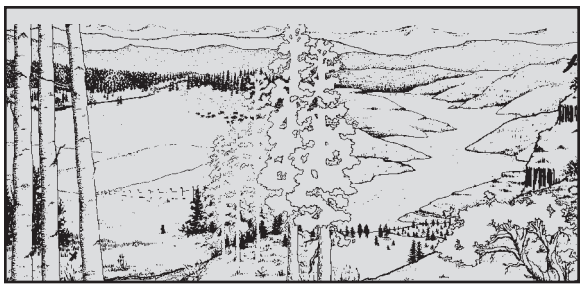

CHAPTER 1
INTRODUCTION

Ecosystem Management Mandate

In July 1993, as part of his plan for ecosystem management in the Pacific Northwest, President Clinton directed the Forest Service (FS) to "develop a scientifically sound and ecosystem-based strategy for management of Eastside forests." The President further stated that the strategy should be based on the *Eastside Forest Ecosystem Health Assessment* recently completed by agency scientists as well as other studies. The Chief of the Forest Service and the Director of the Bureau of Land Management (BLM) jointly directed through a Charter (see appendix A) that an ecosystem management framework and assessment be developed for lands administered by the FS and BLM east of the Cascade crest in Washington and Oregon and other lands in the United States within the interior Columbia Basin and portions of the Klamath and Great Basins (hereafter called the Basin) (fig. 1). Moreover, this ecosystem management approach was to be founded on basic natural resource management ethics (Thomas 1994).

To accomplish this the Chief of the Forest Service and the Director of the Bureau of Land Management jointly established the Interior Columbia Basin Ecosystem Management Project (ICBEMP). The ICBEMP was organized around several teams with specific assignments. The teams included Science Integration, Environmental Impact Statement, Tribal Liaison, Communications, Administration, and Spatial Analysis. The overall assignment of the ICBEMP Science Integration Team (SIT) included a scientific framework, scientific assessment, and an evaluation of management futures. This document is the *Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin*. This integrative assessment links landscape, aquatic, terrestrial, social, and economic characterizations to describe biophysical and social systems. Integration was achieved through the use of a framework built around six goals for ecosystem management and three different views of the future.

There are nine chapters in this document. The first two chapters provide an introduction and describe the assessment process and ecosystem

The Eastside Forest Ecosystem Health Assessment (EFEHA) was an assess ment of the effects of Forest Service management practices on the sustainability of eastern Oregon and Washington ecosystems. It recommended methods and practices that could be used to restroe stressed ecosystems. It is described in several publications. The concepts of ecosystem management and principles of landscape ecology as described in Volume II (Jensen and others 1994), the major findings of the assessment Volume III (Agee 1994, Harvey and others 1994, Hessburg and others 1994, Huff and others 1995, Irwin and others 1994, Johnson and others 1994, Lehmkuhl and others 1994, Marcot and others 1994, McIntosh and others 1994, Oliver and others 1994, Robbins and Wolf 1994, Wissmar and others 1994), the management insights concerning restoration needs and approaches Volume IV (Everett 1994), and insights from the EFEHA framework for ecosystem management Volume V (Bormann and others 1994).

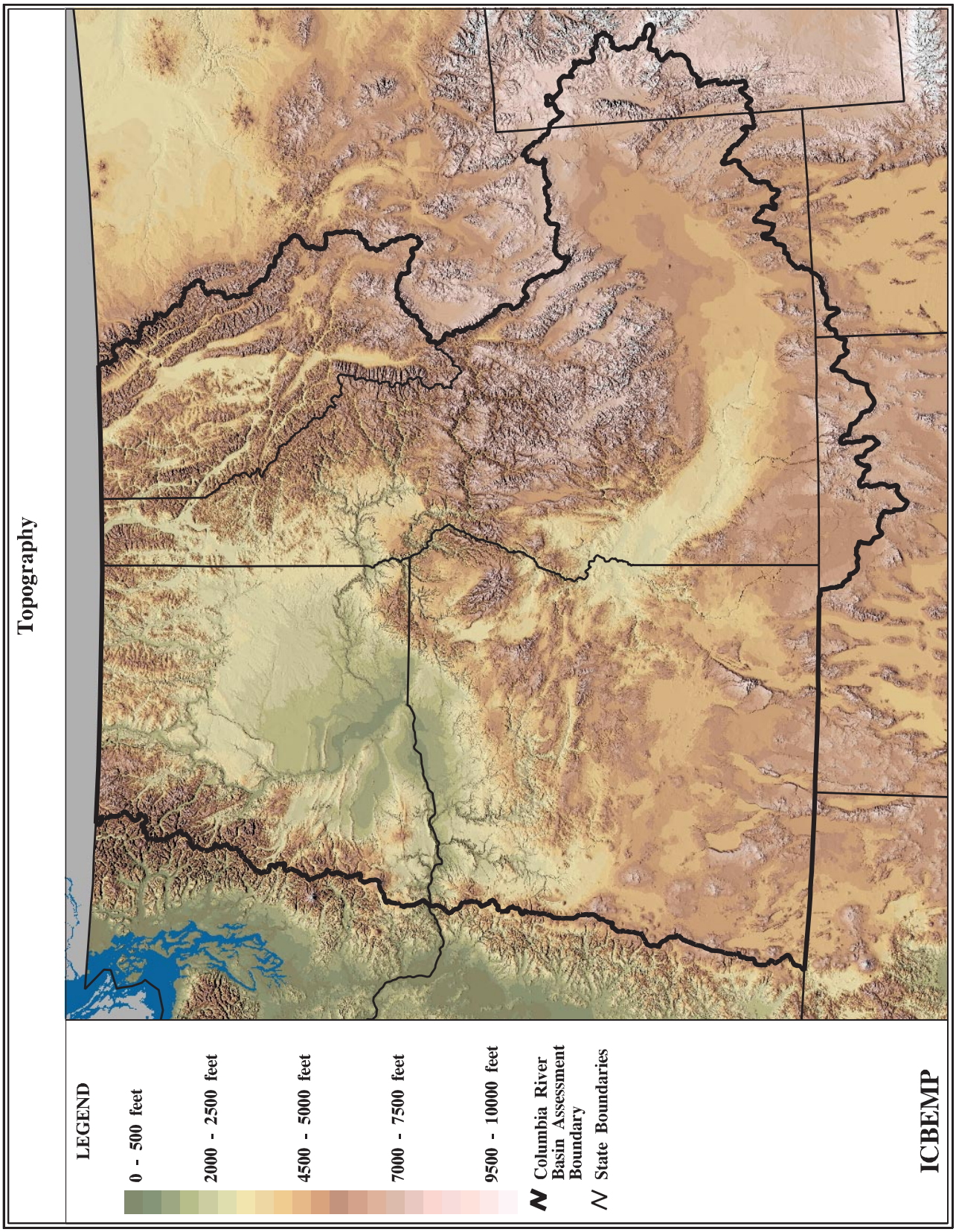

Figure 1—Topography of the assessment area.

concepts that were employed in conducting the assessment. The Basin's current status is described in Chapter 3. The fourth and fifth chapters in the document describe the current and future integrity and resiliency of the Basin. The sixth chapter discusses the policy questions outlined in the Charter. The final chapters discuss science gaps, emerging management issues, findings, and lessons learned.

Assessments

The general planning model (GPM) in the *Framework for Ecosystem Management* (Haynes and others 1996, called hereafter the *Framework*) describes four integral steps for ecosystem management (fig. 2). Assessments may lead to proposals for action. The emergence of a proposal triggers the formal decision-making process of notice and comment. During the open, public, decision-making process, the assessment can be modified. After the formal review process, decisions are made and actions are taken. Monitoring these actions may trigger changes to these actions or new proposals for action. Each step has considerable room for complexity, integration, and participation as has been the case with the Interior Columbia Basin Ecosystem Management Project.

In assessments, planners and managers often quickly identify a problem but then devote the bulk of their efforts to developing solutions. Effective ecosystem management implementation requires a clear problem definition, a clear understanding of management goals and objectives, and a clear and solid assessment of biophysical and social conditions, trends and management opportunities before recommending and selecting solutions. The GPM begins by noting who are the clients and what are their questions. In the case of the ICBEMP, the SIT adopted an approach that began with a set of policy questions and issues. These questions or issues reflect contemporary land management concerns as reflected in the Charter for the ICBEMP. These policy questions articulated public concerns about natural resources and the primary decision variables. They also comprised the spectrum of questions around which discussions of future management needs could be focused.

The role of scientific assessments is to describe and project the biophysical and social ecosystem components over several timeframes and spatial extents (fig. 3). Understanding the past, present, and possible future environments including vegetation, communities, cultures, fish, wildlife, and other ecosystem components, will help identify ecosystem limitations and choices.

Assessments represent a synthesis of current scientific knowledge including a description of uncertainties and assumptions. For Federal land managers, assessments are not decision documents. They do not resolve issues nor provide direct answers to specific policy questions. Rather, assessments provide the foundation for proposed additions or changes to existing land management direction. They provide necessary, though not always sufficient, information for policy discussions and decisions.

The Ecological Society of America (1995) defines ecosystem management as "…management driven by explicit goals, executed by policies, protocols, and practices, and made adaptable by monitoring and research based on our best understanding of the ecological interactions and processes necessary to sustain ecosystem composition, structure, and function."

The Basin

This assessment covers the interior Columbia Basin east of the Cascade crest and those portions of the Klamath and Great Basins within Oregon (see fig. 1). The Basin's vegetation is nearly half forested vegetation types (46%). Agriculture

For purposes of this assessment, the Basin is defined as those portions of the Columbia River basin inside the United States east of the crest of the Cascades in Washington and Oregon and those portions of the Klamath River basin and the Great Basin in Oregon. The total area of the Basin includes more than 145 million acres (58 million ha) and its boundary spans portions of seven western states (Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming).

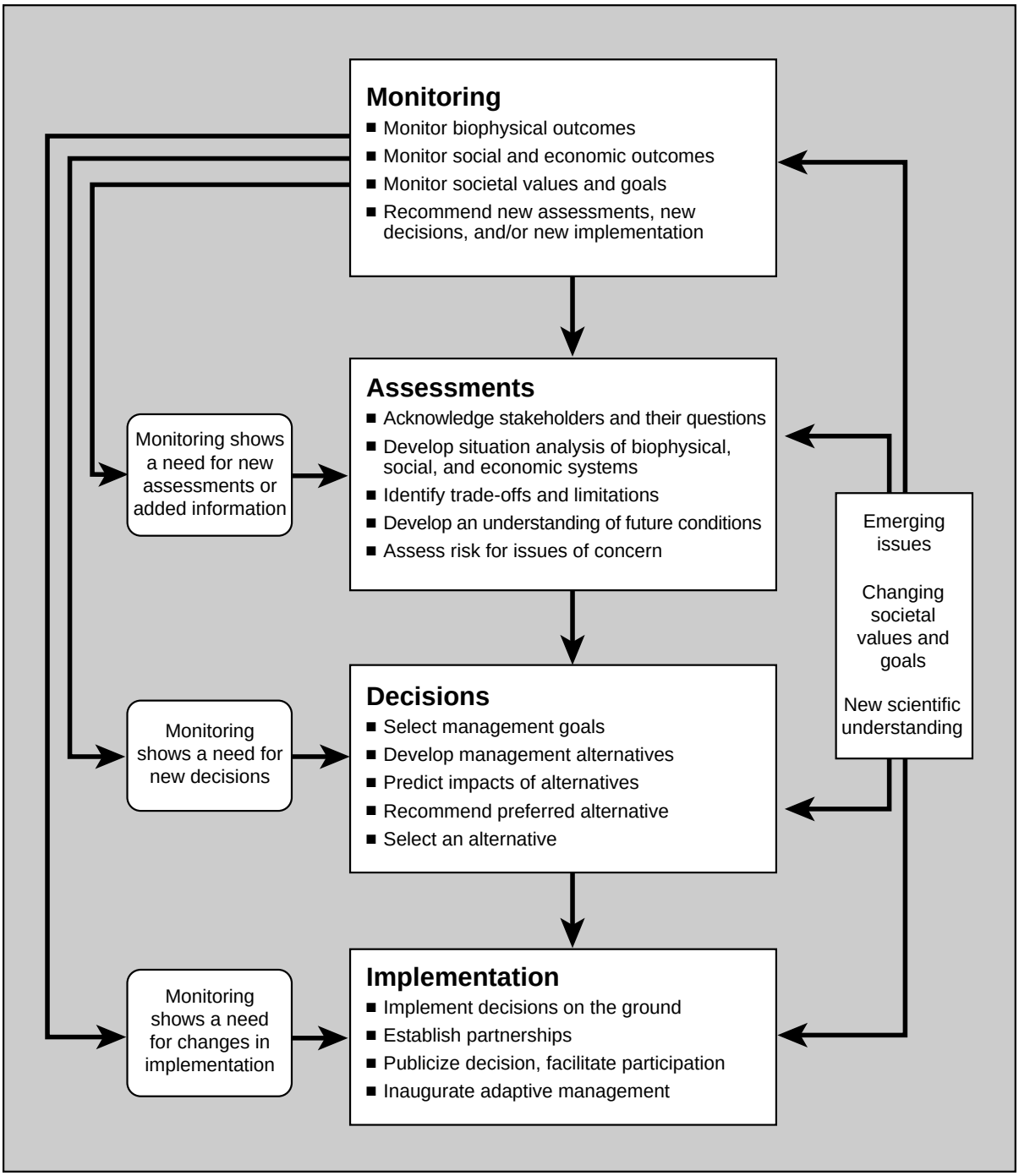

Figure 2—Each step of the General Planning Model for ecosystem management has several parts. Because the model is iterative, external or internal influences can initiate any step in the process and the process never ends.

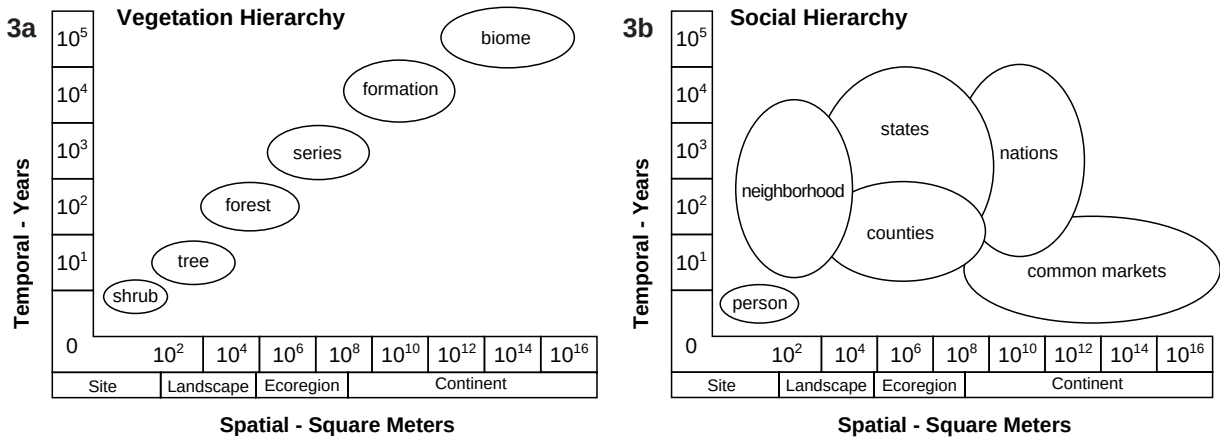

Figure 3—Ecosystem organization can be viewed as a hierarchy. Each level of the hierarchy has both time frames and spatial extents. A vegetation hierarchy is shown in 3a and a social hierarchy is shown in 3b.

occupies 16 percent of the Basin and represents what were historically rangeland vegetation types.

Federal Government projects and policies have played a major role in transforming the social, economic, and biophysical systems in the Basin. From the establishment of the forest reserves and the public domain to federal dam and irrigation projects, the Federal Government's presence in the Basin has a long legacy. Currently, the public lands administered by the BLM and FS constitute over half of the area of the Basin. In addition, national parks, monuments, wildlife refuges, energy facilities, and other public lands cover 8.1 million acres (3.3 million ha).

The transitions among the population of the Basin are as dramatic as the transitions among the mountains, plains, and rivers--from a scattered population of American Indian tribes, to the immigrants working the mines, mills, and ranches, to a diverse mix of ethnic backgrounds and urban and rural dwellers of today. Relative to other parts of the United States, the current population remains low in the Basin. The ranching and farming communities cluster along mountain valleys and lower slopes where perennial streams provide water. Some historically rural settings within the Basin have given way to expanding population centers. Spokane, Pasco/Kennewick/Richland ("Tri-Cities"), Yakima, and Wenatchee, Washington; Boise, Idaho; Bend, Oregon; and Missoula, Montana, are examples of places where once rural areas are now urban environments.

The Basin supplies goods and services to an expanding, changing, and demanding human population. The most dramatic changes have occurred in areas that attract retirees or are centers of recreation. Half of the Basin's population have rural lifestyles, particularly agricultural lifestyles, which is considerably higher than the national average of 20 percent. Moreover, nearly 50 percent of the workforce is employed in the service and trade sectors with around 10 percent employed in the farm and agriculture sectors.

Today, public perceptions and expectations regarding management of Federal lands in the Northwest have led to increases in the protection of unique ecosystems and species, increased concern with riparian areas, and experimentation with methods of forest and rangeland management. Increasingly these management strategies strive to retain features found in "natural" ecosystems and to mimic natural disturbance regimes. Tribal governments are concerned about culturally and economically significant resources, and other

stakeholders[1] are concerned about the availability of commodities from Federal lands. Those with environmental interests express concern about the conditions in the forest, rangeland, and aquatic systems and particularly wildlife species in these systems. Issues arise from conflicting values, and often involve more than one spatial extent or timeframe. Therefore, issues play a major role in defining analysis boundaries, types of assessments, and data collection. The ICBEMP was initiated to address these issues as they relate to public land management.

Science Team

The Science Integration Team was composed of Federal employees from the FS, BLM, Environmental Protection Agency, U.S. Geological Survey (USGS) and Bureau of Mines (BOM). Contractors were brought in for specific tasks and assignments. The SIT was headquartered in Walla Walla, Washington. Detached analysis units were located in Missoula and Kalispell, Montana; Boise, Moscow and Coeur d'Alene, Idaho; Portland and Corvallis, Oregon; Seattle, Spokane and Wenatchee, Washington; and Reno and Las Vegas, Nevada. Its purpose was to develop a framework for ecosystem management, a scientific assessment of the interior Columbia Basin (of which this document is a part), and an evaluation of the alternatives in the Environmental Impact Statement. The SIT was organized around the functional groups of landscape ecology (physical and vegetative resources), terrestrial resources, aquatic resources, economics, and social sciences. A staff of Geographic Information System (GIS) specialists supported the spatial and data processing needs of the science staffs.

The SIT identified, designed, evaluated, and integrated all information for the science products associated with the project. The SIT integrated the information brought forward by five functional groups and described the tradeoffs and potential consequences of interactions. This document, *An Integrated Scientific Assessment for Ecosystem Management for the Interior Columbia Basin and portions of the Klamath and Great Basins* (hereafter called the *Integrated Assessment*) examined the current and future condition of the Basin by integrating the information brought forward in the detailed assessments of ecosystem components (Quigley and Arbelbide 1996, hereafter called the *Component Assessment*[2]). This integrated assessment also examined probable outcomes of management under several futures. More detailed explanations of databases, models, and information layers will be published later, and will provide useful information to both public and private land managers.

Basin Assessment Objectives

The changes in public perceptions and expectations regarding Federal land management as outlined in the Charter led to the following objectives of this integrated assessment:

- Provide a basic characterization of landscape, terrestrial, aquatic, social and economic systems and processes of the Interior Columbia Basin and portions of the Klamath and Great Basins. This characterization should include diversity, distribution, and abundance of plant and animal species; watershed conditions; and economic, cultural, and community trends. The assessment will be bounded in time, space, issues being considered, and depth of analysis.
- Emphasize conditions, resources, and interactions within and among the components listed in the first objective.
- Describe probable outcomes (changes in goods and services, ecological states and conditions) of continued and potential natural resource management practices and trends.
- Describe risks and tradeoffs of management actions.

[1]In this document stakeholders are defined as tribal, state, county, local governments, and private landholders; as well as individuals and groups representing local, regional, and national interests in Federal land management.

[2]The *Component Assessment* is composed of separate chapters consisting of Biophysical, Landscape Dynamics, Aquatic, Terrestrial, Economic, Social, and Information Systems Development and Documentation (Spatial Analysis). Hereafter chapters are referenced by chapter name (for example, aquatic findings would be referenced to as *Component Assessment*--Aquatic).

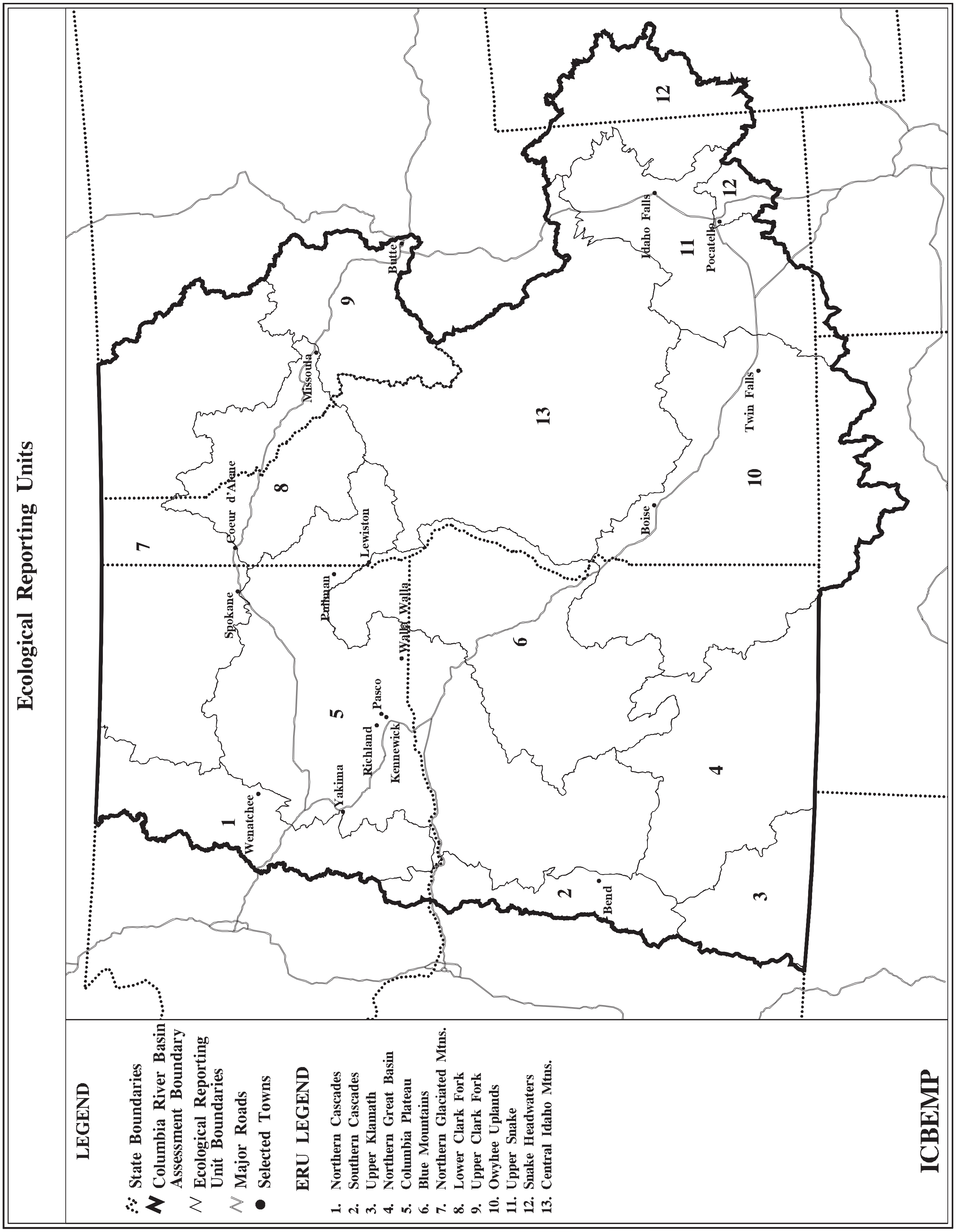

Figure 4—Ecological Reporting Units were used to differentiate the characterizations within the Basin.

Assessment Process

Assessments can differ not only in geographic extent, such as river basins versus watersheds, but also in the level of spatial and temporal resolution (see the discussion in Chapter 2 for further detail). Regional assessments show short- and long-term trends over broad areas (multiple river basins), while sub-regional assessments generally have higher data resolution and supply quantitative information on patterns and processes within smaller geographic areas (watersheds) and over shorter lengths of time. The Basin was characterized over different spatial extents and timeframes around the five broad functional groups (landscape, aquatic, terrestrial, social, and economic).

The Basin assessment analyzed the rates of change and the cause and effect relations of various social and biophysical elements, but some characteristics made linking biophysical and social processes difficult. First, there are differences in the geographic extent of commonly available biophysical and social science data. Much of the biophysical data is available at lower geographic units where the least is known about human behavior (how individuals respond to change). Second, there are also differences in the treatment of time. For social processes, various interactions are observed only for a specific point in time often described as annual or in some other temporal unit. Biophysical processes, while specific in time, are often described at longer time intervals (for example decades). Finally, there is the problem that biophysical processes are typically described for some fixed spatial extent (such as a square kilometer or a river reach) while social process are a function of human populations, which themselves have a highly variable relation with different spatial extents.

Ideally, an integrated assessment would consist of information that was integrated from its inception. Most resource information, however, is collected by individuals who, based on training, have different perspectives. To facilitate the analysis and presentation of information and results on geographic areas smaller than the entire Basin, the Basin was divided into thirteen geographic areas called Ecological Reporting Units (ERUs). Figure 4 shows the delineation of ERUs. These areas were intended to describe both biophysical and social systems but the ERUs were identified and delineated based on recommendations by the terrestrial and aquatics staffs (see Jensen and others 1996, *Component Assessment*--Biophysical for more detail). The aquatics staff proposed boundaries based primarily on watershed characteristics, stream data, and general data about the distribution of aquatic species. The terrestrial staff proposed boundaries based on groupings of potential vegetation groups. These two approaches yielded similar delineations and were combined using subwatersheds (6th code hydrologic units) as the basic mapping unit to create the ERUs (see figure 5 for the relation between the Basin, a subbasin, and a subwatershed). In the Basin there are approximately 7,500 6th code watersheds called "subwatersheds" [approximately 8,000 ha (20,000 acres) each]. To further facilitate discussions, these subwatersheds were grouped into 164 subbasins (4th code hydrologic units). The social science equivalent to the subbasin is the county (there are 100 counties in the Basin). Various social processes are discussed either at the county level or for groupings of counties.

The SIT used ERUs to describe biophysical environments, characterize ecological processes, discuss the effects of management activities, observe trends from past management, and to identify management opportunities. Some ecological and most socioeconomic processes and functions did not conform well to the ERU boundaries. Where this occurred the discussion and reporting was within a context deemed more appropriate. Some other topics could only be addressed for the entire Basin.

An integrative approach linking landscape, aquatic, terrestrial, social, and economic models was developed to link the biophysical and social systems. The goals outlined in the *Framework* and the questions outlined in the Charter guided the

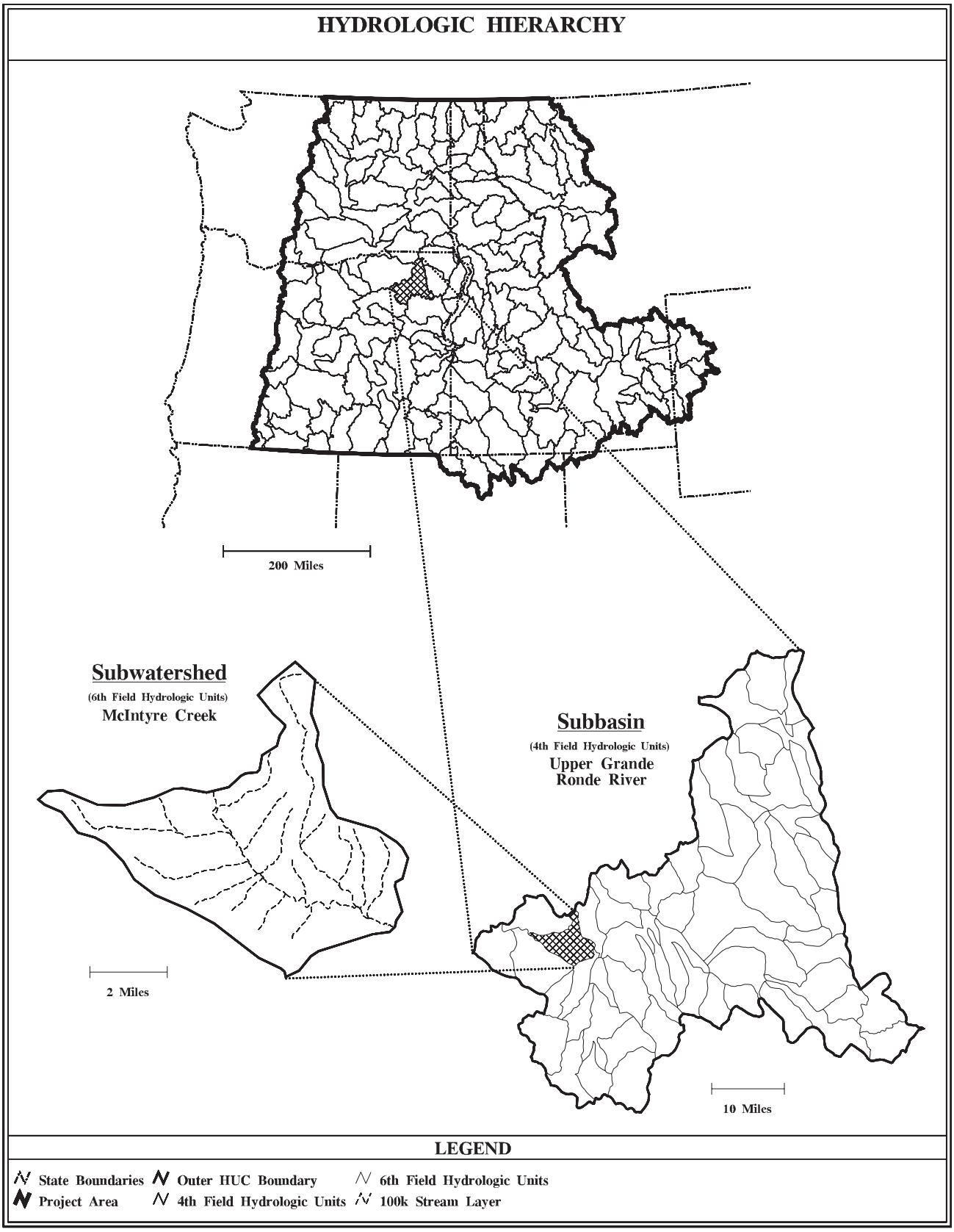

Figure 5—An example of hydrologic hierarchy from subwatersheds to subbasins.

integrated biophysical and social characterization of the Basin. The SIT used several management options as a way to display the possible effects of broad management actions on biophysical and social ecosystem components.

In this assessment, we recognize that a special relationship exists between the American Indian tribal governments and the United States Government. The sovereign status of the American Indian tribes is recognized through treaties and executive orders with those tribes and special provisions of law. These treaties and laws set the tribes apart from all other U.S. populations and define a set of Federal agency responsibilities. There are 22 recognized tribes in the Basin. Each tribe is a separate entity, and relationships need to be established with each tribe; government-to-government relations differ in format among tribes.