REMOTE SENSING SURVEY OF RANGELAND: VICINITY OF JOHN DAY, OREGON JUNE 1977

EMSL-LV PROJECT RSD 7813

REMOTE SENSING OPERATIONS BRANCH
REMOTE SENSING DIVISION
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OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
LAS VEGAS, NEVADA 89114

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By

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For

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GENERAL

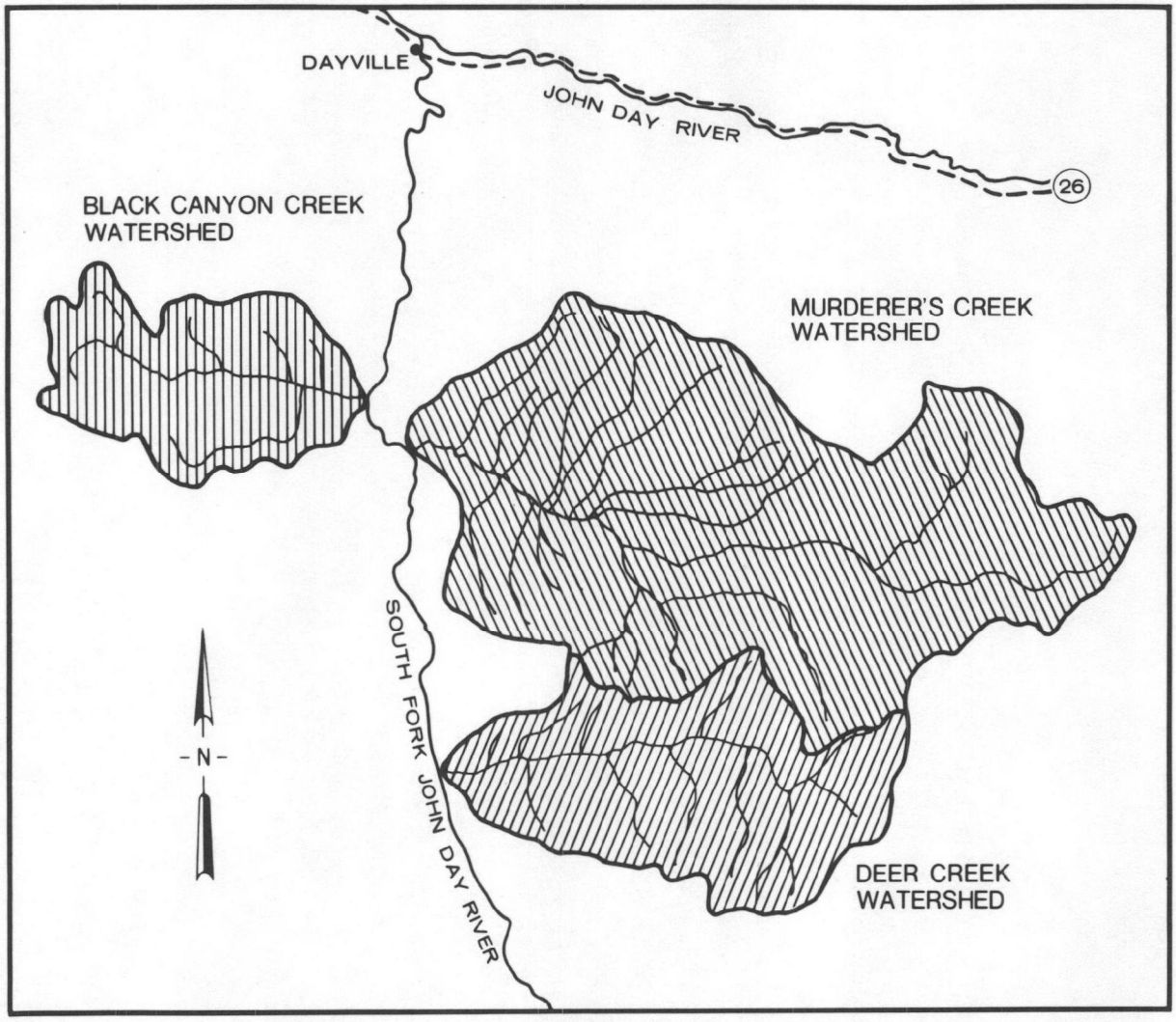
The purpose of this study is to provide the Environmental Protection Agency (EPA), Region X, with remotely sensed data on non-point source pollution within the Murderer's Creek, Deer Creek, and Black Canyon Creek watersheds in Oregon. Non-point source pollution is defined as contaminants entering waterways from diffuse of non-distinct points or locations. Since the Federal Water Pollution Control Act Amendment of 1972, much emphasis has been placed upon the identification of land management practices that cause non-point source pollution problems and the development of methods to control such problems. EPA Region X, has been involved in development of various models to define and describe non-point source pollution processes. Input to these models has come from conventional water quality sampling programs.

In 1976, in an effort to gather pertinent data from all possible sources, the Region requested that the Environmental Monitoring and Support Laboratory (EMSL-LV) in Las Vegas perform remote sensing surveys of selected sites within agriculture, forest, and rangeland environments. Seven sites within the States of Washington, Oregon, and Idaho were selected on the

basis of available water quality data and their representation of a broad range of non-point source problems. Aerial photography was acquired in May and June, 1977, for subsequent analysis and documentation.

This is the second year that EMSL-LV has performed remote sensing surveys related to non-point source (NPS) pollution problems in Region X. As these projects continue, data collection, analysis, and documentation efforts are being refined in order to produce more useable products. The ultimate objective is the development of models through an input of conventional water quality sampling data and remotely sensed information. Data derived from these models would then allow the Region to monitor specific watersheds for compliance to established water quality standards and/or best management practices. This is the second in a series of seven reports concerned with non-point source problems in Region X.

This report presents data from Murderer's Creek, Deer Creek, and Black Canyon Creek watersheds. These 3 watersheds are located approximately 25 miles west of John Day, Oregon, in Grant County (See Figure 1). The areal extent of these watersheds is approximately 215 square miles. Vegetation on the lower slopes and valley bottoms are composed of grasses, shrubs, and scattered timber and is used primarily for grazing. The upper slopes, utilized for timber production and recreation, are heavily forested.



MURDERER'S, DEER, AND
BLACK CANYON CREEK WATERSHEDS
GRANT COUNTY, OREGON
JUNE, 1977

Legend

0 4 8
MILES (APPROX)

Watersheds
Watercourses
Roads

Figure 1

COLLECTION OF AERIAL IMAGERY

Prior to imagery acquisition, EMSL-LV and Region X personnel discussed data needs of the Region and EMSL-LV remote sensing capabilities. The result of these discussions was a list of features to be identified and delineated during the analysis phase of the project. Color infrared photographs of the watersheds were acquired for photoanalysis in June of 1977. Approximately 3 weeks later, the National Aeronautics and Space Administration (NASA) U2 Aircraft acquired high-altitude color infrared photography of the watersheds. The high-altitude photography is used to construct photomosaic base maps for displaying interpreted data. After imagery acquisition, a field trip was made to the three study watersheds to observe and document the features of interest.

ANALYSIS OF IMAGERY

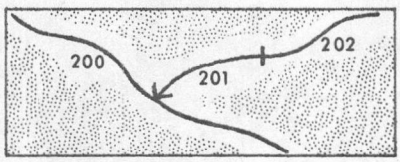
The photography was viewed stereoscopically using image parameters such as tone, texture, size and shape, in conjunction with ground-truth data to develop "signatures" for each category or feature of interest. These signatures are unique combinations of the image parameters that allow a photointerpreter to recognize and differentiate each feature.

Vegetation cover can be categorized in a number of ways. Since the information within this report is to be used for non-point source modeling, it was decided that physical structure,

i.e., grass, brush, and trees would be the best categorization scheme. On the accompanying maps, each category has a 3 digit number. The first number identifies a density of grass cover, the second, a percent cover of brush, and the third, a percent cover of trees within a given area. Essentially, the presence of grass, brush, and trees in a given location represents a vertical arrangement of vegetation as well as a horizontal one. Grass cover would be the lowest level; followed by brush, and finally, trees are at the upper most level. To be able to view and map these vegetation strata from an aerial perspective, tree cover percentage must be fairly low so that the brush below can be seen. Likewise, the brush cover percentage should be low so that the grass can be observed.

DATA PRESENTATION

Maps 1 through 4 display results of the photoanalysis. The first two maps depict vegetation types and streambank vegetation for Murderer's and Deer Creek watersheds, while Maps 3 and 4 illustrate the same data for the Black Canyon Creek watershed. Relative to the streambank vegetation maps, two symbols should be explained. A short bar transecting a given watercourse indicates a change in streambank vegetation type. Where tributaries and receiving waters have different vegetation categories, the tributary is marked with an "arrow" at the point of confluence. (See illustration below).



Tables 1 and 2 present acreage by vegetation type for Murderer's Creek and Deer Creek watersheds. Tables 3 and 4 present streambank vegetation data for the Black Canyon Creek watershed. Due to aircraft alignment during data acquisition, photography for two small areas of Murderer's and Black Canyon Creek watersheds was not obtained. The acreage of these areas amounts to less than 1% of the total watershed acreage.

TABLE 1. VEGETATION COVER ACREAGES

Murderer's Creek Watershed		Deer Creek Watershed		Black Canyon Creek Watershed	
Category	Acreage	Category	Acreage	Category	Acreage
100	2772.0	100	1240.0	200	6398.0
101	349.0	101	62.0	201	7046.0
110	112.0	120	243.0	202	1962.0
200	27,443.0	121	830.0	203	5831.0
201	26,019.0	200	3489.0	210	1065.0
202	1501.0	201	15,631.0	220	455.0
203	20,478.0	202	2442.0		
210	3458.0	203	4018.0		
211	2828.0	210	1364.0		
212	69.0	211	1196.0		
220	274.0	220	417.0		
		221	2274.0		
		230	343.0		
Totals	85,303.0		33,549.0		22,757.0

TABLE 2. STREAMBANK VEGETATION MILEAGE

Murderer's Creek Watershed		Deer Creek Watershed		Black Canyon Creek Watershed	
Category	Mileage	Category	Mileage	Category	Mileage
100	1.0	100	2.0	201	12.0
101	1.0	101	2.0	201*	4.0
200	100.0	200	46.0	202	40.0
201	85.0	201	53.0	210*	0.1
201*	0.5	201*	0.3	220	1.0
202	98.0	202	9.0	220*	7.0
202*	4.0	203	1.0	222	0.5
203	2.0	210	3.0		
203*	3.0	214	0.1		
210	4.0	221	1.0		
210*	6.0	230	0.4		
220	3.0				
221	0.2				
Totals	308.0		118.0		65.0

* Denotes Riparian Vegetation.