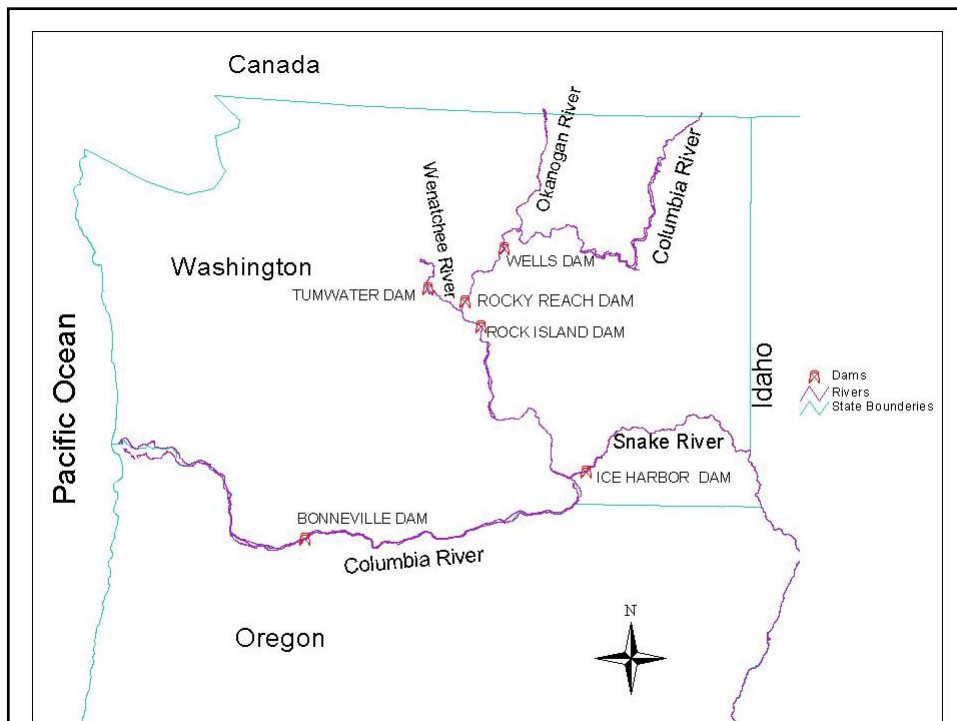
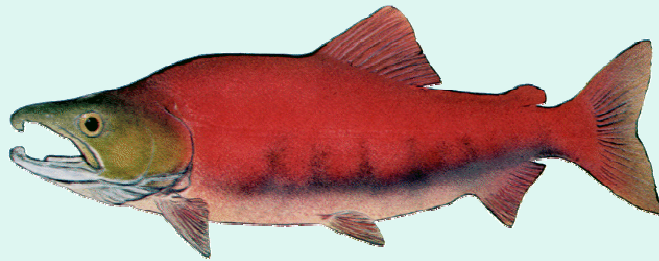
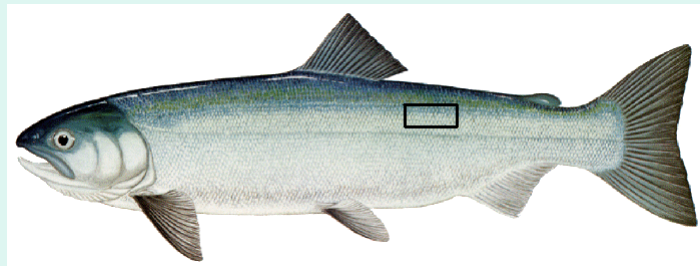


Exploring GIS as a Tool to Age Fish Scales

Columbia River Inter Tribal Fish Commission
Denise Kelsey



Scale Collection from Sockeye



Scale Card and Plastic Impression

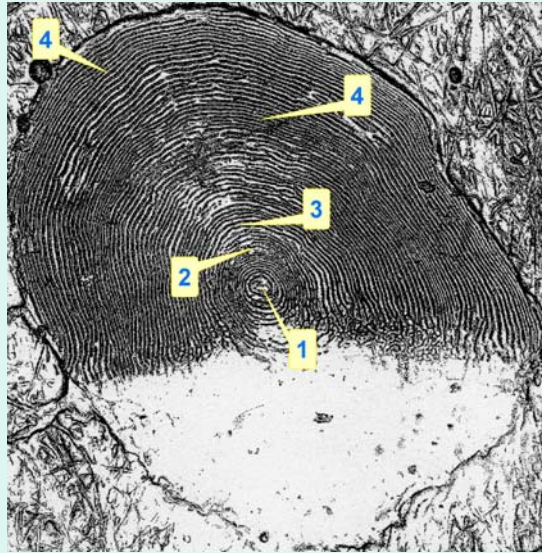


Scale Reading

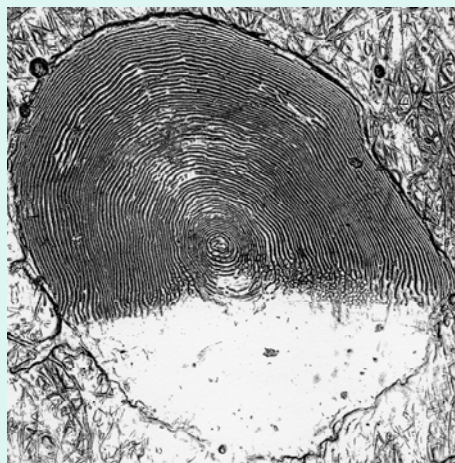
- 1) Focus
- 2) Freshwater winter
- 3) Saltwater entry
- 4) Saltwater winters

Aging – we want to know the # of freshwater and saltwater winters for all species.

Sockeye population – we measure the distance from the focus to saltwater entry.



A microfiche reader is used to view and print the scale impression

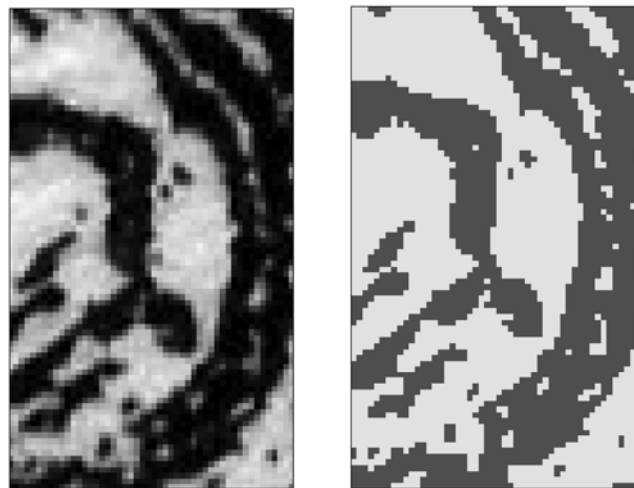


A 5mm scale impression becomes a 12.5 mm image at maximum magnification.

Printed Image is Scanned

- Printed images were scanned in as black and white (gray scale)
- 800 dpi was used for sockeye scale (Chinook scale only required 600 dpi)
- Format was JPG
- Cropped the 8.5 x 11 inch digital image to just a box around the scale
- Resulting in a gray scale digital image of 5,000 KB
- The image is ready for GIS

Reclassify Tool



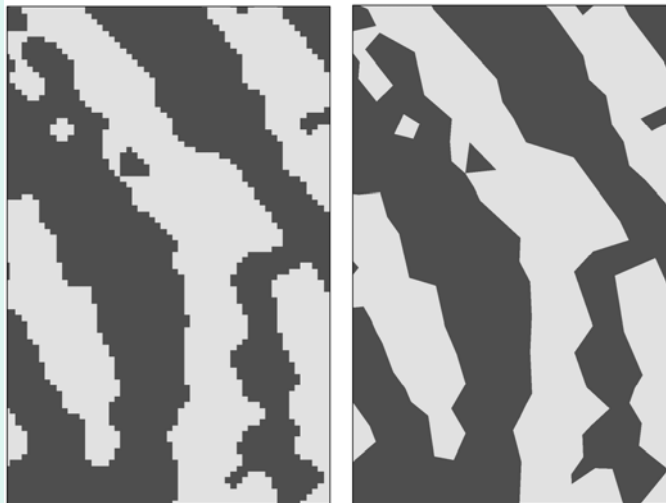
The raster cells in gray scale (range 0 - 255) were converted to two class breaks 0 – 90 is a ridge = 1 and 90 – 255 is a valley = 2

Majority Filter Tool



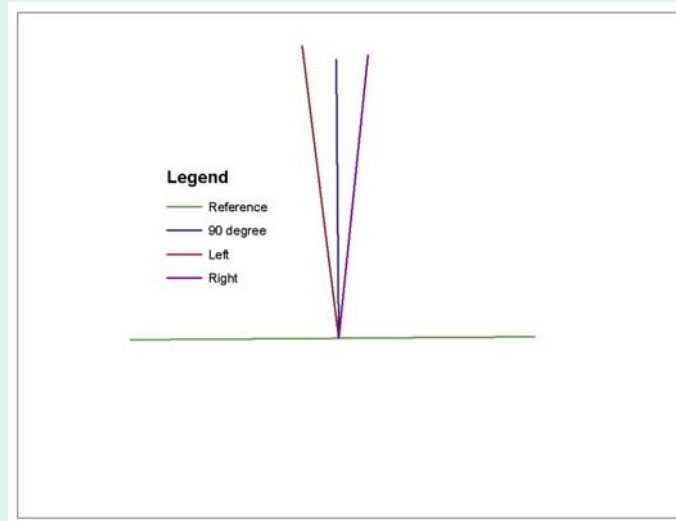
Each product of the MF tool was run through again for a total of 5 times to achieve the best clean (choose 8 and Majority)

Raster to Polygon Tool



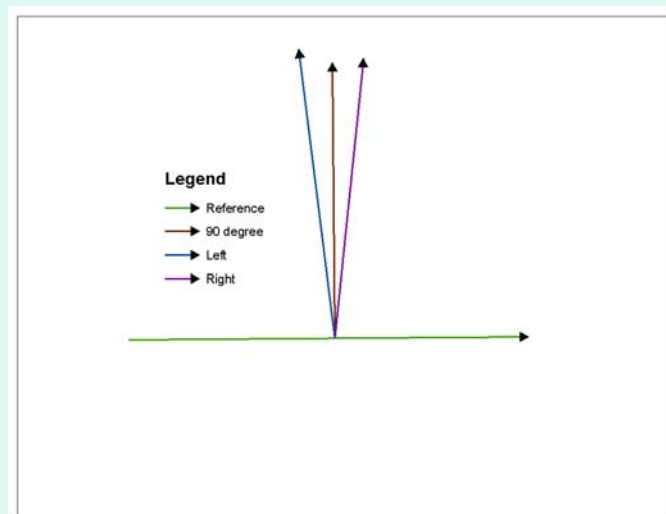
Convert the cleaned raster image to a vector polygon feature

Edit Session to Create Line Feature Class



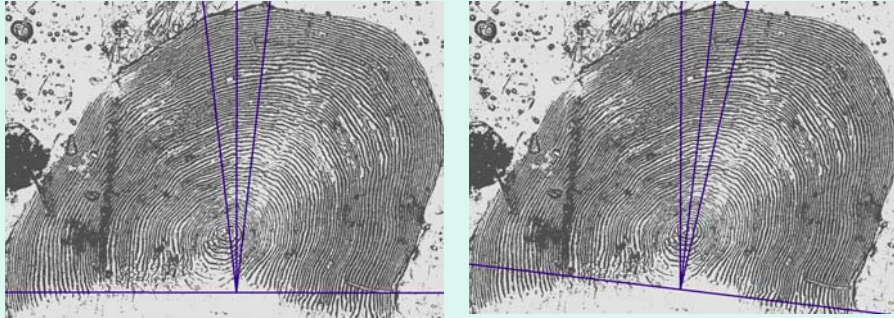
A four line feature was sketched based on a scale.

Create Route Tool



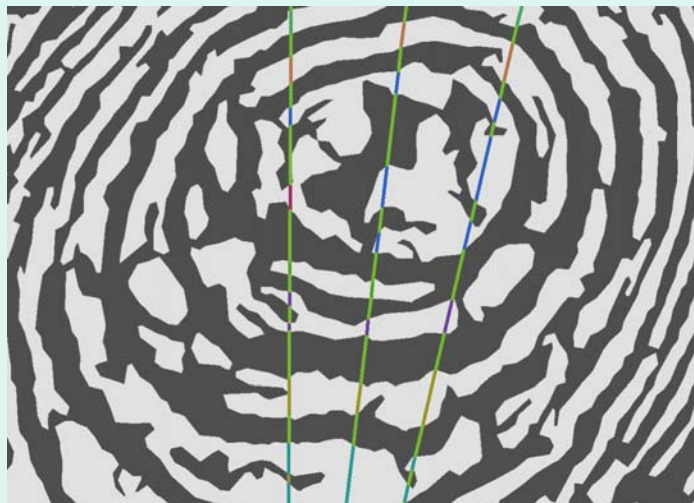
The vector line was converted to a route, so measurements of the scale would have direction from the focus to the edge of the scale.

The route line and scale layers are combined in a map project



The route layer is adjusted into place in an editing session by selecting the lines as a group and/or moving them along the x,y coordinate system.

Locate Features Along Route Tool



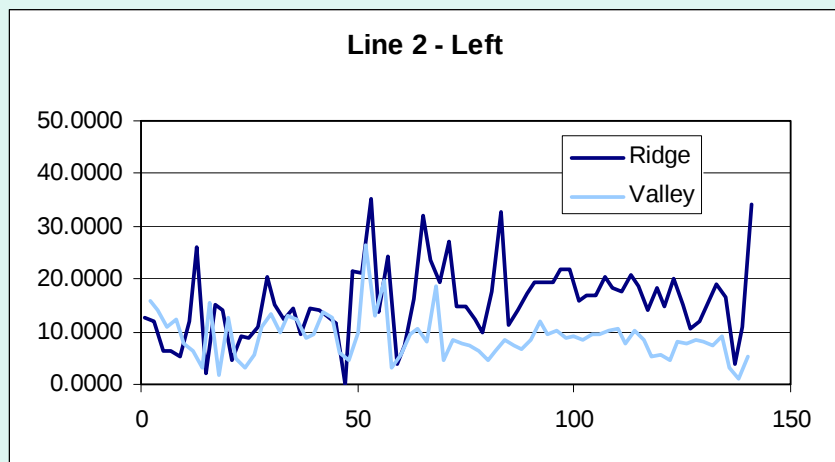
The line layer is intersected with the polygons of the scale layer and a route event is created and placed in table form

Event Table

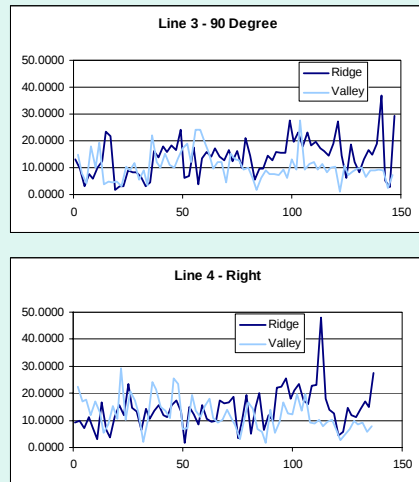
OBJECTID	RID	FMEAS	TMEAS	ID	GRIDCODE
625	2	0.000	39.869	12547	2
302	2	39.869	46.656	8640	1
626	2	46.656	47.894	12547	2
303	2	47.894	56.441	8640	1
627	2	56.441	96.160	12547	2
212	2	96.160	109.655	7579	1
628	2	109.655	181.469	12547	2
205	2	181.469	188.254	7333	1
629	2	188.254	203.524	12547	2
552	2	203.524	209.144	7264	1
630	2	209.144	219.350	12547	2
304	2	219.350	236.438	8640	1

The table contains measurement information as the route travels through each polygon

Some Results



Some Results



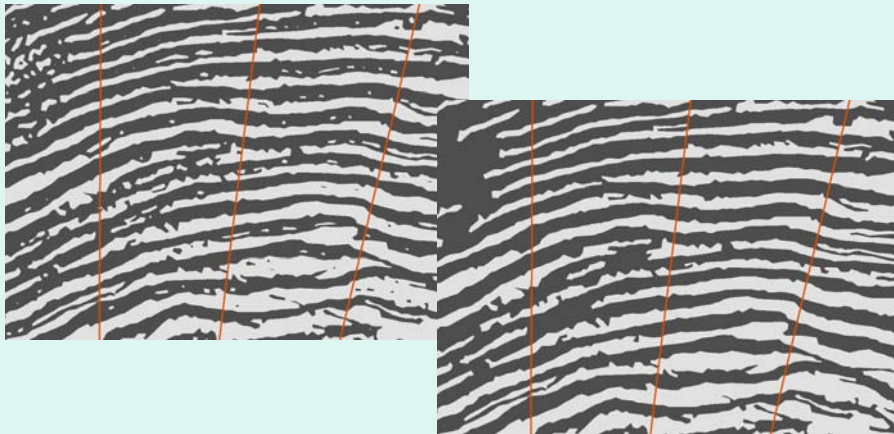
Problems

- Ideally the polygon layer should be rotated into place under a fixed set of routed lines.
- One set of lines instead of a set for every scale (100s of scales).
- Plus, scales would then be aligned on top of each other and direct comparison may be possible.
- ArcGIS crash – likely too many polygons to edit and rotation or move at once.

Reduce the Number of Polygons

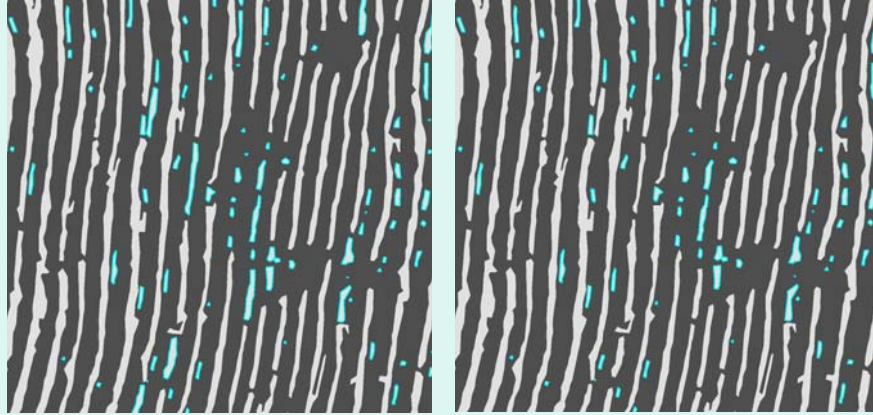
- May solve the crashing program
- Dissolve Tool, better yet . . .
- Elimination Tool – which deletes unwanted polygons thus reducing the number from 12,500 to 1,600.

Elimination Tool



Set parameters for deletion with “select by attribute” and removed noisy polygons

Elimination Tool



Selection of polygons with area of 275 versus 200.
Care must be taken and I need to explore this further.

Tasks for the future

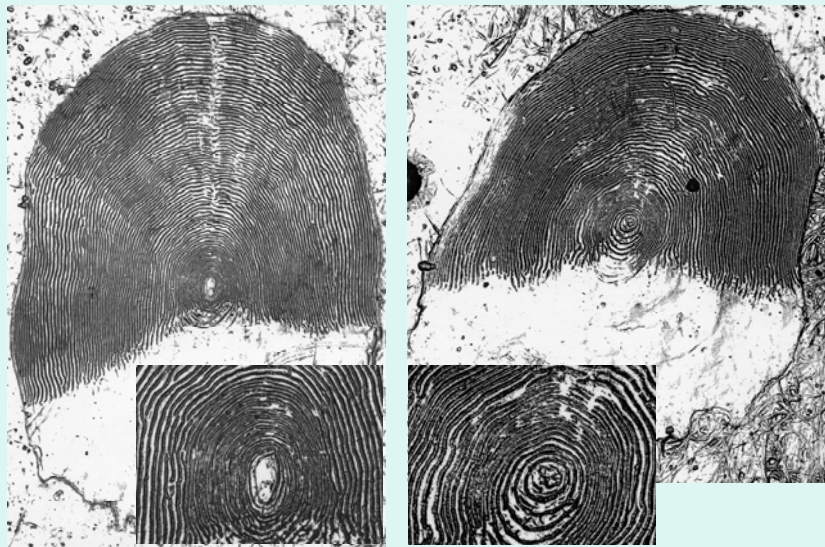
- The elimination tool will work to not only reduce polygon numbers, but will clean my data further, however . . .
- I still can not rotate the layer an error message appears . . .
“The features could not be rotated. The coordinates or measurements are out of bounds”
- ESRI's statement “Geodatabase feature coordinates must fall within the feature class x,y domain extent. The x,y domain is set when the dataset or stand-alone feature class is created. It cannot be updated after creation.”
ESRI's solution, move the feature class into a new Geodatabase and redefine the x,y domain extent.
- Explore the measurement data further for patterns and models to find those patterns.
- Explore other avenues . . .

Centerline of Polygons



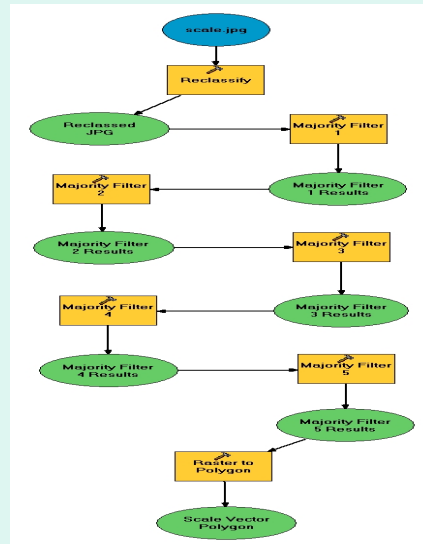
Centerlines of ridge polygons, would this be a better form for measuring and aging?

Tasks for the future



Explore other species scales, can the same parameters be used?

Tasks for the future



Creating models and automation.

Thanks Professor