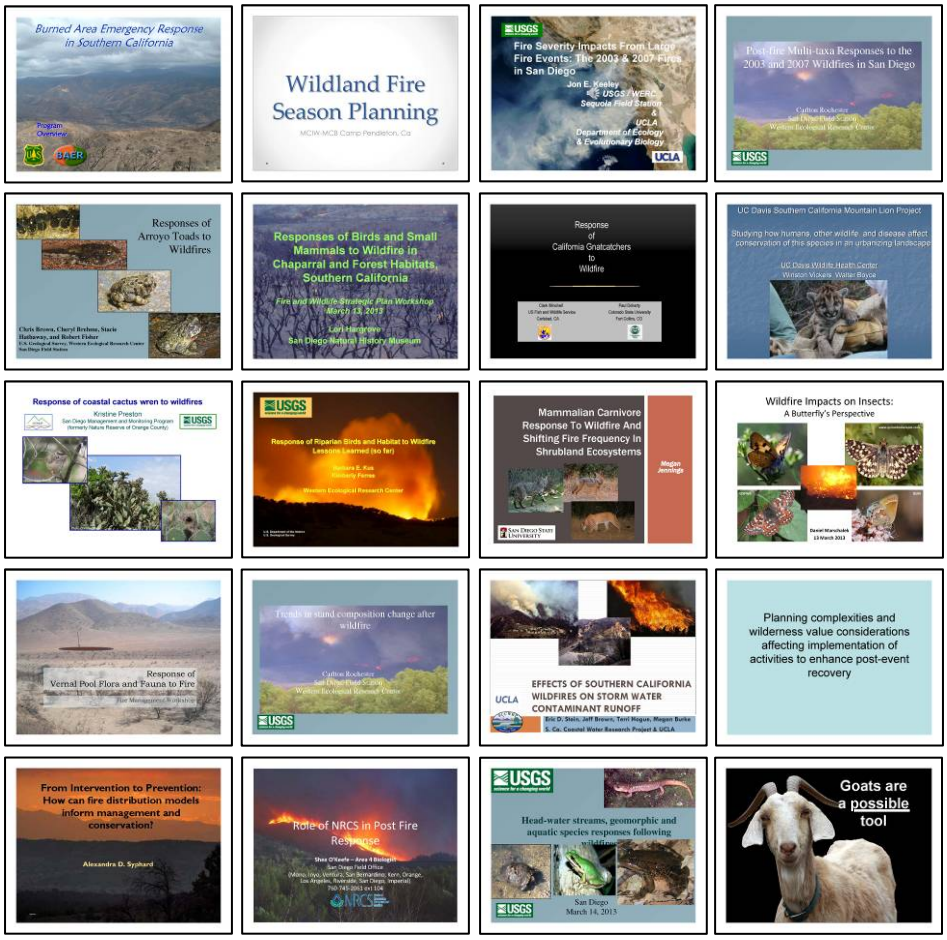
FIRE AND WILDLIFE STRATEGIC PLAN WORKSHOP
SAN DIEGO COUNTY - CALIFORNIA

Meeting Summary and Recommendations



Prepared for:

San Diego Association of Governments – Environmental Mitigation Program

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
WESTERN ECOLOGICAL RESEARCH CENTER

FIRE AND WILDLIFE STRATEGIC PLAN WORKSHOP
SAN DIEGO COUNTY - CALIFORNIA

By: Carlton J. Rochester and Robert N. Fisher

U.S. GEOLOGICAL SURVEY
WESTERN ECOLOGICAL RESEARCH CENTER

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Prepared for:

San Diego Association of Governments – Environmental Mitigation Program

San Diego Field Station – San Diego Office
USGS Western Ecological Research Center
4165 Spruance Road, Suite 200
San Diego, CA 92101

Sacramento, California
2014

U.S. DEPARTMENT OF THE INTERIOR
Sally Jewell, SECRETARY

U.S. GEOLOGICAL SURVEY
Suzette Kimball, Director

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Table of Contents

Workshop Purpose & Objectives

On March 13th and 14th, 2013, the U.S. Geological Survey (USGS), in collaboration with the San Diego Management and Monitoring Program (SDMMP), hosted a workshop to bring together land managers, researchers, and fire management personnel to continue the discussions on the topic of wildland fire impacts to at risk natural resources. The purpose of this workshop was to present, collaborate, and plan wildland fire-related research, management, responses, and future recovery as it applies to the "at risk" natural resources of San Diego County. Speakers and attendees were selected based on their experience, expertise, and roles in managing biological resources, fires, and conserved lands within San Diego County. Lessons from the research and monitoring programs conducted after the previous fires were shared, with the goal that these lessons would be applied to conservation and protection of the diverse resources of San Diego County. A science advisory panel was invited based on their expertise in and familiarity with wildfire impacts, fire management practices, and local ecological conditions. The role of the science panel was to ask questions, provide feedback during the workshop, and to pre-review and comment on this report.

Through this collaborative effort with the larger San Diego fire management and natural resource/fire research community, the USGS looks to produce a more robust account of previous efforts and a strong set of operational goals and objectives for future wildland fire emergency events. The intention for this report is for it to serve as a first step in the development of a "Fire and Natural Resource Management Strategic Framework" that will be focused on at risk resources with implementable management actions that will fall into three wildland fire planning categories: pre-fire planning and prevention, suppression, and post-fire emergency stabilization and rehabilitation activities.

Date & Location: Day 1 (March 13, 2013): 8:30 AM - 5:30 PM
Day 2 (March 14, 2013): 8:00 AM - 3:30 PM

USGS, Western Ecological Research Center Conference Room
4165 Spruance Road, Suite 200
San Diego, CA 92101

Workshop Organizers:

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Workshop Facilitator:

Steven Schwarzbach, Center Director, Western Ecological Research Center, US Geological Survey

Scientific Advisory Panel Members:

Name	Organization	Region	Specialty
Marti Witter	National Park Service-Santa Monica	Southern California	Fire Ecologist

David Pilliod	USGS	Northwest	Fire ecology, Monitoring design
Harvey Lillywhite	University of Florida	Southeast US	Vertebrate Fire ecology
Janet Franklin	Arizona State University	Southern California	Conservation ecology, GIS

Workshop Overview, Materials and Structure of the Report

The presenters and participants were informed that the workshop, presentations, and discussions were documented so as to be available to a wider audience and can continue to serve as discussion points. The entire duration of the workshop was recorded to video and has been uploaded to YouTube. These are available at:

http://www.youtube.com/user/usgswercfisherlab

The video has been divided up so that each presenter can be viewed as a separate video clip. The discussion sessions on Day 2 are longer and have not been divided into the individual topics.

For each speaker, a brief summary of their presentation, including audience questions and subject matter reference material, has been prepared and is available at:

https://drive.google.com/folderview?id=0B9zdgMIuSETLVDJzR3FnZS1nRjQ&usp=sharing

For speakers who used a slide presentation as part of their talk, there is a pdf version of the presentation available at the same web address.

The agenda for the workshop is included below. This includes a list of the speakers, their topics, and the names of any associated files.

The discussions during the workshop are summarized below. The opinions presented during the discussions are those of the individuals expressing them and may not reflect the opinion of the USGS or of the SDMMP. Although the majority of notes were developed from the video recordings, they may not be in the same order as they occurred during the workshop. The notes have been reorganized in an attempt to organize the conversations.

Workshop Agenda - Outline of Workshop Presentations and Discussion Topics

Fire and Wildlife Strategic Plan Workshop San Diego County - California

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WORKSHOP AGENDA

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Day 1 (March 13, 2013)

Scientific Working Group

Introductions (name, agency, expertise); background, goals and objectives; Expected outcomes from meeting.

Presentation Session

Review of Wildfire Management Process in San Diego County What examples of fire management plans already exist for conserved lands within San Diego County? What from these examples can be applied to the rest of the preserve?

Presentations:

0_01 Forest Service Model: Role of Resource Advisor on Wildfires

Kirsten Winter - U.S. Forest Service

Video – USGS-SDMMP Workshop Day 1 – 9:03 Kirsten Winters USDA Forest Service

Fire Management Strategy summary – 0_01 FMS_WintersK

0_02 Forest Service Model: Burned Area Emergency Response in Southern California

Megan Jennings – U.S. Forest Service

Video – USGS-SDMMP Workshop Day 1 – 9:07 Megan Jennings USDA Forest Service

PDF of Power-point – 0_02 JenningsM

Fire Management Strategy summary – 0_02 FMS_JenningsM

0_03 Forest Service Model: Post-fire Management and Restoration

Gloria Silva – U.S. Forest Service

Video – USGS-SDMMP Workshop Day 1 – 9:35 Gloria Silva USDA Forest Service

Fire Management Strategy summary – 0_03 FMS_SilvaG

0_04 Review of CAL FIRE mandate in San Diego County

Thom Porter, Unit Chief – CAL FIRE San Diego Unit

Video – USGS-SDMMP Workshop Day 1 – 9:45 Thom Porter CAL FIRE San Diego Unit

Fire Management Strategy summary – 0_04 FMS_PorterT

0_05 Wildland fire season planning aboard MCI-WEST Marine Corps Base Camp Pendleton

Gabriel Goodman and Deborah Bieber – Marine Corps Base Camp Pendleton

Video – USGS-SDMMP Workshop Day 1 – 10:20 Gabriel Goodman Camp Pendleton
PDF of Power-point – 0_05 GoodmanG
Fire management Strategy summary – 0_05 FMS_GoodmanG

Presentation Session Theme 1

Theme 1: What have we learned?: What did we learn from the 2003 and 2007 and other large fires with regard to fire impacts on biological resources and ecological processes? Review of scientific findings by taxa and process.

Presentations:

1_01 Fire severity impacts from large fire events: The 2003 & 2007 Fires in San Diego
Jon Keeley – U.S. Geological Survey
Video – USGS-SDMMP Workshop Day 1 – 11:00 Jon Keeley USGS Western Ecological Resource Center (WERC)
PDF of Power-point – 1_01 KeeleyJ
At risk resource assessment summary – 1_01 ARRA_KeeleyJ

1_02 Post-fire multi-taxa responses to the 2003 and 2007 wildfires in San Diego
Carlton Rochester – U.S. Geological Survey
Video – USGS-SDMMP Workshop Day 1 – 11:30 Carlton Rochester USGS WERC
PDF of Power-point – 1_02 RochesterC
At risk resource assessment summary – 1_02 ARRA_RochesterC

1_03 Responses of arroyo toads to wildfires
Christopher Brown – U.S. Geological Survey
Video – USGS-SDMMP Workshop Day 1 – 11:40 Chris Brown USGS WERC
PDF of Power-point – 1_03 BrownC
At risk resource assessment summary – 1_03 ARRA_BrownC

1_04 Responses of birds and small mammals to wildfire in chaparral and forest habitats, Southern California
Lori Hargrove – San Diego Natural History Museum (SDNHM)
Video – USGS-SDMMP Workshop Day 1 – 11:50 Lori Hargrove SDNHM
PDF of Power-point – 1_04 HargroveL
At risk resource assessment summary – 1_04 ARRA_HargroveL

1_05 Response of California gnatcatchers to wildfires
Clark Winchell – U.S. Fish and Wildlife Service (USFWS)
Video – USGS-SDMMP Workshop Day 1 – 12:00 Clark Winchell USFWS
PDF of Power-point – 1_05 WinchellC
At risk resource assessment summary – 1_05 ARRA_WinchellC

1_06 University of California Davis (UC Davis) Southern California Mountain Lion Project: Studying how humans, other wildlife, and disease affect conservation of this species in an urbanizing landscape

Winston Vickers – UC Davis Wildlife Health Center

Video – USGS-SDMMP Workshop Day 1 – 13:45 Winston Vickers UC Davis

PDF of Power-point – 1_06 VickersW

At risk resource assessment summary – 1_06 ARRA_VickersW

1_07 Response of coastal cactus wren to wildfires

Kris Preston – San Diego Management and Monitoring Program

Video – USGS-SDMMP Workshop Day 1 – 13:55 Kris Preston SDMMP/USGS WERC

PDF of Power-point – 1_07 PrestonK

At risk resource assessment summary – 1_07 ARRA_PrestonK

1_08 Responses of riparian birds and habitat to wildfire: Lessons learned (so far)

Barbara Kus – U.S. Geological Survey

Video – USGS-SDMMP Workshop Day 1 – 14:10 Barbara Kus USGS WERC

PDF of Power-point – 1_08 KusB

At risk resource assessment summary – 1_08 ARRA_KusB

1_09 Mammalian carnivore response to wildfire and shifting fire frequency in shrubland ecosystems

Megan Jennings - Cleveland National Forest, U.S. Forest Service

Video – USGS-SDMMP Workshop Day 1 – 14:20 Megan Jennings SDSU

PDF of Power-point – 1_09 JenningsM

At risk resource assessment summary – 1_09 ARRA_JenningsM

1_10 Deer and big-horn sheep population response pre- and post-fire

Randy Botta - California Department of Fish and Wildlife

Video – USGS-SDMMP Workshop Day 1 – 14:40 Randy Botta CDFW

At risk resource assessment summary – 1_10 ARRA_BottaR

1_11 Wildfire impacts on insects: A butterfly's perspective

Dan Marschalek – San Diego State University (SDSU)

Video – USGS-SDMMP Workshop Day 1 – 14:55 Dan Marschalek SDSU

PDF of Power-point – 1_11 MarschalekD

At risk resource assessment summary – 1_11 ARRA_MarschalekD

1_12 Response of vernal pool flora and fauna to fire

Betsy Miller - City of San Diego Department of Parks and Recreation

Video – USGS-SDMMP Workshop Day 1 – 15:07 Betsy Miller City of San Diego

PDF of Power-point – 1_12 MillerB

At risk resource assessment summary – 1_12 ARRA_MillerB

1_13 Trends in stand composition change after wildfire

Carlton Rochester – U.S. Geological Survey

Video – USGS-SDMMP Workshop Day 1 – 15:15 Carlton Rochester USGS WERC

PDF of Power-point – 1_13 RochesterC

At risk resource assessment summary – 1_13 ARRA_RochesterC

1_14 Effects of Southern California wildfires on storm water contaminant runoff

Eric Stein - Southern California Coastal Water Research Project (SCCWRP)

Video – USGS-SDMMP Workshop Day 1 – 16:00 Eric Stein SCCWRP

PDF of Power-point – 1_14 SteinE

At risk resource assessment summary – 1_14 ARRA_SteinE

1_15 What plant species may be at risk from wildfire in San Diego County

Tom Oberbauer – AECOM (T. Oberbauser was unable to attend the workshop but the materials that were prepared for the workshop are included here)

PDF of comments – 1_15 OberbauerT

At risk resource assessment summary – 1_15 ARRA_OberbauerT

Discussion Session Theme 2

Theme 2: What pre-fire actions (pre-fire planning and prevention) can be taken before the next wild fires to reduce impacts or to increase the resiliency of "at risk" resources and what are the ecological trade-offs in each of these strategies.

A. How do we identify portions of the county where baseline data may be lacking/where habitat hasn't burned recently/where habitat has burned too frequently?

Video – USGS-SDMMP Workshop Day 1 – 16:30 Discussion

PDF of Power-point – Theme2A

Presentations:

2_01 Planning complexities and wilderness value considerations affecting implementation of activities to enhance post-event recovery

Eric Hollenbeck - Cuyamaca State Park (SP)

Video – USGS-SDMMP Workshop Day 1 – 17:05 Eric Hollenbeck Cuyamaca State Park

PDF of Power-point – 2_01 HollenbeckE

At risk resource assessment summary – 2_01 ARRA_HollenbeckE

B. Can predictive models be used to identify where ignition sources intercept at risk resources/biodiversity?

Presentations:

2_02 From intervention to preventions: How can fire distribution models inform management and conservation?

Alex Syphard – Conservation Biology Institute

Video – USGS-SDMMP Workshop Day 1 – 17:20Alexandra Syphard Conservation Biology Institute

PDF of Power-point – 2_02 SyphardA

At risk resource assessment summary – 2_02 ARRA_SyphardA

Day 2 (March 14, 2013)

Brief review of Day 1 – Questions and Feedback from the Science Panel Members

Presentations:

2_03 The use of goats to manage vegetation to reduce fire risk to resources

Kathy Voth – Livestock for Landscapes

Video – USGS-SDMMP Workshop Day 2 – 09:35 Kathy Voth Livestock for Landscapes

PDF of Power-point – 2_03 VothK

Fire management Strategy summary – 2_03 FMS_VothK

2_04 Role of the Natural Resources Conservation Service (NRCS) in post-fire response

Shea O'Keefe – USDA-Natural Resources Conservation Service

Video – USGS-SDMMP Workshop Day 2 – 10:35 Shea O'Keefe USDA NRCS

PDF of Power-point – 2_04 OKeefeS

Fire management Strategy summary – 2_04 FMS_OKeefeS

2_05 Head-water streams, geomorphic and aquatic species responses following wildfires

Robert Fisher – U.S. Geological Survey

Video – USGS-SDMMP Workshop Day 2 – 10:50 Robert Fisher USGS WERC

PDF of Power-point – 2_05 FisherR

At risk resource assessment summary – 2_05 ARRA_FisherR

2_06 Wildland Fire Decision Support System (WFDSS)

James Gannon – Bureau of Land Management

Video – USGS-SDMMP Workshop Day 2 – 11:10 James Gannon BLM

Fire management Strategy summary – 2_06 FMS_GannonJ

Continue - Theme 2 Discussion items

Video – USGS-SDMMP Workshop Day 2 – 11:40 Discussions

Video – USGS-SDMMP Workshop Day 2 – 13:20 Discussions

C. What actions are possible to build resiliency for "at Risk resources" into the system?

D. What resources can be developed in preparation for recovery following the next event?

E. What should standardized symbology look like for mapping various categories of at risk resources across land management units (i.e. Update

Natural Resource Protection Guidebook for Borderlands)? Can we identify and map priority sites to commit prevention/suppression efforts?

Discussion Session Theme 3

Video – USGS-SDMMP Workshop Day 2 – 13:20 Discussions

Theme 3: What can be done during the next "active" fire event? (Preparation for some of these may fall under Theme 2)

A. ***What is the mechanism for transmission of geographic information system (GIS) layers during an incident?***

B. ***Are there resources that can be or should be rescued/secured/moved ahead of the advancing fire? If so what advance planning would be needed?***

C. ***What regulatory/agency permits are needed and can be put in place if necessary to carry out emergency actions such as salvage and rescue for at risk resources with San Diego County?***

D. ***How do we identify and get qualified Resource Assessment expertise engaged at the right time? How do we get proper red card training for Resource Assessment staff?***

Discussion Session Theme 4

Video – USGS-SDMMP Workshop Day 2 – 13:20 Discussions

Theme 4: What post-fire emergency response/monitoring activities need to be taken immediately, and at various time intervals (i.e. 5, 10 years) after the next big fires?

A. What are the administration/funding procedures to expedite immediate recovery/research actions after large wildfires? How do we work best with the* Burn Area Emergency Response (*BAER) team organization?

B. When and how should we implement re-vegetation efforts using mature plants from staging nursery? What would trigger "at risk" species seeding?

C. How do we increase soil moisture content post burn? Should/can leaf litter/ground cover substitutes be made by mulching a portion of dead, woody materials?

Summary of Wildfire Workshop Discussions

Review of Wildfire Management Process in San Diego County

To provide a background and examples of how local resource agencies prepare for, respond to, and think about wildfires, several representatives presented some of the fire management plans and activities that are currently in place on selected conserved lands throughout the county. These plans that already exist at the state and federal level may potentially serve as starting points for the development of fire management and at risk resource planning for the remainder of the county's conserved lands.

Each presenter's topic served as a starting point for discussions within the larger group where members both contributed to the topic and asked questions to further understand the process.

Highlights of additional discussions related to each topic are included below. These should not be considered to be recommendations or the opinions of USGS, but are a summary of the discussions during the meeting. Portions of the discussions presented here have been drawn together from the entirety of the workshop and may not have been discussed during the actual presentation, but have been presented in an attempt to organize the topics. In addition to the information presented during the workshop, there are extensive literature, research, and management practices that must be considered in any long-term policy recommendations. For a thorough coverage of each of these topics, please see the presenter's materials, presentation summary, and any suggested reference materials in addition to these notes on the discussions.

A. Forest Service Model: Role of Resource Advisor (RA) on Wildfires –
    a. RA's are personnel called up on large fires. On approximately 95-97% of the fires in the region, the fire will be put out by local firefighting crews before any resource concerns can be recognized and addressed by an RA. The local firefighting crews may be familiar with the local biological and cultural resources, and know the protocols to address these risks, depending on experience, training and personal interest.
    b. The existing community of resource advisors work for state or federal entities and can be requested through the Incident Command (IC) system. During large fires, where multiple jurisdictions are involved, multiple RA's may be called. RA's will coordinate amongst themselves and communicate a united message that is short, simple, and focused to the IC. This improves the chances that the suppression teams are able to protect resources of concern. RA's from one agency may coordinate with the RA from another and attend a fire on their behalf.
    c. Although this topic was presented by a representative of the U.S. Forest Service, the same policies exist for other federal agencies.
B. Forest Service Model: Burned Area Emergency Response in Southern California (CA)
    a. In past years, such as 2003, the California Department of Forestry and Fire Protection (CAL FIRE) has performed a BAER-like role at the state level to assess wildfire damage and recommend post-fire treatments, but has withdrawn from this type of effort due to complications. It was expressed

that there is little evidence that post-fire treatments are effective and, as a result, funding is spent elsewhere.

b. Since the conserved lands in San Diego County have such a high number of diverse ownerships, perhaps a non-federal BAER equivalent should be developed. The cities of Chula Vista and Carlsbad already have funding built into their conservation plans to address fire impacts. A local area response program would need to have a mechanism to evaluate when an emergency situation exists, a team to quickly assess conditions in the field in a coordinated effort with the reserve managers, and a funding release process. The evaluation team would need to be able to respond to an emergency scene and be able to see the larger picture and not just focus on a single species or at risk resource.

C. Forest Service Model: Post-fire Management and Restoration

a. Post-fire management and restoration can be driven by public opinion, rather than by research supported science. An idea expressed during another discussion was the idea of planning for the long term, not to restore habitat to what we are accustomed to seeing, but rather work to restore it to what might be more sustainable in the future.

D. Review of California Department of Forestry and Fire Protection mandate in San Diego County

a. There are long standing protocols that have grown out of the realities of fighting fires and managing for it. What CAL FIRE needs to know is where there are sensitive resources, what resources have priority, and what actions are most appropriate to protect these resources. Knowing these will help CAL FIRE to develop work plans and treatments to meet those goals.

b. CAL FIRE policy states that they cannot convert the vegetation on the landscape to anything other than what it was to start with. The prescription must be such that the plant community persists. The vegetation cannot be converted to a different cover type intentionally.

c. In the past decade, penalties have begun to be imposed for wildfire resource damages. If the source of an ignition can be identified, then the guilty party may be responsible for the cost of suppression and associated impacts. Previously, only the cost of suppression was included but compensation for resource damages, such as the loss of water quality, if it can be properly quantified and documented, has become more common. The responsible party can usually not be held responsible for costs that were not actually accrued. What it “would” have cost cannot be included in a settlement if the action wasn’t ever actually performed. Where there are emergency actions that are required to protect, repair, or rescue a resource, the plan should be to do the work out of pocket to meet the need. If a settlement is reached, it may include funds to reimburse emergency activities. Legal settlements for damages are unpredictable and are often paid years after the event.

There have been examples of court awards for environmental damages, but laws in California have changed since that decision.

E. Wildland fire season planning aboard Marine Corps Institute West (MCI WEST) Camp Pendleton
    a. The fire management / resource planning program at MCI WEST Camp Pendleton was repeatedly held up as a role model for the plan that should be developed for the larger area:
        i. identify the values
        ii. gather data
        iii. prioritize the known risks
        iv. develop an action plan

    On Camp Pendleton, the integration of resource managers, an experienced firefighting program and an appropriate organizational structure have come together to develop and implement a plan to manage for fire and biological resources. For San Diego County, some of the values have been identified by the Multiple Species Conservation Program (MSCP); goals were put forth for the conservation of habitat and species. Some of the values may need to be re-evaluated in the light of current conditions following two very large wildfire events, and others may need to be added based on new knowledge gained following those fire events. The continued presence of salamanders, butterflies, and rare plants within the Reserve is a value that can be identified as negatively impacted in recent years as a result of the recent wildfires. Data gathering in regards to these values following the fires has been extensive, is on-going, and needs to continue to better understand the impacts and the long term response to disturbance. For some of the conserved lands in San Diego, the risks have already been prioritized and plans developed. These last two tasks need to be developed further for the county as a whole. A clear plan with objectives and action items bridges the world of biological resource management and fire fighting.

Discussion Session Theme 1: What did we learn from the 2003 and 2007 and other large fires? Review of science findings by taxa and process.

To provide examples of how local biological resources respond to wildfires, several local researchers presented the results of fire related studies throughout the county. These studies are only a small portion of the efforts in the County and were intended to represent the types of risks to resources that should be considered in developing a fire and conservation management program.

Each presenter's topic served as a starting point for discussions within the larger group where participants both contributed to the topic and asked questions to further understand the issues.

More detailed information regarding each presentation in this session is available on-line. A brief outline is presented in Appendix 1.

Discussion Session Theme 2: What pre-fire planning and preventative actions can be taken before the next wildfires to reduce impacts or increase resiliency to "at risk" resources and what are the ecological trade-offs in each of these strategies.

A. How do we identify portions of the county where baseline data may be lacking/where habitat hasn't burned recently/where habitat has burned too frequently?
    a. FRID – Fire Return Interval Departure model developed by Forest Service may be a useful tool for addressing this question, along with looking at the number of fires, fire return interval, and time since last fire. GIS analysis of these available data, along with information on sensitive resources, will provide an initial overview of areas that may be at high risk from future fires or of high conservation value. Using tools like this, we may be able to better understand what the appropriate fire regimes are for the different wildlife communities. Based on the vegetation found in an area and the fire return interval that would be expected without human influence, areas that have burned outside of the expected range can be identified. An appropriate fire regime could be described as the number of fires above or below the number expected 75% or 95% of the time for the given vegetation type. Short return interval fires on native grasslands may be appropriate and necessary to maintain healthy native communities and would not be considered outside of the normal range. Short return interval fires on shrublands or woodlands would be measured on a different scale as appropriate for the given vegetation community. When a shrubland, or any habitat, burns outside of the natural range of variability, that is an un-natural fire regime.
    b. Continue to develop the integrated management practices as presented by MCI WEST Camp Pendleton, modeling their efforts for the county as a whole. The coordination and implementation of fire management actions as described on Camp Pendleton, based on resource data, could be extended to the larger area.
    c. Generate the land cover statistics for the county with regards to land use, vegetation classification, and stand age, both within the conserved lands and the county as a whole. Compare what the county looked like before and after the 2000's decade. How do these compare and do we want to set targets for this in the future? Can the FRID be used to estimate what the vegetation age distribution should look like for the county?
    d. With regard to the diversity of wildlife, there is a data gap when it comes to invertebrates. They are challenging to study due to the high species richness, small body size, and the nature of the group.

B. Can predictive models be used to identify where ignition sources intercept at risk resources/biodiversity? What can be done to further minimize ignition sources?

a. Ignition sources have been identified and modeled based on data in the existing fire management databases. Proximity to roads and housing density are key factors for ignitions. Previous efforts have identified certain times of the year and days of the week that have a higher likelihood of an ignition. The Forest Service has used fire modeling and ignition risks to plan for resource protection.
b. In a county where most of the losses to habitat occur during extreme fire weather, further reducing ignition sources may be more productive than fuel management actions. Focused efforts during these events may be productive.
c. For more than 50 years, the US Forest Service, Bureau of Land Management (BLM) and CAL FIRE have been pro-active in their efforts to educate the public and to try to reduce the risk of ignition. They adapt their messages as new information on ignition sources are observed.
    i. Continuing and adapting their efforts, BLM has recently identified the recreational shooter using steel ammunition as an ignition source. Patrols now educate shooters on the risks associated with this type of ammunition. The use of steel ammunition should be avoided especially during red flag or high fire danger weather.
    ii. All CAL FIRE personnel are trained on public outreach and fire safety materials are included in all vehicles for distribution.
    iii. Educating the public on fire dangers in at risk areas includes the extensive participation of both BLM and CAL FIRE personnel in the many fire safe council programs active in the county. Fire safe councils in communities in the wildland-urban interface (WUI) need to include an understanding of ignition prevention, home owner responsibilities, and lessons learned over the past decades regarding the patterns of what has burned in the past.
    iv. A “project activities level” (PAL) rating system is being developed with the goal of reducing the number of fires ignited by equipment. The PAL serves as a fire danger rating system to be used by land managers to regulate work projects that have a potential to produce ignitions. Local ordinances may need to be developed so that these same guidelines apply to privately held lands.
d. CAL FIRE and Forest Service both commented that the suppression and containment of the remaining 3-5% of the fires that grow beyond 10-150 acres may be unobtainable. The majority of fires that happen in the county are suppressed immediately, even in the areas where modeling has indicated high risk. The firefighting experts felt there is little more that can be done to further reduce ignition sources. Above the 97% suppression level, it becomes time and cost prohibitive.
    i. This topic is complicated by the fact that these remaining 3-5% of fires account for 95% of the impacts to the biological system in San Diego County. Even a small reduction in the ignitions that start these few remaining fires has the potential to have the largest conservation results.

ii. Several of the conservation and vegetation experts felt this statement from the firefighting personnel was unsupported.

e. The fire danger rating system is already established in San Diego County.
   i. Unfortunately, this system also serves to let would-be arsonist know when then can cause the most damage.
   ii. Any plan to prevent ignitions and reduce losses should include consideration as to what provides the best measure about when to alert the public of sever fire danger, how to notify them of upcoming events and what preparation/prevention actions they should take based on the severity of the fire threat.

C. What actions are possible to protect "at risk biological resources", both those that are rare and those impacted by changing fire regimes?
   a. A potential risk to rare biological resources occurs when species are reduced to isolated, single populations. To increase resiliency, such species or the habitats they require should be more widely distributed if possible. These resources should be identified, prioritized, evaluated for risk, and planned for accordingly. Where possible, multiple populations should be established so as to reduce the risk that a single catastrophic event puts the entire species in harm's way. Examples of this may include the arroyo chub and western pond turtles in the upper San Luis Rey River. The only populations of each of these species in the San Luis Rey watershed may be subject to extirpation in the event of a single large fire in the head-waters of the system. Similar situations exist for invertebrates and plants. Managing the resources so that the situation doesn't come down to one at risk population has the greatest potential to result in the long term sustainability of the species.
   b. Attempts to protect valued resources may have their own ecological impacts. A previous attempt to reduce fire impacts to old growth Tecate Cypress through a fuels treatment resulted in a "no action" situation. Concerns around the use of fuel modifications and the potential for the introduction of exotic, flashy fuels were raised. When no consensus could be reached, the decision was made to take no preventative action, the vegetation and fire process was allowed to follow a natural course. Fuel modification and grazing brought up concerns of unintended consequences.
   c. Developing a relationship between land managers, resource experts, and fire suppression crews was identified as a complicated but worthwhile effort. A coordinated meeting between these partners on a monthly or annual basis would help to familiarize each with the others resources, values, and goals. Being familiar with the reserves and the values within will help local fire crews during the 95% of the fires that are put down before resource advisors and land managers can arrive to assist.
   d. There were several thoughts expressed that the resiliency of the Reserve should not be limited to just what is available on the conserved lands. Wildlife does not typically adhere to property boundaries and adjacent private lands may hold added value. Although privately held undeveloped

lands are under no obligation for conservation actions, they may be of value in the process. In some cases, unburned private lands may serve as source populations for recolonization. Restoration projects on preserve lands may need to consider the value of neighboring private lands. Some species will only reestablish from the unburned surroundings into the recovering habitat. Prioritizing reserve lands and proposed management actions that take into account the value of adjacent unburned private land may result in a higher likelihood of success. Another potential advantage of managing the Reserve within the context of the matrix of the surrounding private land would be that the distribution of fire differs within the Reserve versus across the landscape. Statistically, in the 2003 and 2007 fire, private lands appear to have burned less than the conserved lands in San Diego County.

e. Further research is needed to understand those elements of the system that require 10, 20, or more years to recover and are only in the early stages of the recovery process with respect to the 2003 and 2007 fires. Certain aspects of post-fire recovery, such as interactions with drought, are not well understood. As drought and fire frequency increase, these two are likely to intersect more often.
f. Develop a list of non-conserved lands and lands that had previously been considered but rejected for inclusion in the reserve to evaluate their value for conservation in the current landscape with respect to fire history, land use, and isolation. The situation may have been changed by the recent fires and some of these lands may now have higher value to the reserve network.
    i. This may also apply to linkages and connectivity.
g. Fire management and at risk resource protection by means of fuel / vegetation manipulation was a wide ranging topic with some opposing viewpoints. At risk resources included both human and biological assets.
    i. Using livestock for management actions was presented as a possible tool for consideration. Concerns regarding the use of goats or other livestock included the potential for escape, habitat degradation, and the spread of exotic vegetation.
        1. Goat prescriptions are not an easy answer, like any tool it can be used incorrectly. Starting with small scale experiments, familiarization with the process can lead to a better understanding of what is and is not possible. “More animals” is not always a better situation.
        2. Feral goats have had devastating impacts around the world and have proven nearly impossible to eradicate in some landscapes. One possible solution is to use single gender herds, any escapees will be subject to the native carnivores.
        3. Animal behavior training can be used to condition grazers to target or avoid focal plant species in support of sensitive species management. Vegetation around spiny red berry could be thinned by livestock in an attempt to reduce fire

impacts to butterfly habitat. But it may be more productive to establish a more widely distributed population of the host plant and the butterfly.

4. Within San Diego County, goats have been used to establish and maintain fuel modification zones. The fuel break near Palomar Mountain made a significant contribution to protecting the human lives and property on the mountain as well as the habitat for the Laguna skipper and old growth forest.
5. CAL FIRE relies heavily on inmate labor for its work force on fuel modification projects. This tool also has a learning curve and can be less expensive than managing a livestock herd.

ii. There were opposing views of the usefulness of fuel modifications to protect either homes or fire sensitive wildlife and habitat. This topic may require further discussion before the implementation of any new treatments.

1. There were concerns that the majority of biological impacts occur during extreme weather events and that in these situations, fuel modification zones were useless and only created compromised habitat in the mean time. Fuel treatments don't do anything to prevent the spread of fire under extreme weather conditions and are only useful when fire crews use them for access.
2. Fuel treatment / management areas have protected many human communities and saved lives, as well as protected habitat for wildlife. Palomar Mountain, with Laguna skipper habitat, was protected due to the fuels management actions between South and East Grade. In Cuyamaca Rancho SP, a treatment served its purpose during a recent fire.

h. The ecological communities of the region, in their very nature, are already resilient to the impact of fire, so maybe it really doesn't need any management actions to help it recover.

i. In response to this topic, it was suggested that due to other impacts, many of the local species and systems are not as resilient as they may be capable of. The goal is not to remove all fire or loss of habitat due to large or small fires. A potential goal is to identify resources that can be managed differently than what has occurred to date.

i. The long term sustainability of individual species and habitats may be more multifaceted than just the ability to persist through a disturbance. Sensitivity to disturbance is different when connectivity is also considered. A species might be sensitive to fire and be knocked out of a site but whether or not that site is connected to surrounding suitable habitat may play a big role in the ultimate recovery of the species at that location.

j. The small 5 acre island of unburned sugar pines may be an example of a biological resource at risk that could provide the seed source for future regeneration of this species in Cuyamaca Rancho SP. Data need to be gathered to assess the risk factors to stand survival and determine if there are appropriate management actions to protect it. The continuation and conservation of this stand may also need to be evaluated in the context of climate change to judge how much effort may be warranted.

k. Succession is happening; we need to identify which young stands are most likely to transition into old growth, where and when. If a certain percentage of old growth habitat is one of the goals of the Reserve, it may be necessary to identify those places where planning for such habitat can be successful and develop plans and management actions to achieve the desired result.

D. What resources can be developed in preparation for recovery and restoration following the next event?

a. Establish a funded program responsible for the management of salvaged plants, namely cactus. Without a funded, dedicated program, this effort will not be possible. A location for storing and maintaining these plants must be established in both the north and south portions of the county. There are already regulations that require cactus to be salvaged from lands being developed, and the resources to support this need to be developed further. After significant fires, mature plants from a nursery can be used to begin the restoration process.

b. Seed lease – MCI WEST Camp Pendleton, BLM, and the Forest Service have previously used this option as a means of a source for native plant seed for restoration efforts. Companies are contracted to collect seed and in return, the agency or land owner gets a portion of the harvest or can bank the resources until such time as it is needed. Before this task could be started, it would be necessary to determine what species to work on and coordinate with any partnering agencies to avoid redundant efforts. Concern was expressed that many post-fire restoration efforts are ineffectual and that resources would be better spent elsewhere.

c. An understanding of the genetic histories of at risk resources may be necessary before future post-fire restoration efforts can be undertaken in the form of translocation of individuals from one location to another. Efforts to understand the genetic distinctiveness of several at risk vertebrates are underway, but similar efforts for sensitive plant species may be lagging behind. It is also important to understand any risks associated with spreading diseases and impacts to the ecology and demographics of the source populations that may be associated with translocating animals.

d. In the event that individual plants and animals must be removed from a threating situation, arrangements should be made ahead of time to provide for a safe place to maintain the specimen until it can be returned to suitable habitat. Emergency recovery plans should be developed that

identify how and where at risk resources can be taken in times of emergency.

e. Fire management plans for many of the lands conserved under the MSCP are lacking, they have not been finalized or have never been started. CAL FIRE must consult on many of these, but they are neither able nor responsible to develop them. A fire manager or coordinator may be required to work with the land owners and managers to develop these important resources. Fire management plans and increased interactions between reserve managers, resource advisors, and fire suppression teams can increase awareness of at risk species on a property and what suppression activities may and may not be appropriate at a site. It would be beneficial to develop a centralized management system for these data. In addition to a fire management plan, each property should have an identified resource advisor that can coordinate with the IC in a productive fashion.

f. There was a comment that the Conservation Biology Institute (CBI) has been considering the development of a program to collect and store seed stock for rare plant species and develop a nursery rearing program for these cryptic species. This would serve as a source to re-establish some of these species as part of a post-fire recovery effort.

g. A pre-fire activity to include in the development of a fire management plan would be to build and identify fire suppression staging areas ahead of time. Signage and fencing installed at the desired location would aid in directing suppression crews to the pre-approved areas.

h. Predicting post-fire impacts to at risk resources may be useful to plan for the aftermath of future fire events. Based on existing knowledge, identify invasive plants that may be problematic for a sensitive species. The invasive species may not be an immediate problem, but we know that it can be with the next growing season. There is also the possibility that an unknown threat can impact at risk resources. Developing a generic, off the shelf post-fire restoration and monitoring plan that includes considerations for erosion, invasive plants, and restoration may be beneficial to expedite post-fire actions and capitalize on existing monitoring networks. But this option may not be available to all agencies.

E. What should standardized symbology look like for mapping various categories of at risk resources across land management units (i.e. update Natural Resource Protection Guidebook for Borderlands)? Can we identify and map priority sites to commit prevention/suppression efforts?

a. Even if at risk biological resources can be mapped and conveyed to fire suppression crews, there must be an understanding that human life, property, and the welfare of the firefighters will always come first. Biological resources are considered during suppression efforts, but under extreme fire conditions, the first priority is human safety.

b. Many agencies, including the Forest Service, MCI WEST Camp Pendleton, California State Parks, CA Department of Fish and Wildlife, and BLM, have already developed mapping standards to identify property

boundaries, resources of concern, access points, appropriate and approved actions, preferred locations for suppression efforts, and lists of contacts. The existing tools need to be reviewed to determine the best elements of each.

c. A two page, hard copy handout should be developed for each conserved property that contains only critical information on the site that can be distributed when needed. For the fire crews in the field, on the ground, the document must be kept simple, identifying what can and can not be done, and where it is appropriate to do each action. Where possible, preferred staging areas for suppression efforts should be mapped. A standard format will increase the value of such information and increase the likelihood that it can be used when the time comes. For the majority of fires, a two page document may be the only resource document for which there is time.
d. Sensitive resources should be mapped and evaluated for functional risks related to wildfire. Risks might include responses to fire, life history of the species, fire interval, and to suppression activities. Resources like vernal pools may persist through fires but be heavily impacted by suppression vehicles driving across the landscape. Allowing these to burn is less damaging than the efforts to suppress them from burning. The categorization of plant species responses to fire is already well developed. Knowing whether a species is a closed or open habitat species and its dispersal capabilities should also be considered. A closed habitat species with poor dispersal will be at risk from large fires more than an open habitat species. Recovery is very time dependent. Coverage by a focal species may take time as vegetation grows and fills in the habitat.
e. The "Border Agency Fire Council Natural Resource Protection Guidebook for Fire Management and Law Enforcement Officers" that covers the southern portion of the county should be extended to include the whole county. This reference provides first responders with information on property ownership, contact information and fire suppression guidance for Forest Service, BLM, and USFWS lands. The 7.5 minute quad maps do not include information on at risk resources or preferred suppression activities.
f. The type of resource maps that the Forest Service has produced for its lands should be extended to cover the whole county, especially conserved lands. The 7.5 or 15 minute quads should include biological and cultural resources and any critical habitats that have been identified. Symbology can be generalized about the details of the specific resource at risk but it must be clear regarding what actions are appropriate and where they can be performed.
g. Consolidating the available data for at risk resources will be a complicated task. The SDMMP may have resources that can take on this task, or perhaps the county GIS mapping resource agency. The individual conserved lands will need to make fire and resource management documents. For some conserved lands, there is not a designated person to prepare this information. In addition to bringing the data together, the data

will have to be categorized by fire response and appropriate management actions.

h. However sensitive resources are identified on the maps, they may need to be buffered so that each is visible at the spatial scale of the map.

Theme 3: What can be done during the next "active" fire event? (Preparation for some of these may fall under Theme 2)

A. What is the mechanism for transmission of GIS layers during an incident?
   a. It is important to have the data on the resources at risk, but it is just as important to know who the right person is that needs to have the data in the time of an emergency. A resource advisor needs to attend the daily briefings and consult with the Planning Branch of the IC. Any RA involved in this process will need to understand the procedures and operating constraints within which the mapping and GIS support team functions during a wildfire.
   b. For the small fires that are quickly contained, resource concerns will be dealt with based on the existing knowledge of the local fire crews and possibly a one or two page hard copy of resource concerns.
   c. For large events, the IC structure will be established, which typically includes its own GIS specialist and resources, which will use digital data.
   d. In addition to the local GIS resource, any data on at risk resources should also be transferred to the California Natural Diversity Database (CNDDB) and the California Department of Forestry and Fire Protection's Fire and Resource Assessment Program (FRAP). Providing these data ahead of time to the appropriate program will help to ensure they are available to all of the fire suppression teams when the time comes.

B. Are there resources that can be or should be rescued/secured/moved out of the potential fire area? If so what advance planning would be needed?
   a. For large, on-going fires, all activities must be coordinated through the IC. Activities such as this should be requested through the Planning division and the resource advisor.
   b. During fires of extreme weather conditions, this is not advised and most likely will not be authorized.
   c. In the event that individual plants and animals must be removed from a harmful situation, arrangements should be made ahead of time to provide for a safe place to maintain the specimen until it can be returned to suitable habitat. Emergency recovery plans should be developed that identify how and where at risk resources can be taken in times of emergency.

C. How do we identify and get qualified Resource Assessment expertise engaged at the right time? How do we get proper training for Resource Assessment staff to participate in active fires?

a. Interested biologists or other technical specialists need to get red card certification. The red card is certification that the individual has met the minimum requirements for wildland firefighter access to the fire line and lists the holder's wildland fire suppression and prescribed fire qualifications. The red card process requires a one week class with an annual one day refresher course. Those who want to go on the fire line will also need to pass a physical and a pack test at the arduous level. BLM and National Park Service (NPS) offer training classes for RA's so that there can be a system of RA's working within the network of cooperators. RA's need to be able to communicate with the fire crews and understand their operational needs.
b. Within San Diego County, resources have been expended to train personnel to be responders for types of emergencies that are unlikely to happen in the area. As useful as this may be, the agencies should also ensure that local staff are properly trained to respond to the types of disasters that are going to impact this region. The management within each local, state, and federal agency should be encouraged to fund and support resource advisor training and red card qualifications for local personnel to contribute to wildfire emergencies.
c. A group of resource advisors should be developed and educated to respond to fires within the non-state and non-federal conserved lands within the county. These resource advisors would need to collaborate with all major fire response agencies in the county to integrate into the existing fire response programs. These resource advisors would need to have the authority to work across the lands held by multiple owners. An RA in this role would function at the scale of the management units as outlined in the "Management Strategic Plan" developed by the SDMMP. Resources within the management unit would be considered as a whole and not necessarily at the individual fire or property level.
d. On any fire over 100 acres on state lands, a resource advisor from the California Department of Fish and Wildlife (CDFW)is supposed to come out and advise on resource issues. There have been problems with this in the past. Steps should be taken to understand the previous complications that prevented this from happening and develop the resources to ensure that the correct steps are taken in the future. The 100 acre minimum may need to be evaluated against the size of the typical conserved lands parcel to determine if this minimum fire size is appropriate or if a lower limit is necessary.

Theme 4: What post-fire emergency response/monitoring activities need to be taken immediately, and at various time intervals (i.e. 5, 10 years) after the next big fires?

A. How do we work best with the BAER team organization? Can fire suppression rehab be used to improve the post-fire habitat quality?

a. The BAER program addresses immediate post-fire emergency situations and is not an opportunity to fix historic problems or conduct new assessments or perform long-term restoration. The BAER team prescribes treatments for emergency conditions only where there are resources at risk. The "R" in BAER is for response and not for rehabilitation. NRCS may be a more appropriate partner to address biological restoration concerns.
b. During the meeting it was suggested that, if something is important enough and an immediate need, the task should be done with the resources on hand and then seek reimbursement afterwards. In the case of fines, penalties, and court awards, funds can not be levied for "what could have been done". But if actual work was done and charges accrued, then there may be some recourse to getting reimbursed.
c. Fire suppression rehab begins before the fire is completely contained. One part of this effort includes repairing the impacts of dozers, re-contouring the soil to match the surrounding landscape. Additionally, in the past CAL FIRE has performed tasks to reseed dozer disturbed areas and reestablish specific plants where possible. NRCS may be able to build off of these efforts to further improve habitat for target species. Although fire suppression rehab is a requirement, different agencies work to different standards and have different resources available. Developing specific standards in advance and communicating these to IC will help to achieve mutually desirable goals.

B. When and how should we implement re-vegetation efforts using mature plants from staging nursery? What would trigger "at risk" species seeding?
a. There are not many examples of the successful restoration of shrubland habitats in a wildland condition through direct management actions. On Camp Pendleton, for example, restoring coastal sage scrub (CSS) has cost as much as $40-60K per acre. The Forest Service is contracting SDSU to evaluate the effectiveness of previous efforts to try and determine what has and has not worked.
b. One example of restoring coastal CSS is Starr Ranch in Orange County, where a labor intensive effort was undertaken to foster the growth of shrubs in linear strips. As the shrubs mature, small mammals have moved in and continued the work of distributing seeds outward from the linear arrangement.
c. For sensitive species that are linked to a focal plant species, careful consideration must go into determining the best planting arrangement to increase the probability of success. For example, cactus planted for cactus wren should be configured to support more than one nesting pair. For species such as this and the California gnatcatcher, it may be most productive to plant out seedlings or saplings grown in the nursery rather than start from seed in the field.

d. If restoration efforts are attempted, resources should go to sites considered to be high quality habitat and that also have a high probability of success. This may include building out from existing habitat or areas that are already recovering, which may include nearby privately held, non-conserved lands.
e. The idea was presented elsewhere that old growth California sage and buckwheat do not recover well after fire due to the nature of the species. Young plants regenerate and produce seeds more readily than old growth specimens. In areas where old scrub isn't recovering after two years, restoration may be necessary if the habitat appears to be converting to invasive weeds. However, spreading seed is not enough; it has to be timed correctly and is very dependent on the timing and amount of precipitation. Not enough moisture may lead to everything dying and too much may result in an over-abundance of non-native grasses.

C. How do we conserve soil moisture content post burn? Should/can leaf litter/ground cover substitutes be made by mulching a portion of dead, woody materials?
a. Hydro-mulch was suggested as a means to increase the moisture retention properties of the landscape following wildfires. There were concerns about the cost of the hydro-mulch process and also the risk of spreading weedy invasive species in the process. Although efforts can be made to guarantee that the mulch is weed free, it can still be cost prohibitive to apply to large areas. And in the end, there is the potential that the species this is intended to help will still not recover or that the hydro-mulch could have a negative impact on other species. The hydro-mulch may not provide all of the benefits that real leaf litter offers. Increased soil moisture may not be the only factor required for species to recover.
b. In places where moisture sensitive species are still missing from the system following the 2003 and 2007 fires, it may now be too late to perform any management actions. The system may have to recover naturally and be re-colonized from neighboring populations if possible. In the example of the salamanders at Elliott Chaparral Reserve and the chipped woody material added in 2012, the nine years between the time of the fire and the addition of the shredded materials was too long to expect the salamanders to have persisted on the site without suitable habitat. Management actions in a more timely fashion may have been more productive. Ash and chemical reactions are also potential problems that may impact amphibian species independently of loss of suitable habitat.
c. At sites where the decrease in soil moisture and loss of mesic habitats is a concern, it may be the case that the communities are still in the recovery process and require additional time to naturally rebuild. Although the vegetation may appear to have re-grown to comparable levels, there are other elements that need more time to fully develop.

d. A possible solution to retaining these moisture sensitive environmental elements is to have a more heterogeneous landscape where some portion of the vegetation remains unburned within the larger matrix of habitat. This may be a more viable route for the long term sustainability of the system.
e. There was a suggestion that CAL FIRE's post-fire activities could be modified to address some of these ideas. As CAL FIRE crews work on cleaning up after a fire, dead and downed brush could be made into piles instead of being spread out. Piling the organic material may be more helpful in creating patches of increased soil moisture than distributing the materials evenly across the landscape.
f. Small scale experiments may be necessary to determine the relative importance of each environmental variable before any large-scale effort is conducted.

Additional topics

A. Due to circumstances beyond our control, the system is changing. Instead of trying to maintain the system in its previous state, should we begin preparing for what could be the new normal? It may be that there is no means to return to the previous community due to anthropogenic climate change. There are other factors generated outside the region affecting the system that can't be mitigated.
B. It may be time to consider the overall ecosystem function regardless of the nativity of its component species. Does the new system work to support species and processes that are part of a healthy environment?
    a. There may be species that would not persist in the new environmental conditions without some management action.
C. We are in a world of rapid and big change – climate, human footprint, increasing drought, fire and extreme storms. This change may be faster than our planning process.
D. In Southern California, fire management concerns have to incorporate the high level of human presence along the WUI Private property rights, construction regulations, and community participation in fire planning all come into play when coping with fire. There are rules and regulations outlining homeowners' responsibilities, construction guidelines, and fire severity risk assessments. Some of the responsibility for protecting their homes must be placed on the home owner and not just on the firefighting crews. Nor should the environmental resources that benefit the greater community be degraded because of the individual who knowingly put their home in harm's way. The pattern of future development in the county has the potential to affect fire impacts on both the human resources and the biological values.
E. Existing roads within the county may be acting as barriers to wildlife movement. Redesigning these to better facilitate both firefighting efforts and animal movement would have multiple benefits to the reserve system.

F. Before talking about what can be done, we must decide what we want the future to look like before we can decide what to do to get us there. This is a question that is common to both conservation and fire management. Knowing the starting point and the end goal are essential to determining the best route to follow.

G. There were two main lines of thought on areas of old growth vegetation which are the result of successful long term fire exclusion: 1) To fire fighters, old age stands can be greater hazards, they are valued resources, but they can be dangerous beyond the level of acceptable risk to fire fighters and 2) From an ecological perspective, old growth stands are an uncommon, valued resource with unique properties and should be considered worthy of suppression efforts.

   Within the conserved lands, there are stands of old vegetation mixed in with the dense urban human landscape that can pose an increased fire risk. In certain configurations of old, dense vegetation, the risk to fire fighters is so high that the vegetation will be allowed to burn rather than attempt to suppress the flames and endanger the lives of fire fighters. A suggestion was made that the landscape should be developed into a heterogeneous mix of stand ages instead of letting the entire landscape grow into a fuel loaded system. This would require the loss of some habitat for the purpose of conserving the larger landscape. Management aimed at promoting a heterogeneous mix of stand ages in this region would require that more old growth patches be created (though fire prevention) rather than more young stands (through wildfire or prescribed fire).

   The biological value of long unburned vegetation may be higher than frequently burned landscapes simply due to the scarcity of old growth habitat. Frequently burned habitat is very abundant in Southern California. For biological resources, both plants and animals, there are two fire related risks, the risk of species loss due to immaturity and the risk of species loss associated with senescence. Senescence risk would be where a species is threatened by too little fire on the landscape. Immaturity risk is when a species is threatened by too much fire. In San Diego, there is no sign of senescence risk, no species is likely to drop out of the system due to the habitat being too old. But there are species at risk due to excessive fire.

Recommendations to be Included in a "Fire and Natural Resource Management Strategic Framework"

Based on the presentations from researchers, land managers, and fire fighters, we have summarized recommendations for actions that should be considered in the development of an integrated framework for fire and natural resource management. These recommended actions will help identify biological resources at risk, collect data on those

resources, including assessment of the fire risk to them, and develop plans to protect and maintain the biological resources of San Diego County in a sustainable manner.

1. Establish and fund a county-wide wildland fire management coordinator to oversee fire related issues affecting the Reserve outside of the state and federal land owners. A person in this position would need to not only have a background in wildfires but also a background, training and expertise in solving vegetation and wildlife problems, and have demonstrated the necessary communication skills to facilitate among the many agencies and personalities involved in wildland fires in San Diego. A fire management coordinator should be well grounded in both science and fire operations. This position would be responsible for such things as:
    a. Create an inventory of the established fire management plans in the region for individual conserved lands. Identify conserved lands that are lacking fire management plans. Existing plans should be evaluated for strengths and weaknesses, including other local, county, state, and federal plans that may affect the conservation areas.
    b. Develop standards and guidelines for the preparation of fire management plans for those sites where they are lacking. These guidelines could follow the framework established for the Santa Monica Mountain National Recreation Area (NRA), with a priority placed on identifying and protecting at risk biological resources. These plans should include a brief summary for use by on-the-ground fire personnel that includes a map and appropriate fire management actions as developed and approved by the land managers, biological advisors, and firefighting coordinator.
    c. Work with reserve owners and managers to develop or update their fire management plans, coordinating with the fire resource personnel, GIS specialists, archeological and biological advisors as needed, following established guidelines.
    d. Coordinate to identify and develop a team of natural resource advisors that could be deployed to fires affecting conserved lands not already covered by a federal or state agency resource advisor. The coordinator would need to identify potential personnel from the local agencies with appropriate expertise to address fire impacts and resource concerns. This would also include ensuring that all members of the resource advisor pool are properly qualified and trained to participate in a fire event.
    e. Conveying data on the biological resources at risk to the fire crews. This was identified as a crucial step in protecting the Reserve. Someone with the recognized credentials and background that could communicate with IC would be useful.
2. Develop or increase our participation in a fire safety organization that is open to all interested parties, including private, local, state, and federal agencies to collaborate on wildfire issues in the county. Potential examples would be the Santa Monica Mountains Fire Safe Alliance or the California Wildland Fire Coordinating Group (http://www.preventwildfireca.org/). The objective would be to meet regularly to develop personal relationships and to learn from each other's expertise, to identify actions to protect communities and resources in San Diego

County. State and federal agencies should be included as well as major conservation and research groups. This type of organization may be beneficial in developing and improving fire management plans for the conserved lands. A fire management coordinator, as recommended above, could serve as a coordinator for this organization.

3. Fire ignition models showed that fire starts from equipment along highways was a significant threat to the reserve. Preventing and reducing ignitions at these points should be further investigated. An in depth literature search within the peer-reviewed and grey literature should be done to determine the state of knowledge on the subject. If little information exists, then research and small scale experiments should be taken up to investigate the hardening of the roadways to increase their resistance of spreading fire to the surrounding vegetation. Depending on the results of these efforts, the larger network of roadways may or may not need modifications to help reduce the probability of ignitions. This needs to be done with knowledge of the Connectivity Monitoring Strategic Plan (SDMMP 2011) so that these plans can integrate and not conflict in their goals.
4. Establish and fund a program to coordinate and manage resources associated with post-fire vegetation recovery efforts on fire affected conserved lands. This program could be responsible for such things as:
    a. Developing a cactus nursery. This would include harvesting cactus from development sites and propagating them to produce mature specimens for out-planting for restoration following fire events. While salvage is required, there is not an identified facility or personnel to maintain these resources until they are needed.
    b. Management of seed lease agreements. It should be evaluated whether or not this is a viable option; some agencies have regulations limiting this type of arrangement.
    c. Coordination among the larger conservation community to reduce redundancy of effort and species lists for seeding.
    d. It may be necessary to evaluate the need of this program versus contracting it out to a potentially existing organization. There may be companies already in place that could fill this role for the conserved lands in San Diego. Providing funding and guidelines for an existing operational system may be more efficient with respect to both time and money than starting a new effort.
    e. Evaluating the need for post-fire weed control in natural areas.
5. Use the "Border Agency Fire Council – Natural Resource Protection Guidebook for Fire Management and Law Enforcement Officers" as a template for developing a county-wide reference for first responders regarding information on property ownership, access, points of contact, and preferred suppression guidelines for Reserve lands. Where available, approved fire management plans could be included in this document at an abbreviated level to fit the format of the report.
6. Create a centralized data source / GIS system to facilitate the collection, organization, prioritization and distribution of information on at risk resources. This may be in-part the South Coast Multi-Taxa Database (SC-MTX) or

developing a Wildland Fire Decision Support System (WFDSS) entry for the conserved lands within the county that do not already have such a file. WFDSS is a fire management plan that is currently used by the federal agencies to plan and identify resources and tactics before a fire event. It is used to guide and document how operational decisions are made in the field. The proper development of an application such as this will require collaboration between resource managers, biological advisors, and fire operation and planning systems.

7. Identification of resources at risk – for San Diego County, the Habitat Conservation Plan (HCP) and Natural Community Conservation Plan's (NCCP) may serve as a starting point. Many at risk biological resources (sensitive species and communities) have already been identified but these may need to be reviewed under current conditions. Identifying the condition of the high priority resources (or "values at risk") today and how we want them to look in the future is a necessary step in determining what actions we take to get there.
8. Gather data – Determine the current state of knowledge on the fire response of each species and communities identified in the multiple conservation plans that exist within the county. Species and communities beyond those already covered under these plans or otherwise legally protected (e.g. federally listed) will need to be considered also. For species and communities lacking data, new research will be required to make informed decisions. The data gathering process may include genetic analysis of plants, invertebrates, and vertebrates to determine the uniqueness and structure that may exist within the system which may influence translocation and recovery plans.
9. Prioritize the risk – determine the species or community response to fire, to repeated fire, and to potential fire mitigation activities. It may be possible to categorize species responses based on shared traits. While many species are naturally adapted to disturbance and are resilient, there are confounding issues that may be compromising the long term sustainability of the species or habitat. Risks to some of the resources may be altered based on the level of connectivity. A species may be susceptible to declines due to fire but may only recover if there is adequate connectivity to a source population, unburned refugia, and eventual re-establishment of suitable habitat after the fire.
10. Make an action plan – for biological resources at risk that would be negatively impacted by fire, determine a course of action to increase the resiliency and sustainability of the species, critical habitat, or environmental process. For some species, the plan may be to establish new populations or re-establish old populations to reduce the likelihood that the whole species might be impacted by a single catastrophic event. For other species, the action plan may require experimentation and adaptive management to determine what can and cannot be done to benefit the species and the reserve before any large scale effort can be taken up.
11. For the non-federal preserved lands within the county, a county level BAER-like equivalent should be considered. As funding would allow, this may be the source to include species and habitat recovery and rehabilitation efforts, which are not always covered by BAER (where the "R" stands for response). A formalized process needs to be developed to rapidly evaluate resources at risk, estimate that

there may be a recovery risk or rehabilitation need, and approve an action plan. The existing BAER process could serve as a starting point for this process, but would also need to include considerations for recovery and rehabilitation. For at risk plant and animals species where there is a post-fire risk of negative impacts from invasive grasses, programs could be set up to treat the affected area at the appropriate time to encourage the recovery of the species. A "San Diego Preserve Area Emergency Response, Recovery and Rehabilitation Plan" would rely heavily on the management process of identifying values, gathering data, evaluating risks, and developing and implementing action plans. Knowing where we have at risk biological resources and the likely impacts from fire to each, we can plan ahead as part of pre-fire planning and suppression efforts. Developing generalized projects ahead of time, "off-the-shelf" projects will help to expedite responses when the time comes to take action during post-suppression. During the workshop, it was presented that the post-fire scene sometimes offers an opportunity to rehabilitate a long standing problem (i.e. riparian areas with Arundo). Identifying these situations and taking advantage of fire impacts may improve the chances of success. Fire management plans, resources mapping, and data management would all feed into this process.

12. Re-evaluate conserved lands based on current conditions. In the past two decades, plans have been developed in San Diego to protect biological resources based on the best available knowledge at that time. But as the Reserve has been built out, as previously unconsidered impacts have accrued, and human development has continued, there is the potential that some of the species, habitats, and properties have changed with respect to their level of functionality to the overall system.
    - New information - Habitat changes resulting from altered fire return intervals have been shown to affect habitat associations and landscape connectivity for some wildlife, which may change what can be considered as potentially high-quality habitat and functional linkages and corridors.
    - Unexpected impacts - The large fires of 2003 and 2007 have homogenized much of the shrublands with respect to age class, which influences what species of plants and animals it will support.
    - Continuing development - Major roads, highways and housing developments have been constructed, changing what biological resources are present or can be supported, how wildlife must move in response, and what ecosystem services are present.

Conclusion

This workshop represents a continuation of our efforts to work collaboratively to formulate wildland fire management programs that serve to protect both human communities and biological resources that are increasingly at risk from human impacts. The workshop was intended to summarize our state of knowledge about the interactions between biological resources at risk within the region and recent large fire events. Fire management and wildlife conservation in southern California is complex and will need ongoing collaboration between the conservation, research, firefighting, and land

management communities to protect and maintain the biological resources of San Diego County in a sustainable manner.

References

San Diego Management and Monitoring Program (SDMMP) 2011. Connectivity monitoring strategic plan for the San Diego Preserve System.

Appendix 1: Summary of Fire Responses

This table briefly summarizes the biological resources presented during the meeting and the response of each to fire. For more details, please see the presentation, summary, references, and video of each presenter.

Presenter:	Species:	Response:	Management action:	Notes:
J. Keeley	Flora	Decline, but can recover		Frequent fires increase the risk of conversion.
	Fauna	Decline		More dependent on colonization.
	Erosion	Increased in the long term		
C. Rochester	Orange-throated whiptail	Increase		
	Coast horned lizard	No change		
	Western skink	No change		
	Western spadefoot toad	Mixed		
	Slender Salamander	Decline	Increase post-fire leaf litter/habitat moisture.	
	Yellow-bellied raced	Decline		
	Shrews	Decline		
	San Diego Pocket Mouse	Declined, but recovered		
	California Mouse	Declined, but recovered		
	Desert Woodrat	Declined		
	Bird diversity	Stable		Slight shifts in community, but diversity was consistent
	Bat community	Different pre-fire to post-fire		
	Ant community	Different pre-fire to post-fire in CSS		
	Large mammals	Stable		

C. Brown	Arroyo toad	Increase	Bullfrog also identified as management concern.	Temporary, but declines as veg. regenerates.
L. Hargrove	Mammals	Stable		No long-term extirpations detected. Frequent fires and invasive plants may lead to type conversion & diversity loss.
	Northern flicker	Decline		
	Lazuli Bunting	Increase		
	Mountain Chickadee	Decline		
	Rufous-crowned sparrow	Increase		
	Steller's Jay	Decline		
	Wrentit	Decline, but recovering		
	Coniferous woodland bird species	Decline		Several species have been extirpated from Cuyamaca
	Gray vireo	Decline		Prefer old age chaparral
C. Winchell	CA gnatcatcher	Declined	High quality habitat should be conserved.	Recovery slower than previously reported.
W. Vickers	Mtn. lion	Stable		Some mortality, lions remained in burned areas.
K. Preston	Coastal cactus wren	Decline	Cactus scrub restoration.	Loss of suitable habitat in all areas.
B. Kus	Least Bell's Vireo	Recovered rapidly		Impacts are short-term.
M. Jennings	Mtn. lion	Stable		Slight preference for burned areas.
	Bobcat	Avoided burns		FRID is also important to connectivity.
	Coyote	Prefer burned habitat		
R. Botta	Mule deer	Increase		
	Sheep	Increase		

D. Marschalek	Hermes copper	Decline	Further research is needed for all insect species.	
	Laguna Mountains skipper	Decline		Extirpated on Laguna Mtn. since 2003 fires.
	Quino checkerspot	Declined, but recovering		
	Thorne's hairstreak	Recovering		Requires refugia within fire perimeter and nearby unburned areas.
B. Miller	San Diego mesa mint	Declined, but recovered quickly		
	Vernal pool plants	Increase		Fire counteracted exotic invasion of vernal pool basins.
	San Diego fairy shrimp	Persisted		
	Spadefoot toad	Persisted		
C. Rochester	CA sage scrub	Decline		Excessive age may hinder post-disturbance recovery.
	CA buckwheat	Decline		Excessive age may hinder post-disturbance recovery.
	Tecate cypress	Decline, but recovering		Requires fire but only after maturity is reached
	Chamise	Decline, but recovering		
	Total shrub and tree cover	Decline, but slowly recovering.		
	Non-native grasses	No change		
E. Stein	Sediment load	Increase		Direct and indirect impacts.
	Zinc, PAH, and Nutrient Flux	Increase		Direct and indirect impacts.
T. Oberbauer*	Perennial shrubs (re-sprouters)	Typically consumed by even low		Frequent fires may deplete energy resources and impair

		intensity fires		re-sprouting ability
	Perennial shrubs (seedlings)	Typically consumed by even low intensity fires		Extensive seed bank may exist for many decades. Risk from weedy invasion.
	Trees (re-sprouters)	Consumed by high intensity fires, but may survive low intensity fires		Risk from confounding affects associated with drought, repeat fires may deplete re-sprouting capacity.
	Trees (seedlings)	Consumed by high intensity fires, but may survive low intensity fires. Seeds typically not surviving fire.		Stand replacement if adult trees killed. But need occasional fire to clear understory.
	Trees (post-fire seed release)	Consumed by high intensity fires, but may survive low intensity fires. Require periodic fires to reproduce.		Risk from frequent fire before mature plants can produce next round of seed.
	Herbaceous plants (bulbs or corms)	Consumed by even low intensity fires. But reproduction may be stimulated by fire.		Need occasional fire to reproduce. Risk from fire stimulated weeds which heavily compete.
	Herbaceous plants (reproduction without fire)	Consumed by even low intensity fires.		Risk from fire stimulated non-native weeds which heavily compete.
	Annuals (typically requiring fire to reproduce)			Risk from fire stimulated weeds. Requires occasional fire to maintain seed bank.
	Annuals (reproduction	May expand with fire.		Risk from fire stimulated weeds.

	independent of fire)			

* T. Oberbauer was not able to attend the meeting but did provide a review of plant species responses to wildfire with notes on growth form and reproductive strategy. See presentation materials for plant species typically associated with each growth form or reproductive strategy.

Appendix 2: Science Advisory Panel Review of Wildfire Workshop Report

Thank you to those who agreed to participate in the workshop as the scientific advisory panel. This document was improved thanks to their thorough review and input. The advice of the scientific advisory panel was incorporated into the document as seemed appropriate. The scientific advisory panel was asked to provide feedback and recommendations, which are included below. The comments and concerns expressed by the scientific advisory panel are theirs and may not reflect the position of the USGS.

COMMENTS BY THE SCIENTIFIC ADVISORY PANEL ON THE
FIRE AND WILDLIFE STRATEGIC PLAN WORKSHOP
SAN DIEGO COUNTY, CALIFORNIA
March 13-14, 2013

Scientific Advisory Panel

Janet Franklin, Arizona State University
Harvey B. Lillywhite, University of Florida
David S. Pilliod, USGS Forest and Rangeland Ecosystem Science Center
Marti Witter, National Park Service, Santa Monica Mountains National Recreation Area

Response to Review Questions from Carlton Rochester

We were asked by Carlton Rochester to address these questions in our review of the report:

1. **Did I capture the presentations and discussions accurately?**

   This was a difficult task because of the diversity and breadth of topics. The major points of the presentations and discussions were fairly well captured or summarized. However, the major problem with the structure of the process and the report is how it will help develop a Fire and Natural Resource Management Strategic Framework for San Diego County (or the MSCP lands). It is not the job of this report to capture all of the content of the discussions as accurately as possible, it is to assess the credibility of the data and synthesize the information to provide a path forward.

2. **Did I fairly include both sides of any discussions? There were often opposing viewpoints expressed and I feel that all have an equal right to be included in the summary. This wasn't supposed to be a "USGS telling everybody else how to plan for fire in San Diego" workshop. This has to be a collaborative effort amongst all of the agencies and partners that are**

involved. Everybody that was at the workshop was invited because they are part of the process and if they had something to say, it should be included in the summary.

The document does not come across as overly authoritative or USGS-centric. I think the diversity of viewpoints was mostly expressed. However, the Scientific Advisory Panel did not participate in the workshop assuming that the purpose of the workshop *was* "USGS telling everybody else how to plan for fire in San Diego". The workshop was about wildfire impacts on wildlife. More to the point, USGS is a science organization – it says so in your mission statement and your logo. WERC is a research organization. While land management and land use policy are implemented by society, they can be scientifically informed. So, while differing opinions expressed at the workshop may be included in the summary, they may not all be equally well supported by scientific evidence. "Everyone is entitled to his own opinion, but not his own facts" (Daniel Patrick Moynihan). Science is not law or politics – it is not about giving everyone an equal voice, it is not about point-counterpoint -- it is about testing hypotheses against evidence. It does not always have two sides that deserve equal consideration, sometimes one side is supported by scientific evidence and the other is wrong. Scientifically informed land management should be USGS's goal.

3. **If any of you have additional recommendations on where do we go from here, I'd be glad to hear them.**

   These are mainly made as comments and text edits to the draft report document (*FireWorkshopSummary_071813b_ScienceAdvisoryPanel_FINALeditorial comments*) and in the additional comments below.
   How many views are the videos and powerpoints getting? It is a lot of information, but fairly easy to navigate to topics of interest. You might provide some tracking of site visits over time for the major websites and YouTube videos.

4. **… if I've missed anything else that I should be asking of the science panel, let me know that as well.**

   Thank you for organizing the workshop and soliciting our input. It was a very stimulating interaction and your report will be an important product. There are substantial revisions recommended, so there may be more back and forth that you will want with the panel members.

Organization and Structure

1. The **cover page** is a little confusing because it is difficult to determine what the title is for the document. The subtitle says "Meeting Notes and Summary." Is that the totality of purpose for this document, or is it supposed to include recommendations coming from conclusions and related to policies and implementation. If this is part of the purpose of

the document, then perhaps it should have a title that includes “recommendations” or some similar wording.

2. **Report structure #1:** Pages 1 and 2 should be followed by the Workshop Agenda, in turn followed by the Summary of the Workshop Discussions. These sections should not be called appendices. The beginning section “Workshop Purpose and Objectives” might be clearer if it was structured with a statement of the overall purpose, followed by specifically focused and bulleted objectives. What is called “Suggested Action Items to Come out of the Workshop” (beginning page 2 and running through p. 5) seems to be the recommendations and product of the Workshop. Calling them “suggested action items” sounds a little fuzzy. If recommendations were a goal of the workshop (and this document), then call them that. Finally, the “Conclusion” section beginning on page 5 might be placed at the end, or expanded just a little and converted to a summary to be placed at the beginning of the document, following the title page. Items such as the table found on pp. 16-19 could be placed as appendices at the end of the document.

Structure of the Report #2: The report needs to be re-structured – call the first 5 pages “Executive Summary “ and do not relegate the rest of the report to appendices. It seems really odd to have 5 page report with a 30 page appendix. The agenda and summaries are the heart of the report and should not be relegated to appendices which makes it sound like no one actually needs to read them.
Structure of the Report #3: The report needs to be re-structured. Most importantly it needs to be decided if this is a reporting of discussions as they were or a synthesis of the best available information related to an action plan. A lot of the muddle will disappear if it is more focused on what the informational and operational needs are and how to accomplish them.
3. **Acronyms.** All acronyms should be identified precisely where they are first used. Also, an appendix that lists all the acronyms and what they stand for would be useful for easy reference when one is reading further into the document.

4. **Terminology.** Various terminologies should be consistent throughout the document. What is most bothersome is the use of “at risk values” and “at risk resources” that are mixed in various places to refer (I think) to the same thing. I think you are talking about “at risk ***resources***.” Values imply something else. I have changed “values” to “resources” at various places within the document.

Technical Comments on Content

1. See track changes and comments on the edited draft report.

2. Page 1 says: “Through this collaborative effort with the larger San Diego fire management and *natural resource/fire research community, the USGS looks to produce a more robust account of previous efforts and a strong set of operational goals and objectives for future wildland fire emergency events. This product is to be a “ Fire and Natural Resource Management Strategic Framework” focused on*

at risk resources with implementable management actions that will fall into these three wildland fire planning categories: pre-suppression, suppression, and post-suppression activities." This statement is confusing, because it is stated as the objective of the workshop, but that implied to me that this Report is the product – the "Strategic Framework." I don't think this is what you meant… Do you mean that the workshop is one step in achieving this goal, and this report summarizes the content of the workshop? I think this has to be more explicit.

3. Suggested Action Items (p. 2-): Who are these recommendations made to? USGS? Is the recommendation that USGS should "Establish and fund a county-wide wildland fire management coordinator" Is the recommendation to the San Diego Association of Governments (SANDAG)? What authority would this coordinator have?

4. What exactly is the Reserve (and is it capitalized)? Define explicitly early in the report, and then use the Reserve as shorthand.

5. Page 23: I do not like the term 'bad fire' – even though we may have used it in the workshop, I would not promote it by repeating it so many times in the paragraph. It is too imprecise. Maybe use it once and then after that use precise language such as 'too-frequent fire (outside the historic range of variability)' or something like that.

6. Page 21, C.a: I think what this is describing is a kind of translocation, and while it makes sense that establishing multiple populations spreads risk, if you are moving individuals/propagules it can have a negative effect on the source population, and metapopulation modeling is an appropriate tool for determining if and under what scenarios this benefits the species as a whole. There is a literature on this.

7. Page 24: Maybe I missed something but I am not sure why all the emphasis on cactus. Is if because of cactus wren? Cactus is an unimportant component of chaparral and not very abundant in CSS, which is why I ask. It is not obvious why it is emphasized so should be made more explicit.

8. Page 30 B.h: "Old growth California sage and buckwheat don't regenerate well after fire due to the nature of the species" --- I know this was stated in the workshop, but it just doesn't sound correct to me. These are fast-growing, light-tolerant species. I would almost consider them weedy. I am surprised to hear it said that they are not recovering. Is it simply due to post-fire drought? Is there any documentation of this?

Conclusions and Recommendations

1. While the objective of this report seems to have been to structure conclusions and recommendations based solely on the presentations and discussion at the workshop, any serious long-term policy recommendations should not neglect previous science related to the subject.

2. Except as noted in the comments on organization and technical content, the summary is scientifically sound and we agree with the "action items" recommended. Some recommendations will be fairly easy to accomplish and yield immediate benefit, namely: #5 "Create a centralized data source / GIS system to facilitate the collection, organization, prioritization and distribution of information on at risk resources". This one action will influence the success of #6 "Identification of resources at risk", #7 "Prioritize the risk", and #9 "Make an action plan". Other recommendations will be more difficult and require considerable resources but are still warranted, namely #7 "Determine current state of knowledge on the fire response of each species and community" and "Establish and fund a program to coordinate and manage resources associated with vegetation recovery programs".

3. How useful will this document be? There should be some type of follow up to answer that question, particularly with the considerable effort that went into hosting the workshop and soliciting feedback from the scientific panel. Perhaps a brief online survey (e.g. Survey-Monkey) could be created to ask folks to respond to the Workshop Summary and supporting material on the internet. This should target both folks that attended the workshop and those that did not.

4. The most important action that could be taken to integrate wildfire conservation and fire safety through the framework from this workshop would be to promote the **establishment of a permanent wildfire working group** (e.g. "San Diego FireSafe Alliance". The object would be to meet regularly to develop personal relationships, to learn from each other's expertise, and to identify and implement actions to protect communities and natural resources in San Diego County. Models are the **Santa Monica Mountains FireSafe Alliance**, sponsored by Zev Yaroslavsky, LA County Board of Supervisors, contact: Susan Nissman (*SNissman@bos.lacounty.gov*) and the LA County Fire Department (contact: John Todd *jtodd@fire.lacounty.gov*) or **Firescape Monterey** (*http://firescape.ning.com/ Contact: Mary Huffman (mhuffman@tnc.org).* The Firescape Monterey group is facilitated through the Fire Learning Network (FLN) *(http://www.conservationgateway.org/ConservationPractices/FireLandscapes/FireLearningNetwork/Pages/fire-learning-network.aspx).* The FLN is highly experienced at building collaborative working groups to achieve group goals related to wildfire management. Contact: Lynn Decker *(ldecker@tnc.org).* Similar successful efforts have an open structure that allows for participation of representatives from all backgrounds and affiliations with wildfire concerns. In addition to the fire agencies, other participants should include state and federal land management agencies, scientists, major conservation groups such as the Chaparral Institute and California Native Plant Society (CNPS), FireSafe

councils, fair plan insurance etc. It would need to be decided who could be an appropriate lead - USGS, SDMMP, the office of one of the San Diego county supervisors, the office of the San Diego County Fire Marshall, or ?

5. Despite having a few people participate in the meeting who have fire fighting experience, there is a lack of operational expertise represented in the document, with some suggestions probably unrealistic or naïve. It is recommended that fire fighting personnel less involved in vegetation management issues in San Diego, but highly skilled and experienced in IC and fire suppression operations, become involved. The Fire Management Officer (FMO) at the Santa Monica Mountains NRA, Kathy Kirkpatrick, is an excellent example.

6. The possibility of a major fire is now and the likelihood of one occurring is going to increase exponentially in the next three months unless we get major early rains or a weak Santa Ana season. How would the recommendations in this report help now if there were to be a large fire(s)? What recommendations are there that could be implemented to reduce the chance of a large fire this year? Re-reading the report from this viewpoint might provide a useful reality check and help set priorities for the planning framework.

Submitted September 16, 2013

Appendix 3: Acronyms

Acronym	Definition
AECOM	Architecture, Engineering, Consulting, Operations and Maintenance
ARRA	At risk Resource Assessment
BAER	Burn Area Emergency Response
BLM	Bureau of Land Management
CA	California
CAL FIRE	California Department of Forestry and Fire Protection
CBI	Conservation Biology Institute
CDFW	California Department of Fish and Wildlife
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CSS	Coastal Sage Scrub
FLN	Fire Learning Network
FMO	Fire Management Officer
FMS	Fire Management Strategy
FRAP	Fire and Resource Assessment Program
FRID	Fire Return Interval Departure
GIS	Geographic Information System
HCP	Habitat Conservation Plan
IC	Incident Command
MCI WEST	Marine Corps Institute West
MSCP	Multiple Species Conservation Program
NCCP	Natural Community Conservation Plan
NPS	National Park Service
NRA	National Recreation Area
NRCS	Natural Resource Conservation Service
PAH	Polycyclic Aromatic Hydrocarbons
PAL	Project Activities Level
PDF	Portable Document Format
RA	Resource Advisor
SanDAG	San Diego Association of Governments
SCCWRP	Southern California Coastal Water Research Project
SC-MTX	South Coast Multi-Taxa Database
SDMMP	San Diego Management and Monitoring Program
SDNHM	San Diego Natural History Museum
SDSU	San Diego State University

Acronym	Definition
SP	State Park
UC Davis	University of California Davis
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WERC	Western Ecological Research Center
WFDSS	Wildland Fire Decision Support System
WUI	Wildland – Urban Interface

Appendix 4: Participant Critique of Wildfire Workshop

Jon E. Keeley, USGS

This workshop bit off far more than it could conceivably accomplish. It would have benefited from pre-planning meetings with fire scientists and most particularly with resource managers trained in strategic planning.

Numerous aspects of the planning and execution of this workshop supports a conclusion that this meeting had a pre-determined agenda that was distinctly political in nature focused on promoting vegetation treatments to reduce fuels. There was a carefully designed agenda that limited the presentation of the best available science and it did not reflect well on the range of scientific expertise available on these issues. In my opinion it would have been best if USGS had not been involved.

The first day provided a plethora of plant and animal stories about their response to fire. As one of the scientific panel members noted (Janet Franklin) the responses for most faunal groups spans the range from species whose populations expand with fire to those that contract with fire.

The second day should have begun with a clear discussion of what the future conditions should be on these landscapes and a clear weighing of the likely success of alternative management options. Since goals were never articulated much of the second day was not focused clearly enough to reach any useful conclusions. Based on the recognition that some species are favored by short fire intervals and others by long fire intervals there was a brief discussion of how we might need to maintain a mosaic of age classes on the landscape. Creating such a landscape implies that the goal is to maintain maximum floral and faunal diversity at all points in time. This is perhaps not an achievable goal on southern California landscapes because of the inevitability of large Santa Ana wind driven fires that reset the landscape to a single age class over vast swaths covered by such fires.

Because the organizers did not entertain alternative goals there was no discussion of options other than trying to maintain maximum diversity at all times. In particular this workshop could have benefited from considering goals that drive faunal biodiversity management in other Mediterranean ecosystems such as Australian national parks. Their management goal is to minimize longterm extinctions of animal and plant species. This management goal recognizes that maximizing diversity at any given point in time is not the way to minimize extinctions. Longterm sustainability of species in these crown fire shrubland ecosystems requires a focus on longterm sustainability of populations and not on trying to have maximum diversity at any given point in time.

Translating the Australian park model to Southern California leads to the question of what is most threatened, young age classes or old classes of vegetation? As Kristen Winter from the Cleveland National Forest noted, the landscapes under discussion in this meeting are largely out of whack with historical fire regimes by too much fire. The scientific evidence to date supports the conclusion that few if any species is threatened by too little fire, despite an apparent fire dependence for completion of many life cycles. In

contrast there is abundant evidence that short fire return intervals are a threat to many species. The inevitable consequence of short fire return intervals is type conversion from native shrublands to exotic annual 'grasslands.' The opinion was offered by Clay Howe from BLM that there is nothing wrong with this and we should embrace these 'Spanish grasses' as a new and important vegetation type, a sentiment supported by rangeland ecologist Harold Heady who many years ago labeled these species as the 'new natives.' One could imagine situations where this view might be compatible with some management goals, however, it is incompatible with the aim of maintaining biodiversity. Type conversion eliminates native plant species, increases site aridity and eliminates habitats for many native faunal species. Studies have shown that these annual grasslands are assiduously avoided by many native animal species. Although type conversion may contribute to enhanced habitat for deer and other game animals, such species do not appear to be species at risk. While type conversion has some advantages for fire fighters in that grasses generate lower flame lengths, this benefit needs to be seriously examined in terms of potential negative impacts. On certain terrains grass fires may be more dangerous due to their potential for more rapid fire spread. In addition, these annual grasses and forbs greatly increase the fire season in this region and as Alex Syphard's studies of fire origins have shown, herbaceous fuels comprise the vast majority of vegetation types where fires ignite. Such fires provide an important wick for spread of fires into more hazardous fuels. A good example is the deadly Esperanza Fire that readily ignited near Hwy 10 in a landscape that had a long history of repeated burning, which had type converted the native sage scrub to red brome and other highly flashy fuels.

The organization of this workshop and the facilitation of the second day seemed to suggest that Fisher had decided ahead of time that retention of the biota required a reduction in fire severity and an appropriate way to do this was through fuel treatments. However, no model of how this would achieve the goal of maintaining the longterm sustainability of plant or animal species was presented and attempts by participants to discuss that issue were ignored because of an apparent need to push a preconceived agenda.

An unfortunate part of this workshop was that it forced some managers to aggressively defend their policies of fuel management and this was largely not relevant to the topic of this workshop. The role of fuel treatments in achieving the aims of fire fighting organizations such as CalFire are well supported under some circumstances. Extensive USGS research on fuel breaks supports the role of fuel breaks under those instances where they enhance fire fighting activities. However, CalFire is not a resource management agency and their perspectives are not highly appropriate to how to best maintain faunal and floral diversity on conservation lands in the region.

Overall this meeting presented some interesting papers but far more could have been achieved with appropriate collaborations and good planning prior to the meeting.