Vegetation Classification and Mapping

Developed by Montana Natural Heritage Program
1515 East 6th Avenue
Helena, MT 59620-1800
http://mtnhp.org/

Vegetation classification

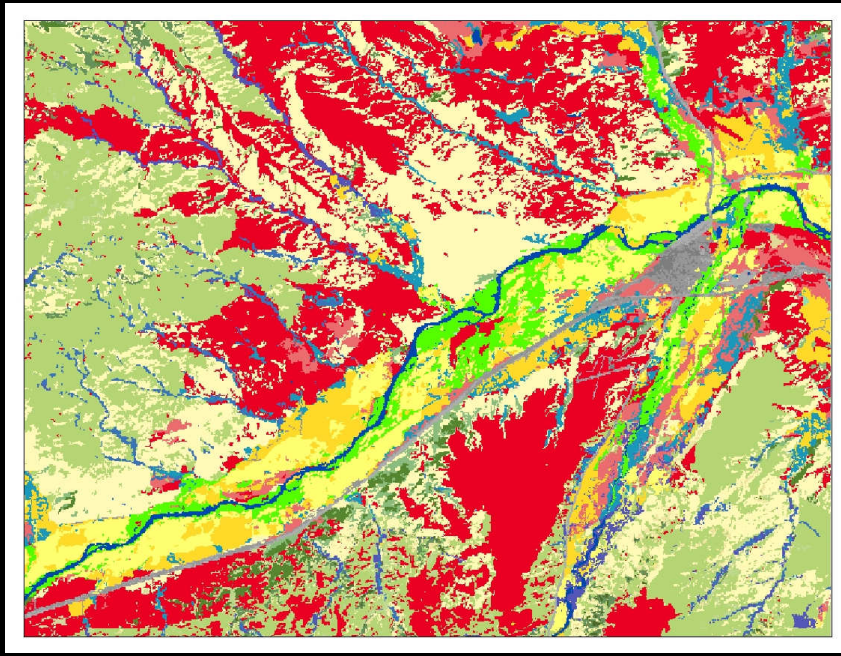
- ***Vegetation classification*** is the process of grouping similar stands together based on shared characteristics.
- ***For ecologists*** classifying vegetation, the relevant shared characteristics are physiognomy and floristics
- ***For mappers*** classifying vegetation, the relevant shared characteristics are spectral signatures and detectable structural characteristics.

The National Vegetation Classificiation Standard and Mapping

- The NVC is *not* a mapping standard
- **However,** the NVC *can* be used as a map legend
- The level of the NVC that can be used as a map legend will depend on the size of the area being mapped

Map-based classification

- Across large areas (e.g., a state, a region), formations, divisions, or macrogroups can be used as mapping units
- Across smaller areas (e.g., a wetland complex, a forest) it is possible to use groups, associations or alliances as mapping units



Refresher: the NVC Hierarchy

- Formation Class: Forest and Woodland
- Formation: Cool Temperate Forest
- Division: Western North America Cool Temperate Forest
- Macrogroup: Northern Rocky Mountain Subboreal-Montane Forest
- Group: Northwestern Great Plains Aspen Forest and Woodland
- Alliance: *Populus tremuloides* Woodland Forest
- **Association:** *Populus tremuloides/Osmorhiza occidentalis* Association

Steps in classification and mapping

- Plots are used to gather field data
- In small areas, all vegetation types are sampled
- In large areas, representative types are sampled

Sampling

- Once sample sites are located (by either community-based or site-based methods), plots are placed in areas of homogenous vegetation which are determined to be representative of the vegetation type.

Stand selection and plot design

- A plot is established in a relatively homogenous unit of vegetation that is of sufficient size to represent the total species composition and abundance of the stand.
- Species composition and abundance, structure and canopy cover are measured to describe vegetation within the plot.
- The NVC association and/or alliance is determined for mapping purposes

Turning field data into maps

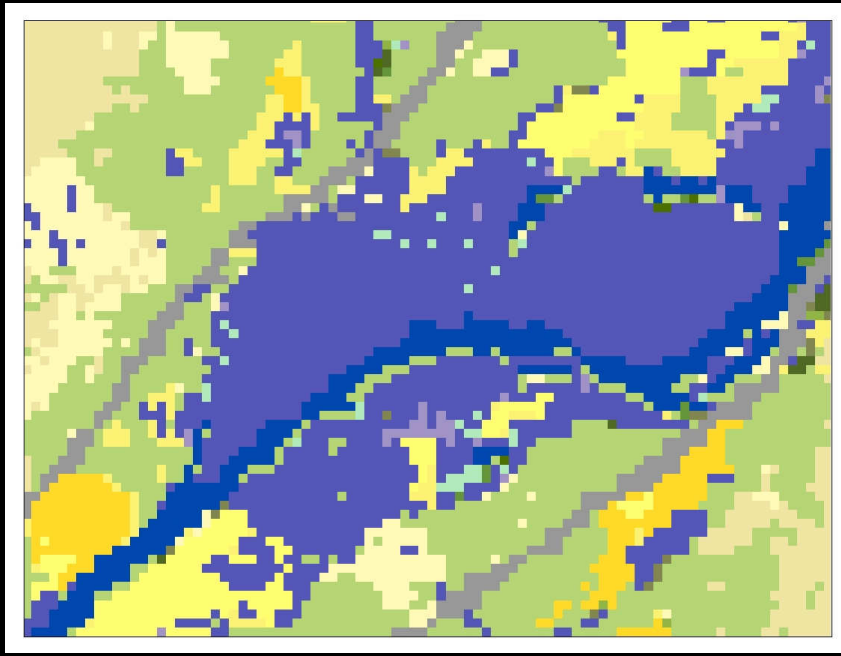
- Field data is used to develop “signatures” for different vegetation types
- The signatures are used to photointerpret aerial images with the human eye or to “train” image classification software
- Images are transformed into maps with appropriate legends

Image segmentation and classification

- One approach to vegetation classification involves segmenting the image
- The software parses out the image into segments with distinct signatures
- The segments are then grouped and classified based on the field data.

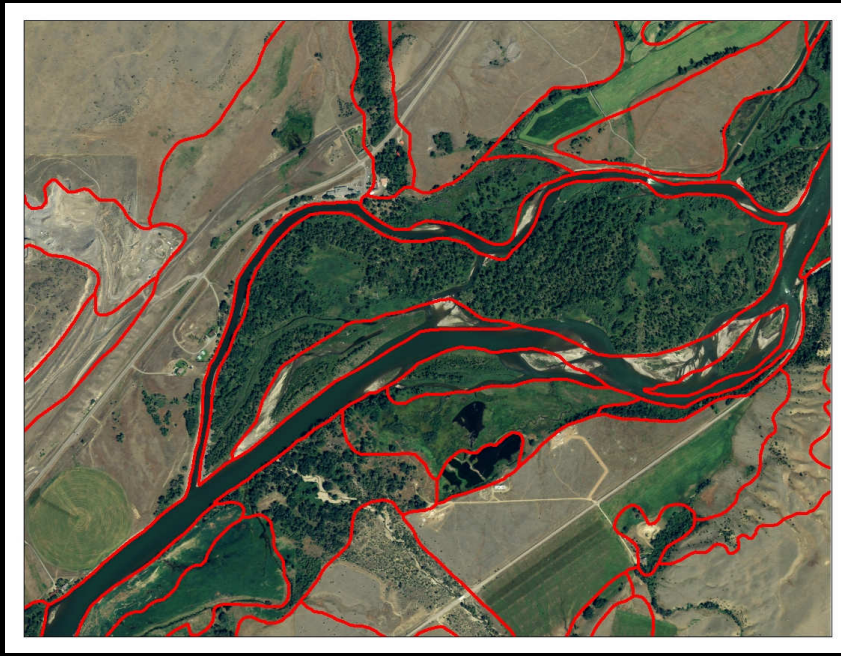
Classifying segmented images

- A spatial database is used to house attributes (e.g. elevation, slope, soils) for each region in the segmented image.
- The data is analyzed with a classification algorithm to classify segments by vegetation type. When field data is used as training data, it is referred to as "supervised classification."
- The segments are then labelled using a map legend based on a classification, e.g., the NVC



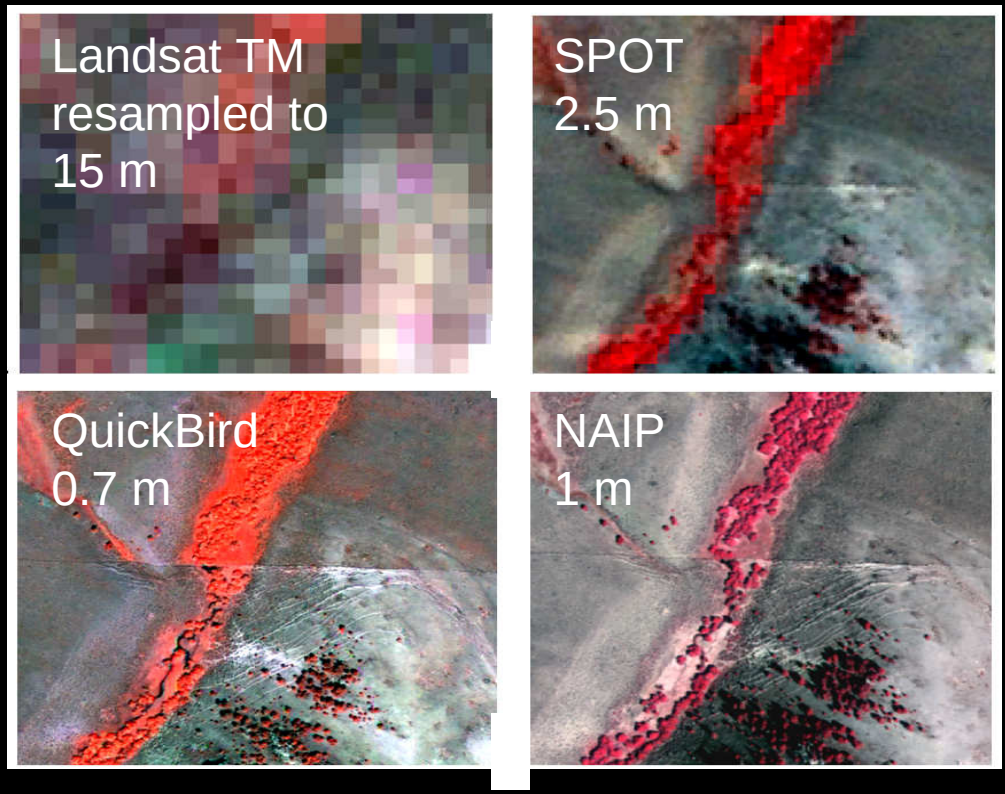
Post-processing

- Classified images are post processed using expert knowledge and ancillary datasets
- Expert knowledge helps adjust spatial accuracy (e.g., eliminates mapped associations beyond their range)
- Ancillary datasets (e.g. soils data overlaid on right) help refine maps by aligning vegetation types with appropriate habitats



Scale Matters!

- The scale of the image being classified will determine the detail that can be captured, and the level of the NVC that can be used as a map legend
- The scale of the image will always affect accuracy



Field verification (ground truthing)

- The larger and more variable a landscape, the less accurate the classification will be
- Field verification helps determine the accuracy of maps.
- Verification data is added to training data sets and the classification can be rerun

Maps are representations, not reality

- Classification-based vegetation maps are useful for general characterization of broad landscapes
- Classification-based maps are least useful for identifying specific boundaries of individual vegetation types, especially at the association or alliance level