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Western North American
*Juniperus* Communities

A Dynamic Vegetation Type

Edited by

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Preface

Juniperus woodlands and savannas in western North America are both extensive and dynamic. They are influenced and perhaps controlled by fire and anthropogenic factors, specifically herbivory. Their recent expansion into many grasslands has been carefully documented (Norris et al. 2001). Some of these Juniperus communities have shown dramatic changes in response to very recent global-change-type droughts (Breshears et al. 2005). However, the future community response to these global-change-type conditions is unknown. These Juniperus communities seem to be very sensitive and possibly pivotal in understanding global-change-type phenomena, including droughts.

This volume has grown out of a symposium held in San Antonio, Texas, in April 2004. The symposium was associated with the annual meeting of the Southwestern Association of Naturalists. Much of the material included has been published in the open literature and in reports by state and national agencies, although it has not appeared in one place in one document. A synthesis of past, current, and proposed future research on Juniperus woodland and savanna ecosystems is presented.

It has been difficult to develop a comprehensive understanding of Juniperus communities because they are quite diverse. They occur on shallow limestone soils in the eastern United States, on steep slopes in the Great Plains, and at low to mid-altitudes in the western United States, Texas, and Mexico (McPherson 1997). They occur in areas with very low rainfall bordering arid grasslands and deserts, as well as early-successional woodlands embedded in deciduous forest communities and most communities in between. Juniperus communities appear to occur along an elevation gradient as well as a spatial rainfall gradient in western North America. The Juniperus communities change dramatically along these gradients. On one end, a few scattered Juniperus plants are embedded in a grassland matrix. On the other end, grassland is found as small patches that are embedded in a Juniperus woodland matrix. If succession is involved in determining community structure along this grassland–forest continuum, the Juniperus woodland patches may end up within a forest matrix, or they may be replaced by forest species from within or below the canopy. However, neither the mechanism nor the dynamics of the process is well understood.
Although *Juniperus* woodlands are intermediate successional communities in the development of deciduous forests in relatively mesic areas, the successional sequence in more arid regions is unclear (Howard and Lee 2002). In addition, the dynamics of woody plant replacement in many of these *Juniperus* woodlands and savannas has only been partially investigated (McKinley and Van Auken 2005). The future structure of these communities is unknown, especially as it relates to global change.

There are four general sections in this volume. The first section concerns the ecology of these western North American *Juniperus* communities and includes six chapters. Chapter 1 covers the distribution of the various *Juniperus* species and where the different communities are found. It also covers Pleistocene community distributions and long-term changes in community locations. Chapter 2 is concerned with the composition and structure of western North American *Juniperus* communities and the factors that seem to control the structure, composition, and location of these communities. Chapter 3 compares the various landforms where communities are found. Chapter 4 examines changes in the environment between canopy and intercanopy positions and how those abiotic changes alter the community structure. The herbaceous understory of various *Juniperus* communities is examined in Chapter 5, and the importance of mycorrhizae to *Juniperus* seedlings is examined in Chapter 6.

Community changes associated with *Juniperus* encroachment are included in the second section, and there are five chapters. The ecological importance of encroachment of *Juniperus* plants into grasslands is examined in Chapters 7 and 8; alterations in ecosystem processes are examined in Chapter 9. Modifications in water budgets and the water cycle are examined in Chapters 10 and 11. The third section concerns human impact on *Juniperus* ecosystems and includes four chapters: Chapters 12 through 15 cover effects of herbivory, fire, physical treatments, and combinations thereof on various *Juniperus* communities and their potential degradation, restoration, and recovery. The fourth and last section contains one chapter, Chapter 16, which covers future research needs and possible directions.

Finally, this volume represents a significant effort and represents many years of effort by the various authors. This specific project was started more than 3 years ago. These efforts came from all my co-authors, friends, and others. I appreciate all their help and patience.

San Antonio
November 2006

*O.W. Van Auken*
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