Joint Fire Science Program Project 08-S-09

Fire Ecology and Management of Non-Forested Ecosystems in Western North America

Final Report: Description of Organizational Meetings and Development of a Publication Plan

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Introduction

It has been almost 30 years since the last major book on the ecology and management of fire was published that contained extensive information from non-forested ecosystems across western North America (Wright and Bailey 1982). During subsequent years there have been notable books that have focused largely on forested ecosystems (e.g. Agee 1993), and there was one very recent book that addressed many important grassland, shrubland, woodland, and forest areas, but its geographic extent was confined to California (Sugihara et al. 2006). No single book has since matched the geographic scope associated with non-forested ecosystems in western North America as that previously addressed by Wright and Bailey (1982).

Much has changed during the past few decades that warrant an updated synthesis of fire ecology in non-forested ecosystems. Exploding human populations and dramatic increases in the dominance of non-native invasive plants have led to increased fire occurrences and altered fire regimes that have catapulted fire management to the forefront of many lists of major threats to ecological and economic resources in non-forested ecosystems of western North America. As a result of this heightened concern, there has been a flush of new fire ecology studies that have in many ways altered previous thoughts about the inter-relationships between fire and vegetation in non-forested ecosystems.

In addition, most fire science books have focused on the physical aspects of fire and their effects on soils, hydrology, and vegetation, but have not significantly addressed effects on wildlife. The role of fire management in the broader context of land management has also been underrepresented in most fire science books, even though fire management is probably more affected by various land use and agency policies than anything else. Recently there has also developed a greater appreciation for a long-term perspective of fire management, and the potential effects of future changes in climate and other atmospheric conditions that may confound fire management planning efforts.

Land managers and others have been calling for more synthesis products that summarize the current state-of-the-science for major thematic and biogeographic areas, making the information more accessible and relevant to land managers. Recent years of record acreages burned, new incursions of invasive plants species, declines in many wildlife species, increasing human populations, new challenges related to land uses, and concern for how climate change may affect fuels and fire regimes in non-forested ecosystems of western North America have led many to call for an updated synthesis related to fire management in this region.

The JFSP has heeded the call for synthetic fire science products in non-forested ecosystems, and funded a number of projects to help fill this void. However, none of these projects comes close to addressing the scope of our proposed book, which spans the entire Intermountain West and Southwest bioregions. For example, the most expansive JFSP project to date in a non-forested ecosystem is the SageSTEP project, but that project only focuses on a specific part of the Intermountain West, namely Great Basin sagebrush steppe and the sagebrush ecotones with juniper and pinyon juniper woodlands. In addition, that project is specifically focused on developing tools to manage pinyon-juniper and cheatgrass invasions and reduce their negative impacts on resource values, not on the broader issues of fire ecology and management over multiple non-forested bioregions. We are also aware of numerous other past and current JFSP projects that are relevant to our proposed book, and know of some proposals in development that will be submitted to the JFSP in the near future (e.g. a field study proposal to evaluate past postfire seedings in non-forested ecosystems and a literature meta-analysis to evaluate information in past ESR project reports). These other JFSP projects will no doubt produce useful products, but their primary emphases (and costs) are associated with implementing new research, not on carefully producing effective synthesis products..

Project Objectives and Scope

The objective of this project is to create a book describing the Fire Ecology and Management of Non-Forested Ecosystems in Western North America. The regional scope will be non-forested areas west of the Continental Divide. This will include parts of the following Level I Ecoregions 10.0 (North American Deserts), 11.0 (Mediterranean California), and 12.0 (Southern Semi-Arid Highlands).

Specific questions that this book will address will include the following:

- What is the current state-of-the science related to fire in non-forested ecosystems of western North America?
- How do fires and fire regimes affect soils, hydrology, plants, and wildlife?
- How do these effects vary among major bioregions and vegetation types?
- What can land managers do to influence the effects of fires and fire regimes?
- How is fire management affected by other land use policies?
- How might future changes in climatic conditions affect fire effects and fire management

Organizational Meetings

We held a series of online meetings to bring together authors previously identified as contributors for the proposed. The purpose of these meetings was to:

- Discuss and finalize the book outline and author assignments
- Develop instructions for authors to maximize continuity among chapters
- Finalize a project timeline and milestones
- Obtain commitments from each author to abide by the instructions for authors and the project timeline

Authors

Book Editors

Matt Brooks (U.S. Geological Survey, Western Ecological Research Center)
Stephen Bunting (University of Idaho)
Richard Miller (Oregon State University)
Kevin Shaffer (California Natural Resources Agency, Department of Fish and Game)

Publication Manager

Kevin Shaffer

Other Confirmed Authors

Jim Ansley (Texas A&M University)
Peter Brown (Rocky Mountain Tree Ring Research)
Tom Dudley (UC Santa Barbara)
CJ Fotheringham (UCLA)
Sam Fuhlendorf (Oklahoma State University)
Emily Heyerdahl (USFS)
Dale Johnson (University of Nevada, Reno)
Jon Keeley (USGS)
Stanley Kitchen (USFS)
Robert Klinger (USGS)
Jim Lenihan (USFS)
Chris McDonald (University of California Cooperative Extension)
Randy McKinley (USGS)
Penny Morgan (University of Idaho)
Ron Neilson (USFS, PNW)
Keith Owens (Oklahoma State University)
Fred Pierson (USDA ARS)
David Pyke (USGS)
Benjamin Rau (University of Nevada, Reno)
Bruce Roundy (Brigham Young University)
Nelson Siefkin (NPS, Pacific West Region)
Robin Tausch (USFS, Rocky Mountain Research Station)
Robin Wills (NPS, Pacific West Region)
Tom Zimmerman (NIFC)

Chapter Outline

Chapter 1. Introduction (*Brooks, Bunting, Miller, and Shaffer*)

- Outline the purpose, scope, topics, and organizational structure of the book.
- Introduce the region covered
- Explain the nature of fire weather, fuels, and behavior in non-forested ecosystems.
- Explain fire as ecological and land management concepts in non-forested ecosystems (i.e. grasslands, shrublands, and woodlands)
- Summarize the recent fire history of the region using agency and MTBS fire data

Part I. Principles of Fire Ecology in Non-Forested Ecosystems

Chapter 2. Characterizing Fire and Vegetation Dynamics in Woodland, Shrubland and Grassland Ecosystems (*Heyerdahl, Kitchen, Brown, Morgan*)
Chapter 3. Fire Effects on Soils (*Johnson, Rau*)
Chapter 4. Fire Effects on Hydrology (*Pierson*)
Chapter 5. Ecophysiological Responses of Plants to Fire (*Owens, Ansley*)
Chapter 6. Vegetation Responses to Fire: Individuals, Populations, and Communities (*Pyke, Brooks*)
Chapter 7. Wildlife Responses to Fire: Individuals, Populations, and Communities (*Ostoja et al.*)

Part II. Bioregional Summaries

Major and minor headers (in bold font) for each chapter within Section III

- **Biogeographic Description** (including a map formatted similarly for each chapter)
    - **Geographic Range** (topography, climate, and other physical characteristics)
    - **Ecological Range** (vegetation/fuel types)
- **Interactions Between Vegetation and Fire** (authors have the discretion to divide this section into ecotype subsections each addressing the three header topics below, or to address the entire bioregion for each of the header topics)
    - **Vegetation Effects on Fire Behavior**
    - **Fire Effects on Vegetation** (distinguish between initial burn severity vs. long-term successional patterns)
    - **Fire Regimes** (interactions between veg and fire over time, history of)
        - Past
        - Present
        - Potential future
- **Soils and Watershed Issues** (issues important, and potentially unique, to the bioregion)
- **Species Management Issues** (key plant or animal species that interface with fire management; e.g. effects of too much or too little fire on the species, effects of fuels treatments on species habitat, ESA/NEPA issues, etc.)
- **History of Fire Management** (describe past and present approaches to fire management in the bioregion; may address fuels management, fire suppression, post-fire management, and/or fire planning approaches; also discuss predicted changes for the future related to climate change, land use trends, etc.)

Chapter 10. Hot Desert Grasslands and Shrublands (*McDonald and Brooks*)
potential ecotype subsections: Chihuahuan desert; Sonoran desert; Mojave Desert

Chapter 8. Cold Desert Shrublands and Steppe (*Bunting, Miller*)
potential ecotype subsections: Columbia plateau; Great Basin; Colorado plateau; Mojave Desert

Chapter 9. Pinyon and Juniper Woodlands (*Miller, Tausch*)
potential ecotype subsections: Columbia plateau; Great Basin; Colorado plateau; Mojave Desert; Great Plains; cismontane California
Chapter 10. Chaparral Shrublands (*Keeley and Fotheringham*)
potential ecotype subsections: coastal scrub; California chaparral; Arizona chaparral; mountain brush; juniper-oak woodlands
Chapter 11. California Grasslands (*Klinger et al.*)
potential ecotype subsections: Coastal Prairie; Central Valley Grassland; oak savanna
Chapter 12. Riparian (*Dudley et al.*)
potential ecotype subsections: Grasslands; Shrublands; Woodlands; Oases

Part III. Principles of Fire Management in Non-Forested Ecosystems
Chapter 13. The Advantages and Limitations of Fire Management (*Tom Zimmerman, et al.*)
Chapter 14. Planning Tools for Fire Managers (*Randy McKinley et al.*)
Chapter 15. Integrating Invasive Plants into Fire Management (*Brooks*)
Chapter 16. Fuels management (*TBD*)
Chapter 17. Fire suppression (*Seifkin and Wills*)
Chapter 18. Post-fire Stabilization, Rehabilitation, and Restoration Strategies (*Bruce Roundy*)
Chapter 19. Interactions of Fire Management with Land Uses (*Fuhlendorf et al.)*
Chapter 20. Potential Effects of Climate Change on Fire Management (*Ron Neilson and Lenihan*)
Chapter 21. Learning from the Past to Predict the Future (*Brooks, Bunting, Miller, and Shaffer*)

Timeline

	2010				2011				2012			
	W	**Sp**	**Su**	**F**	**W**	**Sp**	**Su**	**F**	**W**	**Sp**	**Su**	**F**
Finalize book outline and authors	x	x										
Review and approve chapter outlines	x	x	x									
Write 3 sample chapters			x	x	x	x						
Write initial chapter drafts			x	x	x	x	x	x	x			
Peer-reviews & revisions							x	x	x	x	x	
Final compilation and formatting											x	x
Submit manuscript to the publisher												x

Literature Cited

Agee, J.K. 1993. Fire ecology of Pacific Northwest forests. Island Press. Washington, D.C.
Sugihara, N.G., J.W. van Wagtendonk, K.E. Shaffer, J. Fites-Kaufman, and A.E. Thode (eds). 2006. Fire in California's Ecosystems. The University of California Press. Berkeley.
Wright, HA. and A.W. Bailey, Arthur W. 1982. Fire Ecology. John

Appendix A
Instructions for Contributing Authors

The following instructions will aid authors in developing their sections and chapters for the manuscript. Because we have not entered into a publishing agreement with a specific publisher, consistency and completeness of each manuscript file will allow for the most effective coordination with any publisher.

GENERAL MANUSCRIPT GUIDELINES

All manuscripts must be written using times new roman 12-point font and be double-spaced with 1 inch margins.

Use MS Word for: text; references; tables; captions for figures
Use MS Excel for: spreadsheets for tracking information
Use Corel Draw or Adobe InDesign & Illustrator for: drawings & illustrations
**note that if you will be creating graphic art, please contact the Publication Manager ASAP*

Chapters within Sections I, II, and IV, are to be limited to 25 pages plus 5 figs/tables/maps.

Chapters within Section III are to be limited to 40 pages plus 15 figs/tables/maps.

These page limits are based on preliminary feedback from potential publishers indicating a primary interest in the content of the Section III chapters. These are not hard and fast limits, but if authors want to exceed them they need to submit their request and explanation via email to Publication Manager (Kevin Shaffer) and cc the Lead Editor (Matt Brooks).

MANUSCRIPT FILE CONVENTIONS

File types

You will be creating several files, depending on the content of your chapter(s). You need a separate Word file for each of the following:

1. Text (text)
2. References (references)
3. Figure captions (figcaptions)
4. Tables (tables)

Each figure will be its own file.

File name convention

Chpt[two-digit #]_[file type]_[mmddyy].doc

Examples: chpt01_text_082808.doc
chpt12_figcaptions_010109.doc

Text File

Font- Times New Roman
Font size- 12
Line spacing- double
Margins: 1 inch (top, bottom, left, right)
Paragraph designation- Do not indent. Instead, use an extra space.

Figure, map, and table designation- Do not insert tables, maps, or figures into text. Document where the figure or map should be inserted by using a single-line, bolded reference. Left-align and include an additional spacing below and above, and use the following convention:

Insert Figure [chapter #].[sequential #] here
or
Insert Table [chapter #].[sequential #] here
or
Insert Map [chapter #].[sequential #] here

First references in your chapter[1]

Species names: First time: full common name, followed by scientific name in parentheses.
Subsequent reference- abbreviated scientific name

Example: purple needlegrass (*Nassella pulchra*)
N. cernua

Phrases needing abbreviation:
First time: full phrase, followed by upper-case abbreviation including all initial characters in parentheses.
Subsequent reference- the uppercase abbreviation

Example: United States Fish and Wildlife Service (USFWS)
USFWS **Note: NOT FWS or Service.*

Figures:

Figures will refer to technical drawings & illustrations and photographs.

Figure naming convention: Figure[single space][chapter #].[sequential #].[two spaces]Title.

Example: Figure 1.6. Overview of fire regime attributes.

Photographs

[1] You will need to initially populate a spreadsheet of abbreviations and species names you will be using. See below.

Photographs will be considered figures [see above]. We will need the original photograph, negative or slide. We are likely to scan each at 600 dpi for flexibility. Mail materials to me. I will:

1. maintain a master list of original material provided me;
2. return original material directly to you after publication of the text;
3. develop, distribute, and maintain artist permission [see below];
4. ensure photographs are properly credited in the text.

Maps

Maps will be dealt with uniquely. If you plan on including a map, please contact the Publication Manager ASAP. You need to be able to obtain or provide us the ability to obtain the data layers and/or shape files to develop any necessary maps. It may not be able to use an existing single electronic file of a map you may wish to use. If there is an existing map that is properly formatted and we can use, we will still need permission [see below].

PERMISSIONS

Two types of permissions must be provided- public domain and copy-right.

Public domain

For material in the public domain, we still need to provide credit to the originator. This is obvious in the case with references. But this also must be done for existing material used directly or refined for the text. This will most often be encountered when using an existing figure or adapting an existing figure.

Example:	Figure 1.6. Distribution of climatic potential vegetation types (Riegel et al. 2006)
	or
	Figure 1.6. Distribution of climatic potential vegetation types (From Riegel et al. 2006)

References

Please follow the following conventions for your references.

<u>In text</u>:	1. Single reference (last name[single space]year)
	2. Multiple references- chronological order then alphabetical order, each reference separated by a comma:
Example:	(DeMarrias et al. 1965, Fosberg and Schroeder 1966, Schroeder et al. 1966, Schultz and Warner 1982, Hayes et al. 1984, Lu and Turco 1995)

Reference file

1. Do not indent;

2. single space on either side of the publishing year, after title and between journal name and page reference;
3. completely spell out name of journal;
4. always include the page number OR number of pages when referencing journal articles, articles in symposia, or books;

Examples:

1. Journal reference

Keeley, J.E. 1977. Seed production, seed populations in soil, and seedling production after fire for two congeneric pairs of sprouting and non-sprouting chaparral shrubs. Ecology 58:820-829.

2. Symposium article

Keeley, J.E. 1982. Distribution of lightning and man-caused wildfires in California. Pages 431-437. *In* C. E. Conrad and W. C. Oechel, editors. Proceedings of the symposium on dynamics and management of Mediterranean-type ecosystems. USDA Forest Service, Pacific Southwest Forest and Range Experiment Station, General Technical Report PSW-58.

3. Text chapter

Keeley, J.E. 2000. Chaparral. Pages 203-253. *In* M. G. Barbour and W. D. Billings, editors. North American terrestrial vegetation. Cambridge University Press, Cambridge, United Kingdom.

4. Articles in review

Keeley, J.E., C.J. Fotheringham, and M.B. Keeley. 2004a. Dyanmics of postfire succession in mediterranean-climate shrublands. I. Life form changes. Journal of Ecology. *in review*.

5. Government document:

United States Departments of Agriculture and Interior. 2001. The National Fire Plan: A Report to the President In Response to the Wildfires of 2000 September 8, 2000. Managing the Impact of Wildfires on Communities and the Environment. 19 pages.

6. Government statute or regulation:

United States Fish and Wildlife Service. 1997. Final Rule: Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Callippe Silverspot Butterfly and the

Behren's Silverspot Butterfly and Threatened Status for the Alameda Whipsnake. Federal Register 62(234):64306-64320.

Personal communication

If you are going to utilize personal communications as references, please include all the following information.
[Full name, last name first].[single space].[title, organization].[single space][full date]

Example: Shaffer, Kevin E. Environmental Program Manager, Fisheries Branch, California Department of Fish and Game. August 28, 2008

Copyright

For original material that may be protected by copyright, we need 1) written permission from the originator and acknowledgement in the manuscript. I will provide you with a letter template for you to obtain artist permission to use photographs, quotes, or other materials. Those permissions will be sent and catalogued by me.

NOMENCLATURE

Preliminarily, the following will be used as taxonomic reference:

1. **PLANTS**: The PLANTS Database, U.S. Department of Agriculture, Natural Resources Conservation Service, http://plants.usda.gov
2. **INSECTS:** To be determined.
3. **AMPHIBIANS AND REPTILES:** To be determined.
4. **FISHES:** Nelson, J.S., E.J. Crossman, H. Esponosa~Perez, L.T. Findley, C.R. Gilbert, R.N. Lea, and J.D. Williams. 2004. Common and scientific names of fishes from United States, Mexico, and Canada, sixth edition. American Fisheries Society Special Publication 29, American Fisheries Society.
5. **BIRDS:** American Ornithologists' Union. 1998. The Check-list of North American Birds: The species of birds of North America from the Arctic through Panama, including the West Indies and the Hawaiian Islands, seventh edition.
6. **MAMMALS:** D.E. Wilson and D.M. Reeder. 2005. Mammal species of the world, third edition, revised. John Hopkins University Press, Baltimore, Maryland.

RESPONSIBILITIES, COORDINATION, AND CORRESPONDENCE

Team Responsibilities

Editors

- Develop the book outline.

- Recruit and select chapter authors.
- Develop instructions for authors.
- Select a species nomenclature standard.

Responsibilities for managing the writing process for the chapters within the four sections of this book will be separately delegated. Specific tasks will include communicating with chapter authors, managing the peer-review process, coordinating with the publication manager, and making final approval decisions for each chapter in the section they are managing.

Section I (Bunting)
Section II (Shaffer)
Section III (Brooks)
Section IV (Miller)

Publication Manager
Communication and Administration

- Manage communications between editors and authors
- Coordinate and facilitate up to three authors' meetings.

Formatting and Editing

- Develop general guidelines and instructions for authors
- Review all final chapter drafts to ensure species nomenclature standards and make corrections if necessary
- Create species list index
- Create glossary of key terms
- Serve as POC for the editors in negotiations for a publication contract with a University Press. Represent the editors in all subsequent communications with publisher.
- Collate all final chapter literature cited sections into a single formatted section at the end of the book.
- Manage the process of formatting tables and figures for publication. If necessary, sub-contract the task of creating final publication quality figures to deliver to the publisher.

Chapter Authors
Comply with the outlines, templates, and deadlines.

Coordination among chapters

An Excel file will be created with various sheets dedicated to:

1. Abbreviations
2. Species names
3. Figure titles
4. Table titles
5. Map titles

The spreadsheet will be initially distributed to each author to populate with information from your initial draft. The spreadsheet will be updated as each author revises their chapters.

Correspondence

Email all publication questions and documents to the Publication Manager, Kevin Shaffer (kvnshffr@comcast.net, kshaffer@dfg.ca.gov, home 530-753-7155, work 916-327-8841), and cc the Lead Editor, Matt Brooks (matt_brooks@usgs.gov, 559-240-7622). Please begin the subject line with the keywords "**fire text**" so that we can more easily track these emails, and use all three email addresses listed.

Original photographs and original-signed permissions should be mailed to Kevin Shaffer at the following address: 2529 Loyola Drive, Davis CA 95618