YUROK TRIBE

Watershed Restoration Department


2004 Blue Creek Implementation Final Report

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By:

Yurok Tribe Watershed Restoration program.

2004 BLUE CREEK
WATERSHED RESTORATION
IMPLEMENTATION AND TRAINING PROGRAM

EXECUTIVE SUMMARY

The purpose of this report is to summarize the watershed restoration work completed by the Yurok Tribe, as part of the Lower Klamath River Watershed Restoration 2004 project. From September 04 through the end of October 04, the Yurok Tribe conducted a Watershed Restoration Implementation and Training Program within the Polavasar Creek drainage located in the lower portion of the Blue Creek basin. Polavasar Creek is a small tributary that feeds directly into the mainstem of Blue Creek. Funding was obtained from the U.S. Fish and Wildlife Service and Green Diamond Resource Company. This project has been part of a multi-year restoration effort in Blue Creek, This effort is intended to remedy road related sediment sources from 30 tributary sub-basins, within the Lower Klamath River Basin.

This program is part of a long-term watershed restoration goal intended to fulfill two principal Tribal objectives:

1. Return the Klamath River fishery to the healthiest possible condition.
2. Create job training and employment opportunities for Tribal members.

The Blue Creek Watershed Implementation and Training Program employed ten Tribal members within the Yurok Tribe's Watershed Restoration Department. First Aid and CPR training was provided by the Northern California Safety Consortium (here in referred to as N.C.S.C). Advanced training in road restoration layout, site supervision, and heavy equipment operation/coordination was also provided throughout the heavy equipment field season. The training included actual road decommissioning along prioritized roads and stream crossings within the Blue Creek watershed.

The roads decommissioned in the Polavasar area of the Blue creek watershed during this project include the PC10, PC10A, PC14, PCB830, and PC16. In this watershed, approximately 3 miles of road were decommissioned, preventing an estimated 55,735yd^3 of road fill material from entering surrounding streams.

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INTRODUCTION

After several months of planning and coordination the Yurok Tribe conducted a watershed restoration program that was held during the months of September through October of 2004. This effort was divided into two coordinated projects

1. Implementation of the hydrologic decommissioning of Blue Creek roads located within the Yurok Reservation and/or ancestral Yurok territory.

2. Training of watershed restoration techniques to Tribal members (including heavy equipment operation, site layout, and survey work).

This course was intended to fulfill two principal objectives:

1. To return the Klamath River fishery to its healthiest possible condition by:
   a) Improving stream/riparian habitat in watersheds identified as immediate priority work areas.
   b) Treating the most critical erosion and/or chronic sediment sources in each watershed in the most cost-effective manner possible, by:
      - Conducting a watershed wide roads assessment to aid in planning and prioritizing of project implementation.
      - Hydrologic decommissioning/obliteration of road and skid trails.
      - Road upgrade/improvements for erosion control.
      - Slope stabilization.
      - Improvement of stream channel morphology.

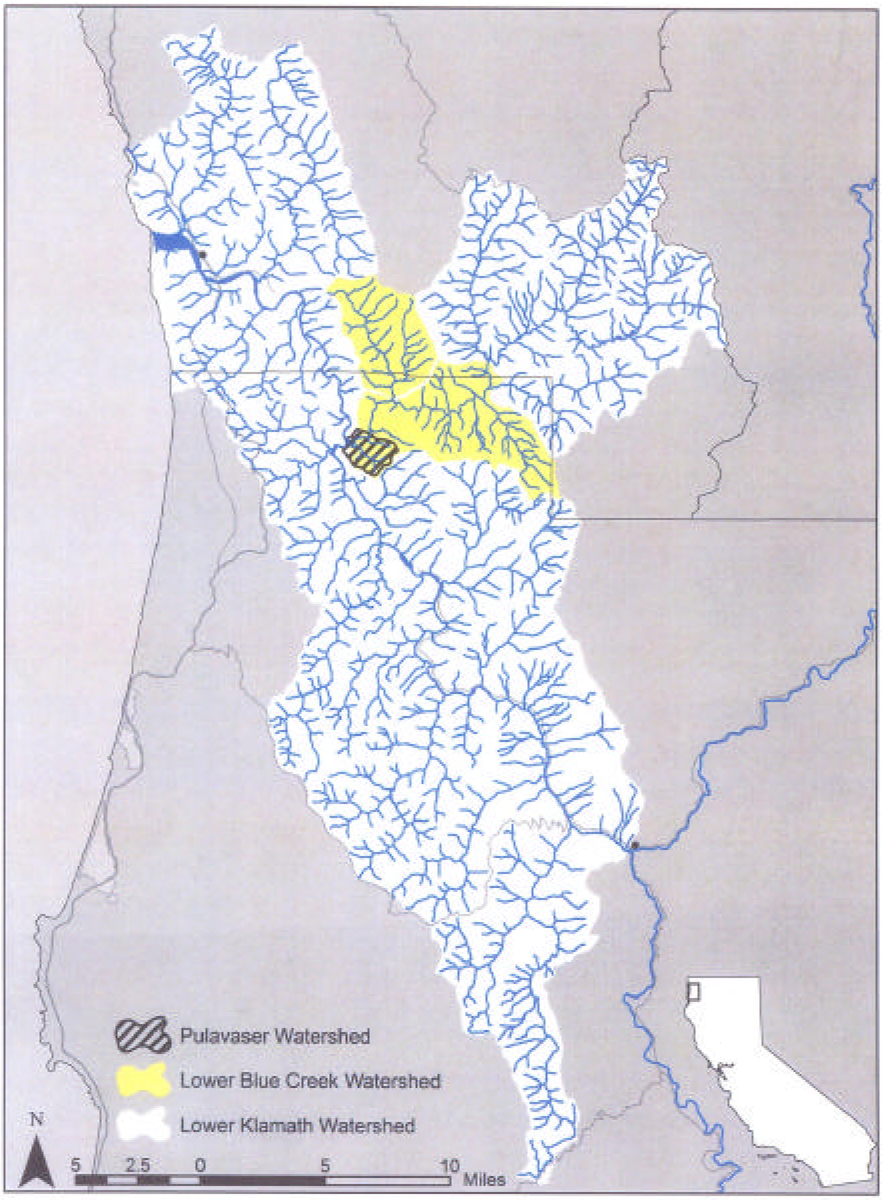
2. To create job training and employment opportunities.
   - Development of the technical skills and the long-term availability of watershed restoration jobs for Tribal members.

Location

The implementation and training program took place within the Blue Creek watershed, located in the lower portion of the Klamath River Basin (Figure 1). The Blue Creek mainstem lies in Humboldt and Del Norte Counties, California, (in Townships T12N-13N and Ranges R2E-3E on the USGS Klamath Glen & Ah Pah Ridge 7.5 Quadrangle).

Figure 1- Location map Blue creek watershed

Figure 1: Location Map



Land Status

The Yurok Klamath River Reservation is approximately 56,000 acres, and was created by Federal actions between 1853 and 1891. The Reservation encompasses a strip of land one mile wide on each side of the Klamath River, from its confluence with the Trinity River at Weitchpec, California, to its mouth at the Pacific Ocean.

Green Diamond Resource Company and a few other private landowners own more than 85% of the land within the Yurok Tribe's Lower Klamath River ancestral territory. A smaller portion of the Reservation consists of public lands managed by Redwood National/State Parks, the United States Forest Services, Bureau of Land Management and tribal trust land. Blue Creek is no exception to this fact Green Diamond Resource Company manages 21.5 sq. mi. of the watershed for commercial timber production, leaving 7.6 sq. mi. of wilderness and Forest Service lands. Creating a total hydrological basin drainage of approximately 29.3 sq. mi. (18,719 acres)

The Blue creek assessment area totals approximately 29.3 mi^2 (18,719 acres) and includes the entire hydrological watershed draining into Blue Creek. Green Diamond Resource Company manages 21.5 mi^2 of the Blue Creek watershed for the commercial production of timber, leaving 7.6 mi^2 of wilderness and forest service land.

Fisheries Background

Blue Creek is one of the most productive Lower Klamath River anadromous fish tributary. Historically Klamath River Steelhead and spawning adult salmon, including spring and fall run Chinook and Coho species, may have numbered more than a million each year. The total annual salmon harvest and escapement to the Klamath Basin averaged 300,000 to 400,000 fish between 1915 and 1928 (Rankel 1978). Now these fish are in serious decline, as their abundances have fallen significantly enough to warrant Federal listings of Coho salmon under the Endangered Species Act.

LAND USE HISTORY

Tribal Use

For centuries Yurok people have lived along the Pacific Coast and inland along the Klamath River. The river and the ocean were the central focus of Yurok Tribal life. In the early 1900's, anthropologist Alfred Kroeber noted that the Yurok language and oral history reflected the relationship between the people and the Klamath River. Yurok myths and legends are rich with references to the river. Indeed, nearly every aspect of Yurok life was, and continues to be, bound to the river's fisheries (Yurok Strategic Plan, 1999).

Fishing

Although the first impacts of immigrant settlers upon the valleys of the Klamath River Basin were related to gold mining and refining, those settlers quickly recognized the wealth and importance of the river's fisheries. Competition with the Yurok people over those resources soon began. By the 1930's, a booming commercial fishing industry was well established upon the river and its outlying ocean. Innumerable photographs and postcards from the '30's through the early 1960's hail Klamath, California as the "Salmon Fishing Capital of North America." Even as the commercial fishery began to decline in the 1970's and '80's, the Klamath River remained a recreational salmon fishing Mecca.

Timber Harvesting

The harvesting of timber has remained one of the main economic staples for the Lower Klamath River Basin's portion of the "Redwood Empire" for more than a century. Although logging only locally impacted the forests in the early days, the advent of powerful hydraulic technologies allowed timber cutting to quickly spread across the Klamath Basin. By the mid-1950's, clear-cutting had begun within the Blue Creek basin, and by the mid -1970's approximately 50% of the drainage had been logged (Yurok Tribe, 1997). By 1994, essentially all old growth trees had been removed (see Harvest Unit Maps, Figures 2). Roads were constructed concurrent with harvest operations in the Blue Creek basin (see Road Construction History Maps, Figures 3). Most logging roads in the watershed were constructed with in-sloped or crowned prisms and with inboard ditches. These roads were built within steep inner gorge localities, as well as in gentler upland hill slope areas.

Figure 2: Land Use History Map

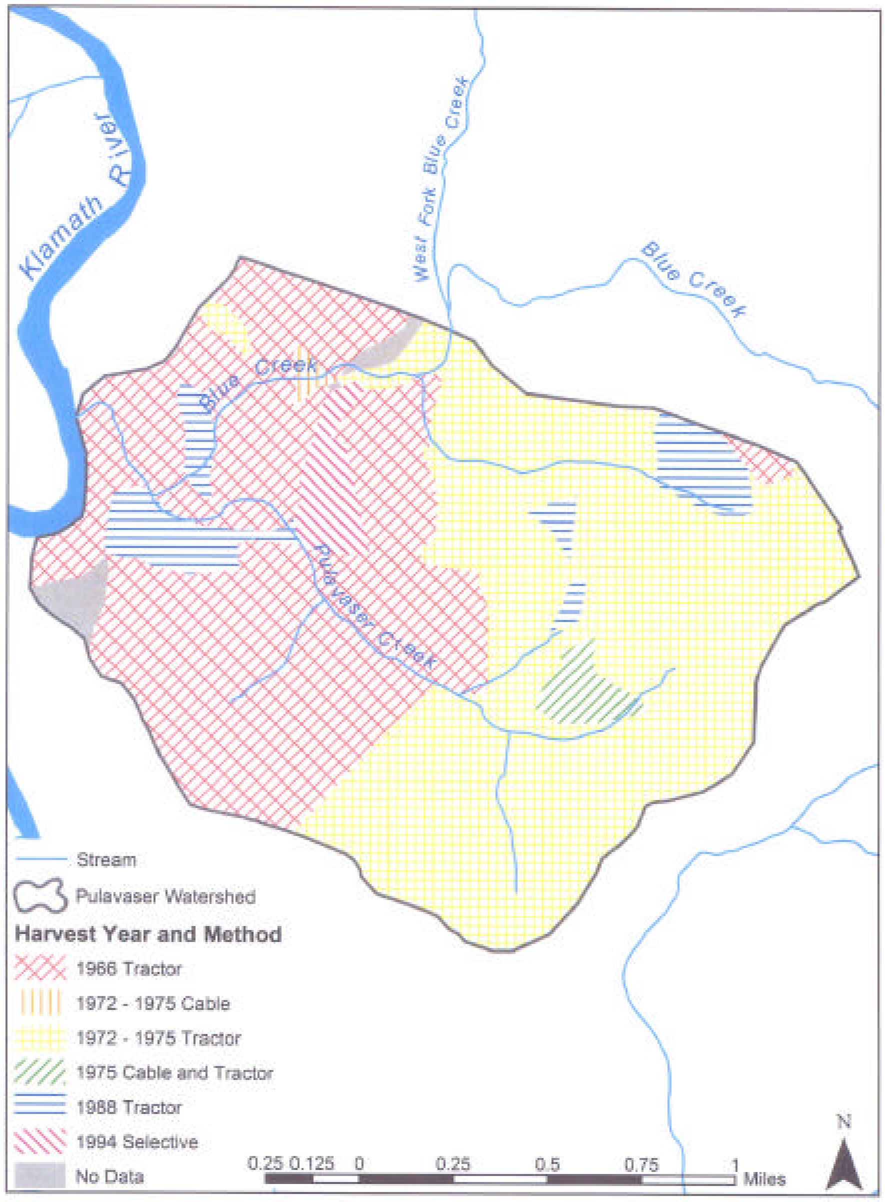
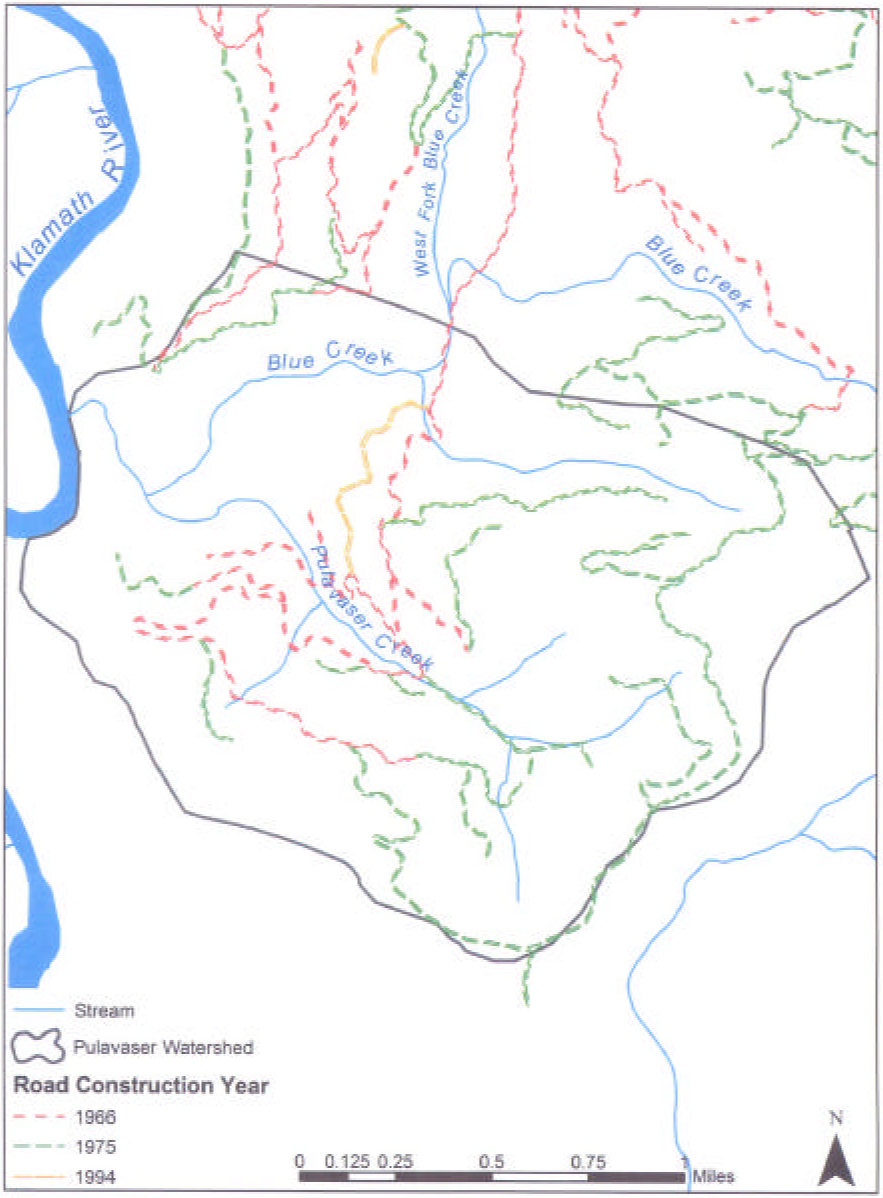


Figure 3: Road Construction Map



Tourism

With the dramatic decline in both the fishing and timber industries, tourism now remains the number one source of income for the Lower Klamath River region. Tourism is so intimately connected to recreational fishing and the redwood forests and that the protection and restoration of both is paramount to local economic well being. Restoration of logged watersheds offers the greatest potential for restoration of the fisheries and revival of fishery related tourism.

LONG-RANGE PLANNING

A Long-Range Plan for restoration of the Klamath River fishery was developed for the Congressionally created Klamath Restoration Program in 1991 (Public Law 99-552) that documents the need for watershed restoration. Pages 3-21 to 3-25 of the plan state that, "The low number of anadromous Salmonid in the Lower Klamath tributaries is directly related to sediment problems. …Only changes in land use management and large-scale watershed stabilization efforts can effectively address these problems and begin the process of recovery of the Lower Klamath tributaries. …Only by reducing the sediment supply of the entire Klamath River Basin, and allowing time for natural recovery, can the current problems be fully resolved."

In response to the recognized need to coordinate watershed restoration efforts in the Lower Klamath River Basin, the Lower Klamath Restoration Partnership (LKRP) was formed, composed of representatives of the Yurok Tribe, Green Diamond Resource Company, and the California State Coastal Conservancy. The Lower Klamath Restoration Partnership developed a comprehensive "Lower Klamath River Sub-Basin Watershed Restoration Plan" (Yurok Tribe 2000). This plan reviews the general condition of Lower Klamath River tributaries and assigns a priority ranking to each tributary based on priority for fisheries and watershed restoration (Table 1).

Blue Creek ranked the highest priority watershed for restoration within the Lower Klamath River Sub-basin Watershed Restoration Plan. The Blue Creek drainage basin was prioritized for immediate restoration, this ranking reflected both a high restoration potential, and relatively intact habitat diversity, with good connectivity and biologic diversity.

PRIORTIZATION OF THE LOWER KLAMATH WATERSHEDS

Significant long-term improvements of the anadromous Klamath River fishery is dependent upon many factors, with two major components being:

1) In stream water flows
2) Habitat restoration and slope stabilization

As efforts to address water flow in the mainstem Klamath River are focused on a basin-wide solution the Yurok Tribe has worked with funding agencies and private land owners to develop a watershed restoration program in the lower Klamath river basin. The recommended course of action in implementing habitat restoration and slope stabilization is to assess the habitat condition, prioritize needs, and then develop a restoration strategy for implementation.

PHYSIOGRAPHY OF THE BLUE CREEK DRAINAGE

The lowest portion of the Lower Klamath River Basin, from the river's mouth up to around Pecwan, is located within a belt of rocks known as the "Franciscan Formation". Rocks of the "Franciscan (geological) Formation" underlie the Blue Creek drainage basin. This formation is a collection of rocks comprised predominantly of sandstones, shales, and minor conglomerates, which are composed of the fluvial/oceanic sediments that are commonly found along a continental shelf margin. These sediments were essentially thrust up onto the edge of North America by faulting, as part of the construction of the North Coast Ranges. This mountain building began around the end of the Jurassic Period (approximately 140 million years ago), and continues to this day. "Splinters" of metamorphic rocks have become incorporated into the Franciscan Formation. These rocks were derived from the deep-sea volcanic and sedimentary rocks upon which the continental shelf sediments were originally deposited. High pressures and temperatures associated with deep burial beneath the continental sediments have essentially "baked" these deep-sea rocks into denser forms. These denser metamorphic rocks are more resistant to weathering than surrounding sedimentary rocks, and are therefore being exposed (by erosion) as prominent monolithic knobs known as "knockers." Since the rocks of the Franciscan Formation were generally uplifted along the continental rim by faults, they have been broken up and pulverized along fault zones. Shearing along these zones is typically so intense that the rocks are ground into clays, which form extremely unstable hill slopes. This, coupled with heavy seasonal precipitation, greatly increases the potential for landslides within the Blue Creek region.

PRIORITIZATION OF WORK SITES

During the winter of 2000, the Yurok Tribe conducted a watershed assessment survey of the Blue Creek watershed. Recommendations from the assessment report (Yurok Tribe, 2000) were considered in choosing the roads for decommissioning during the year 2004 Implementation/Training Program. Some of the factors that were considered were:

- Green Diamond Resource Company's long-range management plans
- Erosion potential and associated volumes
- Potential delivery to a stream channel
- Location within the watershed
- Cost effectiveness of the work proposed

Based on the information assembled during the watershed assessment a proposal was written for watershed restoration and training in the Blue Creek watershed. When funding was received the training project was modified by the recently hired program director for the year 2004 season.

Table 1: Lower Klamath Watershed Restoration Plan Prioritization Table

Sub-Basin	Anadromous Salmonid Diversity (1-5)	Relative Biological Importance (1-5)	Channel & Riparian Condition (1-5)	Habitat Connectivity Y (1-5)	Road Density (1-5)	Stream Crossing Density (1-5)	Total (1-30)	Rank (1-30)
Salt Creek	2	2	2	2	2	1	11	26
High Prairie Creek	2	1	3	1	2	2	11	25
Hunter Creek	5	4	2	2	2	2	17	11
Hop paw Creek	4	3	2	1	3	3	16	12
Waukell Creek	2	1	1	1	4	3	12	24
Saugep Creek	2	1	1	2	3	2	11	30
Terwer Creek	5	5	4	3	2	2	21	3
McGarvey Creek	4	4	3	4	3	2	20	5
Tar up Creek	4	2	2	1	3	2	14	22
Omagaar Creek	3	1	2	1	2	2	11	29
Blue Creek								
-Mainstem	5	5	5	5	2	2	24	1
-Westfork	3	3	3	4	2	3	18	8
-Slide Creek	1	3	4	4	1	1	14	20
-Nickowitz Creek	2	3	4	4	1	1	15	13
-Crescent City Fork	5	5	5	5	1	1	22	2
Ah Pah Creek								
-Mainstem	3	3	3	2	5	3	18	9
-North Fork	3	2	2	3	2	2	15	14
-South Fork	3	3	3	2	4	5	19	7
Bear Creek	3	2	2	2	3	3	15	15
Surpur Creek	3	1	1	2	4	3	14	21
Little Surpur Creek	1	1	1	2	3	3	11	28
Blue creek	4	5	3	3	2	3	20	4
Johnson's Creek	4	3	2	2	2	2	15	16
Pecwan Creek	3	2	3	2	2	2	14	18
Mettah Creek	4	4	3	4	2	2	19	6
Roaches Creek	3	3	3	3	2	3	17	10
Mo rek Creek	1	1	3	2	2	2	11	27
Cappel Creek	1	2	3	2	2	2	12	23
Tully Creek	1	3	3	3	2	2	14	19
Pine Creek	3	3	3	3	1	1	14	17

TRAINING PROJECT

Introduction

On September 1 2004, the Watershed Implementation and Training Program began. Prior to hiring heavy equipment operators, Watershed Restoration Department staff conducted a standardized skill test, to rank tribal applicants on their familiarity with the equipment and basic dozer or excavator operation. Watershed Restoration Department staff scored each applicant separately utilizing a standardized scoring system. Based on the results of the skill test, the most qualified applicants were selected. Of the operators hired four were experienced heavy equipment operators who had performed work for the Watershed Restoration Department in Redwood National Park during previous years. They were chosen to provide on site heavy equipment instruction to the remaining crew. In doing this, the Watershed Department choose not to hire a consultant to train the heavy equipment operators, but to rely on the experience of existing staff.

Advanced training in road restoration layout, site supervision, and heavy equipment operation/coordination was provided throughout the heavy equipment field season. The training included actual road decommissioning along prioritized roads and stream crossings within the Blue Creek watershed.

In preparation for program implementation, two dozers and excavators were transported into the PC10 road system in the Blue Creek Watershed. Three bridges were installed and three hundred feet of road was reconstructed to gain access. A fuel tanker and stationary refueling tank was transported to the project work area and all related equipment and supplies were purchased in preparation for project implementation. Once the applicants were hired, First Aid and CPR training was provided by the N.C.S.C.

Training and Evaluations

The Watershed Restoration Department believed that the veteran equipment operators had enough experience to instruct other operators in the use of heavy equipment to remove unstable fill. Less experienced heavy equipment operators were trained to perform restoration treatments, as prescribed by Project Coordinators. Standardized techniques were used to excavate unstable Humboldt stream crossings, remove unstable fill at potential and active slides /earth-flow locations, to decompact road and skid trail surfaces for accelerated revegetation; and eliminate any diversion potentials.

Operators were evaluated, utilizing a standardized performance evaluation form, by project coordinators. The performance evaluation measured the operator’s heavy equipment skill and personnel performance throughout the summer field season. Based on the performance evaluations, each participant's original skill test score was adjusted to reflect their performance during the field season for potential rehire into the watershed restoration program. Layoff from the program occurred in the fall of 2004

GENERAL TRAINING METHODOLOGY

The 2004 Blue Watershed Training and Implementation Program utilized the "Blue Creek Watershed Assessment" (Yurok Tribe, 2000) report to prioritize roads for hydrologic decommissioning. This report offers detailed descriptions of the assessment process that was used.

Step #1: Standard First Aid and CPR

During the summer of 2004, Standard First Aid, CPR and Safety Operations of heavy equipment were part of the hands on training. Standard First Aid and CPR training was provided by the N.C.S.C.

Step #2: Site Prescription and Layout

After the Standard First Aid, CPR and Safety Training was completed, the training participants were oriented to the site prescription and layout work that had been conducted by Watershed Restoration Department staff. Prior to the heavy equipment field season, Watershed Restoration Department staff went out into the field to identify corrective treatments for each problem site and then prescribed treatments in field notes (figure 4), and on survey flagging (at the site) for the heavy equipment operators to see. Rolling dip, cross road drain and outslope road treatments were some of the prescribed techniques noted for the operators. The limits of the excavation work were also flagged and given three-letter code designations to let the operator know his/her whereabouts within the site. For example, the top and bottom of an excavation were flagged as "TOP" and "BOT," respectively. Other three-letter designations included IBR (in-board road), OBR (out-board road), OBF (out-board fill), LEC (left edge of cut), REC (right edge of cut), CTH (cut to here), and FTH (fill to here). This procedure is generally referred to as road "layout." The process of identifying treatment prescriptions for erosional problems begins at the end of the road where decommissioning would begin. Since heavy equipment cannot move across a road after it has been decommissioned (without damaging the work), decommissioning is essentially done while "backing out" of a road. Illustrations of the road prescriptions that were used during the training/implementation program are shown in (Figure 4).

This year, during the heavy equipment field season, the Watershed Department utilized the site prescription and layout methodology of Redwood National Park. The field crew measured a profile across each excavation site, using either a survey tape/clinometer or a laser range finder, and a compass. The compass was used to determine the bearing of the designed cut area. A set of cross sections was then installed at each representative point throughout the center line (top to bottom) profile. This information was then entered into the Redwood National Park computer program specially designed to develop a pre-estimate of the amount of dirt that needed to be excavated during decommissioning.

Step #3: Implementation

Project Coordinators are in charge of site management. This included overseeing the work done by heavy equipment operators. The project coordinators made certain that the operators excavated down to the original natural-ground surface. This surface was approximated by:

1. Locating excavated stumps and using them as indicators of original base level.
2. Identifying discolored (organic rich) soil horizons, presumably at the level of buried topsoil.
3. Imitating the contours of surrounding natural slopes.

Project Coordinators were also responsible for correcting water diversions (e.g., across or along roadways) by ensuring that all diverted surface drainage was redirected into natural channels. Project coordinators monitored the work done by heavy equipment operators and their machinery. By tracking an operator's equipment work vs. downtime in their notebooks, project coordinators could perform comparative analyses of the relative efficiencies of each worker and operator team (i.e., a bulldozer and excavator working in tandem). Since heavy equipment time was the most expensive part of the project, each pair of dozer/excavator operators was taught to work as a coordinated unit, thus making them as cost-effective as possible. Both operators had to develop teamwork to ensure that they didn't move dirt more times than necessary, and to reduce the time lost waiting for each other to perform his or her respective tasks.

Initially, the bulldozers were used to brush open those roads that were chosen for hydrologic decommissioning. The dozer operators were generally sent to prepare the fluvial and mass movement work sites (by removing as much fill material as possible) ahead of the excavators. Next, each dozer/excavator team began working in tandem to remove all targeted fill from the site. The excavators would typically "switch-back" down to the bottom of the fill margin and then feed material up to the bulldozers. The dozer operators then pushed this material up a ramp-like road, to a disposal area off of the site. Disposal areas included the backsides of stable landings, proximal skid trails, through-cuts, and Full Out Slope sites (FOS).

Step #4: Post-Work Site Survey

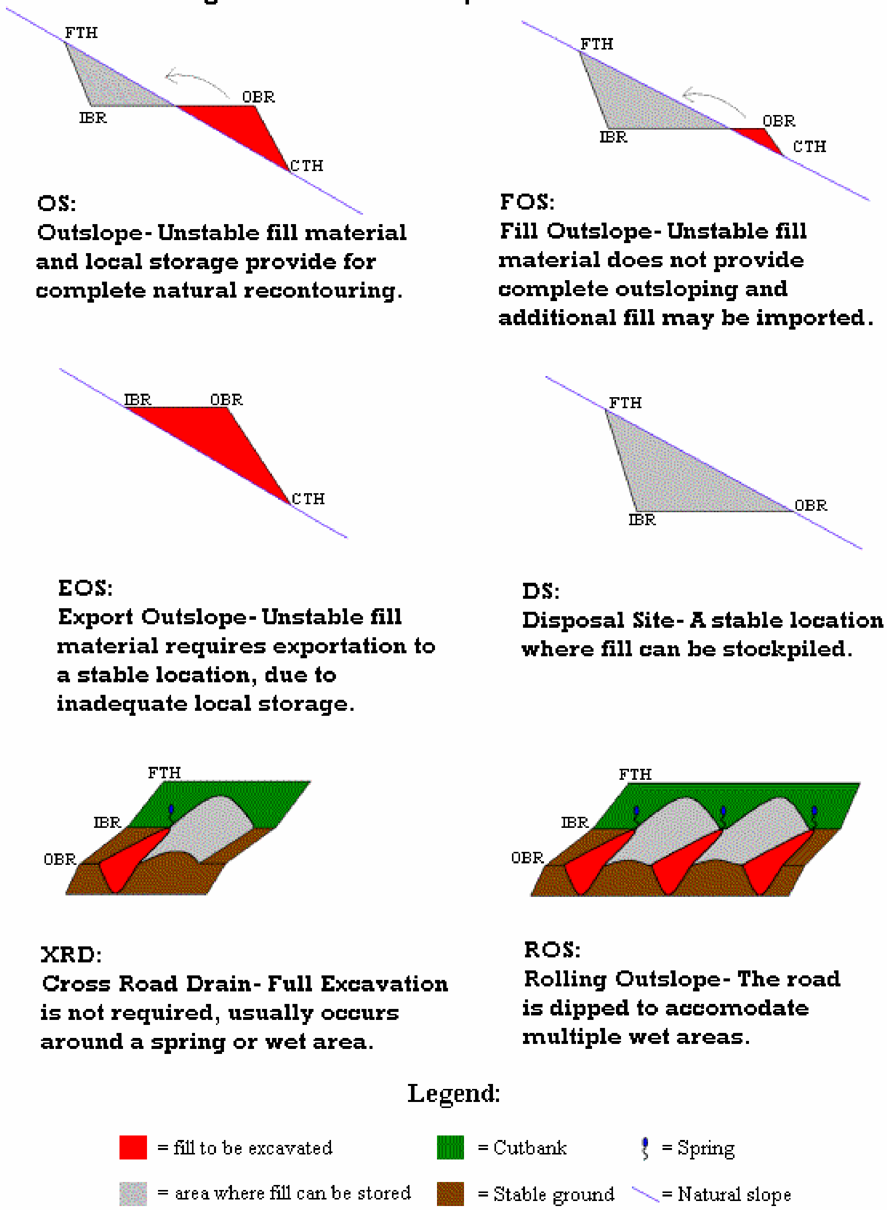
At the end of the 2004 field season, a post-excavation volume inventory was conducted; utilizing the same Redwood National Park survey points that were installed before the heavy equipment entered the site. This "post-work site survey" was used to appraise the effectiveness and accuracy of the pre-volume estimate. The post-work survey results were entered into the

Redwood National Park computer program and a final volume of actual dirt moved was calculated.

Step #5: Effectiveness Monitoring

The Blue Creek Implementation Project was photo-documented to evaluate the results of the work. Pre and post restoration photos were taken, to monitor the recovery of the watershed through time. The staff of the department will be returning to these sites on a per event (large storm) basis for the next four years to continue photo-documentation and a department level evaluation of the performance of our work.

Figure 4: Road Prescription Illustrations



PROJECT IMPLEMENTATION

Roads were chosen for implementation based upon:

1. The cost-effectiveness of the work required for their hydrologic decommissioning.
2. Their erosion/delivery potential.

Prior to initiating any work tribal staff and Green Diamond representatives determined what roads should be decommissioned based upon their location within the watershed, soil type, and future timber harvest plans (Figures 5). Roads designated for decommissioning would have their fill removed from all crossings, and from all fill failures noted to have delivery potential to a stream (Figure 6). Green Diamond Resource Company would maintain roads identified for retention for future timber management.

Treatments

The Yurok Watershed Restoration Training Program decommissioned 3 miles of road in the Polavasar region of Blue creek Watershed. The roads treated were PC10, PC10A, PC14, PC16, as well as the PCB830 road. (Figure 7) Approximately 57,783 yd^3 of soil were removed and 38,415 yd^3 of sediment saved. These roads were decommissioned using one or all of the following treatments:

- Road decompaction,
- Installation of cross-road drains,
- Stream crossing excavation,
- Outsloping.

Stream crossings were excavated to original width, depth and slope to expose natural channel morphology. Side slopes were excavated and filled to match original contours above and below the road.

When fill material was placed on road benches for permanent storage, the road bench was ripped or decompacted first. The fill was placed against the cutbank and shaped to blend with the surrounding topography that existed prior to road construction. Outsloping of the roadbed occurred as needed to reduce potential sediment delivery to the stream. Additional material was endhauled and stored in stable locations where it would not erode. Woody debris was scattered over the surface as mulch upon completion of each site.

Figure 5: Road Classification Map

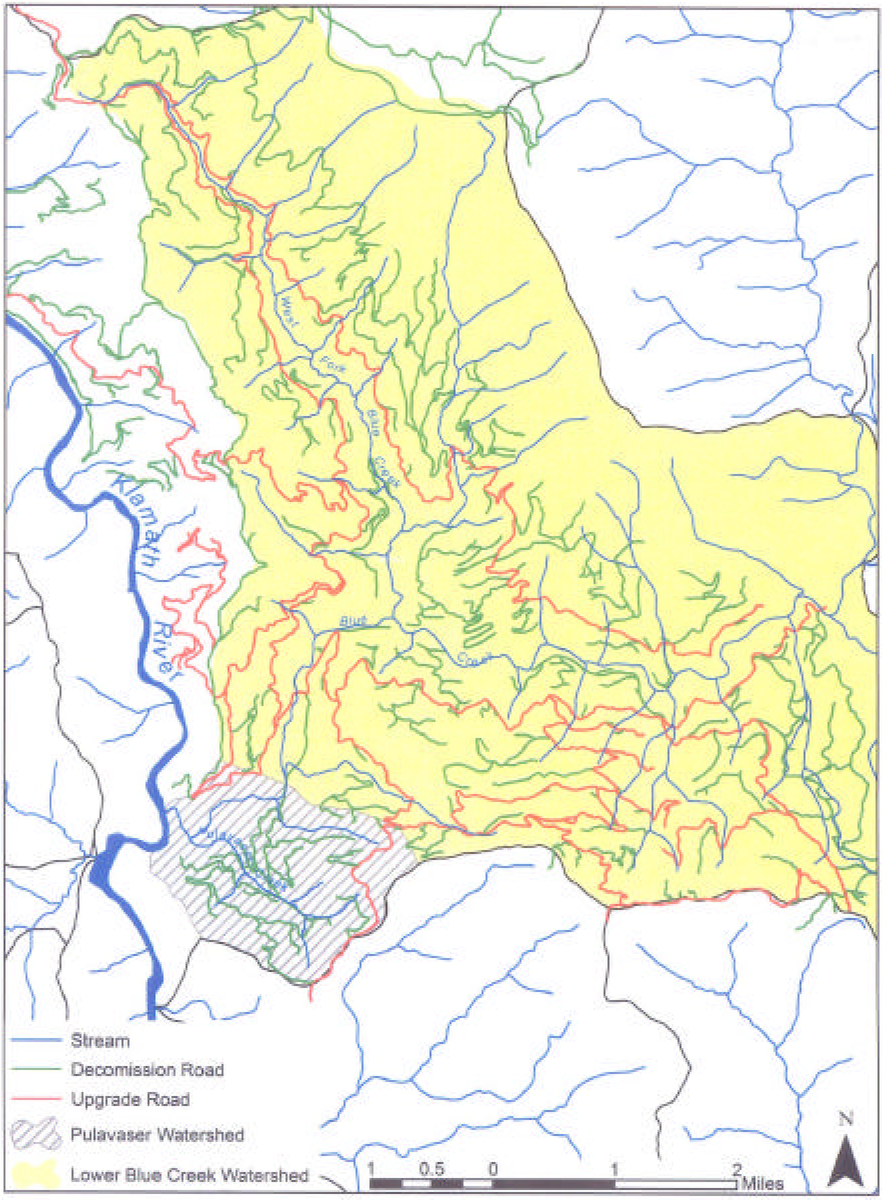


Figure 6: Erosional Site Map

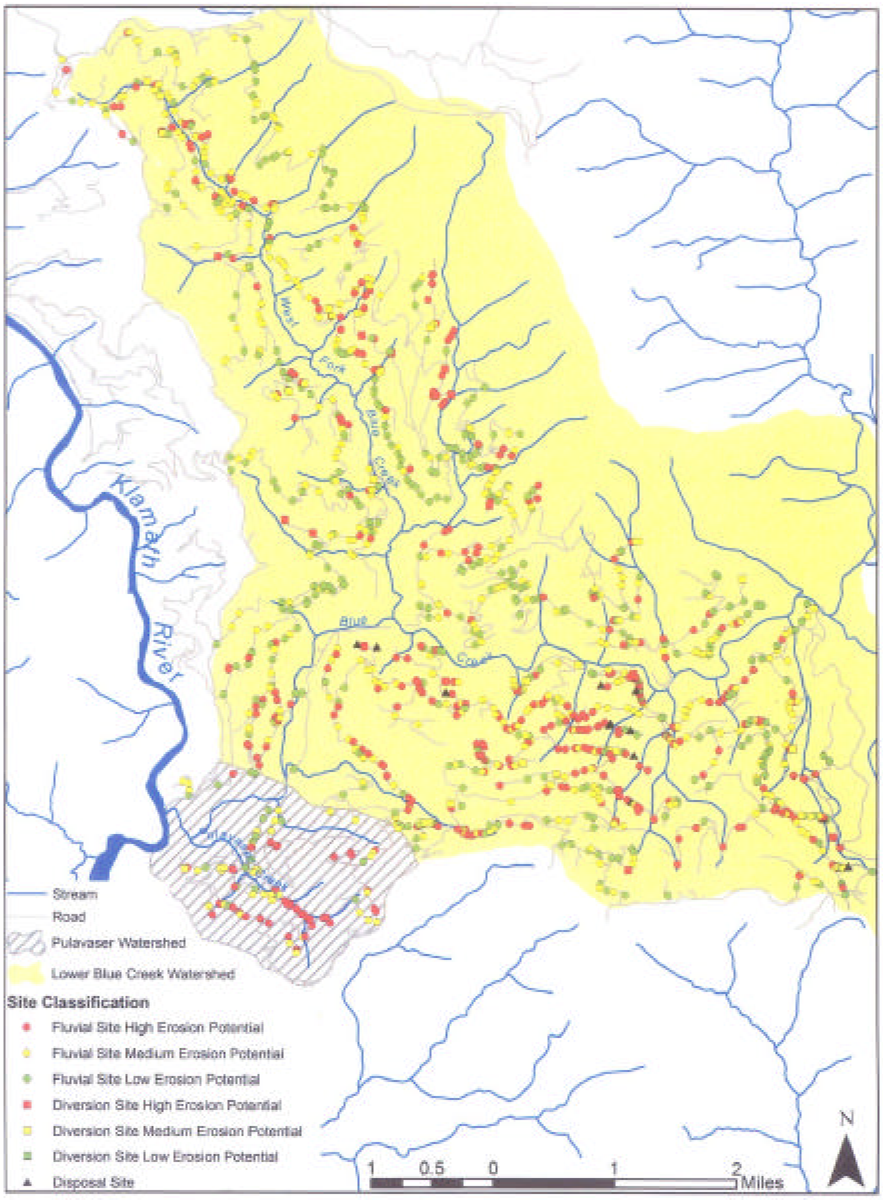
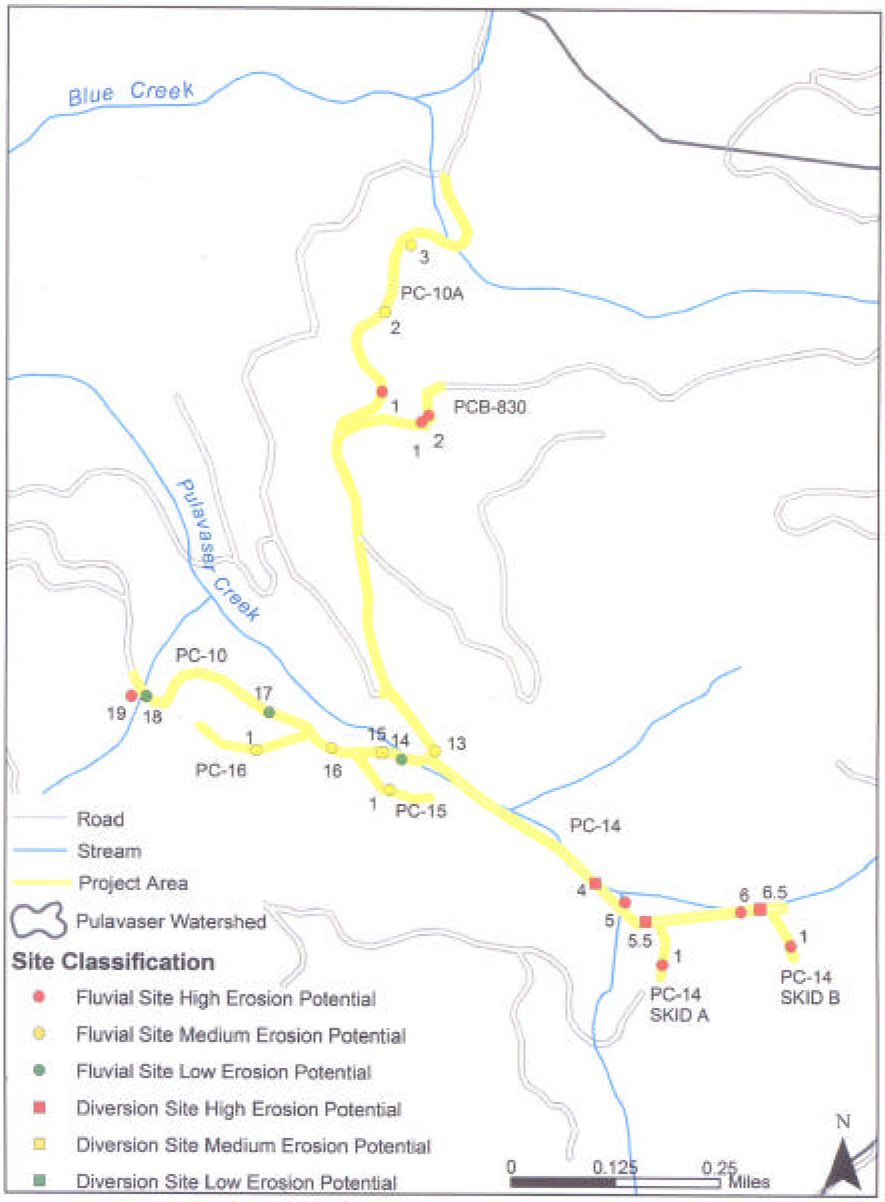


Figure 7: Project Area Map



BLUE CREEK ROAD PRIORITIES

The roads in the Polavasar Creek region of the Blue Creek watershed that were designated as "high priority" for work during the watershed assessment process were the:

PC10 and spurs
PC14 and spurs

2004 ROAD WORK

Decommission work in the Blue Creek watershed during the 2004 season began on the PC10/10A and worked through thePC14 including approximately 3 miles of the PC road complex.

PC road complex (PC10, 10A, 14,B830, 16)

The PC road complex was constructed between 1966 and 1974, constituting approximately 9.5 miles of road**.** The roadway is located above the Blue Creek mainstem. It was estimated there would be a total of 55,735 cubic yards of fill removed. A total of 57,783 cubic yards were actually removed during the implementation with a sediment savings of 38,415 within the PC road complex decommissioning project.

The intended compound objective for the three agreements of 53,450 cubic yards was achieved by matching the three US Fish and Wildlife Service awards with a Green Diamond Resource Company contribution. Combining the two funding sources allows the cost per yard to vary slightly between $6.50/yard and $7.00/yard even though a large number of these yards moved were endhauled. Completion of each road segment would not have been possible without the funding assistance of the U.S. Fish and Wildlife Service and Green Diamond Resource Company.

HURDLES AND HIGHLIGHTS

There were some administrative and field logistic issues in the 2004 Summer Season. The following is a written result received from compiling the mental and physical notes of the events and complexities that took place during this time.

Before you can begin a summer implementation project, the assessment must first be done. Keeping the winter assessment and the summer implementation as close together as possible is crucial because the project area can change in one winter causing the data previously collected to be incomplete or invalid. In this case, we were fortunate this assessment had already been completed and we were able to begin.

In the 2004 Summer Implementation, the administrative issues are as follows. There was as turn over in the Department Director position. The new Acting Director was briefed on the fund status and permitting issues. Meanwhile, the Orick office lease was expired and we were relocated to Klamath, and the planning was started to put together a summer season to spend funds on the verge of expiring. Another administrative loop thrown our way was the passing of a federal law requiring the payment of Davis bacon/prevailing wage to our employees. This issue could be looked at as a hurdle as well as a highlight. Because it was a great thing for our Staff to be making really good money while at the same time it sent the cost of operation way up and none of the budgets were written to include this higher wage. Another mater that spills into both categories of this section is the purchase of The Watershed Restoration Departments dump truck. Now the complications of this issue were pretty minimal included justifying the purchase to our funding agencies which wasn't all that hard considering that for the same cost as renting one all season we could purchase one and this would help lean cost in future years of work. While the highlights include the acquisition of a new piece of equipment for a cost breakdown of this see (figure 9) the as spent budget.

Some other issues that stumbled the department in the field were changing and creating access into the work areas. Their previous director had designed this project to be accessed from a completely unlogistical point adding 20 to 25 miles of travel for project vehicles including pickups, dump trucks, fuel trucks, and lowboys. So with a little help and advice from some of our regulatory agencies we changed our approach to access our work site from across the bottom rather than haul all the way around to the top and then back down to the bottom. We used bridges instead of culverts when rebuilding this access to minimize impact to two already washed out stream crossing (figure9 and appendix A) one of the final situations that firmly sticks out in mind of this season is that this years project contained one of our biggest endhaul shows we have ever conducted. Site #5 on the PC 14 according to the pre survey there was approximately 6500 cubic yards. Upon completion of post surveys of this site we had removed approximately 20,000 yards of fill and 95% of that dirt needed to be end hauled ¾ of a mile down the road. With our recently purchased dump truck working frantically, and bad weather getting closer everyday we realized that our late start due to permitting hurdles wasn't going to allow us to continue this project to completion with only one dump truck. So it was decided that we needed more trucks. Then to add insult to injury when we started looking for dump trucks to rent of contract with it seemed as though every truck in the world was unavailable. Eventually we got more trucks to help, even though we had to incur extra cost to get them here from across the state. We finished our site and moved on before bad weather set in, but it was a learning experience that won't soon be forgotten.

FUTURE WORK

Future work for the upcoming 2005 field season will include projects in the McGarvey and Blue Creek watersheds. The watershed department has made a pledge to its funding agencies as well as Green Diamond Resource Company. This pledge is to finish the watersheds that restoration work has already begun in so that positive long-term effects of a completed tributary can be monitored over time. The department was unable to complete the P.C. 14 this year because of the additional time and money spent to endhaul the extra yards from site #5. We are currently planning on returning there to finish this road in 2005 pending the out come of B.I.A. funding applied for.

BUDGET

As read before in the section of this report tilted highlights and hurdles there were some planned and unforeseen events that took place through out the duration of this project, that caused some what of variance in the budget submitted. (Figure 8) To help create a better understanding for this project and all it's complexities there has been an actual or as spent budget included. (Figure 9)

The combined awards of U.S. Fish and Wildlife Service funds provided this project with $264,696.00. The original proposals had identified the need for matching funds. Total combined match was approximately $80,000 to complete the prescribed work. Neither of these funds however addressed the extra expense of Davis Bacon wage, the need for dump trucks used to endhaul approximately 20,000 to 25,000 cubic yards of fill, or any of the other related costs required to remove 53,450 cubic yards of sediment from the PC road system. (For a detailed break down of the budget for this project see Figure 8 and Figure 9) U.S. Fish and Wildlife Service funds were utilized in conjunction with Green Diamond Resource Company matching funds to begin work on the PC10 road and spurs in early September 2004, carrying through mid October 2004 where winter conditions brought work to a stop on the PC14 and related spurs. A total excavational volume of 57,783 cubic yards, with 38,415 cubic yards of sediment was saved of which 20,000 to 25,000 cubic yards were endhauled. With all the additional cost we were unable to complete the noted section of roads however we did manage to remove 4000 more cubic yards than the agreements called for. The remaining portions of the PC complex will be completed in 2005 pending B.I.A. funding, which we have applied for.

Figure 8 – Budget Breakdown

ESTIMATED BUDGET
Blue Creek up-slope Restoration Implementation Project
FY 2004 USFWS (jobs in the woods)

				USFWS BUDGETS				COST SHARE BUDGETS	
				#505	**#716**	**#603**	**Project**	**SIMPSON**	**YUROK**
				$71,322	**$119,012**	**$74,362**	**Total**	**$79,627**	
PERSONNEL SERVICES COSTS									
Level of Staff	**Person**	**Hours**	**Rate**	-	-	-			
Watershed Director	1	300	$25.00	$7,500.00			$7,500.00		
Site supervisor	1	550	$21.30	$11,715.00			$11,715.00		
Watershed laborer	2	550	$21.60			$23,760.00	$23,760.00		
Dozer Operator	2	550	$38.90		$42,790.00		$42,790.00		
Excavator Operator	2	550	$48.13		$52,943.00		$52,943.00		
Staff Benefits at 36%				$6,917.40			$6,917.40		
Total Personal Services Costs				**$26,132.40**	**$95,733.00**	**$23,760.00**	**$145,625.40**		
OPERATING EXPENSES		**Units**	**Cost**						
Sub contracts									
D6Dozer		2.5	$8,000			$20,000.00	$20,000.00		
Excavator 230		2.5	$8,000				$20,000.00		$20,000.0
D8Dozer		2.5	$9,000				$22,500.00	$22,500.00	
Excavator 330		2.5	$9,500				$23,750.00	$23,750.00	
Dump trucks				$23,232.60			$40,000.00	$16,767.40	
Sub contracts total							**$126,250.00**		
Materials and Supplies		**Units**	**Cost**						
Repair & Maintenance					$1,755.70		$2,700.00	$913.05	$31.2
Mobilization/lowboy			$2,500				$2,500.00	$2,500.00	
Fuel		11,500	$1.70	$8,760.60		$10,789.40	$19,550.00		
GSA Vehicle 4@$300/month		2.5	$1,200			$3,000.00	$3,000.00		
Vehicle Insuraqnce6@$61.08/month		2.5	$366.48			$916.20	$916.20		
Transportation @$0.36/mile		7500	0.36			$2,700.00	$2,700.00		
Field equipment		1	$1,000		$1,000.00		$1,000.00		
Program Supplies		1	$500		$500.00		$500.00		
Misc. Hand tools		1	$500		$500.00		$500.00		
Other Expenses: bridges		2	$2,000		$4,000.00		$4,000.00		
TOTAL OPERATING EXPENSES				**$31,993.20**	**$7,755.70**	**$37,405.60**	**$163,616.20**		
Project Subtotal							$435,491.60		
Admin Overhead @ 30.4% (See attached justification)				$13,196.40	$15,523.30	$13,196.40	$55,112.64	$13,196.55	
Total Estimated Budget							**$490,604.24**		
US Fish Wildlife Service agreement number				113333J003	113100J013	113312J206			
Program number				**#505**	**#716**	**#603**	**Total Est. Budget**	**SIMPSON**	**YUROK**
Total amount per Program				**$71,322.00**	**$119,012.00**	**$74,362.00**	**$364,354.24**	**$79,627.00**	**$20,031.24**

FIGURE 9 AS SPENT BUDGET
Blue Creek up-slope Restoration Implementation Project
FY 2004 USFWS (jobs in the woods)

				USFWS BUDGETS				COST SHARE BUDGETS	
USFW Agreement #'s				#113333J003	#113100J013	#113312J206			
Fiscal Account codes				#505	#716	#603	Project	SIMPSON	YUROK
				$71,322	$119,012	$74,362	Total	$79,627	
PERSONNEL SERVICES COSTS									
Level of Staff	person	Hours	Rate						
Site supervisor	1	400	$21.30	$8,520.00			$8,520.00		
Supervisor overtime	1	40	$31.95	$1,278.00			$1,278.00		
Watershed laborer	2	400	$21.60			$17,280.00	$17,280.00		
Labor overtime	2	40	$32.40	$2,592.00			$2,592.00		
Dozer Operator	3	400	$38.90		$42,790.00	$1,094.02	$46,680.00	$2,795.98	
Dozer overtime	3	40	$58.35				$7,002.00	$7,002.00	
Excavator Operator	3	400	$48.13	$12,741.44	$40,201.56		$57,756.00	$4,813.00	
Excavator overtime	3	40	$72.19				$8,662.80	$8,662.80	
Staff Benefits at 36%				$1,103.30		$2,423.98	$3,527.28		
Total Personal Services Costs				$26,234.74	$82,991.56	$20,798.00	$153,298.08		
OPERATING EXPENSES		Units	Cost						
Sub contracts									
D6Dozer		2	$6,000	$7,259.56			$12,000.00	$577.61	$4,162.83
Excavator 230		2	$6,000				$12,000.00		$12,000.00
D8Dozer		2	$13,800				$27,600.00	$27,600.00	
excavator 330		2	$9,500				$19,000.00	$19,000.00	
Dump truck purchase				$1,907.70	$3,183.29	$1,989.00	$7,079.99		
Dump truck rental 2@		2	$11,000.00	$14,000.00	$9,000.00	$21,000.00	$44,000.00		
sub contracts total				$23,167.26	$12,183.29	$22,989.00	$121,679.99		
Materials and Supplies		Units	Cost						
Repair & Maintenance					$2,313.85		$2,700.00	$300.59	$85.56
Mobilization/lowboy			$2,500				$2,500.00	$2,500.00	
Fuel		11,500	$1.70	$8,760.60		$10,789.40	$19,550.00		
GSA Vehicle 4@$300/month		2	$1,200			$3,000.00	$3,000.00		
Vehicle Insuraqnce6@$61.08/mon		2	$366.48			$916.20	$916.20		
Transportation @$0.36/mile		7500	0.36			$2,700.00	$2,700.00		
field equipment		1	$1,000		$1,000.00		$1,000.00		
Program Supplies		1	$500		$500.00		$500.00		
Misc. Handtools		1	$500		$500.00		$500.00		
Other Expenses: bridges		2	$2,000		$4,000.00		$4,000.00		
TOTAL OPERATING EXPENSES				$8,760.60	$8,313.85	$17,405.60	$37,366.20		
Project Subtotal							$312,344.27		
Admin Overhead @ 28.19% (See attached justification)				$13,169.40	$15,523.30	$13,169.40	$48,237.12	$6,375.02	
Total Estimated project Budget							$360,581.39		
Permitting and reporting costs							$3,772.85		
Total as spent budget 2004							$364,354.24		
Program number				#505	#716	#603	Total Budget	SIMPSON	YUROK
l amount per Program				$71,332.00	$119,012.00	$74,362.00	$364,354.24	$79,627.00	$16,248.39

(Simpson budget reflects the cumulative cost share amount of all three program matches)

REFERENCES

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Yurok Tribe; 1996-1997. Lower Klamath River Aquatic Habitat Inventory.

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APPENDIX A:
Photos

Pre photo: UES Site #5 (Looking upslope)

Post photo: UES Site #5 (Looking up)

Pre Photo: BOT Site #5 (Looking Down)

Post Photo: BOT Site #5 (Looking Downstream)

Unfinished Access: Location of point of access.

Finished Access: Created point of access.

Pre Photo: TOP Site #1 on PC 10a (Looking down).

Post Photo: Site #1 on PC 10a (Looking down).

1994, 10 Yard International Dump truck.

The following pictures are of various sites from this years decommissioning project. These photos were taken after our first big storm, and are a product of the on going monitoring project watershed conducts of their finished work.

UES Site #5.

BOT Site #5 (Looking up).

Site #3 XS 6 (Looking Down).

TOP #1 PC10A

BOT Site #13 (Looking up).

LEC Site #13.

APPENDIX B:
Road Survey Data

Polavasar roads survey data(summer implemention 2004 season)

Road	Site #	Site Type	Org-vol	Pre-Vol	Post-Vol	Off By %
PC10	13	Mass Movement	4888	4,888	2,444	50%
PC10	14	Fluvial Erosion	521	3,511	4,047	13%
PC10	15	Fluvial Erosion	697	1,300	650	50%
PC10	16	Fluvial Erosion	634	882	2,354	63%
PC10	17	Fluvial Erosion	161	468	1,059	56%
PC10	18	Fluvial Erosion	484	673	1,931	65%
PC10	19	Fluvial Erosion	2,515	4,486	6,398	30%
PC10A	1	Fluvial Erosion		7,110	6,493	9%
PC10A	2	Fluvial Erosion	750	829	3,467	76%
PC10A	3	Rolling Dip	316	316	350	10%
PC830	1	Fluvial Erosion		1,874	1,586	15%
PC830	2	Fluvial Erosion		1,071	1,947	45%
PC14	4	Mass Movement	4,692	4,700	2,350	50%
PC14	5	Fluvial Erosion	6,428	13,059	22,229	41%
PC14	5.5	Mass Movement	719	962	769	20%
PC14	6	Fluvial Erosion		7,746	3,140	59%

In this table the "org-vol" category represents the original survey volume that was collected during the 2000 winter assessment. The "pre-vol" category represents the volume found in the pre work survey done in the lay out portion of this summer season. Since the 2000 winter assessment we have adopted a different survey method similar to the one used by Redwood National Parks Service in hopes of getting more accurate numbers so this is the primary difference in the org. and the pre. category. The "post-vol" represents the actual yardage of dirt removed from that site. Finally the color red in this table is used to highlight the sites that when finished had a post-vol that was smaller than the pre-vol.

APPENDIX C:

Glossary

Abandoned Road: A road is considered "abandoned" when there is no evidence of maintenance or current use.
Anadromous: Fish that leave freshwater and migrate to the ocean to mature then return to freshwater to spawn.
Bottom Flag: A survey flag, which marks the bottom (BOT) of an excavation, at the lower extent of the fill slope at a stream crossing.
Cable Yarded: A modern type of power logging, where logs are attached to cables and dragged to a landing by means of a block-and-tackle, hung on a spar tree or steel tower or pole.
Channel Width: The estimated stream channel width during a 100-year flow event.
CLP: Refers to the "Centerline (of a) Profile". At stream crossings, this line is concurrent with the stream profile.
Complexity: Based upon the amount of large organic material within a road fill, &/or how much vegetation surrounds a work site; this refers to the difficulty of the work needed from heavy equipment.
Conglomerate: A sedimentary rock type, which is composed predominantly of cemented gravels.
Continental Shelf: A gently sloping, shallowly submerged platform of sediments that extends from the shoreline to the edge of the continental slope.
Continental Slope: The steeply sloping continental margin, which extends from the edge of the continental shelf down into the oceanic abyss.
Cracks: A crack is a break or split, usually without a complete separation of parts. These may be continuous or discontinuous, within a road reach.
Crossroad Drain: A ditch-like channel, excavated across a road fill prism, to drain a spring or seep. The fill material is not entirely excavated for an XRD.
Culvert: A transverse drain, usually a metal pipe set beneath the road surface, which drains water from the inside of the road to the outside of the road. Culverts are used to drain ditches, springs, and streams across the road alignment.
Cutbank: A steep embankment located immediately above a road bench that was created during road construction.
CTH: Acronym for "Cut-to-Here." This is a reference point, usually located at the bottom of the fill.
Debris Slide: A slow to rapid slide, involving down-slope translation of relatively dry and predominantly unconsolidated materials, with more than half of the particles being larger than sand size.
Debris Torrent: Rapid movement of a large quantity of materials (wood and sediment) down a stream channel during storms or floods. This generally occurs in smaller, steep stream channels and results in scouring of the streambed.
Decommissioned Road: A road along which those elements that unnaturally reroute hill slope drainage, or present slope stability hazards, have been removed.
Deep Seated: A fill failure that cuts into most of the road prism, and takes natural ground along with it.
Disposal Site: A stable location for the stockpiling of fill removed from a work site.
Ditch Relief: A drainage structure or facility that will move water from an inside road ditch to an area outside of the edge of the road fill.

Diversion Potential (DP): If a drainage structure is plugged, or could possibly become plugged, diverting water down a road and away from its natural channel, the stream is considered to have "diversion potential."
Drivable: A road that is passable to a standard four-wheel drive vehicle without having to clear any brush or make improvements.
DS: Acronym for "Disposal Site."
Earth-flow: A mass movement landform, and slow to rapid mass movement process, characterized by down-slope translation of soil and weathered rock, over a discreet shear zone at the base. Most of the included particles are actually smaller than sand.
EOS: Acronym for "Export Outslope."
Erosion Potential: This is the likelihood of a stream crossing or landslide to erode away road/slope material.
Excavation Production Rate: The rate of production at which dirt can be moved at a particular site, by a particular type of equipment.
Export Outslope: In areas where a road prism is composed entirely of unstable fill material (i.e., no dozer cut road bench) complete exportation to a stable storage location becomes necessary.
Fault: A fracture or zone of fractures within the Earth's crust, along which there has been
Relative movement and resultant shearing.
Faulting: the oppositional movement of 2 blocks of the Earth's crust, along a fracture.
Fill: The material that is placed in low areas, compacted, and built up to form a roadbed or landing surface.
Fill Failure: Unstable fill, along the outside edge of a road, which is considered active or waiting to move down-slope.
Fluvial: Anything pertaining to streams or rivers; also organisms that migrate between main rivers and tributaries.
Fluvial Erosion Site: Fluvial erosion sites are places where erosion by the action of water is likely, as at a stream crossing.
Future Fill Failure: The estimated volume of a mass movement along a road bench or landing, caused by gravitational erosion &/or diversion of water, and measured in cubic yards.
Future Hill Slope Failure: The estimated volume of a mass movement upon a hill slope, which is related to gravitational erosion &/or diversion of water. Generally based on observed dimensions of existing hill slope failures, in nearby terrain, that have similar characteristics (e.g., slope position, geology, etc.).
Future Stream Erosion: The predicted volume of bank and/or bed erosion and streamside landslides, attributable to diversion at a crossing, and measured in cubic yards.
Future Percent Delivery to a Channel: The percentage of a volume of mass movement material reported in the field that will be transported to a stream channel.
Geomorphic Investigations: The overall study of a landscape and its drainage features.
Geomorphic Mapping: The mapping of drainage patterns along roads and their surrounding slopes.
Gully: An erosional channel that is formed by concentrated surface runoff, which is defined as larger than 1 $ft.^2$ in cross sectional area (i.e., 1 ft. depth by 1 ft. width).

Gullies often form where road surface or ditch runoff is directed onto unprotected slopes.

Headwall Height: Headwall height is measured in inches, from the bottom of a culvert inlet, to the lowest point of the road fill at a crossing. This is the vertical distance between the point where water can enter a culvert and where water will flow over a road bench. Headwall height is used to assess the culvert capacity for each site.

Humboldt: A road-crossing drainage structure made out of logs laid in (and parallel to) streams channel and then covered over with road fill.

Hydrologic Decommissioning: The removal of those elements that unnaturally reroute hill slope drainage, or present slope stability hazards.

IBD: Acronym for “Inboard Ditch,” which generally runs along the IBR.

IBR: Acronym for “Inboard (edge of) Road” commonly located below a cutbank.

Igneous: Rocks formed by solidification of hot fluid material termed magma.

Inner Gorge: A stream reach bounded by steep valley walls that terminate up slope into a more gentle topography. Common in areas of rapid stream down cutting &/or geologic uplift.

Landing: Any place on or adjacent to a logging site (usually on a road), where logs are collected and assembled for further transport.

LEC: Acronym for “Left Edge of Cut:” refers to a field estimate (in feet) to the point at which the top of an excavation would extend to the left side of a CLP.

LES: Acronym for "Lower End Stake:” refers to the lowest ending point of a profile. This point is always shot downhill from the bottom of the fill.

Maintained: If a road shows evidence of recent maintenance, including grading, cleaning of culvert inlets, brushing, or upgrading, it is considered to be “maintained.”

Mass Movement Site: Mass movement sites are places where failure of a hillside or road prism (by land sliding) is likely.

Metamorphic: All rocks that have changed form (from their sedimentary or igneous origin) due to the effects of high pressure/temperature &/or associated changes in chemistry.

Natural Ground: Undisturbed native soil.

Photo Number: The frame number (along a flight line) of an aerial photograph.

Plug Potential: The likelihood for sediment or woody to plug a culvert inlet. Example: If a pipe is already partially filled with sediment, its gradient is substantially less than the natural channel, &/or if the upstream channel contains large amounts of organic material likely to move at high flows, a culvert is considered to have plug potential.

OBF: Acronym for “Outer Board (edge of the) Fill” slope, which extends beyond the OBR.

OBR: Acronym for “Outboard Edge (of a) Road.”

Primary-Line: A surveyed line used to identify the locations/relationships of sites along a road and/or its strip map.

REC: Acronym for the "Right Edge of Cut": refers to the field estimate (in feet) to where the top of an excavation would extend to the right side of the CLP of a road.

Rill: An erosional channel, varying in size from a rivulet up to about 1 $ft.^2$ in cross section, that typically forms where rainfall and surface runoff is concentrated on fill slopes, cut-banks, and ditches. If the channel is larger than 1sq.ft. In size, this becomes a “gully.”

Road Name: The name assigned to a road along which a potential erosion site is located. If no road name is available, then the field person will improvise, using conventional methods.
Road Reach: A stretch of road (excluding landings and/or stream crossings), which has been prescribed for a single treatment**.**
Rolling Dip: Rolling dips are broad, low road structures constructed to facilitate effective water drainage, while allowing passage of motor vehicles at a reduced road speed.
Rolling Outslope: An outsloped road receives a series "rolling dips" to accommodate multiple wet areas (i.e., springs/seeps)
ROS: Acronym for "Rolling Outslope."
Scarps: Cracks that show vertical displacement. These may be discontinuous and/or continuous within a road reach.
Sedimentary: Descriptive term for rock formed from sediment.
Sediment saved: the amount of fill stopped from entering a stream channel by decommissioning a road. Usually equal to the erosional volume of the site.
Seep: Wet areas of ground seepage; distinguishable from springs by lack of visible flow.
Shale: A sedimentary rock type that is composed predominantly of mud (a mixture of clay and silt), and which characteristically breaks into plates.
Shotgun: A pipe outlet that is elevated above the natural channel, and with no form of down spout. This time of outlet creates an erosional plunge basin.
Site: A numbered road locality that is considered to host erosional problems. Sites are numbered sequentially from one end of a road to the other.
Skid Trail: Generally a short, wide road-like trail over which tractors have dragged logs that were attached to cables.
Slope Stabilization: The removal of any and all features that may lead to slope instability and mass wasting.
Soil removed: the amount of fill removed from a site. Usually equal to the excavational volume.
Spring: A flow of water from the ground; often the source of a stream or pond.
Stream Channel Morphology: The various forms and shapes of a stream channel.
Stream Crossing: The location where a road crosses a stream channel, whether water is flowing or not. Drainage structures used in stream crossings include bridges, Humboldts, fords, culverts, and a variety of temporary crossings.
Swale: A channel-like linear depression, or small valley-like feature, that may, or may not contain any well-developed stream flow.
Top Flag: A survey flag hung at the top of an excavation site. This marks the upper limit that the excavation will extend to, and usually coincides with the upper extent of a stream crossing (including any stored sediment above a culvert inlet).
Total Fill Volume: The total volume of road fill at a potential erosion site, measured in cubic yards. At a stream crossing, this volume includes all road fill placed within the natural channel. Total fill volume is computed from field measurements made with a tape and clinometer (or Abney level). The computation requires measurements of slope angles and distance on upstream and downstream fill slopes, the width of the road surface, and the valley width at the upstream and downstream edges of the road

surface. Volumes are generally computed from field measurements using scale drawings prepared in the office.

Total Volume Excavated: The amount, in cubic yards, to be excavated at a site.

Tractor Logged: A logging operation where cable-attached skidding is done with crawler tractor power.

Treatment Immediacy: The urgency of implementation of hydrologic decommissioning at a site.

Tribal Allotment: Trust lands granted by the Federal Government to individuals/families with a long-established history of occupation/ownership.

UES: Acronym for "Upper End Stake:" refers to the upper starting point of a profile line.

Underfit: Any drainage structure (e.g. a culvert, swale, floodplain, etc.) that is too small to accommodate runoff during a flood..

USGS: Abbreviation for the United States Geological Survey.

Watershed: The entire area that contributes both surface and underground water to a particular lake, river, or stream system.

XRD: Abbreviation for "Cross-Road Drain;" a ditch-like channel excavated across road fill to drain a spring or seep. The road fill prism is not entirely excavated for an XRD, as at a stream crossing.

Year of Construction: The year that a road was built. This information is usually extrapolated from historical air photo analysis.