Table 1. Compatibility of GWF hydrological modelling workflows with NHD Plus High Resolution extention product – Transboundary Geospatial Fabric (TGF) – covering transboundary waters of Canada and US. DOI: https://doi.org/10.5066/P971JAGF.

#	Model	Component	Channel Length	Channel Slope	Channel Width	HRU Area	Downstream river segments	Upstream/ downstream connectivity	HRU(s)/seg(s) correspondence		Compatibility	Comments
1	mizuRoute	IRF-UH[1] method	✓	✗	○	○	✓	✓	✓		✗	River slope values are missing for IRF-UH
2		KWT[2] method	✓	✗	○	○	✓	✓	✓		✗	River slope values are missing for KWT. River width values could improve accuracy.
3	MESH	CLASS	○	○	○	✓	○	○	○		✓	
4		SVS	○	○	○	✓	○	○	○		✓	
5		WatRoute RTE	✓	✗	○	✓	✓	✓	✗		✗	River slope values are missing for RTE. HRU/River segment correspondence could be fixed.
6	SUMMA[3]	——	○	○	○	✓	○	○	○		✓	
7	HYPE[4]	Hydrology	○	○	○	✓	○	○	○		✓	
8		Routing	✓	✗	○	○	✓	✓	✓		✗	River slope values are missing. River width values are optional.

[1] Impulse Response Function – Unit Hydrograph method
[2] Kinematic Wave Tracking method
[3] SUMMA's CWARHM workflow manual and Dr. Wouter Knoben are consulted for SUMMA's requirements.
[4] HYPE's requirements are checked with Dr. Dayal Wijayarathne.

Available ●
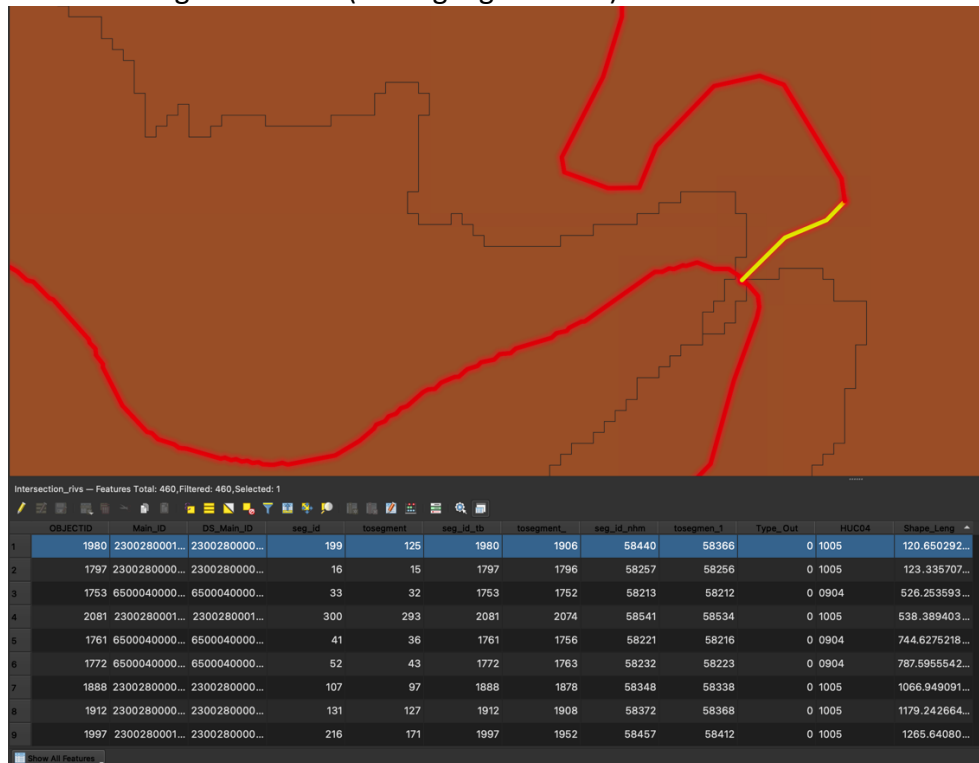Missing ⊗
Not Needed/Optional ○

Compatible ✓
Not Compatible ✗
Compatible with adjustments ✗

Notes:
- If the underlying DEM data are accessible (the current file available on the webpage of the dataset is corrupted), calculating slope for the river segments should be possible given that the coordinates of the confluence points are provided by the dataset,
- Complete metadata of the available features in TGF are available in an XML format in the following: https://doi.org/10.5066/P971JAGF,
- The available HRUs are divided into left- and right-bank areas. This could be an issue for *MESH*; however, it could be fixed by post-processing the TGF geofabric with a few lines of script,
- Some connectivity issues are visible in the river network of TGF. For example, some long rivers are divided into shorter segments within a single HRU. This can cause some discrepancies between HRU and River Segment ID numbers. An example is in the following screenshot (see highlighted line):

Intersection_rivs — Features Total: 460,Filtered: 460,Selected: 1

| OBJECTID	Main_ID	DS_Main_ID	seg_id	tosegment	seg_id_tb	tosegment_	seg_id_nhm	tosegmen_1	Type_Out	HUC04	Shape_Leng
1980	2300280001...	2300280000...	199	125	1980	1906	58440	58366	0	1005	120.650292...
1797	2300280000...	2300280000...	16	15	1797	1796	58257	58256	0	1005	123.335707...
1753	6500040000...	6500040000...	33	32	1753	1752	58213	58212	0	0904	526.253593...
2081	2300280001...	2300280001...	300	293	2081	2074	58541	58534	0	1005	538.389403...
1761	6500040000...	6500040000...	41	36	1761	1756	58221	58216	0	0904	744.6275218...
1772	6500040000...	6500040000...	52	43	1772	1763	58232	58223	0	0904	787.5955542...
1888	2300280000...	2300280000...	107	97	1888	1878	58348	58338	0	1005	1066.949091...
1912	2300280000...	2300280000...	131	127	1912	1908	58372	58368	0	1005	1179.242664...
1997	2300280001...	2300280000...	216	171	1997	1952	58457	58412	0	1005	1265.64080...

Show All Features

This issue could potentially be resolved by some manual interventions on the geofabric with a few lines of script.

It is worth mentioning that this is a feature of the NHD Plus HR dataset to provide extra information regarding flowlines' time of travel. "If the calculated travel time is greater than 24 hours for a flowline, a time of travel Point of Interest (POI) is added at the end point (node) of the next downstream flowline" (Bock et al.).

- In a few cases, sub-basins with significant areas are considered as Non-Contributing Area catchments. As an example, In the case below, the sub-basin shown in the middle of the black rectangle has an area of ~750 km^2. In MERIT-Basins, on the other hand, the same area fully contributes to the St. Mary & Milk system.
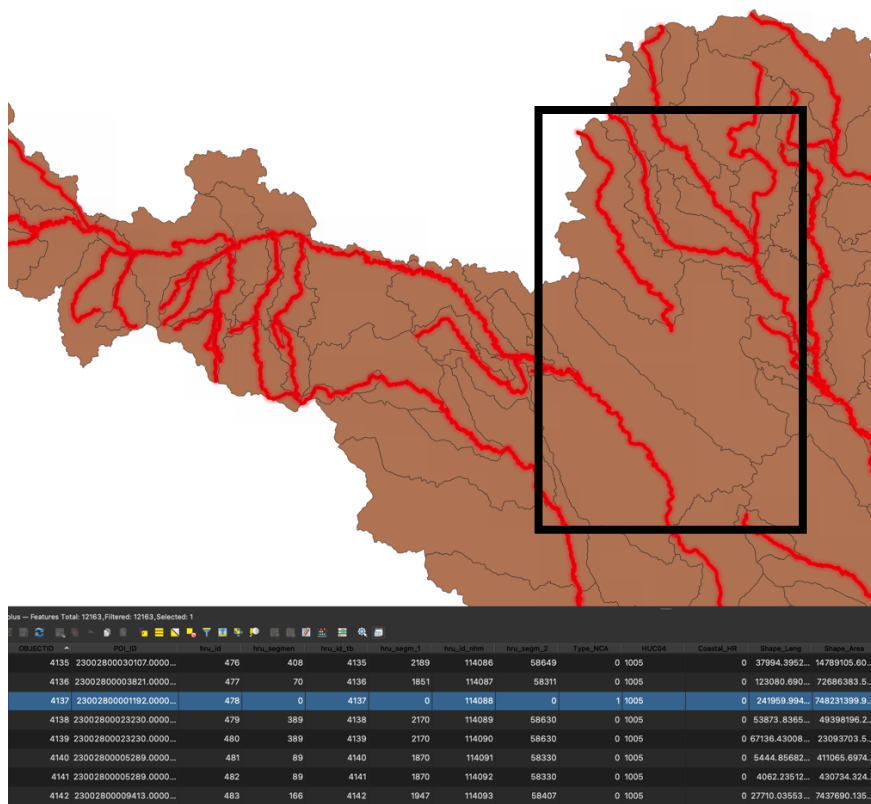
TGF Geofabric
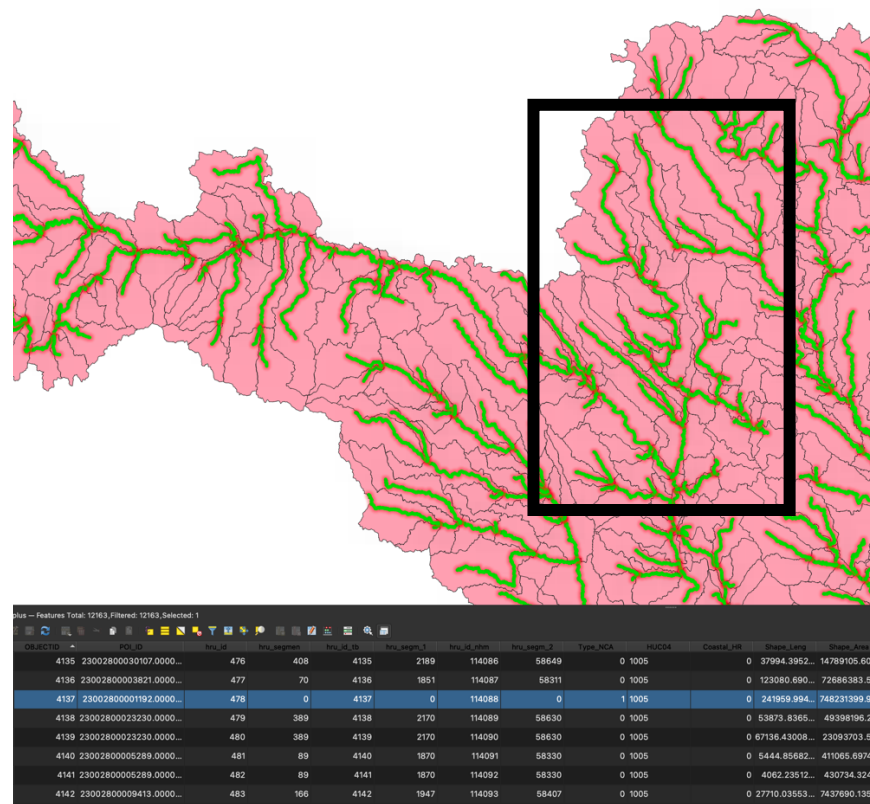
MERIT-Basins Geofabric

The TGF geofabric for the St. Mary & Milk area suggests a total non-contributing area of approximately 4,706 KM^2. Whereas for MERIT-Basins, this value is around 100-150 KM^2.

References:

1. Bock, A.E, Santiago,M., Wieczorek, M.E., Foks, S.S., Norton, P.A., and Lombard, M.A., 2020, Geospatial Fabric for National Hydrologic Modeling, version 1.1 (ver. 3.0, November 2021): U.S. Geological Survey data release, https://doi.org/10.5066/P971JAGF.