Methods and status of land cover mapping for the Northwest Gap Analysis Project

Anne Davidson[1], Tom Miewald[2], Janet Ohmann[3]; Jimmy Kagan[4], Emilie Grossmann[4], Todd Sajwaj[1], Jocelyn Aycrigg[1], Steven Lennartz[2], and Stacy McDonough[1]

[1] National Gap Analysis Program Moscow, Idaho [2] Sanborn Mapping Company Portland, Oregon [3.] U.S. Forest Service, Portland, Oregon [4.] Oregon State University, Corvallis, Oregon;

Background on the Northwest Gap Analysis project and the Northwest land cover mapping project

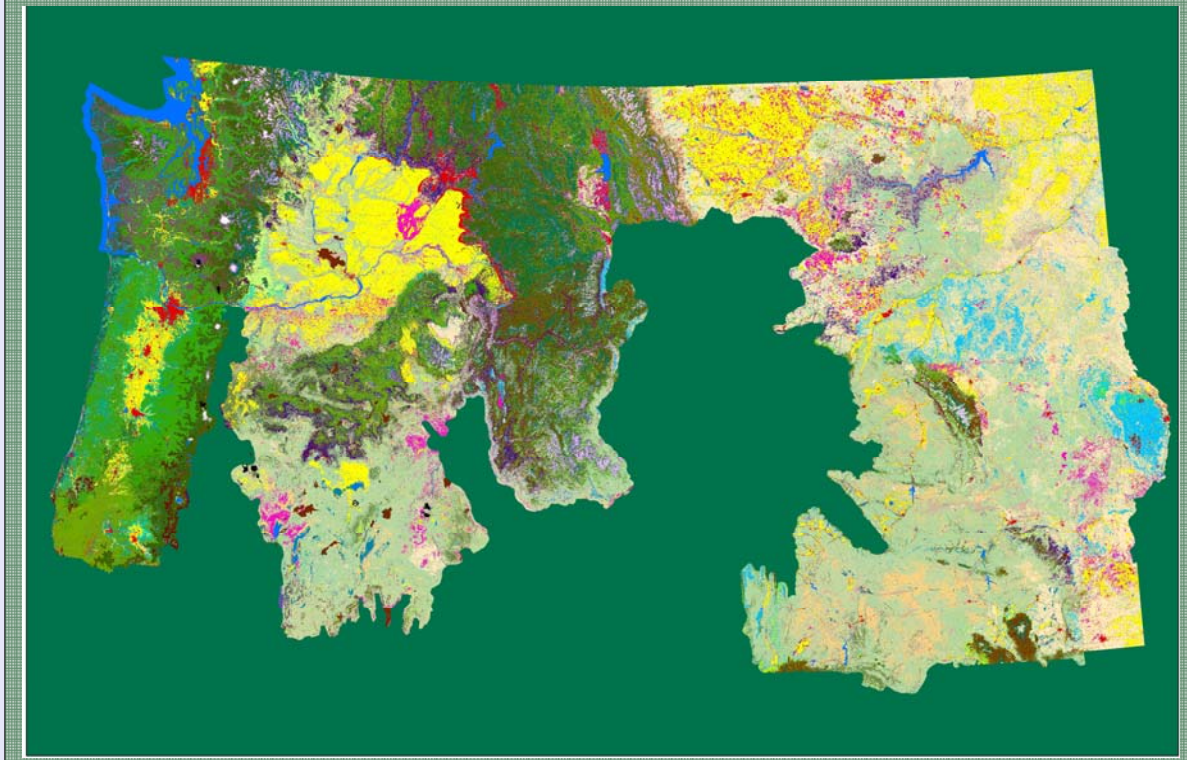
- The Northwest Gap Analysis Project is the third regional Gap Analysis Project. It will contain three main components, land cover, vertebrate species distributions and stewardship. The project will be completed in early 2009.
- The land cover mapping portion of the project was initiated in the Fall of 2004 and will be completed in the spring of 2008. Vertebrate species distribution and stewardship mapping are also underway .
- The project area covers 514,300 sq miles and encompasses 5 states (Montana, Wyoming, Idaho, Oregon, and Washington . The project are contains twelve Multi-Resolution Land Characteristics Consortium (MRLC) map zones and portions of an additional nine zones (Figure 1).
- The Northwest land cover mapping project uses NatureServe's Ecological System classification scheme. This classification scheme was also used in the Southwest and Southeast Regional Gap Projects. This consistency in classification schemes will allow for seamless edge mapping between the projects and the eventual creation of a seamless National map
- Northwest land cover is being mapped at a 30 meter resolution using Landsat ETM data collected in 2001 as the primary base layer

Structure and Status of the Northwest land cover mapping project :

- Responsibility for mapping the ecological systems of the Northwest has been divided among three mapping teams,, 1. Sanbon Mapping Company, Portland Oregon, 2. Oregon State University (OSU) and the US Forest Service (USFS) in Corvallis Oregon, and the National Gap Operations office in Moscow Idaho (Figure 2). The mapping of ecological systems in Zone 18 was recently completed by the Shrubmap project . The plan is to incorporated into the Northwest Gap project with minor updates.
- The three mapping teams are exploring different mapping technique s for developing the most accurate Ecological Systems map possible details on these methodologies are discussed in the modeling techniques boxes below
- To ensure the projects success at meeting the projects primary goal of providing a seamless representation of the distribution of ecological systems across the northwest, the teams communicate frequently about ecological system interpretations, and modeling techniques.
- To date the project teams have developed preliminary models for nine of the mapping zones and mapped the distribution of 167 ecological systems in those zones (Figure3)

Classification and Regression Tree (CART) Modeling Techniques

- The Sandborn and National Gap Analysis Operations office teams are employing CART Modeling techniques to model the distribution of Ecological Systems in their zones.
- Both teams use he Rulequest C5 classifier along with the ERDAS NLCD extension developed by the Earth Satellite Corporation for CART Analysis..
- Explanatory data sets for CART analysis include spring. leaf on, and leaf off Landsat 2001 imagery, tasseled cap transformed imagery, aspect, topographic position index, precipitation, topographic moisture, elevation, and slope
- Reference data sets include ;field data collected by project technicians and analysts., existing field plots from agency university and private researchers, and high resolution imagery interpreted plots.
- Map review by Heritage program vegetation ecologists guides the iterative CART modeling process and guides post-CART modeling to improve the distribution of small patch and rare ecological systems poorly mapped by CART



Gradient Nearest Neighbor (GNN) and Random Forest Modeling Techniques

- The OSU/ USFS mapping team uses a combination of GNN and Random Forest Modeling techniques to model the distribution of Ecological Systems in their zones.
- GNN uses multivariate gradient modeling to integrate data from regional grids of field plots with satellite imagery and mapped environmental data. A suite of fine scale plot variables are imputed to each pixel in a digital map.
- The GNN method allows for the creation of maps depicting vegetation structure in addition to ecological system distributions.
- Random Forest modeling consists of the construction of many CART like decision trees . The final output class is the mode of the classes output by individual trees.
- Final Ecological System maps are constructed using the combined best results of both methods.