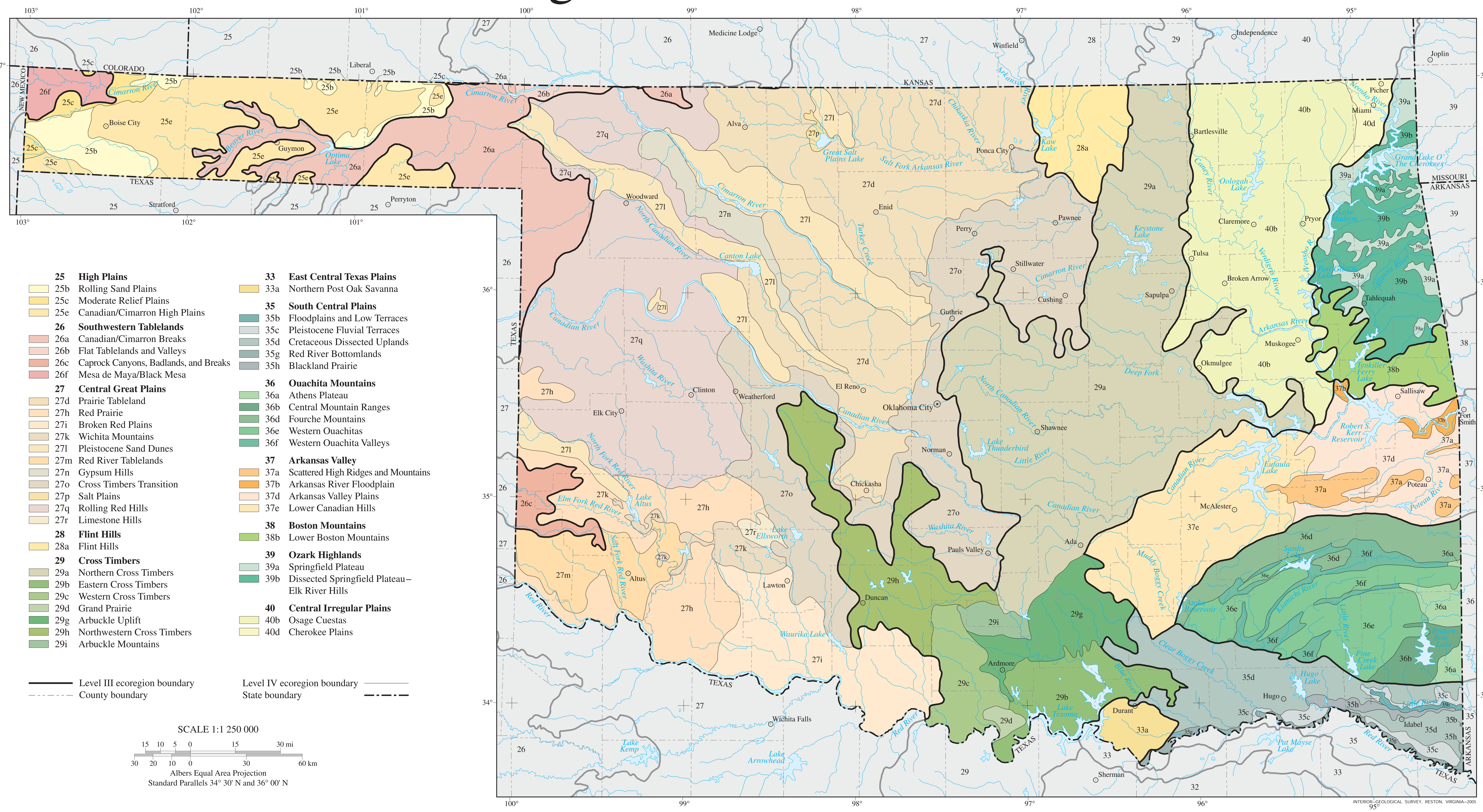
Ecoregions of Oklahoma



Ecoregions denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. They are designed to serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components. By recognizing the spatial differences in the capacities and potentials of ecosystems, ecoregions stratify the environment by its probable response to disturbance (Bryce, Omernik, and Larsen, 1999).

Ecoregions are general purpose regions that are critical for structuring and implementing ecosystem management strategies across federal agencies, state agencies, and nongovernment organizations that are responsible for different types of resources in the same geographical areas (Omernik and others, 2000). A Roman numeral hierarchical scheme has been adopted for different levels of ecological regions. Level I is the coarsest level, dividing North America into 15 ecological regions. Level II divides the continent into 52 regions (Commission for Environmental Cooperation Working Group, 1997). At level III, the continental United States contains 104 regions whereas the conterminous United States has 84 (U.S. Environmental Protection Agency, 2005). Level IV ecoregions are further subdivisions of level III ecoregions. Methods used by the U.S. Environmental Protection Agency (USEPA) to define the ecoregions are explained in Omernik (1995, 2004), Omernik and others (2000), and Gallant and others (1989).

The Oklahoma ecoregion map was compiled at a scale of 1:250,000; it revises and subdivides an earlier level III ecoregion map that was originally compiled at a smaller scale (Omernik, 1987; U.S. Environmental Protection Agency, 2005). The approach used to compile the Oklahoma ecoregion map is based on the premise that ecoregions can be identified through the analysis of the spatial patterns and the composition of biotic and abiotic characteristics that affect or reflect differences in ecosystem quality and integrity (Wiken, 1986; Omernik, 1987, 1995). These characteristics include physiography, geology, climate, soils, land use, wildlife, fish, hydrology, and vegetation (including "potential natural vegetation", defined by Küchler (p. 2, 1964) as "vegetation that would exist today" if human influence ended and "the resulting plant succession" was "telescoped into a single moment"). The relative importance of each characteristic varies from one ecoregion to another regardless of ecoregion hierarchical level.

In Oklahoma, there are 12 level III ecoregions and 46 level IV ecoregions; all but twelve of these level IV ecoregions continue into ecologically similar parts of adjacent states (Chapman and others, 2001, 2002; Griffith and others, 2004; Woods and others, 2004). Oklahoma's ecological diversity is strongly related to its varied climate, terrain, geology, soil, and land use.

Oklahoma contains vast plains, elevated karst plateaus, hills, and folded, low mountains. Precipitation increases eastward, rainfall variability increases westward, and both mean annual temperature and the length of the growing season increase southward. Soils influence the effectiveness and availability of moisture for plant life. Forests cover most of the Ozark Plateau and the Ouachita Mountains; they become progressively more stunted and open westward. Southern pine forests, typical of the Gulf Coastal Plain, occur in the southeast. Tall grass prairie, mixed grass prairie, and short grass prairie are native to central and western Oklahoma. Mesquite and other xeric plants characterize the dry southwest. Elevations drop from about 5,000 feet on Black Mesa in the northwestern Panhandle to about 300 feet in southeastern Oklahoma. Rivers follow regional topographic trends. Impoundments are common, and impact hydrology and the abundance and distribution of fish.

The strong east-west zonation of vegetation and climate in Oklahoma significantly influences the distribution of fauna, including reptiles, mammals, and insects (Blair and Hubbell, 1938; Webb, 1970). The western boundary of deciduous forest limits the westward extension of many eastern species. Southern Rocky Mountain fauna species intergrade with Great Plains species on Black Mesa in the western Panhandle. Great Plains fauna are found in intervening districts.

Much of Oklahoma's natural vegetation has been lost to overgrazing, burning, logging, erosion, and cultivation. Today, the state is a mosaic of grazing land, cropland, woodland, forests, and abandoned farmland. Wheat and alfalfa are the main crops. Grain sorghum is well adapted to sandy soils. Soybeans are becoming increasingly common on eastern plains and on moister parts of the prairie. Cotton is now concentrated on irrigated farmland in the southwest. Corn, once a major Oklahoma crop, has declined in importance due to soil depletion and periodic droughts.

This poster is part of a collaborative project between the USEPA Region 6, USEPA–National Health and

Environmental Effects Research Laboratory (Corvallis, Oregon), Oklahoma Water Resources Board, Oklahoma Biological Survey, Oklahoma Climatological Survey, Oklahoma Conservation Commission, Oklahoma Department of Agriculture, Food, and Forestry, Oklahoma Department of Environmental Quality, Oklahoma Geological Survey, The Nature Conservancy, U.S. Department of Agriculture–Natural Resources Conservation Service, U.S. Geological Survey (USGS), and USGS National Center for Earth Resources Observation and Science. This project is associated with an interagency effort to develop a common framework of ecological regions (McMahon and others, 2001). Reaching that objective requires recognition of the differences in the conceptual approaches and mapping methodologies that have been applied to develop the most common ecoregion-type frameworks, including those developed by the U.S. Department of Agriculture–Forest Service (Bailey and others, 1994), the USEPA (Omernik 1987, 1995), and the U.S. Department of Agriculture–Soil Conservation Service (1981). As each of these frameworks is further refined, their differences are becoming less discernible. Each collaborative ecoregion project, such as this one in Oklahoma, is a step toward attaining consensus and consistency in ecoregion frameworks for the entire nation.

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PRINCIPAL AUTHORS: Alan J. Woods (Oregon State University), James M. Omernik (U.S. Geological Survey), Daniel R. Butler (Oklahoma Conservation Commission–Water Quality Division), Jimmy G. Ford (U.S. Department of Agriculture–Natural Resources Conservation Service), James E. Henley (U.S. Department of Agriculture–Natural Resources Conservation Service), Bruce W. Hoagland (Oklahoma Biological Survey), Derek S. Arndt (Oklahoma Climatological Survey), and Brian C. Moran (Indus Corporation).

COLLABORATORS AND CONTRIBUTORS: Kurt Atkinson (Oklahoma Department of Agriculture, Food, and Forestry), Sandy A. Bryce (Dynamac Corporation), Shannen S. Chapman (Dynamac Corporation), Philip A. Crocker (U.S. Environmental Protection Agency), Glenn E. Griffith (Dynamac Corporation), Chris Hise (The Nature Conservancy), Charlie Howell (U.S. Environmental Protection Agency), Ron Jarman (Apex Environmental, Inc.), Thomas R. Loveland (U.S. Geological Survey), Kenneth V. Luza (Oklahoma Geological Survey), Phillip Moershel (Oklahoma Water Resources Board), Mark E. Moseley (U.S. Department of Agriculture–Natural Resources Conservation Service), Randy Parham (Oklahoma Department of Environmental Quality), and Brooks Tramell (Oklahoma Conservation Commission–Water Quality Division).

REVIEWERS: George A. Bukenhofer (U.S. Forest Service), Richard A. Marston (Boone Pickens School of Geology, Oklahoma State University), David V. Peck (U.S. Environmental Protection Agency), and Dale Splinter (Boone Pickens School of Geology, Oklahoma State University).

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Electronic versions of ecoregion maps and posters as well as other ecoregion resources are available at http://www.epa.gov/wed/pages/ecoregions.htm