

**Forest Service Handbook  
National Headquarters - Washington Office  
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**Forest Service Handbook 2090.11 – Ecological Classification and Inventory Handbook**

**Chapter 3 - Ecological Unit Inventories**

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**Approved by:** F. Dale Robertson, Chief

**Date approved:**

**Responsible Staff:**

**Last Change:** This amendment is the first in a new numbering series corresponding to the year in which material was amended. Since this amendment replaces all text except Interim Directives (ID), do not check for the last transmittal received for this title. Replace the entire title text except ID's.

**Superseded Document(s):** Entire Title except ID's, 00--1 thru 2.81; Transmittal, 2/86; and Amendment 1, 5/86.

**Digest:** Following is an explanation of the changes throughout the directive by section.

This amendment changes the title of the handbook to include direction for inventory, eliminates the reserved chapter for field procedures, renames and rewrites the text for chapter 1 (formerly chapter 2) on Classification of Ecological Types, retitles chapter 2 (formerly chapter 1) Classification of Potential Natural Communities and deletes section on interrelationships and making interpretations. It also adds text for chapter 3 (Ecological Unit Inventories) and chapter 4 (Interpretations and Applications). It also incorporates direction previously issued in FSM 2060.5 through 2062.9.

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Ecological unit inventories provide information about the production capabilities, management opportunities, and limitations to land use. Ecological Unit Inventories are developed by an interdisciplinary team and form the basis for land capability determinations for land management planning. A soil resource inventory usually forms the basis for the development of an Ecological Unit Inventory.

### **3.04 - Responsibility**

FSM 2060.4.

#### **3.04a - Regional Ecologists and Regional Soil Scientists**

It is the joint responsibility of Regional soil scientists and Regional ecologists to develop and recommend Ecological Unit Inventory workplans, interpretation criteria, and reporting format. Involve other disciplines in this process to ensure an integrated approach. See FSH 1909.14, Resource Inventory Handbook.

### **3.1 - Inventory Planning**

Execute the major planning steps as follows:

1. Identify primary users of the inventory data. The needs of users affect the design of map units and guide the style of reports.
2. Collect and evaluate existing information pertinent to the inventory area, such as previous soil resource inventories, plant community classifications, landform descriptions, geology legends, and so on.
3. Determine inventory leadership responsibilities. Verify assignments and clarify understandings between soil scientists, ecologists, and others on the size, purpose, procedures, and products of the inventory. Identify the what, where, who, when, and how to do the job. Document the assignments in the Ecological Unit Inventory workplan (sec. 3.11).
4. Ensure that data collection plans are consistent with the objectives of the inventory.
5. Evaluate adequacy of personnel (time and expertise), equipment, and funding available to accomplish the work. Analyze methods (detailers, helicopters, contracting). Clarify management needs for successfully accomplishing the inventory.
6. Schedule worksteps. Coordinate annual and multi-year program planning and budgeting processes with the work plan schedule. Continually update with recommendations from inventory reviews.

### 3.11 - Work Plans for Inventory Areas

Prepare work plans for all Ecological Unit Inventories. In addition to serving as a record of purpose, specifications, participant responsibilities, report plans, and general work schedule, the work plan provides the participants with a common understanding of the product to be produced, and guides ecologists and soil scientists in organizing and conducting the Inventory. The content of a work plan should include the following:

1. Purpose for Doing the Work. Specify inventory objectives with sufficient detail to support recommended inventory intensity and map unit design. The main objective is to produce a product for current and future resource management needs and which meets forest planning needs. It must be cost-efficient and maintain technical integrity of mapping procedures. State objectives in terms of planning levels and data requirements. Determine specific information requirements by consulting potential users and other specialists, and by reviewing pertinent documents such as the forest plan. Coordinate with other resource specialists to design the inventory to meet multiple needs for information. When survey areas contain large areas of land with different management direction, develop objectives for each area. For example, an area which contains classified wilderness and intensively managed forest will generally require an inventory with two different mapping intensities, map scales, and mapping techniques. The mapping detail should be identified. Use inventory orders described in FSH 2509.18, Chapter 1 as a guide.
2. Description of the Work Area. Describe location, physiography, climate, and vegetation. State the number of acres and ownership of lands to be inventoried. Supply a general location map.
3. Cooperating Agencies and Their Responsibilities. List responsibilities of and expected contributions from cooperating agencies, if any are to be involved.
4. Specifications and Plans. Develop specifications consistent with the objectives of the inventory. Accomplish ecological map unit design and interpretations in an interdisciplinary manner. Identify disciplines needed to assist in this effort. Include scientifically defensible methods for data collection needed to describe potential and current vegetation, soil, topographic features, geology, landform, hydrologic function, and climate information significant for management. Describe classification systems and data analyses to be used for these components and procedures for integrating this data into ecological map unit design.

Describe additional needs including map compilation and finishing, word and data processing, and contracting. Identify the final products. Describe manuscript format and content. Identify map scale. Establish time frames and assign responsibility for manuscript preparation, review, and distribution. Specify plans to consolidate mapping from other inventory areas to meet management needs.

5. Signature Blocks. Include appropriate signature blocks.

### **3.12 - Annual Plan of Operation**

Compile an annual plan of operation. Include the amount of work completed and an appraisal of the remaining work. Estimate time required to complete inventory and schedule work for the current fiscal year. Include targeted acres, amount and kind of supporting data, sampling for lab analysis, interpretation development, a schedule of reviews, plans for report writing and map finishing, and training of personnel and resource managers.

## **3.2 - Ecological Unit Mapping**

### **3.21 - Preparation**

Prepare for mapping by collecting and reviewing appropriate resource reference material and by conducting a field reconnaissance of the survey area. Select suitable base maps and/or aerial photography for field mapping. Make tentative delineations of probable ecological map units on field sheets based on features visible on maps and air photographs. Utilize visible and inferred patterns of soils, vegetation pattern, landform, slope, topographic and geomorphic features, and geologic material for premapping. Incorporate additional properties visible on the map base or those available from other inventories.

Choose representative delineations for field study. Collect field data, describing taxonomic components, for preparation of a tentative identification legend by transecting and/or traversing. Collect sufficient information to refine Ecological Map Unit boundaries, to develop soil phases and/or phases of a plant association and to describe ecological types.

In the field, establish relationships between tentative map delineations and actual on-the-ground properties.

Schedule overflights of the survey area to provide broad information on premapping patterns and access routes and for rapid evaluation of the entire inventory area.

### **3.22 - Design**

Objectives of the inventory, as outlined in the work plan, provide overall guidance for map unit design. Involve appropriate disciplines and managers to ensure map unit design meets management requirements.

Stratify the landscape into ecological units (map units) according to established ecological type criteria (chapter 1). Create mappable units that meet management objectives. Ecological Units must be designed by an interdisciplinary team. Local conditions, map scale, signatures

on remotely sensed data, and topographic map identifiers are important considerations in designing and reliably delineating ecological units to meet management objectives.

Methods for designing ecological units include: (1) Using ecological type(s) with one or more common landscape components that provide distinguishing capability ratings or management interpretations, or (2) Stratification of the landscape into ecological units using components identified in chapter 1. Classes of these components need to be established to meet management objectives.

The proportion of dissimilar ecologic types in map units is a compromise between the resource management needs, intensity of mapping, and component variability. Refer to the National Soils Handbook and FSH 2509.08 for a discussion of similar and dissimilar inclusions in Ecological Map Units.

Design map units to represent consistently repeating portions of landscapes with similar combinations of ecology types. Use the ecological units, during the inventory process, to collect all essential component data.

### **3.23 - Description**

Include appropriate components, along with the kinds and proportions of ecological types, common landscape components, rationale for design, general setting, inclusion of minor ecological types, and a description of management implications.

### **3.24 - Interpretations**

Develop interpretations, which may include vegetation manipulation, timber, forage production, silviculture, wildlife and fisheries habitat capability, engineering properties, geologic hazards, livestock grazing, visuals, watershed, fire, insect and disease management, recreation, and other locally important issues. Interpretations developed for ecological types (sec. 1.47) may be used as the initial basis for ecological unit interpretations. However, interpretations for the ecological units are area specific rather than site specific for ecological types and must be geared to site capabilities and specific management objectives.

### **3.25 - Naming Ecological Units**

Name ecological units for one ecological type that provides a brief description. Numbers or other brief descriptors may be used for complex units that are difficult to name. Map unit descriptions must include the full technical names for each attribute used to characterize the ecological unit.

### **3.26 - Interdisciplinary Participation**

Design Ecological Unit Inventory to meet the specific objectives of potential users. Conduct inventories with sufficient coordination with potential users and cooperators to ensure inventory objectives are being met. Specifically, coordinate with potential users in the following:

1. Inventory Objectives in Work Plan. Encourage participation by potential users at the ranger district and supervisor's office in defining inventory objectives. Ensure consistence of objectives in mapping techniques and map scale. Inform users of potentials and limitations of ecological inventories for specific uses. Seek complete understanding of how field techniques and map scale affect data resolution and reliability as well as mapping rates.

2. Reviewing Map Unit Design. Review map unit design in the field with intended users. Evaluate map unit concepts on a continuing but informal basis as the ecological inventory progresses.

3. Interpretation of Map Units. Soil Scientists, Ecologists, other functional experts, and potential users jointly determine the type of interpretations, their format, and application.

Evaluate interpretive criteria for appropriateness. Develop or propose modifications or new criteria. Continue participation in data collection and testing of interpretations during the course of the inventory.

4. Ecological Inventory Report. Review format and content with potential users. Evaluate success in communicating with the intended user by encouraging use of the field notebook during the course of the inventory.

### **3.27 - Map Unit Delineation**

Develop a tentative identification legend during preliminary study and premapping. Test the legend by intensively sampling representative areas. Identify relationships of soils to vegetation patterns, landforms, and parent material. Note visible features with predictive value as possible map unit design criteria. Review map units with foresters, range conservationists, planners, engineers, and other potential users, to determine if they meet resource objectives.

### **3.28 - Field Notes and Descriptions**

Document reliability of map unit characteristics through a systematic data collection process utilizing transects, traverses, and observations. This is essential for making defensible interpretations and predicting component properties.

Determine documentation needs based on inventory intensity, level of taxonomic classification, and ecologic type variability.

### **3.29 - Field Notebook**

Keep a field notebook to provide a progressive and systematic record of information and data collected during the inventory. A current notebook facilitates field mapping, provides interim information for inventory users, and serves as the initial draft of the final report. Safeguard the field notebook and field sheets by maintaining duplicate copies in a separate location.

### **3.3 - Records and Data Bases**

Organize and update inventory records to ensure efficient operation and management of the Inventory. As a minimum, include the following:

1. Work plan.
2. Field review reports.
3. Annual and long-range schedules and funding.
4. Mapping progress (acreage completed and progress map).
5. Ecological type descriptions and field notes.
6. Acreage computations (by field sheet and map unit).
7. Soil sampling (laboratory analyses, correlation samples).
8. Special investigations (yield, growth, management responses).
9. Interpretation criteria.
10. Interpretations.
11. Productivity Data.

At the end of the inventory, ensure that inventory data is entered into forest or district inventory data bases. Keep the data current, and update it as needed.

### **3.4 - Soil Classification and Correlation**

See FSH 2509.18, section 1.3. Follow guidance in chapter 1 for the soils component of the ecological inventory.