bbox
  - Limits the features returned to only those which overlap with the given bbox

- idOnly
    - Limits the feature output to only a list of ID values for the requested features.

2.4 Content Types and Negotiation

The content type of the responses can be specified using either the “Accept” HTTP header, or by specifying the format extension in the URL. The URL format extension takes precedence, allowing for easy testing and interaction with the API using a standard web browser.

Supported content types:

Content type(s)	**URL Format Extension(s)**	**Format Returned**
text/html, application/xhtml+xml	.html, .xhtml	HTML
application/geo+json, application/json	.json, .geojson	GeoJSON
application/javascript	.jsonp, .geojsonp	GeoJSON wrapped in jsonp function call