UC Science Team updates for SNAMP 2013 Second Quarter (Q2)
Main project findings and work accomplished since previous report on April 29, 2013
~July 30, 2013~

Project Integration and Management (PIM) Team

Quarterly financial update

The UC Science Team continues to be on budget for Year 7, 2013.

Integration

In addition to the financial, administrative, and logistical support that PIM provides to the UCST, we continue to develop the integration framework that the UCST will use to produce the final integrated assessment. Following the creation of an Integration roadmap, we are now working on a unifying concept around which to integrate the findings of the UCST. We have selected C.S. Holling's theory of ecological resilience (defined by Holling and others as the capacity of a system to undergo disturbance and maintain its functions and controls) as the most promising candidate. We are focusing on resilience for two primary reasons:
1) Resilience is an intuitively comprehensible idea but is also grounded in four decades' worth of ecological theory. Over the last decade, there have been increasing instances of real-world applications of resilience theory to social-ecological systems.
2) The resilience concept explicitly incorporates human social systems. Although less developed than the ecological aspects, resilience of combined social-ecological systems is of increasing interest to social scientists and policy-makers. Other integrative concepts such as ecological integrity do not have a strong social systems component. The PIM team has initiated discussion with members of the Public Participation team on the potential of resilience as an integrative concept for SNAMP's social science as well its ecological science. We plan on proposing resilience as SNAMP's integrative concept to the MOUP during the 2nd quarterly meeting at the end of July, and assuming positive feedback, to the public during the Annual meeting in October.

UCST Coordination

PIM continues to plan and budget for successful project completion in 2014. On-going budget uncertainties and reductions, compacted project timelines, and unanticipated project needs such as the Last Chance lidar reflight, require the PIM team to invest much time and effort into coordinating multiple budget and workplan revisions and other administrative activities. In addition, PIM has spent much time 1) planning for the successful completion of SNAMP fisher analysis and integration and 2) working on the transition of the SNAMP fisher project field operations to the Forest Service Sugar Pine fisher project

- Administration: assisting teams with HR activities, planning, and budget reporting; maintaining SNAMP publications list; maintaining bSpace archive
- Logistics: coordinating monthly UCST conference calls and other interteam communication; assisting teams with field crew lodging and other logistical needs
- Coordinating UCST's multiple 2014 budget proposals
- Coordinating search for lead scientist for SNAMP Fisher project and planning for transfer of fisher field operations to USFS Sugar Pine fisher project
- Developing primary integrative concept for SNAMP final report, including extensive literature review
- Met with PPT to discuss resilience concept
- Keeping track of adherence to SNAMP and science team agreements
- Organizing All Scientists meeting in September
- Helping organize SNAMP Annual meeting in October

Communication with MOU Partners (MOUP) and stakeholders

- Communicating with USFS regarding 2014 funding, Water team budgetary needs, and lidar reflight funding and planning
- Helped organize and lead April MOUP 2013 Q1 meeting in Davis
- Presented Integration roadmap to MOUP and sought feedback at Q1 meeting and via email
- Coordinated UCST production of the 2013 Q1 update for MOUP and Q1 MOUP meeting notes
- Helping organize July MOUP 2013 Q2 meeting
- Coordinating UCST team updates and agenda development for MOUP 2013 Q2 meeting
- Coordinated uploading of UCST sample datasets to inform MOUP-UCST discussion of data-archiving
- Coordinating with MOUP on SNAMP Annual meeting planning
- Coordinated with USFS regarding lodging for UCST field crews
- Communicated with USFS regarding GIS treatment layers for FFEH field work planning

California Spotted Owl Team

Working on April-June:

- Owl surveys: we have detected owls at 41 territories across the 3 study areas (Density, Regional, SNAMP) and have assessed reproduction at 34 territories (13 nests, one failed nest). We have completed at least 2 night surveys across all territories.

- Retrospective analysis: we finished the GIS-based habitat map that tracks annual vegetative change across owl territories from 1993–2012 and accounts for harvests and regeneration that occurred during the time frame. We added a covariate for understory removal to include in the models. We recently began the occupancy and reproduction modeling, but we have not begun the survival modeling.

Current and future work:

- We will continue surveying for owls through August.

- We will continue the modeling for the retrospective analysis.

Fire and Forest Ecosystem Health (FFEH) Team

2Q 2013 Activities:

- The FFEH team is measuring all forest inventory plots at both sites this summer. The crew completed Sugar Pine in late June and quickly relocated to Last Chance. We hope to finish all the plots by the end of August. Thus far, the main challenges are relocating plots that have been harvested and masticated and the extra measurements needed to accurately estimate masticated fuels.

- We continue to meet with the Spatial team to discuss altering the forest structure lidar maps for a fire behavior sensitivity analysis and the SPLATs fire hazard assessments. We settled on incorporating the calculated error into the canopy height and canopy base height maps. Crown bulk density continues to be a challenge to estimate using lidar.

- We met with the Owl team to discuss analyzing fire behavior in relation to forest structure and owl habitat. The good news is we have a tentative map that will allow modeling at very large landscape scales (50,000+ ha).

Spatial Team

Update:

Lidar data have been flown for the southern site; we are in negotiations with NCALM about flying the northern site. New lidar data are discrete return and waveform. We have received the discrete and waveform lidar for the Southern site and part of the Northern site (total: about 2T byte space).

Analysis:

The UC Berkeley Spatial team is focusing on an uncertainty analysis of lidar data used for forest modeling (FARSITE). This is in collaboration with the FFEH team.

The UC Merced Spatial team has been actively working on the following:

1. Classifying the vegetation classes for both sites at the plot level.

2. With the fisher team, modeling fisher habitat using environmental niche models.

3. Communicating actively with NCALM re: acquiring the new lidar data.

4. Extracting vegetation parameters from the discrete and waveform lidar data.

5. UCM Spatial is actively working on modifying the SNAMP data server to meet data sharing needs.

Presentations/Workshops:

None to report.

Publications:

New or In Process:
Jakubowski, M K, Q Guo, W Li, M Kelly. Delineating individual trees from lidar data: A comparison of segmentation methods. Submitted to *Remote Sensing*, reviews received. Minor revisions made and resubmitted

Public Participation Team (PPT)

Website

- Maintained and updated regularly
- Sent out Web Updates
- Maintained server health and backed up data

- Updated SNAMP Facebook page regularly
- Continued citations tracking: Total number of citations for all publications is 77

Assessment

- Re-did budget and workplan two times
- Archiving SNAMP materials – on-going
- Analysis of online survey, interview and observational data – on-going
- Program evaluation matrix refinement – on-going
- Learning interviews completed and coding has begun.
- One paper in progress: studying the effect of social network on participation and information flow in adaptive management using social network analysis and content analysis methods
- One paper in progress: "third party monitoring paper" exploring the evolution of the USFS management model from 1900 through SNAMP
- One paper proposed for *California Agriculture*: Snapshot of SNAMP based on the email survey from 2010
- Final interviews and email survey planned
        - Final interviews to be completed by Dec 2013
        - Data analysis – 3 months – to start January 2014
        - Writing of final report – 6 months – to start May 2014
        - Final email survey to be conducted in summer 2014
- Final interview planned subjects:
        - Integration
        - Learning
        - 3rd Party
        - AM process
        - Forest health
        - Closing the AM loop

Outreach

Both sites:
-- Refined the training modules developed to train managers and stakeholders in Collaborative Adaptive Management (CAM) based on outcomes of the workshops held in Auburn (1/31, 2/28 & 3/28/13) and Oakhurst (2/14, 3/14, & 4/18/13)
- Held a Public Participation team meeting May 31, 2013, in Davis to plan future CAM efforts
- Preparing for an advanced workshop at each site from our first round of CAM trainings, in Auburn (8/1/2013) and Oakhurst (9/18/2013)
- Assisted in the preparation of and attended and facilitated the MOUP meeting in Davis on April 29, 2013
- Assisted in the coordination of a SNAMP exhibit at UC Merced, including collecting display materials, April – June 2013

Northern site:
- Published a UC Green blog entitled "Fire Ecology – a "hot" career to attract students to science," April 2013

- Presented SNAMP to the Foresthill/Iowa Hill Fire Safe Council on April 16, 2013
- Set up and maintained the UC Collaborative Tools site for CAM trainings, April 2013
- Participated in a USFS interdisciplinary team field trip to the Last Chance site, May 29, 2013
- Facilitated a session at the Sierra Cascade Dialog meeting on May 30, 2013
- Preparing for a new round of collaboration workshops in Jackson, CA, August 8th and September 10th, 2013

Southern site:
- Presented SNAMP to the Stewards of the Sierra in Fresno, April 10, 2013
- Prepared for and completed the final of three workshops in our Collaborative Adaptive Management series April 18, 2013
- Advised on the facilitation processes at the Forest Service's new Landscape Planning public meeting in Fresno, April 19, 2013
 - Staffed a SNAMP booth at the North Fork Earth Day Celebration April 20th and the Oakhurst Earth Day Celebration April 21, 2013
- Presented SNAMP to the executive committee of the Sierra Club in Fresno, May 8, 2013, which lead to the opportunity to speak at their general meeting 9/18/2013
- Took photos of the Fire and Forest Team doing post treatment plot inventories in the Sugar Pine project May 27, 2013
 - Arranged to have a fisher pelt mounted by a taxidermist for outreach purposes June 6, 2013
- Wrote a story for the Yosemite Gateway Partners newsletter on roadkill issues "A Rare Forest Carnivore Falls Victim to Roadkill on Highway 41" to be published June 2013.
- Wrote a Green Blog for UC Agriculture and Natural Resources on roadkill titled "Should Have Looked Both Ways!" to go public in July 2013.

Fisher Team

During the second quarter, the SNAMP fisher team had a maximum of 4 field staff during the denning season and currently has a total of 3 field staff. Joseph Bridges, who has been with the project for 4 years, has submitted his resignation, and his departure date will be the 26th of July, 2013. Joseph will remain committed, even after his departure from the project, to the SNAMP fisher project and will assist as needed.

Joseph Bridges and Gary Roller have been working with Craig Thompson to get him up to speed so that he can begin working on the SNAMP fisher final report, and to begin coordinating the transition of the SNAMP fisher project to the USFS's Sugar Pine fisher project. Additionally, Joseph has been working to create a database that will summarize all SNAMP-related fisher mortalities. This mortality database will be made available on the SNAMP online project database (https://snamp.ucmerced.edu/). A database is currently under construction that will summarize all the biological data that have been collected on all SNAMP fisher captures.

2013 Denning Season

- The 2013 Pacific fisher denning season formally began on the 18th of March, and ended on the 5th of Jun 2013. On the 23rd of March, our first confirmed denning female was located (F55), which is the project's earliest confirmed den tree.
- Eleven females were confirmed to have denned, and a kit count was acquired for 8 (72.7%) of the denning females. The 5 year average of percent kit count/confirmed denning females (2009-2013) for the SNAMP Fisher team is 64.6%.
- Only 2 females were confirmed with a minimum of 2 kits; all other females only produced a minimum of 1.
- Twenty-seven new den trees were confirmed, and 7 of those (25.9%) were used in previous denning seasons.

Telemetry/Mortalities

- As of the 9th of July 2013, we are aerially monitoring 22 radio-collared Pacific fishers (12 females and 8 males), 5 days per week.
- There were 5 mortalities (4 males and 1 female), 5 dropped collars (2 male and 3 females), and 2 collars off air (due to battery depletion) from April 1st to July 9th, 2013.
    - All mortalities are pending confirmation via necropsy report.
    - All mortalities were a result of predation events.
    - All male mortalities occurred in April.
    - The one female mortality occurred on the 21st of April.

Key Watershed Camera Surveys

- The automatic digital camera trapping of the Key Watershed is due to be completed by mid-July.
- As of the 9th of July 2013, a total of 159 1km camera grids have been surveyed.

Future Work Priorities

- After completion of the Key Watershed Surveys for Year 6, camera grids have been identified outside the Key Watershed for survey. These surveys will be conducted from now to mid-October, which coincides with the end of Cam Survey Year 6.
- At the start of Cam Survey Year 7 (16th October 2013), the Key Watersheds will begin to be resurveyed again.
- Aerial telemetry flights are scheduled to continue 5 days a week.
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Water Team

Field Activities

• A priority for this past quarter has been routine visits to sites to download data, collect samples, and make repairs following the winter season. Additionally, water quality sondes at both the Last Chance and Sugar Pine stream sites have been repaired and recalibrated as needed.

• Infrastructure for the wireless network around the Bear Trap meteorological station (Last Chance lower elevation met) has been installed. Additional work is needed to fine tune the placement of network equipment to ensure that the network remains robust. This is being done under a parallel NSF-supported project, and it is planned that the site will continue to operate after SNAMP ends, in cooperation with the local water agency.

Data Analysis

• Data efforts are focused on detailed analysis of sediment patterns; water sources/flow paths, discharge measurement methods, and stream chemistry.

• A draft manuscript on turbidity and storm event patterns is complete and will be submitted this summer. Additional analyses of bedload measurements and water chemistry data have begun with manuscripts to follow in the next few months.

• Laboratory processing of sediment and water chemistry samples and data analysis is progressing.

• Data processing (QA/QC) of water quantity data for the 2012 water year has been completed and is being used for higher level data analysis as well as for validating hydrologic models. We have begun processing the first half of WY 2013 data.

Hydrologic Modeling

Modeling is continuing in parallel at the 4 SNAMP headwater catchments, and the comparative KREW catchments. Model calibration for current conditions provides a good ability to simulate daily evapotranspiration, streamflow, soil moisture storage, and snowpack storage. Work is currently focusing on simulating responses to forest thinning.

The figure below shows the differences in modeling the changes in water cycle when reducing forest vegetation using canopy cover or Leaf Area Index (LAI). Frazier Creek currently has an average LAI of 3.2 and a Canopy Cover of 91% - this is considered the 100%, or current condition. From the figure, it is clear that the model sensitivity to canopy cover has a more pronounced effect on increasing snowmelt rates, lowering evapotranspiration, extending soil moisture availability into the dry summer season, and shifting streamflow timing to earlier in the spring.

Frazier Creek, Canopy & LAI Reduction, Treatment Comparison, Avg Precip Year (2010)
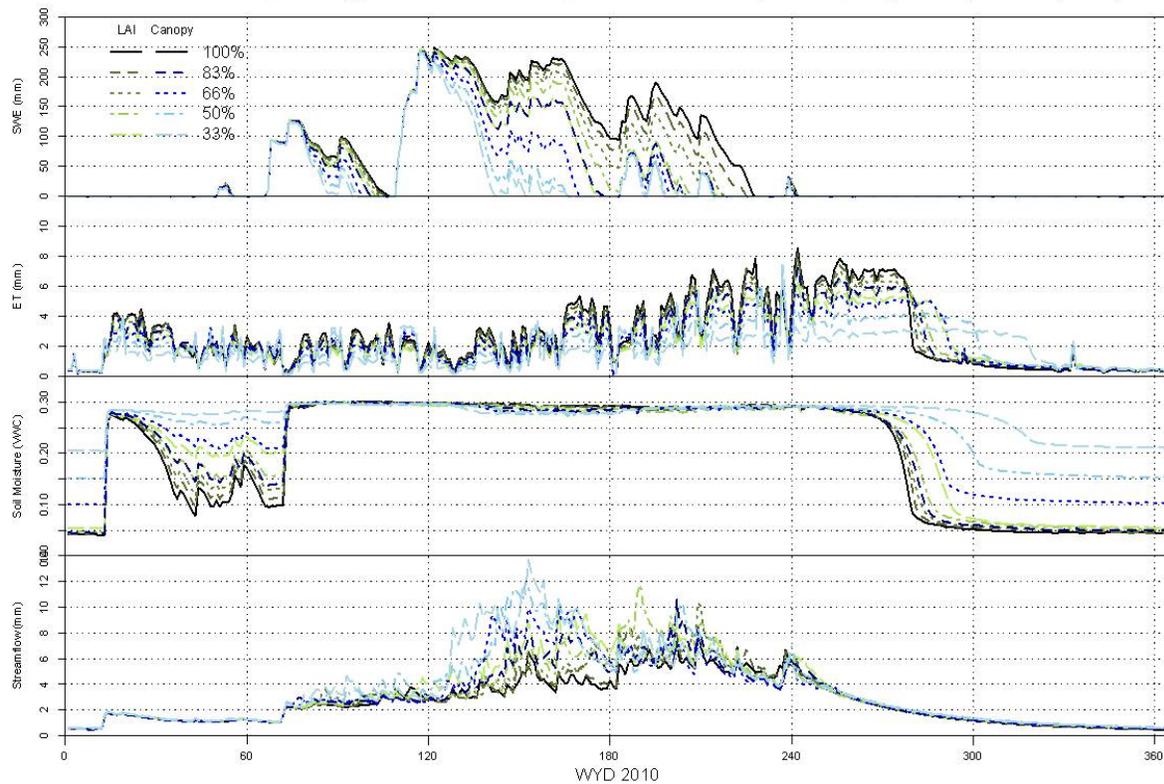
   The issue we are currently working on with this version of the model is that snow melt from thermal radiation is not directly linked to vegetation density. We know that dense vegetation has a greater ability to intercept solar radiation, in turn heating up and emitting thermal radiation to melt snow. The reason that any reduction in vegetation increases melt in the model, is that less vegetation always increases solar radiation to the snowpack but does not decrease the thermal radiation from the vegetation. We are working on adjusting the equation for calculating snowmelt so that it also accounts for the thermal radiation from vegetation. In addition, we are also working on to develop static topographic wetness index (TWI) map using 10m lidar DEM and dynamic modeled (RHESSys) soil moisture index maps for selected months of wet and dry years.

   The figure below shows the model results of water yield as a fraction of precipitation, after reducing vegetation in a burned and unburned scenario. In the burned scenario, litter cover is set at 10% which greatly increases evaporation from the soil, while in the unburned scenario, litter cover is at 90%, protecting most of the soil from direct evaporation to the atmosphere. These results show modeled effects immediately following a burn so litter cover would return over time.

Frazier Creek, Water Yield comparing treatments