# *Sierra Watershed Ecosystem Enhancement Project*

*Presentation to the Mountain Counties Water Association June 15th, 2012*

Susie Kocher – University of California Cooperative Extension, sdkocher@ucdavis.edu

# *Sierra Watershed Ecosystem Enhancement Project*

* **SWEEP Vision** - to quantify the effect of forest management on water yields and other ecosystem services in Sierra Nevada forests

* 1st phase of project led to publishing of the SWEEP report http://ucanr.edu/sweep/

* <u>Goal</u> – provide proof of concept that upstream management of Sierra Nevada forests can increase value of downstream water resources

* Funding by the Sierra Nevada Conservancy and the Bella Vista Foundation

Forests and Water in the Sierra Nevada: Sierra Nevada Watershed Ecosystem Enhancement Project

Roger C. Bales, John J. Battles, Yihsu Chen, Martha H. Conklin, Eric Holst, Kevin L. O'Hara, Philip Saksa, William Stewart

November 29, 2011

Sierra Nevada Research Institute, UC Merced       Center for Forestry, UC Berkeley       Environmental Defense Fund

# SWEEP 2<sup>nd</sup> Phase

* <u>Goal</u> – Develop measurement and modeling strategies, identify sites, develop prescriptions and obtain permits to allow for experimentation

* Water and sustainable natural ecosystem research prioritized in the 2010 UCANR Strategic Initiative

* Project team awarded $600,000 over four years through the UC Competitive Grants program

* Grant program integrates research and extension into one team

# SWEEP team– Phase 2

* *Dr. Kevin L. O'Hara*, University of California, Berkeley, Forest Silviculturalist, [kohara@berkeley.edu](kohara@berkeley.edu) PRINCIPAL INVESTIGATOR

* .*Dr. Roger Bales*, University of California, Merced, Hydrologist, [rbales@ucmerced.edu](rbales@ucmerced.edu)

* *Dr. John Battles*, University of California, Berkeley, Forest Ecologist, [jbattles@berkeley.edu](jbattles@berkeley.edu)

* *Dr. William Stewart*, University of California, Berkeley, Forest Economist, [billstewart@berkeley.edu](billstewart@berkeley.edu)

* *Susie Kocher*, University of California Cooperative Extension, Natural Resources Advisor, [sdkocher@ucdavis.edu](sdkocher@ucdavis.edu)

* *Project coordinator* – looking for funding and person

# SWEEP – Phase 3



* Goal – Monitor forest thinning for impacts on ecosystem services.

* Activities - conduct experiment involving pre-project data collection, forest thinnings, and post project data collection along with partners and interested stakeholders.

* Phase 2 should hopefully lead to Phase 3.

* No funding secured for Phase 3 at this time.

# Phase 2 - UCANR work plan 2012-15

* *Determine rates of evapotranspiration (ET) in Sierran mixed-conifer/true fir forests*
* *Determine water use efficiency of trees and shrubs in Sierran mixed-conifer and true fir forests*
* *Determine the potential for forest management to delay snowmelt in Sierran forests*
* *Determine potential economic tradeoffs of forest management treatments to affect water yield and ecosystem services*
* *Involve stakeholders in decision-making regarding forest management and watershed effects*
* *2012 summer season – start measurements needed to calibrate the 'forest/water' model*

# SWEEP Physical Measurements

* *Leaf area index* (LAI) - sum of all the leaf surface areas projected downward per unit area of ground beneath canopy. Calculated by felling 10 trees (of varying sizes) per tree species and measuring all the area on the leaves allowing construction of a curve relating tree size to LAI.

* *Snowpack* accumulation and melting measured by acoustic depth sensors.

* *Soil moisture* measured by soil moisture sensors at multiple depths.

* *Stream runoff* measured using stage recorders at natural sections, weirs, flumes.

* *Evapo-transpiration* (conversion of water in soil or plants into water vapor released to the atmosphere) - measured by sap flux, and estimated using meteorological methods & through basin-scale water balances.

Meteorology, snowcover, soils and forest structure data available from other research programs.

# Public Involvement in SWEEP

* Looking for involvement by agencies, landowners and other stakeholders.
  * identify appropriate research sites,
  * implement forest thinning treatments,
  * collaborate on the economic valuation of ecosystem services provided by the forest both before and after thinning.
* We will hold a public meeting in Summer 2012 to
  * get public input on SWEEP methods and design
  * explore connections with other on-going forest and water yield research projects.
* Outreach Methods
  * Presentations
  * Website – http://ucanr.edu/sweep/
  * Newsletter
  * Email list
  * Annual meeting?
  * Valuation TAC
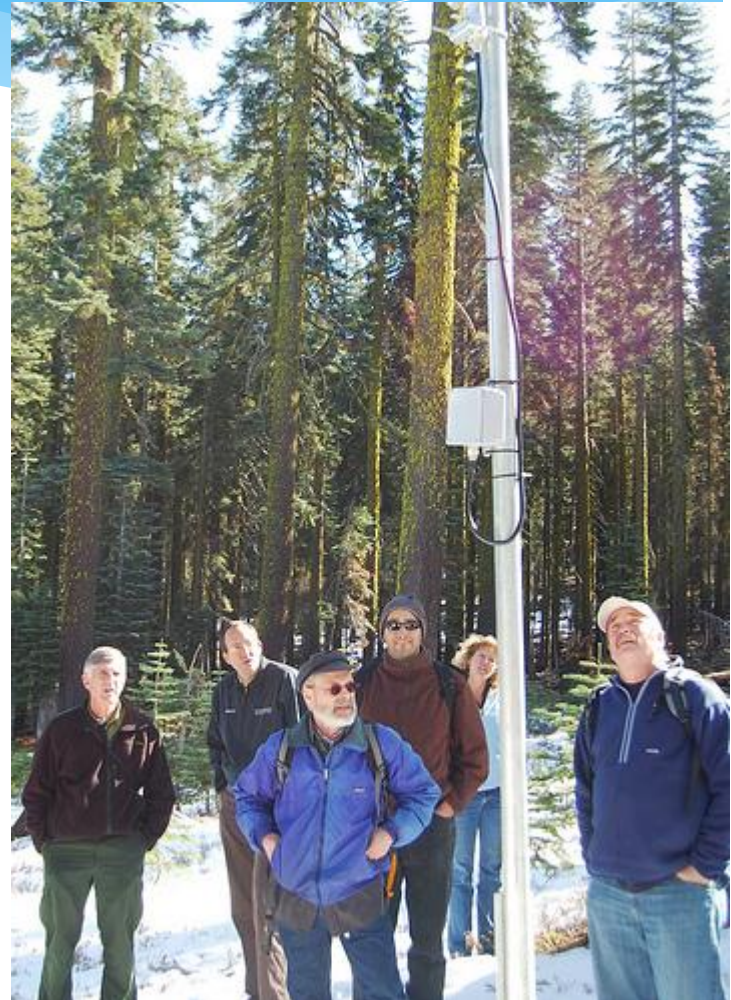
# SWEEP Economic Study



* Technical Advisory Committee (TAC) to price /allocate ecosystem services in American River basin.
    * Water agencies, environmental consultants, hydro-electric generators, forest residents, forest managers, downstream water users
* 2 project meetings a year as well as collaboration in committees. Tasks:
    * Study plan phase - review the valuation study plan and add critical variables
    * Research phase - supply needed data for case study and vet findings.
    * End of study - assist in dissemination of results and advise on policy changes to develop ecosystem service markets based on project results.

# Valuing Forest Ecosystem Services

* Ecosystem services – the benefits provided to people from the resources and processes supplied by natural ecosystems

* Productivity (forage, timber, etc)
* Surface water retention, delivery, storage
* Groundwater recharge
* Walter filtration
* Flood control
* Fire control

* Local climate control
* Carbon sequestration
* Recreation
* Hunting and fishing
* Wildlife habitat
* Natural viewscapes

# How can Ecosystem Services be Optimized through Forest Management?

* Thinning and fuels reduction can be expected to affect multiple ecosystem services:

  * Water yield. Increased water runoff
    * Is most valuable if it can also be used to produce hydroelectric power during periods of high prices
    * least valuable if it is spilled early in the season from already full reservoirs
  * Increased forest resilience / long term carbon storage
  * Reduced fire risk
  * Reduced potential for fire caused sediment
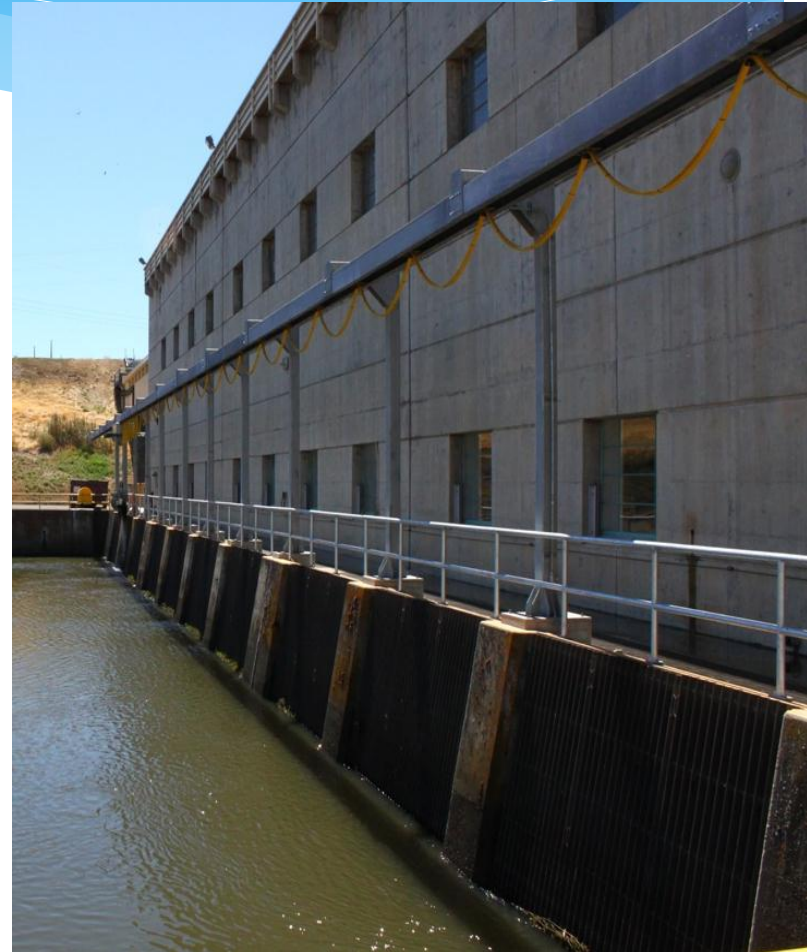
# Bill's Economic Questions



* Who would benefit from thinning? By how much? Who could pay for it?

* Who will measure the changes in services caused by thinning and be able to draw statistically valid conclusions?

* How will stakeholders react to proposed changes?

# Questions?

* To stay involved:
  * Sign up for email list
  * Check the website: http://ucanr.edu/sweep
  * Email:
    * Susie Kocher, sdkocher@ucdavis.edu
    * Bill Stewart, billstewart@berkeley.edu