Monitoring for McKenzie Aspen Enhancement Timber Sale

Eagle Lake Ranger District

Baseline Monitoring:

Baseline monitoring was the first step in delineating and documenting the health and status of aspen communities on Eagle Lake Ranger District. Aspen delineation began in 2000 and was completed in 2006. The baseline data demonstrates the need for aspen enhancement and provides treatment recommendations.

Aspen Inventory and Risk Assessment Results

Figure 1: Number of aspen stands by risk rating.

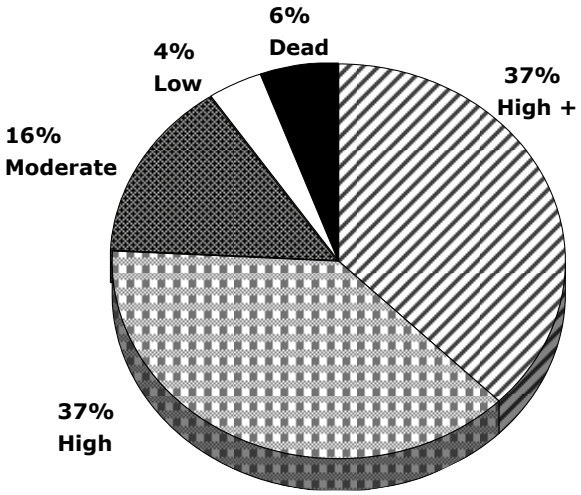


Table 1. Number of aspen stands that have conifer removal or fencing recommended; and number of stands with implemented enhancement treatments.

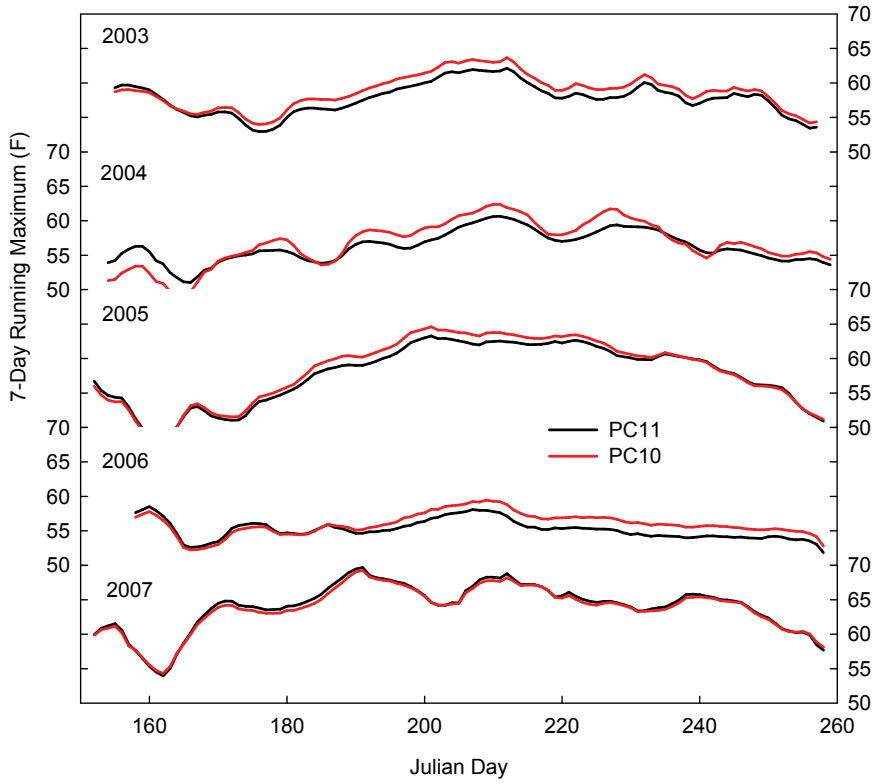
Treatment	Recommended Restoration	Implemented Restoration
Conifer Removal	625 (96%)	84 (13%)
Fencing	375 (58%)	54 (14%)

Effectiveness Monitoring:

Baseline monitoring demonstrated that conifer removal was needed to enhance the aspen in the McKenzie project area. A long-term monitoring project was designed in collaboration with UC Davis to evaluate the effect of conifer removal to achieve aspen release in riparian areas. The following attributes were monitored.

- In-stream
- Soil
- Aspen
- Understory Vegetation

Results of Effectiveness Monitoring:



Stream Water Temperature

Figure 2: Stream temperature from 2003-2007. PC11= Control, PC10= Treatment reach. This data demonstrates that there was no significant increase in stream temperature due to treatment.

Soil Bulk Density

Figure 3: Soil Bulk Density from 2006-2008. There was no change in soil bulk density due to treatment in either the 0-6 in or the 6-12 in soil depths.

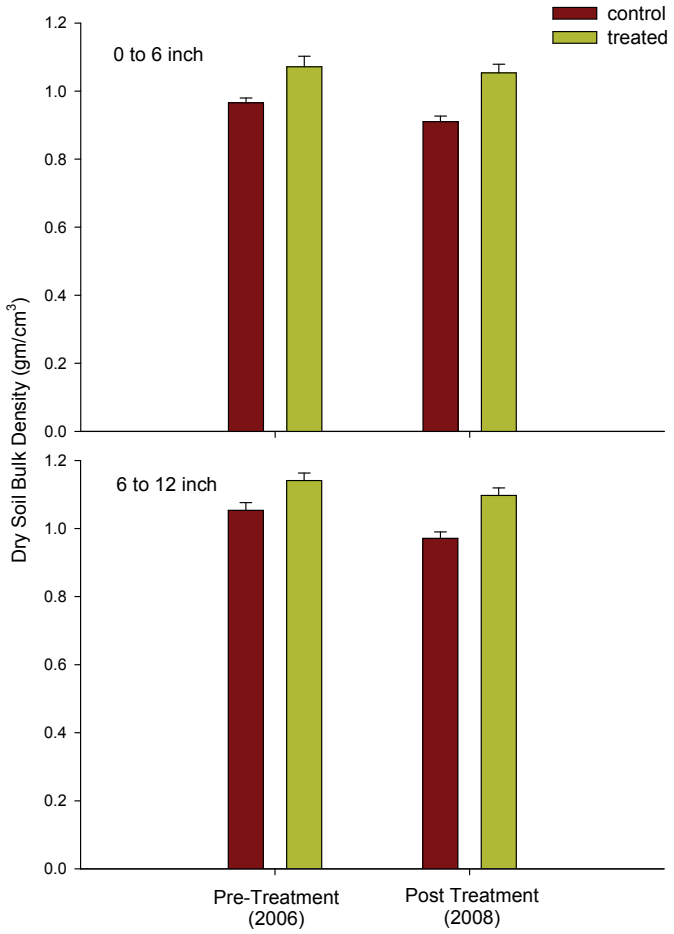


Table 1. Pine – Bogard Creek sample stations and data collection.

Factor	Parameters Measured	Sample Stations	Data Frequency / Year	Years Collected
Water	Streamflow, water and air temperature, pH, dissolved oxygen, electrical conductivity, turbidity, total suspended solids, total N, total P, nitrate, ammonium, phosphate, potassium, sulfate.	17 monitoring stations which define 10 stream reaches	Temperature continuously collected, other parameters sampled every 2 weeks.	2003-2006
Aquatic Macroinvertabrates	Samples will be identified to family and various metrics of richness, diversity, and composition determined.	Samples collected at 8 water monitoring stations.	Samples collected once.	2003-2006
Stream Canopy Cover	Canopy density and percent of available solar radiation reaching the stream each month.	5 to 20 readings for each reach defined by 17 water monitoring stations	Samples collected once.	2003-2005
Soil Moisture McKenzie Project	Soil moisture at 6 and 18 inches depth.	16 monitoring stations (8 controls and 8 treatment).	Sampled every 2 weeks.	2003-2006
Soil Bulk Density Bogard Units	Soil samples have been collected at 0-3 and 3-6 inches depth for bulk density analysis	80 monitoring stations (40 controls and 40 treatment).	Sampled once.	2003-2005
Soil Quality Bogard Units	Soil samples have been collected at 0-3 and 3-6 inches depth for the following analysis: total N, nitrate, ammonium, phosphate, total C, organic C, and organic matter.	80 monitoring stations (40 controls and 40 treatment).	Sampled once.	2003
Soil Bulk Density McKenzie Units	Soil samples have been collected at 0-6 and 6-12 inches depth for bulk density analysis	3 monitoring stations with 25 samples per station (2 treatment stations, 1 control station).	Sampled once.	2004-2005
Aspen	Aspen density by 4 size classes and total.	10 transects (5 controls and 5 treatment fall/winter 2005)	Sampled once.	2003-2006
Stream Condition Inventory	LWD, substrate size distribution, channel gradient, entrenchment, W:D, residual pool depth, pools formed by wood, % pool tail surface fines, % shade, stream shore depth, bank angle, % undercut banks.	Jan 2004 treatment reach on Pine Creek	Sampled once.	2003-2004

Water Chemistry

- Nitrogen and phosphorus levels are uniformly low, with insufficient observation above the detection limit to allow or require statistical analysis. This system is N and P limited.
- 386 of 512 samples analyzed for nitrate-nitrogen (NO_3-N) from 2003 through 2007 were below our detection limit of 0.01 mg/L, the mean of detectable samples was 0.51 mg/L.
- 506 of 512 samples analyzed for ammonium-nitrogen (NH_4-N) from 2003 through 2007 were below our detection limit of 0.32 mg/L.
- 395 of 512 samples analyzed for orthophosphate (PO_4-P) from 2003 through 2007 were below our detection limit of 0.001 mg/L, the single detectable sample was 0.15 mg/L.

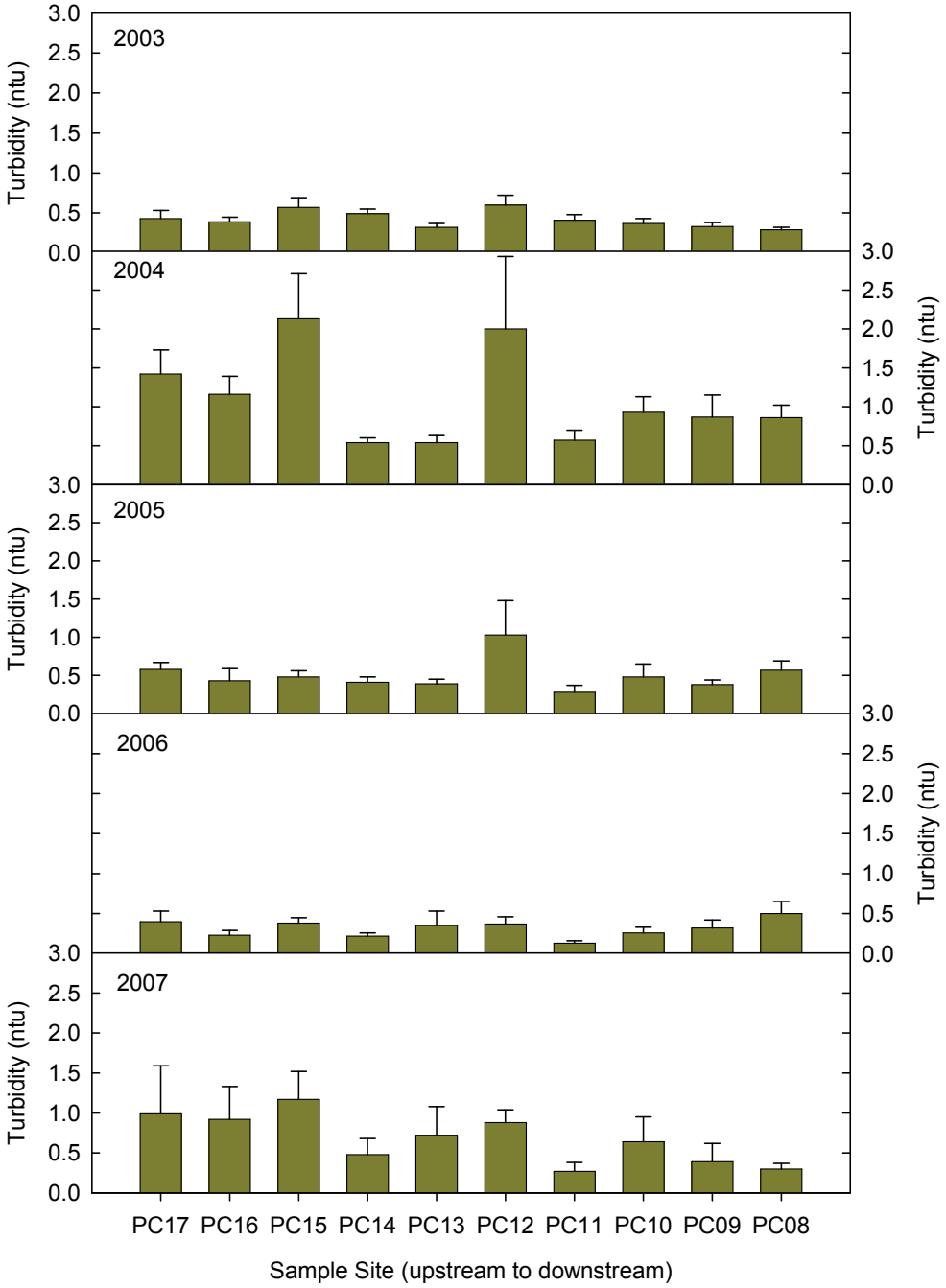


Figure4: All water quality variables (e.g. suspended solids, turbidity, nitrate, phosphate) were below any level of water quality concern. N and P were below analytical detection limits for the vast majority of the 1000+ samples collected. Turbidity had no pattern related to treatment and is essentially within drinking water standards. PC 17 through 13 are the reference stations and PC 12-8 are within the treatment area.

Pre-treatment photo 2003

Post-treatment photo 2007

Conclusion:

Overall, the results suggest that conifer removal projects implemented and monitored to date have had no negative impacts on the riparian attributes measured. An adaptive management framework will be used based on the lessons learned and the results of this monitoring effort to plan future aspen enhancement projects.

Future Aspen sites recommended for enhancement. Pink= Highest and High Risk Rating, Green = Moderate, and Black= dead

HFQLG
Project Evaluation Form

Project Name: McKenzie Aspen Enhancement DFPZ Project Type: Aspen Enhancement/ DFPZ Construction

Forest: Lassen Ranger District: Eagle Lake Ranger District Date: September 9, 2008

Attendance:
Agency- George Cella, State of California, California Lahontan Regional Water Quality Control Board.
Public- Frank Stewart, Counties Forester and Quincy Library Group; Linda Blum, QLG; Harry Reeves, QLG; John Forno, Sierra Pacific Industries; Ryan Burnett, PRBO Conservation Science.
USFS- Kathleen Morse, Lassen Forest Supervisor; Terri Frolli, Eagle Lake District Ranger; Scott Stawiarski, Eagle Lake District Silviculturist; Dave Evans, Forest Silviculturist; Linda Wrenn-Johnson, Forest Service Representative; Rod Vineyard, Biomass Specialist; Bobette Jones, Ecologist; Fred Ngotel, Sale Administrator; David Wood, HFQLG Implementation Team Leader; Colin Dillingham, HFQLG Monitoring Team Leader; Erin Ernst, Sierraville RD Silviculturist; Brandy Hebert, Sierraville RD Asst Wildlife Biologist; Craig Wilson, Sierraville RD Wildlife Biologist; Emily Fudge, Almanor RD Hydrologist; Coye Burnett, Almanor RD Wildlife Biologist; and Wendy McNight, Ecologist Crew.

Project completed by: Sierra Pacific Industries Date completed: February 2008.

Type of treatment and acres:
230 acres of harvest; 14,620 green ton acres of sawlogs removed; 4,240 green tons of biomass removed.
See example below of photo point that illustrates both the pre-project and post-project conditions.

Resource Area	Attribute	Objective	Source of Objective	Degree Met	Comments
Silviculture	Aspen Stand Health and Regeneration	Reduce Conifer component to improve aspen health and regeneration	EA	Yes (see Appendix 1)	Dry season logging areas showing aspen regeneration, Bogard Winter harvest area with excellent regeneration.
Aquatic Habitat	Stream Water Temperature	Do not increase stream temperature	EA	Yes (see Appendix 2)	No significant increase in stream temperature due to treatment.
Water Chemistry	Turbidity, and others, see appendix	Maintain healthy aquatic system	EA	Yes (see Appendix 2)	All water quality variables were below level of concern.
Wildlife	Bird Species Diversity/ Cavity nesting birds	Increase species diversity and cavity nesting birds	EA	Yes (see Aspen Paper, HFQLG website)	Woodpeckers were 2 to 3 times more abundant; higher species richness and abundance of most key aspen associated species.
Fuels	DFPZ	Create an effective DFPZ as part of network	EA	Yes	Ladder fuels reduced, fuel loading reduced. Follow-up burning need will be evaluated.
Botany	Noxious Weeds	No increase in Noxious Weeds	EA	Yes	Monitoring indicated no measurable increase in noxious weeds. Bull thistle present.
Soils	Soil compaction	Meet LRMP objectives to minimize soil compaction	Lassen NF LRMP	Yes (See Appendix 2)	No change in soil bulk density due to treatment.

Shortcomings and Successes:
Highly successful adaptive management project with well planned monitoring program and feedback to managers has continually improved treatments on the land. The project was an economic success creating a successful DFPZ and aspen enhancement project. The results of the monitoring effort will be used to plan future aspen enhancement projects.

The forest conditions were poor prior to stand entry, with a large amount of dead and declining trees and little aspen regeneration. Post-treatment conditions demonstrate a high level of aspen regeneration without negative impacts to riparian and soil attributes measured.

Stand conditions with high risk ratings are good candidates for aspen enhancement treatments.

Follow up actions:
Aspen enhancement monitoring documents need for continued aspen enhancement projects within the HFQLG project area and provides treatment recommendations.

Notes prepared by: /s/ Colin Dillingham, HFQLG Monitoring Team Leader Date: 9/11/2008

Reviewed by District Ranger: /s/ Theresa M. Frolli Date: 9/16/2008

Appendices Attached Below

Appendix 1. McKenzie Aspen Enhancement Monitoring
Appendix 2. Aspen Pre-Post Treatment Photo
Appendix 3. McKenzie Aspen Enhancement Field Trip Objectives

MCKENZIE ASPEN ENHANCEMENT DFPZ

Primary focus of today:

- Three stops planned.
- Wintertime harvest along Bogard and Pine Creeks.
- Monitoring results to date.

Stops:

- Stop # 1: Primary objectives of the sale, the Rx, discuss site specifics during the layout for the winter harvest, winter verse dry harvest fuel accumulation.
- Stop # 2: Meadow ecotone with winter harvest and dry harvest, riparian protection measures, monitoring. Bobette will provide a handout. Ryan Burnett from the Point Reyes Bird Observatory Conservation Science will discuss some of his monitoring.
- Stop # 3: Response of the understory, different slash levels with different harvest periods, pre-designated landings, low water crossing and temporary road building, logging challenges.
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General overview of the area:

- Map
- Dry season harvest: August – November 2005
- Winter harvest: January – February 2008
- Total acres harvested: 230
- Sawtimber volume removed: 14620 GT
- Biomass volume removed: 4240 GT

Total value: $320,000

Stop # 1: Objectives of the sale:

- Enhancing the aspen on a landscape level while maintaining a conifer component.
- Treat as many acres during the dry time harvest while achieving the Riparian Management Objectives.
- Provide for DFPZ opportunities (two locations).

Several different delineations for marking:

- Leave tree mark in yellow for the aspen treatment units during the dry harvest.
    - Retain all trees greater than 30”.
    - Used pre-setttlement stumps or logs to approximate a pre-settlement conifer component.
    - In existing conifer clumps, especially clumps with old growth characteristics, a component will be maintained. Clumps are to be emphasized in areas adjacent to but not within aspen.
- Individual tree mark in blue for the aspen treatment units during the winter harvest.
    - Retain bank stability trees.
    - Within the equipment exclusion zone there will be limitations to remove trees due to equipment constraints.
- Leave tree mark in orange for the DFPZ treatment.
    - Primary zone is from the road edge to 150 feet.
    - Secondary zone is 150’ to 1320’.
    - Retain trees greater than 20”.

- Desired BA in the primary zone is 100 and the secondary zone is 120.
- When possible radial thin 30’ from the bole of the pre-dominate yellow barked, old growth pine trees.
- Designate an average of 3 of the largest snags as wildlife trees within the secondary zone.

Marking of the treatment boundaries:

- Boundaries for the leave tree mark for the dry harvest were in orange.
- For the winter harvest the boundary was from the orange boundary to the two yellow dots. This is where the equipment could enter provided at least 24” of snow or 4” of frozen soil.
- Beyond the two yellow dots was the equipment exclusion zone where the equipment could not go in except for the boom and the cutting head to reach the designated timber.

Design features:

- Maximize the dry season harvest acres. (slash, and economics)
- All landings were pre-designated.
- Directional felling was required along Bogard and Pine Creeks.
- Winter harvest units must have a minimum of 24” of snow or 4” of frozen soil.
- C6.416# - Mechanized Harvesting was required for the winter harvest units which required the cutting of the included material and moving it to a designated skid trail using equipment with a boom having an operating radius of 20’ for bunching trees up to 20” at stump height.
- Whole tree yarding required up to 18” DBH.
- Oversized material would be hand felled and bucked into two or more pieces with the butt log limbed prior to skidding to the landing. End-lining would be performed where needed.
- Inventory plots throughout the harvested areas identified with the metal t-posts required protection.