Input Files

Watercourse: shapefile or feature class

The fields don't matter because it will be altered in the following steps

Barriers: shapefile or feature class. Has the following fields at a minimum, other fields can be added for additional information

BARRIER_CO: Unique identifier for the barrier

PermPass: The upstream permeability of the barrier

Data pre-processing (ArcGIS)

____ **1. Dissolve watercourse**: Use *Dissolve* so that stream network is one feature. Checking Checking 'Create multipart features' will dissolve to a single feature.

____ **2. Snap barriers to watercourse**: Use *Snap* to join barriers to watercourse. Set search radius to default of 100 meters OR to distance exceeding largest distance between barrier and stream segment.

____ **3. Remove duplicate points**: Use *Find Identical* with Field(s) set to 'Shape' and 'Output only duplicated records' checked. Use this list to remove points with identical geometry, as identical or near-identical barriers will snap to the same location.

____ **4. Split segments at barriers**: Use *Split Line at Point* to create individual segments between barriers and confluences. Set search radius to 0.0001 Meters.

____ **5. Remove dangling segments**: In *Catalog*, right click the feature class containing the stream network and select *New*/*Topology*. Add the stream network feature class, then add the rule 'Must Not Have Dangles (Line)' and finish the setup. Right click the feature class topology and select *Validate*, which will produce a point topology of every dangle end. Search network for any dangles that do not represent either the outlet or headwaters.

____ **6. Calculate stream length**: Use *Calculate Geometry Attributes* to create a field ('Length_km') that is the feature length in kilometers.

____ **7. Add To/From Node Fields**: Use ArcHydro tool *Generate To/From Node for Lines*. Note that the terminus should have a 'To_Node' that is one greater than the number of links in the network.

____ **8. Convert watercourse to point layer**: Use *Feature Vertices to Points* to convert the watercourse to a points layer. Vertice type == 'End'.

____ **9. Join barrier data to stream network points**: Use *Spatial Join* to join the barrier layer to the point-stream layer. This creates a point layer with upstream (Fnode), downstream (Tnode), and barrier attributes in one file.

____ **10. Export shapefile to .csv**: Use *Export Table* tool to convert the barrier-joined points attribute table to a .csv file for use in R.