

# California's Forests and Rangelands: 2010 Assessment

**Arnold Schwarzenegger**  
Governor  
State of California

**Lester Snow**  
Secretary for Natural Resources  
The Natural Resources Agency

**Del Walters**  
Director  
California Department of Forestry and Fire Protection

**CALIFORNIA DEPARTMENT OF FORESTRY AND FIRE PROTECTION  
FIRE AND RESOURCE ASSESSMENT PROGRAM**

**June, 2010**

<http://frap.fire.ca.gov/assessment2010.html>

# Contributors

## **CAL FIRE and Fire and Resource Assessment Program Staff**

*We would like to recognize the contribution of the following people for their roles in developing the assessment and strategy reports.*

Ron Caluza (Research Analyst)  
Patti Cox (Publications Support)  
Dean Cromwell (Unit Chief)  
Rebecca I. Ferkovich (Research Analyst)  
George Gentry (Executive Officer, Board of Forestry and Fire Protection)  
Russ Henly, Ph.D. (Asst. Deputy Director, Resource Protection and Improvement)  
Chris Keithley, Ph.D. (Strategies Report, Lead)  
Mary Klaas Schultz (Research Program Specialist)  
Suzanne Lang (Publications Support)  
Kelly Larvie (Research Analyst)  
Robin Marose (Senior GIS, Lead)  
John Melvin (Urban Forestry Program Manager)  
Tiffany Meyer (Research Program Specialist)  
Lauren McNees (Research Assistant)  
David Passovoy (Environmental Scientist)  
Brian Peasley (Research Analyst)  
Timothy A. Robards, Ph.D. (Forest Biometrician)  
Mark Rosenberg (Research Program Specialist)  
Dave Sapsis (Fire Scientist)  
Tom Smith (Plant Pathologist)  
Bill Snyder (Deputy Director, Resource Management)  
James G. Spero (Research Program Specialist)  
Jim Thompson (Research Analyst)  
Crawford Tuttle (Chief Deputy Director)  
Rich Walker, Ph.D. (Assessment Report, Lead)

# Acknowledgements

*We wish to acknowledge and thank the many persons and agencies that helped review and comment on the assessment and strategy reports. In particular, we would like to thank the USFS for their funding support and collaboration throughout the entire project. The leadership and administrative support from David Bakke, Lisa Fischer, Jim Pena, and Laurie Tippin helped to ensure that a broad range of policy issues were considered across both public and private lands.*

Dominique Bachelet, Ph.D., Oregon State University  
Desiree Backman, Sacramento Tree Foundation  
David Bakke, U.S. Forest Service  
Barbara Bamberger, California Air Resources Board  
Phyllis Banducci, California Department of Forestry and Fire Protection  
Gina Bartlett, Center for Collaborative Policy  
Faith Berry, Fire Safe Council of San Diego County  
Cathy Bleier, California Department of Forestry and Fire Protection  
Clay Brandow, California Department of Forestry and Fire Protection  
Lisa Beutler, Center for Collaborative Policy  
Brad Burmark, U.S. Forest Service  
Pete Cafferata, California Department of Forestry and Fire Protection  
Dick Cameron, The Nature Conservancy  
Kim Camili, California Department of Forestry and Fire Protection  
Phil Cannon, U.S. Forest Service  
Jeff Calvert, California Department of Forestry and Fire Protection  
Dan Cayan, Ph.D., University of California – San Diego  
Lorna Dobrovolny, California Department Fish and Game  
Denise Downie, U.S. Forest Service  
Lisa Fischer, U.S. Forest Service  
Guido Franco, California Energy Commission  
Doug Forrest, California Department of Forestry and Fire Protection  
Dorian Fougères, Ph.D., Center for Collaborative Policy  
David Fournier, U.S. Forest Service  
Maria Garcia, U.S. Forest Service  
Janice Gauthier, U.S. Forest Service  
Charleen Gavette, National Marine Fisheries Service  
James Geiger, U.S. Forest Service  
Thomas Gillett, U.S. Forest Service  
Bruce Goines, U.S. Forest Service  
Daphne Greene, California Department of Parks and Recreation  
Rob Griffith, U.S. Forest Service  
Kamyar Guivetchi, Department of Water Resources  
Zachary Heath, U.S. Forest Service  
Lee Hannah, Ph.D., University of California – Santa Barbara  
Joe Hobbs, California Department Fish and Game  
Nancy J. Hughes, California Urban Forests Council  
Kevin Hunting, California Department Fish and Game

Justin Johnson, California Department of Forestry and Fire Protection  
Steve Jones, California Department of Forestry and Fire Protection  
Trini Juarez, U.S. Forest Service  
Tyrone Kelley, U.S. Forest Service  
Suzanne Lang, California Department of Forestry and Fire Protection  
Tom Lupo, California Department of Fish and Game  
Sandra Macias, U.S. Forest Service  
Trudie Mahoney, U.S. Forest Service  
Terri Marceron, U.S. Forest Service  
Jack Marshall, California Department of Forestry and Fire Protection  
Tad Mason, TSS Consultants  
Ray McDowell, California Department of Fish and Game  
Darlene McGriff, California Department Fish and Game  
Greg McPherson, PhD, U.S. Forest Service  
Julie Lydick, U.S. Forest Service  
Marc Meyer, U.S. Forest Service  
Wayne Mitchell, California Department of Forestry and Fire Protection  
Robert Motroni, California Department of Forestry and Fire Protection  
Peter Moyle, Ph.D., University of California – Davis  
Larry Orman, GreenInfo Network  
Don Owen, Ph.D., California Department of Forestry and Fire Protection  
Monica Parisi, California Department of Fish and Game  
Michelle Passero, The Nature Conservancy  
Jim Pena, U.S. Forest Service  
Amy Pettler, California Department of Transportation  
Sarah Pittiglio, California Energy Commission  
Jim Quinn, Ph.D., University of California - Davis  
Heather Raitt, California Energy Commission  
Brenda Rightmyer, California Fire Alliance  
Hugh Safford, U.S. Forest Service  
Klaus Scott, California Air Resources Board  
Misha Sarkovich, Ph.D., Sacramento Municipal Utility District  
Kevin Shaffer, California Department Fish and Game  
Sheri Smith, U.S. Forest Service  
Stephen Smith, Natural Resources Conservation Service  
Michele Steinberg, National Fire Protection Association  
Bill Stewart, Ph.D., University of California - Berkeley  
Randy Striplin, U.S. Forest Service  
Tina Terrell, U.S. Forest Service  
James Thorne, Ph.D., University of California – Davis  
Laurie Tippin, U.S. Forest Service  
Linda Tombras Smith, Ph.D., California Air Resources Board  
Mary Tyree, University of California – San Diego  
Doug Updike, California Department Fish and Game  
Joseph Vondracek, California Department Fish and Game  
Ann Walker, Western Governors' Association  
Doug Wickizer, California Department of Forestry and Fire Protection  
Meghan Woods, U.S. Forest Service

# Table of Contents

<i>Executive Summary</i>	1
<i>Introduction</i>	31
<b>1. Conserve Working Forest and Range Landscapes</b>	
<i>1.1 Population Growth and Development Impacts</i>	45
<i>1.2 Sustainable Working Forests and Rangelands</i>	59
<b>2. Protect Forests and Rangelands from Harm</b>	
<i>2.1 Wildfire Threat to Ecosystem Health and Community Safety</i>	95
<i>2.2 Forest Pests and Other Threats to Ecosystem Health and Community Safety</i>	113
<b>3. Enhance Public Benefits from Trees, Forests and Rangelands</b>	
<i>3.1 Water Quality and Quantity Protection and Enhancement</i>	137
<i>3.2 Urban Forestry for Energy Conservation and Air Quality</i>	161
<i>3.3 Planning for and Reducing Wildfire Risks to Communities</i>	179
<i>3.4 Emerging Markets for Forest and Rangeland Products and Services</i>	193
<i>3.5 Plant, Wildlife and Fish Habitat Protection, Conservation and Enhancement</i>	217
<i>3.6 Green Infrastructure for Connecting People to the Natural Environment</i>	235
<i>3.7 Climate Change: Threats and Opportunities</i>	251
<i>Beyond California: Bordering States</i>	273
<b>References</b>	283
<b>Appendix</b>	
<i>Data and Analytical Needs</i>	305
<i>Glossary</i>	317
<i>Acronyms</i>	331
<i>List of Figures</i>	333
<i>List of Tables</i>	337