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# Application of the "Sequoia method" for cumulative watershed effects analysis in the Flathead Basin

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# APPLICATION OF THE "SEQUOIA METHOD" FOR CUMULATIVE WATERSHED EFFECTS ANALYSIS IN THE FLATHEAD BASIN

By

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# ABSTRACT

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The primary objective of this study is to adapt and apply a U.S. Forest Service Region 5 cumulative watershed effects risk assessment methodology to the Swan River watershed, and to selected third order drainages located elsewhere in the Flathead Basin. Using nonparametric statistical methods, the results of this application will be compared to a similar application of the water yield model currently in use on the Flathead National Forest.

## ACKNOWLEDGEMENTS

I wish to thank Dr. Donald Potts of the University of Montana School of Forestry, who initiated the Swan River Drainage Study and gave it his wholehearted support. I would also like to thank my wife Lisa, whom I love very much, for her patience, support, and understanding during the completion of this manuscript. Dean Cirucek, Dr. Robert Hollister, and Elizabeth Hill offered invaluable technical assistance and insight. I am also grateful to the Flathead Basin Cooperative for funding this study. In addition, other people in Federal and State Agencies and private industry made significant contributions to this report.

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## INTRODUCTION

The National Environmental Policy Act of 1969 (Public Law 91-190) directed agencies to assess cumulative impacts of management activities on the environment. The Act requires that all Federal agencies prepare environmental impact statements on projects that may be detrimental to the environment. The Council on Environmental Quality (CEQ) mandated that such statements consider direct impacts and cumulative impacts or effects. The CEQ defined cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, reasonably foreseeable future actions Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time" (CEQ 1978).

Cumulative watershed effects are the results of downslope and\or downstream interaction of runoff from two or more management activities that reduce the productive land and water base. The USDA Forest Service (1988) defines cumulative watershed effects as any impact on beneficial uses of water that occur away from the locations of actual land use and which are transmitted through the fluvial system. A partial list of management activities that increase surface runoff includes road construction, silvicultural site preparation and release work, timber

harvesting, fires (both controlled and uncontrolled), ORV use, and grazing. All these activities reduce vegetative cover and thereby decrease interception and infiltration. Some of these activities also increase soil compaction. The result is overland surface flows and increased peak flows inside of developed channels. This equates to increased erosion and sedimentation (USDA Forest Service 1981).

Development of management techniques to control effects of increased runoff coming from one management activity have been devised. These practices, if implemented properly, usually keep erosion and sedimentation within acceptable limits. Failure to meet these standards are primarily the result of two or more management activities interacting in ways not anticipated (Megahan 1974).

Methods to reduce cumulative effects by reducing sources of increased runoff are possible. For example, this can be done by obliterating roads in effected watersheds. However, we will ultimately have to coordinate our management activities in order to mitigate cumulative effects. Some examples of this include shortening the time between harvest and regeneration and coordinating downslope vegetation manipulation with the design of the upslope road system to spread harvesting and planting activities out in time and space.

Cumulative watershed effects manifest themselves in many of the same ways a singular watershed effects. These

manifestations are typically physical evidence of watershed degradation and include gullies, rills and sheet erosion. Often these reduce the productive land base by removing fertile soil leading to a reduction of the productive water base by degrading water quality (USDA Forest Service 1981).

However, there are some manifestations of watershed effects that are cumulative. These manifestations may result from changes in timing of storm runoff. Moreover, the manifestations of these changes occur downstream, and may include larger and more frequent flooding, worsening streamside mass-wasting, and other problems related to stream channel expansion.

Generally, the main variables that affect cumulative watershed effects are:

1) Intense management
2) High ratio of miles of road per square mile of watershed
3) Frequent rain on snow events
4) Active landslides
5) Highly erodible soils
6) Low streambank stability
7) Past or present management activities occurring in ephemeral drainages
8) High rainfall intensities (greater than 5.5 inches per 24-hr. period)

Nearly all the manifestations of cumulative watershed effects can be traced to increases in peak flows. Gullies, rills, and sheet erosion are caused by overland flow; streambank sloughing, flooding and scouring are caused by peak stream flows (USDA Forest Service 1981).

Increasing peak flows in a stream has the same effect as decreasing the return period for major storm events. For example, what was formerly a 25-year flood might be expected to occur once every ten years. All the flooding, bank scour, sediment transport and erosive energy associated with larger storms happens with smaller, more frequent storms.

Almost all forest management activities result, to some degree, in compaction, vegetation change, concentration of runoff, interception of subsurface flow and stream channel changes. Over time, watersheds do recover from the effects of management activities, but all too often management activities are crowded together in time and space.

One third of the Flathead Basin is composed of forested lands which are managed for timber production. The timber industry strongly supports the local economy, and contributes to the regional economic base. Flathead Lake and its tributary streams and rivers contain superior fish habitat and pristine water quality that offers a valuable economic and recreational resource.

The effects of forest management activity, such as timber harvest and road building, may be a potential risk to

the environment. Unfortunately, the relationships of forest management activities to water quality and fisheries are poorly understood at this time.

To address these problems, the Flathead Basin Fisheries and Water Quality Cooperative was formed. The Cooperative represents a coordinated effort consisting of federal and state agencies and private industry.

The main goals of the Cooperative are to:

1. Determine the effects of forest practices on water quality.
2. Develop a process for protecting water quality from unacceptable impacts from forest practices.
3. Develop a monitoring program to supplement, if necessary, the monitoring program of the Flathead Basin Commission.
4. Identify and implement continuing, coordinated research and evaluation as a followup to initial activities.

In western Montana, streams originate mainly from snowmelt runoff from higher elevations, or from groundwater springbrooks at lower elevations. These streams network around a variety of forests with marketable timber stands. However, not until after the late 1940's and early 1950's were large tracts of timber cut from non-private forest lands.

Hauer (1990) points out that Federal and State agencies and private industry, have come under increasing public scrutiny for their forest management activities. These activities may affect transport and deposition of sediments, temperature changes, and nutrient export. Streamflow quantity and regime may also be affected by deforestation.

Present knowledge of streamflow changes are based primarily on experiments usually conducted on small catchments. The impacts of timber harvest on larger drainage basins has not been well-documented.

The rate of timber harvest in the Flathead Basin has accelerated in recent years (see Figure 1). Industry and agencies propose increased logging and road building in headwater drainages characterized by steep slopes and erodible soils. These headwater fisheries may well be negatively impacted by probable increases in sediment. Chapman and others (1987) found methods to quantify the effects of sediment on fish populations are not accurate and require integrated watershed studies to answer questions about land-use impacts. Due to the potential environmental degradation and economic hardship, it is imperative a management system be developed to gain additional information to make effective decisions.

Study Objectives

The objectives of this study are to help find a way for the Flathead Basin Fisheries and Water Quality Cooperative

to answer questions concerning relationships between forest management and water resources. I will apply a Region 5 cumulative watershed effects risk assessment procedure, SEQUOIA, to the Swan River watershed and to 30 additional watersheds being studied by the Cooperative.

SEQUOIA's results on the 30 additional watersheds will be compared with the results of the water yield model currently used by the Flathead National Forest, using nonparametric rank correlation techniques. The purpose of the comparison is to assess the degree of association and correlation between the two models. This may improve confidence in the use of either or both models for assessing cumulative watershed effects in the Flathead Basin.

When the two methods are applied to the same population of watersheds, and the results ranked from highest to lowest impacts, a testable hypothesis is:

"There are no significant differences among the rankings of disturbed watersheds as determined by the two risk assessment techniques."

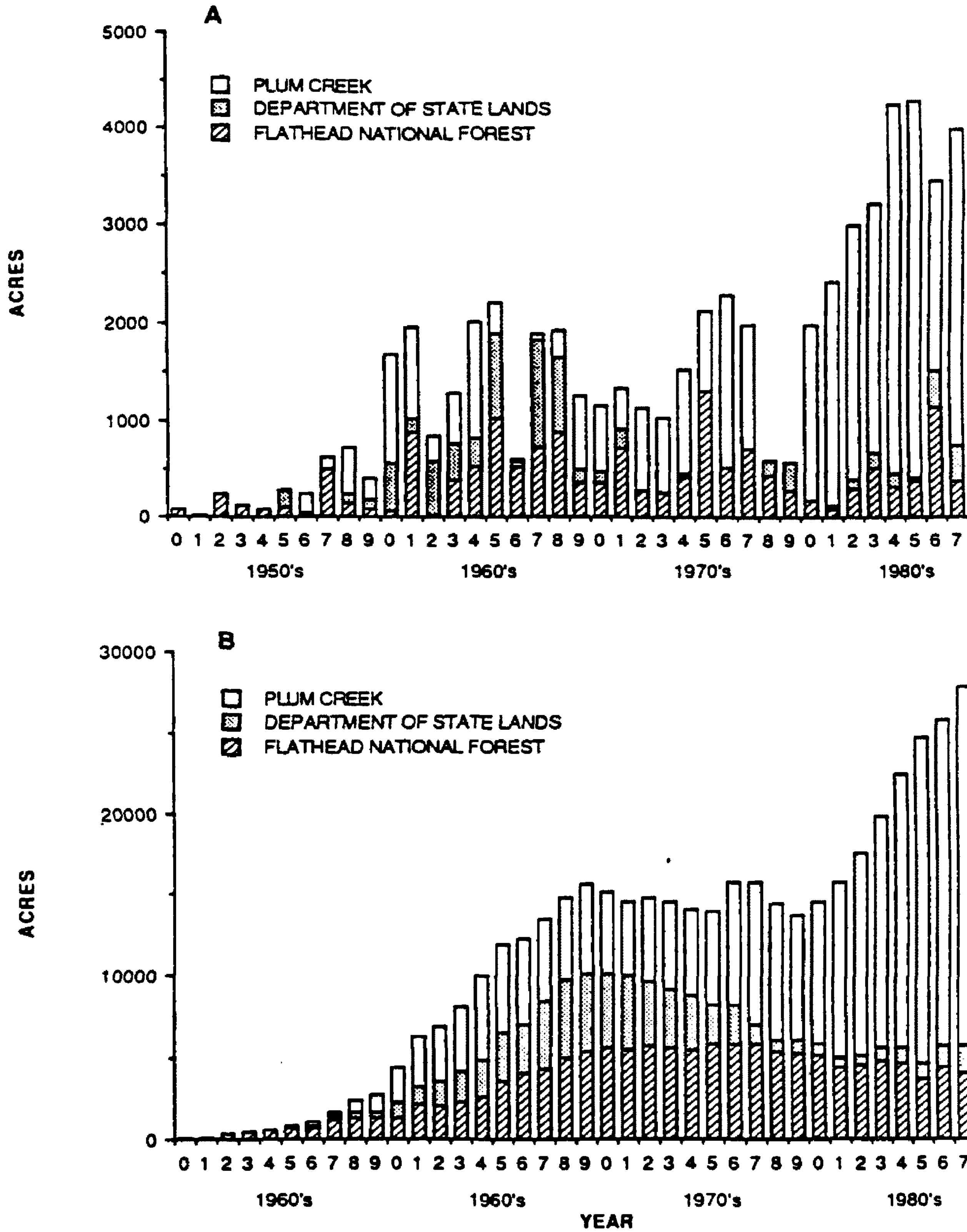



Figure 1. A) Total Equivalent Clearcut Acres (ECA) harvested each year, 1950-1987, in the Swan Watershed. B) Ten-year cumulative ECA harvested by landowner. From Hauer (1990).

# CHAPTER 2

## PREVIOUS WORK

There are four basic approaches to assess cumulative effects of forest management on water related resources: qualitative modeling or risk assessment; quantitative modeling; BMP (Best Management Practices) audits; and water quality monitoring (NCASI 1988; Knopp 1988). The literature covering the four approaches is quite extensive, therefore only the qualitative and quantitative methodologies developed in the northwestern United States will be discussed in this paper.

There are substantial differences between qualitative and quantitative approaches. Generally, qualitative approaches are used to estimate the risk or potential for watershed impacts using relative measures such as high, medium and low. They have been called non-argumentative procedures in that most professionals can agree on relative or order-of-magnitude impact scales. Quantitative methods usually involve process-type models inevitably containing empirically derived coefficients. The methods predict quantities of material produced - acre-feet of water or tons of sediment per square mile. Problems with quantitative methods revolve around acceptance of empirical coefficients, lack of model validation and ultimately, interpretation. There are also hybrids of the two approaches which have

fairly rigorous quantification of activities, yet are not related to measurable quantities of water or sediment.

<u>Qualitative Approaches</u>

Musgrave (1947) was among the first to approximate the relationships between management activities and erosion, looking at four primary factors that influence erosion rates - rainfall, slope, soil type, and vegetative cover. He assigned a coefficient to the relative amounts of erosion observed under different vegetal covers which allowed a comparison of different vegetation conditions. Musgrave found that his work gave satisfactory results in many applications. However, the quantitative evaluation of the factors was limited by a lack of supporting research.

Leopold and others (1968) developed a procedure that assisted with the development of uniform environmental impact statements. They devised a matrix system which can be cross referenced to the environmental impact statement, to locate specific problems found in watershed management. The procedure characterized the existing environment including a detailed description of environmental factors. This description also included the expected outcome of specific management activities. The matrix is a weighting method based on these factors. Leopold found the best utility of the matrix is its use as a checklist of the full range of impacts of management activities. However, the matrix should be reviewed by knowledgeable professionals to

overcome subjectivity in rating the importance of management activities.

Rickert (1975) spoke to the use of mathematical (quantitative) models and their effectiveness to assess water quality problems. He felt the models must be based on sound data and reliable assumptions, but water quality problems may be too complex to model in a practical and useful manner.

Brown III and others (1979) developed a procedure based on relationships among physiographic factors, land use activities, and resulting erosional-depositional problems. His study dealt mainly with the Willamette River Basin, Oregon. The approach involved the development of an erosional land base map, accompanied by a Leopold-type matrix for rating erosional impacts. Erosional and depositional features, and land use activities were mapped using infra-red aerial photographs. The map and matrix are used as a tool to estimate erosional impact associated with forest management activities.

Rickert and others (1979) adapted the same procedure for assessing the impacts of land management activities on erosion related nonpoint source identification and control in the Oregon 208 Nonpoint Source Assessment Project. The procedure relates stream quality conditions to regional terrain aspects and to forest management practices, and was expanded from the earlier method by utilizing ratings of

stream quality and fish habitat. The Leopold-type risk matrix was also changed from order-of-magnitude to high-medium-low risk categories. The topographic features are compared to the stream quality rating and arranged in matrix format, to identify the sensitive areas in relation to the management activity locations. The information is then combined into an interpretive map to locate management-sensitive areas. Together, the maps and matrices can be used to:

1) coordinate land management activities on stable terrain
2) provide land managers with an understanding of erosional processes and resultant stream quality problems
3) identify existing problems and their locations
4) prioritize resources for future site-specific studies
5) enable the system to be enlarged to cover larger areas of similar terrain.

Around 1980, a number of National Forests in Region 5 (California) simultaneously developed similar qualitative cumulative watershed effects analyses, each with innovative analytical techniques for the diverse geomorphic provinces of the region, Rice (1982). Technological progress had encouraged watershed managers to share data and develop working methodologies.

The Shasta-Trinity National Forest staff designed one of these cumulative watershed effects models to address both Forest and project level needs. Haskins (1986), described the project level application of the model. Forest level planning is on a broader scale than project level and was not discussed in his paper.

The Shasta-Trinity model is based on the assumptions that cumulative watershed effects are due in part to:

1) The amount of sensitive ground and its relative (high, medium, low) risk level within a watershed.
2) The timing and magnitude of management practices within a watershed that can influence peak flows, erosion and sedimentation.
3) The proximity of management practices to sensitive areas.

The amount of sensitive ground is quantified empirically based on a watersheds physical characteristics. The timing and magnitude of management practices are compiled using the Equivalent Road Area (ERA) accounting system. It should be noted that the ERA is equivalent to the Cumulative Runoff Acreage (CRA) used in some other Region 5 porcedures, and the two terms are used interchangeably. A third factor, the "threshold of concern" (TOC), represents the total ERA in a watershed beyond which cumulative effects will be initiated.

"Thresholds of concern" combine management activities and sensitivity levels of a watershed. Haskins (1986) states that "it is apparent that a watershed having a low sensitivity can withstand a higher level of management activity without incurring impact, than can a high-sensitivity watershed."

Based on Harr and others (1975), and observations made on the Shasta-Trinity National Forest relating accelerated channel degradation to ERA, a 14% ERA was chosen as the TOC for the most sensitive watersheds, 16% for moderately, and 18% for the least sensitive watersheds.

The model is applied to watersheds between 250 acres and 2000 acres. It is important to maintain resolution within a watershed. If the watershed is too large, the activities will appear clumped together and will not show up in the analysis.

The Shasta-Trinity model has been used primarily as in alternative selection process to disperse timber harvest activities in time and space. It is also used to weigh economic losses against resource gains if timber sales are deferred.

The Sequoia National Forest (USDA Forest Service 1981), developed a similar methodology, known as the Sequoia Method (SEQUOIA), to analyze watershed disturbance. The Sequoia Method estimates watershed impacts with the ERA/CRA accounting system, but assigns 12% threshold of concern for

most channels. A detailed description of SEQUOIA is presented in CHAPTER 3.

The Shasta-Trinity model and SEQUOIA are similar in analysis approaches. However, the Shasta-Trinity model is more site-specific and was meant to analyze smaller watersheds than SEQUOIA. Shasta-Trinity analyzes watersheds 25 to 2000 acres, while SEQUOIA's size requirements are between 5000 and 15000 acres.

Klock (1984) thought the most appropriate approach to determine the cumulative effects of forest practices on the downstream aquatic ecosystem would be a large watershed study - much like the one undertaken by the Cooperative. However, he observed that resources to sponsor large watershed studies are and will remain scarce.

Klock's alternative approach was to develop a watershed cumulative effects analysis model which best reflects the multitude of potential downstream impacts forest practices may generate. Klock's model, The Klock Watershed Cumulative Effects Analysis (KWCEA) model, incorporates many of the analysis features of previous approaches. Although the model can be used on large watersheds, it is best suited for watersheds up to 4000 hectares (about 10000 acres).

The KWCEA value is defined as a function of several site-specific variables.

$$KWCEA = (R \times E \times S \times H \times T \times A1) \times (C \backslash A2)$$

where R = precipitation erosivity

E = surface erodibility factor

S = slope stability factor

H = hydrologic risk characteristic

T = topographic factor

A1 = area of the activity, and,

A2 = total area of the watershed.

The equation is initially used to calculate a "reference year" and then the process of predicting the effects of future management practices are calculated.

A KWCEA value greater than 1.0 indicates a potential for increased impact on the watershed as a result of forest management activities. KWCEA values less than 1.0 indicate the potential for cumulative watershed effects are no greater than may be expected by natural hydrologic events. The KWCEA model is useful for evaluating all planning options to estimate potential downstream impacts.

Grant (1986, 1988) suggests that research must focus on specific cause-and-effect relationships in what he refers to as "the management-modified disturbance system" to determine whether there is evidence of specific effects at different spatial scales, and whether the results are due to individual or cumulative effects. To determine this Grant used aerial photographs to evaluate downstream effects that may be located within a given watershed.

Grant felt that previous studies dealing with cumulative watershed effects assumed links between upstream

activities and downstream channel changes, but did not describe the importance of specific water and sediment delivery mechanisms. His model distinguishes different supply mechanisms, such as peak flows, chronic sediment input, and pulse sediment input.

Each mechanism results in different channel responses. The most common response is a widening of channel dimensions. Secondary responses include debris dam instability, accumulation of fines, and collection of assorted debris in the channel.

Grant demonstrated channel changes resulting from management activities by analyzing sequential aerial photos taken in 1959 and 1967 at scales of 1:24000 and 1:15840. The differences in the size of the channels were statistically analyzed and a determination was made if the channel changes were a result of the upstream management activities. Grant felt that his technique uses parameters that can be rapidly (thus called RAPID) and inexpensively measured on aerial photographs as opposed to requiring detailed field observations. This system lends itself well to situations where other data are not available or where time and budgetary restraints will not allow a detailed field survey.

Region 5 of the U.S. Forest Service finally formally directed the California Forests to develop their individual cumulative watershed effects methods, based on the generic

"Cumulative Off-Site Watershed Effects Analysis" (USDA Forest Service 1988).

Cobourn (1989a) describes the most recent application of the now-official Region 5 cumulative effects analysis on the Eldorado National Forest. The analysis is a four-phased process:

1) evaluate the natural sensitivity of the watershed
2) develop a land disturbance history
3) field-survey the watershed, and
4) estimate the threshold of concern (TOC).

Cobourn feels that the model needs to be updated periodically, and that a continuous refinement of the product will allow watershed managers meet their goals of maintaining productivity and water quality in the future.

Cobourn (1989b) found that these Region 5 cumulative watershed effects analyses are now workable, but they need further refinement before critics will be satisfied. He feels we are in a transition period, in which federal and state agencies should identify super-sensitive watersheds and develop computerized data bases, using Geographic Information Systems. The product of these efforts should be used in a monitoring system that enables long-term tracking. Higher water quality levels will result from coordinated, long-range planning to guard against cumulative watershed effects.

Hogan and others (1989) designed a sediment transfer hazard classification system. The system is based on geomorphic factors that influence sediment production, transport, and deposition. Aerial photographs, topographic maps, fish habitat inventories and interpretive terrain maps are used to describe the factors involved. The data are input into a sediment transfer hazard map which is used to indicate where sediment production and transfer will affect key fisheries areas. Hogan and others found this is an effective way to restrict forest harvesting or focus limited funds on special road and harvest techniques.

McCorison and others (1989) developed a method to analyze watershed sensitivity on the Tongass National Forest. The Tongass needed a system that could indicate how much harvest watersheds could absorb over short time intervals without incurring unacceptable levels of cumulative watershed effects.

To accomplish this they modified the "Watershed Sensitivity" model, which is an ARC\INFO Geographical Information System (GIS) version of the watershed sensitivity concept. They used four index values that could be rated by the watershed personnel - extreme, high, moderate, and low. The model has a parallel procedure for evaluating flow regime changes.

The model assumes that watersheds recover at least 50% of their preharvest condition within the first decade

following harvest. The effect of the harvest would decrease as much as 50% during the next decade after that. The third decade then decreases the residual effect by 50%. Eventually, the conditions nearly return to the original state.

Quantitative Approaches

Many forest hydrologists in the Northern Region (Region 1) use some form of the equivalent clearcut area (ECA) water yield model. The methodology is mainly used to forecast average streamflow responses to vegetation manipulation, road building, and fire. The ECA procedure was first published in "Forest Hydrology II: Hydrologic Effects of Vegetation Manipulation" (USDA Forest Service 1974) and has been critiqued in detail by Harr (1981) and King (1989).

Although many adaptations of the original method exist, the basic principles have not changed. The relationship between annual water precipitation and average annual water yield is used to estimate water yield after timber harvest operations. Following vegetation removal, the model predicts water yield increase by elevation zone and general aspect. Roads, clearcuts, burned areas, and partial cuts are all expressed as equivalent clearcut areas. There is also an option to use soil and land-type information to improve the elevation/water yield function. The ECA model also allows the user to estimate reductions in water yield

increases as vegetation returns to its original state. This phenomenon is called hydrologic recovery.

The Flathead National Forest routinely uses an adaptation of the ECA procedure called H2OY (USDA Forest Service 1979). H2OY was developed and programmed by the Idaho Panhandle National Forests and will be discussed in greater detail in CHAPTER 3.

The Environmental Protection Agency (EPA 1980) in cooperation with the U.S. Forest Service, designed an approach to evaluate nonpoint silvicultural sources of pollution. The procedural handbook is known as WRENSS (Water Resources Evaluation Nonpoint Sources Silviculture) hydrology. The handbook describes the process to evaluate changes in water quality due to nonpoint pollution resulting from silvicultural activities.

WRENSS covers only the pollution and transport aspects of pollution control, and not socio-economic considerations. Quantitative techniques are used to estimate potential changes in streamflow, surface erosion, soil mass movement, total potential sediment discharge, and temperature. Silvicultural impacts on dissolved oxygen, organic matter, nutrients, and introduced chemicals are qualitatively discussed.

Two water yield models were selected to fit the WRENSS requirements - The Subalpine Water Balance Model (WATBAL) (Leaf and Brink 1973), and PROSPER (Goldstein and others

1974). WATBAL was designed to simulate management effects in snow-dominated hydrologic systems, PROSPER was designed for rain-dominated hydrologic systems. The models function similarly:

1) determination of on-site seasonal precipitation
2) determination of seasonal evapotranspiration
3) determination of determination of seasonal water yield, as the difference.
4) determination of changes in seasonal evapotranspiration caused by vegetation removal
5) determination of changes in seasonal water yield

Both models are very broad and intended to be used in varying climatic regions. A considerable amount of validation of the models has taken place, and there is growing confidence in their use.

The R1-R4 Sediment yield model (Cline et al. 1981) was developed for use in the northern Rocky Mountains, and utilizes major pieces of WRENSS hydrology in its procedure. R1-R4 is a "conceptual framework which outlines a process and is designed to be supplemented by local data". Its limitations and assumptions are clearly documented. Validation has proven difficult, however, so the model can and should only be used to compare various management alternatives.

The Montana Cumulative Effects Cooperative formally adopted (MCEC 1988) a computer model, developed on the

Clearwater National Forest, which combines WATBAL with R1-R4 to quantitatively model watershed impacts. The Cumulative Effects Cooperative is attempting to fine-tune the model using coefficients that reflect local conditions. The implementation of the model by Cooperators will not take place until required input data and coefficients are available to all participants. The intent is to replace the current use of the ECA procedures in the Northern Region.

CHAPTER 3

# METHODS OF ANALYSIS

## Risk Assessment

The Sequoia Method to predict cumulative watershed effects was chosen for a variety of reasons. First, and foremost, was that it is representative of the Region 5 methodologies. In short, we are not "re-inventing the wheel", but simply applying a model that was developed elsewhere. Further, to analyze very large watersheds, time constraints alone make it important to use methods not requiring detailed site-specific data.

In a preliminary study, SEQUOIA was compared to KWCEA (Klock 1985), OREGON (Rickert, et al. 1979), and RAPID (Grant 1986, 1988) to assess input data requirements, ease of application and ease of interpretation. KWCEA requires far too much site specific information - obtaining all of the input data for the Flathead Basin would be impossible. OREGON input data requirements are more reasonable, but the outputs are map products, and do not directly meet the requirements of this study. The OREGON method was adopted for a Geographic Information System (GIS) application, however (Lull 1990). RAPID looks for channel changes using aerial photogrammetry. The method requires a historical series of air photos and then can be used only on larger rivers and streams. We don't have the necessary photogrammetry and we have many concerns about smaller

bodies of water. SEQUOIA offers a compromise in data requirements and utility. Further, the Sequoia National Forest may be more like western Montana than any other Region 5 Forest. Thus, derived coefficients that may be influenced by climate, for example, may be more reliable.

SEQUOIA

SEQUOIA estimates watershed impacts based on Cumulative Runoff Acreage (CRA, which is the same as Equivalent Road Area, ERA), which is a measure of aerial disturbance (compaction, primarily) in a watershed. CRA considers roads and skid trial systems, types of harvest activity and site preparation, and ages of the various treatments. The rationale behind the model is that compaction of soil reduces storage and provides an effective increase in the drainage density of a watershed. The result of these two impacts are usually an increase in water yield and a tendency towards higher peak flows. The Sequoia National Forest assumes that a 12% CRA is a "threshold for concern" indicating the possibility for cumulative watershed effects resulting from changes in runoff quantity and timing.

Table 1 displays Runoff Coefficients (RC's) and Recovery Rates for various practices, as they are used in the model. Runoff coefficients are scaled relative to system roads that have an RC of 1.0. RC's are highest in the first year following disturbance and with the exception

of roads and recreation/administration sites, disturbances recover within 10 years.

The calculation to determine a CRA for a specific activity is straight-forward and simple:

CRA = Equivalent Acres (EA) X Runoff Coefficient (RC)

Equivalent Acres are the actual number of acres harvested or treated for silvicultural activities. EA's for system roads, abandoned roads and ORV trails are figured at 3.5 acres, 2 acres, and 1.5 acres per mile, respectively. Permanent skid systems and landings are figured at 27% of the harvested acres.

The total CRA for a watershed is simply the sum of the CRA's for all activities.

A Test of SEQUOIA

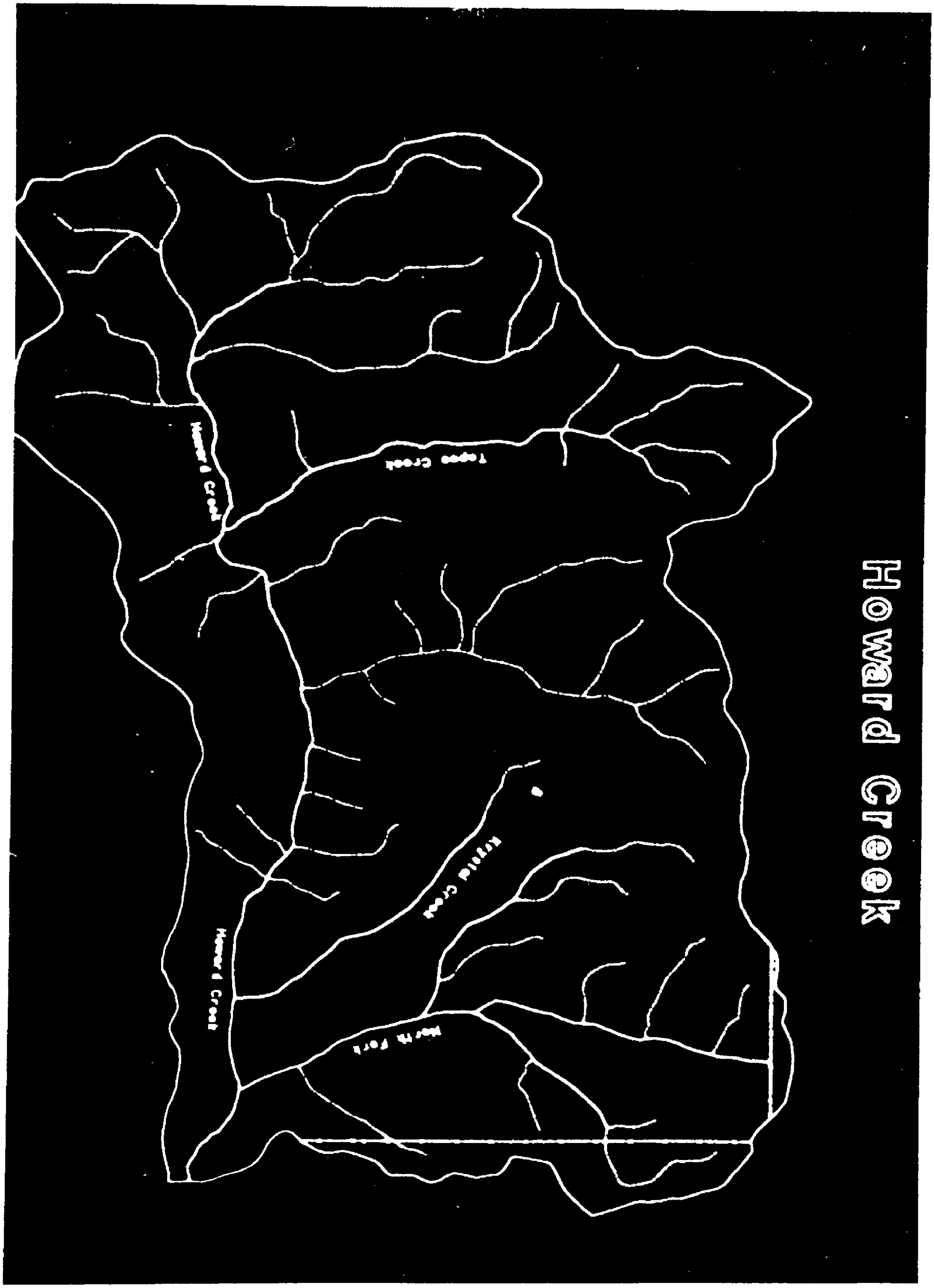
Before committing to all the work necessary to build the data base to run SEQUOIA in the Flathead Basin, a feasibility study was conducted on Howard Creek on the Lolo National Forest. Howard Creek (see Figure 2) totals 12636 acres, is a classic example of mixed-ownership, and currently is under a timber harvest-moratorium on Forest Service Land. There has been a considerable amount of logging and road building in the watershed. Recreational use may also impact peak flows and sediment production.

Timber harvest activities during the past ten years and road data for Howard Creek were solicited from Champion Timber Lands, Plum Creek Timber and the Lolo National

Table 1 : Runoff Coefficients and Recovery Rates

| ACTIVITY | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 (yrs) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tractor Clearcut | .4 | .4 | .35 | .2 | .1 | .1 | .1 | .1 | .1 | .1 | .1 |
| Cable Clearcut | .2 | .2 | .2 | .15 | .1 | .1 | .1 | .1 | .1 | .1 | .1 |
| Tractor Partial | .2 | .2 | .15 | .1 | .1 | .1 | .1 | .1 | .1 | .1 | .1 |
| Cable Partial | .1 | .1 | .1 | .1 | 0 | - | - | - | - | - | - |
| Site Prep Mech. | .7 | .7 | .6 | .5 | .3 | .2 | .1 | .1 | .1 | .1 | .1 |
| Mechan. Release | .5 | .4 | .4 | .3 | .25 | .15 | .1 | .1 | 0 | - | - |
| Aband. Roads | .9 | .9 | .9 | .9 | .9 | .9 | .9 | .9 | .9 | .9 | .9 |
| Perm. skid sys. | .9 | .9 | .9 | .9 | .9 | .9 | .9 | .9 | .9 | .9 | .9 |
| Burns 10% soil | .1 | .1 | .1 | 0 | - | - | - | - | - | - | - |
| Burns 80% soil | .4 | .4 | .35 | .3 | .2 | .1 | 0 | - | - | - | - |
| ORV Trails | .9 | .9 | .9 | .9 | .9 | .9 | .9 | .9 | .9 | .9 | .9 |
| System Roads | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

Figure 2.


Howard Creek
Tepee Creek
Howard Creek
Howard Creek
North Fork

Forest. Dozer piling and burning were the standard site preparation techniques used in the watershed, but in some cases, site preparation had not been completed.

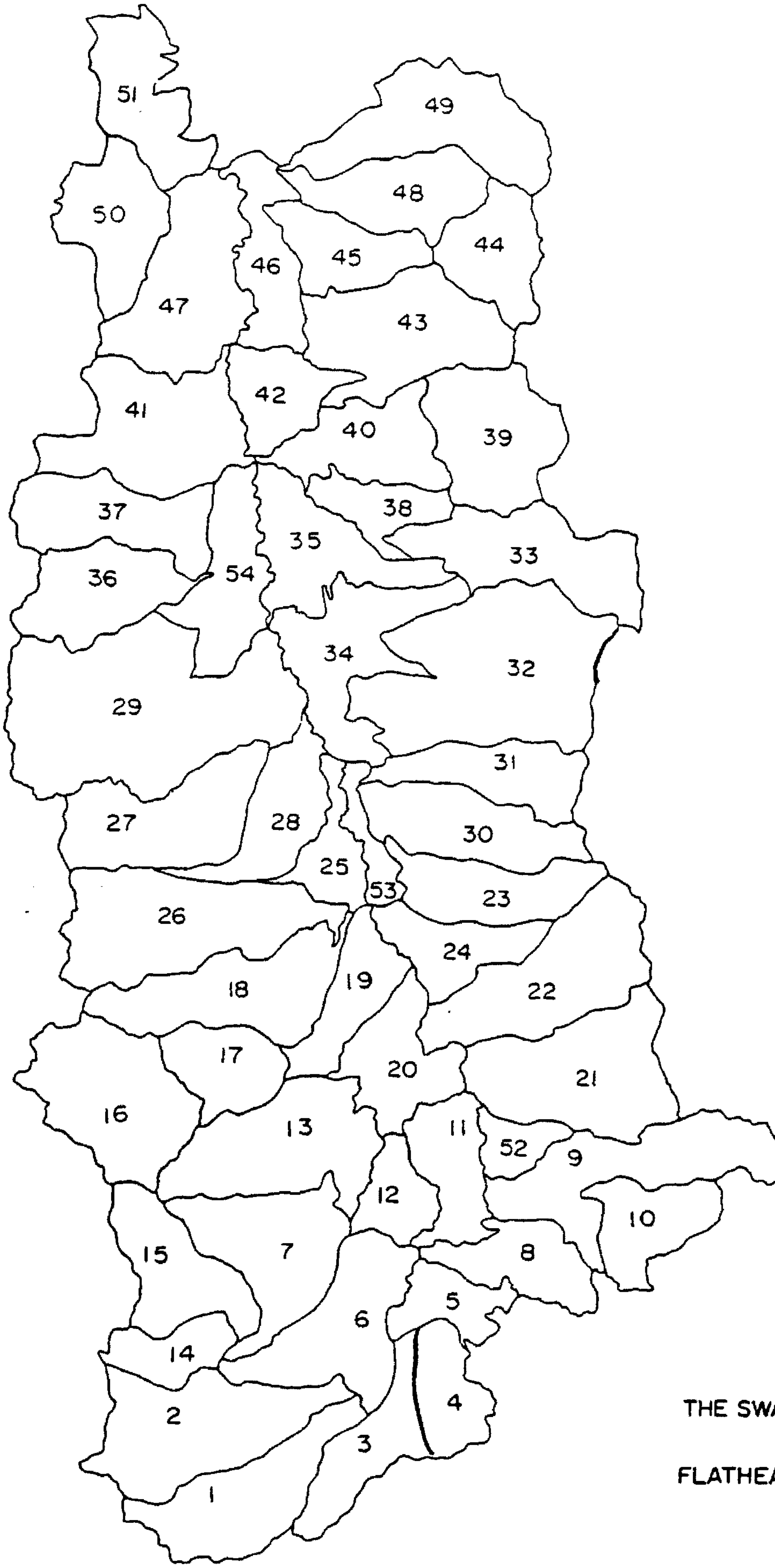
The detailed results of the SEQUOIA application in Howard Creek are presented in CHAPTER 4, but as of Fall 1989, the watershed had over 78 miles of system roads and over 2700 acres that had received some type of silvicultural treatment during the 10 previous years.

The Use of SEQUOIA in the Flathead Basin

A compartment boundary information layer on the Flathead National Forest MURIS system was used to partition the Swan River watershed into 54 analysis units (Figure 3). Some analysis units do not have topographic divides for boundaries, and analysis units range from 2663 to 14978 acres (Figure 4). Two analysis units (#29, #32) are larger than others because they hold large tracts of roadless, unmanaged land.

The areal extent of all forest management activities for the past ten years was accounted for in each analysis unit. Activity records were obtained from the Flathead National Forest, Montana Department of State Lands, and Plum Creek Timber Company. Harvest methods, acreage, and year of harvest were recorded. Site preparation information was provided by the respective land managers.

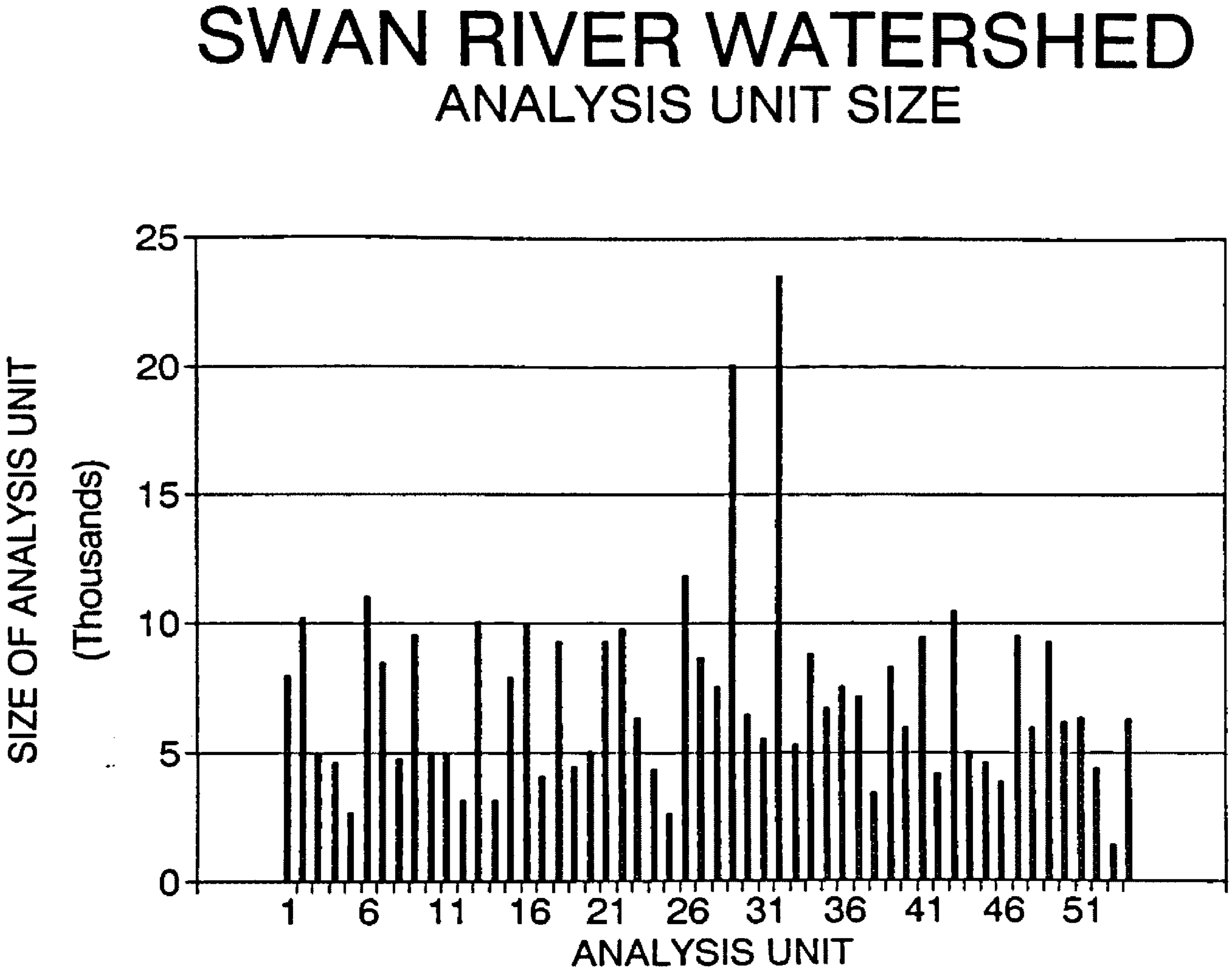
SEQUOIA weights impacts from abandoned roads and system roads differently. However, because maps obtained from the




MAP OF
THE SWAN RIVER DRAINAGE
OF THE
FLATHEAD NATIONAL FOREST

Figure 3

Figure 4


SWAN RIVER WATERSHED
ANALYSIS UNIT SIZE
SIZE OF ANALYSIS UNIT
(Thousands)
25
20
15
10
5
0
1
6
11
16
21
26
31
36
41
46
51
ANALYSIS UNIT

land owners didn't always make a distinction between those roads, I assumed that all roads within sale areas were abandoned and that all connecting roads outside of the cutting units were system roads. Skid trail systems and landings were assumed to total 27% of the harvested acres in each unit. This value may be high, but was the default value suggested in the SEQUOIA documentation.

Analysis unit boundaries, harvest unit boundaries and all roads were drawn onto 1:24000 scale US Geological Survey maps for subsequent analysis. All road lengths and boundary perimeters and areas were measured with a LASICO Model 1280 Digitizer/ Planimeter.

SEQUOIA was also applied to 22 additional watersheds in the Flathead National Forest, and 8 watersheds (not analysis units) in the Swan River Drainage. The 30 additional watersheds were chosen because of their importance as fisheries and they are being intensively studied in other projects funded by the by the Flathead Cooperative.

The Water Yield Model, H2OY

The water yield analysis model, H2OY (USDA Forest Service 1977), is an adaptation of the Equivalent Clearcut Area (ECA) procedure that was developed by the Idaho Panhandle National Forests then adopted and currently used by the Flathead National Forest. The procedure estimates the effects of timber harvest, fires and roads on streamflow.

The ECA procedure is basically a two step method:

1) Average annual water yields at different elevations for undisturbed forest conditions are estimated. Average annual water yield for the watershed is determined by summing the area-weighted yield from each elevation zone.
2) Increases in average annual water yield, by elevation zone, following vegetation removal are estimated. Roads, clearcuts, burned areas, and partial cuts are all expressed as "equivalent clearcut areas".

In the ECA procedure, the increase in annual water yield is distributed by months over the snowmelt season as a function of general aspect and elevation of the equivalent clearcut areas. This distribution of water yield is done to allow estimation of increases in the highest monthly yield and the channel impact period.

To reflect local and regional conditions, the model documentation recommends three timber harvest guidelines:

1) limitation of increases in average annual water yield to 10 percent, which may be adjusted depending on channel stability or soil characteristics.
2) limitation of increases in the highest monthly yield to 20 percent.
3) limitation of increases in the channel impact

period to 20 percent.

These guidelines are based on local analysis of runoff, topography, and channel conditions. It is assumed that most third to fifth order drainages can sustain a 5 to 17 percent runoff increase as a result of timber harvest and road building.

Water yield increases recover to original yields with time. The Flathead National Forest uses log-linear recovery curves, based on forest habitat types. Unlike the 10-year disturbance recovery rates used in SEQUOIA, hydrologic recovery rates used in H2OY range from 60 to 120 years.

Comparison of SEQUOIA and H2OY

SEQUOIA and H2OY both measure disturbance, but they measure different parameters, operate under different assumptions, and use vastly different recovery rates following disturbance. Nevertheless, since canopy removal can only be facilitated by road access and ground disturbance, there should be a reasonable correlation between the estimates made by the 2 models.

Parametric statistics depend on a variety of assumptions dealing with populations, most notably equal variances and normal distributions. Nonparametric methods are distribution free, and lend themselves to comparisons like the one presented.

Pearson's R nonparametric correlation was used in this comparison. Pearson's R is a measure of association

indicating the strength of the linear relationship between 2 variables. The interpretation of R is the same as for the parametric correlation coefficient, r. If R is close to 0, little or no association between the variables is present. If the value of R approaches +1.0 or -1.0, strong association is present.

This comparison is specifically testing the correlation between the disturbance ranking of the same 30 watersheds as determined by 2 different methods. The 95% confidence interval for the significant value of R with a sample size of 30 lies between 0.755 and 0.945.

CHAPTER 4

# RESULTS

## Howard Creek

Table 2 displays the accounting of activities and disturbances which taken place in Howard Creek during the past 10 years.

Table 2. Determination of Cumulative Runoff Acres for Howard Creek, Montana.

The following definitions apply in this table:
TPC = Tractor logged, partial cut
TCC = Tractor logged, clearcut
CPC = Cable logged, partial cut
CCC = Cable logged, clearcut
SPD = Site preparation, dozer piling
SPB = Site preparation, burning

| Sale # | Activity | Age (yrs) | EA * | RC = | CRA |
|---|---|---|---|---|---|
| 1 | TPC | 3 | 110 | 0.10 | 11.00 |
| 2 | CPC | 9 | 84 | 0.00 | 0.00 |
| | *SPD | 9 | 84 | 0.09 | 7.56 |
| 3 | TPC | 9 | 28 | 0.10 | 2.80 |
| 4 | TPC | 9 | 64 | 0.10 | 6.40 |
| | *SPD | 9 | 64 | 0.09 | 5.76 |
| 5 | TPC | 10 | 51 | 0.00 | 0.00 |
| | *SPD | 10 | 51 | 0.00 | 0.00 |
| 6 | TPC | 3 | 84 | 0.10 | 8.40 |
| 7 | TPC | 3 | 108 | 0.10 | 10.80 |
| 8 | TPC | 3 | 31 | 0.10 | 3.10 |
| 9 | TPC | 3 | 134 | 0.10 | 13.40 |
| | *SPB | 4 | 134 | 0.00 | 0.00 |
| 10 | CPC | 4 | 97 | 0.00 | 0.00 |
| 11 | TPC | 4 | 38 | 0.10 | 3.80 |
| | *SPD | 4 | 34.2 | 0.30 | 10.26 |
| 12 | TPC | 4 | 163 | 0.10 | 16.30 |
| | *SPD | 4 | 146 | 0.30 | 44.01 |
| 13 | TPC | 4 | 193 | 0.10 | 19.30 |
| | *SPD | 4 | 173.7 | 0.30 | 51.90 |
| 14 | TPC | 7 | 12 | 0.00 | 0.00 |
| 15 | TPC | 7 | 89 | 0.10 | 8.90 |
| 16 | TPC | 7 | 45 | 0.10 | 4.50 |
| 17 | TPC | 7 | 98 | 0.10 | 9.80 |
| 18 | TPC | 7 | 52 | 0.10 | 5.20 |
| | *SPD | 7 | 46.8 | 0.10 | 4.70 |

Table 2 (continued)

| | | | | | |
|---|---|---|---|---|---|
| 19 | TPC | 8 | 27 | 0.10 | 2.70 |
| 20 | TCC | 8 | 25 | 0.10 | 2.50 |
| 21 | TCC | 8 | 6 | 0.10 | .60 |
| 22 | TCC | 8 | 10 | 0.10 | 1.00 |
| | *SPD | 8 | 16 | 0.10 | 1.60 |
| 23 | TCC | 8 | 4 | 0.10 | .40 |
| 24 | TPC | 5 | 35 | 0.10 | 3.50 |
| | *SPB | 5 | 35 | 0.00 | 0.00 |
| 25 | TPC | 5 | 33 | 0.10 | 3.30 |
| | *SPD | 5 | 29.7 | 0.10 | 5.94 |
| 26 | CCC | 5 | 38 | 0.10 | 3.80 |
| | *SPB | 5 | 38 | 0.00 | 0.00 |
| 27 | *CPC | 5 | 47 | 0.00 | 0.00 |
| | *SPB | 5 | 47 | 0.00 | 0.00 |
| 28 | TPC | 5 | 63 | 0.10 | 6.30 |
| | *SPD | 5 | 56.7 | 0.20 | 11.34 |
| 29 | CPC | 5 | 4 | 0.00 | 0.00 |
| | *SPD | 5 | 3.6 | 0.20 | .72 |
| 30 | CPC | 5 | 63 | 0.10 | 6.30 |
| | *SPD | 5 | 56.7 | 0.20 | 11.34 |
| 31 | CPC | 5 | 40 | 0.10 | 4.00 |
| | *SPD | 5 | 36 | 0.20 | 7.20 |
| 32 | TPC | 5 | 6 | 0.10 | 0.60 |
| | *SPB | 5 | 6 | 0.00 | 0.00 |
| 33 | TCC | 5 | 4 | 0.10 | 0.40 |
| | *SPD | 5 | 3.6 | 0.20 | .72 |
| 34 | CPC | 5 | 3 | 0.00 | 0.00 |
| | *SPD | 5 | 27 | 0.20 | .54 |
| 35 | TPC | 5 | 19 | 0.10 | 1.90 |
| | *SPD | 5 | 17.1 | 0.20 | 3.42 |
| 36 | TPC | 5 | 59.4 | 0.20 | 11.88 |
| | *SPD | 5 | 59.4 | 0.20 | 11.88 |
| 37 | TPC | 5 | 85 | 0.10 | 8.10 |
| | *SPD | 5 | 76.5 | 0.00 | 0.00 |
| 38 | CPC | 5 | 23 | 0.00 | 0.00 |
| 39 | TPC | 5 | 48 | 0.10 | 4.80 |
| 40 | TPC | 5 | 43.2 | 0.20 | 4.80 |
| | *SPD | 5 | 14 | 0.10 | 1.40 |
| 41 | TPC | 5 | 12.6 | 0.20 | 2.52 |
| 42 | TPC | 5 | 8 | 0.10 | .80 |
| | *SPD | 5 | 7.2 | 0.20 | 1.44 |
| 43 | TPC | 5 | 18 | 0.10 | 1.80 |
| | *SPD | 5 | 16.2 | 0.20 | 3.24 |
| 44 | TPC | 3 | 110 | 0.10 | 11.00 |
| 45 | TPC | 4 | 30 | 0.10 | 3.00 |
| 46 | CPC | 4 | 8 | 0.00 | 0.00 |
| 47 | TPC | 4 | 38.6 | 0.00 | 0.00 |
| | | | | TOTAL | 389.39 |

Table 2 (continued)

TOTAL OF ALL SYSTEM ROADS, ORV ROADS, AND TRAILS:

| | TOTAL MI. | x | RC | = | EQUIVALENT ACRES |
|---|---|---|---|---|---|
| System Roads | 78.2 | | 3.5 | = | 273.7 |
| ORV Roads | 27.7 | | 1.5 | = | 41.5 |
| Trails | 25.5 | | 1.5 | = | 38.3 |
| | | | | TOTAL | 353.5 |

TOTAL OF PERMANENT SKID SYSTEMS AND LANDINGS

harvested acres x 27% = equivalent acres for permanent skid systems and landings.
2701.9 x .27 = 729.5 equivalent acres

TOTAL CRA

| | CRA |
|---|---|
| harvested acres | 389.4 |
| system roads (273.7 X 1) | 273.7 |
| ORV roads & trails (79.8 X .9) | 71.8 |
| permanent skid systems and landings (729.5 X .9) | 656.6 |
| TOTAL | 1391.5 CRA |

<u>Swan River Analysis Units</u>

Similar accounting of all forest management activities in the 54 Swan River analysis units appears in Appendix 1. Table 3 lists the 54 Swan River analysis units by unit number. Table 4 lists the analysis units ranking from highest to lowest percentage of unit disturbance. Units higher than 12% are in highlighted in bold. The units ranged from 40.9% of disturbance in unit #24, to 0% disturbance in nine other units.

Of the 54 analysis units evaluated, 13, or 24%, had CRA's 12% of the unit or greater. Seventeen analysis units, or 31%, had CRA's 10% of the unit or greater. The total cumulative runoff acreage in the Swan River watershed is

Table 3 .
SWAN RIVER ANALYSIS UNIT DATA.

| AU | AREA (ACRE) | HARVEST (ACRE) | ROAD (MILE) | CRA | DISTUR. |
|---|---|---|---|---|---|
| 1 | 7988.9 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2 | 10192.8 | 0.0 | 0.0 | 0.0 | 0.0 |
| 3 | 4958.7 | 177.0 | 9.4 | 207.1 | 4.2 |
| 4 | 4591.4 | 627.0 | 21.2 | 359.2 | 8.7 |
| 5 | 2663.0 | 9.0 | 3.7 | 10.1 | 0.0 |
| 6 | 11019.2 | 1054.0 | 16.7 | 278.6 | 2.5 |
| 7 | 8448.1 | 613.0 | 20.2 | 261.6 | 3.0 |
| 8 | 4775.0 | 831.0 | 23.5 | 595.8 | 12.5 |
| 9 | 9550.0 | 225.0 | 9.3 | 162.1 | 1.7 |
| 10 | 4958.7 | 456.0 | 13.8 | 335.6 | 6.8 |
| 11 | 4946.3 | 390.0 | 16.6 | 348.8 | 7.0 |
| 12 | 3122.1 | 709.2 | 13.4 | 636.7 | 20.3 |
| 13 | 10009.1 | 902.0 | 11.7 | 628.7 | 6.3 |
| 14 | 3122.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| 15 | 7897.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| 16 | 9917.3 | 38.0 | 1.9 | 9.7 | 0.0 |
| 17 | 4040.4 | 0.0 | 0.0 | 0.0 | 0.0 |
| 18 | 9274.5 | 1173.0 | 27.5 | 698.3 | 7.5 |
| 19 | 4407.7 | 876.0 | 14.1 | 330.5 | 7.5 |
| 20 | 5050.4 | 226.0 | 8.5 | 203.7 | 4.0 |
| 21 | 9274.5 | 1047.5 | 22.7 | 307.8 | 3.3 |
| 22 | 9733.7 | 88.0 | 2.3 | 48.4 | 0.5 |
| 23 | 6336.1 | 484.0 | 18.3 | 584.3 | 9.2 |
| 24 | 4315.9 | 2007.0 | 28.9 | 1768.2 | 40.9 |
| 25 | 2592.4 | 714.0 | 24.9 | 262.1 | 10.1 |
| 26 | 11845.7 | 4429.0 | 69.8 | 2985.7 | 25.2 |
| 27 | 8594.3 | 2052.0 | 13.8 | 1052.6 | 12.2 |
| 28 | 7529.8 | 3182.0 | 21.1 | 1708.1 | 22.7 |
| 29 | 20067.2 | 2618.0 | 35.0 | 1730.6 | 8.6 |
| 30 | 6427.9 | 1780.0 | 22.0 | 1040.7 | 16.2 |
| 31 | 5509.6 | 578.0 | 11.8 | 404.6 | 7.3 |
| 32 | 23507.7 | 658.0 | 9.2 | 444.2 | 1.9 |
| 33 | 5325.9 | 0.0 | 0.0 | 0.0 | 0.0 |
| 34 | 8776.8 | 959.0 | 26.4 | 512.5 | 5.8 |
| 35 | 6730.9 | 253.0 | 17.2 | 179.9 | 27.0 |
| 36 | 7529.8 | 18.0 | 3.6 | 21.5 | 0.2 |
| 37 | 7162.5 | 754.0 | 8.2 | 468.7 | 6.5 |
| 38 | 3397.6 | 1049.0 | 13.5 | 611.1 | 18.0 |
| 39 | 8264.4 | 432.0 | 19.6 | 190.6 | 2.3 |
| 40 | 5968.6 | 1684.0 | 12.5 | 1202.5 | 20.1 |

TABLE (3) cont.

| A.U. | AREA | HARVEST | ROADS | CRA | DIST. |
|---|---|---|---|---|---|
| 41 | 9429.3 | 1548.0 | 5.6 | 971.7 | 10.3 |
| 42 | 4182.1 | 1395.0 | 13.4 | 620.5 | 14.8 |
| 43 | 10468.3 | 516.9 | 5.8 | 214.6 | 2.0 |
| 44 | 5050.4 | 0.0 | 2.1 | 0.0 | 0.0 |
| 45 | 4591.4 | 180.8 | 10.9 | 238.7 | 5.2 |
| 46 | 3817.4 | 1027.0 | 12.5 | 394.2 | 10.3 |
| 47 | 9489.7 | 1734.5 | 29.3 | 825.9 | 10.8 |
| 48 | 5968.8 | 121.0 | 1.1 | 21.5 | 0.4 |
| 49 | 9274.5 | 182.0 | 10.2 | 68.3 | 0.7 |
| 50 | 6152.4 | 585.0 | 10.2 | 304.1 | 4.9 |
| 51 | 6336.1 | 1032.0 | 12.1 | 337.0 | 5.3 |
| 52 | 4380.7 | 504.0 | 18.2 | 353.9 | 8.1 |
| 53 | 1401.2 | 158.0 | 8.2 | 177.9 | 12.6 |
| 54 | 6267.5 | 1884.0 | 21.7 | 1764.2 | 28.2 |
| TOTAL | 386633.9 | 43960.9 | 753.6 | 26883.1 | 8.2 |

Table 4:.

SWAN RIVER ANALYSIS UNITS
RANKED BY % OF DISTURBANCE.

| AU | AREA (ACRE) | HARVEST (ACRE) | ROAD (MILE) | CRA | DISTUR. (%) |
|---|---|---|---|---|---|
| **24** | **4315.9** | **2007.0** | **28.9** | **1768.2** | **40.9** |
| **54** | **6267.5** | **1884.0** | **21.7** | **1764.2** | **28.2** |
| **35** | **6730.9** | **253.0** | **17.2** | **179.9** | **27.0** |
| **26** | **11845.7** | **4429.0** | **69.8** | **2985.7** | **25.2** |
| **28** | **7529.8** | **3182.0** | **21.1** | **1708.1** | **22.7** |
| **12** | **3122.1** | **709.2** | **13.4** | **636.7** | **20.3** |
| **40** | **5968.6** | **1684.0** | **12.5** | **1202.5** | **20.1** |
| **38** | **3397.6** | **1049.0** | **13.5** | **611.1** | **18.0** |
| **30** | **6427.9** | **1780.0** | **22.0** | **1040.7** | **16.2** |
| **42** | **4182.1** | **1395.0** | **13.4** | **620.5** | **14.8** |
| **53** | **1401.2** | **158.0** | **8.2** | **177.9** | **12.6** |
| **8** | **4775.0** | **831.0** | **23.5** | **595.8** | **12.5** |
| **27** | **8594.3** | **2052.0** | **13.8** | **1052.6** | **12.2** |
| 47 | 9489.7 | 1734.5 | 29.3 | 825.9 | 10.8 |
| 41 | 9429.3 | 1548.0 | 5.6 | 971.7 | 10.3 |
| 46 | 3817.4 | 1027.0 | 12.5 | 394.2 | 10.3 |
| 25 | 2592.4 | 714.0 | 24.9 | 262.1 | 10.1 |
| 23 | 6336.1 | 484.0 | 18.3 | 584.3 | 9.2 |
| 4 | 4591.4 | 627.0 | 21.2 | 359.2 | 8.7 |
| 29 | 20067.2 | 2618.0 | 35.0 | 1730.6 | 8.6 |
| 52 | 4380.7 | 504.0 | 18.2 | 353.9 | 8.1 |
| 18 | 9274.5 | 1173.0 | 27.5 | 698.3 | 7.5 |
| 19 | 4407.7 | 876.0 | 14.1 | 330.5 | 7.5 |
| 31 | 5509.6 | 578.0 | 11.8 | 404.6 | 7.3 |
| 11 | 4946.3 | 390.0 | 16.6 | 348.8 | 7.0 |
| 10 | 4958.7 | 456.0 | 13.8 | 335.6 | 6.8 |
| 37 | 7162.5 | 754.0 | 8.2 | 468.7 | 6.5 |
| 13 | 10009.1 | 902.0 | 11.7 | 628.7 | 6.3 |
| 34 | 8776.8 | 959.0 | 26.4 | 512.5 | 5.8 |
| 51 | 6336.1 | 1032.0 | 12.1 | 337.0 | 5.3 |
| 45 | 4591.4 | 180.8 | 10.9 | 238.7 | 5.2 |
| 50 | 6152.4 | 585.0 | 10.2 | 304.1 | 4.9 |
| 3 | 4958.7 | 177.0 | 9.4 | 207.1 | 4.2 |
| 20 | 5050.4 | 226.0 | 8.5 | 203.7 | 4.0 |
| 21 | 9274.5 | 1047.5 | 22.7 | 307.8 | 3.3 |
| 7 | 8448.1 | 613.0 | 20.2 | 261.6 | 3.0 |
| 6 | 11019.2 | 1054.0 | 16.7 | 278.6 | 2.5 |
| 39 | 8264.4 | 432.0 | 19.6 | 190.6 | 2.3 |
| 43 | 10468.3 | 516.9 | 5.8 | 214.6 | 2.0 |
| 32 | 23507.7 | 658.0 | 9.2 | 444.2 | 1.9 |
| 9 | 9550.0 | 225.0 | 9.3 | 162.1 | 1.7 |

*** BOLD INDICATES > 12%**

Table 4 (Cont.)
SWAN RIVER ANALYSIS UNITS (CONT'D.)

| | | | | | |
|---|---|---|---|---|---|
| 49 | 9274.5 | 182.0 | 10.2 | 68.3 | 0.7 |
| 22 | 9733.7 | 88.0 | 2.3 | 48.4 | 0.5 |
| 48 | 5968.8 | 121.0 | 1.1 | 21.5 | 0.4 |
| 36 | 7529.8 | 18.0 | 3.6 | 21.5 | 0.2 |
| 1 | 7988.9 | 0.0 | 0.0 | 0.0 | 0.0 |
| 2 | 10192.8 | 0.0 | 0.0 | 0.0 | 0.0 |
| 14 | 3122.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| 33 | 5325.9 | 0.0 | 0.0 | 0.0 | 0.0 |
| 17 | 4040.4 | 0.0 | 0.0 | 0.0 | 0.0 |
| 5 | 2663.0 | 9.0 | 3.7 | 10.1 | 0.0 |
| 15 | 7897.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| 16 | 9917.3 | 38.0 | 1.9 | 9.7 | 0.0 |
| 44 | 5050.4 | 0.0 | 2.1 | 0.0 | 0.0 |
| | 386633.9 | 43960.9 | 753.6 | 26883.1 | 8.2 |

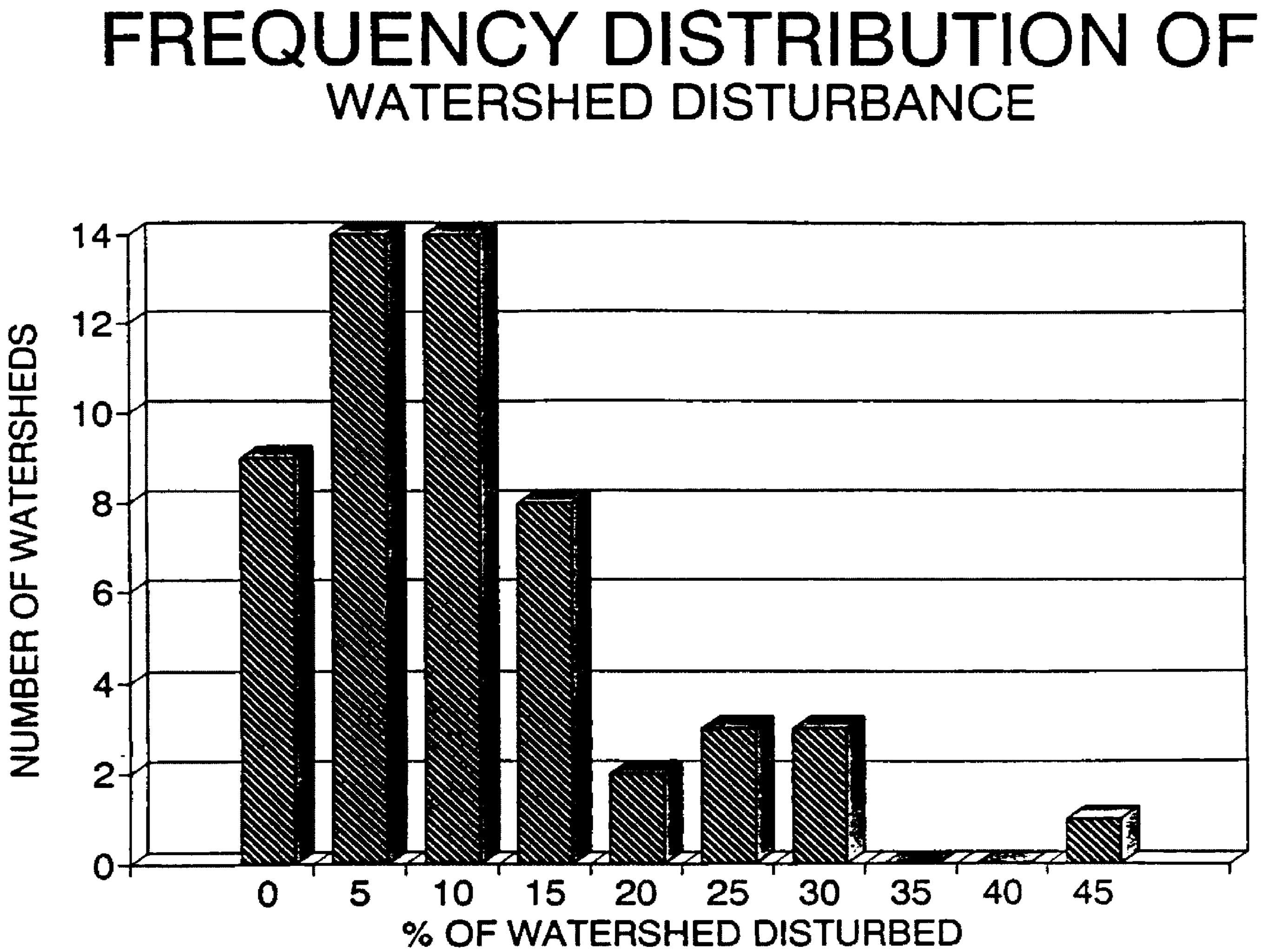
cumulative runoff acreage in the Swan River watershed is 8.2% of the total land area. A cumulative frequency distribution of the percentage of unit disturbance is shown in Figure 5. Analysis units, shown in Figure 6 are colored to indicate the level of disturbance with that unit. Black coloring indicate disturbance levels greater than 12%. Red units indicate disturbances between 10 and 12%.

The 30 Flathead Basin Watersheds

The accounting of all forest management-related activities in the 30 Flathead basin watersheds is found in Appendix 2. Table 5 identifies those watersheds and displays the estimates of their surface disturbance made by SEQUOIA and of their water yield increases made by H2OY.

The correlation between the watersheds ranked from highest to lowest disturbance and highest to lowest water yield increases, evaluated with Pearson's R, was 0.88181. This value is significant at the 95% confidence level and indicates the strong relationship observed between SEQUOIA and H2OY is not due to chance.

Figure 5


FREQUENCY DISTRIBUTION OF
WATERSHED DISTURBANCE
NUMBER OF WATERSHEDS
14
12
10
8
6
4
2
0
0 5 10 15 20 25 30 35 40 45
% OF WATERSHED DISTURBED

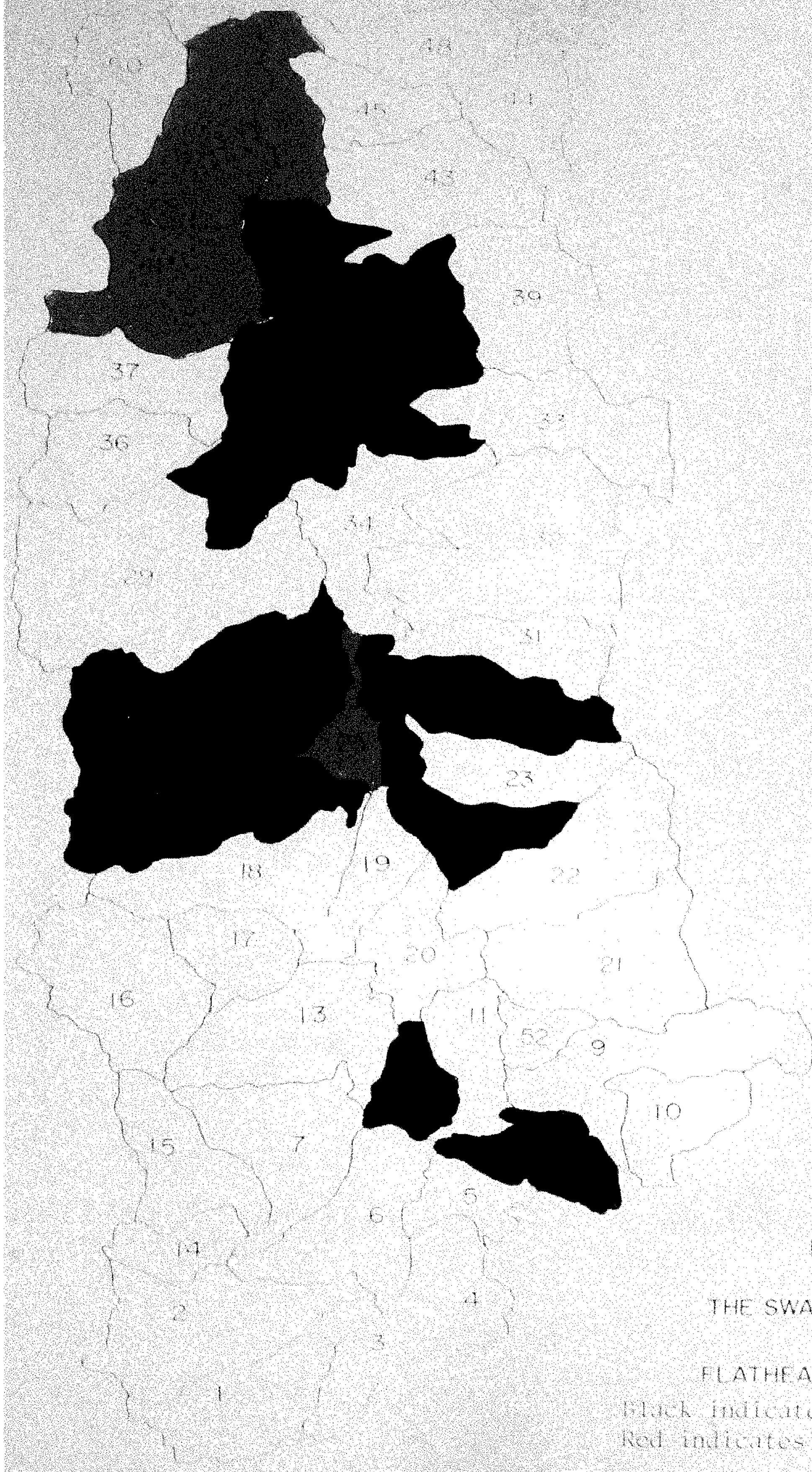



Figure 6.
MAP OF
THE SWAN RIVER DRAINAGE
OF THE
FLATHEAD NATIONAL FOREST
Black indicates greater than 12
Red indicates between 10 - 12

Table 5.
Comparison of Results for 30 watersheds in the Flathead Basin as determined by the Sequoia Method and H2OY water yield model.

| WATERSHED | | SEQUOIA(% DIST) | H2OY(% INCR) |
|---|---|---|---|
| 1A | ELK CREEK | 0.00 | 0.00 |
| 1B | ELK CREEK | 0.00 | 0.00 |
| 2 | GOAT CREEK | 0.01 | 0.90 |
| 3 | SQUEEZER | 0.04 | 0.46 |
| 4 | LION | 0.00 | 0.00 |
| 5A | JIM | 12.20 | 4.49 |
| 5B | JIM | 13.00 | 4.26 |
| 6 | PIPER | 0.00 | 0.00 |
| 7 | FREELAND | 30.90 | 18.00 * |
| 8 | FISH | 22.60 | 16.78 |
| 9 | HAND | 9.50 | 1.55 |
| 10 | SWIFT | > 0.00 | N-A |
| 11 | SHEPPARD | 15.70 | 10.24 |
| 12A | UPPER BIG | 1.20 | 2.93 |
| 12B | LOWER BIG | 3.00 | 3.32 |
| 13 | LOWER COAL | 2.30 | 1.58 |
| 14 | COAL CREEK NF | 6.70 | 3.03 |
| 15 | COAL CREEK SF | 3.90 | 1.70 |
| 17 | RED MEADOW | 3.40 | 1.83 |
| 18 | WHALE | 1.20 | 1.27 |
| 19 | TRAIL | 2.30 | 0.65 |
| 20 | GRANITE | 1.90 | 1.72 |
| 21 | CHALLENGE | 2.50 | 1.03 |
| 23 | MORRISON | 2.50 | 1.30 |
| 24A | HUNGRY HORSE | > 0.00 | 0.60 |
| 24B | HUNGRY HORSE | > 0.00 | 0.50 |
| 25 | MARGARET | > 0.00 | 1.64 |
| 26 | TIGER | > 0.00 | 0.11 |
| 27 | EMERY | 2.00 | 3.14 |
| 29 | SQUAW TRIB | 11.10 | 3.62 |

* personal communication, William Schultz, Hydrologist, Montana Department of State Lands

CHAPTER 5

# DISCUSSION

## Howard Creek

The application of SEQUOIA to Howard Creek was to be a feasibility study, but actually exposed many problems facing coordinated watershed management in watersheds with mixed-ownership. For example, the watershed is 12636 acres (about 20 sq.mi.) and approximately 20% of the watershed has received silvicultural treatment during the past 10 years. That treatment figure is a little misleading in that the majority of timber harvest has been conducted on Industrial timber lands, which are only 50% of the watershed.

Even more revealing is that there are nearly 80 miles of system roads in the watershed, yet whole sections have not been entered yet. A 4 mile/sq.mi. road density may seem reasonable, but in areas of the watershed that have been entered and harvested, the actual road density is probably double that. Roads are the greatest source of sediment and influence the timing of runoff by effectively increasing the drainage density.

SEQUOIA estimates a 1989 CRA of about 1390 acres which is about 11% of the total watershed area. Again, activities have not been distributed across the entire watershed. If Howard Creek were on the Sequoia National Forest, the "flag would have been raised" because the watershed had reached

the "threshold of concern." As previously stated, the Forest Service has its lands in the area under a harvest moratorium because concerns over cumulative watershed effects have been raised.

Swan River Analysis Units

Although SEQUOIA estimates that only 8.2% of the Swan River watershed is in cumulative runoff acreage, once again the disturbances are not uniformly distributed across the basin. Analysis unit #24 has a CRA which is over 40% of its total area and a road density of over 4 mi./sq.mi., probably has reached most peoples' TOC.

While 17 of 54 analysis units had CRA's greater than 10% of their areas, the median for disturbance was about 6.5%, and almost 25% of the Swan has seen less that 1% disturbance. Clearly, there is considerable room for additional forest management and timber harvest in the watershed. It may even be safe to assume that there are minimal cumulative watershed effects occurring basin-wide.

But is is also clear that perhaps 10 to 15% of the watershed has reached a level of disturbance that is too high. Perhaps there should be a coordinated effort to defer additional impacts in those areas and move to other areas of the drainage. If SEQUOIA's recovery estimates are correct, the deferral need only be for a decade or so in most cases.

The 30 Additional Watersheds

As expected, there was a very good correlation between the rankings of watershed disturbance as estimated by SEQUOIA and H2OY. However, only 3 of the watersheds had exceeded the water yield increase threshold employed by the Flathead National Forest. Six of the watersheds exceeded the 10% CRA threshold suggested by SEQUOIA. Both methods identified, in the same rank-order, Freeland, Fish and Sheppard Creeks as being above threshold. Interestingly, two of the SEQUOIA-threshold streams were different reaches of Jim Creek. Jim Creek has been the center of recent concern over forest management impacts on fisheries and water quality.

There are a number of possible reasons why the 2 methods don't have perfect agreement. Foremost is that they measure different types of disturbance, and have vastly different estimates of disturbance recovery. Nevertheless, the strong agreement between the methods suggest that they are telling the same story. The question still remains as to when in the story we get concerned about the outcome.

Thresholds are a concept in need of study. Does a 10% increase in water yield or a 10% CRA mean anything? Fortunately, the results of this study will be compared and correlated with the other studies funded by the Flathead Cooperative, and together may help build an understanding of cumulative watershed effects in the Flathead Basin.

<u>Comments and Observations</u>

The application of Sequoia to the Flathead Basin was generally uneventful. However, if this study were to be duplicated in some way, a few general comments regarding data collection and organization may be helpful.

SEQUOIA is structured to account for forest management activities that take place over a ten year period. After land ownership is determined, data must be collected from the respective land owners.

Of the land owners in the Flathead Basin, I felt Plum Creek Timber Company maintained the best-organized and accessible timber harvest records. The harvesting and road building were organized by year and section. The information was easy to understand and interpret. It also appeared to be the most complete and didn't require consulting many other sources.

The Montana Department of State Lands maintained records that were easily accessible and the personnel at the DSL were very helpful in locating the information I needed. However, a small amount of the information was incomplete, and additional sources were needed to interpret the missing timber harvest information.

The U.S. Forest Service data was the most difficult to interpret. The Forest Service uses overlays with management codes to indicate what activity had taken place in a given area. The number on the overlay is then referred to the Forest Service code book. This system may work well for

employees of the Forest Service, however, I felt it very time-consuming and frustrating. The information on the overlays dated back thirty years, whereas Plum Creek Timber Company and Department of State lands information could be easily sorted by individual year. If similar research is to be undertaken, I would suggest the researcher become familiar will the Forest Service system before attempting to interpret and process the data.

Two management activities, site preparation and road classification, both part of SEQUOIA's accounting method, could not always be determined. This did not cause a large problem with data interpretation, however, and assumptions were made on both activities.

Site preparation was assumed to total the amount of the harvest activity. Type of site preparation, such as mechanical or burning, were provided in most instances. Road classification could not be given with any conciseness from any one person. This is due to the ongoing classification to determine what type of road exists. The roads within the harvest area were considered abandoned roads and all connecting roads in the area were considered system roads. This may not be the best method, however it was consistently used in the study.

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APPENDIX I

SWAN RIVER DRAINAGE ANALYSIS UNITS

The Analysis Unit number will be accompanied by the legal description. The sections listed may be wholly or partially included in the Swan drainage.

For ease in reporting data, the following definitions and abbreviations will be used

****************************************
(TPC): refers to tractor skidded on partial logged area.
(TCC): refers to tractor skidded on clearcut logged area.
(CCC): refers to cable skidded on clearcut area.
(CPC): refers to cable skidded on partial logged area.
(SPD): refers to site prep by dozer piling
(SPB): refers to site prep by burning
(EA) : equivalent acres
(RC) : runoff coefficient
(CRA): cumulative runoff acreage
****************************************

**Analysis Unit # 1**

Sections 23, 24, 25, 26, 27, 36, 35.T18N, R18W
Sections 6, 9, 10, 15, 16, 17, 18, 19, 28, 29, 30, 31, 32.T18N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 7988.2 ACRES
HARVESTED ACRES: 0
ROAD LENGTH: 0
CRA: 0
% OF ANALYSIS UNIT 0

*******************************************************

**Analysis Unit # 2**

Sections 1, 2, 3, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24. T18, R18W.
Sections 3, 4, 5, 6, 7, 8, 9, 17, 18. Twp 18, R17W

TOTAL AREA OF ANALYSIS UNIT: 10192.8 ACRES
HARVESTED ACRES: 0
ROAD LENGTH: 0
CRA: 0
% of ANALYSIS UNIT 0

*******************************************************

**Analysis Unit # 3**

Sections 25, 36. T19N, R17W
Sections 1, 2, 11, 12, 13, 14, 15, 16. T19N, R17W

TOTAL AREA OF ANALYSIS UNIT: 4958.7 ACRES
HARVESTED ACRES: 177 ACRES
ROAD LENGTH: 9.4 MI
CRA: 207.1
% OF ANALYSIS UNIT 4.2%

| Activity | Age of Act.(yrs) | EA | * RC | = CRA |
|---|---|---|---|---|
| TPC | 1 | 165 | .2 | 33.0 |
| SPD | 0 | 165 | .7 | 115.5 |
| TCC | 3 | 12 | .1 | 1.2 |
| | | | | 149.7 |
| PERMANENT SKID SYSTEMS:149.7*.27= | | 40.4 | .9 | 36.4 |
| ROAD CRA: | | 18.9 | .9 | 17.0 |
| TOTAL CRA: | | | | 207.1 |

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**Analysis Unit # 4**

Sections 25, 26. T19N, R17W
Sections 1, 2, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 27, 28. T18N, R17W

TOTAL AREA OF ANALYSIS UNIT: 4591.4 ACRES
HARVESTED ACRES: 627 ACRES
ROAD LENGTH: 21.2 MI
CRA: 484.7
% OF ANALYSIS UNIT 10.6%

| Activity | Age of Act.(yrs) | EA | * RC | = CRA |
|---|---|---|---|---|
| TCC | 7 | 20 | .1 | 2.0 |
| SPD | 6 | 20 | .1 | 2.0 |
| TPC | 7 | 273 | .1 | 27.3 |
| DPD | 6 | 273 | .1 | 27.3 |
| TPC | 1 | 334 | .2 | 66.8 |
| SPD | 0 | 334 | .7 | 233.8 |
| | | TOTAL | | 359.2 |
| PERM. SKID SYSTEM 359.2 * .27 = | | 97 | .9 | 87.3 |
| ROAD CRA: | | 42.4 | .9 | 38.2 |
| TOTAL CRA: | | | | 484.7 |

**Analysis Unit # 5**

Sections 18, 19 20, 30. T19N, R16W
Sections 13, 23, 24, 25, 26. T19N, R17W

TOTAL AREA OF ANALYSIS UNIT: 2663 ACRES
HARVESTED ACRES: 9 ACRES
ROAD LENGTH: 3.7 MI
CRA: 10.9
% OF ANALYSIS UNIT 0.04%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TCC | 6 | 9 | | .1 | | .9 |
| SPD | 5 | 9 | | .2 | | 1.8 |
| | | | TOTAL | | | 2.7 |
| PERM. SKID SYSTEMS | 2.7 * .27 = | 1.5 | | .9 | | 1.4 |
| ROAD CRA: | | 7.4 | | .9 | | 6.7 |
| TOTAL CRA: | | | | | | 10.9 |

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**Analysis Unit # 6**

Sections 6, 13, 14, 15, 17, 19, 21, 22, 23, 24, 26, 27, 28, 29, 31, 32, 33, 34, 35. T19N, R17W

Sections 2, 3, 4, 5, 6. T18N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 11019.2 ACRES
HARVESTED ACRES: 1054 ACRES
ROAD LENGTH: 16.7 MI
CRA: 485.2 ERA
% OF ANALYSIS UNIT 4.4%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 7 | 8 | | .1 | | .8 |
| SPD | 6 | 8 | | .1 | | .8 |
| CCC | 7 | 15 | | .1 | | 1.5 |
| SPB | 2 | 15 | | .1 | | 1.5 |
| TPC | 7 | 15 | | .1 | | 1.5 |
| SPD | 6 | 15 | | .1 | | 1.5 |
| CCC | 4 | 95 | | .1 | | 9.5 |
| SPB | 2 | 95 | | .1 | | 9.5 |
| TPC | 7 | 25 | | .1 | | 2.5 |
| SPD | 6 | 25 | | .1 | | 2.5 |
| TPC | 7 | 16 | | .1 | | 1.6 |
| SPD | 6 | 16 | | .1 | | 1.6 |

**Analysis Unit #6 (continued)**

| | | | | |
|---|---|---|---|---|
| TPC | 7 | 35 | .1 | 3.5 |
| SPD | 6 | 35 | .1 | 3.5 |
| TPC | 6 | 20 | .1 | 2.0 |
| SPD | 5 | 20 | .2 | 4.0 |
| TPC | 6 | 165 | .1 | 16.5 |
| SPD | 5 | 165 | .2 | 33.0 |
| TCC | 6 | 15 | .1 | 1.5 |
| SPD | 5 | 15 | .2 | 3.0 |
| TCC | 1 | 2 | .4 | .8 |
| SPD | 0 | 2 | .7 | 1.4 |
| TCC | 1 | 4 | .4 | 1.6 |
| SPD | 0 | 4 | .7 | 2.8 |
| TPC | 2 | 12 | .15 | 16.8 |
| SPD | 1 | 12 | .7 | 78.4 |
| | | | TOTAL | 203.6 |

| | | | |
|---|---|---|---|
| PERM. SKID SYSTEM: 203.6 * .27= | 55.0 | .9 | 49.5 |
| ROAD CRA: | 28.3 | .9 | 25.5 |
| TOTAL CRA: | | | 278.6 |

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**Analysis Unit # 7**

Sections 1, 2, 4, 5, 6, 7, 8, 9, 10, 15, 16, 17, 18, 19, 20, 21, 22, 28, 29, 30, 31, 32. T19N, R17W.
Sections 11, 12, 13. T19, R18W.

TOTAL AREA OF ANALYSIS UNIT: 8448.1 ACRES
HARVESTED ACRES: 613 ACRES
ROAD LENGTH: 20.2 MI
CRA: 261.6
% OF ANALYSIS UNIT 3.0%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 9 | 68 | | .1 | | 6.8 |
| SPD | 8 | 68 | | .1 | | 6.8 |
| TCC | 9 | 35 | | .1 | | 3.5 |
| SPD | 8 | 35 | | .1 | | 3.5 |
| TPC | 9 | 17 | | .1 | | 1.7 |
| SPD | 8 | 17 | | .1 | | 1.7 |
| TCC | 9 | 17 | | .1 | | 1.7 |
| SPD | 8 | 17 | | .1 | | 1.7 |
| TPC | 9 | 13 | | .1 | | 1.3 |
| SPD | 8 | 13 | | .1 | | 1.3 |
| TPC | 9 | 7 | | .1 | | .7 |

Analysis Unit #7 (continued)

| | | | | |
|---|---|---|---|---|
| SPD | 8 | 7 | .1 | .7 |
| TCC | 8 | 30 | .1 | 3.0 |
| SPD | 7 | 30 | .1 | 3.0 |
| TPC | 6 | 40 | .1 | 4.0 |
| SPD | 5 | 40 | .2 | 8.0 |
| CCC | 4 | 20 | .1 | 2.0 |
| SPB | 2 | 20 | .1 | 2.0 |
| TPC | 5 | 90 | .1 | 9.0 |
| SPD | 4 | 90 | .3 | 27.0 |
| TPC | 5 | 40 | .1 | 4.0 |
| SPD | 4 | 40 | .3 | 12.0 |
| CCC | 5 | 7 | .1 | .7 |
| SPB | 2 | 7 | .1 | .7 |
| TCC | 2 | 8 | .35 | 2.8 |
| SPD | 1 | 8 | .7 | 5.6 |
| TPC | 2 | 29 | .35 | 10.2 |
| TPC | 1 | 24 | .4 | 9.6 |
| TCC | 9 | 16 | .1 | 1.6 |
| SPD | 0 | 36 | .7 | 25.2 |
| SPD | 9 | 57 | .1 | 5.7 |
| | | | TOTAL | 172.3 |
| PERM. SKID SYSTEM:172.3 * .27 = | | 46.5 | .9 | 41.9 |
| ROAD CRA: | | 52.7 | .9 | 47.4 |
| TOTAL CRA: | | | | 261.6 |

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Analysis Unit # 8

Sections 7, 8, 9, 10, 14, 15, 16, 17, 18, 19, 20, 21, 22.
T19N, R16W.
Sections 13 T19N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 4775 ACRES
HARVESTED ACRES: 831 ACRES
ROAD LENGTH: 22.2 MI
CRA: 595.8
% OF ANALYSIS UNIT: 12.5%

| Activity | Age of Act.(yrs) | EA | * RC | = CRA |
|---|---|---|---|---|
| TCC | 6 | 10 | .1 | 1.0 |
| SPD | 5 | 10 | .2 | 2.0 |
| TPC | 6 | 70 | .1 | 7.0 |
| SPD | 5 | 70 | .2 | 14.0 |
| TPC | 4 | 185 | .1 | 18.5 |
| SPD | 3 | 185 | .5 | 92.5 |
| TCC | 1 | 15 | .4 | 6.0 |

Analysis Unit #8 (continued)

| | | | | |
|---|---|---|---|---|
| SPD | 0 | 15 | .7 | 10.5 |
| TPC | 1 | 145 | .2 | 29.0 |
| SPD | 0 | 145 | .7 | 101.5 |
| TPC | 2 | 160 | .15 | 24.0 |
| SPD | 1 | 160 | .7 | 112.0 |
| CCC | 6 | 5 | .1 | .5 |
| SPB | 3 | 23 | .1 | 2.3 |
| TPC | 1 | 16 | .4 | 6.4 |
| TPC | 8 | 23 | .1 | 2.3 |
| TPC | 8 | 6 | .1 | .6 |
| SPD | 7 | 6 | .1 | .6 |
| TPC | 1 | 16 | .2 | 3.2 |
| TPC | 8 | 16 | .1 | 1.6 |
| SPD | 7 | 16 | .1 | 1.6 |
| TPC | 8 | 21 | .1 | 2.1 |
| SPD | 7 | 21 | .1 | 2.1 |
| CCC | 8 | 10 | .1 | 1.0 |
| TPC | 1 | 10 | .2 | 2.0 |
| SPD | 7 | 10 | .1 | 1.0 |
| TPC | 8 | 6 | .1 | .6 |
| TPC | 1 | 6 | .2 | 1.2 |
| TPC | 8 | 7 | .1 | .7 |
| TPC | 6 | 42 | .1 | 4.2 |
| TPC | 8 | 13 | .1 | 1.3 |
| TPC | 8 | 17 | .1 | 1.7 |
| SPD | 7 | 10 | .1 | 1.0 |
| SPD | 7 | 7 | .1 | .7 |
| SPD | 7 | 13 | .1 | 1.3 |
| SPD | 3 | 4 | .5 | 2.0 |
| TCC | 3 | 9 | .2 | 1.8 |
| SPD | 2 | 9 | .6 | 3.6 |
| TCC | 4 | 4 | .2 | .8 |
| TCC | 3 | 19 | .2 | 3.8 |
| | | TOTAL | | 445.20 |

PERM. SKID SYSTEM:445.2 * .27 = 120.2 .9 108.20

ROAD CRA: 47.3 .9 42.60

TOTAL CRA: 595.80

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**Analysis Unit # 9**

Sections 2, 3, 4, 5, 10, 11, 14. T19N, R16W.
Sections 25, 26, 27, 33, 34, 35, 36. T20N, R16W.
Sections 27, 28, 29, 30, 31, 32, 33, 34. T20N, R15W.

| | | |
|---|---|---|
| TOTAL AREA OF ANALYSIS UNIT: | 9550 | ACRES |
| HARVESTED ACRES: | 225 | ACRES |
| ROAD LENGTH: | 9.3 | MI |
| CRA: | 162.1 | |
| % OF DISTURBED | 1.7 % | |

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 3 | 13 | | .2 | | 2.6 |
| SPD | 9 | 11 | | .1 | | 1.1 |
| SPD | 8 | 56 | | .1 | | 5.6 |
| TPC | 1 | 42 | | .4 | | 16.8 |
| SPD | 1 | 29 | | .7 | | 20.3 |
| SPD | 1 | 9 | | .7 | | 6.3 |
| TPC | 3 | 9 | | .2 | | 1.8 |
| SPD | 1 | 12 | | .7 | | 8.4 |
| TPC | 3 | 9 | | .2 | | 1.8 |
| TPC | 3 | 20 | | .2 | | 4.0 |
| TPC | 3 | 19 | | .2 | | 3.8 |
| TPC | 3 | 23 | | .2 | | 4.6 |
| SPD | 3 | 20 | | .5 | | 10.0 |
| TPC | 3 | 32 | | .2 | | 6.4 |
| SPD | 9 | 18 | | .1 | | 1.8 |
| TPC | 1 | 15 | | .2 | | 3.0 |
| TPC | 1 | 8 | | .2 | | 1.6 |
| CCC | 7 | 8 | | .1 | | .8 |
| TPC | 1 | 6 | | .2 | | 1.2 |
| TPC | 1 | 7 | | .4 | | 2.8 |
| TPC | 4 | 11 | | .1 | | 1.1 |
| TPC | 9 | 4 | | .1 | | .4 |
| SPD | 3 | 1 | | .2 | | .2 |
| TCC | 3 | 6 | | .2 | | 1.2 |
| | | | | | TOTAL | 107.6 |
| PERM. SKID SYSTEM:107.6 * .27 = | | 29 | | .9 | | 26.0 |
| ROAD CRA: | | 31.7 | | .9 | | 28.5 |
| TOTAL CRA: | | | | | | 162.1 |

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**Analysis Unit # 10**

Sections 5, 6, 7. T19N, R15W.
Sections 31, 32. T20N, R15W.
Sections 1, 2, 3, 11, 12, 13, 14, 23, 24. T19N, R16W.
Sections 35, 36. T20N, R16W.

TOTAL AREA OF ANALYSIS UNIT: 4958.7 ACRES
HARVESTED ACRES: 456 ACRES
ROAD LENGTH: 13.8 MI
CRA: 335.6
% OF ANALYSIS UNIT 6.8%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 1 | 110 | | .2 | | 22.0 |
| SPD | 0 | 110 | | .7 | | 77.0 |
| TPC | 1 | 31 | | .2 | | 6.2 |
| SPD | 0 | 31 | | .7 | | 21.7 |
| TPC | 1 | 35 | | .2 | | 7.0 |
| SPD | 0 | 35 | | .7 | | 24.5 |
| TCC | 1 | 3 | | .4 | | 1.2 |
| SPD | 0 | 3 | | .7 | | 2.1 |
| TPC | 1 | 18 | | .4 | | 7.2 |
| SPD | 6 | 13 | | .1 | | 1.3 |
| TPC | 3 | 14 | | .2 | | 2.8 |
| TPC | 5 | 23 | | .1 | | 2.3 |
| TPC | 5 | 9 | | .4 | | 3.6 |
| TCC | 1 | 3 | | .4 | | 1.2 |
| CCC | 7 | 5 | | .1 | | .5 |
| TPC | 6 | 15 | | .1 | | 1.5 |
| TPC | 6 | 41 | | .1 | | 4.1 |
| TPC | 3 | 12 | | .2 | | 2.4 |
| TPC | 9 | 7 | | .1 | | .7 |
| SPC | 6 | 19 | | .1 | | 1.9 |
| TPC | 9 | 13 | | .1 | | 1.3 |
| CCC | 9 | 31 | | .1 | | 3.1 |
| SPB | 2 | 10 | | .1 | | 1.0 |
| TPC | 9 | 10 | | .1 | | 1.0 |
| TPC | 9 | 7 | | .1 | | .7 |
| TPC | 6 | 17 | | .1 | | 1.7 |
| SPD | 9 | 17 | | .1 | | 1.7 |
| CCC | 6 | 19 | | .1 | | 1.9 |
| SPB | 2 | 19 | | .1 | | 1.9 |
| SPD | 9 | 10 | | .1 | | 1.0 |
| SPD | 9 | 13 | | .1 | | 1.3 |
| SPD | 9 | 25 | | .1 | | 2.5 |
| TPC | 6 | 25 | | .1 | | 2.5 |
| TPC | 9 | 15 | | .1 | | 1.5 |
| SPD | 1 | 15 | | .7 | | 8.5 |
| TPC | 9 | 4 | | .1 | | .4 |

**Analysis Unit #10 (continued)**

| | | | | |
|---|---|---|---|---|
| SPD | 6 | 4 | .1 | .4 |
| TCC | 3 | 14 | .2 | 2.8 |
| SPD | 3 | 12 | .5 | 6.0 |
| TCC | 3 | 20 | .2 | 4.0 |
| TCC | 3 | 6 | .2 | 1.2 |
| SPD | 3 | 6 | .5 | 3.0 |
| SPD | 3 | 9 | .5 | 4.5 |
| | | | TOTAL | 245.1 |

| | | | |
|---|---|---|---|
| PERM. SKID SYSTEM: 245.1 * .27 = | 66.2 | .9 | 59.5 |
| ROAD CRA: | 34.4 | .9 | 31.0 |
| TOTAL CRA: | | | 335.6 |

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**Analysis Unit # 11**

Sections 18, 19, 20, 21, 27, 28, 29, 30, 31, 32, 33. T20N, R16W
Sections 13, 24, 25, 26, 35, 36. T20N, R17W.
Sections 5, 6, 7, 18. T19N, R16W.
Sections 1, 12, 13. T19N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 4946.3 ACRES
HARVESTED ACRES: 390.0 ACRES
ROAD LENGTH: 16.6 MI
CRA: 348.8
% OF DISTURBED 7.0%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 9 | 10 | | .1 | | 1.0 |
| SPD | 8 | 10 | | .1 | | 1.0 |
| TCC | 8 | 19 | | .1 | | 1.9 |
| SPD | 7 | 19 | | .1 | | 1.9 |
| TPC | 5 | 82 | | .1 | | 8.2 |
| SPD | 4 | 82 | | .3 | | 24.6 |
| TCC | 5 | 2 | | .1 | | .2 |
| SPD | 4 | 2 | | .3 | | .6 |
| TCC | 4 | 24 | | .2 | | 4.8 |
| SPD | 3 | 24 | | .5 | | 12.0 |
| TPC | 4 | 18 | | .1 | | 1.8 |
| SPD | 3 | 18 | | .5 | | 9.0 |
| TPC | 3 | 235 | | .1 | | 23.5 |
| SPD | 2 | 235 | | .6 | | 141.0 |
| TPC | 4 | 4 | | .2 | | .8 |
| SPD | 5 | 4 | | .1 | | .4 |
| TCC | 3 | 8 | | .2 | | 1.6 |

**Analysis Unit #11 (continued)**

| | | | | |
|---|---|---|---|---|
| SPD | 2 | 8 | .6 | 4.2 |
| | | | TOTAL | 238.5 |

PERM. SKID SYSTEM: 8.5 * .27 = 64.4 .9 58.0

ROAD CRA: 58.1 .9 52.3

TOTAL CRA: 348.8

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**Analysis Unit # 12**

Sections 26, 35, 36. T20N, R17W.
Sections 1, 2, 3, 10, 11, 12, 13, 14. T19N,R17W

TOTAL AREA OF ANALYSIS UNIT: 3122.1 ACRES
HARVESTED ACRES: 709.2 ACRES
ROAD LENGTH: 13.4 MI
CRA: 636.7
% OF ANALYSIS UNIT 20.3%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TCC | 9 | 5 | | .1 | | .5 |
| SPD | 8 | 5 | | .1 | | .5 |
| TCC | 6 | 15 | | .1 | | 1.5 |
| SPD | 5 | 15 | | .2 | | 3.0 |
| TCC | 1 | 50 | | .4 | | 20.0 |
| SPD | 0 | 50 | | .7 | | 35.0 |
| TPC | 1 | 46 | | .2 | | 9.2 |
| SPD | 0 | 46 | | .7 | | 32.2 |
| TPC | 2 | 339 | | .15 | | 50.9 |
| SPD | 1 | 339 | | .7 | | 237.3 |
| TPC | 2 | 200 | | .15 | | 30.0 |
| SPD | 1 | 200 | | .7 | | 140.0 |
| TCC | 4 | 3 | | .2 | | .6 |
| SPD | 4 | 3 | | .3 | | .9 |
| TPC | 4 | 6 | | .2 | | 1.2 |
| SPD | 4 | 6 | | .3 | | 1.8 |
| SPD | 4 | 4 | | .3 | | 1.2 |
| TCC | 4 | 4 | | .2 | | .8 |
| TCC | 4 | 3 | | .2 | | .6 |
| SPD | 4 | 3 | | .3 | | .9 |
| TPC | 1 | 9 | | .2 | | 1.8 |
| SPD | 4 | 9 | | .3 | | 2.7 |
| TCC | 1 | 10 | | .4 | | 4.0 |
| SPD | 4 | 10 | | .3 | | 3.0 |
| TCC | 1 | 11 | | .4 | | 4.4 |
| SPD | 4 | 11 | | .3 | | 3.3 |

**Analysis Unit #12 (continued)**

| | | | | |
|---|---|---|---|---|
| TCC | 1 | 15 | .4 | 6.0 |
| TPC | 4 | 4 | .2 | .8 |
| | | | TOTAL | 594.1 |

| | | | |
|---|---|---|---|
| PERM. SKID SYSTEM: 594.1*.27 = | 160.4 | .9 | 144.4 |
| ROAD CRA: | 42.6 | .9 | 38.3 |
| TOTAL CRA: | | | 776.8 |

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**Analysis Unit # 13**

Sections 20, 21, 22, 27, 28, 29, 30, 31, 32, 33, 34, 35. T20N, R17W.
Sections 25, 35, 36. T20N, R18W.
Sections 3, 4, 5, 6. T19N, R17W.
Sections 1, 2. T19N, R18W.

TOTAL AREA OF ANALYSIS UNIT: 10009.1 ACRES
HARVESTED ACRES: 902 ACRES
ROAD LENGTH: 11.7 MI
CRA: 628.7
% OF ANALYSIS UNIT 6.3%

| Activity | Age of Act.(yrs) | EA | * RC | = CRA |
|---|---|---|---|---|
| CCC | 7 | 14 | .1 | 1.4 |
| SPB | 2 | 14 | .1 | 1.4 |
| TCC | 6 | 50 | .1 | 5.0 |
| SPD | 5 | 50 | .2 | 10.0 |
| TPC | 6 | 55 | .1 | 5.5 |
| SPD | 5 | 55 | .2 | 11.0 |
| TCC | 5 | 40 | .2 | 8.0 |
| SPD | 4 | 40 | .2 | 8.0 |
| TPC | 5 | 260 | .1 | 26.0 |
| SPD | 4 | 260 | .2 | 52.0 |
| TCC | 4 | 135 | .2 | 27.0 |
| SPD | 3 | 135 | .5 | 67.5 |
| TPC | 4 | 45 | .1 | 4.5 |
| SPD | 3 | 45 | .5 | 22.5 |
| TPC | 4 | 35 | .1 | 3.5 |
| SPD | 3 | 240 | .5 | 120.0 |
| SPD | 1 | 5 | .7 | 3.5 |
| SPD | 1 | 5 | .7 | 3.5 |
| TCC | 2 | 5 | .35 | 1.8 |
| TPC | 1 | 7 | .2 | 1.4 |
| SPD | 3 | 7 | .5 | 3.5 |
| TCC | 2 | 5 | .35 | 1.8 |

Analysis Unit #13 (continued)

| | | | | |
|---|---|---|---|---|
| TPC | 1 | 7 | .2 | 1.4 |
| SPD | 3 | 7 | .5 | 3.5 |
| TPC | 5 | 7 | .1 | .7 |
| SPD | 4 | 12 | .3 | 3.6 |
| SPD | 1 | 5 | .7 | 3.5 |
| SPD | 1 | 8 | .7 | 5.6 |
| TCC | 2 | 4 | .35 | 1.4 |
| TCC | 2 | 14 | .35 | 4.9 |
| TCC | 2 | 6 | .35 | 2.1 |
| SPD | 3 | 10 | .5 | 5.0 |
| CPC | 3 | 10 | .1 | 1.0 |
| TPC | 1 | 10 | .2 | 2.0 |
| TCC | 2 | 15 | .35 | 5.3 |
| SPD | 1 | 3 | .7 | 2.1 |
| TCC | 2 | 3 | .35 | 1.1 |
| TPC | 1 | 10 | .2 | 2.0 |
| SPD | 3 | 10 | .5 | 5.0 |
| TPC | 5 | 10 | .1 | 1.0 |
| SPD | 3 | 5 | .5 | 2.5 |
| TCC | 5 | 5 | .1 | .5 |
| SPD | 1 | 6 | .7 | 4.2 |
| TPC | 2 | 6 | .2 | 1.2 |
| SPD | 3 | 5 | .5 | 2.5 |
| TPC | 2 | 12 | .2 | 2.4 |
| SPD | 1 | 12 | .7 | 8.4 |
| SPD | 1 | 4 | .7 | 2.8 |
| SPD | 1 | 4 | .7 | 2.8 |
| TCC | 2 | 5 | .35 | 1.8 |
| SPD | 1 | 7 | .7 | 4.9 |
| TCC | 2 | 6 | .35 | 2.1 |
| SPD | 1 | 6 | .7 | 4.2 |
| TPC | 1 | 6 | .2 | 1.2 |
| | | | TOTAL | 481.5 |
| PERM.SKID SYSTEM:481.5*.27 = | | 130 | .9 | 117.0 |
| ROAD CRA: | | 33.6 | .9 | 30.2 |
| TOTAL CRA: | | | | 628.7 |

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**Analysis Unit # 14**

Sections 30, 31. T19N, R17W.
Sections 25, 26, 34, 35, 36. T19N, R18W.
Sections 2, 3. T18N, R17W

TOTAL AREA OF ANALYSIS UNIT: 3122.1 ACRES
HARVESTED ACRES: 0
ROAD LENGTH: 0
CRA: 0
% OF ANALYSIS UNIT: 0
*************************************************

**Analysis Unit # 15**

Sections 19, 30. T19N, R17W.
Sections 3, 10, 11, 13, 14, 15, 22, 23, 24, 25, 26, 27, 35. T19N,
R18W.

TOTAL AREA OF ANALYSIS UNIT: 7897.1 ACRES
HARVESTED ACRES: 0
ROAD LENGTH: 0
CRA: 0
% OF ANALYSIS UNIT: 0
************************************************

**Analysis Unit # 16**

Sections 2, 3, 4. T19N, R18W.
Sections 15, 16, 17, 18, 19, 21, 23, 25, 26, 27, 28, 29, 33, 34,
35. T20N, R18W.

TOTAL AREA OF ANALYSIS UNIT: 7897.1 ACRES
HARVESTED ACRES: 38 ACRES
ROAD LENGTH: 1.9 MI
CRA: 9.7
% OF ANALYSIS UNIT: 0%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 9 | 38 | | .1 | | 3.8 |
| PERM.SKID SYSTEMS: 3.8 * .27 = | | 1 | | .9 | | .9 |
| ROAD ERA | | 5.5 | | .9 | | 5.0 |
| TOTAL ERA 9.3 | | | | TOTAL | | 9.7 |

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**Analysis Unit # 17**

Sections 17, 18, 19, 20, 30. T20N, R17W.
Sections 13, 14, 23, 24, 25. T20N, R18W.

TOTAL AREA OF ANALYSIS UNIT: 4040.4 ACRES
HARVESTED ACRES: 0
ROAD LENGTH: 0
CRA: 0
% OF DISTURBED: 0
*************************************************

**Analysis Unit # 18**

Sections 27, 28, 33, 34. T21N, R17W.
Sections 31, 36. T21N, R18W.
Sections 1, 2, 3, 4, 8, 9, 10, 11, 12, 13, 14, 15. T20N, R18W.
Sections 4, 5, 6, 7, 8, 9, 16, 17, 18. T20N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 9274.5 ACRES
HARVESTED ACRES: 1173 ACRES
ROAD LENGTH 27.5 MI
CRA: 698.3
% OF ANALYSIS UNIT 7.5%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 9 | 14 | | .1 | | 1.4 |
| SPD | 8 | 14 | | .1 | | 1.4 |
| TPC | 9 | 205 | | .1 | | 20.5 |
| SPD | 8 | 205 | | .1 | | 20.5 |
| TPC | 9 | 18 | | .1 | | 1.8 |
| SPD | 8 | 18 | | .1 | | 1.8 |
| TPC | 9 | 36 | | .1 | | 3.6 |
| SPD | 8 | 36 | | .1 | | 3.6 |
| TCC | 7 | 10 | | .1 | | 1.0 |
| SPD | 6 | 10 | | .1 | | 1.0 |
| TPC | 7 | 99 | | .1 | | 9.9 |
| SPD | 6 | 99 | | .1 | | 9.9 |
| TPC | 7 | 32 | | .1 | | 3.2 |
| SPD | 6 | 32 | | .1 | | 3.2 |
| TPC | 6 | 67 | | .1 | | 6.7 |
| SPD | 5 | 67 | | .2 | | 13.4 |
| TPC | 5 | 60 | | .1 | | 6.0 |
| SPD | 4 | 60 | | .3 | | 18.0 |
| TPC | 3 | 175 | | .1 | | 17.5 |
| SPD | 2 | 175 | | .6 | | 105.0 |
| DPC | 3 | 100 | | .1 | | 10.0 |
| SPD | 2 | 100 | | .6 | | 60.0 |
| TPC | 1 | 45 | | .2 | | 9.0 |

**Analysis Unit #18 (continued)**

| | | | | |
|---|---|---|---|---|
| SPD | 0 | 45 | .7 | 31.5 |
| TPC | 1 | 115 | .2 | 23.0 |
| SPD | 0 | 115 | .7 | 80.5 |
| TPC | 1 | 15 | .2 | 3.0 |
| TPC | 1 | 7 | .2 | 1.4 |
| TPC | 1 | 9 | .2 | 1.8 |
| SPD | 2 | 11 | .7 | 7.7 |
| TCC | 2 | 10 | .35 | 3.5 |
| SPD | 2 | 10 | .6 | 6.0 |
| TCC | 2 | 7 | .35 | 2.5 |
| SPD | 2 | 6 | .6 | 3.6 |
| TCC | 1 | 4 | .4 | 1.6 |
| SPD | 1 | 3 | .7 | 2.1 |
| SPD | 2 | 9 | .6 | 5.4 |
| TPC | 1 | 9 | .2 | 1.8 |
| TPC | 2 | 9 | .2 | 1.8 |
| TPC | 1 | 8 | .2 | 1.6 |
| SPD | 2 | 6 | .6 | 3.6 |
| TCC | 2 | 11 | .35 | 3.9 |
| | | | TOTAL | 514.7 |
| PERM.SKID SYSTEM: 514.7 * .27 = 139 | | | .9 | 125.1 |
| ROAD CRA: | | 65.1 | .9 | 58.6 |
| TOTAL CRA: | | | | 698.3 |

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**Analysis Unit # 19**

Sections 26, 27, 34, 35, 36. T21N, R17W.
Sections 2, 3, 4, 9, 10, 15, 16, 17. T20N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 4407.7 ACRES
HARVESTED ACRES: 876 ACRES
ROAD LENGTH: 14.1 MI
CRA: 330.5
% OF ANALYSIS UNIT 7.5%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 9 | 19 | | .1 | | 1.9 |
| SPD | 8 | 19 | | .1 | | 1.9 |
| TCC | 9 | 4 | | .1 | | .4 |
| SPD | 8 | 4 | | .1 | | .4 |
| TCC | 9 | 1 | | .1 | | .1 |
| SPD | 8 | 1 | | .1 | | .1 |
| TPC | 8 | 90 | | .1 | | 9.0 |

**Analysis Unit #19 (continued)**

| | | | | |
|---|---|---|---|---|
| SPD | 7 | 90 | .1 | 9.0 |
| CCC | 8 | 72 | .1 | 7.2 |
| SPD | 7 | 72 | .1 | 7.2 |
| TPC | 8 | 81 | .1 | 8.1 |
| SPD | 7 | 81 | .1 | 8.1 |
| CCC | 8 | 2 | .1 | .2 |
| SPB | 2 | 2 | .1 | .2 |
| TPC | 7 | 23 | .1 | 2.3 |
| SPD | 6 | 23 | .1 | 2.3 |
| CCC | 7 | 10 | .1 | 1.0 |
| SPB | 2 | 10 | .1 | 1.0 |
| TPC | 6 | 155 | .1 | 15.5 |
| SPD | 5 | 155 | .2 | 31.0 |
| TPC | 6 | 215 | .1 | 21.5 |
| SPD | 5 | 215 | .2 | 43.0 |
| TPC | 4 | 3 | .1 | .3 |
| SPD | 3 | 3 | .3 | .9 |
| TCC | 3 | 4 | .2 | .8 |
| SPD | 2 | 4 | .6 | 2.4 |
| TPC | 3 | 52 | .1 | 5.2 |
| SPD | 2 | 52 | .6 | 31.2 |
| TPC | 1 | 45 | .2 | 9.0 |
| SPD | 1 | 40 | .2 | 8.0 |
| TPC | 1 | 60 | .2 | 12.0 |
| | | | TOTAL | 240.3 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM: 240.3 * .27 = | 64.9 | .9 | 58.4 |
| ROAD CRA: | 35.3 | .9 | 31.8 |
| TOTAL CRA: | | | 330.5 |

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**Analysis Unit # 20**

Sections 7, 8, 10, 11, 12, 13, 14, 15, 21, 22, 23, 24, 25, 26, 27, 35. T20N, R17W.

| | | |
|---|---|---|
| TOTAL AREA OF ANALYSIS UNIT: | 5050.4 | ACRES |
| HARVESTED ACRES: | 226 | ACRES |
| ROAD LENGTH: | 8.5 | MI |
| CRA: | 203.7 | |
| % OF ANALYSIS UNIT | 4.0% | |

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TCC | 1 | 77 | | .4 | | 39.3 |
| SPD | 0 | 77 | | .7 | | 53.9 |
| TPC | 2 | 80 | | .35 | | 28.0 |

## Analysis Unit #20 (continued)

| | | | | |
|---|---|---|---|---|
| SPD | 1 | 80 | .7 | 56.0 |
| | | | TOTAL | 177.2 |
| PERM.SKID SYSTEM:177.2 * .27 = | | 47.8 | .9 | 43.1 |
| ROAD CRA: | | 26.5 | .9 | 23.9 |
| TOTAL CRA: | | | | 244.2 |

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## Analysis Unit # 21

Sections 19, 30. T20N, R15W.
Sections 1, 2, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27, 28. T20N, R16W.

TOTAL AREA OF ANALYSIS UNIT: 9274.5 ACRES
HARVESTED ACRES: 1047.5 ACRES
ROAD LENGTH: 22.7 MI
CRA: 307.8
% OF ANALYSIS UNIT 3.3%

| Activity | Age of act.(yrs) | EA | * RC | = CRA |
|---|---|---|---|---|
| TPC | 7 | 80 | .1 | 8.0 |
| SPD | 6 | 80 | .1 | 8.0 |
| TPC | 7 | 640 | .1 | 64.0 |
| SPD | 6 | 640 | .1 | 64.0 |
| TPC | 6 | 15 | .1 | 1.5 |
| SPD | 5 | 15 | .1 | 1.5 |
| TPC | 1 | 5 | .4 | 2.0 |
| TCC | 3 | 3 | .2 | .6 |
| SPD | 1 | 30 | .7 | 21.0 |
| SPD | 1 | 26 | .7 | 18.2 |
| CCC | 5 | 5 | .1 | .5 |
| TPC | 1 | 26 | .2 | 5.2 |
| TCC | 3 | 4 | .2 | .8 |
| TPC | 1 | 60 | .2 | 12.0 |
| | | | TOTAL | 207.3 |
| PERM.SKID SYSTEMS:207.3 * .27 = | | 56.0 | .9 | 50.4 |
| ROAD CRA: | | 55.7 | .9 | 50.1 |
| TOTAL CRA: | | | | 307.8 |

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**Analysis Unit # 22**

Sections 22, 23, 24, 25, 26, 27, 33, 34, 35, 36. T21N, R16W.
Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. T20N, R16W.
Sections 1, 12. T20N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 9733.7 ACRES
HARVESTED ACRES: 88 ACRES
ROAD LENGTH: 2.3 MI
CRA: 48.4
% OF ANALYSIS UNIT: .5%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TCC | 4 | 4 | | .2 | | .8 |
| SPD | 2 | 11 | | .6 | | 6.6 |
| TPC | 3 | 11 | | .1 | | 1.1 |
| SPD | 2 | 7 | | .6 | | 4.2 |
| TCC | 4 | 7 | | .2 | | 1.4 |
| SPD | 2 | 33 | | .6 | | 19.8 |
| TPC | 1 | 33 | | .2 | | 6.6 |
| TPC | 3 | 33 | | .1 | | 3.3 |
| | | | | TOTAL | | 43.8 |
| PERM.SKID SYSTEMS: 43.8 * .27 = 11.8 | | | | .9 | | 10.6 |
| ROAD CRA: | | 4.6 | | .9 | | 4.1 |
| TOTAL CRA: | | | | | | 58.5 |

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**Analysis Unit # 23**

Sections 13, 14, 24, 25. T21N, R17W.
Sections 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 27, 28, 29, 30. T21N, R16W.

TOTAL AREA OF ANALYSIS UNIT: 6336.1 ACRES
HARVESTED ACRES: 484 ACRES
ROAD LENGTH: 18.3 MI
CRA: 584.3
% OF ANALYSIS UNIT 9.2%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 7 | 5 | | .1 | | .5 |
| SPD | 6 | 5 | | .1 | | .5 |
| TPC | 1 | 40 | | .2 | | 8.0 |
| SPD | 0 | 40 | | .7 | | 28.0 |
| TPC | 2 | 57 | | .15 | | 8.6 |
| SPD | 1 | 57 | | .7 | | 39.9 |
| TPC | 2 | 182 | | .15 | | 27.3 |

**Analysis Unit #23 (continued)**

| | | | | |
|---|---|---|---|---|
| SPD | 1 | 182 | .7 | 154.7 |
| TPC | 2 | 200 | .15 | 30.0 |
| SPD | 1 | 200 | .7 | 140.0 |
| | | | TOTAL | 437.5 |
| PERM.SKID SYSTEM:437.5 *.27 = | | 118.0 | .9 | 106.3 |
| ROAD CRA: | | 45 | .9 | 40.5 |
| TOTAL CRA: | | | | 584.3 |

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**Analysis Unit # 24**

Sections 27, 28, 29, 30, 31, 32, 33. T21N, R16W.
Sections 23, 24, 24, 25, 26, 35, 36. T21N, R17W
Sections 6. T20N, R16W.
Sections 1. T20N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 4315.9 ACRES
HARVESTED ACRES: 2007 ACRES
ROAD LENGTH: 28.9 MI
CRA: 1768.2
% OF ANALYSIS UNIT 40.9%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 9 | 30 | | .1 | | 3.0 |
| SPD | 8 | 30 | | .1 | | 3.0 |
| TPC | 9 | 19 | | .1 | | 1.9 |
| SPD | 8 | 19 | | .1 | | 1.9 |
| TPC | 8 | 27 | | .1 | | 2.7 |
| SPD | 7 | 27 | | .1 | | 2.7 |
| TPC | 8 | 50 | | .1 | | 5.0 |
| SPD | 7 | 50 | | .1 | | 5.0 |
| TCC | 8 | 12 | | .1 | | 1.2 |
| SPD | 7 | 12 | | .1 | | 1.2 |
| TPC | 4 | 195 | | .1 | | 19.5 |
| SPD | 3 | 195 | | .6 | | 117.0 |
| TPC | 4 | 240 | | .1 | | 24.0 |
| SPD | 3 | 240 | | .6 | | 144.0 |
| CCC | 4 | 315 | | .1 | | 31.5 |
| SPD | 3 | 315 | | .6 | | 189.0 |
| TPC | 1 | 440 | | .2 | | 88.0 |
| SPD | 0 | 440 | | .7 | | 308.0 |
| TPC | 1 | 320 | | .2 | | 64.0 |
| SPD | 0 | 320 | | .7 | | 224.0 |
| TPC | 1 | 95 | | .2 | | 19.0 |
| SPD | 0 | 95 | | .7 | | 66.5 |

**Analysis Unit #24 (continued)**

| | | | | |
|---|---|---|---|---|
| TPC | 1 | 15 | .2 | 3.0 |
| TPC | 1 | 6 | .2 | 1.2 |
| CPC | 1 | 8 | .1 | 1.6 |
| CPC | 1 | 16 | .1 | 3.2 |
| CPC | 1 | 20 | .1 | 4.0 |
| SPD | 2 | 9 | .6 | 5.4 |
| TCC | 4 | 9 | .2 | 1.8 |
| SPD | 2 | 4 | .6 | 2.4 |
| SPB | 1 | 11 | .1 | 1.1 |
| TCC | 3 | 11 | .2 | 2.2 |
| TPC | 2 | 16 | .15 | 2.4 |
| TPC | 1 | 8 | .2 | 1.6 |
| TPC | 2 | 8 | .15 | 1.2 |
| SPD | 1 | 8 | .7 | 5.6 |
| TCC | 2 | 8 | .35 | 2.8 |
| TPC | 2 | 79 | .2 | 15.8 |
| SPD | 1 | 3 | .7 | 2.1 |
| TPC | 1 | 23 | .2 | 4.6 |
| SPD | 5 | 4 | .2 | .8 |
| TPC | 5 | 17 | .1 | 1.7 |
| SPD | 5 | 8 | .2 | 1.6 |
| CCC | 5 | 9 | .1 | .9 |
| TPC | 6 | 7 | .1 | .7 |
| SPD | 5 | 6 | .15 | .9 |
| SPD | 5 | 8 | .15 | 1.2 |
| TPC | 1 | 9 | .2 | 1.8 |
| TPC | 6 | 9 | .1 | .9 |
| TCC | 3 | 2 | .2 | .4 |
| SPD | 2 | 2 | .35 | .7 |
| TCC | 3 | 4 | .2 | .8 |
| | | | TOTAL | 1392.2 |
| PERM.SKID SYSTEM:1392.2 *.27 = | | 375.9 | .9 | 338.3 |
| ROAD CRA: | | 41.9 | .9 | 37.7 |
| TOTAL CRA: | | | | 1768.2 |

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**Analysis Unit # 25**

Sections 33,34. T22N, R17W.
Sections 2, 3, 4, 9, 10, 11, 14, 15, 16, 20, 21, 22, 23, 24. T21N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 2592.4 ACRES
HARVESTED ACRES: 714 ACRES
ROAD LENGTH 24.9 MI
CRA: 262.1
% OF ANALYSIS UNIT: 10.1%

**Analysis Unit #25 (continued)**

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 9 | 47 | | .1 | | 4.7 |
| SPD | 8 | 47 | | .1 | | 4.7 |
| TPC | 9 | 62 | | .1 | | 6.2 |
| SPD | 8 | 62 | | .1 | | 6.2 |
| TPC | 9 | 95 | | .1 | | 9.5 |
| SPD | 8 | 95 | | .1 | | 9.5 |
| TPC | 9 | 12 | | .1 | | 1.2 |
| SPD | 8 | 12 | | .1 | | 1.2 |
| TPC | 5 | 45 | | .1 | | 4.5 |
| SPD | 4 | 45 | | .3 | | 13.5 |
| CCC | 4 | 30 | | .1 | | 3.0 |
| SPB | 2 | 30 | | .5 | | 6.0 |
| TPC | 2 | 43 | | .15 | | 6.5 |
| SPD | 1 | 43 | | .7 | | 30.1 |
| TCC | 2 | 6 | | .35 | | 2.1 |
| SPD | 1 | 6 | | .7 | | 4.2 |
| TPC | 2 | 20 | | .15 | | 3.0 |
| SPD | 1 | 20 | | .7 | | 14.0 |
| TPC | 2 | 27 | | .15 | | 4.1 |
| SPD | 1 | 27 | | .7 | | 18.9 |
| | | | | TOTAL | | 153.1 |
| PERM.SKID SYSTEM:153.1 * .27 = | | 41.3 | | .9 | | 37.2 |
| ROAD CRA: | | 79.8 | | .9 | | 71.8 |
| TOTAL CRA: | | | | | | 262.1 |

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**Analysis Unit # 26**

Sections 19, 20, 21, 27, 28, 29, 30, 31, 32. T21N, R17W.
Sections 21, 22, 23, 24, 25, 26, 27, 28, 33, 34, 35, 36. T21N, R18W.
Sections 1, 2, 3, 4, 5. T20N, R18W.

| | | |
|---|---|---|
| TOTAL AREA OF ANALYSIS UNIT: | 11845.7 | ACRES |
| HARVESTED ACRES: | 4429 | ACRES |
| ROAD LENGTH: | 69.8 | MI |
| CRA: | 2985.7 | |
| % OF ANALYSIS UNIT | 25.2% | |

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 9 | 32 | | .1 | | 3.2 |
| SPD | 8 | 32 | | .1 | | 3.2 |

Analysis Unit #26 (continued)

| | | | | |
|---|---|---|---|---|
| TPC | 9 | 188 | .1 | 18.8 |
| SPD | 8 | 188 | .1 | 18.8 |
| TPC | 9 | 62 | .1 | 6.2 |
| SPD | 8 | 62 | .1 | 6.2 |
| TPC | 9 | 10 | .1 | 1.0 |
| SPD | 8 | 10 | .1 | 1.0 |
| TPC | 9 | 190 | .1 | 19.0 |
| SPD | 8 | 190 | .1 | 19.0 |
| TPC | 9 | 15 | .1 | 1.5 |
| SPD | 8 | 15 | .1 | 1.5 |
| TPC | 9 | 56 | .1 | 5.6 |
| SPD | 8 | 56 | .1 | 5.6 |
| TPC | 9 | 7 | .1 | .7 |
| SPD | 8 | 7 | .1 | .7 |
| TCC | 8 | 7 | .1 | .7 |
| SPD | 7 | 7 | .1 | .7 |
| TCC | 7 | 14 | .1 | 1.4 |
| TPC | 8 | 15 | .1 | 1.5 |
| SPD | 7 | 15 | .1 | 1.5 |
| TCC | 8 | 23 | .1 | 2.3 |
| SPD | 7 | 23 | .1 | 2.3 |
| TCC | 8 | 23 | .1 | 2.3 |
| SPD | 7 | 23 | .1 | 2.3 |
| TPC | 8 | 15 | .1 | 1.5 |
| SPD | 7 | 15 | .1 | 1.5 |
| TPC | 8 | 15 | .1 | 1.5 |
| SPD | 7 | 15 | .1 | 1.5 |
| TPC | 8 | 15 | .1 | 1.5 |
| SPD | 7 | 15 | .1 | 1.5 |
| TCC | 8 | 17 | .1 | 1.7 |
| SPD | 7 | 17 | .1 | 1.7 |
| TCC | 8 | 45 | .1 | 4.5 |
| SPD | 7 | 45 | .1 | 4.5 |
| TPC | 8 | 55 | .1 | 5.5 |
| SPD | 7 | 55 | .1 | 5.5 |
| TPC | 7 | 30 | .1 | 3.0 |
| SPD | 6 | 30 | .1 | 3.0 |
| TCC | 7 | 79 | .1 | 7.9 |
| SPD | 6 | 79 | .1 | 7.9 |
| TPC | 7 | 76 | .1 | 7.6 |
| SPD | 6 | 76 | .1 | 7.6 |
| TCC | 7 | 20 | .1 | 2.0 |
| SPD | 6 | 20 | .1 | 2.0 |
| TPC | 7 | 45 | .1 | 4.5 |
| SPD | 6 | 45 | .1 | 4.5 |
| TPC | 7 | 7 | .1 | .7 |
| SPD | 6 | 7 | .1 | .7 |
| TCC | 7 | 30 | .1 | 3.0 |
| SPD | 6 | 30 | .1 | 3.0 |
| TPC | 7 | 15 | .1 | 1.5 |

**Analysis Unit #26 (continued)**

| | | | | |
|---|---|---|---|---|
| SPD | 6 | 15 | .1 | 1.5 |
| TCC | 7 | 35 | .1 | 3.5 |
| SPD | 6 | 35 | .1 | 3.5 |
| TPC | 7 | 12 | .1 | 1.2 |
| SPD | 6 | 12 | .1 | 1.2 |
| TPC | 7 | 23 | .1 | 2.3 |
| SPD | 6 | 23 | .1 | 2.3 |
| TCC | 7 | 8 | .1 | .8 |
| SPD | 6 | 8 | .1 | .8 |
| TPC | 7 | 28 | .1 | 2.8 |
| SPD | 6 | 28 | .1 | 2.8 |
| TCC | 7 | 9 | .1 | .9 |
| SPD | 6 | 9 | .1 | .9 |
| TPC | 6 | 30 | .1 | 3.0 |
| SPD | 5 | 30 | .2 | 6.0 |
| TCC | 6 | 14 | .1 | 1.4 |
| SPD | 5 | 14 | .1 | 1.4 |
| TPC | 6 | 25 | .1 | 2.5 |
| SPD | 5 | 25 | .2 | 5.0 |
| TPC | 7 | 5 | .1 | 1.5 |
| SPD | 6 | 5 | .1 | 1.5 |
| TCC | 7 | 8 | .1 | .8 |
| SPD | 6 | 8 | .1 | .8 |
| TCC | 6 | 108 | .1 | 10.8 |
| SPD | 5 | 108 | .2 | 21.6 |
| TPC | 6 | 130 | .1 | 13.0 |
| SPD | 5 | 130 | .2 | 26.0 |
| TPC | 6 | 110 | .1 | 11.0 |
| SPD | 5 | 110 | .2 | 22.0 |
| TCC | 5 | 30 | .1 | 3.0 |
| SPD | 4 | 30 | .2 | 6.0 |
| TCC | 5 | 90 | .1 | 9.0 |
| SPD | 4 | 90 | .2 | 18.0 |
| TPC | 5 | 30 | .1 | 3.0 |
| SPD | 4 | 30 | .2 | 6.0 |
| TPC | 5 | 18 | .1 | 1.8 |
| SPD | 4 | 18 | .2 | 3.6 |
| TPC | 5 | 42 | .1 | 4.2 |
| SPD | 4 | 42 | .2 | 8.4 |
| TPC | 3 | 4 | .1 | .4 |
| SPD | 2 | 4 | .2 | .8 |
| TPC | 3 | 510 | .1 | 51.0 |
| SPD | 2 | 510 | .2 | 110.0 |
| TPC | 3 | 90 | .1 | 9.0 |
| SPD | 2 | 90 | .2 | 18.0 |
| TPC | 3 | 22 | .1 | 2.2 |
| SPD | 2 | 22 | .2 | 4.4 |
| TPC | 1 | 57 | .2 | 11.4 |
| SPD | 0 | 57 | .7 | 39.9 |
| TPC | 1 | 117 | .2 | 23.4 |

Analysis Unit #26 (continued)

| | | | | |
|---|---|---|---|---|
| SPD | 0 | 117 | .7 | 81.9 |
| TPC | 1 | 19 | .2 | 3.8 |
| SPD | 0 | 19 | .7 | 13.3 |
| TPC | 1 | 248 | .2 | 49.6 |
| SPD | 0 | 248 | .7 | 173.6 |
| TPC | 1 | 73 | .2 | 73.0 |
| SPD | 0 | 73 | .7 | 51.1 |
| TPC | 1 | 553 | .2 | 110.6 |
| SPD | 0 | 553 | .7 | 387.1 |
| TPC | 2 | 95 | .1 | 9.5 |
| SPD | 1 | 95 | .7 | 66.5 |
| TPC | 2 | 29 | .1 | 2.9 |
| SPD | 1 | 29 | .7 | 20.3 |
| TPC | 2 | 387 | .1 | 38.7 |
| SPD | 1 | 387 | .7 | 270.9 |
| TPC | 2 | 26 | .1 | 2.6 |
| SPD | 1 | 26 | .7 | 18.2 |
| TPC | 2 | 154 | .1 | 15.4 |
| SPD | 1 | 154 | .7 | 107.8 |
| TPC | 2 | 21 | .1 | 2.1 |
| SPD | 1 | 21 | .7 | 14.7 |
| TPC | 2 | 45 | .1 | 4.5 |
| SPD | 1 | 45 | .7 | 31.5 |
| CPC | 1 | 2 | .1 | .2 |
| TCC | 2 | 8 | .35 | 2.8 |
| SPB | 2 | 56 | .1 | 5.6 |
| TCC | 1 | 20 | .4 | 8.0 |
| SPD | 1 | 11 | .7 | 7.7 |
| CCC | 1 | 11 | .2 | 2.2 |
| SPD | 1 | 5 | .7 | 3.5 |
| CPC | 1 | 5 | .2 | 1.0 |
| TPC | 1 | 5 | .2 | 1.0 |
| CPC | 1 | 29 | .1 | 2.9 |
| SPD | 2 | 1 | .6 | .6 |
| TPC | 3 | 1 | .1 | .1 |
| | | | TOTAL | 2291.5 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM:2291.5*.27 = | 618.5 | .9 | 556.8 |
| ROAD CRA: | 152.7 | .9 | 137.4 |
| TOTAL CRA: | | | 2985.7 |

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Analysis Unit # 27

Sections 31, 32. T21N, R17W.
Sections 5, 6, 7, 18. T21N, R17W.
Sections 1, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 21, 22, 23, 24. T21N, R18W.

TOTAL AREA OF ANALYSIS UNIT: 8594.3 ACRES
HARVESTED ACRES: 2052 ACRES
ROAD LENGTH: 13.8 MI
CRA: 1052.6
% OF ANALYSIS UNIT: 12.2%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TCC | 9 | 20 | | .1 | | 2.0 |
| SPD | 8 | 20 | | .1 | | 2.0 |
| TPC | 9 | 15 | | .1 | | 1.5 |
| SPD | 8 | 15 | | .1 | | 1.5 |
| TPC | 9 | 35 | | .1 | | 3.5 |
| SPD | 8 | 35 | | .1 | | 3.5 |
| TPC | 9 | 15 | | .1 | | 1.5 |
| SPD | 8 | 15 | | .1 | | 1.5 |
| TCC | 9 | 42 | | .1 | | 4.2 |
| SPD | 8 | 42 | | .1 | | 4.2 |
| TPC | 9 | 4 | | .1 | | .4 |
| SPD | 8 | 4 | | .1 | | .4 |
| TCC | 9 | 14 | | .1 | | 1.4 |
| SPD | 8 | 14 | | .1 | | 1.4 |
| TPC | 9 | 151 | | .1 | | 15.1 |
| SPD | 8 | 151 | | .1 | | 15.1 |
| TPC | 9 | 245 | | .1 | | 24.5 |
| SPD | 8 | 245 | | .1 | | 24.5 |
| TPC | 9 | 30 | | .1 | | 3.0 |
| SPD | 8 | 30 | | .1 | | 3.0 |
| TPC | 9 | 237 | | .1 | | 23.7 |
| SPD | 8 | 237 | | .1 | | 23.7 |
| TCC | 9 | 8 | | .1 | | .8 |
| SPD | 8 | 8 | | .1 | | .8 |
| TCC | 8 | 80 | | .1 | | 8.0 |
| SPD | 7 | 80 | | .1 | | 8.0 |
| TPC | 8 | 80 | | .1 | | 8.0 |
| SPD | 7 | 80 | | .1 | | 8.0 |
| TPC | 8 | 6 | | .1 | | .6 |
| SPD | 7 | 6 | | .1 | | .6 |
| TCC | 6 | 9 | | .1 | | .9 |
| SPD | 5 | 9 | | .1 | | .9 |
| TPC | 6 | 190 | | .1 | | 19.0 |
| SPD | 5 | 190 | | .2 | | 38.0 |
| TPC | 5 | 340 | | .1 | | 34.0 |
| SPD | 4 | 340 | | .3 | | 102.0 |
| TPC | 5 | 95 | | .1 | | 9.5 |

**Analysis Unit #27 (continued)**

| | | | | |
|---|---|---|---|---|
| SPD | 4 | 95 | .3 | 28.5 |
| TCC | 3 | 140 | .2 | 28.0 |
| SPD | 2 | 140 | .6 | 84.0 |
| TPC | 3 | 33 | .2 | 6.6 |
| SPD | 2 | 33 | .6 | 19.8 |
| TPC | 3 | 18 | .2 | 3.6 |
| SPD | 2 | 18 | .6 | 10.6 |
| TCC | 1 | 7 | .4 | 2.8 |
| SPD | 0 | 7 | .7 | 4.9 |
| TCC | 1 | 155 | .4 | 62.0 |
| SPD | 0 | 155 | .7 | 108.5 |
| TCC | 1 | 14 | .4 | 5.6 |
| SPD | 0 | 14 | .7 | 9.8 |
| TCC | 2 | 15 | .35 | 5.3 |
| SPD | 1 | 15 | .7 | 10.5 |
| SPD | 4 | 49 | .3 | 14.7 |
| TPC | 6 | 49 | .1 | 4.9 |
| SPD | 7 | 5 | .1 | .5 |
| TCC | 7 | 5 | .1 | .5 |
| | | | TOTAL | 811.8 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEMS:811.8 * .27 = | 219.2 | .9 | 197.3 |
| ROAD CRA: | 48.3 | .9 | 43.5 |
| TOTAL CRA: | | | 1052.6 |

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**Analysis Unit # 28**

Sections 26, 27, 28, 32, 33, 34, 35. T22N, R17W.
Sections 4, 5, 7, 8, 9, 10, 16, 17, 18, 19, 20, 21. T21N, R17W.
Sections 23, 24. T21N, R18W.

TOTAL AREA OF ANALYSIS UNIT: 7529.8 ACRES
HARVESTED ACRES: 3182 ACRES
ROAD LENGTH: 21.1 MI
CRA: 1708.1
% OF DISTURBED: 22.7%

| Activity | Age of Act.(yrs) | EA * | RC = | CRA |
|---|---|---|---|---|
| TCC | 3 | 2 | .2 | .4 |
| SPD | 2 | 2 | .7 | 1.4 |
| TCC | 3 | 3 | .2 | .6 |
| SPD | 2 | 3 | .7 | 2.1 |
| TPC | 9 | 52 | .1 | 5.2 |
| SPD | 8 | 52 | .1 | 5.2 |
| TPC | 9 | 32 | .1 | 3.2 |

Analysis Unit #28 (continued)

| | | | | |
|---|---|---|---|---|
| SPD | 8 | 32 | .1 | 3.2 |
| TCC | 9 | 50 | .1 | 5.0 |
| SPD | 8 | 50 | .1 | 5.0 |
| TPC | 9 | 60 | .1 | 6.0 |
| SPD | 8 | 60 | .1 | 6.0 |
| TPC | 9 | 43 | .1 | 4.3 |
| SPD | 8 | 43 | .1 | 4.3 |
| TPC | 9 | 53 | .1 | 5.3 |
| SPD | 8 | 53 | .1 | 5.3 |
| TPC | 9 | 9 | .1 | .9 |
| SPD | 8 | 9 | .1 | .9 |
| TPC | 9 | 264 | .1 | 26.4 |
| SPD | 8 | 264 | .1 | 26.4 |
| TCC | 8 | 6 | .1 | .6 |
| SPD | 7 | 6 | .1 | .6 |
| TCC | 8 | 3 | .1 | .3 |
| SPD | 8 | 3 | .1 | .3 |
| TCC | 7 | 140 | .1 | 14.0 |
| SPD | 6 | 140 | .1 | 14.0 |
| TCC | 7 | 75 | .1 | 7.5 |
| SPD | 6 | 75 | .1 | 7.5 |
| TCC | 6 | 155 | .1 | 15.5 |
| SPD | 5 | 155 | .2 | 30.1 |
| TCC | 6 | 15 | .1 | 1.5 |
| SPD | 5 | 15 | .2 | 3.0 |
| TPC | 6 | 35 | .1 | 3.5 |
| SPD | 5 | 35 | .2 | 7.0 |
| TPC | 6 | 90 | .1 | 9.0 |
| SPD | 5 | 90 | .2 | 18.0 |
| TPC | 6 | 18 | .1 | 1.8 |
| SPD | 5 | 18 | .2 | 3.9 |
| TCC | 6 | 130 | .1 | 13.0 |
| SPD | 5 | 130 | .2 | 26.0 |
| TPC | 6 | 95 | .1 | 9.5 |
| SPD | 5 | 95 | .2 | 19.0 |
| TPC | 6 | 130 | .1 | 13.0 |
| SPD | 5 | 130 | .2 | 26.0 |
| TCC | 5 | 15 | .1 | 1.5 |
| SPD | 4 | 15 | .3 | 4.5 |
| TCC | 5 | 2 | .1 | .2 |
| SPD | 4 | 2 | .3 | .6 |
| TPC | 5 | 150 | .1 | 15.0 |
| SPD | 4 | 150 | .3 | 45.0 |
| TCC | 5 | 35 | .1 | 3.5 |
| SPD | 4 | 35 | .3 | 10.5 |
| TCC | 5 | 1 | .1 | .1 |
| SPD | 4 | 1 | .3 | .3 |
| TCC | 5 | 15 | .1 | 1.5 |
| SPD | 4 | 15 | .3 | 4.5 |
| TPC | 5 | 165 | .1 | 16.5 |

Analysis Unit #28 (continued)

| | | | | |
|---|---|---|---|---|
| SPD | 4 | 165 | .3 | 49.5 |
| TPC | 5 | 80 | .1 | 8.0 |
| SPD | 4 | 80 | .3 | 24.0 |
| TPC | 5 | 80 | .1 | 8.0 |
| SPD | 4 | 80 | .3 | 24.0 |
| TPC | 5 | 20 | .1 | 2.0 |
| SPD | 4 | 20 | .1 | 2.0 |
| TPC | 4 | 155 | .1 | 15.5 |
| SPD | 3 | 155 | .5 | 77.5 |
| TCC | 4 | 95 | .2 | 19.0 |
| SPD | 3 | 95 | .5 | 47.5 |
| TPC | 4 | 115 | .1 | 15.5 |
| SPD | 3 | 115 | .5 | 57.5 |
| TCC | 4 | 60 | .1 | 6.0 |
| SPD | 3 | 60 | .5 | 30.0 |
| TCC | 4 | 65 | .2 | 13.0 |
| SPD | 3 | 65 | .5 | 32.5 |
| TCC | 4 | 60 | .1 | 6.0 |
| SPD | 3 | 60 | .5 | 30.0 |
| TPC | 4 | 80 | .1 | 8.0 |
| SPD | 3 | 80 | .5 | 40.0 |
| TCC | 1 | 40 | .4 | 16.0 |
| SPD | 0 | 40 | .7 | 28.0 |
| TPC | 1 | 50 | .2 | 10.0 |
| SPD | 0 | 50 | .7 | 35.0 |
| TPC | 2 | 100 | .15 | 15.0 |
| SPD | 1 | 100 | .7 | 70.0 |
| TPC | 2 | 35 | .15 | 5.3 |
| SPD | 1 | 35 | .7 | 24.5 |
| TPC | 8 | 33 | .1 | 3.3 |
| SPD | 5 | 33 | .2 | 6.6 |
| SPD | 5 | 28 | .2 | 5.6 |
| TPC | 8 | 28 | .1 | 2.8 |
| TPC | 1 | 7 | .2 | 1.4 |
| TPC | 6 | 7 | .1 | .7 |
| SPD | 5 | 7 | .2 | 1.4 |
| TPC | 8 | 17 | .1 | 1.7 |
| SPD | 6 | 44 | .1 | 4.4 |
| TPC | 8 | 44 | .1 | 4.4 |
| SPD | 5 | 12 | .1 | 1.2 |
| SPD | 5 | 14 | .1 | 1.4 |
| SPD | 5 | 11 | .15 | 1.7 |
| TPC | 6 | 11 | .1 | 1.1 |
| SPD | 6 | 33 | .1 | 3.3 |
| TPC | 1 | 30 | .2 | 6.0 |
| SPD | 5 | 30 | .2 | 6.0 |
| SPD | 5 | 6 | .2 | 1.2 |
| TPC | 6 | 6 | .1 | .6 |
| TPC | 8 | 6 | .1 | .6 |
| TCC | 2 | 3 | .4 | 1.2 |

**Analysis Unit #28 (continued)**

| | | | | |
|---|---|---|---|---|
| SPD | 2 | 3 | .6 | 1.8 |
| TPC | 1 | 6 | .2 | 1.2 |
| TCC | 1 | 4 | .4 | 1.6 |
| TPC | 8 | 4 | .1 | .4 |
| TPC | 5 | 54 | .1 | 5.4 |
| SPD | 4 | 17 | .3 | 5.1 |
| TPC | 6 | 17 | .1 | 1.7 |
| TPC | 5 | 17 | .1 | 1.7 |
| | | | TOTAL | 1327.7 |

PERM.SKID SYSTEM:1327.7 *.27= 358.5 .9 322.6

ROAD CRA: 64.2 .9 57.8

TOTAL CRA: 1708.1

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**Analysis Unit # 29**

Sections 1, 2, 3, 4, 5, 6, 10, 11. T21N, R18W.
Sections 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36. T22N, R18W.
Sections 29, 30, 31, 32, 28, 21, 19. T22N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 20067.2 ACRES
HARVESTED ACRES: 2618 ACRES
ROAD LENGTH: 35 MI
CRA: 1730.6
% OF ANALYSIS UNIT 8.6%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 9 | 34 | | .1 | | 3.4 |
| SPD | 8 | 34 | | .1 | | 3.4 |
| TPC | 9 | 20 | | .1 | | 2.0 |
| SPD | 8 | 20 | | .1 | | 2.0 |
| TPC | 9 | 26 | | .1 | | 2.6 |
| SPD | 8 | 26 | | .1 | | 2.6 |
| TPC | 9 | 27 | | .1 | | 2.7 |
| SPD | 8 | 27 | | .1 | | 2.7 |
| TPC | 8 | 25 | | .1 | | 2.5 |
| SPD | 7 | 25 | | .1 | | 2.5 |
| TPC | 5 | 50 | | .1 | | 5.0 |
| SPD | 4 | 50 | | .3 | | 15.0 |
| TCC | 9 | 4 | | .1 | | .4 |
| SPD | 8 | 4 | | .1 | | .4 |
| TPC | 8 | 70 | | .1 | | 7.0 |
| SPD | 7 | 70 | | .1 | | 7.0 |

Analysis Unit #29 (continued)

| | | | | |
|---|---|---|---|---|
| TPC | 8 | 108 | .1 | 10.8 |
| SPD | 7 | 108 | .1 | 10.8 |
| TPC | 7 | 21 | .1 | 2.1 |
| SPD | 6 | 21 | .1 | 2.1 |
| TPC | 6 | 465 | .1 | 46.5 |
| SPD | 5 | 465 | .2 | 93.0 |
| TCC | 6 | 17 | .1 | 1.7 |
| SPD | 5 | 17 | .2 | 3.4 |
| TPC | 6 | 548 | .1 | 54.8 |
| SPD | 5 | 548 | .2 | 142.6 |
| TCC | 5 | 24 | .1 | 2.4 |
| SPD | 4 | 24 | .3 | 7.2 |
| TCC | 6 | 50 | .1 | 5.0 |
| SPD | 5 | 50 | .2 | 10.0 |
| TCC | 6 | 10 | .1 | 1.0 |
| SPD | 5 | 10 | .2 | 2.0 |
| TCC | 5 | 70 | .1 | 7.0 |
| SPD | 4 | 70 | .3 | 21.0 |
| TCC | 5 | 61 | .1 | 6.1 |
| SPD | 4 | 61 | .3 | 18.3 |
| TCC | 6 | 20 | .1 | 2.0 |
| SPD | 5 | 20 | .2 | 4.0 |
| TPC | 5 | 20 | .1 | 2.0 |
| SPD | 4 | 20 | .3 | 6.0 |
| TPC | 3 | 640 | .1 | 64.0 |
| SPD | 2 | 640 | .6 | 384.0 |
| TPC | 3 | 62 | .1 | 6.2 |
| SPD | 2 | 62 | .6 | 37.2 |
| TCC | 1 | 19 | .4 | 7.6 |
| SPD | 0 | 19 | .7 | 13.3 |
| TCC | 1 | 130 | .4 | 52.0 |
| SPD | 0 | 130 | .7 | 91.0 |
| TCC | 1 | 9 | .4 | 3.6 |
| SPD | 0 | 9 | .7 | 6.3 |
| TPC | 2 | 62 | .15 | 9.3 |
| SPD | 1 | 62 | .7 | 43.4 |
| TCC | 2 | 7 | .35 | 2.5 |
| SPD | 1 | 7 | .7 | 4.9 |
| SPD | 1 | 12 | .7 | 8.4 |
| TCC | 2 | 12 | .35 | 4.2 |
| SPB | 2 | 11 | .1 | 1.1 |
| CCC | 2 | 11 | .2 | 2.2 |
| SPD | 1 | 15 | .7 | 10.5 |
| CCC | 2 | 15 | .2 | 3.0 |
| SPB | 2 | 15 | .1 | 1.5 |
| TCC | 3 | 15 | .2 | 3.0 |
| SPD | 1 | 18 | .7 | 12.6 |
| TCC | 3 | 18 | .2 | 3.6 |
| TPC | 3 | 8 | .1 | .8 |
| SPD | 3 | 4 | .5 | 2.0 |

Analysis Unit #29 (continued)

| | | | | |
|---|---|---|---|---|
| SPB | 1 | 10 | .1 | 1.0 |
| CCC | 1 | 10 | .4 | 4.0 |
| TPC | 3 | 4 | .35 | 1.4 |
| TPC | 1 | 6 | .2 | 1.2 |
| SPB | 1 | 15 | .1 | 1.5 |
| CCC | 2 | 15 | .2 | 3.0 |
| SPD | 3 | 13 | .5 | 6.5 |
| TCC | 3 | 13 | .2 | 2.6 |
| TPC | 8 | 74 | .1 | 7.4 |
| SPD | 6 | 4 | .1 | .4 |
| | | TOTAL | | 1330.2 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM:1330.2 *.27 = | 359.2 | .9 | 323.2 |
| ROAD CRA: | 85.9 | .9 | 77.3 |
| TOTAL CRA: | | | 1730.6 |

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Analysis Unit # 30

Sections 4, 5, 6, 7, 8, 9, 10, 14, 15, 16, 17, 18. T21N, R16W.
Sections 1, 2, 3, 10, 11, 12, 13, 14. T21N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 6427.9 ACRES
HARVESTED ACRES: 1780.0 ACRES
ROAD LENGTH: 22.0 MI
CRA: 1040.7
% OF ANALYSIS UNIT: 16.2%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 9 | 330 | | .1 | | 33.0 |
| SPD | 8 | 330 | | .1 | | 33.0 |
| TPC | 9 | 261 | | .1 | | 26.1 |
| SPD | 8 | 261 | | .1 | | 26.1 |
| TPC | 9 | 68 | | .1 | | 6.8 |
| SPD | 8 | 68 | | .1 | | 6.8 |
| TPC | 9 | 120 | | .1 | | 12.0 |
| SPD | 8 | 120 | | .1 | | 12.0 |
| TCC | 8 | 1 | | .1 | | .1 |
| SPD | 7 | 1 | | .1 | | .1 |
| TPC | 6 | 10 | | .1 | | 1.0 |
| SPD | 5 | 10 | | .2 | | 2.0 |
| TPC | 6 | 15 | | .1 | | 1.5 |
| SPD | 5 | 15 | | .2 | | 3.0 |
| TPC | 5 | 240 | | .1 | | 24.0 |
| SPD | 4 | 240 | | .3 | | 72.0 |
| TPC | 5 | 36 | | .1 | | 3.6 |

Analysis Unit #30 (continued)

| | | | | |
|---|---|---|---|---|
| SPD | 4 | 36 | .3 | 10.8 |
| TPC | 2 | 160 | .15 | 24.0 |
| SPD | 1 | 160 | .7 | 112.0 |
| TPC | 2 | 360 | .15 | 54.0 |
| SPD | 1 | 360 | .7 | 252.0 |
| SPD | 2 | 3 | .6 | 1.8 |
| TCC | 2 | 3 | .35 | 1.1 |
| SPD | 2 | 6 | .6 | 3.6 |
| TPC | 1 | 6 | .2 | 1.2 |
| TPC | 2 | 6 | .2 | 1.2 |
| SPD | 2 | 10 | .6 | 6.0 |
| TCC | 2 | 10 | .35 | 3.5 |
| SPD | 2 | 11 | .6 | 6.6 |
| TPD | 2 | 11 | .2 | 2.2 |
| SPD | 2 | 12 | .6 | 7.2 |
| TPC | 1 | 12 | .2 | 2.4 |
| TCC | 2 | 10 | .35 | 3.5 |
| SPD | 2 | 10 | .6 | 6.0 |
| SPD | 2 | 12 | .6 | 7.2 |
| TCC | 2 | 12 | .35 | 4.2 |
| SPD | 2 | 7 | .6 | 4.2 |
| TCC | 2 | 7 | .35 | 2.5 |
| TCC | 5 | 2 | .1 | .2 |
| SPD | 5 | 18 | .2 | 3.6 |
| TCC | 2 | 11 | .35 | 3.9 |
| TPC | 1 | 5 | .2 | 1.0 |
| SPD | 5 | 14 | .2 | 2.8 |
| TPC | 5 | 16 | .1 | 1.6 |
| TPC | 6 | 7 | .1 | .7 |
| SPD | 5 | 14 | .2 | 2.8 |
| TPC | 1 | 15 | .2 | 3.0 |
| TPC | 6 | 8 | .1 | .8 |
| TCC | 9 | 11 | .1 | 1.1 |
| TPC | 5 | 12 | .1 | 1.2 |
| | | | TOTAL | 803.0 |

PERM.SKID SYSTEM: 803 * .27 = 216.8 .9 195.1

ROAD CRA: 47.3 .9 42.6

TOTAL CRA: 1040.7

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**Analysis Unit # 31**

Sections 31, 32, 33, 34. T22N, R16W.
Sections 3, 4, 5, 6, 9, 10. T21N, R16W.
Sections 35, 36. T22N, R16W.
Sections 1, 2, 3. T21N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 5509.6 ACRES
HARVESTED ACRES: 578 ACRES
ROAD LENGTH: 11.8 MI
CRA: 404.6
% OF ANALYSIS UNIT 7.3%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 9 | 21 | | .1 | | 2.1 |
| SPD | 8 | 21 | | .1 | | 2.1 |
| TPC | 9 | 10 | | .1 | | 1.0 |
| SPD | 8 | 10 | | .1 | | 1.0 |
| TPC | 9 | 25 | | .1 | | 2.5 |
| SPD | 8 | 25 | | .1 | | 2.5 |
| TCC | 5 | 3 | | .1 | | .3 |
| SPD | 4 | 3 | | .2 | | .6 |
| TPC | 4 | 480 | | .1 | | 48.0 |
| SPD | 3 | 480 | | .5 | | 240.0 |
| TPC | 5 | 15 | | .1 | | 1.5 |
| TPC | 5 | 24 | | .1 | | 2.4 |
| | | | | TOTAL | | 304.0 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM: 304 * .27 = | 82.1 | .9 | 73.9 |
| ROAD CRA: | 29.7 | .9 | 26.7 |
| TOTAL CRA: | | | 404.6 |

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**Analysis Unit # 32**

Sections 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 31, 34. T22N, R16W.
Sections 11, 12, 13, 14, 22, 23, 24, 25, 25, 26, 27, 35, 36. T22N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 23507.7 ACRES
HARVESTED ACRES: 658 ACRES
ROAD LENGTH: 9.2 MI
CRA: 444.2
% OF ANALYSIS UNIT: 1.9%

**Analysis Unit #32 (continued)**

| Activity | Age of Act.(yrs) | EA | * RC | = CRA |
|---|---|---|---|---|
| TPC | 4 | 515 | .1 | 51.5 |
| SPD | 3 | 515 | .5 | 257.5 |
| TPC | 2 | 29 | .15 | 4.4 |
| SPD | 1 | 29 | .7 | 20.3 |
| TPC | 3 | 7 | .1 | .7 |
| CCC | 6 | 11 | .1 | 1.1 |
| SPB | 6 | 16 | .1 | 1.6 |
| TPC | 3 | 5 | .1 | .5 |
| TPC | 3 | 6 | .1 | .6 |
| TPC | 6 | 6 | .1 | .6 |
| SPD | 7 | 7 | .1 | .7 |
| TCC | 6 | 3 | .1 | .3 |
| TPC | 9 | 3 | .1 | .3 |
| | | | TOTAL | 340.1 |
| PERM.SKID SYSTEM: 340.1 * .27 = | | 91.8 | .9 | 82.6 |
| ROAD CRA: | | 23.9 | .9 | 21.5 |
| TOTAL CRA: | | | | 444.2 |

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**Analysis Unit # 33**

Sections 20, 21, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35. T23N, R16W.
Sections 1, 2, 3, 4, 5, 6. T22N, R16W.
Sections 25, 26, 35, 36. T23N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 5325.9 ACRES
HARVESTED ACRES: 0
ROAD LENGTH: 0
CRA: 0
% OF ANALYSIS UNIT: 0

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**Analysis Unit # 34**

Sections 1, 2, 3, 4, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 28, 29, 30. T22N, R17W.
Sections 6. T22N, R16W.

TOTAL AREA OF ANALYSIS UNIT: 8776.8 ACRES
HARVESTED ACRES: 959 ACRES
ROAD LENGTH: 26.4 MI
CRA: 512.5
% OF ANALYSIS UNIT: 5.8%

**Analysis Unit #34 (continued)**

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 9 | 11 | | .1 | | 1.1 |
| SPD | 8 | 11 | | .1 | | 1.1 |
| TPC | 6 | 80 | | .1 | | 8.0 |
| SPD | 5 | 80 | | .2 | | 16.0 |
| TPC | 5 | 50 | | .1 | | 5.0 |
| SPD | 4 | 50 | | .3 | | 15.0 |
| TPC | 5 | 260 | | .1 | | 26.0 |
| SPD | 4 | 260 | | .3 | | 78.0 |
| TPC | 2 | 206 | | .15 | | 30.9 |
| SPD | 1 | 206 | | .7 | | 144.2 |
| TPC | 8 | 8 | | .1 | | .8 |
| TPC | 9 | 30 | | .1 | | 3.0 |
| SPD | 7 | 6 | | .1 | | .6 |
| TCC | 8 | 6 | | .1 | | .6 |
| TPC | 8 | 15 | | .1 | | 1.5 |
| | | | | TOTAL | | 373.2 |
| PERM.SKID SYSTEM:326.8 * .27 = | | 88.2 | | .9 | | 79.4 |
| ROAD CRA: | | 66.5 | | .9 | | 59.9 |
| TOTAL CRA: | | | | | | 512.5 |

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**Analysis Unit # 35**

Sections 17, 18, 19, 20, 21, 27, 28, 29, 30, 31, 32, 33, 34. T23N, R16W.
Sections 25, 36. T23N, R17W.
Sections 1, 2, 3, 4, 5, 6, 7, 8, 9. T22N, R16W.
Sections 1, 12. T22N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 6730.9 ACRES
HARVESTED ACRES: 253 ACRES
ROAD LENGTH: 17.2 MI
CRA: 179.9
% OF ANALYSIS UNIT: 2.7%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TCC | 2 | 17 | | .35 | | 6.0 |
| SPD | 1 | 17 | | .7 | | 11.9 |
| TPC | 1 | 21 | | .2 | | 4.2 |
| SPD | 0 | 21 | | .7 | | 14.7 |
| TPC | 8 | 27 | | .1 | | 2.7 |
| SPD | 9 | 18 | | .1 | | 1.8 |
| TPC | 7 | 7 | | .1 | | .7 |
| TCC | 8 | 5 | | .1 | | .5 |

Analysis Unit #35 (continued)

| | | | | |
|---|---|---|---|---|
| TPC | 8 | 14 | .1 | 1.4 |
| TCC | 3 | 19 | .2 | 3.8 |
| TCC | 3 | 12 | .2 | 2.4 |
| SPD | 2 | 12 | .6 | 7.2 |
| TCC | 3 | 8 | .2 | 1.6 |
| TCC | 3 | 30 | .2 | 6.0 |
| SPD | 3 | 8 | .5 | 4.0 |
| SPD | 2 | 23 | .6 | 13.8 |
| SPD | 3 | 26 | .5 | 13.0 |
| TPC | 3 | 4 | .1 | .4 |
| SPD | 8 | 41 | .1 | 4.1 |
| | | TOTAL | | 100.2 |

PERM.SKID SYSTEM: 100.2 * .27 = 27.2 .9 24.5

ROAD CRA: 61.3 .9 55.2

TOTAL CRA: 179.9

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Analysis Unit # 36

Sections 31, 32, 33, 34, 35. T23N, R18W.
Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 16, 17, 18.
T22N, R18N.

TOTAL AREA OF ANALYSIS UNIT: 7529.8 ACRES
HARVESTED ACRES: 18 ACRES
ROAD LENGTH: 3.6 MI
CRA: 21.5
% OF ANALYSIS UNIT: 0.2%

| Activity | Age of Act.(yrs) | EA | * RC | = CRA |
|---|---|---|---|---|
| SPD | 3 | 4 | .5 | 2.0 |
| TPC | 3 | 7 | .1 | .7 |
| SPD | 3 | 7 | .5 | 3.5 |
| TCC | 2 | 3 | .35 | 1.1 |
| TPC | 8 | 8 | .1 | .8 |
| | | TOTAL | | 8.1 |

PERM.SKID SYSTEM: 8.1 * 27 = 2.2 .9 2.0

ROAD CRA: 12.7 .9 11.4

TOTAL CRA: 21.5
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**Analysis Unit # 37**

Sections 24, 25, 36. T23N, R18W.
Sections 19, 20, 21, 22, 23, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35. T23N, R19W.
Sections 1.T22N, R18W.
Sections 2 T22N, R19W

TOTAL AREA OF ANALYSIS UNIT: 7162.5 ACRES
HARVESTED ACRES: 754 ACRES
ROAD LENGTH: 8.2 MI
CRA: 468.7
% OF ANALYSIS UNIT: 6.5%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TCC | 7 | 65 | | .1 | | 6.5 |
| SPD | 6 | 65 | | .1 | | 6.5 |
| TPC | 7 | 40 | | .1 | | 4.0 |
| SPD | 6 | 40 | | .1 | | 4.0 |
| TCC | 6 | 100 | | .1 | | 10.0 |
| SPD | 5 | 100 | | .2 | | 20.0 |
| TPC | 6 | 210 | | .1 | | 21.0 |
| SPD | 5 | 210 | | .2 | | 42.0 |
| TCC | 6 | 12 | | .1 | | 1.2 |
| SPD | 5 | 12 | | .2 | | 2.4 |
| TCC | 4 | 260 | | .2 | | 52.0 |
| SPD | 3 | 260 | | .5 | | 130.0 |
| TCC | 3 | 58 | | .2 | | 11.6 |
| SPD | 2 | 58 | | .6 | | 34.8 |
| SPD | 8 | 15 | | .1 | | 1.5 |
| SPD | 8 | 25 | | .1 | | 2.5 |
| SPD | 8 | 90 | | .1 | | 9.0 |
| | | | | TOTAL | | 359.0 |
| PERM.SKID SYSTEM: 359 * .27 = | | 96.9 | | .9 | | 87.2 |
| ROAD CRA: | | 24.3 | | .9 | | 21.9 |
| TOTAL CRA: | | | | | | 468.1 |

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**Analysis Unit # 38**

Sections 16, 21, 22, 23, 24, 25, 26, 27, 28, 34, 35. T23N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 3397.6 ACRES
HARVESTED ACRES: 1049 ACRES
ROAD LENGTH: 13.5 MI
CRA: 611.1
% OF ANALYSIS UNIT 18.0%

Analysis Unit #38 (continued)

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TCC | 9 | 3 | | .1 | | .3 |
| SPD | 8 | 3 | | .1 | | .3 |
| TPC | 6 | 20 | | .1 | | 2.0 |
| SPD | 5 | 20 | | .2 | | 4.0 |
| TCC | 6 | 1 | | .1 | | .1 |
| SPD | 5 | 1 | | .2 | | .2 |
| TCC | 6 | 90 | | .1 | | 9.0 |
| SPD | 5 | 90 | | .2 | | 18.0 |
| TPC | 6 | 275 | | .1 | | 27.5 |
| SPD | 5 | 275 | | .2 | | 55.0 |
| TCC | 6 | 20 | | .1 | | 2.0 |
| SPD | 5 | 20 | | .2 | | 4.0 |
| TPC | 5 | 215 | | .1 | | 21.5 |
| SPD | 4 | 215 | | .3 | | 64.5 |
| TCC | 4 | 30 | | .2 | | 6.0 |
| SPD | 3 | 30 | | .5 | | 15.0 |
| TPC | 4 | 205 | | .1 | | 20.5 |
| SPD | 3 | 205 | | .5 | | 102.5 |
| TPC | 4 | 190 | | .1 | | 19.0 |
| SPD | 3 | 190 | | .5 | | 95.0 |
| | | | | TOTAL | | 466.4 |
| PERM.SKID SYSTEM:466.4 *.27 = | | 125.9 | | .9 | | 113.3 |
| ROAD CRA: | | 34.9 | | .9 | | 31.4 |
| TOTAL CRA: | | | | | | 611.1 |

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Analysis Unit # 39

Sections 31, 32. T24N, R16W.
Sections 4, 5, 6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 29, 30.
T23N, R16W.
Sections 1, 2, 12, 13, 24. T23N, R17W.
Sections 36. T24N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 8264.4 ACRES
HARVESTED ACRES: 432 ACRES
ROAD LENGTH: 19.6 MI
CRA: 190.6
% OF ANALYSIS UNIT: 2.3%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 8 | 138 | | .1 | | 13.8 |
| SPD | 7 | 138 | | .1 | | 13.8 |
| TCC | 8 | 130 | | .1 | | 13.0 |

Analysis Unit #39 (continued)

| | | | | |
|---|---|---|---|---|
| SPD | 7 | 130 | .1 | 13.0 |
| SPD | 1 | 15 | .7 | 10.5 |
| TCC | 1 | 15 | .4 | 6.0 |
| SPD | 2 | 13 | .6 | 7.8 |
| TCC | 2 | 13 | .35 | 4.6 |
| CCC | 2 | 27 | .2 | 5.4 |
| SPB | 2 | 27 | .1 | 2.7 |
| TCC | 1 | 39 | .4 | 15.6 |
| CCC | 1 | 30 | .2 | 6.0 |
| SPB | 1 | 28 | .1 | 2.8 |
| SPB | 1 | 2 | .1 | .2 |
| CCC | 4 | 2 | .2 | .4 |
| TCC | 1 | 15 | .4 | 6.0 |
| SPD | 1 | 2 | .7 | 1.4 |
| SPB | 1 | 9 | .1 | .9 |
| CCC | 1 | 11 | .1 | 1.1 |
| | | | TOTAL | 125.0 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM: 125 * .27 = | 33.8 | .9 | 30.4 |
| ROAD CRA: | 39.1 | .9 | 35.2 |
| TOTAL CRA: | | | 190.6 |

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Analysis Unit # 40

Sections 1, 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24. T23N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 5968.6 ACRES
HARVESTED ACRES: 1684 ACRES
ROAD LENGTH: 12.5 MI
CRA: 1202.5
% OF ANALYSIS UNIT 20.1%

| Activity | Age of Act.(yrs) | EA | * RC | = CRA |
|---|---|---|---|---|
| TPC | 9 | 74 | .1 | 7.4 |
| SPD | 8 | 74 | .1 | 7.4 |
| TPC | 9 | 15 | .1 | 1.5 |
| SPD | 8 | 15 | .1 | 1.5 |
| TPC | 7 | 160 | .1 | 16.0 |
| SPD | 6 | 160 | .1 | 16.0 |
| TPC | 7 | 95 | .1 | 9.5 |
| SPD | 6 | 95 | .1 | 9.5 |
| TPC | 7 | 115 | .1 | 11.5 |
| SPD | 6 | 115 | .1 | 11.5 |
| TPC | 7 | 80 | .1 | 8.0 |
| SPD | 6 | 80 | .1 | 8.0 |

**Analysis Unit #40 (continued)**

| | | | | |
|---|---|---|---|---|
| TCC | 3 | 10 | .2 | 2.0 |
| SPD | 2 | 10 | .6 | 6.0 |
| TPC | 3 | 100 | .2 | 20.0 |
| SPD | 2 | 100 | .6 | 60.0 |
| TCC | 1 | 75 | .4 | 30.0 |
| SPD | 0 | 75 | .7 | 52.5 |
| TPC | 1 | 480 | .2 | 96.0 |
| SPD | 0 | 480 | .7 | 336.0 |
| TPC | 2 | 125 | .15 | 18.8 |
| SPD | 1 | 125 | .7 | 87.5 |
| TPC | 2 | 125 | .15 | 18.8 |
| SPD | 1 | 125 | .7 | 87.5 |
| TPC | 3 | 4 | .1 | .4 |
| TPC | 3 | 59 | .1 | 5.9 |
| TPC | 3 | 19 | .1 | 1.9 |
| TPC | 3 | 28 | .1 | 2.8 |
| TPC | 4 | 120 | .1 | 12.0 |
| | | | TOTAL | 946.9 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM:946.9 * .27= | 255.7 | .9 | 230.1 |
| ROAD CRA: | 28.3 | .9 | 25.5 |
| TOTAL CRA: | | | 1202.5 |

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**Analysis Unit # 41**

Sections 1, 2, 3, 4, 5, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24. T23N, R18W.

TOTAL AREA OF ANALYSIS UNIT: 9429.3 ACRES
HARVESTED ACRES: 1548.0 ACRES
ROAD LENGTH: 5.6 MI
CRA: 971.7
% OF ANALYSIS UNIT: 10.3%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 3 | 350 | | .1 | | 35.0 |
| SPD | 2 | 350 | | .6 | | 210.0 |
| TPC | 3 | 220 | | .1 | | 22.0 |
| SPD | 2 | 220 | | .6 | | 132.0 |
| TCC | 3 | 10 | | .2 | | 2.0 |
| SPD | 2 | 10 | | .6 | | 6.0 |
| TPC | 3 | 160 | | .1 | | 16.0 |
| SPD | 2 | 160 | | .6 | | 96.0 |
| TPC | 9 | 284 | | .1 | | 28.4 |
| SPD | 8 | 284 | | .1 | | 28.4 |

**Analysis Unit #41 (continued)**

| | | | | |
|---|---|---|---|---|
| TPC | 9 | 148 | .1 | 14.8 |
| SPD | 8 | 148 | .1 | 14.8 |
| TCC | 9 | 7 | .1 | .7 |
| SPD | 8 | 7 | .1 | .7 |
| TCC | 7 | 120 | .1 | 12.0 |
| SPD | 6 | 120 | .1 | 12.0 |
| TCC | 7 | 170 | .1 | 17.0 |
| SPD | 6 | 170 | .1 | 17.0 |
| TCC | 4 | 26 | .2 | 52.0 |
| SPD | 3 | 26 | .5 | 13.0 |
| TPC | 4 | 21 | .2 | 4.2 |
| SPD | 3 | 21 | .5 | 10.5 |
| TCC | 4 | 20 | .2 | 4.0 |
| SPD | 3 | 20 | .5 | 10.0 |
| TCC | 4 | 12 | .2 | 2.4 |
| SPD | 3 | 12 | .5 | 6.0 |
| | | | TOTAL | 766.9 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM: 766.9 * .27 = | 66.9 | .9 | 186.4 |
| ROAD CRA: | 20.4 | .9 | 18.4 |
| TOTAL CRA: | | | 971.7 |

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**Analysis Unit # 42**

Sections 31, 32, 33. T24N, R17W.
Sections 3, 4, 5, 6, 7, 8, 9, 17, 18, 19, 30. T23N, R17W.
Sections 36. T24N, R18W.
Sections 1, 2, 12, 13, 24, 25, 36. T23N, R18W.

TOTAL AREA OF ANALYSIS UNIT: 4182.1 ACRES
HARVESTED ACRES: 1395 ACRES
ROAD LENGTH: 13.5 MI
CRA: 620.5
% OF ANALYSIS UNIT: 14.8%

| Activity | Age of Act.(yrs) | EA | * RC | = CRA |
|---|---|---|---|---|
| TPC | 1 | 220 | .2 | 44.0 |
| SPD | 0 | 220 | .7 | 154.0 |
| TPC | 7 | 205 | .1 | 20.5 |
| SPD | 6 | 205 | .1 | 20.5 |
| TPC | 8 | 160 | .1 | 16.0 |
| SPD | 7 | 160 | .1 | 16.0 |
| TPC | 9 | 30 | .1 | 3.0 |
| SPD | 8 | 30 | .1 | 3.0 |
| TPC | 9 | 5 | .1 | .5 |

Analysis Unit #42 (continued)

| | | | | |
|---|---|---|---|---|
| SPD | 8 | 5 | .1 | .5 |
| TPC | 8 | 84 | .1 | 8.4 |
| SPD | 7 | 84 | .1 | 8.4 |
| TPC | 8 | 80 | .1 | 8.0 |
| SPD | 7 | 80 | .1 | 8.0 |
| TCC | 7 | 82 | .1 | 8.2 |
| SPD | 6 | 82 | .1 | 8.2 |
| TPC | 5 | 145 | .1 | 14.5 |
| SPD | 4 | 145 | .3 | 43.5 |
| TPC | 4 | 40 | .1 | 4.0 |
| SPD | 3 | 40 | .5 | 20.0 |
| TPC | 3 | 50 | .1 | 5.0 |
| SPD | 2 | 50 | .6 | 30.0 |
| TCC | 1 | 19 | .4 | 76.0 |
| SPD | 0 | 19 | .7 | 13.4 |
| TCC | 1 | 24 | .4 | 9.6 |
| SPD | 0 | 24 | .7 | 16.8 |
| TCC | 1 | 25 | .4 | 10.0 |
| SPD | 0 | 25 | .7 | 17.5 |
| TCC | 1 | 22 | .4 | 8.8 |
| SPD | 0 | 22 | .7 | 15.4 |
| TCC | 1 | 4 | .4 | 1.6 |
| SPD | 0 | 4 | .7 | 2.8 |
| TCC | 1 | 8 | .4 | 3.2 |
| SPD | 0 | 8 | .7 | 5.6 |
| TCC | 1 | 2 | .4 | .8 |
| SPD | 0 | 2 | .7 | 1.4 |
| TCC | 1 | 17 | .4 | 6.8 |
| SPD | 0 | 17 | .7 | 11.9 |
| TCC | 1 | 10 | .4 | 4.0 |
| SPD | 0 | 10 | .7 | 7.0 |
| TCC | 1 | 5 | .4 | 2.0 |
| SPD | 0 | 5 | .7 | 3.5 |
| TCC | 1 | 7 | .4 | 2.8 |
| SPD | 0 | 7 | .7 | 4.9 |
| TCC | 1 | 9 | .4 | 3.6 |
| SPD | 0 | 9 | .7 | 6.3 |
| TCC | 1 | 11 | .4 | 4.4 |
| SPD | 0 | 11 | .7 | 7.7 |
| TCC | 6 | 6 | .1 | .6 |
| SPD | 5 | 6 | .2 | 1.2 |
| TCC | 6 | 7 | .1 | .7 |
| SPD | 5 | 7 | .2 | 1.4 |
| TCC | 6 | 10 | .1 | 1.0 |
| SPD | 5 | 10 | .2 | 2.0 |
| TCC | 6 | 7 | .1 | .7 |
| SPD | 5 | 7 | .2 | 1.4 |
| TPC | 6 | 1 | .1 | .1 |
| SPD | 5 | 1 | .2 | .2 |
| TCC | 6 | 2 | .1 | .2 |

Analysis Unit #42 (continued)

| | | | | |
|---|---|---|---|---|
| SPD | 5 | 2 | .2 | .4 |
| TCC | 6 | 5 | .1 | .5 |
| SPD | 5 | 5 | .2 | 1.0 |
| TCC | 6 | 8 | .1 | .8 |
| SPD | 5 | 8 | .2 | 1.6 |
| TCC | 6 | 25 | .1 | 2.5 |
| SPD | 5 | 25 | .2 | 5.0 |
| TPC | 6 | 30 | .1 | 3.0 |
| SPD | 5 | 30 | .2 | 6.0 |
| TCC | 2 | 10 | .35 | 3.5 |
| SPD | 1 | 10 | .7 | 7.0 |
| TCC | 2 | 20 | .35 | 7.0 |
| | | TOTAL | | 468.8 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM:468.8 * .27 = | 126.6 | .9 | 113.9 |
| ROAD CRA: | 42.0 | .9 | 37.8 |
| TOTAL CRA: | | | 620.5 |

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Analysis Unit # 43

Sections 13,14, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36. T24N, R17W.
Sections 2, 3, 4, 9. T23N, R17W.
Sections 19, 29, 30, 31, 32. T24N, R16W.

TOTAL AREA OF ANALYSIS UNIT: 10468.3 ACRES
HARVESTED ACRES: 516.9 ACRES
ROAD CRA: 5.8 MI
CRA: 214.6
% OF ANALYSIS UNIT 2.0%

| Activity | Age of Act.(yrs) | EA | * RC | = CRA |
|---|---|---|---|---|
| TCC | 7 | 7 | .1 | .7 |
| SPD | 6 | 7 | .1 | .7 |
| TPC | 5 | 72 | .1 | 7.2 |
| SPD | 4 | 72 | .3 | 21.6 |
| TPC | 6 | 54 | .1 | 5.4 |
| SPD | 5 | 54 | .2 | 10.8 |
| TPC | 6 | 54 | .1 | 5.4 |
| SPD | 5 | 54 | .2 | 10.8 |
| TPC | 6 | 41 | .1 | 4.1 |
| SPD | 5 | 41 | .2 | 8.2 |
| TPC | 6 | 41 | .1 | 4.1 |
| SPD | 5 | 41 | .2 | 8.2 |
| TCC | 6 | 16 | .1 | 1.6 |
| SPD | 5 | 16 | .2 | 3.2 |

**Analysis Unit #43 (continued)**

| | | | | |
|---|---|---|---|---|
| TPC | 6 | 225 | .1 | 22.5 |
| SPD | 5 | 225 | .2 | 45.0 |
| | | | TOTAL | 159.5 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM:159.5 *.27 = | 43.1 | .9 | 38.8 |
| ROAD CRA: | 18.1 | .9 | 16.3 |
| TOTAL CRA: | | | 214.6 |

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**Analysis Unit # 44**

Sections 5, 6, 7, 8, 17, 18, 19, 20, 29. T24N, R16W.
Sections 12, 13, 24. T24N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 5050.4 ACRES
HARVESTED ACRES: 0
ROAD LENGTH: 2.1 MI
CRA: 0
% OF ANALYSIS UNIT: 0

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**Analysis Unit # 45**

Sections 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 20, 21, 22, 23. T24N. R17W.

TOTAL AREA OF ANALYSIS UNIT: 4591.4 ACRES
HARVESTED ACRES: 180.8 ACRES
ROAD LENGTH: 10.9 MI
CRA: 238.7
% OF ANALYSIS UNIT: 5.2%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TCC | 2 | 63 | | .35 | | 22.1 |
| SPD | 1 | 63 | | .7 | | 44.1 |
| TCC | 2 | 63 | | .35 | | 22.1 |
| SPD | 1 | 63 | | .7 | | 44.1 |
| TPC | 2 | 27 | | .15 | | 4.1 |
| SPD | 1 | 27 | | .7 | | 18.9 |
| TPC | 2 | 27 | | .15 | | 4.1 |
| SPD | 1 | 27 | | .7 | | 18.9 |
| | | | | TOTAL | | 178.4 |

**Analysis Unit #45 (continued)**

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM:178.4 * .27 = | 48.2 | .9 | 43.4 |
| ROAD CRA: | 18.8 | .9 | 16.9 |
| TOTAL CRA: | | | 238.7 |

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**Analysis Unit # 46**

Sections 5, 6, 7, 8, 17, 18, 19, 20, 29, 30. T24N, R17W.
Sections 1, 2, 3, 10, 11, 12. T24N, R18W.

TOTAL AREA OF ANALYSIS UNIT: 3817.4 ACRES
HARVESTED ACRES: 1027 ACRES
ROAD LENGTH: 12.5 MI
CRA: 394.2
% OF ANALYSIS UNIT: 10.3%

| Activity | Age of Act.(yrs) | EA | * RC | = CRA |
|---|---|---|---|---|
| TPC | 2 | 27 | .15 | 4.1 |
| SPD | 1 | 27 | .7 | 18.9 |
| TCC | 2 | 22 | .35 | 7.6 |
| SPD | 1 | 22 | .7 | 15.4 |
| TCC | 2 | 7 | .35 | 2.5 |
| SPD | 1 | 7 | .7 | 4.9 |
| TPC | 2 | 56 | .15 | 8.4 |
| SPD | 1 | 56 | .7 | 39.2 |
| TCC | 1 | 60 | .4 | 24.0 |
| SPD | 0 | 60 | .7 | 42.0 |
| TCC | 1 | 60 | .4 | 24.0 |
| SPD | 0 | 60 | .7 | 42.0 |
| TCC | 1 | 25 | .4 | 10.0 |
| SPD | 0 | 25 | .7 | 17.5 |
| TCC | 1 | 25 | .4 | 10.0 |
| SPD | 0 | 25 | .7 | 17.5 |
| | | | TOTAL | 288.0 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM: 288 * .27 = | 77.8 | .9 | 70.2 |
| ROAD CRA: | 40 | .9 | 36.0 |
| TOTAL CRA: | | | 840.7 |

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Analysis Unit # 47

Sections 10, 11, 12, 13, 14, 15, 21, 22, 23, 24, 25, 26, 27, 28, 34, 35, 36. T24N, R18W.
Sections 1, 2, 3, 4. T23N, R18W.

TOTAL AREA OF ANALYSIS UNIT: 9489.7 ACRES
HARVESTED ACRES: 1734.5 ACRES
ROAD LENGTH: 29.3 MI
CRA: 825.9
% OF ANALYSIS UNIT: 8.7%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 9 | 208 | | .1 | | 20.8 |
| SPD | 8 | 208 | | .1 | | 20.8 |
| TCC | 9 | 12 | | .1 | | 1.2 |
| SPD | 8 | 12 | | .1 | | 1.2 |
| TPC | 9 | 3 | | .1 | | .3 |
| SPD | 8 | 3 | | .1 | | .3 |
| TPC | 9 | 80 | | .1 | | 8.0 |
| SPD | 8 | 80 | | .1 | | 8.0 |
| TPC | 8 | 260 | | .1 | | 26.0 |
| SPD | 7 | 260 | | .1 | | 26.0 |
| TPC | 7 | 35 | | .1 | | 3.5 |
| SPD | 6 | 35 | | .1 | | 3.5 |
| TPC | 6 | 5 | | .1 | | .5 |
| SPD | 5 | 5 | | .2 | | 1.0 |
| TCC | 6 | 15 | | .1 | | 1.5 |
| SPD | 5 | 15 | | .2 | | 3.0 |
| TCC | 5 | 25 | | .1 | | 2.5 |
| SPD | 4 | 25 | | .3 | | 7.5 |
| TCC | 4 | 15 | | .2 | | 3.0 |
| SPD | 3 | 15 | | .5 | | 7.5 |
| TPC | 4 | 214 | | .1 | | 21.4 |
| SPD | 3 | 214 | | .5 | | 107.0 |
| TPC | 4 | 120 | | .1 | | 12.0 |
| SPD | 3 | 120 | | .5 | | 60.0 |
| TPC | 3 | 60 | | .1 | | 6.0 |
| SPD | 2 | 60 | | .6 | | 36.0 |
| TPC | 3 | 230 | | .1 | | 23.0 |
| SPD | 2 | 230 | | .6 | | 138.0 |
| TCC | 7 | 44 | | .1 | | 4.4 |
| SPD | 6 | 44 | | .1 | | 4.4 |
| TPC | 7 | 31 | | .1 | | 3.1 |
| SPD | 6 | 31 | | .1 | | 3.1 |
| TPC | 1 | 3 | | .2 | | .6 |
| TCC | 8 | 14 | | .1 | | 1.4 |
| TPC | 2 | 10 | | .15 | | 1.5 |
| TPC | 2 | 84 | | .15 | | 12.6 |
| TPC | 2 | 77 | | .2 | | 14.4 |
| TPC | 2 | 45 | | .15 | | 6.8 |

**Analysis Unit #47 (continued)**

| | | | | |
|---|---|---|---|---|
| TPC | 2 | 33 | .15 | 5.0 |
| TPC | 2 | 7 | .15 | 1.2 |
| TPC | 2 | 15 | .15 | 2.3 |
| TPC | 2 | 105 | .15 | 15.8 |
| | | | TOTAL | 626.1 |
| PERM.SKID SYSTEM:626.1 * .27 = | | 169.0 | .9 | 152.1 |
| ROAD CRA: | | 53.0 | .9 | 47.7 |
| TOTAL CRA: | | | | 825.9 |

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**Analysis Unit # 48**

Sections 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, 13, 14. T24N, R17W.
Sections 6, 7. T24N, R16W.
Sections 34, 35. T25N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 5968.7 ACRES
HARVESTED ACRES: 121.0 ACRES
ROAD LENGTH: 1.1 MI
CRA: 21.5
% OF ANALYSIS UNIT: 0.4%

| Activity | Age of Act.(yrs) | EA | * RC | = CRA |
|---|---|---|---|---|
| TCC | 8 | 6 | .1 | .6 |
| SPD | 7 | 6 | .1 | .6 |
| TPC | 8 | 6 | .1 | .6 |
| SPD | 7 | 6 | .1 | .6 |
| TPC | 8 | 25 | .1 | 2.5 |
| SPD | 7 | 25 | .1 | 2.5 |
| TPC | 9 | 84 | .1 | 8.4 |
| | | | TOTAL | 15.8 |
| PERM.SKID SYSTEM: 15.8 * .27 = | | 4.3 | .9 | 3.8 |
| ROAD CRA: | | 2.2 | .9 | 1.9 |
| TOTAL CRA: | | | | 21.5 |

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**Analysis Unit # 49**

Sections 21, 22, 23, 24, 25, 26, 27, 28, 29, 31, 32, 33, 34,
35,
36. T25N, R17W.
Sections 4, 5, 6. T24N, R17W.
Sections 5, 6. T24N, R16W.
Sections 30, 31. T25N, R16W.

TOTAL AREA OF ANALYSIS UNIT: 9274.5 ACRES
HARVESTED ACRES: 182.0 ACRES
ROAD LENGTH: 10.2 MI
CRA: 68.3
% OF ANALYSIS UNIT: 0.7%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| SPD | 0 | 5 | | .7 | | 3.5 |
| TCC | 1 | 5 | | .4 | | 2.0 |
| TCC | 9 | 23 | | .1 | | 2.3 |
| TCC | 9 | 10 | | .1 | | 1.0 |
| TCC | 9 | 19 | | .1 | | 1.9 |
| TCC | 9 | 17 | | .1 | | 1.7 |
| TCC | 9 | 16 | | .1 | | 1.6 |
| TCC | 9 | 19 | | .1 | | 1.9 |
| TCC | 9 | 16 | | .1 | | 1.6 |
| TCC | 9 | 9 | | .1 | | .9 |
| TCC | 9 | 10 | | .1 | | 1.0 |
| TCC | 9 | 8 | | .1 | | .8 |
| TCC | 9 | 11 | | .1 | | 1.1 |
| TCC | 9 | 19 | | .1 | | 1.9 |
| SPD | 9 | 9 | | .1 | | .9 |
| SPD | 9 | 3 | | .1 | | .3 |
| TPC | 1 | 4 | | .2 | | .8 |
| SPD | 9 | 4 | | .1 | | .4 |
| SPD | 9 | 15 | | .1 | | 1.5 |
| SPD | 9 | 21 | | .1 | | 2.1 |
| | | | | TOTAL | | 29.2 |
| PERM.SKID SYSTEM: 29.2 * .27 = | | 7.9 | | .9 | | 7.1 |
| ROAD CRA: | | 35.6 | | .9 | | 32.0 |
| TOTAL CRA: | | | | | | 68.3 |

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**Analysis Unit # 50**

Sections 32, 33. T25N, R18W.
Sections 3, 4, 5, 6, 7, 8, 9, 10, 15, 16, 17, 18, 20, 21, 22, 28, 29. T24N, R18W.

| | | |
|---|---|---|
| TOTAL AREA OF ANALYSIS UNIT: | 6152.4 ACRES | |
| HARVESTED AREAS: | 585 | ACRES |
| ROAD LENGTH: | 10.2 | MI |
| CRA: | 304.1 | |
| % OF ANALYSIS UNIT: | 4.9% | |

| Activity | Age of Act.(yrs) | EA | * RC | = CRA |
|---|---|---|---|---|
| TPC | 4 | 160 | .1 | 16.0 |
| SPD | 3 | 160 | .5 | 80.0 |
| TPC | 7 | 30 | .1 | .3 |
| TPC | 2 | 15 | .15 | 2.3 |
| TPC | 7 | 35 | .1 | 3.5 |
| TPC | 2 | 21 | .15 | 4.1 |
| TPC | 2 | 12 | .15 | 1.8 |
| TPC | 2 | 128 | .15 | 19.2 |
| TPC | 2 | 93 | .15 | 14.0 |
| TPC | 2 | 28 | .15 | 4.2 |
| TPC | 2 | 19 | .15 | 2.9 |
| TPC | 1 | 4 | .2 | .8 |
| SPD | 9 | 12 | .1 | 1.2 |
| SPD | 2 | 100 | .6 | 60.0 |
| SPD | 2 | 32 | .6 | 19.2 |
| | | | TOTAL | 133.5 |
| PERM.SKID SYSTEM: 133.5 *.27 = | | 36.1 | .9 | 32.4 |
| ROAD CRA : | | 46.9 | .9 | 42.2 |
| TOTAL CRA: | | | | 208.1 |

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**Analysis Unit # 51**

Sections 16, 17, 18, 19, 20, 21, 27, 28, 29, 30, 31, 32, 33, 34. T25N, R18W.
Sections 2, 3, 4. T24N, R18W.

| | | |
|---|---|---|
| TOTAL AREA OF ANALYSIS UNIT: | 6336.1 ACRES | |
| HARVESTED ACRES: | 1032.0 | ACRES |
| ROAD LENGTH: | 12.1 | MI |
| CRA: | 337.8 | |
| % OF ANALYSIS UNIT: | 5.3% | |

Analysis Unit #51 (continued)

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TCC | 3 | 16 | | .5 | | 8.0 |
| SPD | 6 | 3 | | .1 | | .3 |
| TCC | 6 | 3 | | .1 | | .3 |
| TCC | 6 | 3 | | .1 | | .3 |
| TPC | 2 | 26 | | .15 | | 3.9 |
| SPD | 7 | 28 | | .1 | | 2.8 |
| TPC | 1 | 80 | | .2 | | 16.0 |
| TPC | 8 | 10 | | .1 | | 1.0 |
| SPD | 8 | 25 | | .1 | | 2.5 |
| TPC | 1 | 12 | | .2 | | 2.4 |
| SPD | 6 | 1 | | .1 | | .1 |
| TCC | 6 | 1 | | .1 | | .1 |
| TCC | 1 | 24 | | .4 | | 9.6 |
| SPD | 1 | 11 | | .7 | | 7.7 |
| TCC | 2 | 11 | | .35 | | 3.9 |
| TCC | 1 | 17 | | .4 | | 6.8 |
| CCC | 2 | 26 | | .4 | | 10.4 |
| SPB | 1 | 26 | | .1 | | 2.6 |
| SPD | 1 | 6 | | .7 | | 4.2 |
| TPC | 1 | 6 | | .2 | | 1.2 |
| TPC | 2 | 6 | | .15 | | .9 |
| SPD | 1 | 6 | | .7 | | 4.2 |
| TPC | 1 | 4 | | .2 | | .8 |
| TPC | 1 | 4 | | .2 | | .8 |
| TPC | 1 | 21 | | .2 | | 4.2 |
| SPD | 8 | 21 | | .1 | | 2.1 |
| SPD | 4 | 10 | | .3 | | 3.0 |
| TPC | 5 | 27 | | .1 | | 2.7 |
| SPD | 2 | 39 | | .5 | | 19.5 |
| TPC | 1 | 41 | | .2 | | 8.2 |
| SPD | 3 | 40 | | .5 | | 20.0 |
| TPC | 1 | 30 | | .2 | | 6.0 |
| TPC | 1 | 5 | | .2 | | 1.0 |
| TPC | 2 | 12 | | .15 | | 1.8 |
| SPB | 1 | 26 | | .1 | | 2.6 |
| TPC | 1 | 26 | | .2 | | 5.2 |
| TPC | 2 | 26 | | .15 | | 3.9 |
| SPD | 8 | 9 | | .1 | | .9 |
| TPC | 1 | 17 | | .2 | | 3.4 |
| TPC | 1 | 26 | | .2 | | 5.2 |
| SPD | 6 | 18 | | .1 | | 1.8 |
| TPC | 9 | 5 | | .1 | | .5 |
| TPC | 9 | 12 | | .1 | | 1.2 |
| SPD | 7 | 12 | | .1 | | 1.2 |
| TPC | 1 | 12 | | .2 | | 2.4 |
| SPD | 8 | 22 | | .1 | | 2.2 |
| TPC | 1 | 22 | | .2 | | 4.4 |
| SPD | 8 | 30 | | .1 | | 3.0 |

Analysis Unit #51 (continued)

| | | | | |
|---|---|---|---|---|
| TPC | 1 | 47 | .2 | 5.4 |
| SPD | 7 | 31 | .1 | 3.1 |
| TPC | 9 | 31 | .1 | 3.1 |
| TPC | 1 | 9 | .2 | 1.8 |
| SPD | 7 | 10 | .1 | 1.0 |
| TPC | 1 | 17 | .2 | 3.4 |
| SPD | 7 | 6 | .1 | .6 |
| SPD | 7 | 16 | .1 | 1.6 |
| TPC | 1 | 14 | .2 | 2.8 |
| TPC | 1 | 60 | .2 | 12.0 |
| SPD | 5 | 5 | .2 | 1.0 |
| CCC | 5 | 28 | .1 | 2.8 |
| TCC | 6 | 13 | .1 | 1.3 |
| SPD | 3 | 6 | .5 | 3.0 |
| TCC | 5 | 9 | .1 | .9 |
| | | | TOTAL | 241.0 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM: 241 * .27 = | 65.1 | .9 | 58.6 |
| ROAD CRA: | 42.4 | .9 | 38.2 |
| TOTAL CRA: | | | 337.8 |

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Analysis Unit # 52

Section 13 T19W, R17W

TOTAL AREA OF ANALYSIS UNIT: 4380.7 ACRES
HARVESTED ACRES: 504 ACRES
ROAD LENGTH: 18.2 MI
CRA: 353.9
% OF ANALYSIS UNIT: 8.1%

| Activity | Age of Act.(yrs) | EA | * RC | = CRA |
|---|---|---|---|---|
| TCC | 1 | 33 | .4 | 13.2 |
| SPD | 0 | 33 | .7 | 23.1 |
| TPC | 9 | 152 | .1 | 15.2 |
| SPD | 8 | 152 | .1 | 15.2 |
| TPC | 5 | 23 | .1 | 2.3 |
| SPD | 4 | 23 | .3 | 6.9 |
| TPC | 5 | 82 | .1 | 8.2 |
| SPD | 4 | 82 | .2 | 16.4 |
| TPC | 4 | 170 | .1 | 17.0 |
| SPD | 3 | 170 | .5 | 85.0 |
| TPC | 1 | 44 | .2 | 8.8 |
| SPD | 0 | 44 | .7 | 30.8 |
| | | | TOTAL | 242.1 |

**Analysis Unit #52 (continued)**

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM: 242.1 * .27 = | 65.4 | .9 | 58.8 |
| ROAD CRA: | 58.9 | .9 | 53.0 |
| TOTAL CRA: | | | 353.9 |

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**Analysis Unit # 53**

Section 2, T21N, R17W

TOTAL AREA OF ANALYSIS UNIT: 1401.2 ACRES
HARVESTED ACRES: 158.0 ACRES
ROAD LENGTH: 8.2 MI
CRA: 177.9
% OF ANALYSIS UNIT: 12.6%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 1 | 130 | | .2 | | 26.0 |
| SPD | 0 | 130 | | .7 | | 91.0 |
| TPC | 4 | 8 | | .1 | | .8 |
| SPD | 3 | 8 | | .5 | | 4.0 |
| TPC | 7 | 20 | | .1 | | 2.0 |
| SPD | 6 | 20 | | .1 | | 2.0 |
| | | | | TOTAL | | 125.8 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM:125.8 * .27 = | 34.0 | .9 | 30.6 |
| ROAD CRA: | 23.9 | .9 | 21.5 |
| TOTAL CRA: | | | 177.9 |

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**Analysis Unit # 54**

Section 5, T23N, R17W.

TOTAL AREA OF ANALYSIS UNIT: 6267.5 ACRES
TOTAL HARVESTED ACRES: 1884 ACRES
ROAD LENGTH: 21.7 MI
CRA: 1764.2
% OF ANALYSIS UNIT: 28.2%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 7 | 15 | | .1 | | 1.5 |
| SPD | 6 | 15 | | .1 | | 1.5 |

Analysis Unit #54 (continued)

| | | | | |
|---|---|---|---|---|
| TPC | 7 | 50 | .1 | 5.0 |
| SPD | 6 | 50 | .1 | 5.0 |
| TPC | 6 | 335 | .1 | 35.0 |
| SPD | 5 | 335 | .2 | 67.0 |
| TPC | 3 | 120 | .1 | 12.0 |
| SPD | 2 | 120 | .6 | 72.0 |
| TPC | 3 | 25 | .1 | 2.5 |
| SPD | 2 | 25 | .6 | 15.0 |
| TCC | 3 | 49 | .2 | 9.8 |
| SPD | 2 | 49 | .6 | 29.4 |
| TPC | 3 | 25 | .1 | 2.5 |
| SPD | 2 | 25 | .6 | 15.0 |
| TPC | 3 | 26 | .1 | 2.6 |
| SPD | 2 | 26 | .6 | 15.6 |
| TPC | 3 | 29 | .1 | 2.9 |
| SPD | 2 | 29 | .6 | 17.4 |
| TCC | 2 | 11 | .35 | 3.9 |
| SPD | 1 | 11 | .7 | 7.7 |
| TPC | 2 | 11 | .15 | 1.7 |
| SPD | 1 | 11 | .7 | 7.7 |
| TPC | 2 | 20 | .15 | 3.0 |
| SPD | 1 | 20 | .7 | 1.4 |
| TCC | 2 | 5 | .35 | .8 |
| SPD | 1 | 5 | .7 | 3.5 |
| TCC | 2 | 8 | .35 | 2.8 |
| SPD | 1 | 8 | .7 | 5.6 |
| TCC | 2 | 11 | .35 | 3.9 |
| SPD | 1 | 11 | .7 | 7.7 |
| TCC | 2 | 10 | .35 | 3.5 |
| SPD | 1 | 10 | .7 | 7.0 |
| TCC | 2 | 13 | .35 | 4.6 |
| SPD | 1 | 13 | .7 | 9.1 |
| TCC | 2 | 15 | .35 | 5.3 |
| SPD | 1 | 15 | .7 | 10.5 |
| TCC | 2 | 17 | .35 | 5.6 |
| SPD | 1 | 17 | .7 | 11.9 |
| TCC | 2 | 12 | .35 | 4.2 |
| SPD | 1 | 12 | .7 | 8.4 |
| TCC | 2 | 1 | .35 | .4 |
| SPD | 1 | 1 | .7 | .7 |
| TCC | 2 | 10 | .35 | 3.5 |
| SPD | 1 | 10 | .7 | 7.0 |
| TCC | 2 | 6 | .35 | 2.1 |
| SPD | 1 | 6 | .7 | 4.2 |
| TCC | 2 | 5 | .35 | 1.8 |
| SPD | 1 | 5 | .7 | 3.5 |
| TPC | 1 | 22 | .2 | 4.4 |
| SPD | 0 | 22 | .7 | 15.4 |
| TPC | 1 | 24 | .2 | 4.8 |
| SPD | 0 | 24 | .7 | 16.8 |

Analysis Unit #54 (continued)

| | | | | |
|---|---|---|---|---|
| TPC | 1 | 21 | .2 | 4.2 |
| SPD | 0 | 21 | .7 | 14.7 |
| TPC | 1 | 19 | .2 | 3.8 |
| SPD | 0 | 19 | .7 | 13.3 |
| TPC | 1 | 18 | .2 | 3.6 |
| SPD | 0 | 18 | .7 | 12.6 |
| TPC | 1 | 23 | .2 | 4.6 |
| SPD | 0 | 23 | .7 | 16.1 |
| TPC | 1 | 10 | .2 | 2.0 |
| SPD | 0 | 10 | .7 | 7.0 |
| TPC | 1 | 12 | .2 | 2.4 |
| SPD | 0 | 12 | .7 | 8.4 |
| TPC | 1 | 13 | .2 | 2.6 |
| SPD | 0 | 13 | .7 | 9.1 |
| TPC | 1 | 59 | .2 | 11.8 |
| SPD | 0 | 59 | .7 | 41.3 |
| TPC | 1 | 8 | .2 | 1.6 |
| SPD | 0 | 8 | .7 | 5.6 |
| TPC | 1 | 49 | .2 | 9.8 |
| SPD | 0 | 49 | .7 | 34.3 |
| TPC | 1 | 76 | .2 | 15.2 |
| SPD | 0 | 76 | .7 | 53.2 |
| TPC | 1 | 44 | .2 | 8.8 |
| SPD | 0 | 44 | .7 | 30.8 |
| TPC | 1 | 3 | .2 | .6 |
| SPD | 0 | 3 | .7 | 2.1 |
| TPC | 1 | 14 | .2 | 2.8 |
| SPD | 0 | 14 | .7 | 9.8 |
| TCC | 2 | 44 | .15 | 6.6 |
| SPD | 1 | 44 | .7 | 30.8 |
| TPC | 2 | 596 | .15 | 89.4 |
| SPD | 1 | 596 | .7 | 417.2 |
| | | | TOTAL | 1372.2 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM: 1372.2 * .27= | 370.5 | .9 | 333.4 |
| ROAD CRA: | 65.9 | .9 | 59.3 |
| TOTAL CRA: | | | 1764.2 |

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APPENDIX II

**Watershed #1A: Elk Creek**

N.E. 1\4 Section 18 T20N, R17W.

TOTAL AREA OF WATERSHED: 12278.9 ACRES
HARVESTED ACRES: 0
ROAD LENGTH: 0
CRA: 0
% OF DISTURBANCE: 0
************************************************

**Watershed # 1B: Elk Creek**

N.E.1\4 Section 16 T20N, R17W

TOTAL AREA OF WATERSHED: 15104.4 ACRES
HARVESTED ACRES: 0
ROAD LENGTH: 0
CRA: 0
% OF DISTURBANCE: 0
************************************************

**Watershed # 2: Goat Creek**

S.E. 1\4 Section 10 T23N, R17W.

TOTAL AREA OF WATERSHED: 9398.9 ACRES
HARVESTED ACRES: 268 ACRES
ROAD LENGTH: 22.7 MI
CRA: 97.1
% OF DISTURBANCE .01

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 8 | 100 | | .1 | | 10.0 |
| SPD | 9 | 100 | | .1 | | 10.0 |
| TCC | 8 | 10 | | .1 | | 1.0 |
| SPD | 7 | 10 | | .1 | | 1.0 |
| TCC | 4 | 12 | | .1 | | 1.2 |
| SPD | 3 | 12 | | .5 | | 6.0 |
| TCC | 1 | 11 | | .4 | | 4.4 |
| SPD | 0 | 11 | | .7 | | 7.7 |
| TCC | 1 | 15 | | .4 | | 6.0 |
| SPD | 0 | 15 | | .7 | | 10.5 |
| | | | | TOTAL | | 57.8 |
| PERM.SKID SYSTEM: 57.8 * .27 = | | 24.1 | | .9 | | 15.6 |
| ROAD CRA: | | 25.2 | | .9 | | 22.7 |
| TOTAL CRA: | | | | | | 96.1 |

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**Watershed # 3: Squeezer Creek.**

N.W. 1\4 Section 27 T23N, R17W.

| | |
|---|---|
| TOTAL AREA OF WATERSHED: | 5897.1 ACRES |
| HARVESTED ACRES: | 465.2 ACRES |
| ROAD LENGTH: | 7.8 MI |
| CRA: | 212.7 |
| % OF DISTURBANCE: | .04 |

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TCC | 9 | 3 | | .1 | | .3 |
| SPD | 8 | 3 | | .1 | | .3 |
| TCC | 6 | 90 | | .1 | | 9.0 |
| TPC | 6 | 275 | | .1 | | 27.5 |
| SPD | 5 | 275 | | .2 | | 55.0 |
| TCC | 4 | 15 | | .2 | | 3.0 |
| SPD | 3 | 15 | | .5 | | 7.5 |
| TPC | 4 | 82 | | .1 | | 8.2 |
| SPD | 3 | 82 | | .5 | | 41.0 |
| | | | | TOTAL | | 151.3 |
| PERM.SKID SYSTEM:151.3 * .27 = | | 40.9 | | .9 | | 36.8 |
| ROAD CRA: | | 27.3 | | .9 | | 24.6 |
| TOTAL CRA: | | | | | | 212.7 |

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**Watershed # 4: Lion Creek**

S.W. 1\4 Section 11 T22N, R17W.

| | |
|---|---|
| TOTAL AREA OF WATERSHED: | 13915.4 ACRES |
| HARVESTED ACRES: | 0 |
| ROAD LENGTH: | 0 |
| CRA: | 0 |
| % OF DISTURBANCE: | 0 |

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**Watershed # 5A: Jim Creek**

N.W. 1\4 Section 32 T22N, R17W.

| | | |
|---|---|---|
| TOTAL AREA OF WATERSHED: | 8594.3 | ACRES |
| HARVESTED ACRES: | 2052 | ACRES |
| ROAD LENGTH: | 13.8 | MI |
| CRA: | 1052.6 | |
| % OF DISTURBANCE: | 12.2 | |

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TCC | 9 | 20 | | .1 | | 2.0 |
| SPD | 8 | 20 | | .1 | | 2.0 |
| TPC | 9 | 15 | | .1 | | 1.5 |
| SPD | 8 | 15 | | .1 | | 1.5 |
| TPC | 9 | 35 | | .1 | | 3.5 |
| SPD | 8 | 35 | | .1 | | 3.5 |
| TPC | 9 | 15 | | .1 | | 1.5 |
| SPD | 8 | 15 | | .1 | | 1.5 |
| TPC | 9 | 42 | | .1 | | 4.2 |
| SPD | 8 | 42 | | .1 | | 4.2 |
| TPC | 9 | 4 | | .1 | | .4 |
| SPD | 8 | 4 | | .1 | | .4 |
| TCC | 9 | 14 | | .1 | | 1.4 |
| SPD | 8 | 14 | | .1 | | 1.4 |
| TPC | 9 | 151 | | .1 | | 15.1 |
| SPD | 8 | 151 | | .1 | | 15.1 |
| TPC | 9 | 245 | | .1 | | 24.5 |
| SPD | 8 | 245 | | .1 | | 24.5 |
| TPC | 9 | 30 | | .1 | | 3.0 |
| SPD | 8 | 30 | | .1 | | 3.0 |
| TPC | 9 | 237 | | .1 | | 23.7 |
| SPD | 8 | 237 | | .1 | | 23.7 |
| TCC | 9 | 8 | | .1 | | .8 |
| SPD | 8 | 8 | | .1 | | .8 |
| TCC | 9 | 80 | | .1 | | 8.0 |
| SPD | 8 | 80 | | .1 | | 8.0 |
| TPC | 9 | 80 | | .1 | | 8.0 |
| SPD | 8 | 80 | | .1 | | 8.0 |
| TPC | 8 | 6 | | .1 | | .6 |
| SPD | 7 | 6 | | .1 | | .6 |
| TCC | 6 | 9 | | .1 | | .9 |
| SPD | 5 | 9 | | .1 | | .9 |
| TPC | 6 | 190 | | .1 | | 19.0 |
| SPD | 5 | 190 | | .2 | | 38.0 |
| TPC | 5 | 340 | | .1 | | 34.0 |
| SPD | 4 | 340 | | .3 | | 102.0 |
| TPC | 5 | 95 | | .1 | | 9.5 |
| SPD | 4 | 95 | | .3 | | 28.5 |
| TCC | 3 | 140 | | .2 | | 28.0 |
| SPD | 2 | 140 | | .6 | | 84.0 |

**Watershed #5A (continued)**

| | | | | |
|---|---|---|---|---|
| TPC | 3 | 33 | .2 | 6.6 |
| SPD | 2 | 33 | .6 | 19.8 |
| TPC | 3 | 18 | .2 | 3.6 |
| SPD | 2 | 18 | .6 | 10.6 |
| TCC | 1 | 7 | .4 | 2.8 |
| SPD | 0 | 7 | .7 | 4.9 |
| TCC | 1 | 155 | .4 | 62.0 |
| SPD | 0 | 155 | .7 | 108.5 |
| TCC | 1 | 14 | .4 | 5.6 |
| SPD | 0 | 14 | .7 | 9.8 |
| TCC | 2 | 15 | .35 | 5.3 |
| SPD | 1 | 15 | .7 | 10.5 |
| SPD | 4 | 49 | .3 | 14.7 |
| TPC | 6 | 49 | .1 | 4.9 |
| SPD | 7 | 5 | .1 | .5 |
| TCC | 7 | 5 | .1 | .5 |
| | | | TOTAL | 811.8 |

PERM.SKID SYSTEM:811.8 * .27 = 219.2 .9 197.3

ROAD CRA: 48.3 .9 43.5

TOTAL CRA: 1052.6

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**Watershed # 5B: Jim Creek**

N.W. 1\4 Section 32 T22N, R17W.

| | | |
|---|---|---|
| TOTAL AREA OF WATERSHED: | 7899.4 | ACRES |
| HARVESTED ACRES: | 2052 | ACRES |
| ROAD LENGTH: | 13.8 | MI |
| CRA: | 1033.2 | |
| % OF DISTURBANCE: | 13.0 | |

| Activity | Age of Act.(yrs) | EA * | RC = | CRA |
|---|---|---|---|---|
| TPC | 9 | 15 | .1 | 1.5 |
| SPD | 8 | 15 | .1 | 1.5 |
| TPC | 9 | 42 | .1 | 4.2 |
| SPD | 8 | 42 | .1 | 4.2 |
| TPC | 9 | 4 | .1 | .4 |
| SPD | 8 | 4 | .1 | .4 |
| TCC | 9 | 14 | .1 | 1.4 |
| SPD | 8 | 14 | .1 | 1.4 |
| TPC | 9 | 151 | .1 | 15.1 |
| SPD | 8 | 151 | .1 | 15.1 |
| TPC | 9 | 245 | .1 | 24.5 |
| SPD | 8 | 245 | .1 | 24.5 |
| TPC | 9 | 30 | .1 | 3.0 |

**Watershed #5B (continued)**

| | | | | |
|---|---|---|---|---|
| SPD | 8 | 30 | .1 | 3.0 |
| TPC | 9 | 237 | .1 | 23.7 |
| SPD | 8 | 237 | .1 | 23.7 |
| TCC | 9 | 80 | .1 | 8.0 |
| SPD | 8 | 80 | .1 | 8.0 |
| TPC | 9 | 80 | .1 | 8.0 |
| SPD | 8 | 80 | .1 | 8.0 |
| TPC | 8 | 6 | .1 | .6 |
| SPD | 7 | 6 | .1 | .6 |
| TCC | 6 | 9 | .1 | .9 |
| SPD | 5 | 9 | .1 | .9 |
| TPC | 6 | 190 | .1 | 19.0 |
| SPD | 5 | 190 | .2 | 38.0 |
| TPC | 5 | 340 | .1 | 34.0 |
| SPD | 4 | 340 | .3 | 102.0 |
| TPC | 5 | 95 | .1 | 9.5 |
| SPD | 4 | 95 | .3 | 28.5 |
| TCC | 3 | 140 | .2 | 28.0 |
| SPD | 2 | 140 | .6 | 84.0 |
| TPC | 3 | 33 | .2 | 6.6 |
| SPD | 2 | 33 | .6 | 19.8 |
| TPC | 3 | 18 | .2 | 3.6 |
| SPD | 2 | 18 | .6 | 10.6 |
| TCC | 1 | 7 | .4 | 2.8 |
| SPD | 0 | 7 | .7 | 4.9 |
| TCC | 1 | 155 | .4 | 62.0 |
| SPD | 0 | 155 | .7 | 108.5 |
| TCC | 1 | 14 | .4 | 5.6 |
| SPD | 0 | 14 | .7 | 9.8 |
| TCC | 2 | 15 | .35 | 5.3 |
| SPD | 1 | 15 | .7 | 10.5 |
| SPD | 4 | 49 | .3 | 14.7 |
| TPC | 6 | 49 | .1 | 4.9 |
| SPD | 7 | 5 | .1 | .5 |
| TCC | 7 | 5 | .1 | .5 |
| | | | TOTAL | 796.2 |
| PERM.SKID SYSTEM:796.2 * .27 = | | 215.0 | .9 | 193.5 |
| ROAD CRA: | | 48.3 | .9 | 43.5 |
| TOTAL CRA: | | | | 1033.2 |

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**Watershed # 6: Piper Creek**

S.W. 1\4 Section 25 T22N, R17W.

TOTAL AREA OF WATERSHED: 5056 ACRES
HARVESTED ACRES: 0
ROAD LENGTH: 0
CRA: 0
% OF DISTURBANCE: 0

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|

no activity
**********************************************************

**Watershed # 7: Freeland Creek**

S.W.1\4 Section 16 T25N, R22W.

TOTAL AREA OF WATERSHED: 7149.7 ACRES
HARVESTED ACRES: 2624 ACRES
ROAD LENGTH: 41.8 MILES
CRA: 2214.5 CRA
% OF DISTURBANCE: 30.9

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 1 | 944 | | .2 | | 188.9 |
| SPD | 0 | 994 | | .7 | | 660.8 |
| TPC | 1 | 96 | | .2 | | 19.2 |
| SPD | 1 | 96 | | .7 | | 67.2 |
| TPC | 1 | 1104 | | .1 | | 110.4 |
| SPD | 4 | 1104 | | .3 | | 331.2 |
| TPC | 3 | 192 | | .1 | | 19.2 |
| SPD | 2 | 192 | | .6 | | 115.2 |
| TCC | 3 | 112 | | .2 | | 22.4 |
| SPD | 2 | 112 | | .6 | | 67.2 |
| TCC | 2 | 64 | | .35 | | 22.4 |
| SPD | 1 | 64 | | .7 | | 44.8 |
| TPC | 5 | 32 | | .1 | | 3.2 |
| SPD | 4 | 32 | | .3 | | 9.6 |
| TPC | 2 | 48 | | .15 | | 7.2 |
| SPD | 1 | 48 | | .7 | | 33.6 |
| TPC | 1 | 32 | | .2 | | 6.4 |
| SPD | 0 | 32 | | .7 | | 22.4 |
| | | | | TOTAL | | 1751.3 |
| PERM.SKID SYSTEM:1751.3 *.27 = | | 472.9 | | .9 | | 425.6 |
| ROAD CRA: | | 41.8 | | .9 | | 37.6 |
| TOTAL CRA: | | | | | | 2214.5 |

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**Watershed # 8: Fish Creek**

N.W. 1\4 Section 15 T28N, R24W.

| | | |
|---|---|---|
| TOTAL AREA OF WATERSHED: | 1852 | ACRES |
| HARVESTED ACRES: | 396 | ACRES |
| ROAD LENGTH: | 24.4 | MI |
| CRA: | 419.1 | |
| % OF DISTURBANCE: | 22.6 | |

| Activity | Age of Act.(yrs) | EA | * RC | = CRA |
|---|---|---|---|---|
| TCC | 4 | 44 | .2 | 8.8 |
| SPD | 3 | 44 | .5 | 22.0 |
| TCC | 4 | 53 | .2 | 10.6 |
| SPD | 3 | 53 | .5 | 26.5 |
| TPC | 4 | 24 | .1 | 2.4 |
| SPD | 3 | 24 | .5 | 12.0 |
| TCC | 3 | 24 | .2 | 12.0 |
| SPD | 2 | 24 | .6 | 14.4 |
| TPC | 3 | 35 | .15 | 5.3 |
| SPD | 2 | 35 | .6 | 21.0 |
| TCC | 3 | 32 | .2 | 16.0 |
| SPD | 2 | 32 | .6 | 19.2 |
| TPC | 3 | 23 | .1 | 2.3 |
| SPD | 2 | 23 | .6 | 13.8 |
| TCC | 3 | 22 | .2 | 4.4 |
| SPD | 2 | 22 | .6 | 13.2 |
| TPC | 4 | 27 | .1 | 2.7 |
| SPD | 3 | 27 | .5 | 13.5 |
| TPC | 4 | 43 | .1 | 4.3 |
| SPD | 3 | 43 | .5 | 21.5 |
| TPC | 2 | 19 | .15 | 2.9 |
| SPD | 1 | 19 | .7 | 13.3 |
| TCC | 3 | 13 | .2 | 2.6 |
| SPD | 2 | 13 | .6 | 7.8 |
| TPC | 5 | 1 | .1 | .1 |
| SPD | 4 | 1 | .3 | .3 |
| TCC | 9 | 36 | .1 | 3.6 |
| SPD | 8 | 36 | .1 | 3.6 |
| | | | TOTAL | 280.1 |
| PERM.SKID SYSTEM:280.1 * .27 = | | 75.6 | .9 | 68.1 |
| ROAD CRA: | | 78.8 | .9 | 70.9 |
| TOTAL CRA: | | | | 419.1 |

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**Watershed # 9: Hand Creek**

N.E. 1\4 Section 4 T29N, R25W.

TOTAL AREA OF WATERSHED: 550 ACRES
HARVESTED ACRES: 29 ACRES
ROAD LENGTH: 6.1 MI
CRA: 52.4
% OF DISTURBANCE: 9.5%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TCC | 4 | 5 | | .2 | | 1.0 |
| SPD | 3 | 5 | | .5 | | 2.5 |
| TPC | 4 | 6 | | .2 | | 1.2 |
| SPD | 3 | 6 | | .5 | | 3.0 |
| TCC | 4 | 18 | | .2 | | 3.6 |
| SPD | 3 | 18 | | .5 | | 9.0 |
| | | | | TOTAL | | 20.3 |
| PERM.SKID SYSTEM:20.3 * .27 = | | 5.5 | | .9 | | 4.9 |
| ROAD CRA: | | 30.2 | | .9 | | 27.2 |
| TOTAL CRA: | | | | | | 52.4 |

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**Watershed # 10: Swift Creek**

N.E. 1\4 Section 24 T33N, R23W.

TOTAL AREA OF WATERSHED: 6909 ACRES
HARVESTED ACRES: 0 ACRES
ROAD LENGTH: 14.6 MI
CRA: 46.0
% OF DISTURBANCE: 0

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| no activity | | | | | | |
| ROAD CRA: | | 51.1 | | .9 | | 46.0 |
| TOTAL CRA: | | | | | | 46.0 |

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**Watershed # 11: Sheppard Creek**

S.W. 1\4 Section 18 T30N, R25W.

TOTAL AREA OF WATERSHED: 16991 ACRES
HARVESTED ACRES: 3758 ACRES
ROAD LENGTH; 114 ACRES
CRA: 2669.5
% OF DISTURBANCE: 15.7%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 9 | 39 | | .1 | | 3.9 |
| SPD | 8 | 39 | | .1 | | 3.9 |
| TPC | 9 | 55 | | .1 | | 5.5 |
| SPD | 8 | 55 | | .1 | | 5.5 |
| TPC | 8 | 26 | | .1 | | 2.6 |
| SPD | 7 | 26 | | .1 | | 2.6 |
| TCC | 8 | 27 | | .1 | | 2.7 |
| SPD | 7 | 27 | | .1 | | 2.7 |
| TCC | 6 | 40 | | .1 | | 4.0 |
| SPD | 5 | 40 | | .1 | | 4.0 |
| TCC | 6 | 37 | | .1 | | 3.7 |
| SPD | 5 | 37 | | .1 | | 3.7 |
| TCC | 5 | 40 | | .1 | | 4.0 |
| SPD | 4 | 40 | | .3 | | 12.0 |
| TPC | 6 | 16 | | .1 | | 1.6 |
| SPD | 5 | 16 | | .2 | | 3.2 |
| TCC | 6 | 24 | | .1 | | 2.4 |
| SPD | 5 | 24 | | .2 | | 4.2 |
| TPC | 5 | 11 | | .1 | | 1.1 |
| SPD | 4 | 11 | | .3 | | 3.3 |
| TPC | 8 | 35 | | .1 | | 3.5 |
| SPD | 7 | 35 | | .1 | | 3.5 |
| TPC | 3 | 40 | | .2 | | 8.0 |
| SPD | 2 | 40 | | .6 | | 24.0 |
| TCC | 3 | 15 | | .2 | | 3.0 |
| SPD | 2 | 15 | | .6 | | 9.0 |
| TPC | 2 | 29 | | .15 | | 4.4 |
| SPD | 1 | 29 | | .7 | | 20.3 |
| TCC | 2 | 14 | | .35 | | 4.9 |
| SPD | 1 | 14 | | .7 | | 9.8 |
| TCC | 1 | 36 | | .4 | | 14.4 |
| SPD | 0 | 36 | | .7 | | 25.2 |
| TPC | 5 | 60 | | .1 | | 6.0 |
| SPD | 4 | 60 | | .1 | | 6.0 |
| TPC | 4 | 11 | | .1 | | 1.1 |
| SPD | 3 | 11 | | .1 | | 1.1 |
| TCC | 5 | 57 | | .1 | | 5.7 |
| SPD | 4 | 57 | | .3 | | 17.1 |
| TCC | 3 | 30 | | .2 | | 6.0 |
| SPD | 2 | 30 | | .6 | | 18.0 |

**Watershed #11 (continued)**

| | | | | |
|---|---|---|---|---|
| TPC | 1 | 77 | .4 | 30.8 |
| SPD | 0 | 77 | .7 | 53.9 |
| TCC | 2 | 12 | .35 | 4.2 |
| SPD | 1 | 12 | .7 | 8.4 |
| TPC | 9 | 124 | .1 | 12.4 |
| SPD | 8 | 124 | .1 | 12.4 |
| TPC | 3 | 12 | .1 | 1.2 |
| SPD | 2 | 12 | .6 | 7.2 |
| TCC | 5 | 9 | .1 | .9 |
| SPD | 4 | 8 | .3 | 2.4 |
| TCC | 3 | 32 | .2 | 6.4 |
| SPD | 2 | 32 | .6 | 19.2 |
| TPC | 6 | 14 | .1 | 1.4 |
| SPD | 5 | 14 | .1 | 1.4 |
| TPC | 7 | 10 | .1 | 1.0 |
| SPD | 6 | 10 | .1 | 1.0 |
| TPC | 2 | 0 | .15 | 4.5 |
| SPD | 1 | 0 | .7 | 21.0 |
| TCC | 2 | 7 | .35 | 9.5 |
| SPD | 1 | 7 | .7 | 18.9 |
| TPC | 1 | 0 | .2 | 6.0 |
| SPD | 0 | 0 | .7 | 21.0 |
| TCC | 1 | 9 | .4 | 3.6 |
| SPD | 0 | 9 | .7 | 6.3 |
| TPC | 4 | 3 | .1 | 11.3 |
| SPD | 5 | 3 | .2 | 22.6 |
| TPC | 6 | 80 | .1 | 8.0 |
| SPD | 5 | 80 | .1 | 8.0 |
| TPC | 5 | 30 | .1 | 3.0 |
| SPD | 4 | 30 | .1 | 3.0 |
| TPC | 6 | 40 | .1 | 4.0 |
| SPD | 5 | 40 | .2 | 8.0 |
| TCC | 3 | 18 | .2 | 3.6 |
| SPD | 2 | 18 | .6 | 10.8 |
| TPC | 3 | 26 | .1 | 2.6 |
| SPD | 2 | 26 | .6 | 15.6 |
| TCC | 4 | 27 | .2 | 5.2 |
| SPD | 3 | 27 | .5 | 13.5 |
| TCC | 3 | 33 | .2 | 6.6 |
| SPD | 2 | 33 | .6 | 19.8 |
| TPC | 4 | 42 | .1 | 4.2 |
| SPD | 3 | 42 | .5 | 21.0 |
| TCC | 3 | 41 | .2 | 8.2 |
| SPD | 2 | 41 | .6 | 24.6 |
| TPC | 5 | 31 | .1 | 3.1 |
| SPD | 4 | 31 | .3 | 9.3 |
| TPC | 5 | 52 | .1 | 5.2 |
| SPD | 4 | 52 | .3 | 15.6 |
| TPC | 5 | 41 | .1 | 4.1 |
| SPD | 4 | 41 | .3 | 12.3 |

**Watershed #11 (continued)**

| | | | | |
|---|---|---|---|---|
| TPC | 5 | 83 | .1 | 8.3 |
| SPD | 4 | 83 | .3 | 24.9 |
| TPC | 5 | 60 | .1 | 6.0 |
| SPD | 4 | 60 | .3 | 18.0 |
| TCC | 3 | 76 | .2 | 15.2 |
| SPD | 2 | 76 | .6 | 45.6 |
| TCC | 5 | 8 | .1 | .8 |
| SPD | 4 | 8 | .3 | 2.4 |
| TCC | 2 | 18 | .35 | 6.3 |
| SPD | 1 | 18 | .7 | 12.6 |
| TPC | 3 | 30 | .1 | 3.0 |
| SPD | 2 | 30 | .6 | 18.0 |
| TCC | 4 | 8 | .2 | 1.6 |
| SPD | 3 | 8 | .5 | 4.0 |
| TCC | 3 | 25 | .2 | 5.0 |
| SPD | 2 | 25 | .6 | 15.0 |
| TPC | 3 | 167 | .1 | 16.7 |
| SPD | 2 | 167 | .6 | 100.2 |
| TPC | 2 | 15 | .15 | 2.3 |
| SPD | 1 | 15 | .7 | 10.5 |
| TCC | 3 | 114 | .2 | 22.8 |
| SPD | 2 | 114 | .6 | 68.4 |
| TCC | 2 | 25 | .35 | 8.8 |
| SPD | 1 | 25 | .7 | 17.5 |
| TCC | 3 | 33 | .2 | 6.6 |
| SPD | 2 | 33 | .6 | 19.8 |
| TPC | 5 | 16 | .1 | 1.6 |
| SPD | 4 | 16 | .3 | 4.8 |
| TPC | 4 | 52 | .1 | 5.2 |
| SPD | 3 | 52 | .5 | 26.0 |
| TCC | 5 | 11 | .1 | 1.1 |
| SPD | 4 | 11 | .3 | 3.3 |
| TCC | 4 | 96 | .1 | 9.6 |
| SPD | 3 | 96 | .5 | 48.0 |
| TPC | 5 | 19 | .1 | 1.9 |
| SPD | 4 | 19 | .3 | 5.7 |
| TCC | 4 | 24 | .2 | 4.8 |
| SPD | 3 | 24 | .5 | 12.0 |
| TPC | 2 | 20 | .15 | 3.0 |
| SPD | 1 | 20 | .7 | 14.0 |
| TPC | 1 | 32 | .2 | 6.4 |
| SPD | 0 | 32 | .7 | 22.4 |
| TCC | 2 | 38 | .35 | 13.3 |
| SPD | 1 | 38 | .7 | 26.6 |
| TPC | 9 | 10 | .1 | 1.0 |
| SPD | 8 | 10 | .1 | 1.0 |
| TCC | 6 | 24 | .1 | 2.4 |
| SPD | 5 | 24 | .2 | 4.8 |
| TCC | 1 | 93 | .4 | 37.2 |
| SPD | 0 | 93 | .7 | 65.1 |

**Watershed #11 (continued)**

| | | | | |
|---|---|---|---|---|
| TPC | 1 | 34 | .2 | 6.8 |
| SPD | 0 | 34 | .7 | 23.8 |
| TPC | 2 | 55 | .15 | 8.3 |
| SPD | 1 | 55 | .7 | 38.5 |
| TPC | 4 | 49 | .1 | 4.9 |
| SPD | 3 | 49 | .5 | 24.5 |
| TCC | 3 | 14 | .2 | 2.8 |
| SPD | 2 | 14 | .6 | 8.4 |
| TCC | 5 | 27 | .1 | 2.7 |
| SPD | 4 | 27 | .1 | 2.7 |
| TPC | 4 | 30 | .1 | 3.0 |
| SPD | 3 | 30 | .5 | 15.0 |
| TPC | 3 | 71 | .2 | 14.2 |
| SPD | 2 | 71 | .6 | 42.6 |
| TPC | 2 | 65 | .15 | 9.8 |
| SPD | 1 | 65 | .7 | 45.5 |
| TCC | 9 | 35 | .1 | 3.5 |
| SPD | 8 | 35 | .1 | 3.5 |
| TPC | 1 | 51 | .2 | 10.2 |
| SPD | 0 | 51 | .7 | 35.7 |
| TPC | 9 | 100 | .1 | 10.0 |
| SPD | 8 | 100 | .1 | 10.0 |
| TCC | 9 | 202 | .1 | 20.2 |
| SPD | 8 | 202 | .1 | 20.2 |
| TPC | 3 | 60 | .1 | 6.0 |
| SPD | 2 | 60 | .6 | 36.0 |
| TCC | 9 | 67 | .1 | 6.7 |
| SPD | 8 | 67 | .1 | 6.7 |
| TCC | 5 | 6 | .1 | .6 |
| SPD | 4 | 6 | .1 | .6 |
| TPC | 9 | 45 | .1 | 4.5 |
| SPD | 8 | 45 | .1 | 4.5 |
| TCC | 5 | 108 | .1 | 10.8 |
| SPD | 4 | 108 | .3 | 32.4 |
| TCC | 4 | 40 | .2 | 8.0 |
| SPD | 3 | 40 | .3 | 12.0 |
| | | | TOTAL | 2065.1 |
| PERM.SKID SYSTEM:2065.1 * .27= | | 557.6 | .9 | 501.8 |
| ROAD CRA: | | 114.0 | .9 | 102.6 |
| TOTAL CRA: | | | | 2669.5 |

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**Watershed # 12a: Upper Big Creek**

N.E. 1\4 Section 33 T33N, R21N

TOTAL AREA OF WATERSHED: 34240 ACRES
HARVESTED ACRES: 895 ACRES
ROAD LENGTH: 69.1 MI
CRA: 427.3
% OF DISTURBANCE: 1.2%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TCC | 7 | 41 | | .1 | | 4.1 |
| SPD | 6 | 41 | | .1 | | 4.1 |
| TPC | 6 | 44 | | .1 | | 4.4 |
| SPD | 5 | 44 | | .2 | | 8.8 |
| TCC | 9 | 51 | | .1 | | 5.1 |
| SPD | 8 | 51 | | .1 | | 5.1 |
| TCC | 8 | 127 | | .1 | | 12.7 |
| SPD | 7 | 127 | | .1 | | 12.7 |
| TPC | 8 | 22 | | .1 | | 2.2 |
| SPD | 7 | 22 | | .1 | | 2.2 |
| TPC | 8 | 47 | | .1 | | 4.7 |
| SPD | 7 | 47 | | .1 | | 4.7 |
| TPC | 1 | 43 | | .2 | | 8.6 |
| SPD | 0 | 43 | | .7 | | 30.1 |
| TPC | 8 | 174 | | .1 | | 17.4 |
| SPD | 7 | 174 | | .1 | | 17.4 |
| TPC | 7 | 86 | | .1 | | 8.6 |
| SPD | 6 | 86 | | .1 | | 8.6 |
| TCC | 7 | 55 | | .1 | | 5.5 |
| SPD | 6 | 55 | | .1 | | 5.5 |
| TCC | 8 | 31 | | .1 | | 3.1 |
| SPD | 7 | 31 | | .1 | | 3.1 |
| | | | | TOTAL | | 178.7 |
| PERM.SKID SYSTEM:178.8 * .27 = | | 48.2 | | .9 | | 43.4 |
| ROAD CRA: | | 228.0 | | .9 | | 205.2 |
| TOTAL CRA: | | | | | | 427.3 |

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**Watershed # 12b: Lower Big Creek**

N.W. 1\4 Section 30 T33N, R20W.

TOTAL AREA OF WATERSHED: 44901 ACRES
HARVESTED ACRES: 1881 ACRES
ROAD LENGTH: 110.7 MI
CRA: 1332.8
% OF DISTURBANCE: 3%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 8 | 15 | | .1 | | 1.5 |
| SPD | 7 | 15 | | .1 | | 1.5 |
| TPC | 5 | 59 | | .1 | | 5.9 |
| SPD | 4 | 59 | | .3 | | 17.7 |
| TPC | 9 | 56 | | .1 | | 5.6 |
| SPD | 8 | 56 | | .1 | | 5.6 |
| TPC | 9 | 85 | | .1 | | 8.5 |
| SPD | 8 | 85 | | .1 | | 8.5 |
| TPC | 5 | 28 | | .1 | | 2.8 |
| SPD | 4 | 28 | | .3 | | 8.4 |
| TCC | 7 | 41 | | .1 | | 4.1 |
| SPD | 6 | 41 | | .1 | | 4.1 |
| TPC | 8 | 20 | | .1 | | 2.0 |
| SPD | 7 | 20 | | .1 | | 2.0 |
| TPC | 5 | 44 | | .1 | | 4.4 |
| SPD | 4 | 44 | | .3 | | 13.2 |
| TPC | 9 | 115 | | .1 | | 11.5 |
| SPD | 8 | 115 | | .1 | | 11.5 |
| TPC | 1 | 26 | | .2 | | 5.2 |
| SPD | 0 | 26 | | .7 | | 18.2 |
| TPC | 8 | 131 | | .1 | | 13.1 |
| SPD | 7 | 131 | | .1 | | 13.1 |
| TPC | 9 | 20 | | .1 | | 2.0 |
| SPD | 8 | 30 | | .1 | | 3.0 |
| TPC | 9 | 237 | | .1 | | 23.7 |
| SPD | 8 | 237 | | .1 | | 23.7 |
| TCC | 9 | 8 | | .1 | | .8 |
| SPD | 8 | 8 | | .1 | | .8 |
| TPC | 8 | 80 | | .1 | | 8.0 |
| SPD | 7 | 80 | | .1 | | 8.0 |
| TPC | 8 | 6 | | .1 | | .6 |
| SPD | 7 | 6 | | .1 | | .6 |
| TPC | 6 | 9 | | .1 | | .9 |
| SPD | 5 | 9 | | .1 | | .9 |
| TPC | 6 | 190 | | .1 | | 19.0 |
| SPD | 5 | 190 | | .3 | | 38.0 |
| TPC | 5 | 340 | | .1 | | 34.0 |
| SPD | 4 | 340 | | .3 | | 102.0 |
| TPC | 5 | 95 | | .1 | | 9.5 |

**Watershed #12B (continued)**

| | | | | |
|---|---|---|---|---|
| SPD | 4 | 95 | .3 | 28.5 |
| TCC | 3 | 140 | .2 | 28.0 |
| SPD | 2 | 140 | .6 | 84.0 |
| TPC | 3 | 33 | .2 | 6.6 |
| SPD | 2 | 33 | .6 | 19.8 |
| TPC | 3 | 18 | .2 | 3.6 |
| SPD | 2 | 18 | .6 | 10.6 |
| TCC | 1 | 7 | .4 | 2.8 |
| SPD | 0 | 7 | .7 | 4.9 |
| TCC | 1 | 155 | .4 | 62.0 |
| SPD | 0 | 155 | .7 | 108.5 |
| TCC | 1 | 14 | .4 | 5.6 |
| SPD | 0 | 14 | .7 | 9.8 |
| TCC | 2 | 15 | .35 | 5.3 |
| SPD | 1 | 15 | .7 | 10.5 |
| SPD | 4 | 49 | .3 | 14.7 |
| TPC | 6 | 49 | .1 | 4.9 |
| TCC | 7 | 5 | .1 | .5 |
| SPD | 6 | 5 | .1 | .5 |
| TPC | 6 | 17 | .1 | 1.7 |
| SPD | 5 | 17 | .1 | 1.7 |
| TPC | 5 | 17 | .1 | 1.7 |
| SPD | 4 | 17 | .1 | 1.7 |
| TPC | 5 | 54 | .1 | 5.4 |
| SPD | 4 | 54 | .3 | 16.2 |
| TPC | 9 | 19 | .1 | 1.9 |
| SPD | 8 | 19 | .1 | 1.9 |
| TPC | 9 | 4 | .1 | .4 |
| SPD | 8 | 4 | .1 | .4 |
| TPC | 9 | 74 | .1 | 7.4 |
| SPD | 8 | 74 | .1 | 7.4 |
| TCC | 7 | 5 | .1 | .5 |
| SPD | 6 | 5 | .1 | .5 |
| TPC | 6 | 49 | .1 | 4.9 |
| SPD | 5 | 49 | .1 | 4.9 |
| TPC | 1 | 23 | .2 | 4.6 |
| SPD | 0 | 23 | .7 | 16.1 |
| TCC | 1 | 17 | .4 | 6.8 |
| SPD | 0 | 17 | .7 | 11.9 |
| TCC | 3 | 13 | .2 | 2.6 |
| SPD | 2 | 13 | .6 | 7.8 |
| TPC | 1 | 18 | .2 | 3.6 |
| SPD | 0 | 18 | .7 | 12.6 |
| TCC | 3 | 15 | .2 | 3.0 |
| SPD | 2 | 15 | .6 | 9.0 |
| TPC | 1 | 12 | .2 | 2.4 |
| SPD | 0 | 12 | .7 | 8.4 |
| TPC | 1 | 15 | .2 | 3.0 |
| SPD | 0 | 15 | .7 | 10.5 |
| TPC | 1 | 20 | .2 | 4.0 |

Watershed #12B (continued)

| | | | | |
|---|---|---|---|---|
| SPD | 0 | 20 | .7 | 14.0 |
| TPC | 7 | 11 | .1 | 1.1 |
| SPD | 6 | 11 | .1 | 1.1 |
| TCC | 1 | 97 | .4 | 38.8 |
| SPD | 0 | 97 | .7 | 67.9 |
| TPC | 1 | 60 | .2 | 12.0 |
| SPD | 0 | 60 | .7 | 42.0 |
| TCC | 1 | 37 | .4 | 14.8 |
| SPD | 0 | 37 | .7 | 25.9 |
| TPC | 1 | 206 | .2 | 41.2 |
| SPD | 0 | 206 | .7 | 144.2 |
| TCC | 7 | 20 | .1 | 2.0 |
| SPD | 8 | 20 | .1 | 2.0 |
| TPC | 6 | 77 | .1 | 7.7 |
| SPD | 5 | 77 | .2 | 15.4 |
| TPC | 1 | 30 | .2 | 6.0 |
| SPD | 0 | 30 | .7 | 21.0 |
| TCC | 3 | 13 | .2 | 1.3 |
| SPD | 2 | 13 | .6 | 7.8 |
| TPC | 3 | 17 | .1 | 1.7 |
| SPD | 2 | 17 | .6 | 10.2 |
| TCC | 8 | 51 | .1 | 5.1 |
| SPD | 7 | 51 | .1 | 5.1 |
| TCC | 8 | 107 | .1 | 10.7 |
| SPD | 7 | 107 | .1 | 10.7 |
| TPC | 8 | 28 | .1 | 2.8 |
| SPD | 7 | 28 | .1 | 2.8 |
| TPC | 8 | 47 | .1 | 4.7 |
| SPD | 7 | 47 | .1 | 4.7 |
| TPC | 1 | 43 | .2 | 8.6 |
| SPD | 0 | 43 | .7 | 30.1 |
| TPC | 9 | 174 | .1 | 17.4 |
| SPD | 8 | 174 | .1 | 17.4 |
| TCC | 7 | 171 | .1 | 17.1 |
| SPD | 6 | 171 | .1 | 17.1 |
| TCC | 9 | 31 | .1 | 3.1 |
| SPD | 8 | 31 | .1 | 3.1 |
| TCC | 8 | 21 | .1 | 2.1 |
| SPD | 7 | 21 | .1 | 2.1 |
| | | | TOTAL | 815.2 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEMS:815.2 *.27 = | 220.1 | .9 | 198.1 |
| ROAD CRA: | 355.0 | .9 | 319.5 |
| TOTAL CRA: | | | 1332.8 |

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**Watershed # 13: Lower Coal Creek**

S.W. 1\4 Section 28 T34N, R21W

TOTAL AREA OF WATERSHED: 28910 ACRES
HARVESTED ACRES: 766 ACRES
ROAD LENGTH: 48.2 MI
CRA: 671.7
% OF DISTURBANCE; 2.3%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 8 | 65 | | .1 | | 6.5 |
| SPD | 7 | 65 | | .1 | | 6.5 |
| TPC | 6 | 35 | | .1 | | 3.5 |
| SPD | 5 | 35 | | .2 | | 7.0 |
| TCC | 6 | 16 | | .1 | | 1.6 |
| SPD | 5 | 16 | | .2 | | 3.2 |
| TPC | 6 | 9 | | .1 | | .9 |
| SPD | 5 | 9 | | .2 | | 1.8 |
| TPC | 6 | 20 | | .1 | | 2.0 |
| SPD | 5 | 20 | | .2 | | 4.0 |
| TPC | 9 | 30 | | .1 | | 3.0 |
| SPD | 8 | 30 | | .1 | | 3.0 |
| TPC | 8 | 79 | | .1 | | 7.9 |
| SPD | 7 | 79 | | .1 | | 7.9 |
| TPC | 9 | 22 | | .1 | | 2.2 |
| SPD | 8 | 22 | | .1 | | 2.2 |
| TCC | 6 | 10 | | .2 | | 1.0 |
| SPD | 0 | 10 | | .7 | | 7.0 |
| TCC | 1 | 4 | | .2 | | 0.8 |
| SPD | 0 | 4 | | .7 | | 2.8 |
| TCC | 1 | 5 | | .2 | | 1.0 |
| SPD | 0 | 5 | | .7 | | 3.5 |
| TCC | 3 | 41 | | .2 | | 8.2 |
| SPD | 2 | 41 | | .6 | | 24.6 |
| TCC | 2 | 38 | | .35 | | 13.3 |
| SPD | 1 | 38 | | .7 | | 26.6 |
| TPC | 6 | 41 | | .1 | | 4.1 |
| SPD | 5 | 41 | | .1 | | 4.1 |
| TPC | 9 | 49 | | .1 | | 4.9 |
| SPD | 8 | 49 | | .1 | | 4.9 |
| TPC | 2 | 24 | | .15 | | 3.6 |
| SPD | 1 | 24 | | .7 | | 6.8 |
| TCC | 2 | 49 | | .35 | | 17.2 |
| SPD | 1 | 49 | | .7 | | 34.3 |
| TCC | 1 | 7 | | .4 | | 2.8 |
| SPD | 0 | 7 | | .7 | | 4.9 |
| TCC | 2 | 30 | | .35 | | 10.5 |
| SPD | 1 | 30 | | .7 | | 21.0 |

**Watershed #13 (continued)**

| | | | | |
|---|---|---|---|---|
| TCC | 3 | 35 | .2 | 7.0 |
| SPD | 2 | 35 | .6 | 21.0 |
| TCC | 4 | 3 | .2 | 0.6 |
| SPD | 3 | 2 | .6 | 1.2 |
| TCC | 1 | 22 | .4 | 8.8 |
| SPD | 0 | 22 | .7 | 15.4 |
| TPC | 3 | 27 | .1 | 2.7 |
| SPD | 2 | 27 | .6 | 16.2 |
| TCC | 1 | 59 | .4 | 23.6 |
| SPD | 0 | 59 | .7 | 41.3 |
| TPC | 9 | 128 | .1 | 12.8 |
| SPD | 8 | 128 | .1 | 12.8 |
| TPC | 6 | 18 | .1 | 1.8 |
| SPD | 5 | 18 | .2 | 3.6 |
| | | | TOTAL | 1342.6 |

PERM.SKID SYSTEM:1342.6 * .27 = 362.5 .9 326.3

ROAD CRA: 48.3 .9 43.5

TOTAL CRA: 1712.4

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**Watershed # 14: Coal Creek (North Fork)**

S.W. 1\4 Section 24 T34N, R21W.

TOTAL AREA OF WATERSHED: 12965 ACRES.
HARVESTED ACRES: 740 ACRES
ROAD LENGTH: 67.8 MI
CRA: 868.6
% OF DISTURBANCE: 6.7%

| Activity | Age of Act.(yrs) | EA * | RC = | CRA |
|---|---|---|---|---|
| TPC | 2 | 24 | .15 | 3.6 |
| SPD | 1 | 24 | .7 | 16.8 |
| TCC | 6 | 26 | .1 | 2.6 |
| SPD | 5 | 26 | .2 | 5.2 |
| TCC | 1 | 35 | .4 | 14.0 |
| SPD | 0 | 35 | .7 | 24.5 |
| TCC | 4 | 47 | .2 | 9.4 |
| SPD | 3 | 47 | .5 | 23.5 |
| TCC | 1 | 16 | .4 | 6.4 |
| SPD | 0 | 16 | .7 | 11.2 |
| TCC | 1 | 21 | .4 | 8.4 |
| SPD | 0 | 21 | .7 | 14.7 |
| TCC | 4 | 30 | .2 | 6.0 |
| SPD | 3 | 30 | .5 | 15.0 |
| TCC | 6 | 21 | .1 | 2.1 |

**Watershed #14 (continued)**

| | | | | |
|---|---|---|---|---|
| SPD | 5 | 21 | .2 | 4.2 |
| TCC | 3 | 50 | .2 | 10.0 |
| SPD | 2 | 50 | .7 | 35.0 |
| TCC | 1 | 67 | .4 | 26.8 |
| SPD | 0 | 67 | .7 | 46.9 |
| TPC | 4 | 21 | .1 | 2.1 |
| SPD | 3 | 21 | .1 | 2.1 |
| TPC | 3 | 20 | .1 | 2.0 |
| SPD | 2 | 20 | .6 | 12.0 |
| TPC | 4 | 28 | .1 | 2.8 |
| SPD | 3 | 28 | .5 | 14.0 |
| TCC | 1 | 6 | .4 | 2.4 |
| SPD | 0 | 6 | .7 | 4.2 |
| TCC | 1 | 25 | .4 | 10.0 |
| SPD | 0 | 25 | .7 | 17.5 |
| TCC | 4 | 14 | .4 | 5.6 |
| SPD | 3 | 14 | .7 | 9.8 |
| TCC | 1 | 47 | .4 | 18.8 |
| SPD | 0 | 47 | .7 | 32.9 |
| TCC | 5 | 126 | .1 | 12.6 |
| SPD | 4 | 126 | .3 | 37.8 |
| TCC | 6 | 21 | .1 | 2.1 |
| SPD | 5 | 21 | .1 | 2.1 |
| TCC | 6 | 38 | .1 | 3.8 |
| SPD | 5 | 38 | .1 | 3.8 |
| TCC | 5 | 17 | .1 | 1.7 |
| SPD | 4 | 17 | .3 | 5.1 |
| TCC | 1 | 40 | .4 | 16.0 |
| SPD | 0 | 40 | .7 | 28.0 |
| | | TOTAL | | 535.5 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM: 535.5 * .27 = | 144.6 | .9 | 130.1 |
| ROAD CRA: | 225.6 | .9 | 203.0 |
| TOTAL CRA: | | | 868.6 |

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**Watershed # 15: Coal Creek (South Fork)**

N.W. 1\4 Section 25 T34N, R22W.

| | |
|---|---|
| TOTAL AREA OF WATERSHED: | 3877 ACRES |
| HARVESTED ACRES: | 386 ACRES |
| ROAD LENGTH: | 19.9 MI |
| CRA: | 152.1 |
| % OF DISTURBANCE; | 3.9% |

**Watershed #15 (continued)**

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 8 | 65 | | .1 | | 6.5 |
| SPD | 7 | 65 | | .1 | | 6.5 |
| TPC | 6 | 35 | | .1 | | 3.5 |
| SPD | 5 | 35 | | .1 | | 3.5 |
| TCC | 6 | 16 | | .1 | | 1.6 |
| SPD | 5 | 16 | | .1 | | 1.6 |
| TPC | 9 | 83 | | .1 | | 8.3 |
| SPD | 8 | 83 | | .1 | | 8.3 |
| TCC | 7 | 57 | | .1 | | 5.7 |
| SPD | 6 | 57 | | .1 | | 5.7 |
| TPC | 6 | 9 | | .1 | | .9 |
| SPD | 5 | 9 | | .1 | | .9 |
| TPC | 9 | 30 | | .1 | | 3.0 |
| SPD | 8 | 30 | | .1 | | 3.0 |
| TPC | 8 | 91 | | .1 | | 9.1 |
| SPD | 7 | 91 | | .1 | | 9.1 |
| | | | | TOTAL | | 77.2 |

PERM.SKID SYSTEM:77.2 * .27 = 20.8 .9 18.8

ROAD CRA: 62.3 .9 56.1

TOTAL CRA: 152.1

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**Watershed # 17: Red Meadow Creek**

N.W. 1\4 Section 11 T35N, R22W.

TOTAL AREA OF WATERSHED: 13925 ACRES
HARVESTED ACRES: 289
ROAD LENGTH: 18.3 ACRES
CRA: 449.0
% OF DISTURBANCE: 3.4%

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TCC | 1 | 129 | | .4 | | 51.6 |
| SPD | 0 | 129 | | .7 | | 90.3 |
| TCC | 1 | 67 | | .4 | | 26.8 |
| SPD | 0 | 67 | | .7 | | 46.9 |
| TCC | 2 | 33 | | .35 | | 11.6 |
| SPD | 1 | 33 | | .7 | | 23.1 |
| TPC | 6 | 60 | | .4 | | 24.0 |
| SPD | 5 | 60 | | .7 | | 42.0 |
| | | | | TOTAL | | 316.3 |

**Watershed #17 (continued)**

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM:316.3 * .27 = | 85.3 | .9 | 76.8 |
| ROAD CRA: | 62.1 | .9 | 55.9 |
| TOTAL CRA: | | | 449.0 |

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**Watershed # 18: Whale Creek**

S.E. 1\4 20 T36N, R22W.

| | | |
|---|---|---|
| TOTAL AREA OF WATERSHED: | 33646 | ACRES |
| HARVESTED ACRES: | 585 | ACRES |
| ROAD LENGTH: | 18 | MI |
| CRA: | 419.9 | |
| % OF DISTURBANCE: | 1.2% | |

| Activity | Age of Act.(yrs) | EA * | RC = | CRA |
|---|---|---|---|---|
| TPC | 9 | 91 | .1 | 9.1 |
| SPD | 8 | 91 | .1 | 9.1 |
| TCC | 9 | 24 | .1 | 2.4 |
| SPD | 8 | 24 | .1 | 2.4 |
| TPC | 4 | 19 | .2 | 1.9 |
| SPD | 3 | 19 | .5 | 9.5 |
| TCC | 9 | 12 | .1 | 1.2 |
| SPD | 8 | 12 | .1 | 1.2 |
| TPC | 4 | 42 | .2 | 8.4 |
| SPD | 3 | 42 | .5 | 21.0 |
| TPC | 4 | 20 | .1 | 2.0 |
| SPD | 3 | 20 | .5 | 10.0 |
| TPC | 5 | 39 | .1 | 3.9 |
| SPD | 4 | 39 | .3 | 11.7 |
| TPC | 3 | 53 | .1 | 5.3 |
| SPD | 2 | 53 | .6 | 31.8 |
| TPC | 6 | 13 | .1 | 1.3 |
| SPD | 5 | 13 | .2 | 2.6 |
| TPC | 4 | 14 | .1 | 1.4 |
| SPD | 3 | 14 | .5 | 7.0 |
| TCC | 5 | 8 | .1 | 0.8 |
| SPD | 4 | 8 | .3 | 2.4 |
| TCC | 4 | 5 | .2 | 1.0 |
| SPD | 3 | 5 | .5 | 2.5 |
| TPC | 4 | 34 | .1 | 3.4 |
| SPD | 3 | 34 | .5 | 17.0 |
| TPC | 6 | 5 | .1 | 0.5 |
| SPD | 5 | 5 | .2 | 1.0 |
| TPC | 4 | 59 | .1 | 5.9 |
| SPD | 3 | 59 | .5 | 29.5 |

**Watershed #18 (continued)**

| | | | | |
|---|---|---|---|---|
| TPC | 4 | 92 | .1 | 9.2 |
| SPD | 3 | 92 | .5 | 46.0 |
| TPC | 4 | 55 | .1 | 5.5 |
| SPD | 3 | 55 | .5 | 27.5 |
| | | | TOTAL | 295.4 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM: 295.4 * .27 = | 79.8 | .9 | 71.8 |
| ROAD CRA: | 58.5 | .9 | 52.7 |
| TOTAL CRA: | | | 419.9 |

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**Watershed # 19: Trail Creek**

N.E. 1\4 Section 33 T37N, R22W.

TOTAL AREA OF WATERSHED: 39643 ACRES
HARVESTED ACRES: 465 ACRES
ROAD LENGTH: 21.0 MI
CRA: 917.4
% OF DISTURBANCE: 2.3%

| Activity | Age of Act.(yrs) | EA * | RC | CRA |
|---|---|---|---|---|
| TPC | 5 | 59 | .1 | 5.9 |
| SPD | 4 | 59 | .3 | 17.7 |
| TPC | 9 | 56 | .1 | 5.6 |
| SPD | 8 | 56 | .1 | 5.6 |
| TPC | 9 | 85 | .1 | 8.5 |
| SPD | 8 | 85 | .1 | 8.5 |
| TPC | 5 | 28 | .1 | 2.8 |
| SPD | 4 | 28 | .3 | 8.4 |
| TCC | 7 | 41 | .1 | 4.1 |
| SPD | 6 | 41 | .1 | 4.1 |
| TPC | 8 | 20 | .1 | 2.0 |
| SPD | 7 | 20 | .1 | 2.0 |
| TPC | 5 | 44 | .1 | 4.4 |
| SPD | 4 | 44 | .3 | 13.2 |
| TPC | 9 | 115 | .1 | 11.5 |
| SPD | 8 | 115 | .1 | 11.5 |
| TPC | 1 | 26 | .2 | 5.2 |
| SPD | 0 | 26 | .7 | 18.2 |
| TPC | 8 | 131 | .1 | 13.1 |
| SPD | 7 | 131 | .1 | 13.1 |
| TPC | 1 | 20 | .2 | 4.0 |
| SPD | 0 | 20 | .7 | 14.0 |
| TPC | 7 | 11 | .1 | 1.1 |
| SPD | 6 | 11 | .1 | 1.1 |
| TCC | 1 | 97 | .4 | 38.8 |

**Watershed #19 (continued)**

| | | | | |
|---|---|---|---|---|
| SPD | 0 | 97 | .7 | 67.9 |
| TPC | 1 | 60 | .2 | 12.0 |
| SPD | 0 | 60 | .7 | 42.0 |
| TCC | 1 | 37 | .4 | 14.8 |
| SPD | 0 | 37 | .7 | 25.9 |
| TPC | 1 | 206 | .2 | 41.2 |
| SPD | 0 | 206 | .7 | 144.2 |
| TCC | 7 | 20 | .1 | 2.0 |
| SPD | | 20 | .1 | 2.0 |
| SPD | 7 | 20 | .1 | 2.0 |
| TPC | 9 | 20 | .1 | 2.0 |
| SPD | 8 | 20 | .1 | 2.0 |
| TCC | 6 | 40 | .1 | 4.0 |
| SPD | 5 | 40 | .2 | 8.0 |
| TCC | 8 | 30 | .1 | 3.0 |
| SPD | 7 | 30 | .1 | 3.0 |
| TCC | 7 | 101 | .1 | 10.1 |
| SPD | 6 | 101 | .1 | 10.1 |
| TCC | 6 | 76 | .1 | 7.6 |
| SPD | 5 | 76 | .2 | 15.2 |
| TCC | 8 | 62 | .1 | 6.2 |
| SPD | 7 | 62 | .1 | 6.2 |
| TCC | 6 | 12 | .1 | 1.2 |
| SPD | 5 | 12 | .2 | 2.4 |
| TCC | 6 | 52 | .1 | 5.2 |
| SPD | 5 | 52 | .2 | 10.4 |
| TCC | 9 | 52 | .1 | 5.2 |
| SPD | 8 | 52 | .1 | 5.2 |
| | | TOTAL | | 685.4 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM:685.4 * .27 = | 185.1 | .9 | 166.6 |
| ROAD CRA: | 72.1 | .9 | 64.9 |
| TOTAL CRA: | | | 202.9 |

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**Watershed # 20: Granite Creek**

S.W. 1\4 Section 6 T28N, R14W.

| | | |
|---|---|---|
| TOTAL AREA OF WATERSHED: | 11117.7 | ACRES |
| HARVESTED ACRES: | 144 | ACRES |
| ROAD LENGTH: | 20.7 | MI |
| CRA: | 206.8 | |
| % OF DISTURBANCE: | 1.9 | |

**Watershed #20 (continued)**

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TCC | 3 | 33 | | .2 | | 6.6 |
| SPD | 2 | 33 | | .6 | | 19.8 |
| TCC | 5 | 17 | | .1 | | 1.7 |
| SPD | 4 | 17 | | .1 | | 1.7 |
| TCC | 2 | 43 | | .35 | | 15.1 |
| SPD | 1 | 43 | | .7 | | 30.1 |
| TCC | 2 | 37 | | .35 | | 13.0 |
| SPD | 1 | 37 | | .7 | | 25.9 |
| | | | | TOTAL | | 113.9 |

PERM.SKID SYSTEM: 113.9 * .27 = 30.8 .9 27.7

ROAD CRA: 72.5 .9 65.2

TOTAL CRA: 206.8

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**Watershed # 21: Challenge Creek**

N.W. 1\4 Section 32 T29N, R14W

| | | |
|---|---|---|
| TOTAL AREA OF WATERSHED: | 4480 | ACRES |
| HARVESTED ACRES: | 90 | ACRES |
| ROAD LENGTH: | 1.8 | MI |
| TOTAL CRA: | 113.0 | |
| % OF DISTURBANCE: | 2.5 | |

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TCC | 3 | 33 | | .2 | | 6.6 |
| SPD | 8 | 20 | | .1 | | 2.0 |
| TPC | 6 | 77 | | .1 | | 7.7 |
| SPD | 5 | 77 | | .2 | | 15.4 |
| TPC | 1 | 30 | | .2 | | 6.0 |
| SPD | 0 | 30 | | .7 | | 21.0 |
| TCC | 3 | 13 | | .2 | | 1.3 |
| SPD | 2 | 13 | | .6 | | 7.8 |
| TPC | 3 | 17 | | .1 | | 1.7 |
| SPD | 2 | 17 | | .6 | | 10.2 |
| TCC | 8 | 51 | | .1 | | 5.1 |
| SPD | 7 | 51 | | .1 | | 5.1 |
| TCC | 8 | 107 | | .1 | | 10.7 |
| SPD | 7 | 107 | | .1 | | 10.7 |
| TPC | 8 | 28 | | .1 | | 2.8 |
| SPD | 7 | 28 | | .1 | | 2.8 |
| TPC | 8 | 47 | | .1 | | 4.7 |
| SPD | 7 | 33 | | .6 | | 19.8 |
| TCC | 2 | 57 | | .35 | | 20.0 |

**Watershed #21 (continued)**

| | | | | |
|---|---|---|---|---|
| SPD | 1 | 57 | .7 | 39.9 |
| | | | TOTAL | 86.3 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM: 86.3 * .27 = | 23.3 | .9 | 21.0 |
| ROAD CRA: | 6.3 | .9 | 5.7 |
| TOTAL CRA: | | | 113.0 |

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**Watershed # 23: Morrison Creek**

N.W. 1\4 Section 9 T28N, R14W.

| | | |
|---|---|---|
| TOTAL AREA OF WATERSHED: | 6829.7 | ACRES |
| HARVESTED ACRES: | 53 | ACRES |
| ROAD LENGTH: | 11 | MI |
| TOTAL CRA: | 173.4 | |
| % OF DISTURBANCE: | 2.5 | |

| Activity | Age of Act.(yrs) | EA * | RC = | CRA |
|---|---|---|---|---|
| TPC | 1 | 43 | .2 | 8.6 |
| SPD | 0 | 43 | .7 | 30.1 |
| TPC | 9 | 174 | .1 | 17.4 |
| SPD | 8 | 174 | .1 | 17.4 |
| TCC | 7 | 171 | .1 | 17.1 |
| SPD | 6 | 171 | .1 | 17.1 |
| TCC | 9 | 31 | .1 | 3.1 |
| SPD | 8 | 31 | .1 | 3.1 |
| TCC | 8 | 21 | .1 | 2.1 |
| SPD | 7 | 21 | .1 | 2.1 |
| | | | TOTAL | 118.1 |

| | | | |
|---|---|---|---|
| PERM.SKID SYSTEM: 118.1 * .27 = | 31.9 | .9 | 28.7 |
| ROAD CRA: | 29.5 | .9 | 26.6 |
| TOTAL CRA: | | | 173.4 |

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**Watershed # 24A: Hungry Horse Creek**

N.W. 1\4 Section 22 T30N, R18W.

| | |
|---|---|
| TOTAL AREA OF WATERSHED: | 10358.9 ACRES |
| HARVESTED ACRES: | 10 |
| ROAD LENGTH: | 14.9 MI |
| CRA: | 47.0 |
| % OF DISTURBANCE: | <0.0 |

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 5 | 10 | | .1 | | 1.0 |
| SPD | 4 | 10 | | .3 | | 3.0 |
| | | | | TOTAL | | 4.0 |
| PERM.SKID SYSTEM: | 4 * .27 = | 1.1 | | .9 | | 1.0 |
| ROAD CRA: | | 47.8 | | .9 | | 42.0 |
| TOTAL CRA: | | | | | | 47.0 |

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**Watershed # 24B: Hungry Horse Creek**

S.E. 1\4 Section 23 T30N, R18W.

| | |
|---|---|
| TOTAL AREA OF WATERSHED: | 3090.3 ACRES |
| HARVESTED ACRES: | 0 |
| ROAD LENGTH: | 6.5 MI |
| CRA: | 18.5 |
| % OF DISTURBANCE: | <0.0 |

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| no activity | | | | | | |
| ROAD CRA: | | 20.5 | | .9 | | 18.5 |
| TOTAL CRA: | | | | | | 18.5 |

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**Watershed # 25: Margaret Creek**

S.E. 1\4 Section 15 T30N, R18W.

| | |
|---|---|
| TOTAL AREA OF WATERSHED: | 2835 ACRES |
| HARVESTED ACRES: | 46 ACRES |
| ROAD LENGTH: | 4.4 MI |
| CRA: | 23.1 |
| % OF DISTURBANCE: | <0 |

**Watershed #25 (continued)**

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 7 | 27 | | .1 | | 2.7 |
| SPD | 6 | 27 | | .1 | | 2.7 |
| TPC | 7 | 19 | | .1 | | 1.9 |
| SPD | 6 | 19 | | .1 | | 1.9 |
| | | | | | TOTAL | 9.2 |
| PERM.SKID SYSTEMS: 9.2 * .27 = | | 2.5 | | .9 | | 2.3 |
| ROAD CRA: | | 15.4 | | .9 | | 13.9 |
| TOTAL CRA: | | | | | | 23.1 |

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**Watershed # 26: Tiger Creek**

S.E. 1\4 Section 14 T30N, R18W

TOTAL AREA OF WATERSHED: 4326 ACRES
HARVESTED ACRES: 0 ACRES
ROAD LENGTH: 6.3 MI
CRA: 20.3
% OF DISTURBANCE: <0

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| no activity | | | | | | |
| ROAD CRA: | | 22.5 | | .9 | | 20.3 |
| TOTAL CRA: | | | | | | 20.3 |

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**Watershed # 27: Emery Creek**

N.E. 1\4 Section 8 T30N, R18W.

TOTAL AREA OF WATERSHED: 9801.1 ACRES
HARVESTED ACRES: 131 ACRES
ROAD LENGTH: 36.3 MI
CRA: 207.4
% OF DISTURBANCE: 2

| Activity | Age of Act.(yrs) | EA | * | RC | = | CRA |
|---|---|---|---|---|---|---|
| TPC | 9 | 40 | | .1 | | 4.0 |
| SPD | 8 | 40 | | .1 | | 4.0 |
| TCC | 4 | 59 | | .2 | | 11.8 |
| SPD | 3 | 59 | | .5 | | 29.5 |
| TCC | 3 | 32 | | .2 | | 6.4 |

**Watershed #27 (continued)**

| | | | | |
|---|---|---|---|---|
| SPD | 2 | 32 | .6 | 19.2 |
| | | | TOTAL | 74.9 |
| PERM.SKID SYSTEM:74.9 * .27 = | | 20.2 | .9 | 18.2 |
| TOTAL ROADS: | | 127.1 | .9 | 114.3 |
| TOTAL CRA: | | | | 207.4 |

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**Watershed # 29: Squaw trib.**

N.W. 1\4 Section 34 T29N, R25W.

TOTAL AREA OF WATERSHED: 1075 ACRES
HARVESTED ACRES: 138 ACRES
ROAD LENGTH: 6.3 MI
CRA: 119.5
% OF DISTURBANCE: 11.1%

| Activity | Age of Act.(yrs) | EA | * RC = | CRA |
|---|---|---|---|---|
| TCC | 8 | 24 | .1 | 2.4 |
| SPD | 7 | 24 | .1 | 2.4 |
| TCC | 2 | 21 | .35 | 7.4 |
| SPD | 1 | 21 | .7 | 14.7 |
| TPC | 1 | 31 | .2 | 6.2 |
| SPD | 0 | 31 | .7 | 21.7 |
| TCC | 7 | 36 | .1 | 3.6 |
| SPD | 6 | 36 | .1 | 3.6 |
| TCC | 6 | 13 | .1 | 1.3 |
| SPD | 5 | 13 | .2 | 2.6 |
| TCC | 1 | 13 | .4 | 5.2 |
| SPD | 0 | 13 | .7 | 9.1 |
| | | | TOTAL | 80.2 |
| PERM.SKID SYSTEM: 80.2 * .27 = | | 21.7 | .9 | 19.5 |
| ROAD CRA: | | 22.1 | .9 | 19.8 |
| TOTAL CRA: | | | | 119.5 |

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