

MEETING SUMMARY: CLIMATE CHANGE WORKSHOP
Southern Sierra Regional Water Management Group
June 5, 2014

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1. Summary of Action Items

- **Provost and Pritchard** to correct any errors on the map of the SSIRWMP, add known landmarks, and upload the revised version to the project website.

2. Welcome and Introductions

Mr. Bobby Kamansky, Stakeholder Coordinator, welcomed Regional Water Management Group (RWMG) members and other interested stakeholders to the Climate Change Workshop and presented an initial list of issues that would be explored, which included:

- Climate change impacts and vulnerabilities at a watershed scale
- Adaptation and mitigation
- Management
- Challenges in the Southern Sierra (SS)
- Need for watershed plans and collaborative project implementation
- No regrets strategies, co-benefits of conjunctive uses
- Resiliency

Rich Wilson, Facilitator with the Center of Collaborative Policy, reviewed the agenda and ground rules. He then described the workshop objectives, including the following:

- Introduce and discuss the Geos Institute Climate Change Report and associated climate related impacts and vulnerabilities for the Southern Sierra region
- Discuss adaptation and mitigation strategies necessary for building resiliency
- Secure stakeholder feedback and identify priority strategies
- Identify constraints and obstacles to applying climate change strategies

3. Presentation: Climate Change and Integrated Regional Water Management Plans

Ms. Mary Beatie, Senior Planner with Provost and Pritchard, presented the basics of the California Regional Integrated Water Management Plan regulations and process. She described the purpose, funding sources, and various standards of an Integrated Regional Water Management Plan (IRWMP). She noted that most participants across the State generally agree that development of such a management plan, even with limited resources, is more likely to be beneficial to a wide array of stakeholder interests acting collectively and planning collaboratively, rather than acting individually. Given the workshop focus, she described DWR standards for addressing climate change in an IRWMP:

- Evaluate vulnerabilities and adaptation responses;
- Provide a process to consider green house gas emissions; and
- Include a list of prioritized vulnerabilities.

Workshop attendees sought clarification on the definitions of public, urban and rural land management policy makers. Ms. Beatie responded noting that those people are those who develop and/or establish land use management policies for public lands, county and city jurisdictions; such managers can also be considered as stakeholders in a water management planning process. Attendees also asked if the Forest Service is represented in the IRWMP and whether or not they were present at the workshop; Ms. Nina Hemphill, Fisheries Program Leader, affirmed USFS participation and noted her attendance at the workshop. Attendees also requested clarification regarding the Southern Sierra IRWMP funding sources. Ms. Beatie and Mr. Shelton of the Department of Fish and Wildlife (DFW) noted that the IRWMP planning process for the Southern Sierra Regional Water Management Group is currently funded by a Department of Water Resources Proposition 84 planning grant. Once the IRWMP is complete and adopted by a wide range of stakeholder interests, the group will seek additional Proposition 84 funding to implement management actions and associated programs and projects as identified and prioritized in the IRWMP.

4. Presentation: Overview of Climate Change and Climate Change Modeling for Southern Sierra Region

Dr. Marni Koopman, Climate Change Scientist with the Geos Institute, delivered a brief history of her organization and presented an overview of the possible climate change impacts in the Southern Sierra region, current modeling techniques used to predict impacts, and ways in which the region may be affected. She began with a history of the CO₂ concentrations over time and described the 10 indicators of a warming world. She discussed two primary types of models -- the GFDL and PCM models -- and provided the predicted changes in temperature, precipitation, and hydrology patterns that may occur on a local scale by mid-century and late-century.

Discussion followed:

- Participants sought clarity in the overall April trend in snowpack across the Sierra Nevada range as opposed to the trend in the Southern Sierra region. While the overall trend shows a decrease in snowpack, the SS region actually displayed an increase. Mr.

Kamansky noted that the data might be skewed and reflective of El Niño and La Niña events. Dr. Koopman clarified that increased precipitation has led to greater snowpack, but that warming temperatures will cause snowpack to decline in the coming decades.

- Attendees also inquired as to the time period for which the model was calibrated; Dr. Koopman noted that it was calibrated back to 100 years.
- Mr. Shelton emphasized the importance of recognizing distribution change of the variability between dry and wet years.
- Many attendees inquired throughout the day as to how climate change points of reference are determined. What kind of information should inform decision-making? Should the point of reference be extreme, conservative, historical or based on paleoclimatology?
 - Ms. Koopman noted that the points of reference (baseline period) varied from study to study. These models provide information on the potential magnitude of future change, but do not predict future condition with certainty.
 - One attendee inquired about representation of variability in the models and whether or not the model outputs simply represent means. Ms. Koopman noted monthly means as the finest temporal scale, but highlighted the importance of considering expected variability as opposed to current variability.

5. Presentation: Vulnerabilities, Adaptation and Mitigation Strategies

A series of presenters described current and potential strategies for mitigation and adaptation. Dr. Koopman noted that the scale and extent of climate change impacts can vary based on how people in a particular region respond. Mr. Kubit defined key terms such as vulnerability, adaptation and mitigation; he subsequently described example strategies to address climate change relative to agriculture, forests, the economy, water supply and habitat. He encouraged the group to consider ‘no-regrets strategies’ that enhance resource conservation with or without the presence of climate change impacts. Finally, while displaying a map of the SSIRWMP boundaries, he described vested interests across the region and in downstream regions, and outlined potential watershed benefits that could result from the application of key strategies that address climate change. He stressed that activities in the Southern Sierra IRWM region could affect water resource vulnerabilities in other water management regions, so actions need to be coordinated across boundaries.

- **ACTION ITEM: Provost and Pritchard** to correct any errors on the map of the SSIRWMP, add known landmarks, and upload the revised version to the project website.

Ms. Charisse Sydoriak then provided a brief overview of her experiences as a Resource Manager with the U.S. National Park Service. She described the difficulties in predicting climate change impacts, emphasizing that no one model is absolutely correct. She stressed that we cannot predict the future; instead, we utilize science to predict possible outcomes. This approach, she noted, requires flexibility and the ability to adapt to change. Demonstrating her point with a cartoon, she discussed the Climate-Smart Conservation Guidebook:

(http://www.nwf.org/~media/PDFs/Global-Warming/2014/Climate-Smart-Conservation-Final_06-06-2014.pdf).

The guidebook recommends acting with intentionality, managing for change not just persistence, reconsidering the goals not just the strategies. Finally, Ms. Nina Hemphill of the USFS discussed her experiences as an aquatic ecologist and described changes to the

environment that are happening as a result of climate change. She noted common challenges surrounding issues such as hydrologic connectivity in meadow ecosystems and the vulnerability of alpine systems. That said, she pointed out that disagreements will occur about how to manage these ecosystems in the face of a changing climate will occur. As such, she emphasized the value of collaboration in deciding ecosystem values, and stressed the importance of maintaining an adaptive management approach.

6. Open Discussion and Prioritization Exercise

The facilitator introduced four pre-determined categories that were used to guide breakout groups to brainstorm climate change vulnerabilities, as well as adaptation and mitigation strategies. Initial breakout results included the following:

Breakout Theme: Watersheds and Water Quality

Vulnerabilities

- Ephemeral Streams
 - Vulnerable to irregular hydrology
 - Fire, floods, decreased water quality (erosion)
 - Human communities
 - Increased early spring erosion
 - Increase in fire
 - Increased cost
 - Animal and plant communities
 - Recreation

Adaptation and Mitigation Strategies

- Forest and vegetation management
 - Restoration (streamside)
 - Land use designations/ policy (buffer; conservation easements)
- Create more water storage
- Education
 - Planning (e.g. community and disaster)
 - Conservation
- Water back to the environment for recharge
- Planning and implementing conservation planning (corridors)
 - Prescribed fire
 - Invasive species control
- Restoration (water quality)
 - Education
 - Planning
 - Diversity
 - Community involvement

Breakout Theme: Changing Precipitation Patterns and Management (including flooding)

Vulnerabilities

- Inadequate water storage
- Drought
- Flood preparedness
- Infrastructure
- Fire
- Economic resilience
 - Tourism
 - Cattle
- Ecological resilience
 - Vegetation/die-off

Adaptation and Mitigation Strategies

- Re-flood Tulare Lake
- Increase dam size
- Modify/alter watershed
 - Vegetation management
 - Meadow restoration
- Transient Storage
 - Slow water flow through system
 - Moving water around
- Increase downstream stream capacity
 - Setbacks
 - Inadequate flood control
- Increase accuracy of forecasts
- Cloud seeding/water modification
- Infrastructure resiliency

Breakout Theme: Affects of Wildfire Reoccurrence on Water Quantity and Quality

Vulnerabilities

- Overly dense forests
 - Results in fire; uncharacteristically severe fires & more frequent catastrophic fire
 - Results in lower water storage capacity from increased uptake
 - Loss of water through evapotranspiration
 -
- When forests burn
 - Soil is lost from increased erosion
 - Lose absorption capability
 - Erosion/sedimentation leads to lower water quality/loss of aquatic habitat
 - Ash is erosive itself

Adaptation and Mitigation Strategies

- More natural and prescribed fire at the landscape scale
- Data collection, better modeling, and social science research that informs outreach and education
- Education on the tradeoffs between prescribed fire vs. natural fire, benefits of natural

fire, and consequences of a lack of fire

Breakout Theme: Groundwater Resources (fracture flow and diminishing well capacity)

Vulnerabilities

- Loss of surface water that recharges groundwater
- Limited storage space in aquifer
- Water flows quickly through the system
- Wells not deep enough
- Economic interests
- Groundwater exports
- Concentration of pollutants in ground water
- Already overdrafted groundwater resources
- Lack of water planning
- Population growth
- Disadvantaged communities
- Lack of water recycling

Adaptation and Mitigation Strategies

- Water conservation
- Cloud seeding
- Water recycling (grey water)
- New funding sources for climate change/drought adaptation
- Use more surface water
- Require sustainable water supplies for new developments
- Drill deeper wells/drill more wells
- Drought tolerant landscaping
- Renewable energy for well pumps
- Require sustainable water supplies (prevents overdevelopment)

Each breakout group reported back to the full group. Attendees then engaged in a multi-voting exercise to identify priorities. Each attendee chose, from their perspective, the four highest priority vulnerabilities as well as adaptation and mitigation strategies. Prior to discussing the exercise results, the facilitator acknowledged how the group ultimately considered all identified issues as important. The multi-voting exercise simply provided a view towards what the group as a whole considers top priorities for the region relative to climate change.

Highest Priority Vulnerabilities:

- Drought
- Inadequate water storage
- Overly dense forests
- Vulnerability from altered fire regimes
- *Population growth
- Already overdrafted groundwater resources

- Disadvantaged communities

Highest Priority Adaptation and Mitigation Strategies:

- Forests and vegetation management (streamside restoration and land use policy encouraging conservation)
- *Education
- Restoration education and community involvement
- More natural and prescribed fire at the landscape scale
- Water conservation
- Water recycling
- New funding sources for climate change/drought adaptation
- Research that includes data collection, better modeling, and social science research that informs education and outreach
- Education on the benefits of large natural fires and prescribed fire

General Notes on the Process:

- Noticeable overlap occurred across the breakout groups; some items were listed more than once (denoted by a *), thus representing common group thinking.
- Participants noted that virtually none of the priorities occur in isolation; actions taken to address one issue or challenge will often affect other issues or challenges.
- Members expressed surprise in the limited interest to prioritize flood preparedness.
 - Some suggested that limited interest in this strategy may be related to the bias of regional applicability

7. Attendees

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|--|-------------------------------|
| 1. Chris Acree | 17. Marni Koopman |
| 2. Emily Adams (Assistant Facilitator) | 18. Owen Kubit |
| 3. Mary Batie | 19. Chris Moi |
| 4. Mike Baty | 20. Justine Reynolds |
| 5. Lauren Bower (Telephone) | 21. Robert Robinson |
| 6. Bob Buchard | 22. John Shelton |
| 7. John Kirk (Telephone) | 23. Shane Smith |
| 8. Richard Garcia (Telephone) | 24. Charisse Sydoriak |
| 9. Jaime Collins | 25. Rich Wilson (Facilitator) |
| 10. Nina Hemphill | 26. Kathy Wood-McLaughlin |
| 11. Steve Haze | |
| 12. Steve Haugen | |
| 13. David Hoffman | |
| 14. Lance Johnson | |
| 15. Bobby Kamansky | |
| 16. Karry Klein | |