APPENDIX C

CUMULATIVE WATERSHED EFFECTS ANALYSIS

Mt. Ashland Ski Area Expansion

Cumulative Watershed Effects Analysis

Appendix C

Revised July 2004

Introduction and Background

The purpose of this report is to document the assumptions and results of the cumulative effects analysis completed for the Mt. Ashland Ski Area Expansion Final Environmental Impact Statement (FEIS). This document provides the basis of assumptions used in analysis and modeling of cumulative watershed effects. It documents methodology and information that is more in technical than the summary of conclusions presented in the FEIS.

Between the time the Draft EIS was published and the planned publication of the Final EIS, a hazardous fuels reduction project was proposed within the Upper Ashland and Upper Neil Creek Watersheds. This project, Ashland Forest Resiliency (AFR), is designed to reduce hazardous fuels and provide protection to values at risk within and adjacent to the Ashland Municipal Watershed. The effects of this proposed project are included in this update to the original cumulative effects analysis. The AFR project is considered "reasonably foreseeable".

The cumulative effects analysis process described in this document is primarily based on information (data) from the Klamath and Rogue River-Siskiyou National Forests Geographic Information System (GIS) databases. The analysis was primarily performed using ArcView 3.2, a GIS software.

The Mt. Ashland Ski Area is located within the headwaters of four separate watersheds, described in FEIS analysis as the Upper Ashland Creek watershed, the Upper Neil Creek watershed within the Rogue River Basin, and the Grouse Creek watershed and the Upper Cottonwood Creek watershed, within the Klamath River Basin. For the purposes of the analysis of existing conditions and potential cumulative effects associated with actions proposed in the FEIS, reference is made to the "Watershed Scale" Analysis Area.

The Watershed Scale Analysis Area includes the Upper Ashland Creek Watershed, the Upper Neil Creek Watershed, the Grouse Creek Watershed, and the Upper Cottonwood Creek Watershed. The total area of these four watersheds is approximately 30,738 acres. The geographic extent of the Watershed Scale Analysis Areas for this report are depicted on Map III-5 of the FEIS.

> The Upper Ashland Creek watershed is approximately 19.8 square miles (12,700 acres) in size and is one of the primary tributaries to Bear Creek. For this analysis, Upper Ashland Creek is separated from Lower Ashland Creek by Reeder Reservoir, which is the primary drinking water source for the City of Ashland. This separation was made at the reservoir because potential impacts are best measured to that point in the drainage system. Impacts contributed by ski expansion activities below the reservoir would not be measurable. This analysis area includes all of the hydrologic area of the Ashland Municipal Watershed.

The Upper Neil Creek watershed also contributes flow to Bear Creek, and this 10.5 square mile (6,715 acre) watershed is located almost entirely within the National Forest boundary. The lower boundary of the Upper Neil Creek Watershed is located in the vicinity of Interstate 5, which is near to the boundary of the Rogue River National Forest and also the point in the watershed where the slope of the valley floor decreases dramatically. Downstream from the National Forest boundary is primarily pasture or rural developed lands

The Upper Cottonwood Creek watershed is located in a generally south facing basin that is 7.5 square miles in size (4,797 acres). The lower extent of the Upper Cottonwood Creek watershed is at the confluence with Cottonwood Creek and Mill Creek, which is in proximity to the Klamath National Forest boundary. The watershed is a mix of interspersed privately owned and Federally managed lands. The main stem of Cottonwood Creek is almost entirely within private ownership, and supports anadromous fish in its lowest reaches.

The 10.2 square mile (6,526 acre) Grouse Creek watershed is immediately adjacent to the Upper Cottonwood Creek watershed, sharing Upper Cottonwood Creek's western watershed boundary. The southern end of the Grouse Creek Watershed is located at the confluence of Grouse Creek with Cow Creek. The Grouse Creek watershed is a tributary to the larger Beaver Creek watershed. This fifth field watershed supports anadromous fish populations downstream from the Special Use Permit (SUP) area.

On the Klamath National Forest (Forest Service Region 5), an approach entitled the *Equivalent Roaded Area (ERA) Methodology* (UDSA FS 1999) has been utilized for assessing relative risk of cumulative watershed effects. It is important to note that the scope of the analysis of existing conditions at the Watershed Scale is dependant on the nature of the historic and ongoing effects and the availability of data for the watershed being analyzed. In order to provide a consistent analysis for the entire Watershed Scale analysis area, the *ERA Methodology* was used to assess the cumulative watershed effects of past, present, and reasonably foreseeable future activities in the Upper Ashland Creek, Upper Neil Creek, Grouse Creek, and Upper Cottonwood Creek watersheds. This method was selected because the data needed to run the *ERA* model was available and consistent throughout the watershed analysis areas.

Recent environmental analyses completed by the RR-SNF has utilized a methodology referred to as the *CWE Methodology*. This model, sometimes referred to as the "Section 7" model, was used to aid in consultation with the National Marine Fisheries Service (NMFS - now NOAA Fisheries) under Section 7 of the Endangered Species Act. The Forest Service developed the CWE Methodology for assessing the relative risk of adverse cumulative watershed effects in response to a request from NMFS (USDA FS 1993). This methodology has been commonly used in Forest Service Region 6.

In the cumulative effects analysis for the 2003 Draft EIS, this method was compared with results from the equivalent roaded area method. Based on the analysis in the Draft EIS, the two models yielded similar results for the Upper Ashland Creek Watershed Scale analysis area. This revision uses only the ERA Methodology to assess past, current, and future activities.

Equivalent Roaded Area Methodology

The *ERA Methodology* utilizes GIS analysis of land use activities to convert road, timber harvest, fire, and other disturbances within each watershed to equivalent roaded areas based on predetermined coefficients that are regionally specific. The resulting equivalent roaded area within each watershed is divided by the area of each watershed to calculate a relative disturbance rating, which is called the percent ERA. Then, the percent ERA is compared to the Threshold of Concern (TOC) for each watershed. Finally, the calculated TOC is compared to the percent ERA for each watershed to determine a watershed Risk Ratio. The following discussion describes the process and displays the values for each of the Watershed Scale analysis areas.

Equivalent Roaded Area (ERA)

To determine ERA, coefficients for disturbance classes are compared to values for roads to calculate the area of road that would produce the same change in peak flows. The information is used to create a table of Equivalent Roaded Area coefficients. Coefficients have been adjusted over time.

Data was obtained from the Klamath NF that included recently updated disturbance files (Elder pers. com. 2002). Since a similar disturbance map did not exist for the RRNF portion of the analysis area, satellite imagery was modeled with various vegetation classes assigned an ERA coefficient (see Table 1.). In some areas, the imagery was updated to account for activities that have occurred since the image was obtained. The imagery was modeled on the Klamath portion of the analysis area only to test the assumptions. This process yielded similar results. Satellite imagery was used to model ERA on the RRNF portion of the analysis area and the actual data received from the Klamath NF was used for that portion of the analysis area. The following table displays the coefficients used to model the satellite imagery on the RRNF:

Table 1. ERA Coefficient by Vegetation Type

Description		ERA	Coefficient
Late-successional forest	greater than 60% canopy closure, greater than 24" DBH	Undisturbed	0
	less than 60% canopy closure, greater than 24" DBH	Moderate disturbance, 20-30 years old	0.06
Mature forest	greater than 60% canopy closure, 11 - 24" DBH	Undisturbed	0
	less than 60% canopy closure, 11 - 24" DBH	Moderate disturbance, 20-30 years old	0.06
Immature forest	greater than 60% canopy closure, 6 - 11" DBH	High disturbance. 30-40 years old	0.06
	less than 60% canopy closure, 6 - 11" DBH	High disturbance, 20-30 years old	0.17
Seedling/sapling	0 – 6 " DBH	Moderate disturbance, 0-20 years old	0.11
Shrub/grass/forb[1]			0
Barren[2]		Cut/fill	1.0
Roads		Natural or aggregate surface	1.0
Non-erodible		Paved road	1.0
Private[3]		High disturbance 0-20 years old	0.21

[1] Assumes shrub and grass/forb communities are recovered or in an undisturbed, natural condition
[2] Does not include some naturally barren ground. For analysis, assumes that 50% of land mapped as barren is a result of mechanized treatment
[3] Assumes that 75% of the private lands within the analysis area have been disturbed since the satellite imagery was obtained.

Cumulative effects analysis includes past and present actions as well as reasonably foreseeable actions. Many of the past activities are accounted for in the vegetative mapping that was used (i.e. past timber harvest), as described by the current condition. Projects that have occurred since the mapping was completed or that are ongoing were accounted for in the analysis.

Based on these assumptions and the data received from the Klamath NF, the following percent ERA values were determined for the Watershed Scale analysis areas:

Table 2. Current Percent ERA by Watersheds

	Upper Ashland	Upper Neil	Upper Cottonwood	Grouse
Total acres	12,700	6,715	4,797	6,526
ERA	275.2	567.0	313.8	403.7
Percent ERA	2.17%	8.44%	6.54%	6.19%

The value for Grouse Creek is slightly higher than reported in the Beaver Creek Watershed Analysis that was completed in 1996. This is due to updates to mapped harvest and roads, including those on private lands. Refer to the *Beaver Creek Project Environmental Assessment*, completed October 2002 for a discussion of this process.

Upper Neil Creek has a relatively high percent ERA. This is primarily due to the large percentage (44%) of private lands within this watershed. Much of this private land has been harvested in recent years. This harvested area occurs mainly downstream from NFSL. Not including private land, the percent ERA would be similar to that of the Upper Ashland Creek watershed. Although there has historically been more timber harvest on NFSL in Neil Creek than in Upper Ashland Creek, it has become hydrologically recovered. That is, it has become re-vegetated.

Threshold of Concern (TOC)

The TOC is developed specifically for each watershed and is based on channel sensitivity (C), beneficial uses (B), soil erodibility (E), hydrologic response (H), and slope stability (S). The *ERA Methodology* contains detailed evaluation techniques that are described below to determine the numerical index for each of the factors. Once the index values have been determined for each watershed, the Watershed Sensitivity Level (WSL) is calculated using the following the equation: WSL = 3C + 2B + E + H + S. Next, the WSL is converted to a watershed specific TOC value based on the equation: TOC = (43 – WSL) / 2. The number "43" is used because it best fits a regression of the watershed sensitivity levels and previously determined TOCs on the Klamath NF. Following is a discussion of each of the factors used to determine the TOC values for each of the watershed analysis areas:

Channel Sensitivity (C)

This is based on Pfankuch stream stability ratings for the primary streams and major tributaries through each watershed. Since Pfankuck ratings are not available in most streams across the Forest, professional judgment is used in most cases. Generally, streams are considered moderately sensitive unless there are indications otherwise.

Table 3. Channel Sensitivity Rating

Parameter	Sensitivity Class	Index	Pfankuch Rating
Channel Sensitivity	Very High	5	>130
	High	4	115-130
	Moderate	3	77-114
	Low	2	39-76
	Very Low	1	<39

Beneficial Use (B)

Five beneficial use stream classes are defined in the Klamath NF Land and Resource Management Plan. A Class 1A stream is a highly productive anadromous stream or is a municipal or campground water source. Class 1B streams are moderately productive anadromous streams, highly productive resident streams, or are used for individual domestic use, Class 2 streams have little or no anadromous habitat but some resident fish habitat, Class 3 streams have a little resident fish habitat, and Class 4 streams have no beneficial uses.

Table 4. Beneficial Use Descriptions

Parameter	Significance Class	Index	Description
Beneficial Use	Very High	5	Contains the entire drainage of a Class 1A stream
	High	4	Contains 25% or more of the drainage area of a Class 1A stream or the entire drainage of a Class 1B stream
	Moderate	3	Contains 5% or more of the drainage area of a Class 1A stream, 25% or more of a Class 1B stream, or the entire drainage of a Class 2 stream
	Low	2	Contains 1% or more of the drainage area of a Class1A stream, 5% or more of a Class 1B stream, 25% or more of a Class 2 stream, or the entire drainage of a Class 3 stream
	Other	1	Does not meet the criteria of any previous category

Soil Erodibility (E)

This index is based on the inherent sensitivity of the soils to surface erosion. This factor is computed by running the Universal Soil Loss Equation (USLE) model on watersheds to arrive at a background (assuming no disturbance) surface erosion volume in cubic yards per acre per decade.

Table 5. Soil Erodibility Index

Parameter	Sensitivity Class	Index	Background Erosion Volume
Soil Erodibility	Very High	5	Greater than 0.115 cy/acre per decade
	High	4	Between 0.081 and 0.115 cy/acre per decade
	Moderate	3	Between 0.055 and 0.081 cy/acre per decade
	Low	2	Between 0.041 and 0.055 cy/acre per decade
	Very Low	1	Less than 0.041 cy/acre per decade

Hydrologic Response Potential (H)

This index is based on the percent of the watershed in the rain-on-snow zone, which is between 3,500 and 5,000 feet in elevation.

Table 6. Hydrologic Response Index

Parameter	Peak Runoff Potential	Index	Description
Hydrologic Response	High	4	Rain on snow zone > 50% of the watershed
	Moderate	3	Rain on snow zone 25-50% of the watershed
	Low	2	Rain on snow zone < 25% of the watershed

Slope Stability (S)

This factor is based on the inherent sensitivity of the watershed to landslides. The index is computed by running the landslide model on watersheds to arrive at a background (assuming no disturbance) landslide volume in cubic yards per acre per decade.

Table 7. Slope Stability Index

Parameter	Risk Class	Index	Stability Rating
Slope Stability	Very High	5	Greater than 3.2 cy/acre per decade
	High	4	Between 2.6 and 3.2 cy/acre per decade
	Moderate	3	Between 2.0 and 2.6 cy/acre per decade
	Low	2	Between 1.0 and 2.0 cy/acre per decade
	Very Low	1	Less than 1.0 cy/acre per decade

The following table displays the TOC values by watershed analysis area that were used for this analysis:

Table 8. Threshold of Concern Values by Watershed

Watershed	Beneficial Uses	Channel Stability	Soil Erodibility	Hydrologic Response	Slope Stability	Watershed Sensitivity Level	Threshold Of Concern
Upper Ashland	5	3	2	3	2	26	8.5
Upper Neil	4	3	2	4	2	25	9.0
Upper Cottonwood	4	3	2	4	2	25	9.0
Grouse	4	4	3	4	2	29	7.0
Values for Upper Cottonwood and Grouse taken from Klamath NF analysis (toc2002.xls).							

Risk Ratio

The risk ratio is calculated by dividing ERA values by the TOC value. A Risk Ratio approaching or greater than 1.00 serves as a "yellow flag" indicator of increasing susceptibility for significant adverse cumulative effects occurring within a watershed. Susceptibility of cumulative watershed effects generally increases from low to high as the level of land disturbing activities increase toward a risk ratio value of 1.00 (USFS 1988). Watersheds with a "yellow flag" rating of 1.00 are not necessarily in eminent danger of unacceptable cumulative watershed effects, but these watersheds contain enough disturbance to "warrant a closer look" (Beaver Creek Ecosystem Analysis 1996). It should be noted that the *ERA Methodology* analyzes watershed conditions regardless of land ownership.

The table below summarizes the risk ratio calculations by Watershed Scale analysis area based on current conditions. These values are used as a baseline against which the alternatives area compared (i.e., Alternative 1 No-Action).

Table 9. Current Condition Risk Ratio Calculations by Watershed

	Upper Ashland	Upper Neil	Upper Cottonwood	Grouse
Percent ERA	2.17%	8.44%	6.54%	6.19%
TOC	8.5	9.0	9.0	9.0
Risk Ratio	0.25	0.94	0.73	0.88

Alternative Comparison

Each of the action alternatives proposed under the FEIS were evaluated by calculating the change in ERA values that would be a result by implementing the ski expansion alternative. Coefficients are used to model changes in vegetation or land cover. These coefficients were developed by specialists on the Klamath NF and have been updated as a result of monitoring and review of projects. Coefficients are additive, in other words the coefficients for prescription are added to logging system coefficients, which are added to site preparation coefficients.

Table 10. ERA Project-Scale Coefficients

Roads		Prescription		Logging System		Site Prep – Fuels	
Miles X 4.77	12 m (40 feet) wide prism, slopes >35%	High disturbance	0.12	Tractor	0.12	Tractor pile	0.12
		Moderate disturbance	0.06	Tractor – modified	0.04	Tractor bunch	0.06
		Low disturbance	0.03	Cable	0.02	Hand pile	0.001
		None	0.00	Helicopter	0.001	Masticate	0.03
Miles X 2.39	6 m (20 feet) wide prism, slopes <35%			Roadside	0.01	Broadcast burn	0.05
				Feller-buncher	0.08	Jack-pot burn	0.025
						Underburn	0.02

NOTE: Coefficients from Elder & Laurent (April, 1998); modified from Jack/Gray EA (Kilgore & Power, 1998) and using relative values from KNF CWE Analysis Handbook (VandeWater, et al., 1990) & other literature sources. Modified by Elder/Laurent (Sept., 2000) for Dogbark Salvage TS and for Woodchopper Fire Recovery (October, 2001). Modified from CWE timber planners/resources meeting (February 20, 2002); Logging system coefficients modified for Horse Heli (December 10, 2002); Elder, Laurent, Power, et al. {Citations from KNF sources)

Based on these coefficients, the following values were used to model the effects of the actions being proposed in the Mt. Ashland Ski Area Expansion EIS:

Table 11. Calculated Coefficients by Ski Expansion Activity

Activity	Coefficient
Trail Clearing – assumes clear cut (high disturbance) and helicopter removal	0.121
Grading/road construction/road reconstruction/parking lot construction/lift tower construction/buildings/underground utilities	1.0
Glading - assumes thinning (low disturbance)	0.03
Fuels treatment - hand pile and burn	0.001
Fuels treatments - mechanical	0.06

Action alternatives (i.e., Alternative 3 and 6) changed slightly with adjustments to the location and extent of proposed parking. These minor changes did not change the overall predicted results due to model sensitivity and compensating extent of action.

Summary of Results

The following tables display the results of the analysis for each individual Watershed Scale analysis area, by FEIS action alternative for ski expansion.

Table12a. Upper Ashland Creek Watershed by Alternative

Upper Ashland						
	Alternative 1 (current)	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Total Acres	12,700	12,700	12,700	12,700	12,700	12,700
ERA	275.2	+14.39	+8.35	+9.44	+2.36	+10.61
%ERA	2.17%	2.28%	2.23%	2.24%	2.19%	2.25%
TOC	8.50	8.50	8.50	8.50	8.50	8.50
Risk Ratio	0.255	0.268	0.263	0.264	0.257	0.265

Table12b. Upper Neil Creek Watershed by Alternative

Upper Neil						
	Alternative 1 (current)	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Total Acres	6,715	6,715	6,715	6,715	6,715	6,715
ERA	567.0	+0.46	+0.31	+2.11	+0.71	+0.32
%ERA	8.44%	8.45%	8.45%	8.48%	8.46%	8.45%
TOC	9.00	9.00	9.00	9.00	9.00	9.00
Risk Ratio	0.938	0.939	0.939	0.942	0.939	0.939

Table12c. Upper Cottonwood Creek Watershed by Alternative

Upper Cottonwood						
	Alternative 1 (current)	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Total Acres	4,797	4,797	4,797	4,797	4,797	4,797
ERA	313.8	+2.73	+0.49	+0.00	+0.49	+0.54
%ERA	6.54%	6.60%	6.55%	6.54%	6.55%	6.55%
TOC	9.00	9.00	9.00	9.00	9.00	9.00
Risk Ratio	0.727	0.733	0.728	0.727	0.728	0.728

Table12d. Grouse Creek Watershed by Alternative

Grouse						
	Alternative 1 (current)	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Total Acres	6,526	6,526	6,526	6,526	6,526	6,526
ERA	403.7	+0.01	+0.00	+0.00	+0.00	+0.00
%ERA	6.19%	6.19%	6.19%	6.19%	6.19%	6.19%
TOC	7.00	7.00	7.00	7.00	7.00	7.00
Risk Ratio	0.884	0.884	0.884	0.884	0.884	0.884

Other than for the Upper Ashland Creek Watershed Scale analysis area, none of the watersheds show any substantive increase in the risk ratio associated with the action alternatives for ski area expansion. This is primarily due to the low amount of area affected within the watersheds. Upper Ashland Creek watershed currently has a relatively low risk ratio. None of the action alternatives would increase the risk ratio value more than an estimated 5% (Alternative 2). The resultant value of 0.268 would still be considered relatively low. Though the risk ratios for the other watersheds are relatively high, they would remain less than 1.0 ("yellow flag" threshold) and do not increase more than 1% under action alternatives.

Reasonably Foreseeable Actions

Cumulative effects analysis requires that future actions that are reasonably foreseeable be examined along with the proposed action. When the DEIS was developed, there were no future activities proposed within the watershed analysis areas. Since that time Ashland Forest Resiliency has been proposed that would affect areas within the Upper Ashland watershed and the Upper Neil Creek watershed. A hazardous fuels reduction project on the KNF in the Upper Cottonwood watershed is also proposed.

The purpose of the Ashland Forest Resiliency (AFR) project is to reduce hazardous fuel conditions and to protect values at risk within the Ashland Municipal Watershed. The AFR project proposes to treat approximately 8,150 acres of hazardous fuels with various treatments including density management, prescribed fire, and vegetation treatments.

The coefficients shown in Table 10 were applied to the treatments proposed under AFR and Colestine Thin. Of the total 8,150 acres proposed for treatment under AFR, approximately 355 acres would occur within the Upper Neil Creek watershed and 3,055 acres within the Upper Ashland Creek watershed. These figures are based on the most recent version of the AFR proposed action. The Colestine Thin/Hazard Reduction project would treat approximately 425 acres of older pine plantations. The following table identifies the assumptions used to model foreseeable actions:

Table 13. Calculated Coefficients for AFR and Colestine Thin

Activity	Assumptions	Coefficient
Defensible Fuel Profile Zone	Moderate disturbance + helicopter logging + jackpot burning	0.086
Late-Successional Reserve treatments	Light disturbance + helicopter logging + jackpot burning	0.056
Research Natural Area treatments	Moderate disturbance + helicopter logging + jackpot burning	0.086
Colestine Thin - mechanical treatments	Light disturbance - shearing, bunching, whole tree skidding	0.09

Under the assumptions described in Table 13, jackpot burning was used as a midpoint value to describe the various fuels treatments. Not all areas would be jackpot burned.

A “corrected” or revised resultant condition value was calculated for the two watersheds in which AFR would occur (Upper Neil and Upper Ashland). The following tables display these revised current condition values as well as the cumulative change that would occur as a result of implementing each of the alternatives described under MASA expansion.

Table14a. Revised Upper Ashland Creek Watershed by Alternative

Upper Ashland						
	Alternative 1 (current)	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Total Acres	12,700	12,700	12,700	12,700	12,700	12,700
ERA	527.7	+14.39	+8.35	+9.44	+2.36	+10.61
%ERA	4.16%	4.27%	4.22%	4.23%	4.17%	4.24%
TOC	8.50	8.50	8.50	8.50	8.50	8.50
Risk Ratio	0.489	0.502	0.497	0.498	0.491	0.499

Table14b. Revised Upper Neil Creek Watershed by Alternative

Upper Neil						
	Alternative 1 (current)	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Total Acres	6,715	6,715	6,715	6,715	6,715	6,715
ERA	589.7	+0.46	+0.31	+2.11	+0.71	+0.32
%ERA	8.78%	8.79%	8.79%	8.81%	8.79%	8.79%
TOC	9.00	9.00	9.00	9.00	9.00	9.00
Risk Ratio	0.976	0.977	0.977	0.979	0.977	0.977

The cumulative effects within the Upper Ashland Creek watershed, considering the AFR project, still do not approach the "yellow flag" threshold of 1.0 with the highest effect being Alternative 2.

Within the Upper Neil Creek watershed, the AFR project would move the risk ratio for the watershed closer to the threshold, but would still remains below a 1.0 threshold.

A "corrected" or revised resultant condition value was calculated for the Cottonwood watershed in which Colestine Thin would occur. The following table display these revised current condition values as well as the cumulative change that would occur as a result of implementing each of the alternatives described under MASA expansion.

Table14c. Revised Upper Cottonwood Creek Watershed by Alternative

Upper Cottonwood						
	Alternative 1 (current)	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Total Acres	4,797	4,797	4,797	4,797	4,797	4,797
ERA	329.4	+2.73	+0.49	+0.00	+0.49	+0.54
%ERA	6.87%	6.92%	6.87%	6.54%	6.87%	6.89%
TOC	9.00	9.00	9.00	9.00	9.00	9.00
Risk Ratio	0.763	0.769	0.764	0.727	0.764	0.764

Compiled by Don Boucher, Analyst USFS RRNF July 2004

Reviewed by Jon Brazier - USFS Forest Hydrologist August 2004

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