Contents

Preface . . . vii

An Introduction from the State Geologist – *Peter A. Scholle* . . . **1** Lessons from the Pecos River – *Frank Titus*. . . **3**

CHAPTER ONE THE PHYSICAL FRAMEWORK

Regional Geology of the Pecos Country, New Mexico – *Lewis A. Land.* . . . 9

A Primer on Water: Ground Water, Surface Water and Its Development – Peggy S. Johnson. . . 14

Surface Water Hydrology of the Pecos River – John Longworth and John Carron. . . **20**

Regional Hydrology of the Roswell Artesian Basin and the Capitan Aquifer – Peggy Barroll and John Shomaker. . . 23

The Biohydrology of the Middle Pecos Region, New Mexico – *Paul L. Tashjian. . .* **28**

Overview of Water Operations in the Pecos River Basin – John Longworth and John Carron. . . **32**

Inflow-outflow diagrams for the Pecos River. . . 36

Modeling Hydrologic and Water Operations in the Pecos River Basin – Peggy Barroll, Eric Keyes, John Longworth, and Bhasker Rao. . . **39**

CHAPTER TWO THE HISTORICAL AND LEGAL FRAMEWORK

The U.S. Supreme Court in an Original Jurisdiction Action: *Texas v. New Mexico, No. 65 Orig.* (Pecos River) – *John E. Thorson.* . . **47**

The Endangered Species Act – Gary L. Dean. . . 52

Irrigation Districts in New Mexico: A Legal Overview of Their

Role and Function – John W. Utton. . . 55

Priority on the Pecos – G. Emlen Hall. . . 58

How We Got Here: A Brief History of Water Development in the Pecos Basin – *John W. Shomaker*. . . **61**

CHAPTER THREE CURRENT ISSUES

Assessment of New Mexico's Stream Gaging Program – Tom Morrison and Jack Frost. . . 67
Ground Water Is Renewable Only If Managed That Way – Alletta Belin, Consuelo Bokum, and Frank Titus . . . 70
Environmental Regulation of New Mexico's Dairy Industry – Dale M. Doremus. . . 76
Post-Wildfire Hydrology: Effects of Wildfire in New Mexico Ecosystems and Hydrological Response of Burned Watersheds – Deborah A. Martin. . . 80
Effects of Forest Harvest on Water Yields – Lee H. MacDonald. . . 83
Waters of the Sacramento Mountains Forest – Dan Abercrombie. . . . 88
Managing Forests and Woodlands for Increasing Water Yields – Lee H. MacDonald and Sam Fernald. . . 93
Surface Water Quality Monitoring in the Lower Pecos River Watershed – David Hogge and Neal Schaeffer. . . 98

Drought in New Mexico: History, Causes, and Future Prospects – David S. Gutzler. . . **101**

CHAPTER FOUR SOLUTIONS, TECHNOLOGY, AND A LOOK TO THE FUTURE

Building Consensus: A Plan for Long-term Management – *Reese Fullerton*. . . 109
Evaluating the Consensus/Adjudication Settlement Plan: Application of the Pecos River Decision Support System – *Beiling Liu, John Carron, and Jim McCord*. . . 112
Technical Advances in Water Use Efficiency – *J. Phillip King and A. Salim Bawazir*. . . 116
Beneficial Use of Oil-field Produced Waters: One Company's Efforts – *Frank Yates*. . . 121
Riparian Evapotranspiration and Vegetation Management – *A. Salim Bawazir and J. Philip King*. . . 126
Salt Cedar Control and Riparian Habitat Restoration – *John P. Taylor and Kirk C. McDaniel*. . . 128
The Future of Water in New Mexico – *Norman Gaume*. . . 134
List of Contributors. . . 138

Photo Credits. . . 144

Acronyms. . . **145**

Generalized Stratigraphy of the Lower Pecos Region. . . 148

Generalized Geologic Map of the Lower Pecos Region. . . Inside back cover

v