Forested Watershed Health GIS Assessment

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Introduction

• Primary Focus Area
• Summer Intern Results
  – Meadow Monitoring
  – Pacific Fisher Monitoring
  – Forest Health Monitoring
• GIS Analysis
• For our study and this presentation, we primarily focused on the southern portion of the Giant Sequoia National Monument and also the Greenhorn Mountains
Summer Intern Program Results
Summer 2011 Meadow Monitoring

- Meadows are an important ecosystem in the Giant Sequoia National Monument. Meadows provide edge habitat which is important for many wildlife species.

- Easily affected by the actions of people and presence of cattle.

- SFK Interns monitored outlets of 26 meadows in the GSNM in proximity to the Starvation, Packsaddle, and Long Meadow groves.

- Meadows were judged primarily by observing stream bank stability and any obvious negative cattle impacts.
Meadow Monitoring Results

- 5 need restoration, 5 show potential problems

Meadow Status
- Green: no problems
- Yellow: potential problems
- Red: needs restoration
- White: grove boundaries

Legend:
- 0 1 2 Kilometers
- Orientation: North

Map: Long Meadow, Starvation Creek, Packsaddle
Notice the Evidence of Cattle, down cutting, and exposed soils in meadows.
Greenhorn Mountains Pacific Fisher Monitoring (2009-2011)

Map of Fisher monitoring study area. Rancheria project area is in purple and ICE project area.
In the summer of 2011 research on the Pacific fisher, using the procedures and equipment developed by the University of California at Berkeley, was continued. The Pacific fisher (\textit{Martes pennanti}) is a member of the Weasel family, making it a relative of the mink, otter, and marten. Unfortunately, due to habitat loss and coinciding fragmentation due to human practices, the Pacific fisher populations are in need of protection and observation, thus this species is listed as a Candidate Species under the Federal Endangered Species Act in the western part of its range. For the third consecutive year Sequoia ForestKeeper’s monitored the presence of Pacific fishers in the Greenhorn Mountains around Alta Sierra, Ca. Sequoia ForestKeeper (SFK) began its fisher monitoring program using six underutilized fisher cameras borrowed from the UC Berkeley team in 2008 and 2009. In 2010, SFK received a grant which allowed us to purchase five cameras to continue the Pacific Fisher Monitoring Program after the borrowed cameras became unavailable. This summer the 5 cameras were used at 10 different locations. The purpose of the monitoring was to get a better understanding of the presence and prevalence of Pacific fisher in areas of proposed logging projects.
Monitoring around Alta Sierra and the proposed Ice Timber sale was conducted over the last 3 years. Of the 11 monitoring locations, fisher were found at 6 of the locations. This demonstrates that Fisher have a presence in the area.
Pacific Fisher Monitoring in proposed Rancheria Forest Restoration Project Area

- 2011 Monitoring Site
- 2010 Monitoring Site
- Rancheria Project Area
- Pacific Fisher Monitoring
  - not surveyed
  - no detection
  - fisher detection

0 1 2 Kilometers
The Proposed Rancheria site down Rancheria Road in the Greenhorn mountains was monitored in 2010 and 2011. Just like the Ice Study, the Rancheria study has had many sightings of pacific fisher. This data will be used to hopefully inform logging activities for the Rancheria project.
2011 Summer Forest Health Monitoring
In the Summer of 2011. Our interns and Ryan conducted forest health monitoring in 4 different locations around the sequoia national forest. The purpose was to evaluate different management activities and forest stand conditions to learn about the health of the Forest. The greenhorns were monitored to look at logging and planting activities. The Packsaddle and Starvation Groves were monitored to evaluate management activities in and around those groves. The Belknap and McIntyre Groves were monitored along the Nelson Trail to determine the conditions of an old growth sequoia grove which has been exposed to little management activity. The Black Mountain Grove was monitored to evaluate the conditions of the Clear cut within the Sequoia Grove over 20 years ago.
Metrics for Monitoring

- Canopy Height and Composition
- Canopy Cover
- Ground Cover
- Down Woody Material
- Etc...

We looked at various metrics to determine stand conditions and hopefully make some assumptions to forest health.
Open Canopy and Understory
Dense Understory
We monitored in the Greenhorns where logging and replanting activities have occurred. We monitored areas at various stages of management, from unthinned, precommercially thinned, to commercially thinned. What we found were stands overwhelmingly dominated by Jeffrey Pine. This is very uncommon for the region. The Sequoia National Forest is dominated by white fir, cedar and ponderosa pine. Not Jeffrey pine. So why are there monoculture even age stands of Jeffrey pine where the forest has been replanted? We found very little structural diversity in these stands. The forest service should be planting anything but Jeffrey pine. We monitored adjacent stands where inevitably you would find much older stands of trees with a diverse canopy and varying degrees of mid and understory.
We sent the interns to survey the condition of the clearcuts that occurred around the Black mountain Giant Sequoias in the 80s. We don’t need to show you statistics to get the picture. There is very little canopy tree regeneration, let alone sequoia regeneration. It was all in the name of helping out Giant Sequoias. There was a super high density of shrub layer. We compared this to forest conditions of adjacent unlogged stands where we found open understory and old growth canopy.
Black Mountain Clear Cut
GIS Analysis

• Used Forest Service GIS Database

• Data from Spring of 2010

• Also used publicly available Datasets like NAIP Aerial Photography
The previous map depicts the fire frequency for the Sequoia National Forest over the past 100 years. Fire is a natural process in the Sequoia National Forest. Management over the past 150 years has suppressed fire in this region. This map proves it. Historically many areas are on a 10-20 year burn cycle. This would show up in the two darkest grey colors on the map. Very few locations show this type of frequency. Even more poignant is looking at the GSNM. The area is very fire suppressed. 4/5 of the area has not seen a fire in 100 years. That’s bad news for fuel loading and leads to catastrophic wildfire danger. For Giant Sequoias, a fire adapted species, it means conditions for regeneration have not been available. If you only get one thing out of this presentation, its that the Giant Sequoia are very fire suppressed and need help.
The previous map shows the various fire causes and if you have great vision, you can see the years the fires occurred. The Yellow fires are the natural ones (from lightning strikes). The other colors are the human caused fires. Quite interesting.
Sequoia National Forest
Vegetation Burn Severity 1985-2008

Legend
- Giant Sequoia National Monument
- Sequoia National Forest
- Giant Sequoia Groves
- Vegetation Burn Severity:
  - 1
  - 2
  - 3
  - 4

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GIS Director 2011. NAD 1983 California Teale Albers
The previous map shows the last roughly 25 years of fires in the southern portion of the Sequoia National Forest. This data did not overlap with our forest health monitoring. This type of data will be a valuable resource in the future for looking at fuel loading in the forest. Red areas are areas that burned the most and green areas burned with the lowest intensity.
The previous map shows all of the Rangeland Management Units for the Southern Portion of the Sequoia National Forest. Notice that a large portion of the Giant Sequoia National Monument has cattle on it. Data for each RMU is not maintained by the GIS coordinator and we were never able to collect it. We would certainly like to in the future find out about how many cattle and how many days a year they are on each unit.
Sequoia National Forest (South)
Deforested Areas of Site Preparation without Planting

Legend
- Sequoia National Forest
- Giant Sequoia National Monument
- Giant Sequoia Groves
- Focus Area
- Site Preparation for Planting Issues
  - Natural Regeneration
  - No Planned Planting
  - Planned Planting Not Completed

Logging Data from USDA Forest Service Sequoia National Forest GIS Datasets
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The previous map depicts a study which was begun after a trip to the Greenhorns when Ryan Bollinger and the summer interns discovered a bare ridge top while conducting forest health monitoring. They recorded the coordinates and Ryan later researched the history of forest management activities on the location of the bare ridgetop. The 3 focus areas shown here are all areas that are deforested for one reason or other, were site prepped for replanting and were never replanted.
This is the exposed ridge top in the Greenhorn Mountains that we originally saw when conducting forest health monitoring.
You can see that within all of the forest management areas, there is a lack of trees.
Sequoia National Forest (South)
Deforested Areas of Site Preparation without Planting
Focus Area 3

Legend

- Natural Regeneration
- No Planned Planting
- Planned Planting Not Completed

Logging Data from USDA Forest Service Sequoia National Forest GIS Datasets
This map shows many of the tree planting activities in and around the GSNM. If you recall the information on the Jeffrey Pine Plantations, this has significant impacts for the condition of many of these planting sites.
We conducted a Hazard Tree study. Hazard trees are those trees along public access areas like roads, trails, and recreation sites that are deemed unsafe and a hazard to fall. Hazard tree removal projects identify many trees and remove them. This study show that with the loose rules, nearly 160,000 acres are at risk of logging activities. This means that **17.1% OF THE GSNM AND 13.5% OF THE FOREST ARE THREATENED BY HAZARD TREE LOGGING.**
The map is intended to visualize the potential acreage at risk of tree removal based on current USDA Forest Service Hazard Tree Removal Standards. Calculations are based on a 400-foot-wide hazard tree removal area from road and trail centers. Because road and trail widths were not included in the calculation, the actual affected area of the forest is potentially greater.

Legend
- 200 ft trail buffer
- 200 ft road buffer
- 200 ft recreational site buffer
- Sequoia National Forest
- Giant Sequoia National Monument
- Kings Canyon National Park
- Sequoia National Park
Conclusions

• Presented Summer Research and GIS Forest Health Analysis

• Some of these studies have been presented to the Forest Service are awaiting a response

• This is just a jumping off point for SFK

• Bringing on a part time volunteer to continue where Ryan left off.
Thank You!