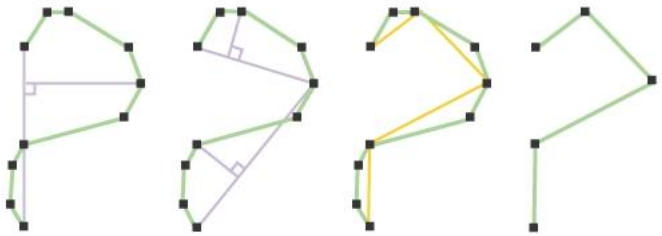
Line Simplification

in ArcGIS

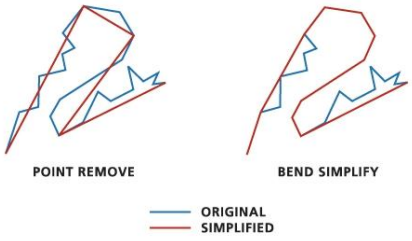


Danny Warren

November 3, 2009

What is it?

- Algorithm that removes redundant points
  - User sets tolerance
- Two types in ArcGIS:



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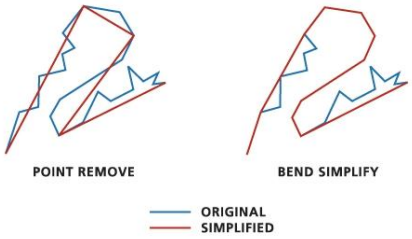
24 points to 5 points



- Uses Douglas-Peucker Algorithm (1973)
- Faster than Bend Simplify
- More blocky / jagged appearance

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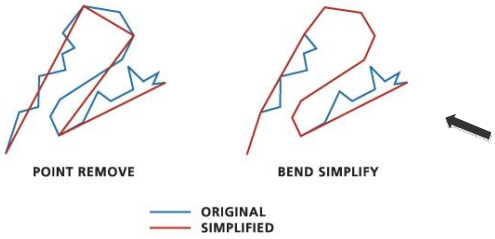


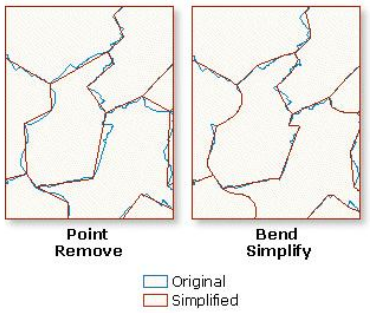
24 points to 11 points

- Uses Douglas-Peucker Algorithm (1973)
- Faster than Bend Simplify
- More blocky / jagged appearance

- Uses an advanced algorithm that better approximates curves
- Slower and more memory intensive
- Better cartographic quality

Why use it?

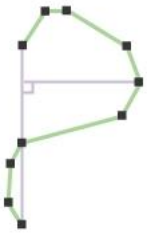
- Faster plotting time
- Reduced storage space
- Removal of redundant points
- Faster vector-raster conversion
- Tool also available for polygons



How it works

Douglas-Peucker algorithm

[Tolerance

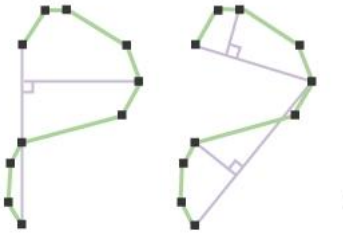


Step 1: Draw line between two ends and calculate distance to furthest point

How it works

Douglas-Peucker algorithm

[Tolerance

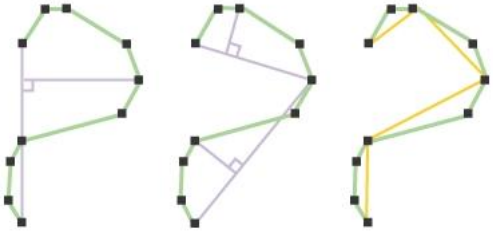


Step 2: Draw line through most distant point and recalculate furthest point(s).

How it works

Douglas-Peucker algorithm

[Tolerance

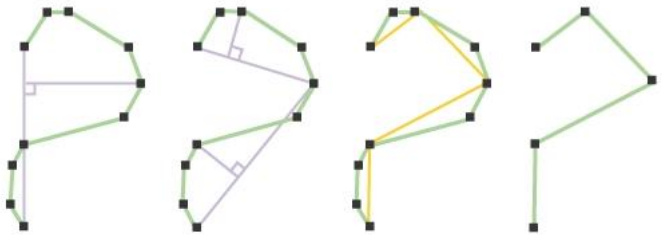


Step 3: Add those points to the line if distance exceeded tolerance.

How it works

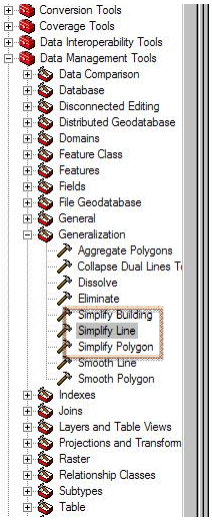
Douglas-Peucker algorithm

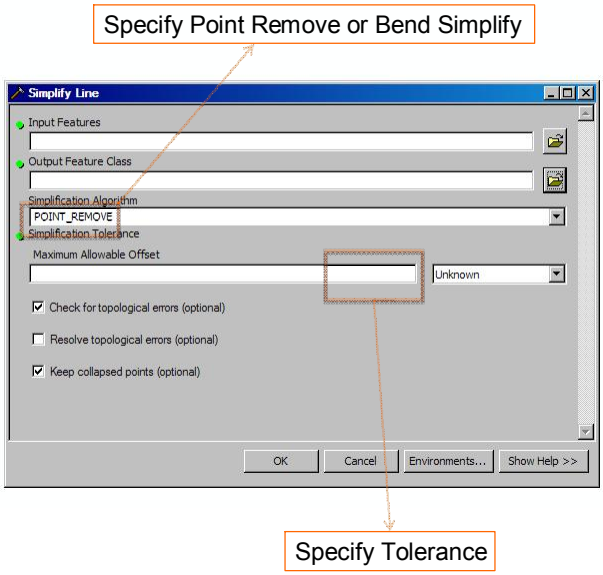
[Tolerance

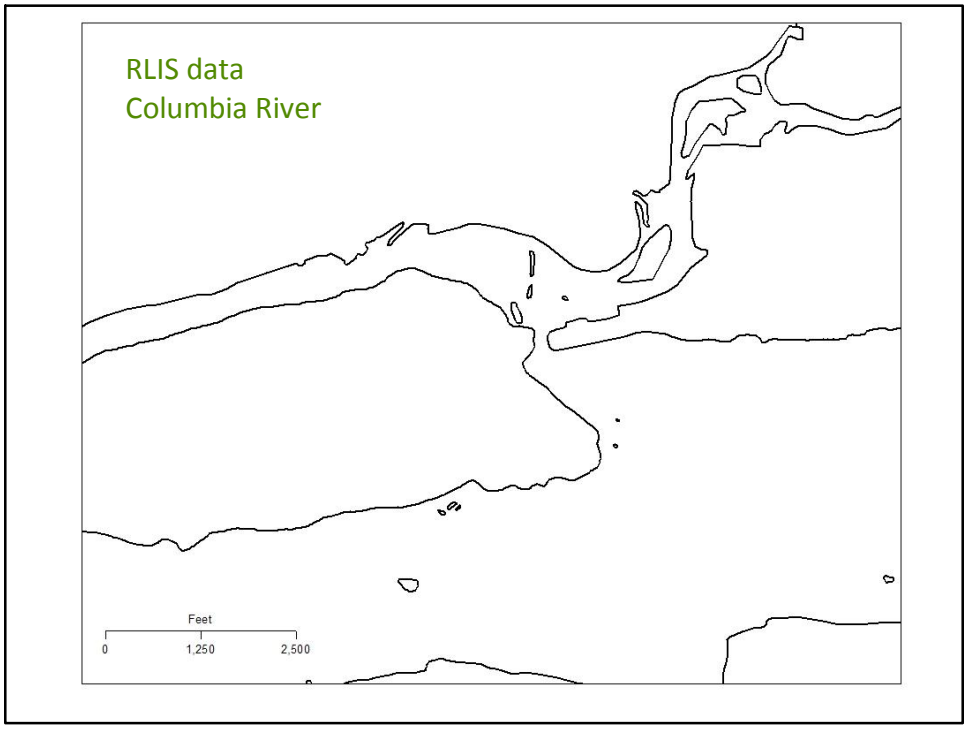


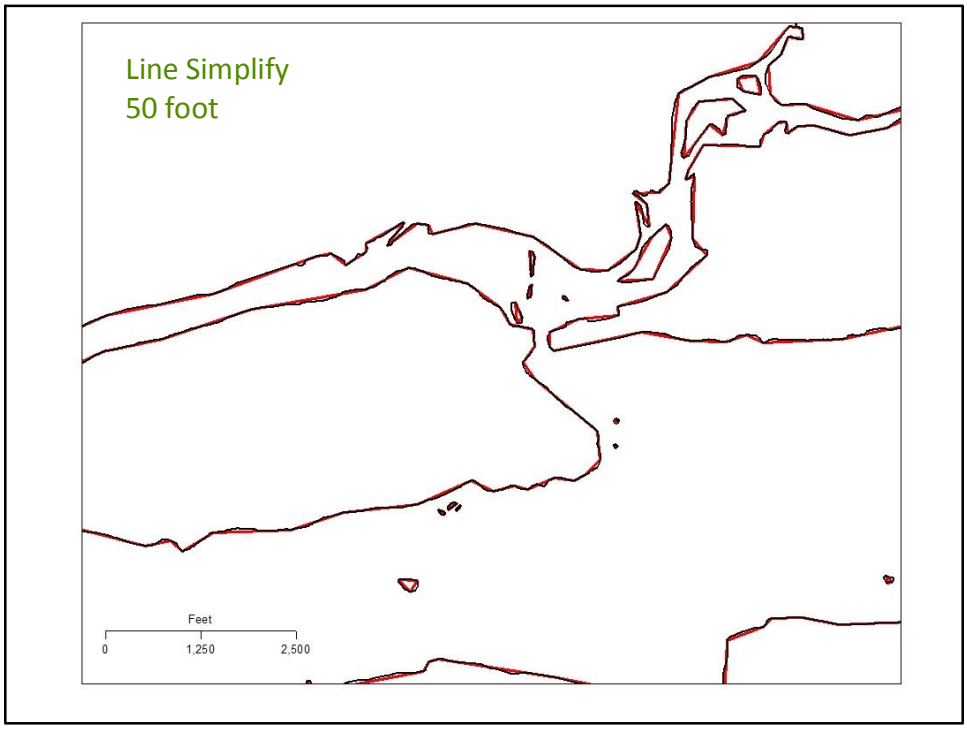
Step 4: No points are outside of tolerance, line is complete.

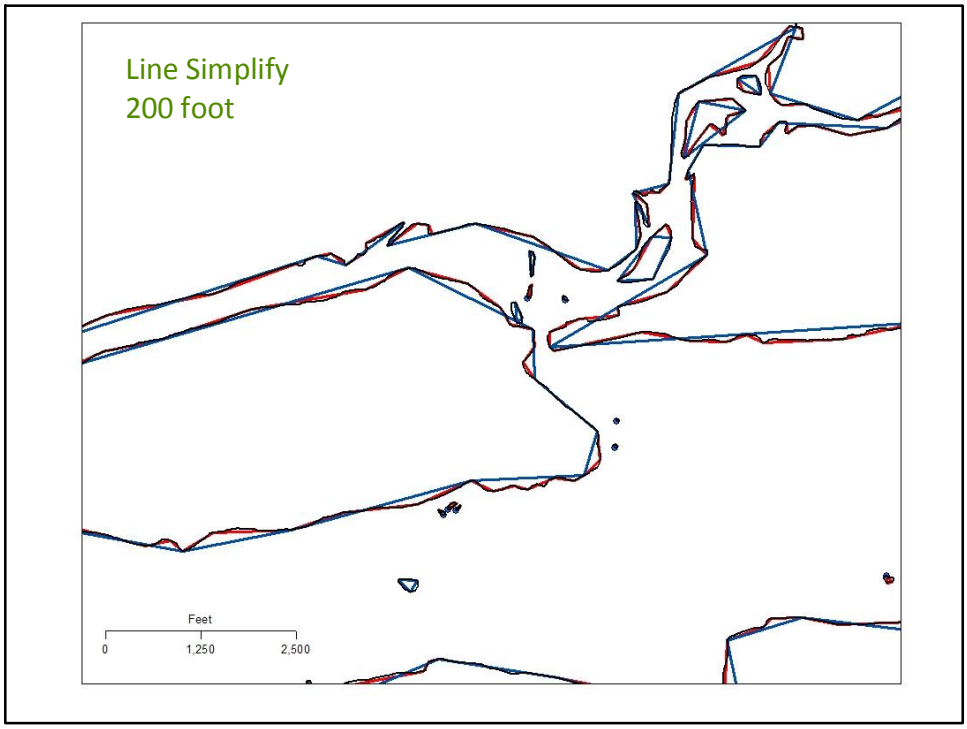
Where is it?






RLIS data
Columbia River
Feet
0
1,250
2,500


Line Simplify
50 foot
Feet
0
1,250
2,500


Line Simplify
200 foot
Feet
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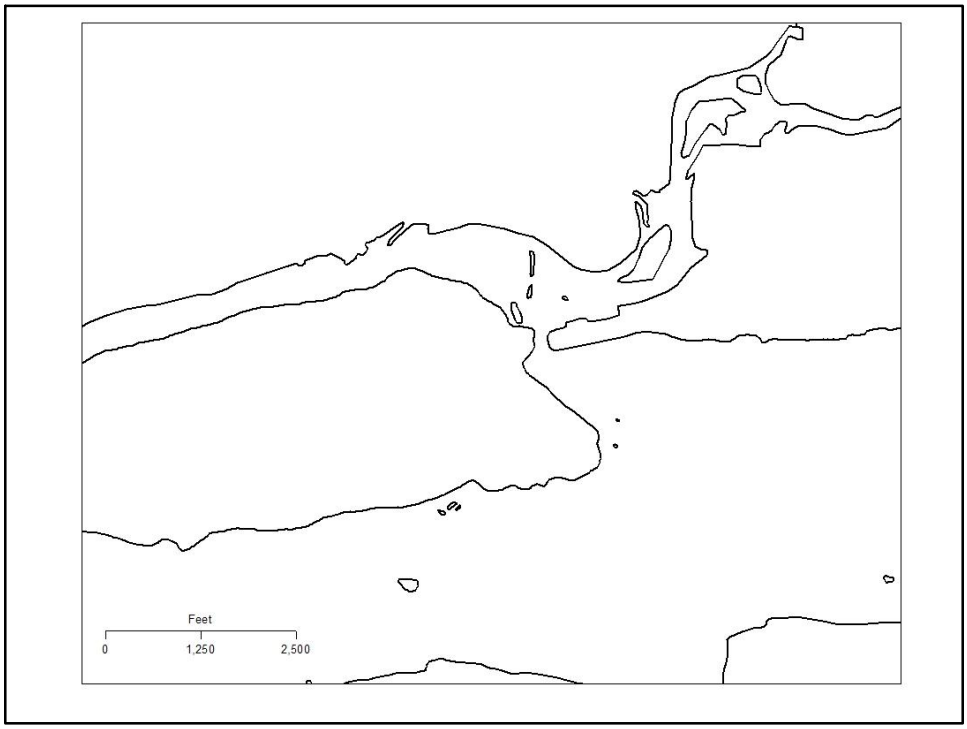
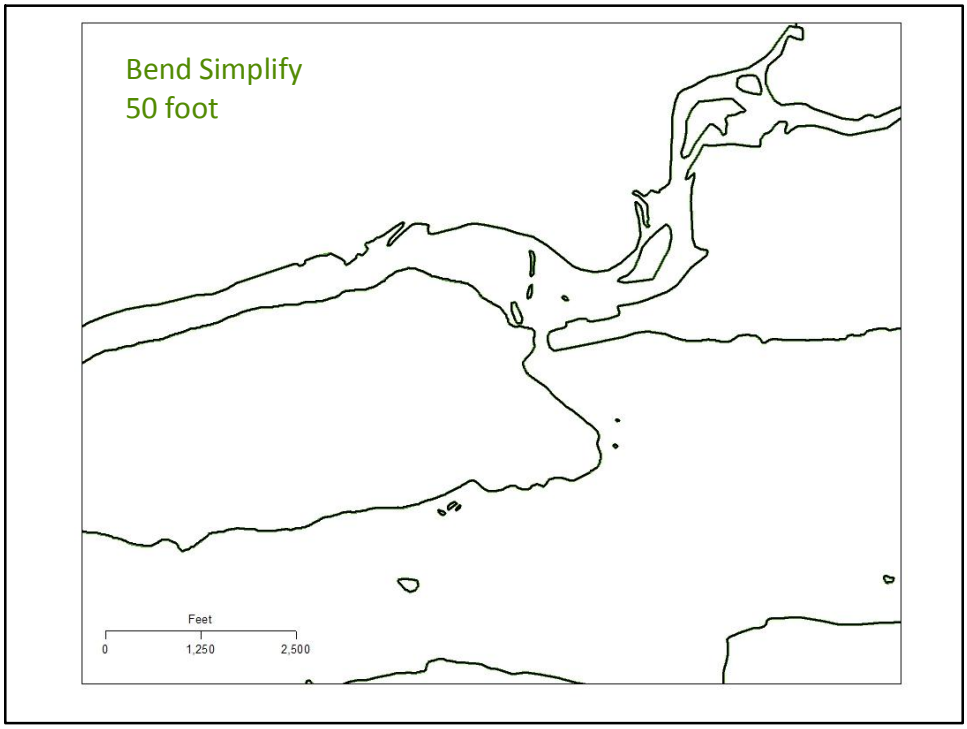
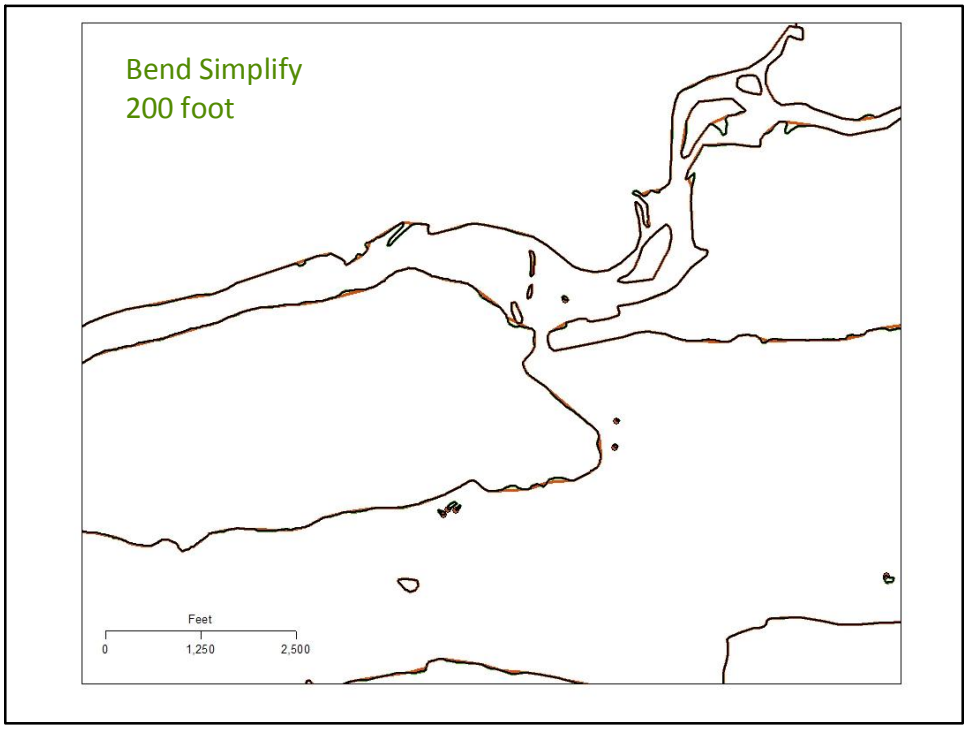
1,250
2,500


Feet
0
1,250
2,500


Bend Simplify
50 foot
Feet
0
1,250
2,500


Bend Simplify
200 foot
Feet
0
1,250
2,500

Questions

1) The tool used for line simplification is the simplify line tool.

2) The two line simplification algorithms available in ArcGIS are point-remove and bend simplify.

3) The bend simplify algorithm provides the best cartographic quality.

References:

ArcGIS Desktop Help, 9.3
Chang, 2009. Introduction to GIS. 5th edition.