

Developing the CLAMS Simulation Units from Topography, Vegetation, and Ownership

Coastal Landscape Analysis and Modeling Study; College of Forestry, Oregon State University, USDA Forest Service, Pacific Northwest Research Station, Corvallis, OR; Oregon Department of Forestry

Pete Bettinger, Department of Forest Resources, Oregon State University (Pete.Bettinger@orst.edu)
 Jonathan Brooks, Department of Forest Resources, Oregon State University (Jonathan.Brooks@orst.edu)
 Andrew Herstrom, Oregon Department of Forestry, Salem, OR (aherstrom@odf.state.or.us)
 Alissa Moses, Department of Forest Resources, Oregon State University (Nesje@fsl.orst.edu)

To develop CLAMS simulation units, we utilize a three step process which focuses on topography, vegetation, and ownership.

First, a topographic process, described below, is used to develop preliminary boundaries for parcels. The end-product is a vector GIS database.

Creating Parcels for CLAMS

What is a Parcel?
 Parcels are individual landscape units used for modeling forest succession within the CLAMS simulation model.

How are Parcels Generated?
 Parcels are generated using a computerized geographic information system (GIS) and digital elevation models. Two steps are involved. First, basin boundaries (ridges) and streams are defined. Second, the parcels are generated using this ridge and stream information. See the following text and adjoining figures.

Figure 1 A shaded relief map of the McKenzie River watershed representing the topographic surface of the landscape.

Figure 2 A Digital Elevation Model (DEM) is created for the watershed. The DEM is a grid of 30-meter cells placed over the watershed. Each cell obtains a value based on the elevation at that cell location.

Figure 3 The DEM represents the 3-dimensional topographic surface of the watershed.

Figure 4 A vector is generated from each cell to the lowest adjoining cell. This vector represents the steepest downhill gradient across the cell surface. The vector describes the direction water will flow as it goes downhill.

Figure 5 The vectors help define the individual catchments and stream segments. For example, if a cell has no other vectors flowing into it, it is considered to be part of a "ridge line". If a cell has more than 11 cells (10 hectares of upstream area) flowing into it, it becomes a stream.

Figure 6 Starting at the stream headwaters, all cells draining into that headwater point are identified. This becomes a parcel.

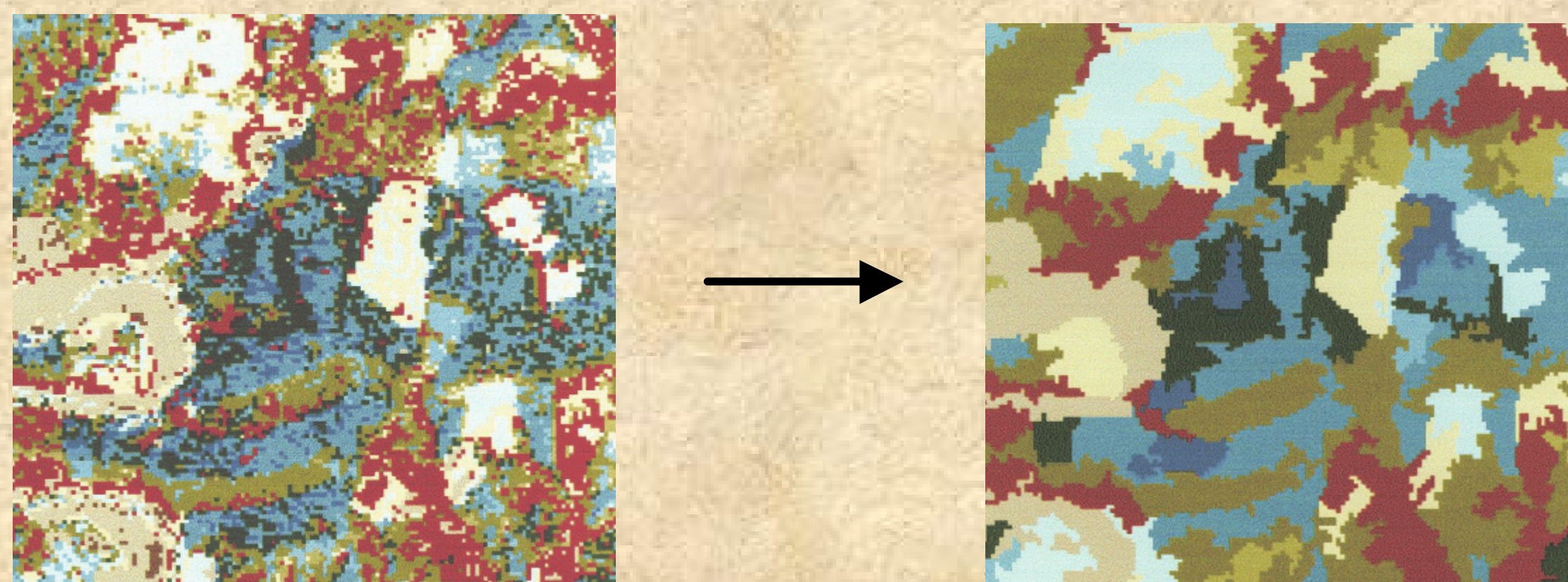
Figure 7 Starting from the headwater point, a 500 meter stream segment is identified. The drainage area for that stream segment is defined. This defines two parcels, one on each side of the stream up to the ridgeline.

Figure 8 This procedure of identifying 500 meter stream segments and drainage areas is repeated the entire way down the stream.

Figure 9 Figure 11 depicts a small area in the McKenzie River basin showing the stream segments defined using steps 4-6 above.

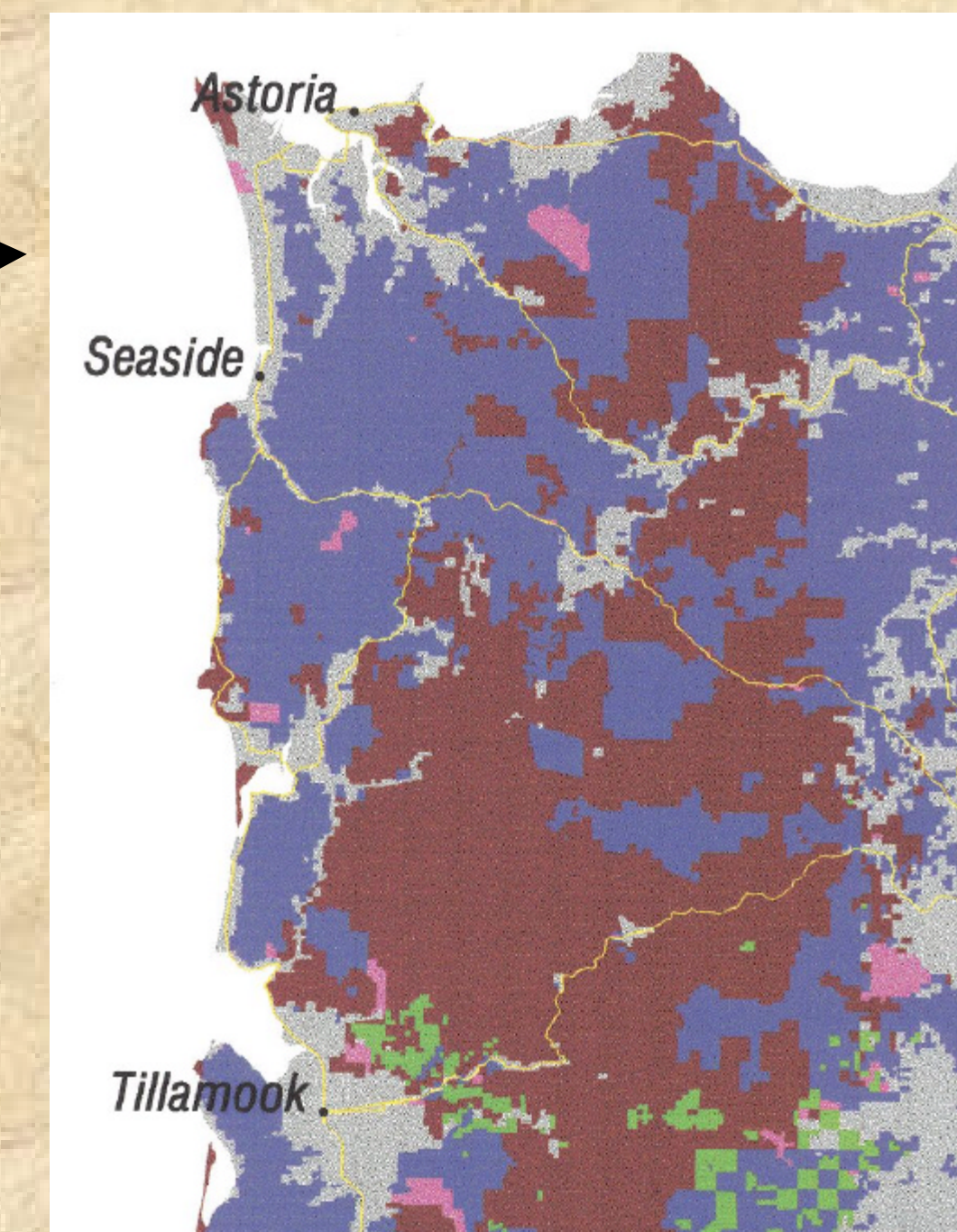
Figure 10 Figure 12 depicts the parcels as generated using the stream segments in Figure 11 and the procedures describes in steps 7-10.

Second, vegetation from the satellite imagery is aggregated into "common" vegetation blocks.

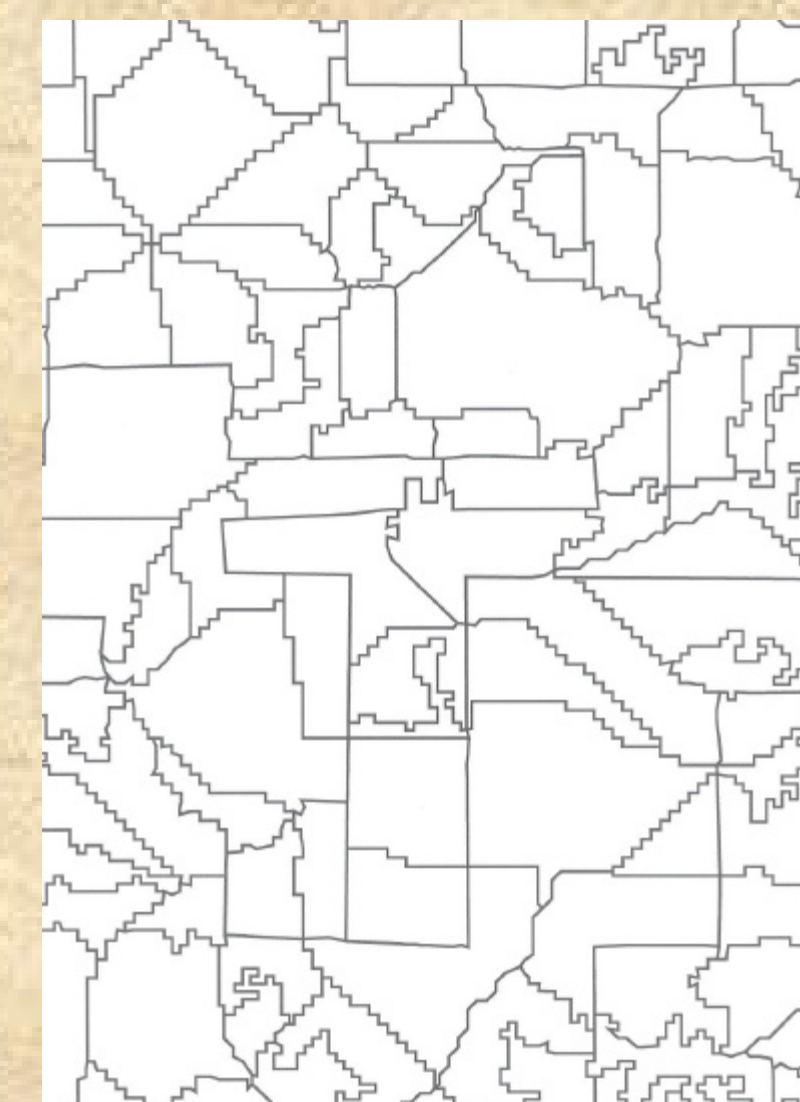


The end-product of this process is also a vector GIS database.

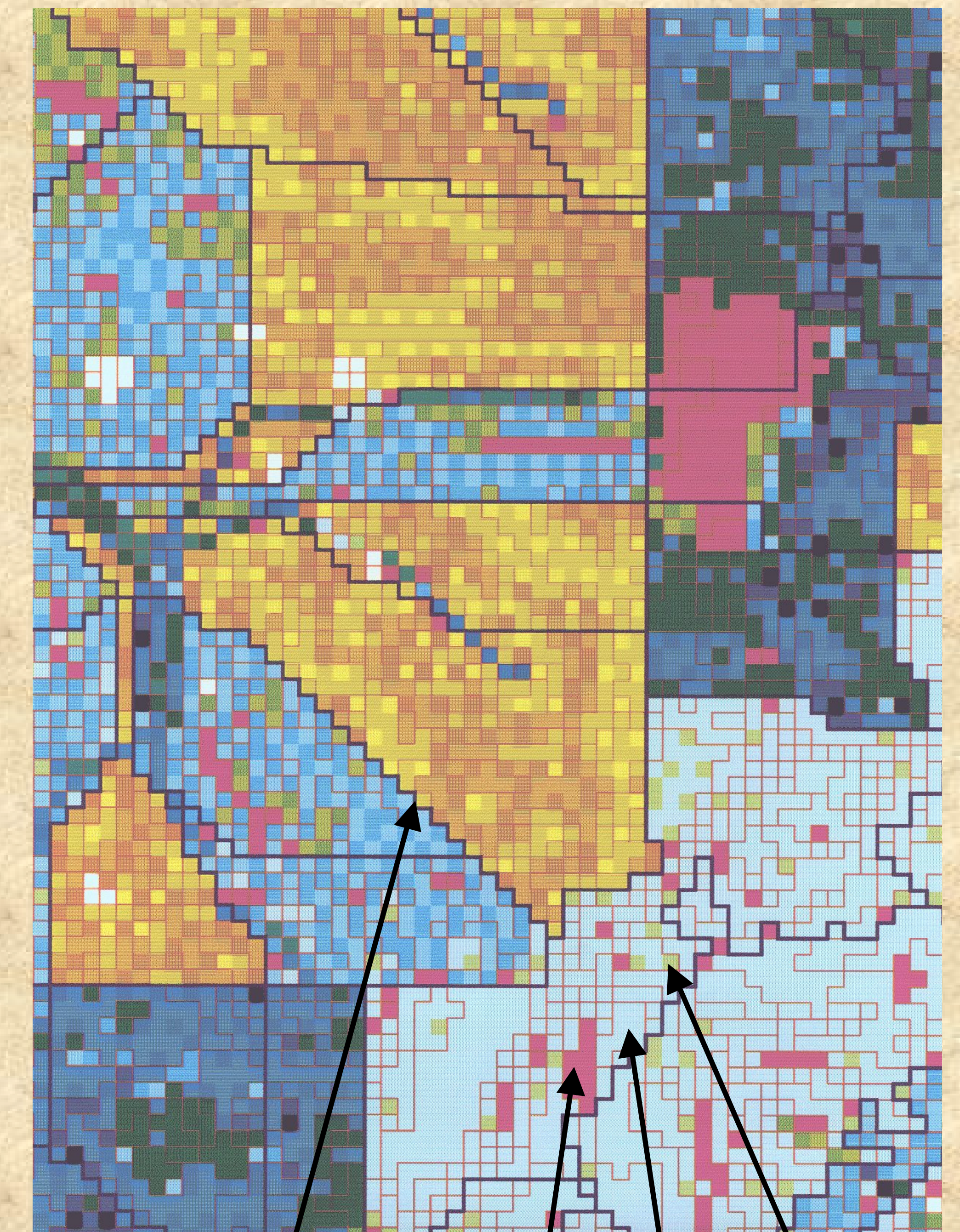
Third, a vector coverage of owner classes . . .



is combined with the topographic units and the aggregated vegetation.



Once complete, the resulting vector GIS database is overlaid on the original satellite image, and the pixels within each parcel identified. Pixels within each parcel may then be aggregated into groups, where adjacent pixels with the same characteristics (slope class, vegetation class, distance from stream class, etc.) become a "basic simulation unit". It is these basic simulation units that we track through time in the simulation model. Decisions can be made at this scale, or at harvest block, watershed, ownership, or megashed scales.



Within each parcel we may have a heterogeneous set of hardwood, softwood, or mixed forest types.

(The dark black lines outline parcels, the red lines outline BSUs)