Freshwater Atlas
Isolated Watershed Identification
Technical Documentation

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1 ISOLATED WATERSHED

1.1 Problem Summary

The isolated watershed identification process locates isolated watersheds and identifies which watershed boundary line should be 'removed' in order to merge the isolated watershed with a non-isolated watershed.

1.1.1 Definition

An isolated watershed has been defined as follows:

> *A watershed is considered isolated if has no connection to the stream network and has no observed flow arcs within the watershed.*

1.1.2 Example

The following figure shows isolated watershed polygons highlighted in purple and orange.

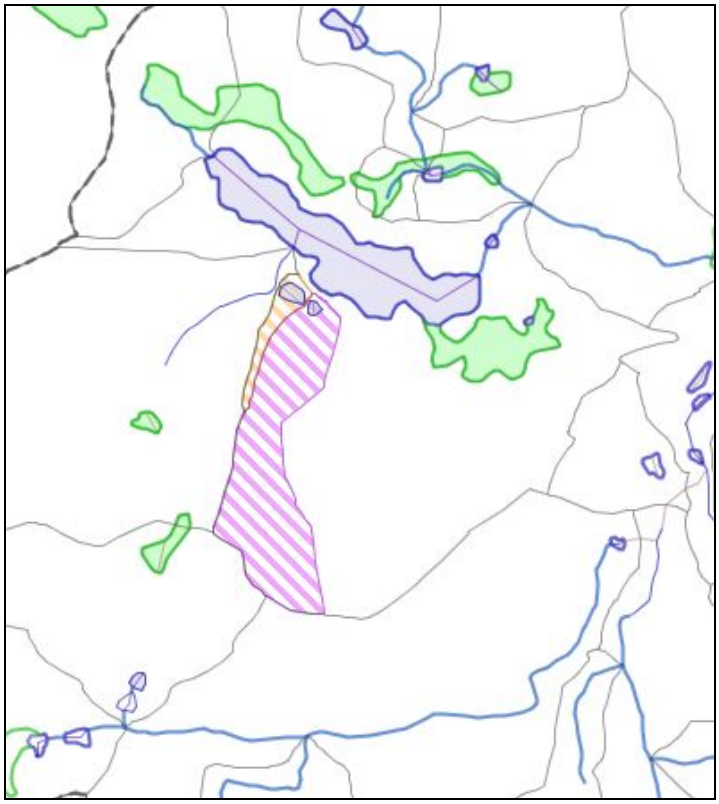

Figure 1: Isolated Watersheds

In the following figure, the isolated watershed removal tool has identified the watershed boundary edges to 'remove'. These edges have been highlighted in red and will subsequently be merged with non-isolated watersheds.

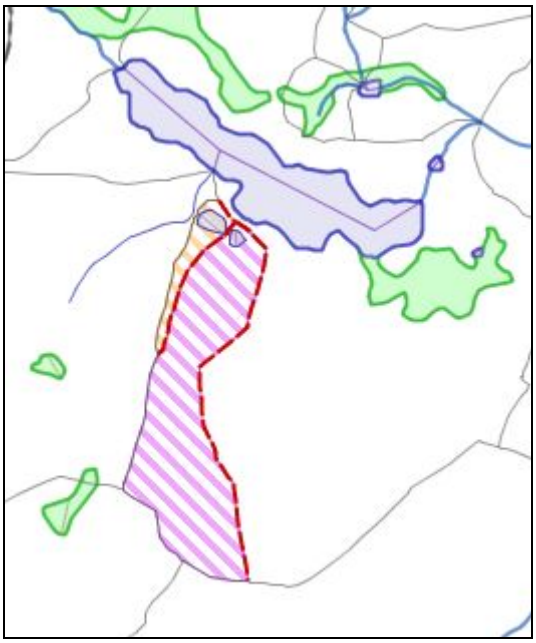

Figure 2: Isolated Watershed Edges

1.2 Processing

1.2.1 Inputs/Outputs

The software that finds which watershed boundary line to 'remove' is written in C and runs off a database with the following tables correctly populated:

fwa_region – Table identifying the regions to process. Each region is associated with a name and that name is used as the prefix for the input/output table names.

field name	type	description
region	integer	Integer representing the region being processed.
name	text	Name associated with the region.

<region>_edges – Input table containing all the watershed boundary edges and links to the watershed they bound.

field name	type	description
wsid	integer	
edge_id	integer	
is_iso	char(4)	
group_code	char(4)	
the_geom	geometry	

<region>_lakes – Input table containing all lake geometries and a link to the watershed the lake is contained within.

field name	type	description
wsid	integer	
skel_id	integer	
type	varchar	
the_geom	geometry	

<region>_polys – Input table containing all the watersheds and an value identifying if they are isolated or not.

field name	type	description
wsid	integer	unique watershed identified
is_iso	char(4)	'Y' if watershed is isolated, 'N' otherwise
group_code	char(4)	watershed group code the watershed is contained within
the_geom	geometry	watershed polygon geometry

<region>_shared – Input table that identifies which isolated watershed share edges with other watersheds.

field name	type	description
iso_wsid	integer	watershed identified that touches another watershed
iso_edge_id	integer	watershed boundary edge that is shared by the watersheds
wsid	integer	watershed touched by wsid
edge_id	integer	watershed boundary edge that is shared by the watersheds

<region>_edge_flag – Output table which the isolated edges that should be 'removed' are written to.

field name	type	description
edge_id	integer	

<region>_order – Output table used by the software.

field name	type	description
gid	integer	
wsid	integer	
ord	integer	
the_geom	geometry	

<region>_paths – Output table used by the software

field name	type	description
wsid	integer	
the_geom	geometry	

<region>_seeds – Output table used by software.

field name	type	description
wsid	integer	

meth	integer	
the_geom	geometry	

<region>_group_processed – Output table used by software. The input wsid provided to the software is writing to this table once all processing is complete. Historically this was done for QA; to ensure s/w didn't fail in the middle of processing.

field name	type	description
grp	integer	

1.2.2 Running

The following steps outline the pre-processing and processing steps to execute the isolated watershed removal software:

1. Generate the input/output tables and populate the input tables.
   - The preprocessing Jump plugin (IsoPreprocessing) software will populate each of these tables for a given region; however, the fwa_region table must be generated manually.
   - The GroupIsoSheds software will group together touching isolated watersheds so they are only processed once.
2. Run the perl script (run.pl). This will run the isolated software identifier tool for each group of isolated watersheds, writing the results to the flag_edges table. Ensure the parameters are correct in the perl file before running.

A note about processing: in cases where multiple isolated watersheds touch each other you only want to call the software for one of these watersheds. The software will determine all isolated watersheds and process them all in one go. If you run the software on each watershed in the group; all watersheds in that group will get processed multiple times. Since there is some randomness in the seed generation process this could result in different edges being flagged in each run and incorrect results.

A second run2.pl script was created in such a way that each grp in a *to_process* table is run. This perl script uses a status field in this column to determine which have been processed and when need to be processed. This allows for the software to be run over multiple processors.

1.2.3 Dependencies

This program uses Terrain Server to retrieve elevation data surrounding the existing watershed.

1.2.4 Algorithm

The general idea for this software is to pick start points inside the isolated watershed and using a modified version of Dijkstra's algorithm, walk out of the isolated watershed to a non-isolated watershed. For more information on the details of the algorithm see Appendix F in the "Corporate Watershed Base Strategy Document, March 2003".