Welcome to our newest SNAMP newsletter! To read previous newsletters and for more information, please visit our project website at: http://snamp.cnr.berkeley.edu. In this and our upcoming newsletters, we will highlight the work of the individual science teams. This issue focuses on the Water Science Team.

**WATER TEAM**

Dr. Roger Bales and Dr. Martha Conklin at UC Merced lead the water research/monitoring activities. They are joined by Sarah Martin, a Ph.D. Student at UC Merced, and Phil Saksa, staff hydrologist. The SNAMP water team members will be investigating impacts of strategic fuel treatments in SNAMP study areas on both water quantity and quality in headwater catchments in the treatment and control firesheds prior to, and after, treatments. Their goal is to better understand the water storage in and movement through the catchments: how the water begins as snow or rain, interacts with the landscape, and eventually exits the system as stream discharge. They will then look at the effects forest treatments might have on the way water is routed through the catchments. Their working hypothesis is that treatments will increase water quantity in the streams. Any change in water quality (such as turbidity) will be due to in-stream changes, related to this increase in water quantity.

**THE SNAMP SCIENCE TEAMS**

As directed by the US Forest Service's 2004 Sierra Nevada Forest Plan Amendment, vegetation management treatments that remove flammable natural materials from National Forests are planned or being implemented at many sites in the Sierra Nevada where fire risk is high. How do these treatments affect fire behaviors, wildlife, forest health and water? To answer this question, a team of university scientists is monitoring the effects of vegetation management treatments in two Sierra Nevada locations: Sugar Pine (in the Sierra National Forest) and Last Chance (in the Tahoe National Forest). The SNAMP science teams are made up of researchers from University of California Berkeley, UC Merced, UC Cooperative Extension, and the Univ. of Minnesota. The science teams study fire and forest health, wildlife (focusing on fisher and spotted owl), water, and public participation. All science teams are supported by remote sensing, spatial analysis and Geographic Information Systems (GIS) techniques.

**WATER TEAM IN THE FIELD**

The Water field sites are part of the SNAMP study areas we are calling Sugar Pine in the south (Sierra National Forest near Fish Camp, CA), and Last Chance in the north (Tahoe National Forest near Foresthill, CA). At each site, there are two study watersheds (a treatment and a control watershed) chosen to be comparable in area, gradient, discharge, aspect, and vegetation cover, with the total watershed contained inside the treatment areas. Each watershed will have instruments that measure both aquatic and terrestrial variables including: two weather stations placed at higher and lower elevations to catch the range of conditions present; snow-depth and soil-moisture sensors, automated water samples for sediment measurements; and in-stream water quality sondes. We chose response reaches in each stream for sediment and water quality measurements that were not too steep and thus subject to sediment deposition and scour.

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**Southern Watersheds:** The two southern watersheds are Big Sandy Creek (treatment) and Speckerman North Creek (control). Both watersheds are in Madera County, CA and are part of the South Fork of the Merced River watershed. Figure at left. Although the watershed falls within the "Fish Camp" Project boundary, it is in the Sugar Pine Project treatment plan.

**Northern Watersheds:** The two northern watersheds are Frazier Creek (control) and Bear Trap Creek (treatment). Both watersheds are above Forest Service Road 44 (Cavanah Deep Rd.) and flow into the North Fork of the Middle Fork of the American River. These watersheds are located in Placer County, CA. Figure at right.

**Water Team Field Instruments**

**Hillslope Measurements:** We have two weather stations in each study area (see photo at right) that are measuring precipitation, temperature, solar radiation, wind, humidity and snow depth. Having stations at lower (~1,500 m) and higher (~2,100 m) elevations allows us to sample the range of conditions present in these watersheds. One example of the variation is the increasing amount of snow with higher elevation. This was demonstrated last year where stations recorded snow depths that ranged 232 cm between the lower elevation and higher elevation sites. Snow depth also varies relative to tree canopies, owing to shading and wind, so snow depth sensors and soil moisture sensors are placed both underneath trees and in open areas. It is important to obtain an accurate estimate of snow depth and density, and the soil moisture response, as this information is used to help develop models that predict snow depletion, soil moisture and runoff.

**In-stream measurements:** Water depth and water quality sensors in each stream record data at 15-minute intervals. The sensors record:
- stage (m) to calculate discharge using rating curves (under development)
- dissolved oxygen (mg/L) an important parameter for aquatic plants and animals
- turbidity (NTUs) a measure of suspended sediment
- conductivity (μS/cm) which indicates the amount of dissolved ionic species in a solution such as calcium, magnesium, and sulfate
- temperature (°C) which is needed to calibrate many of the other parameters.

In addition we will periodically take grab samples of stream water for additional analyses.

**Flow measurements:** Our initial approach was to measure stage in the streams and use salt dilutions to develop a rating curve. Although we are continuing to take those measurements, we are investigating the installation of a weir at Big Sandy and stilling wells in the remaining catchments to provide greater accuracy. Using the data from these measurements on treatment and control watersheds through time, the water team will be able to detect and model the changes that occur in these streams. By having a control stream to account for normal annual variability, we will be able to relate these changes to untreated watershed conditions.

**Water Team Outreach**

The water team is working with local high school classes and has demonstrated their sampling methods in the field with high school students. Martha Conklin is shown at left with some of the students; at right is a student sampler at work. The team has also run field trips at each site for interested stakeholders.

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