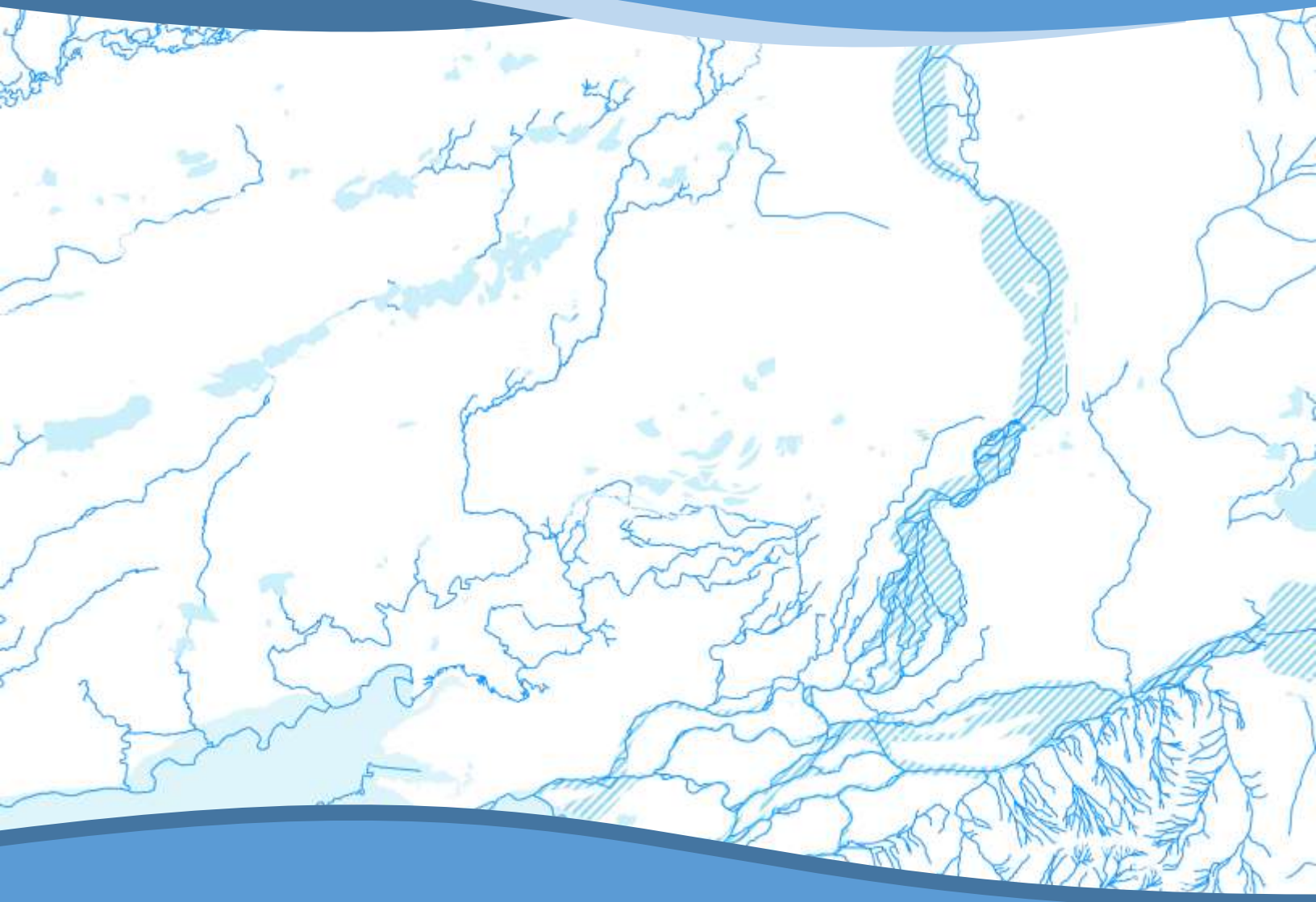
AK Hydro Data Editing Standards



as defined by

The Alaska Hydrography Technical Working Group

I. General Requirements

A. Minimum Mapping Units

1. Lake, Pond, Swamp, Glacier, Ice and 2D Stream polygons must be ≥ 2 acres in size, or they should not be mapped
2. 1D Stream arcs must be ≥ 4 meters in length
3. 2D Stream feature must be ≥20 meters in width, otherwise they should be represented as a line
4. Not all streams ≥20 meters in width must be mapped as a 2D stream polygon

B. Concurrent editing of 1 Dimensional (Stream_LN) and 2-Dimensional (Stream_PL) stream feature

1. All 2D stream polygons must contain a corresponding 1D stream arc
2. When editing a 1D stream feature, the corresponding 2D feature should also be updated, ensuring consistency between 1D and 2D features.
3. Where 1D streams intersect 2D features, 1D streams should break (i.e. end/begin) at a vertex along the boundary of the 2D feature. If there is no vertex along the 2D feature at the point where the 1D feature intersects it, a vertex should be added at that location to the 2D feature.
4. When editing a 2D stream feature, the corresponding 1D feature should also be updated, ensuring the 1D feature remains an accurate representation of the stream thalweg (thread), and located within the 2D feature.
    a) *Note – 1D features occurring within a 2D feature should follow the thalweg where it position is apparent, but centerline mapping is an acceptable substitute where thalweg position is unclear.*

C. Maintaining connectivity between 1D and 2D features intersecting any edited feature(s)

1. Where edits are made to a 1D or 2D stream feature, any intersecting features must then be appropriately modified to ensure topologic connections are maintained. Best practice entails modifying the arcs of the intersecting feature at the junction and a short way beyond the intersection of the 2D features.

D. 2D feature relationships within AK Hydro:

1. Polygons within the same featureclass are not allowed to overlap
2. Polygons within separate featureclasses are not allowed to overlap, with the following exceptions:
    a) *2D stream features (e.g. Stream_PL) are allowed to overlap Upper Intertidal areas (e.g. within Intertidal_PL)*
    b) *2D glacier features (e.g. Glacier_PL) are allowed to overlap Upper Intertidal areas (e.g. within Intertidal_PL)*
    c) *2D stream features (e.g. Lake_PL) are allowed to overlap Upper Intertidal areas (e.g. within Intertidal_PL)*
3. Adjacent polygons with a shared edge should have coincident vertices (e.g. where lakes adjoin glaciers)
4. Lake_PL features should not occur within, however, are allowed to intersect the landward extent of Intertidal_PL features.

5. Stream_PL features should not occur within, however, are allowed to intersect the landward extent of "Intertidal foreshore" polygons within the Intertidal_PL featureclass.

6. Glacier_PL features should not occur within, however, are allowed to intersect the landward extent of "Intertidal foreshore" polygons within the Intertidal_PL featureclass.

E. Minimum Editing Extent

1. Hydrologic features can be edited either feature by feature, or on a geographic area basis, depending on organizational business needs. It is not required that all features within a checkout extent get updated or modified.

a) Note: When checking more than 1 large feature out for editing, it is recommended that editors select all the features within the area of interest (e.g. a HUC12) even though not all the content is subject to update.

F. **Acceptable Types of Digitizing References and Resources** *(e.g. range of DataSource attribute values)*

1. Digital Orthophotos
2. Digital Planimetric Data
3. Digital Elevation Data
4. Digital SDMI Imagery
5. Field Verified Reference Data
6. Other (*source to be identified in Comments attribute*)

G. **Acceptable horizontal accuracy standards as defined by the Alaska Hydrography Technical Working Group** (e.g. range of SourceImage attribute values)

1. Level 1 - Medium Resolution Satellite Derived – Minimum horizontal accuracy +/- 30 meters with a maximum appropriate map scale of 1:63,000
2. Level 2 - Photo Interpretive Imagery – Minimum horizontal accuracy +/- 10 meters with a maximum appropriate map scale of 1:25,000
3. Level 3 - IfSAR or LiDAR Derived – Minimum horizontal accuracy +/- 5 meters with a maximum appropriate map scale of 1:10,000
4. Level 4 - GPS Hand Held Reconnaissance – Minimum horizontal accuracy +/- 3 meters with a maximum appropriate map scale of 1:6,000
5. Level 5 - Continuous Map-Grade Survey – Minimum horizontal accuracy +/- 2 meters with a maximum appropriate map scale of 1:3,600
6. Level 6 - Controlled Land Survey – Minimum horizontal accuracy +/- 1 meter with a maximum appropriate map scale of 1:1,200

H. Stream connectivity

1. 1D stream features must not overlap.
2. In watersheds where Intertidal_PL features exist, all Stream_LN features should flow into and terminate at the landward boundary of Saltwater polygons (e.g. they should end at the seaward extent of Intertidal Foreshore features within Intertidal_PL).
3. All Stream_LN segments within a given stream network must be connected – disconnected stream arcs are not allowed in AK Hydro
4. Where Stream_LN segments flow sub-surface, the mapped stream segments should be approximated with straight lines and their TypeClass attribute coded with one of the following values:

a) Pipe – man-made underground watercourse

b) Connector – common sub-surface flow

c) Underground Conduit – sub-surface flow through karst or subterranean caves

II. Segregating 2D hydrographic features

A. All distinct 2D water bodies should be segregated at the point of junction with another water body.

1. Rivers & streams

a) Individual 2D linear features (rivers, streams and sloughs) should be segregated whether named or not. A feature may include sections of complex channels.

b) 2D features of the same feature type/classification may adjoin one another – e.g. the confluence or 2D tributaries should be segregated at the point of confluence

2. Sloughs, distributaries, side channels

a) Individual linear features which may be significant large channels connected at one or two points to other river or stream features, but are of sufficient size (width or length) to be best mapped as a unique feature

b) Individual features of sufficient human significance to be named

3. Lakes and wetlands

a) Individual water bodies of sufficient size

b) Large distinct expansions of linear water bodies that clearly appear as a lake

4. Estuaries & Lagoons

a) Distinct expansions of linear water bodies occur at the outlet of a river or stream prior to outlet to open marine waters

5. Islands

a) Mapping to a minimum size of 2 acres and/or a minimum length of 150 meters but does not preclude mapping smaller features.

B. Establishing appropriate closing lines

1. tributary junctions – straight line from headland to headland

2. tributary junctions with intervening islands – straight line from mainland headland to island headlands or endpoints to mainland headland

3. river / shoreline junctions – straight line from headland to headland where a river abruptly enters the ocean

4. river / bay junctions – straight line from headland to headland where a river abruptly enters a bay

5. river / estuary junctions – straight line from “headland to headland” across a river where the bank character changes widening from parallel river banks to an expanded estuary character

6. estuary / marine junctions – straight line from “headland to headland” across the mouth of an estuary where the bank character changes from a confined estuary to either an open marine bay or open ocean.

C. Abandoned channels

1. Abandoned stream channels hydrologically segregated at both ends from the active stream channel should be removed from the river feature class. If these features are of sufficient size and still retain water, they should be added to the lake feature class.

2. Abandoned stream channels hydrologically segregated at only one end from the active stream channel should be considered sloughs and if sufficient size should be mapped as a separate slough as described above.

III. Updating 1D linear stream features

A. Automated Generation

1. LiDAR and IFSAR (or similar) generated hydrography needs to be completed by someone with appropriate technical expertise.

a) Due to the high resolution of features derived from LiDAR and IFSAR data products, the number of vertices per feature is often excessive and result in overly complex underlying geometries. Per USGS guidance, it's a requirement that any LiDAR or IFSAR derived features that will be submitted to the NHD must not have underlying vertices spaced closer than 0.5 meters. (AK Hydro recommends the use of a 1 meter maximum allowable offset when processing LiDAR or IFSAR derived data with the Simplify Line or Simplify Polygon tools).

2. Use of LiDAR or IFSAR derived data requires modification of the Surveyed attribute domain values from "Yes" or "No" values to "Field","Digital", or "None".

B. Heads-up Digitizing

1. Determining and mapping the primary channel (thalweg or thread of stream)

a) Visually identify the primary channel based on observed water volume, depth, and hydrologic flow pattern

b) Map the thread of the stream based on observed water volume, depth, and hydrologic flow patterns where possible.

c) Where water depth or flow patterns cannot be clearly determined, map the thread at the center of the channel

2. Maintaining tributary intersections

a) Ensure any intersections with the linear stream feature being edited are maintained or reconnected after feature edits are completed.

b) Where visible, modify tributary intersections to more accurately represent the actual stream flow connections

C. Field Collected/Surveyed

1. Field Surveys using GPS

a) Use corrected data of highest resolution available. Capture point quality attributes (accuracy, HDOP, # of satellites, etc…). Take advantage of open areas with good satellite coverage to produce accurate points. Use data averaging.

b) Use point features over a "best data layer" image backdrop to assist heads-up digitizing.

c) Aim for a smooth, best-fit line that balances GPS and visible stream locations. Keep in mind that observers usually walk around objects, deep pools, beaver ponds but the linear feature should go through it. Don't just "connect the dots".

d) Avoid the direct import of GPS tracks. If GPS captured lines are used, they should be smoothed to remove major jogs.

e) Use the AK Hydro "DataSource" attribute to document the use of Field Verified Reference Data (GPS).

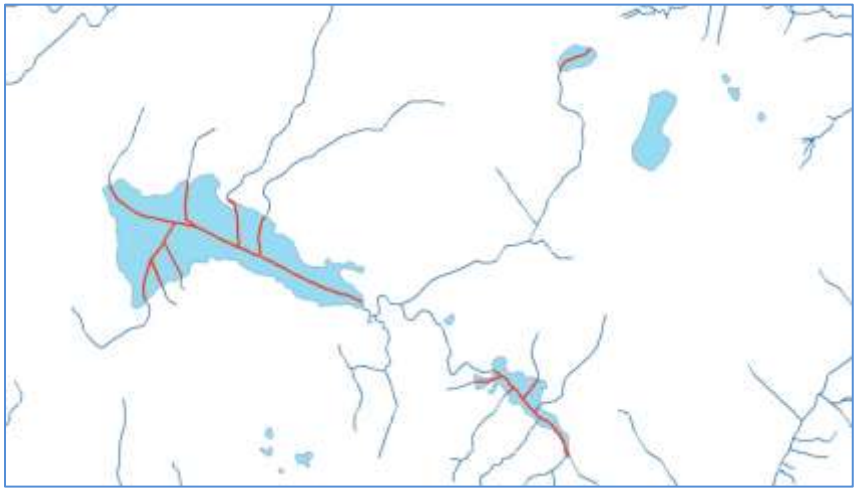
IV. Geometric Networks traversing 2D features within AK Hydro

A. 1D Stream_LN features must break (i.e. begin or end) at the intersection with the boundary of any 2D polygon feature(s)

B. 1D Stream_LN features must not bisect islands occurring within the boundary of any 2D polygon feature(s)

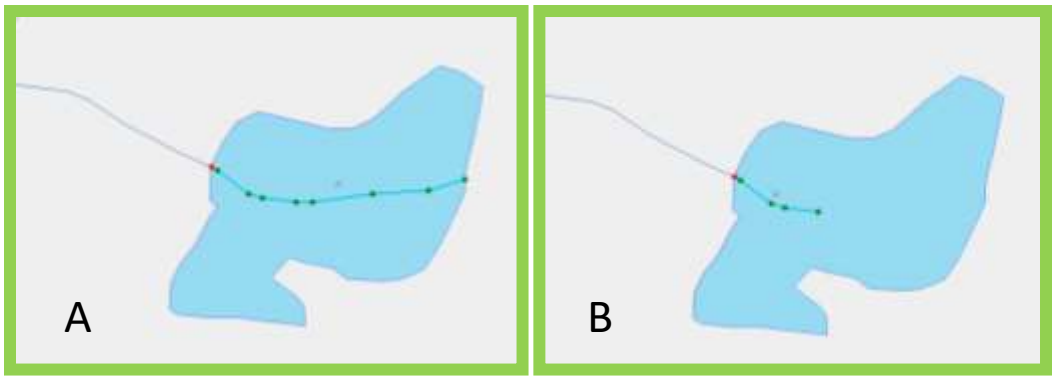
C. 1D Stream_LN features that occur within or traverse 2D Stream_PL features should follow the thalweg based on clear visual cues where available, rather than a minimum route artificial path.

D. 1D Stream_LN features that occur within or traverse 2D Lake_PL or Glacier_PL features should utilize a minimum route artificial path/connector where possible. Examples shown in bold red below.

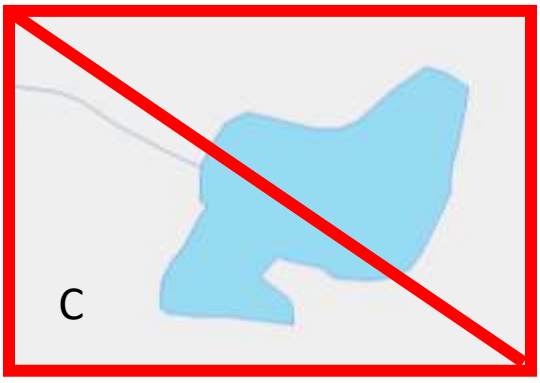


E. 1D Stream_LN features that occur within headwater lake or glacier polygons do not have to traverse the width of the lake or glacier polygon. Either examples A or B below ARE acceptable.

1. Headwater polygons are Lake_PL or Glacier_PL features that intersect Stream_LN features, but have boundaries that extend further upstream than the 1D stream network does.



2. Headwater Lake_PL and Glacier_PL features must contain a Stream_LN feature to demonstrate its connectivity to a stream drainage/network. Example C below is NOT acceptable – examples A or B above ARE acceptable.



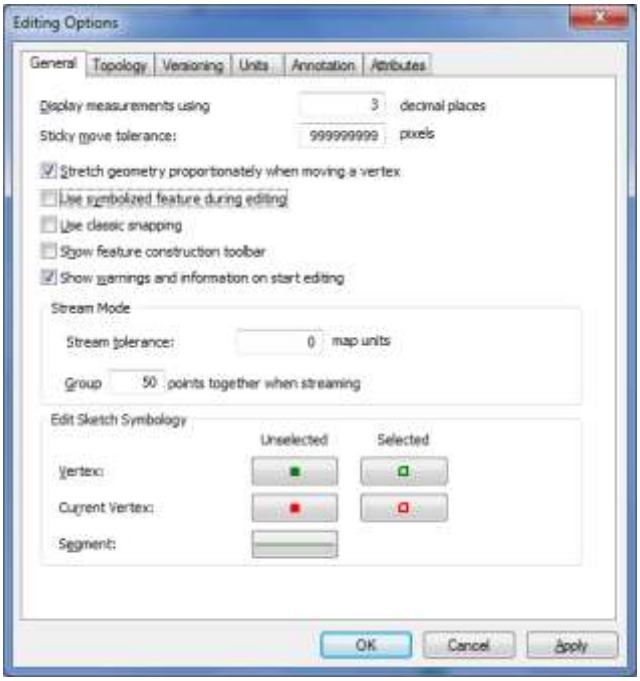
V. Best practices: Editing Environment and Map Document Settings

A. Coordinate System

1. When beginning an AK Hydro edit session, bring the AK Hydro content into the map document first. This ensures the data frame properties are then set to the NAD_1983 Alaska Albers Equal Area Conic projected coordinate system. Although the subsequent addition of certain reference data (e.g. imagery) may cause the data frame properties change, the practice of first adding AK Hydro data into the map document helps to ensure AK Hydro data are edited in their native coordinate systems when possible.

B. Editor toolbar settings

1. Prior to editing AK Hydro data ensure the "Sticky move tolerance" has been set to at least 1000 – it's preferable this is set as high as allowable, but not required. This is done on the Editor toolbar drop down menu > Options > General tab of the Editing Options window > Sticky move tolerance. This setting ensures that selected features do not get moved inadvertently during an edit session.



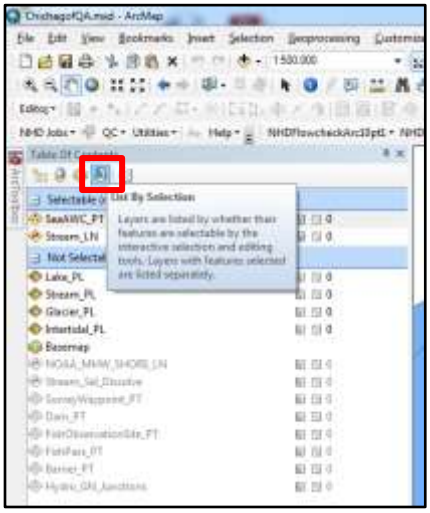
2. Prior to editing AK Hydro data ensure the “Snapping tolerance” has been set are between 10 and 15 pixels. This is done on the Editor toolbar drop down menu > Snapping > Options > General > Tolerance. It is advisable that “Snap tips (same location as Tolerance) are also ticked/turned on, including the “Layer name” and “Snap type” options. These settings help to ensure editors are snapping features to an endpoint or vertex and NOT just snapping to an edge.

C. General practice

1. It is recommended that editors use the selection tool for selecting and the edit tool for editing. While each tool allows editors to select features during an edit session, the edit tool allows editors to inadvertently move selected features if not careful. See setting sticky tolerance above.

2. It is recommended that editors features at a map scale of 1:2,500 and 1:5,000 when possible.

3. It is recommended that editors make use of the “List by Selection” functionality in the map documents Table of Contents (show below). This ensures editors are actively aware which layers they are selecting while editing and helps to prevent unintended edits to other layers.



AHTWG Steering Committee

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For more information, or to participate in hydrography updates in Alaska, please visit our website: **http://akhydro.uaa.alaska.edu**.

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