United States Department of Agriculture

Forest Service

Willamette NF Supervisor's Office

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Reply To: 1920/2500

Date: December 15, 1997

Subject: Detroit Tributaries Watershed Analysis

To: District Ranger, Detroit

I have received and reviewed the final Detroit Tributaries Watershed Analysis (WA) documentation. The results meet my expectations for WA in FY 97 as agreed to at the Forest WA Workshop in November 1995 and is consistent with the guidance in the Federal Guide for WA, Version 2.2. The analysis provides an adequate background and understanding of processes and conditions within the watershed to proceed with project level planning.

The documentation is well written and thorough. While all sections of the WA are well developed and presented, the Social Domain section is especially complete and well done for a WA. The table format used in Section V. to display the Synthesis and Management Recommendations is also well done and provides useful information for future management decisions. Thank you for the quality work that will serve us well in the future.

/s/ Richard C. Stem

RICHARD C. STEM
Deputy Forest Supervisor

cc:
N.Forrester
D.Bates

Detroit Tributaries
Watershed Analysis

Willamette National Forest
Detroit Ranger District
November 1997

Table of Contents

Page

Page

IV. Social Domain *(pink dividers)*

V. Management Implications *(blue dividers)*

After Page

Visuals

Maps

Maps (continued)

Charts

I. INTRODUCTION

A. The Document

The purpose of this watershed analysis is to provide a general understanding of ecological conditions and processes within the Detroit Tributary watersheds. This information will serve as a basis for future project level analysis and decision-making for a wide range of potential management activities there. The analysis helps to ensure that those activities are consistent with ecosystem management objectives as described in the *Willamette National Forest Land and Resource Management Plans* (Forest Plan) as amended by the *Record of Decision for Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl*.

This document will be in a question and answer format. For each subject area, a mini-story will give an overview; an identification of values and the issues that result from differences in values; a discussion of current and reference conditions as they relate to the issues; a comparison of the differences between current and reference condition and the causes for the change. Finally, the last chapter of the document will discuss the influences and relationships between ecosystem processes and proposes recommendations for dealing with identified issues.

The *Federal Guide for Ecosystem Analysis at the Watershed Scale* (version 2.2) provided guidance for the watershed analysis process. Decisions have not been made about implementing recommendations contained in this document. The recommendations must be further analyzed in the NEPA process.

B. Location

The Detroit Tributary watersheds drain into either Detroit or Big Cliff reservoirs along Oregon State Highway 22. These watersheds lie in the North Santiam river basin on the western slope of the Cascade mountain range (see ***Map I-1***). They are on the west side of the Detroit Ranger District of the Willamette National Forest and extend outside the Forest boundary (see ***Map I-2***, ***Map I-3***). These watersheds are located in Marion County and Linn County, Oregon. Detroit Lake and the North Santiam river divide this 49,335 acre area into Marion and Linn Counties, Oregon. The dams that contain these reservoirs were constructed on the North Santiam River. From here, the North Santiam River flows into the Santiam, the Willamette and Columbia rivers before emptying into the Pacific Ocean.

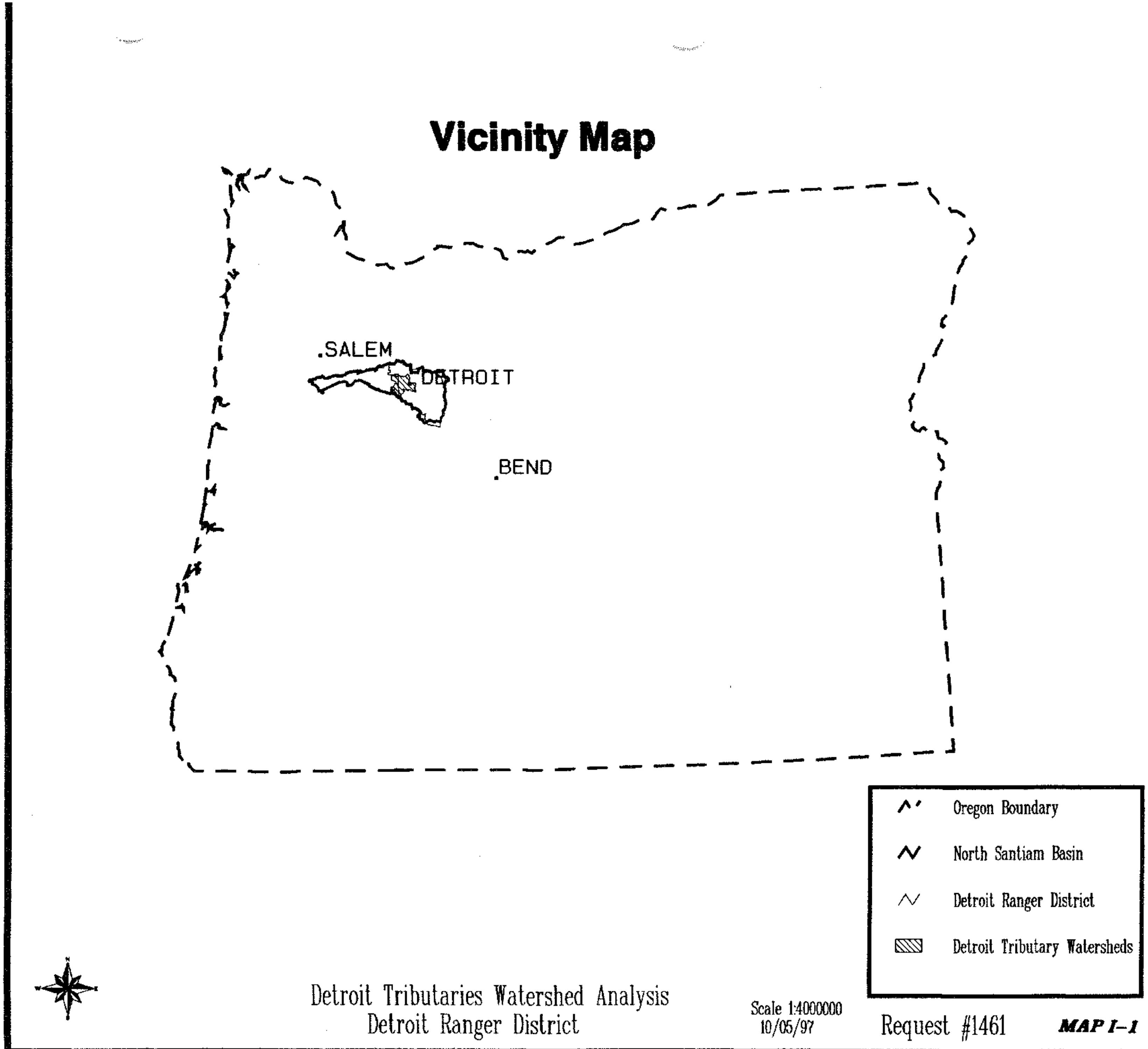
C. Distinguishing Features of the Watershed

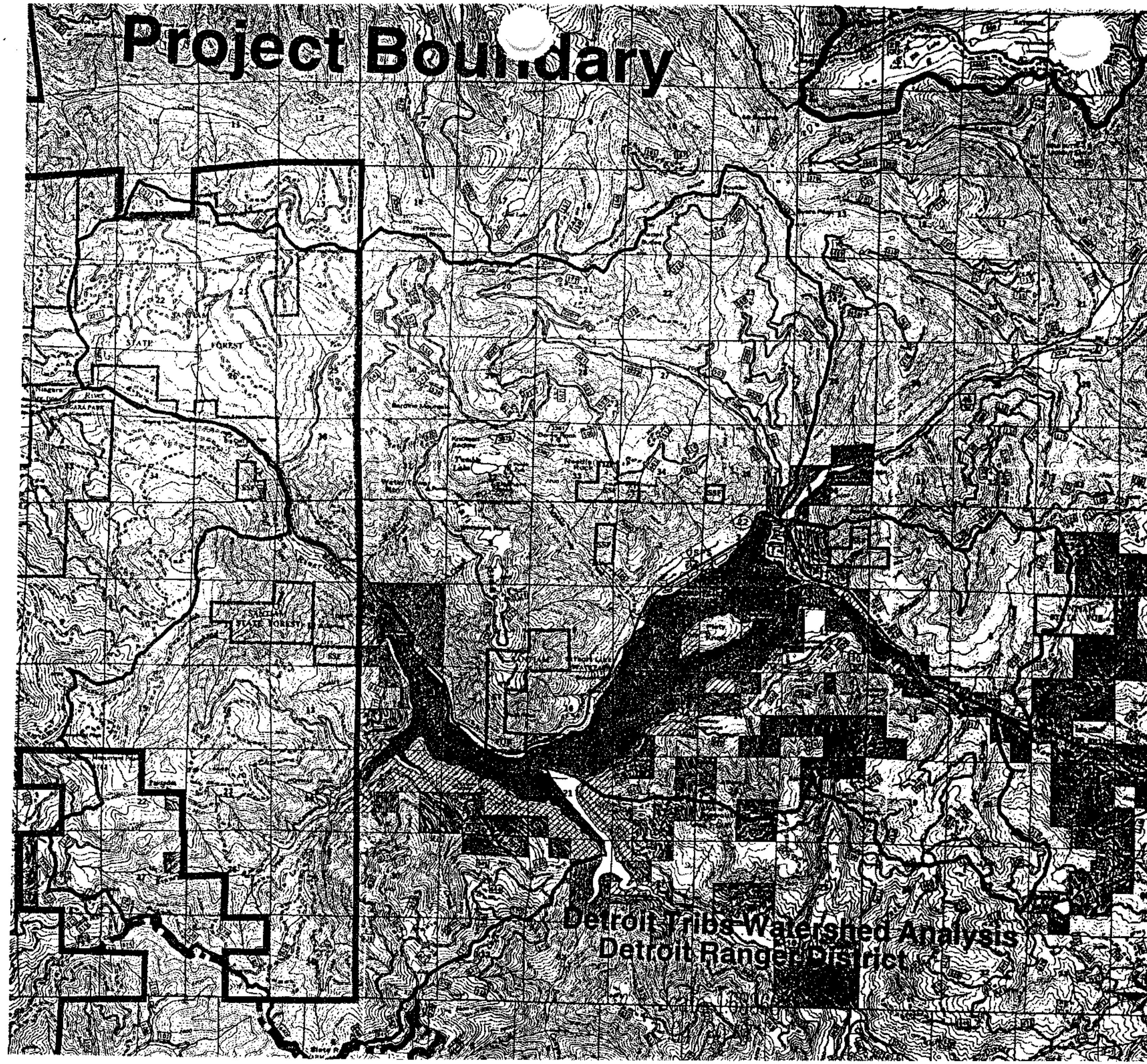
Physical Domain

- Detroit and Big Cliff Reservoirs
  - Detroit and Big Cliff Dams
  - Piety island
- Oregon State Highway 22
- The Cities of Detroit and Idanha
- At least two glaciers ended within center of these watersheds.
- There are few flat wetland areas and small lakes.
- Ten percent of the watersheds are under water (Detroit and Big Cliff reservoirs)
- There are large prominent points such as Needle Rock and Dog Tooth Rock.
- Other facilities include radio towers and powerlines.

Biological Domain

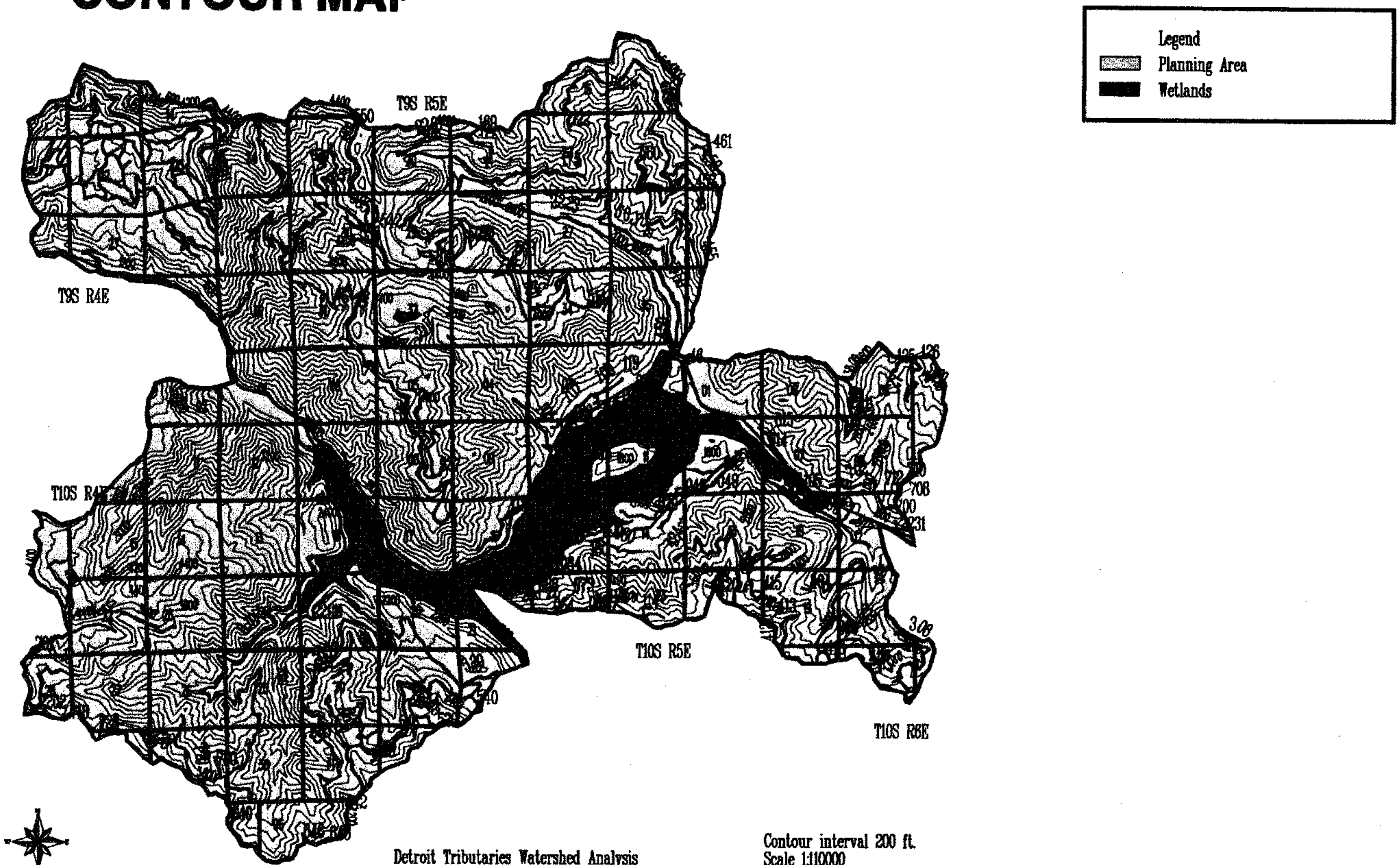
- The Detroit Reservoir has created habitats not previously there.
- Detroit Flats is the most unique area in the watershed for wildlife species, attracting large numbers of species, especially neo-tropical migrant birds.
- There is the highest population of osprey on the District.
- A long standing bald eagle nest is within the area.
- Dams are major barriers that keep anadromous fish out of the North Santiam River.
- There is less plant diversity than other watersheds with the exception of Monument Peak.
- A land locked spring chinook fisheries occurs within Detroit Reservoir.
- There is the largest population of Gorman's aster within its range.
- These watersheds are an entry point for noxious weeds to the Detroit District.


Vicinity Map
.SALEM
DETROIT
.BEND
Oregon Boundary
North Santiam Basin
Detroit Ranger District
Detroit Tributary Watersheds
Detroit Tributaries Watershed Analysis
Detroit Ranger District
Scale 1:4000000
10/05/97
Request #1461
MAP I-1


Project Boundary
Detroit Tribs Watershed Analysis
Detroit Ranger District

MAP I-2

CONTOUR MAP



Detroit Tributaries Watershed Analysis
Detroit Ranger District

MAP I-3

Request #1488

Social Domain

- These watersheds lie in the North Santiam river basin, which is the municipal watershed for communities along the North Santiam River from Marion Forks, Oregon down to and including Salem, Oregon
- City of Detroit and portions of Idanha are in this watershed
- Only watersheds on Detroit District with urban characteristics
- Detroit Lake attracts highest recreational use on the District; second highest use lake in the State
- Reliance on Detroit Lake for City of Detroit tourism economy
- Provides only "roaded" recreational settings; no "semi-primitive" or "primitive" opportunities
- Domestic water supply- domestic water intake for City of Detroit
- Two power line corridors extend through the watershed
- Portions of the West Cascades Scenic Byway and Breitenbush-Clackamas National Scenic Byway.
- Watershed has the most diverse land ownership on the District, including federal, state, private, municipalities, counties, US Army Corps or Engineers; and largest percentage of private land ownership on the District
- Hall's Ridge Communication Site provides local agencies with emergency two-way communication including Forest Service and law enforcement; and local cable television and regional cellular phone services
- Detroit Lake and Mongold State Parks; only State Parks on the Willamette National Forest
- Two privately owned marinas; only commercial marinas on the Willamette National Forest
- Earliest timber harvest anywhere on District
- Five Forest Service concessionaire operated campgrounds, Stahlman summer homes and Sportsmans Club organization site, Piety Island Campground and Detroit Flats Day Use Area
- Lies within the North Santiam Viewshed and managed for high scenic quality
- Scenic features include; first prominent viewpoint of Mt. Jefferson eastbound on Highway 22 overlooking Detroit Lake; Tumble Lake and Falls (Old Growth Grove); Monument Peak (botanical) Special Interest Area; rock/geologic features, such as Phantom Bridge Special Interest Area, Stahlman Point and Dog Tooth, Elephant, Dome and Needle Rocks.
- Only existing hang/para-gliding activities taking place in the Basin

D. Most Important Land Allocations, Management Plan Objectives and Regulatory Constraints

1. Land Allocations (see *Map I-4, Table I-1*)

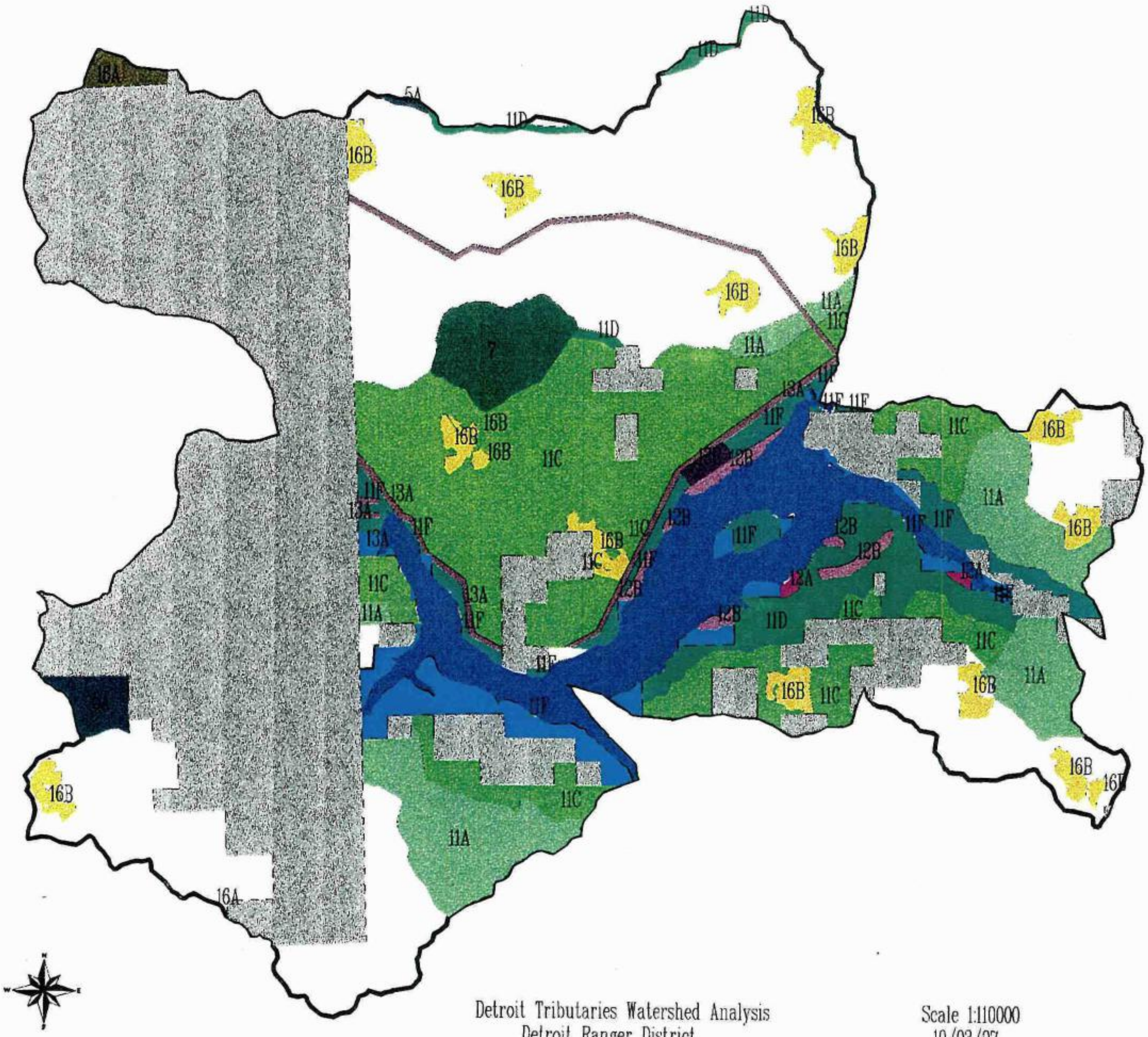
Land allocations and management direction for the allocations were established by forest plans for both the Willamette and Mt. Hood National Forests. The following is a summary of the allocations within the Detroit Tributaries watershed:

Table I-1:

Land Allocations within National Forest Boundary	Acres	Percent of Watersheds within National Forest Boundary
Detroit Reservoir	3275	9
Scenic	9300	26
General Forest	9560	26
Late Successional Reserves (100 acre Owl Cores)	1340	4
Late Successional Reserve	150	0
Currently mapped Riparian Reserves ** (not all streams have been field verified and mapped)	6135	17
Special Use Areas	485	1
Special Interest Area	285	1
Developed Recreation	45	0
Old Growth Grove (Tumble Creek)	830	2
F.S. Administrative Site	70	0
Developed Recreation (special use permit)	235	1
County Ownership	150	0
State Ownership	1015	3
Corps of Engineers Ownership	1115	3
Private Ownership	2120	6
Watershed Acres within National Forest Boundary	36110	100

** This percentage will increase as unmapped streams are field verified in the future.

Land Allocations



Legend

	5A Special Interest Area
	7 Old Growth Grove
	11A Scenic Modification Middleground
	11C Scenic Partial Retention Middleground
	11D Scenic Partial Retention Foreground
	11F Scenic Retention Foreground
	12A Developed Recreation
	12B Developed Rec Special Use
	13A Long Term Special Use
	13B Forest Service Admn Site
	16A Late Successional Reserve
	16B Lsr 100 Acre
	Non Federal Lands
	Corps Land
	Detroit Lake
	General Forest

Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/03/97

MAP I-4

Request #1456

2. Management Plans, Assessments and Guides within the watershed

The management of this watershed is directed by the *Willamette National Forest Land and Resource Management Plan* (1990) and *Mt. Hood National Forest Land and Resource Management Plan* (1990) both of which were amended by the *Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related species Within the Range of the Northern Spotted Owl* (1994).

The land and resource management plan requires site specific direction for management of certain areas. The following existing and proposed plans apply to the Detroit Tributary Watersheds:

- North Santiam River Watershed: City of Salem and the Detroit R.D. Joint Water Quality Monitoring Plan
- New Management Guidelines for Water Quality from the State of Oregon
- Federal Wildland Fire Management Policy and Program
- Bald Eagle Management Plan
- Peregrine Falcon Management Plan*
- Late Successional Reserve Assessment*
- Access and Travel Management Guide*
- Detroit Lake Composite Area Management Guide
- Power line Corridor Management Plan (outdated)
- Wild and Scenic River Management Plan* (if rivers are determined eligible)
- Oregon Scenic Byway Corridor Management Plan
- Reservoir Management and Public Use Development Master Plan (outdated)
- Tumble Lake, Phantom Bridge, and Monument Peak Old Growth Grove and Special Interest Area Implementation Guides*

* = Proposed management plans

3. Memoranda of Understanding/Agreements

- Memorandum of Understanding between USDA Forest Service and US Army Corps of Engineers

- Memorandum of Understanding between the City of Salem, Oregon and USDA Forest Service Willamette National Forest

4. ***Other Plans and Studies**** *- Although these are not Forest Service plans, they affect activities taking place in the watershed, and have implications on Forest Service lands.*

   - Willamette Reservoir Basin Study (Feasibility Report and EIS in progress by the US Army Corps of Engineers and Oregon Water Resources Dept.)
   - North Santiam River Canyon Sewage Treatment Feasibility Study (Cities of Detroit/Idanha)
   - North Santiam Economic Development Strategic Plan (NSCEDC)
   - Cities of Detroit and Idanha Comprehensive and Land Use Plans
   - North Santiam Canyon Tourism Assessment (NSCEDC)
   - North Santiam Canyon Tourism Coalition Action Plan

   * There are other on going studies, this is not a complete list.

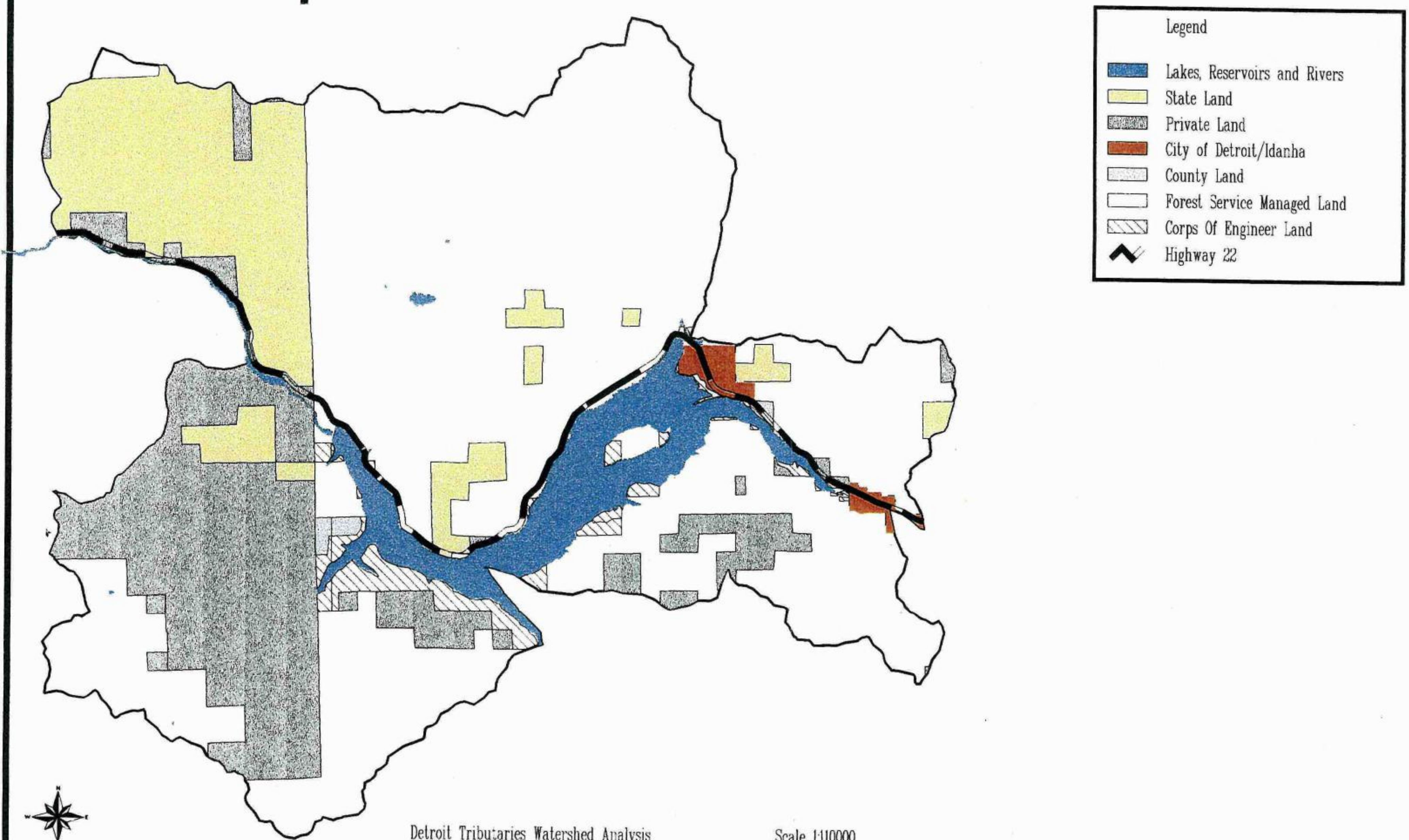
E. Ownership (see *Map I-5*)

- 64% National Forest system land
- < 1% County land
- 14% State land
- 2% Corps of Engineers land
- 19% Private land

F. What makes the watershed important to people?

- Detroit and Big Cliff Dams provide flood control, hydroelectric power generation, agricultural irrigation, reservoir and downstream recreation, and water supply (quantity) to municipal and industrial users.
- Domestic water source; water quality
- North Santiam Canyon economically dependent on timber and other commodity production, tourism, etc. These goods and services provide benefits to consumers.
- Cities of Detroit and Idanha; population centers-livelihood, recreation destination, quality of life
- Recreational opportunities; predominantly lake-based recreation
- Proximity to urban population centers, and easy day drive with improving highway access
- Facilities, such as electric power lines, dams and communications sites, serve people in the region
- Scenic quality
- Highway 22 provides a major east-west travel route through the state.

Ownership



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/05/97

MAP I-5

Request #1536

II. PHYSICAL DOMAIN

A. Geology

1. Characterization

*ii-1. *What **erosion processes**** are dominant within the watershed (e.g. surface erosion processes, mass wasting)?*

Downslope soil creep, as a result of freeze/thaw, root and animal disturbance, and gravity appears to play a predominant role in the more steady state, sediment delivery on the most steep sideslopes. Intermittent, intensive, and often large scale fire activity and the resulting vegetation removal undoubtedly accelerates these downslope processes. At a much slower rate, and over a longer period, stream erosion and deposition have shaped the lower portions of these drainages as major stream terraces have developed at various gradient control points along the main channel of the North Santiam.

Few areas of actively unstable or potentially highly unstable slump / earth flow terrain exist in these watersheds. Therefore, slope instability from slumps is not considered a major factor in this area. However, a few areas of critical highly dissected sideslopes with shallow, often debris chute prone soils (prone to landslides)can be found in this area. ***Map II-1*** shows actively unstable soils, potentially highly unstable soils and land types unsuited for regeneration harvest. The silviculturally unsuited areas (can not regenerate within five years), are included as they contain numerous rock outcrops, talus, and bare soil areas. These areas can be sites where debris chutes initiate.

The principal slide zones are found in the headwaters of Dry, Log and Tom Creeks. These slide zones display considerable natural, shallow, slope instability that appears to be related to the stand replacement fire and/ or flood events. Of some importance is the observation that most larger failure systems provide streams with adequate structure, either in the form of large woody debris and/or boulders.

* = core question and ** = core topic from the *Federal Guide for Ecosystem Analysis at the Watershed Scale* (version 2.2)

2. What values are associated with **geology?**

a. Natural geologic processes and their influences on the ecosystem are valued (i.e. the natural influence of erosion on species diversity).

b. Geologic resources have utilitarian and economic value (i.e. rocks to surface roads and decorative rocks for landscaping).

c. Landform has aesthetic, spiritual and functional value (i.e. vistas, vision quests, recreation settings, travelways for humans and animals, etc.)

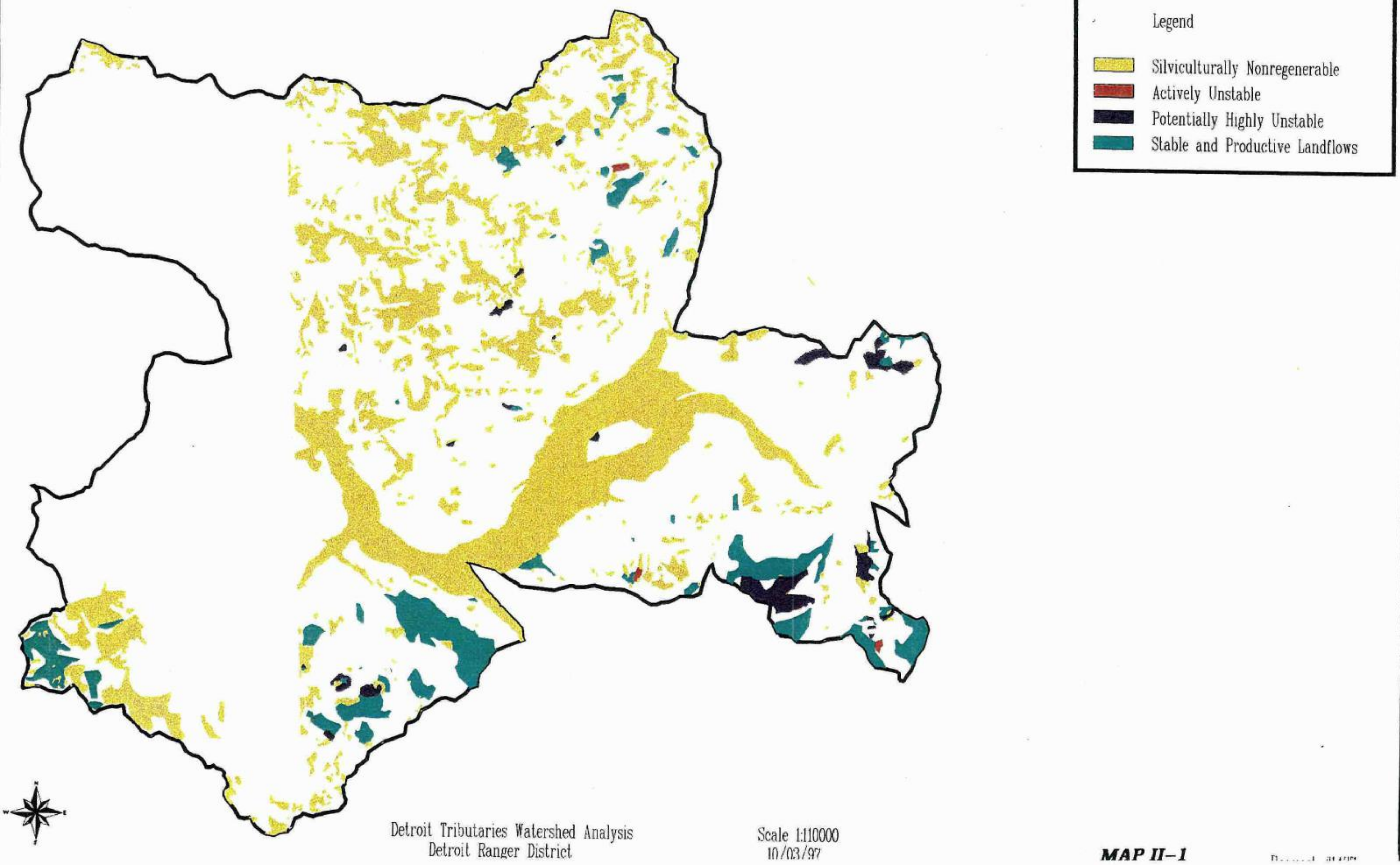
3. What are the highest priority issues or resource concerns associated with **geology?**

a. Whether current **erosion processes**** that are dominant in the Detroit Tributary watersheds are within the natural range of variability or whether they have been influenced to such an extent by human activities that they are now outside that range.

b. A more specific subset of the above issue is whether management activities such as timber harvest and road construction were major contributors to the landslides that occurred in the Detroit Tributary watersheds during the recent flood events and whether the number and types of landslides were outside the range of natural conditions that might be expected in such a storm event.

4. What and where are the management direction/activities, human uses, or natural processes that affect the dominant **erosion processes?**

Unsuited/Unstable Soils



a. Current Conditions

*ii-2. *What are the current conditions and trends of the dominant erosion processes prevalent in the watershed? *Where have they occurred or are they likely to occur?*

Soil displacement occurs with three separate timber harvest activities: yarding, slash treatment, and road building and maintenance.

Yarding and Slash Treatment: Little or no evidence can be found to indicate that yarding and slash treatment activities have resulted in detrimental soil displacement or off site soil movement of any significant degree for most harvested units on Federal land in the analysis area. Willamette National Forest monitoring efforts over a number of years have consistently shown that off-site sediment movement from units where appropriate suspension and duff retention standards have been implemented, has been very low, especially compared with natural disturbance events such as wildfire. Those conclusions were again reinforced with field observations for this investigation. To be sure, detrimental soil displacement from railroad logging and tractor skidding likely resulted from the harvest areas along the North Santiam River and French Creek decades earlier, but these areas have long since vegetated over and completely stabilized. Much of that area is now under the Reservoir. On the remainder, overland flow, indicative of compaction, or gullying of the ephemeral and intermittent channels was not often found in the field reconnaissance on the older plantations.

Road Construction and Maintenance: Approximately, 198 miles of road currently exist in the basin. They range from a double lane, paved U.S Highway (Hwy. 22) to grown over tracks that are difficult to walk along. Many miles of roads have been constructed on stable benches and flats, but numerous sidecast roads segments from past harvest activities (see reference condition) are also present. Road construction standards have varied over time and range from complex sidecast construction to narrow lanes laid lightly on the land.

Although it is difficult to equate, current displacement of soil from roads constructed under more recent, stricter specifications, and downslope creep from colluvial processes (as they effect the streams) are probably of the same order of magnitude when considered in approximately the same time frames and viewed over the entire study area.

b. Reference Conditions

*ii-3. *What are the historical **erosion processes** within the watershed (e.g. surface erosion processes, mass wasting)? *Where have they occurred?*

Road construction was the dominant sediment relocation during the early 1900's through the 1970s. Some road segments were built without regard to sediment impacts to streams. Roads were located without consideration for steep sideslope slough situations; excess excavation was sidecast directly into stream channels; little heed was given to long term maintenance needs. Most of these situations have stabilized over time; some have been assisted with the help structural walls, sidecast pullback, or revegetation programs. Some occasional sites still persist and produce higher than desirable levels of off site sediment movement. However, these are localized problems that require correction. For the most part, sediment production and erosion have approximately returned to pre-harvest levels.

Natural rates of downslope sediment movement from colluvial processes are higher than generally expected. Soil movement from road construction may be higher initially, but tends to drop off quickly after one to three years. Creep continues unabated while the road disturbance tends to quickly stabilize with vegetation. For this basin, mapped stream miles are approximately 221, an amount that exceeds the number of road miles. Of these, more than half are located in Class IV streams where the bulk of creep movement probably occurs. In addition, our experience indicates that Class IV stream miles will likely increase by over 50% (or more) as more detailed field work is performed.

c. Comparison of Current and Reference Conditions

*ii-4. *What are the natural and human causes of changes between historical and current **erosion processes** in the watershed?*

Conditions	Major Causes of Change
Reference- Prior to Forest Management: Large stand replacing fires were the major controlling mechanism of erosion processes. The absence of vegetation after these fires resulted in the transport of large amounts of sediment into the stream. Stream structure such as large logs and boulders caught some of this sediment distributing along the stream channel.	
	Fire Suppression** resulted in the retention vegetation, especially on south aspects.* ***Timber harvest of unstable areas ***Road Construction techniques** - Some road building across unstable areas. Some sidecast road construction with fewer controls than today* ***Salvage and stream cleanout** in what is now riparian reserves.*
Reference- Forest Management to 1994: Erosion processes shifted from fire controlled to management controlled. When natural fires did occur, they still affected erosion processes in the same manner. Higher risk of more intense stand replacement fire due to fuel buildup on south slopes that may be hot enough to cause soil damage. Failures resulted from timber harvest and road construction through unstable areas. Less sediment retained in stream channels due to lack of stream structure.	
	Timber harvest and road construction**- changes in standards have been implemented.* ***Unstable areas** are avoided.* ***Roads have revegetated.

Conditions

Current - 1994 to Present:
Management induced erosion has decreased.
Stream channels still lack structure from earlier stream cleanout.
Higher risk of more intense stand replacement fire that may be hot enough to cause soil damage due to fuel buildup on south slopes.

Sediment from timber management activities is not now a significant issue in these watersheds, although it likely once was in some areas. Older units have almost completely revegetated. Duff retention and suspension on more recent units are well within standards. Older roads have revegetated, and newer roads have generally been constructed to higher standards. Some problem sites are present, and require restoration. However, streams channels and riparian areas do not display those features which might indicate problems with excessive off site sediment generation.

Sediment, whether natural or management induced, is not so much the problem as the lack of storage capacity for sediment retention in the channels. This situation is a result of the removal of large woody debris and essential stream structure through harvest and stream cleanout. This can be most clearly observed in French Creek where extensive stream cleanout has resulted in down cutting in several areas.

When the entire area is taken into account, natural rates of slope instability are currently maintained. The slope failure record for the Detroit Tributary Watersheds is a relatively simple one. For the most part, natural slope instability is not a significant factor in sediment productions for most discussion areas, except for Dry, Tom and Log Creeks. Field reviews indicate that management generated road sidecast and sidecast failures have contributed a higher level of sediment to certain drainages, such as French Creek, than might have been anticipated from natural failure mechanisms, except for those times when extreme fire/flood events occur.

In-unit slope failures are not common. Field review after the 1996 flood , to date, have found only a few small landslides related to management activities scattered within the Detroit Tributary Watersheds. Their extension downstream was usually limited and restricted by debris in the draws. The comparison of the 1996 failures with the natural failure rate is difficult, but general observations would indicate that is of the same order of magnitude, and at the lower end of the spectrum.

In conclusion, then there seems little doubt that sidecast road construction, poor road maintenance practices, and harvest of highly failure prone soils can increase the incidence of failures in some systems. On the other hand, natural failures events can transport extensive amounts of sediment to streams, often far in excess of human caused mechanisms. Sediment rich systems often maintain relatively high population levels of aquatic organisms. The concern then is not so much with the amount of sediment as with how it reacts in the system.

Perhaps the major controlling factor is available stream structure, primarily in the form of large woody debris and boulders. The removal of large organic material in critical locations through harvest stream cleanout can increase the severity of failure impacts by (1) overloading natural systems with sediment to the point where existing features function poorly (or not at all), or (2) allowing sediment to be rapidly flushed through the system and thereby robbing the stream of necessary bank building material. Stream cleanout then has more seriously affected stream integrity in this watershed than any increase in sediment that may have resulted from other management activities.

Our goal, with regard to erosion processes, is the elimination of management induced slope failure. Sensitive areas must be avoided, or effects mitigated.

II. PHYSICAL DOMAIN

B. Hydrology **

1. Characterization

*ii-5. *What are the **dominant hydrological** characteristics (e.g. total peak flows, discharge, minimum flows)and other notable hydrological features and processes in the watershed (e.g. cold water seeps, ground water recharge areas)?*

The Detroit Tributaries hydrology is similar to other documented watersheds within the Western Cascades. Peak flows occur during rain-on-snow events in the transient snow zone which is estimated to occur between 450 to 1200 meters (1,500 feet and 4,000 feet) elevation (Christner and Harr, 1982). Due to the orientation of these tributary watersheds to the dominant winter storm patterns the elevation of this zone changes to approximately 365 meters to 1500 meters (1200 to 4900 feet). Detroit Tributary watersheds are within this elevation zone.

Water storage in these watersheds is limited to some deeper upland soils, terraces, flood plains and Detroit and Big Cliff Reservoirs. Glacial soil remnants, terraces, and flood plains act like sponges, retaining water and releasing it slowly during periods of low precipitation. Annual precipitation for the area averages from 79 inches at Detroit Dam to 130 inches on peaks and ridges. Intense precipitation is episodic in nature, and it often generates peak flows which are a major disturbance mechanism for stream channels and associated riparian areas.

Between 1908 to present, maximum discharge occurred on November 22, 1909 discharging 63,200 cubic feet per second, and its minimal flow was on August 21, 1963, discharging 19 cubic feet per second.,This wide range of variability in stream discharge reflects the Mediterranean climate and the corresponding flow regime that changes dramatically with the seasons. In 1953 storage began in Detroit Reservoir. Total capacity of the Dam is 455,100 acre-feet, and usable capacity is 340,100 acre-feet between elevations 1,425 ft, proposed lower limit of operation, and 1,569 ft., top of the spillway gates. Detroit Reservoir is used for flood control, power development, irrigation, improvement of navigation, pollution abatement, and other purposes (U.S. Geological Survey Water Data Report OR-95-1, 1996, pg.229). Since 1953 Detroit Reservoir has been the prominent hydrologic control in this these watersheds.

2. What do humans value that is associated with **hydrology?**

Water storage and regulation systems; the amount and timing of water flow; and sediment budgets have ecological value.

3. What are the highest priority issues or resource concerns associated with **hydrology?**

The highest priority issue is flow of water, especially peak flow and low flows and the storage of water for downstream beneficial users.

4. What and where are the management direction/activities, human uses, or natural processes that affect the **hydrology?**

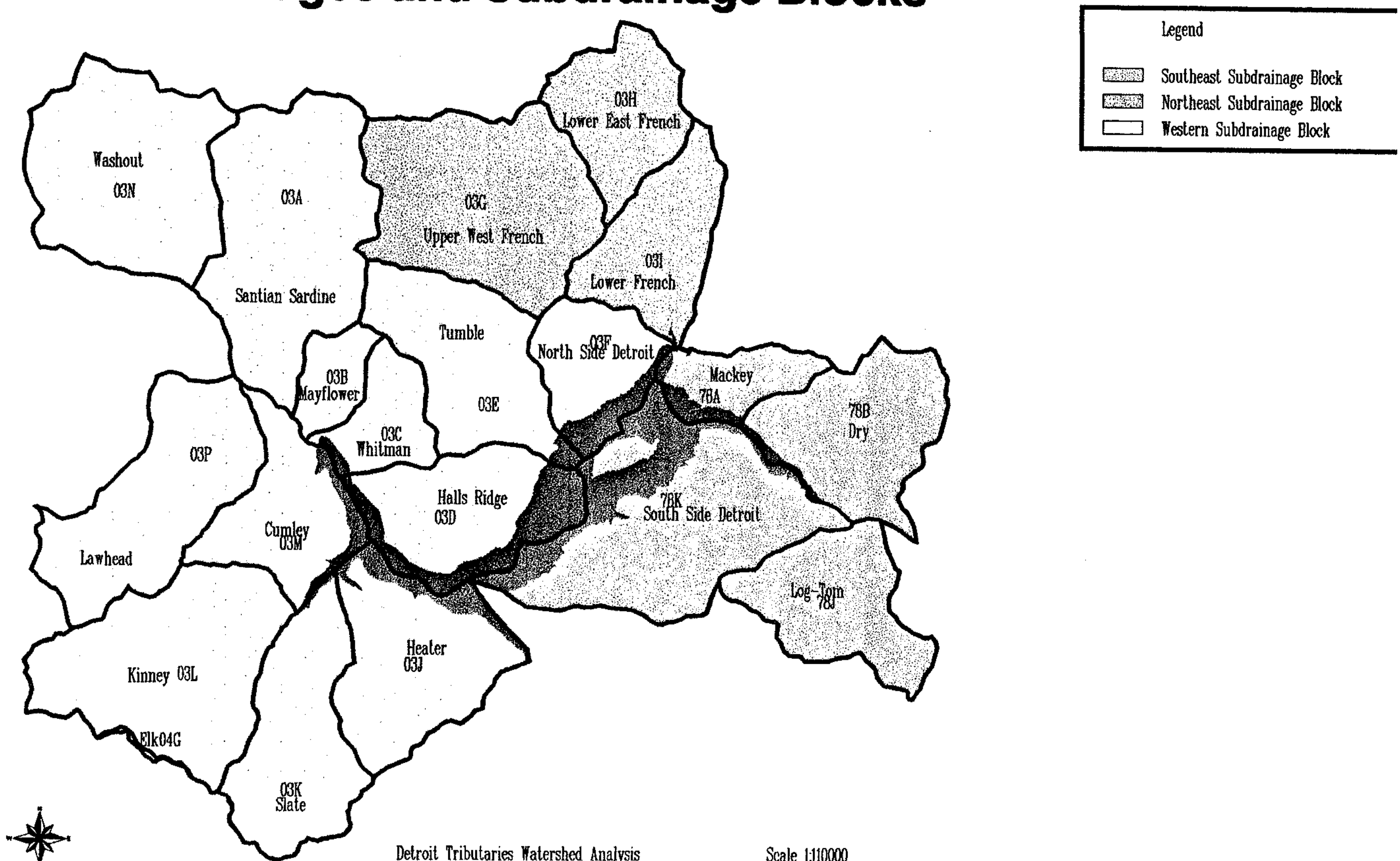
a. Current Conditions

*ii-6. *What are the current conditions and trends of the* ***dominant hydrological characteristics*** *prevalent in the watershed?*

The watersheds have been divided into planning subdrainage blocks which coincide with sixth field subwatersheds(See ***Map II-2***). ***Map II-3*** shows main streams within these watersheds and ***Map II-4*** shows riparian reserves mapped so far.

Southeastern Planning Subdrainage Block: The sixth field subwatershed in this block is Upper Detroit Reservoir. Due to its orientation in relation to weather patterns, all of the block is susceptible to rain-on-snow events that result in peak flows. Planning subdrainages found within this block are: Southside Detroit (78K), Log-Tom (78J), Dry (78B), and Mackey (78A).

Subdrainages and Subdrainage Blocks

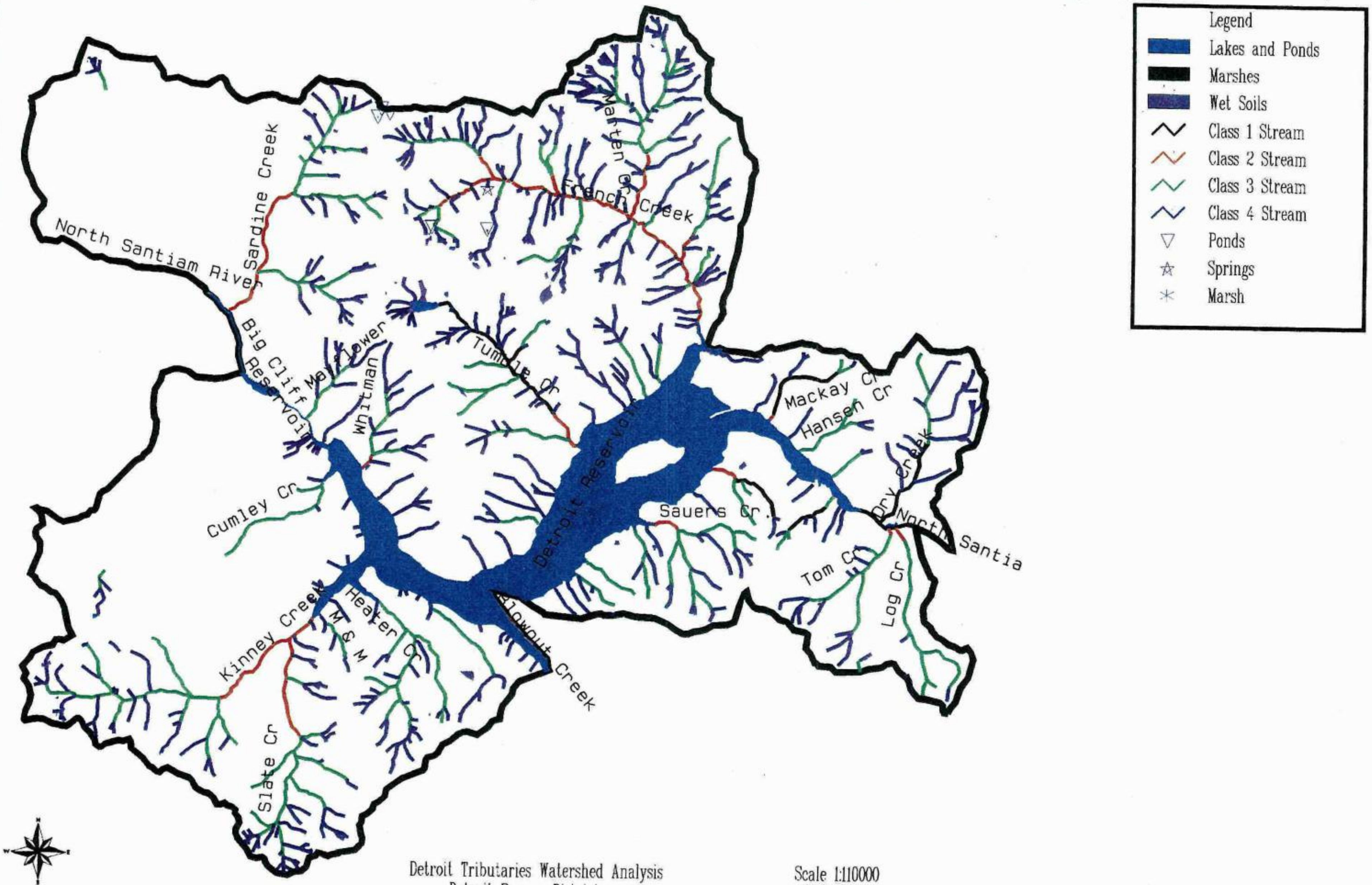


Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/05/97

MAP II-2 Request #1489

Streams, Lakes, Ponds and Wet Soils



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
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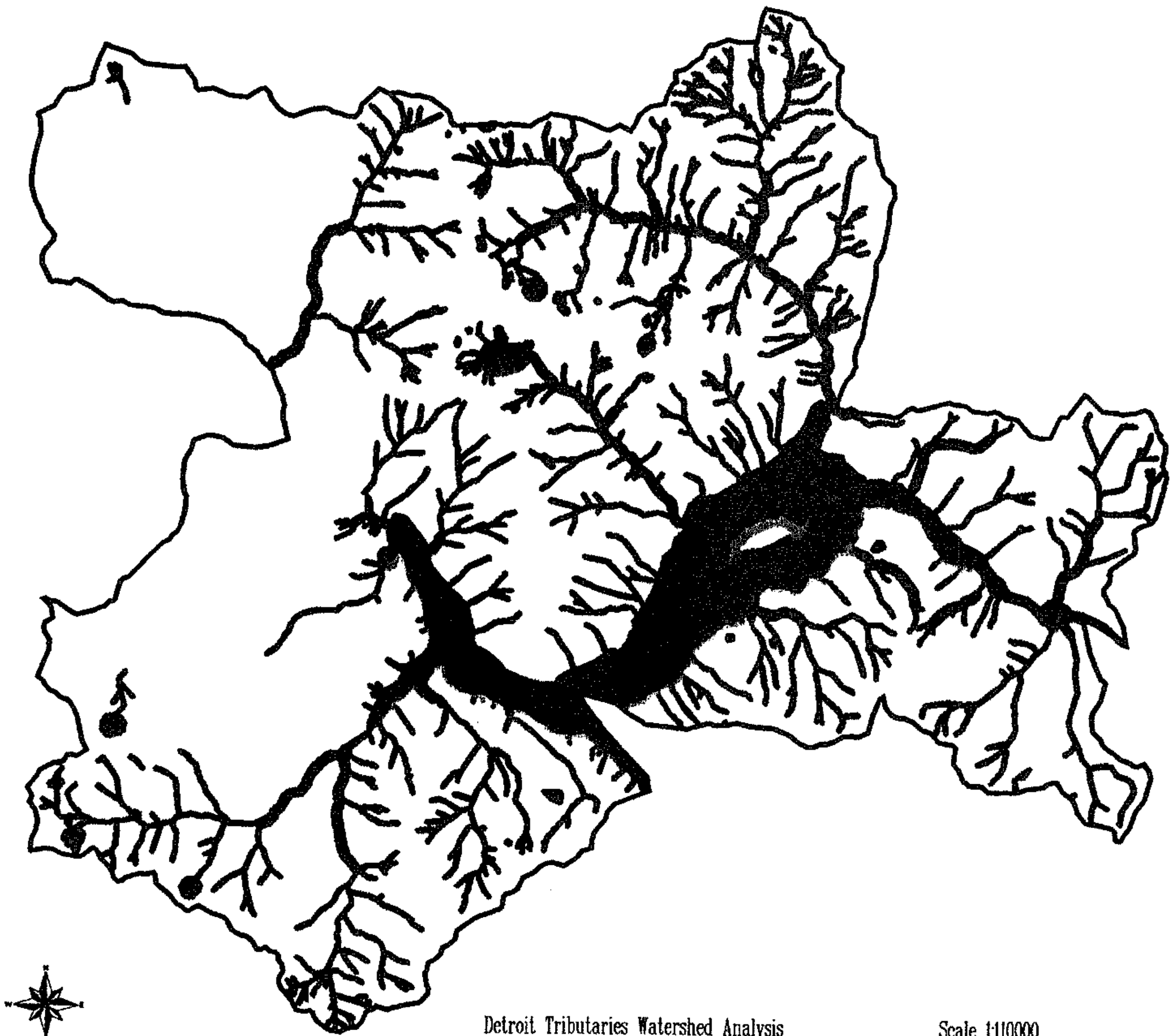
MAP II–3 Request #1594

Riparian Reserves



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/03/97

MAP II-4 Request #1484

Southside of Detroit (78K) has a high water table because of glacial and colluvial dominated terraces occupying toe slope areas within this planning subdrainage. This material provides a water storage potential that allows many streams to have considerable flow into the latter part of the summer months. Above these storage areas are steeper valley walls with shallow soils that are quick to dry out. Wetland in these areas are associated with streams and topographic breaks which are not common in this steep terrain.

Northeastern Planning Subdrainage Block: The sixth field subwatershed in this block is French Creek. Planning subdrainages within this block are Upper West French (03G), Lower East French (03H), and Lower French (03I) planning subdrainages. These planning subdrainages are very susceptible to rain on snow events and subsequent peak flows. The dominant parent material for this area is volcanic in origin, so soils are skeletal and shallow. Water storage in the soils is marginal with the only true storage areas being undulations in the geologic skin underlying these soils.

The shallow soils, which saturate easily, combine with rain-on-snow events to quickly produce peak flow conditions early in the wet portion of the year.

Finally, a remnant glacial terrace exists in the northwestern portion of this area. This remnant has the character of glacial deposits in storing water. The size of the area is small, so it has little effect on groundwater storage.

Western Planning Subdrainage Block The sixth field subwatershed in this block is Lower Detroit Reservoir. This block contains the largest areas within this watershed analysis. Planning Subdrainages found within this block include: Santiam Sardine (03A), Mayflower (03B), Whitman (03C), Halls Ridge (03D), Tumble (03E), North side Detroit (03F), Heater (03J), Slate (03K), Kinney (03L), Cumley (03M), Washout (03N), and Lawhead (03P). This area is very susceptible to rain-on-snow events, so peak flows are a common occurrence in this block.

The shallow soils, which saturate easily, combine with rain-on-snow events, to quickly produce peak flow conditions early in the wet portion of the year. Stream flows recede much earlier in the year due to only small water storage areas existing as forested wetlands, commonly associated with older debris torrent deposits and streams. The dominant parent material for this area is volcanic in origin, so soils are skeletal and shallow. Water storage in the soils is marginal with the only true storage areas being undulations in the geologic skin underlying these soils.

Tumble Lake is the only named natural lake in this block. Origin of this lake is associated with glacial activity and/or colluvial deposits off Elephant Rock to the south of the lake.

b. Reference Conditions

*ii-7. *What are the historical* ***hydrological characteristics*** *(e.g., total discharge, peak flows, minimum flows) and features (e.g., cold water seeps, ground water recharge areas) in the watershed?*

Historical peak flows in the past, occurred much as they do now, during rain-on-snow events in the transient snow zone.

In the past, large scale fires burned vast areas of the watershed stripping them of their vegetation. The removal of this vegetation in combination with rain-on-snow events resulted in increased volumes of water coming off the hillsides and entering stream systems. Because of the increased water volumes, streams were high energy and scoured steep v shaped valleys. Their floodplains were minimal during these events, wet areas in depressions were scattered throughout the landscape.

Specific data on stream discharge for the reference time period goes back to 1909. The gauging station was on the North Santiam River at Niagara (Station #14181500). Since the Detroit Reservoir was built in 1953 this record only gives a brief glimpse of before reservoir flows. Presumably, the average flows were higher than they are now, since peak flows were higher because of fires and rain-on-snow events, and low flows were likely higher because of reduced transpiration.

c. Comparison of Current and Reference Conditions

*ii-8. *What are the natural and human causes of change between historical and current hydrological conditions?*

Conditions **Major Causes of Change**

Reference- Prior to Forest Management:
Large stand replacing fires were the major factor controlling hydrological conditions . The absence of vegetation after these fires resulted in less snow intercept and increased peak flows. Peak flows were higher because of fires and rain-on-snow events, and low flows were likely higher because of reduced transpiration.

Historically large wood allowed for areas of deposition and water storage.

***Fire Suppression** resulted in the retention of vegetation, especially on south aspects.*
Timber harvest of unstable areas
***Road Construction techniques** - Some road building across unstable areas. Some sidecast road construction with fewer controls than today*
***Salvage and stream cleanout** in what is now riparian reserves.*
Detroit Dam and Reservoir created more water storage areas.

Reference- Forest Management to 1994:
It appears that peak flows have decreased over historic conditions, probably as a result of fire suppression allowing vegetation to persist on the landscape. Vegetation changes the rate at which water reaches stream channels and the amount of water available during minimal flow periods. Timber harvest has countered the effects of fire suppression to some extent by removing vegetation, but not to the same degree that fire once did.
Management resulted in active removal of wood from channels following early logging and some subsequent fires. This affected both water storage capacity and the number of wetlands, thus allowing the streams to become high energy and reduce the storage potential.

Minimum flows are currently higher today than in the past on the mainstem of the North Santiam River due to the increase of water storage areas as a result of the Reservoirs.

Conditions	Major Causes of Change
▼ ▼ ⇦ ⇦ ⇦ ⇦ ▼	***Timber harvest and road construction standards*** *Fuel buildup*
Current - 1994 to Present (see Reference- Forest Management to 1994):	
Changes in standards have been implemented (e.g."Best Management Practices" along with the Aquatic conservation strategy)	
Higher risk of more intense stand replacement fire, due to fuel buildup on south slopes, that may remove vegetation, decrease snow intercept	

II. PHYSICAL DOMAIN

C. Stream Channels**

4. Characterization

ii-9. *What are the basic morphological characteristics of stream valleys or segments and the general sediment transport and deposition processes in the watershed (e.g., stratification using accepted classification systems)?

Southeastern Block: Deeply incised parallel streams are found within Mackey and Dry planning subdrainages as evidenced by first to third order stream channels. (***Chart II-1***) This pattern of parallel streams is the result of high gradient channels draining glacially formed slopes that have been altered by erosion. The high gradient stream channels are associated with valley walls greater than 65 percent slope and contain channel bottom materials which are dominated by bedrock and boulders. These high energy stream channels exhibit very little sinuosity.

Headwater channels have lower sediment storage capacity in pools and backwater areas due to the lack of channel structure such as logs and boulders. Sediment storage capacity decreases as streams transition into the valley wall regions where high energy streams transport sediment through to the North Santiam River and reservoir.

In the western portion of this block, Southside Detroit exhibits a terrace before entering the reservoir. Streams in this area show depositional characteristics of a moderate gradient stream. Small flood plains and large woody material retained within the system create a wide, shallow channel during low flows.

As described in the Geology section, debris torrents have at times played an important role in the development of the first and second order stream channels in this subdrainage block. Material from debris torrents builds terraces in 3rd and 4th order stream channels which are shaped and reshaped by peak flow events.

Northeastern Block: Channel morphology in this subdrainage block reflects old volcanic geology. The parallel drainage network in this area creates high gradient, high energy streams. ***(Chart II-2)***

Western Block: Channel morphology within this subdrainage block is a combination of dynamic erosion and stream energy. Glaciated headwalls have eroded to form steep gradient stream channels. Stream channels are incised into unconsolidated colluvial material in the headwaters and old volcanics in the lower valley reaches. Overall, a dendritic drainage pattern is found on this subdrainage block.

High energy first and second order streams have little sediment storage capacity and tend to have bedrock-boulder channel bottoms. A long history of fires and management removed much of the larger vegetation from the landscape, leaving streams without an adequate supply of large woody material to provide structure and store sediments. These areas generated increased peak flows and a landscape more susceptible to debris torrents. This fire-peak flow- debris torrent scenario greatly influenced channel development in this area, in part by its lack of large wood to hold sediments. These channels tend to act like pipes and pump sediments through to higher order stream channels.

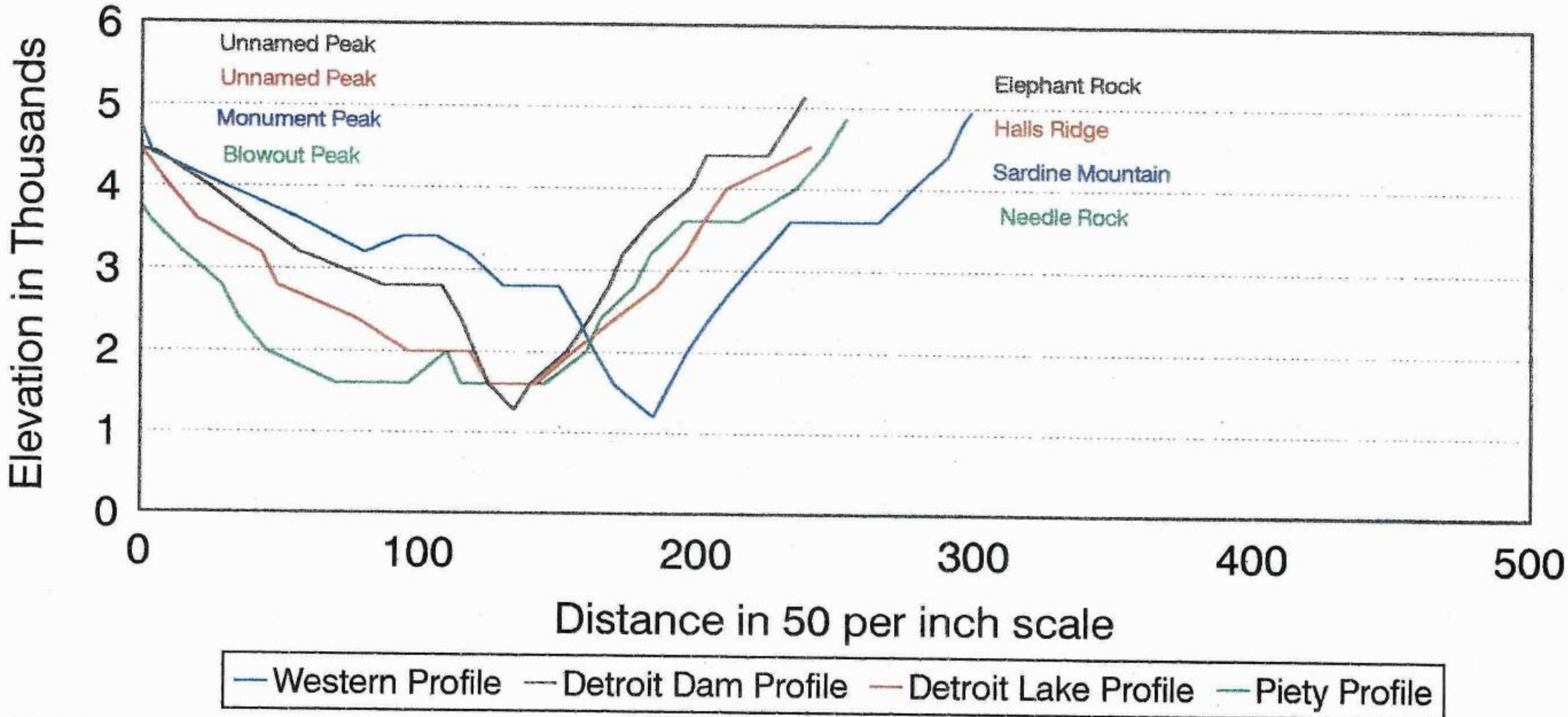
Third and 4th order streams in this subdrainage block are more typical of those of other western Cascades watersheds. Here stream channels transport sediment down narrow valley bottoms that are interrupted or confined by earthflows. Some of the sediment collects behind the large woody material in the channel. At the toes of the earthflows, channel roughness and gradient increase forming a stepped channel as illustrated by longitudinal profiles in ***Chart II-3***.

2. What do humans value that is associated with **stream channels?**

Stream channels and their associated floodplains are a valuable part of the ecosystem.

Profiles Detroit Watershed Analysis

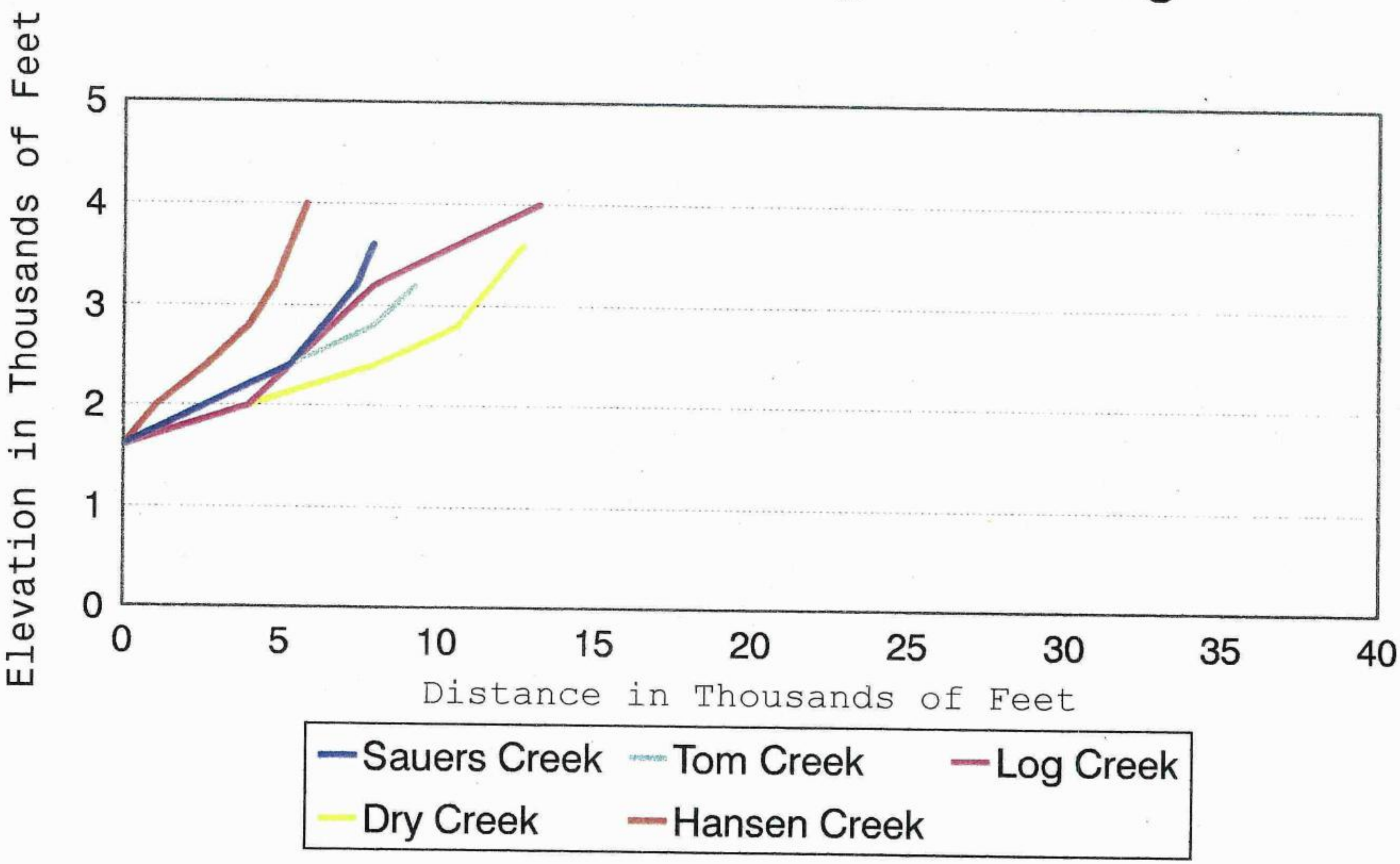
Peak to Peak Profiles



Profiles done across the Analysis Area

Longitudinal Profiles

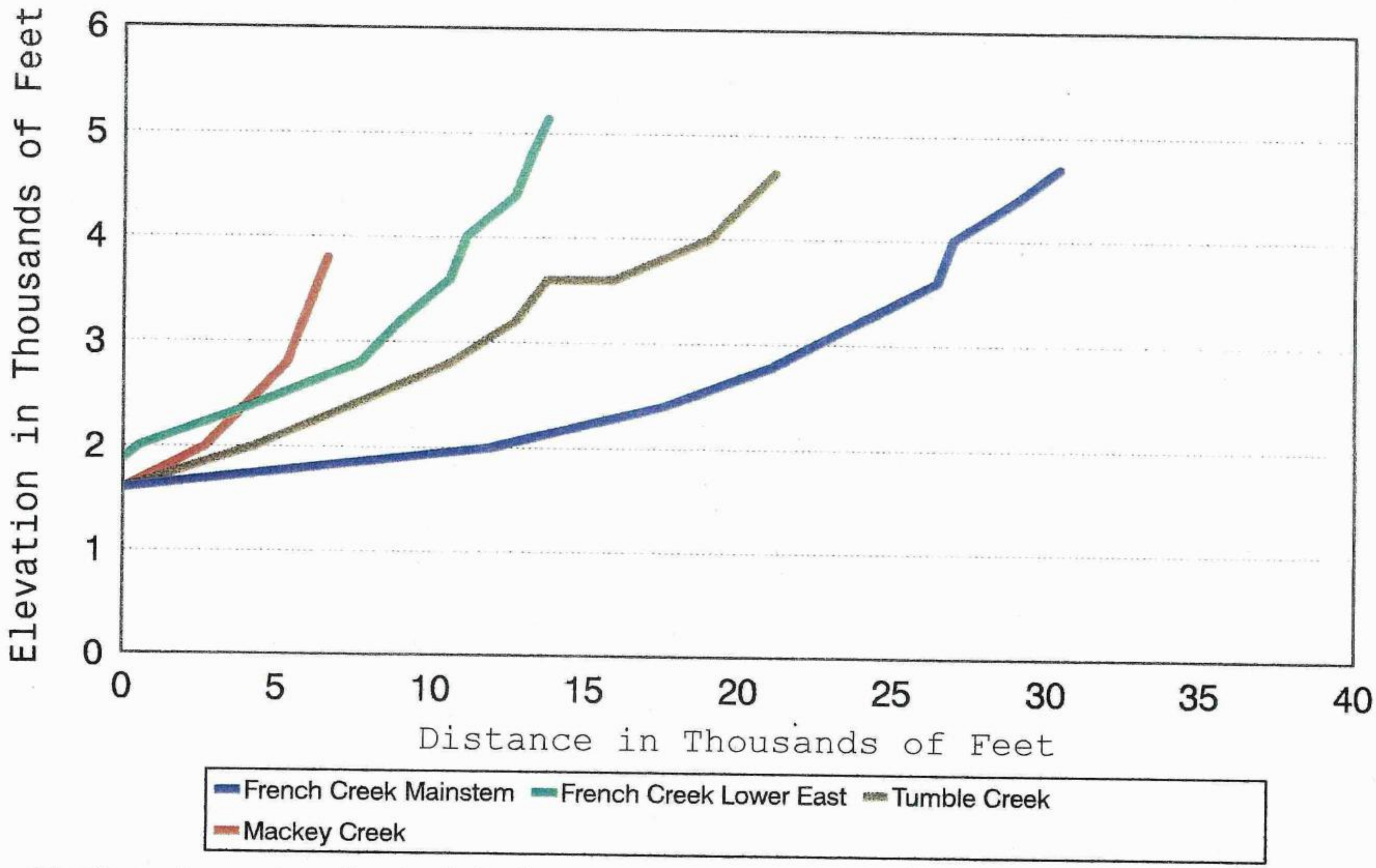
Detroit Tributaries Planning Subdrainages



Southeastern planning subdrainages.

Longitudinal Profiles

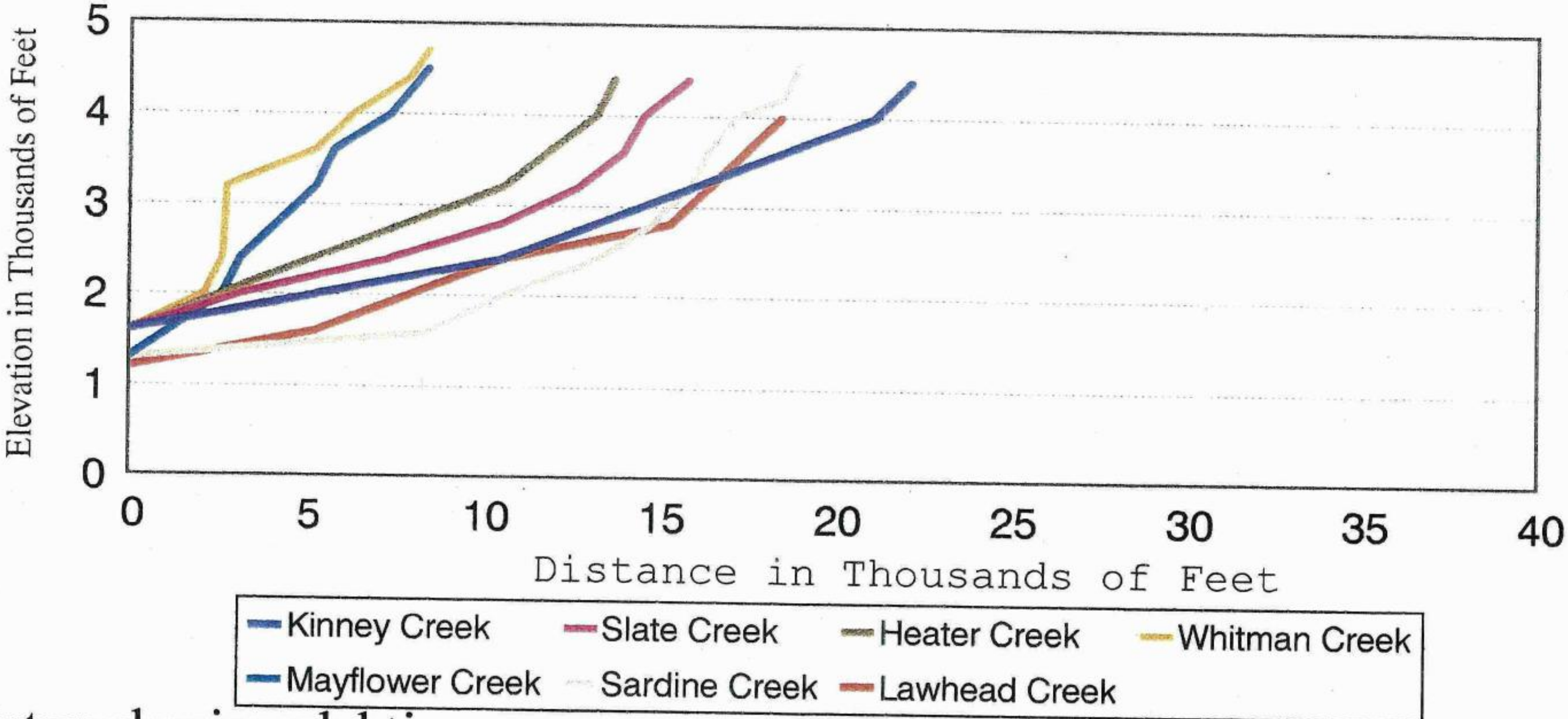
Detroit Tributaries Planning Subdrainages



Northeastern planning subdrainages.

Longitudinal Profiles

Detroit Tributaries Planning Subdrainages



Western planning subdrainages.

3. What are the highest priority issues or resource concerns associated with **stream channels?**

Channel bank stability and protection of headwall areas are the highest priority issues.

4. What and where are the management direction/activities, human uses, or natural processes that affect the **stream channels?**

a. *Current Conditions*

ii-10. *What are the current conditions and trends of stream channel types and sediment and deposition processes prevalent in the watershed?

First to third order streams* are Rosgen type Aa+ channels (steep, narrow channels with little sinuosity) or G channels (gully type channels). Most 4th and 5th order stream channels are Rosgen type B channels (moderate gradients, channel width and sinuosity), while a few are A channels (somewhat less steep, narrow and straight than Aa+ channels). ***Chart II-4*** shows the breakdown of the Rosgen stream classification system. The types of sediment and depositional processes prevalent in the watershed are closely associated with channel types.

The ***Southeastern subdrainage block*** is a conglomerate of colluvial, and debris torrent material which becomes sediment that is transported through the Rosgen type Aa+, A, and B channels. Deposition on the terrace above the reservoir occurs .

In the ***Northeastern block***, sediments are transported through the Rosgen type Aa+(steep gradients, narrow channels with little sinuosity), A, and B channels.

* Stream order can be equated to the branches of a tree. First order streams are the "twig", second order streams are the "branch" and third order streams are the "trunk".

Type B channels are present in higher order channels such as French Creek. Channels historically contained a high percentage of exposed bedrock and large boulders. In addition, debris torrent activity in headwaters streams kept French Creek loaded with structure. Most of the fine sediments were, and still are, transported out of the system.

Rosgen type C channels, with their lower gradients, and wider, more sinuous channels are covered by the reservoir. The reservoir stores these sediments some of the finer sediments can be mobilized during storm events.

The main sediment sources in the ***Western subdrainage block*** are related to fire and the resulting surface erosion. At times, debris chutes and soil ravel may occur in steep topography. Nearly all channels types in this subdrainage block are transport reaches.

Rosgen channel types for this subdrainage block are Aa+ (steep gradients, narrow channels with little sinuosity) to B (moderate gradients, channel widths and sinuosity), while portions of headwater channels are G type (very steep gully like features).

In ***all subdrainage blocks*** and all channel types, large woody material plays an important role in the metering of sediment through stream channels. In the absence of wood, sediment is transported uninterrupted through the system. When large wood is present, sediment is pulsed from wood accumulation to wood accumulation, thus increasing the time sediment remains in the stream channel.

One of the greatest impacts on stream sediment and depositional processes, is a century of fire suppression activities that have reduced debris torrent frequencies as well as the amount of surface erosion. This in turn, reduced the amount of sediment introduced into the stream channels.

Management activities have mimicked the effect of fires on sedimentation in Detroit Tributary streams, but on somewhat smaller scale. This management-induced sedimentation is a result of harvest units where no riparian vegetation was left; roads that were sidecast; recreational activity in proximity to stream channels; fuel management activities; and removal of large wood. Many of these activities are no longer practiced, but the effects are still evident.

Rosgen Channel Types

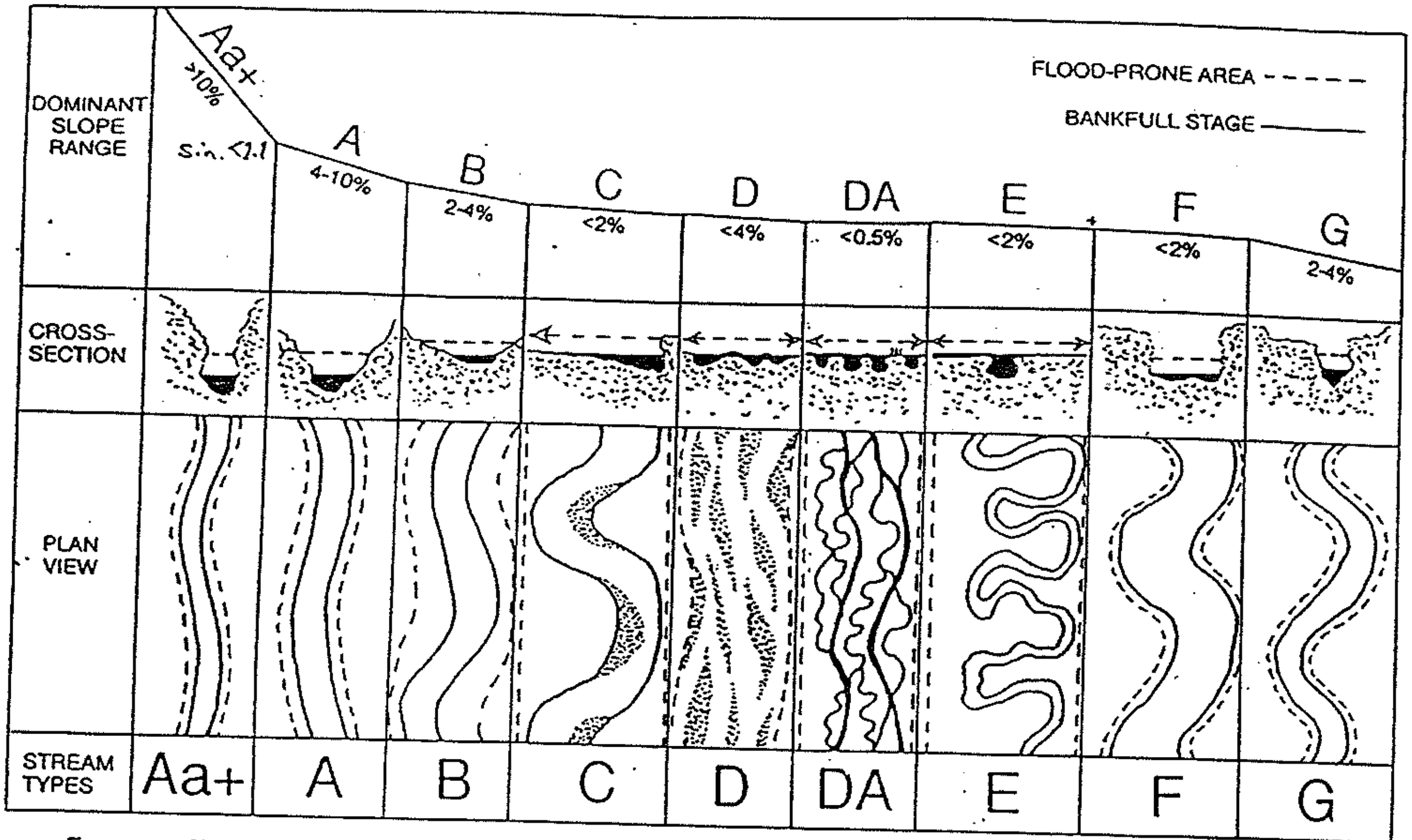
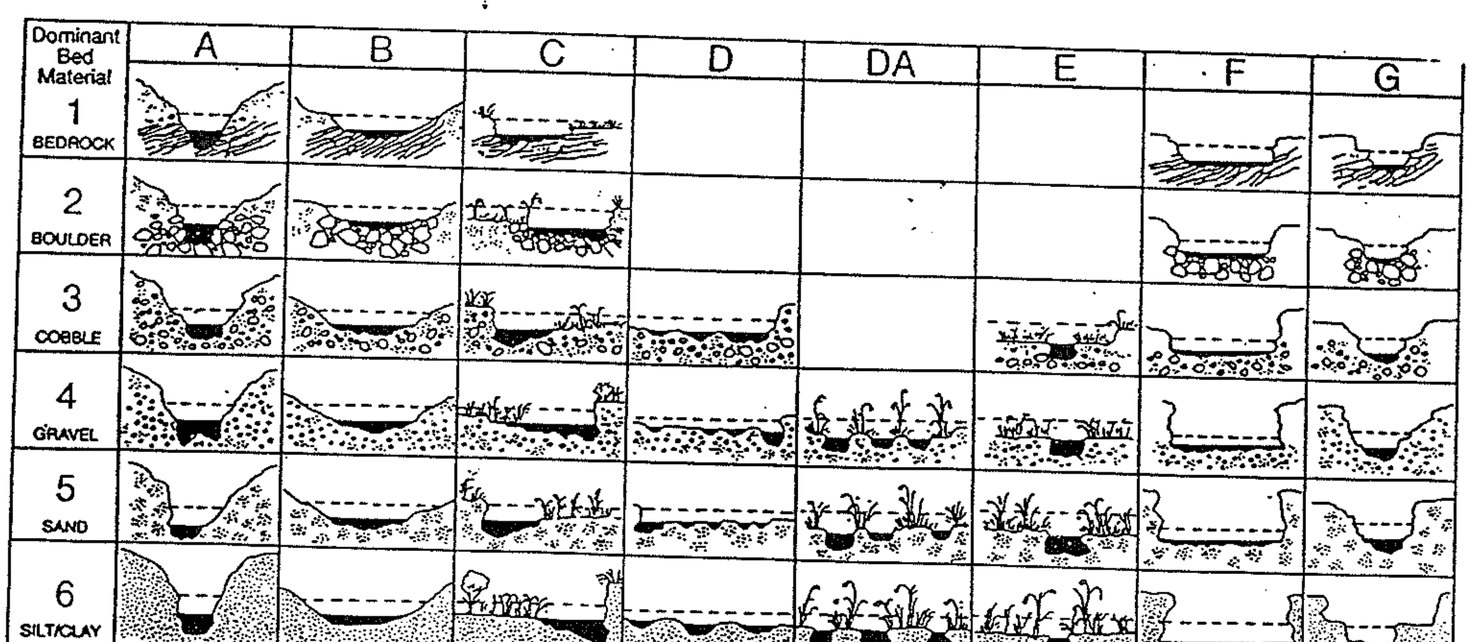


Figure – Stream types: gradient, cross-section, plan view (adapted from Rosgen 1994). Original drawings by Lee Silvey. Courtesy of Catena Verlag.



	A	B	C	D	DA	E	F	G
ENTRH.	<1.4	1.4-2.2	>2.2	N/A	>2.2	>2.2	<1.4	<1.4
SIN.	<1.2	>1.2	>1.4	<1.1	1.1-1.6	>1.5	>1.4	>1.2
W/D	<12	>12	>12	>40	<40	<12	<12	<12
SLOPE	.04-.099	.02-.039	<.02	<.04	<.005	<.02	<.02	.02-.039

–Cross-section view of stream types (adapted from Rosgen 1994). Original drawings by Lee Silvey. Courtesy of Catena Verlag.

c. *Reference Conditions*

*ii-11. *What were the historical morphological characteristics of stream valleys and general sediment transport and deposition processes in the watershed?*

The historic morphological characteristics of stream valleys in Detroit tributary streams are similar to existing conditions. The basic stream patterns and channel gradients are largely influenced by geology, so have not changed a great deal since the reference time frames, 100 years ago.

Historically, sediment transport and deposition processes were a result of peakflows and erosion. After fire burned an area, erosion-generated sediments loaded stream channels. These sediment-loaded channels were later flushed out during peak flows. Though episodic in nature the effects of peakflows on stream channels were long lasting.

The amount of large woody material that acted as sediment traps in stream channels fluctuated with fire intensities. High intensity fires consumed large woody material, while low intensity fires recruited woody material into stream channels. The amount of wood also varied with the topography. Steeper, V-shaped valleys retained less wood than the wider U-shaped valleys. These V-shaped valleys acted as chimneys drawing fire through them and consuming the woody material in the stream channels.

Channels formed under peakflows became very resistant to change as high energy streams scoured out fine sediments and left large boulder and bedrock dominated channel bottoms. This substrate allows for sediments to move through the system rather than be deposited.

Depositional areas are mainly associated with larger order streams and the amount of large woody material in the stream channels. The streams in depositional areas, generally had wide valley bottoms and lots of downed wood to trap sediments.

Soils are a good indicator of historic channel conditions and morphology. ***Map II–5*** shows various soil groupings for the Detroit tributaries watershed. In areas of volcanic soils, very little woody material is available in stream channels.

These soil groupings also relate to historic erosion. ***Table II-1*** shows dominant erosion processes by soil groupings:

Table II-1:

Erosion Process	Soil Grouping
Surface Erosion	All volcanic soils
Stream Erosion	Stream terrace Colluvial deposits
Debris Torrents	Moist unsuited/unstable All volcanics
Weathering/ Freeze Thaw	Moist unsuited rock and cliffs

d. Comparison of Current and Reference Conditions

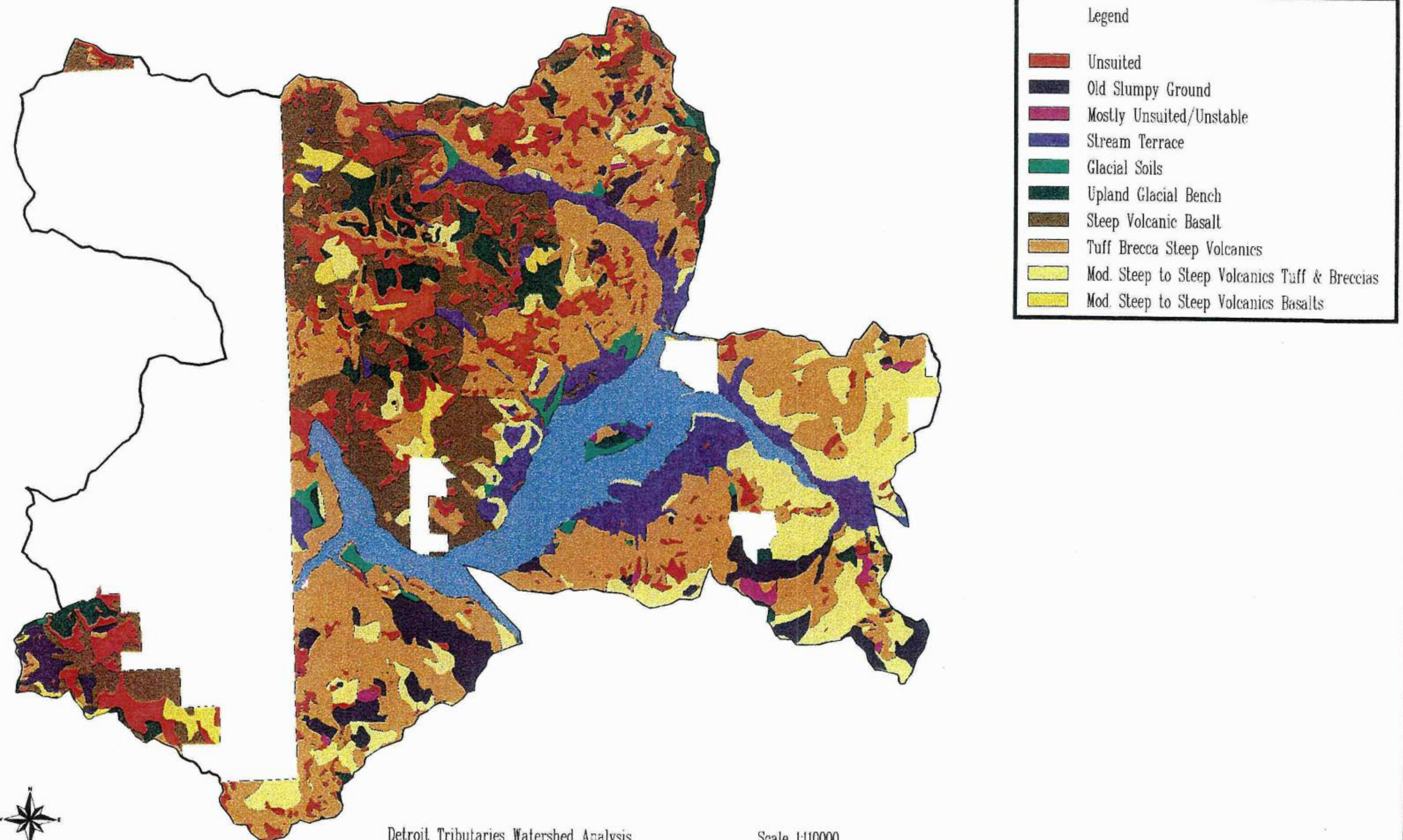
*ii-12. *What are the natural and human causes of change between historical and current* ***channel conditions?***

The most change between historic and current conditions is evident in forth order and larger stream channels. Smaller order channels have exhibited only minimal changes, for the most part.

Conditions

Reference- Prior to Forest Management:
Historically, sediment transport and deposition processes were a result of peakflows and erosion. After fire burned an area, erosion-generated sediments loaded stream channels. These sediment-loaded channels were later flushed out during peak flows. Though episodic in nature the effects of peakflows on stream channels were long lasting.

Soil Categories



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/15/97

MAP II–5

Request #1535

Conditions	Major Causes of Change
Reference- Prior to Forest Management (continued):	
The amount of large woody material, that acted as sediment traps, in stream channels fluctuated with fire intensities. High intensity fires consumed large woody material, while low intensity fires recruited woody material into stream channels.	
▼ ▼ ⇦ ⇦ ⇦ ⇦ ▼	***Fire Suppression*** ***Timber harvest*** ***Road Construction*** ***Salvage and stream cleanout** in what is now riparian reserves.*
Reference- Forest Management to 1994: One change that is evident, stems largely from fire suppression. In many areas, there is an increase in the buildup of down woody material as well as an increase in channel vegetation, since peak flows occur less frequently than they did when catastrophic fires occurred regularly in the watershed.	
Another change is the reduction in surface erosion upslope from stream channels as a result of fire suppression activities. This reduces the sediment available to stream channels to rebuild floodplains. Both sediment and wood have to be available to the channel for proper channel/floodplain interactions.	
Fourth order and greater streams, historically experienced peak flows that altered their channels. Sediment delivered to these channels would build flood plains in response to the natural wood concentrations in the channel. Currently, that sediment loading has been reduced and the wood component removed by management activities such as stream clean out, etc.	

Conditions	Major Causes of Change
▼ ▼ ⇦ ⇦ ⇦ ⇦ ▼	***Timber harvest and road construction-*** *changes in standards have been implemented (e.g. "Best Management Practices" along with the Aquatic conservation strategy)*
Current - 1994 to Present: Today, stream channels in this watershed have high energies just as they did historically. The reintroduction of large wood into these systems can help the stream channels to reduce energies, retain more sediment, and function as they once did.	

II. PHYSICAL DOMAIN

D. Water Quality**

1. Characterization

*ii-13. *What aquatic-dependent beneficial uses occur in the watershed?*

Beneficial uses, dependent on aquatic resources, in this watershed are: domestic water use; resident and anadromous fisheries; aquatic non-fish species; riparian dependent species; water-related recreation; hydroelectric power generation; and water-related fire suppression and road maintenance needs.

- Domestic water is obtained from the Mackey Creek, Tumble Creek, and associated tributaries for summer homes, the Detroit Community, Detroit Ranger District facilities and several campgrounds. Water from the tributaries flows into the North Santiam River which serves as a domestic water supply for several downstream municipalities, including Gates, Mill City, Lyons, Mehama, Stayton, Sublimity and Salem.

- Fisheries are found in the main stem of the North Santiam River, other major tributaries, and lakes and reservoirs in the analysis area. This fisheries resource is not extensive in the tributaries because of steep channel gradients. Kokanee, which are a landlocked anadromous fishery, are present in the watershed. Historically, the North Santiam River provided anadromous habitat for winter steelhead and spring Chinook prior to the construction of Detroit and Big Cliff dams.

- Aquatic non-fish species can be found in all waters within the basin.

- Riparian-dependent species occur along the edges of water bodies in the watershed.

- Historically and currently, water-related recreation use has been extensive. Most recreation facilities in the Detroit Tributaries area are in riparian zones.

- The North Santiam River generates hydroelectric power through hydroelectric operation of Detroit Reservoir.

- Water use for fire suppression and road maintenance are periodic in nature. Use depends upon the amount of activity in the area. Historically, due to the fire frequency and the fire suppression efforts, water sources were developed to aid in the control of fire. These sources would then be utilized during road maintenance.

*ii-14. *Which water quality parameters are critical to these uses?*

Water quality parameters critical to beneficial users are temperature and type and timing of sediment input. Another potential critical parameter is biological contaminants.

Temperature: As is typical in the western Cascades, water temperature controls the type and distribution of aquatic species in the watershed. The primary influence on water temperatures in the Detroit Tributaries is solar radiation.

Sediment: The next critical parameter is sediment. Sediment movement through the watershed is critical for various aquatic, domestic, recreation and hydroelectric resources. The timing, type and amount of sediment have varied effects on beneficial users, including the following:

- Reproduction success of certain aquatic species is reduced when fine sediment inputs occur during egg incubation

- transportation systems can be damaged by coarse bedload deposition that plugs culverts

- impellers on hydroelectric facilities can be eroded by fine grained material

- water treatment costs increase as a result of turbidity from suspended colloidal material

- spawning habitat for various aquatic species is created by stream deposition

- beaches for recreation are created from fine grain deposition
- riparian habitat for riparian-dependent species can be created as a result of depositional areas creating flood plains that later become vegetated

As illustrated above, sediment can have both positive and negative impacts on various other resources. Thus supporting the critical nature of sediment movement, and its properties; (e.g. turbidity; bedload, mode of movement, suspended) as a water quality parameter.

Biological contaminants: The third potentially critical parameter for water quality is biological contaminants. Contaminants, such as water borne diseases, can impact both domestic and aquatic users. In the Detroit Tributaries area there is potential contamination from human waste because of the amount of recreation use the area receives, and from stocking non-native fish species such as hatchery rainbow trout. At this time, the degree to which this is a concern is unknown. In addition to the recreational areas, community sanitation systems pose a risk to water quality. Currently leach fields within the area are being reviewed and a community septic system is being proposed.

2. What do humans value that is associated with **water quality**?

Water and water quality have life-sustaining and economic (e.g. domestic and industrial water supplies), aesthetic, and recreational value.

3. What are the highest priority issues or resource concerns associated with **water quality**?

The highest priority issues are temperature, type and timing of turbidity, and other potential contamination (e.g. colloidal sediments, sanitation, fuel).

4. What and where are the management direction/activities, human uses, or natural processes that affect **water quality?**

a. Current Conditions

ii-15. *What are the current conditions and trends of beneficial uses and associated water quality parameters? What are the current conditions with regard to water quality parameters ?

Current conditions and trends of beneficial users are similar to historic conditions and trends.

Water quality for domestic water use is generally high in the Detroit Tributaries area. Episodic storms temporarily reduce water quality, as sediment increases along with rising waters. This sediment is flushed out of the watershed and water quality returns to previous conditions, under normal flows. Domestic water users downstream of Detroit and Big Cliff dams, have not historically been affected by these pulses of sediment because of the metering of these sediments by the dams.

During the 1996 water year this condition changed. A February storm event delivered increased sediment loads into the reservoir and flushed existing reservoir sediments downstream. In light of the tighter requirements adopted by the State of Oregon that reduced the acceptable level for turbidity in finished drinking water (the condition of water after being treated), downstream communities, especially Salem, were concerned when turbid waters flowed past their water intake systems and they had to rely on alternate water sources for domestic use. Their main concern was that they wanted to determine where sediment sources originated that ended up in the Detroit and Big Cliff reservoirs. The character of sediment they were most concerned with was ultra fine clays or colloidal materials. In the Detroit Tributaries area, sources of these clays are failure zones of earthflows, weathering and geologic erosion of weak volcanic ash deposits.

The Willamette National Forest has entered into a memorandum of Understanding with the City of Salem is working closely with the City to address water quality concerns.

ii-16. What and where are the "303d" water quality limited water bodies within the watershed?

There are currently no "303d" water quality limited water bodies within these watersheds.

ii-17. What effects do proposed improvements in the local infrastructure (e.g. proposed sewer project) have on water quality?

Proposed improvements within the area fall under all permitting requirements as specified by the State and county agencies. Water quality protection is considered under these permitting requirements. Change in current water quality is not anticipated.

b. Reference Conditions

*ii-18. *What were the historical **water quality** characteristics of the watershed?*

Historic water quality characteristics are difficult to determine quantitatively due to the lack of data. Even with the data available, characterizing the watershed can only be done on how the system is operating today. Upon reviewing the records one needs to remember climatic changes that have occurred since this period of record, as well.

Water Temperatures: Fires controlled the amount of vegetation on south and west aspects. The amount of vegetation shading the streams determined the temperatures in those streams.

Turbidity: Historically sediment characteristics can only be classed in relation to historic disturbance. Sediment pulses more than likely came through the system during episodic events that created short term impacts. This sediment was transported into the North Santiam River and through to the Willamette River. Sediment particle size depended upon the source and location. First through fourth order streams contained boulder to clay size particles that were mobilized and fifth and greater order streams would move cobble to clay size particles. The difference between the two, related to the amount of woody material present to increase channel roughness and reduce energy.

Biological contaminants were likely lower in historic times, because less people used the area and there was no fish stocking program.

c. Comparison of Current and Reference Conditions

*ii-19. *What are the natural and human causes of change between historical and current* ***water quality*** *characteristics of the watershed?*

Conditions	Major Causes of Change
Reference- Prior to Forest Management: Historically, due to the fire regime, first to fourth order streams were burned. This burning reduced the vegetation next to the streams and allowed solar radiation to reach the water.	
▼ ▼ ⇦ ⇦ ⇦ ⇦ ▼ ▼	*The causes of change from historic to current relates more to the areas of* ***solar radiation*** *rather than if solar radiation was/is a problem.* ***Fire Suppression*** *resulted in the retention vegetation, especially on south aspects.* ***Timber harvest and Road Construction*** ***Salvage and stream cleanout*** *in what is now riparian reserves.* *Introduction of Hatchery fish*
Reference- Forest Management to 1994:	
Water Temperature: (see Current - 1994 to Present)	

Conditions **Major Causes of Change**

Reference- Forest Management to 1994:

Turbidity: Historic sediment production characteristics have been impacted primarily by fire suppression/prevention activities and large scale wood removal during stream clean out. A reduction in sediment available to the system, as a result of fire management and a lack of wood to hold sediments, led to a change in sediment type. Failures following fires used to load channels with fine and coarse sediments, that would be retained by the large wood and would be slowly metered through the system.

Biological Contaminants (see Current - 1994 to Present)

▼

▼ ⇦ ⇦ ⇦ ⇦

▼

Timber harvest and road construction*- changes in standards have been implemented (e.g. "Best Management Practices" along with the Aquatic conservation strategy)*

Current - 1994 to Present:

Water Temperature: Currently first to fourth order streams are vegetated, for the most part, and solar radiation does not have an opportunity to increase water temperature (some effect will occur due to changes in microclimate but in looking at the watershed as a whole this becomes minor).

Turbidity: Currently, sediment production is mainly due to in-channel recruiting and episodic pulses, during large storm events, which cause road failures and natural debris torrents. During storm events, these pulses of sediment pass through the system. Stream energies are so high, at this time, that sediment of all sizes, are moved.

It seems likely that **biological contaminants** are greater now than in the past, because of increased human use over time, as well as, the introduction of hatchery fish to the system.

II. PHYSICAL DOMAIN

E. Fire

1. Characterization

ii-20. What factors contribute to fire occurrence and where do they occur?

Fuels, topography, weather (hazards) , and ignition (risk) are the factors contributing to fire occurrence.

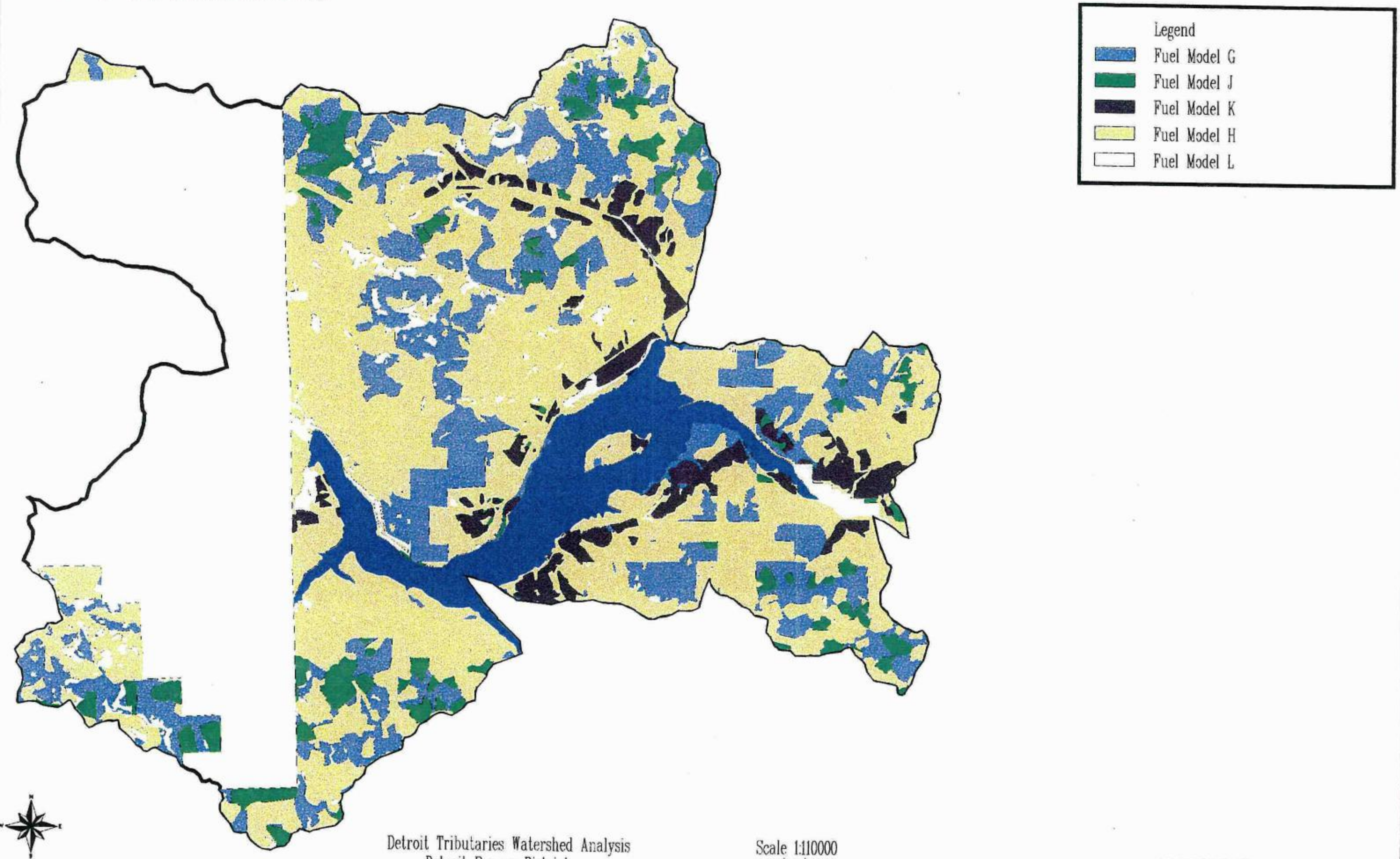
Fuels: Fuels are grasses, brush, timber and slash. Fuel model properties are descriptive of vegetation, quantities (fuel loadings), depth of loadings, and the arrangement of fuels on the landscape. The National Fire Danger Rating System and the Aids to Determining Fuel Models for Estimating Fire Behavior describes and assigns fuel models for providing a quantative basis for rating fire danger and predicting fire behavior. The classified fuels in these watersheds are mostly comprised of National Fire Danger Rating Fuel models G, H, K, L. (See ***Map II-6***). Vegetative data gathered via satellite imagery (PMR data) , on a large general over viewing, modeled the majority of the waterhsed as a fire behavior fuel model 10 (Anderson 19xx) (see ***Table II-2***) Some of the areas in a fuel model ten may exceed maximum allowable fuel loading identified in the Forest Wide- Standards and Guides for non-wilderness.

Fire behavior for a fuel model ten given eight percent dead fuel moisture, 100% live fuel moisture, effective wind speed at midflame height at five miles per hour, fire intensities would suggest a spread rate of approximately 8 chains per hour and a flame length of 5 feet . Fires with these present values are at the upper limit of control by direct attack. More wind or drier conditions could lead to an escaped fire. This model assumes a continuous topography , wind , and fuel conditions.

Table II-2:

Fuel Models		Type of Vegetation	Stand conditions	Total Fuel Load of < 3" dead and live (tons per acre)	Duff and Litter Depth (feet)	Down woody material size
NFDRS Fuel Model	Fuel Model for Estimating Fire Behavior (Anderson)					
G	10	Dense Conifer Stands with heavy accumulation of litter and down woody material.	Overmiature, may suffer from insects, disease, wind or ice damage (natural events that create a heavy buildup of dead material on the forest floor). The undergrowth is variable, but shrubs are usually restricted to openings.	12	1.0	>3" diameter
H	8	Conifer	Healthy stand with sparse undergrowth and a thin layer of ground fuels.	5	0.2	Occasional "jackpot" of heavy fuel concentrations < 6" in diameter
K	11	Slash fuels from light thinning and partial cuts in conifer stands	Typically the slash is scattered about under an open overstory.	11.5	1.0	Fuels greater that 3" in diameter are limited to no more than 10 pieces greater than 4" in diameter along a 50 ft. transect
L	1	Western grasslands vegetated by perennial grasses.	Shrubs and trees occupy less than one third of the area.	.74	1.0	

Fuel Models

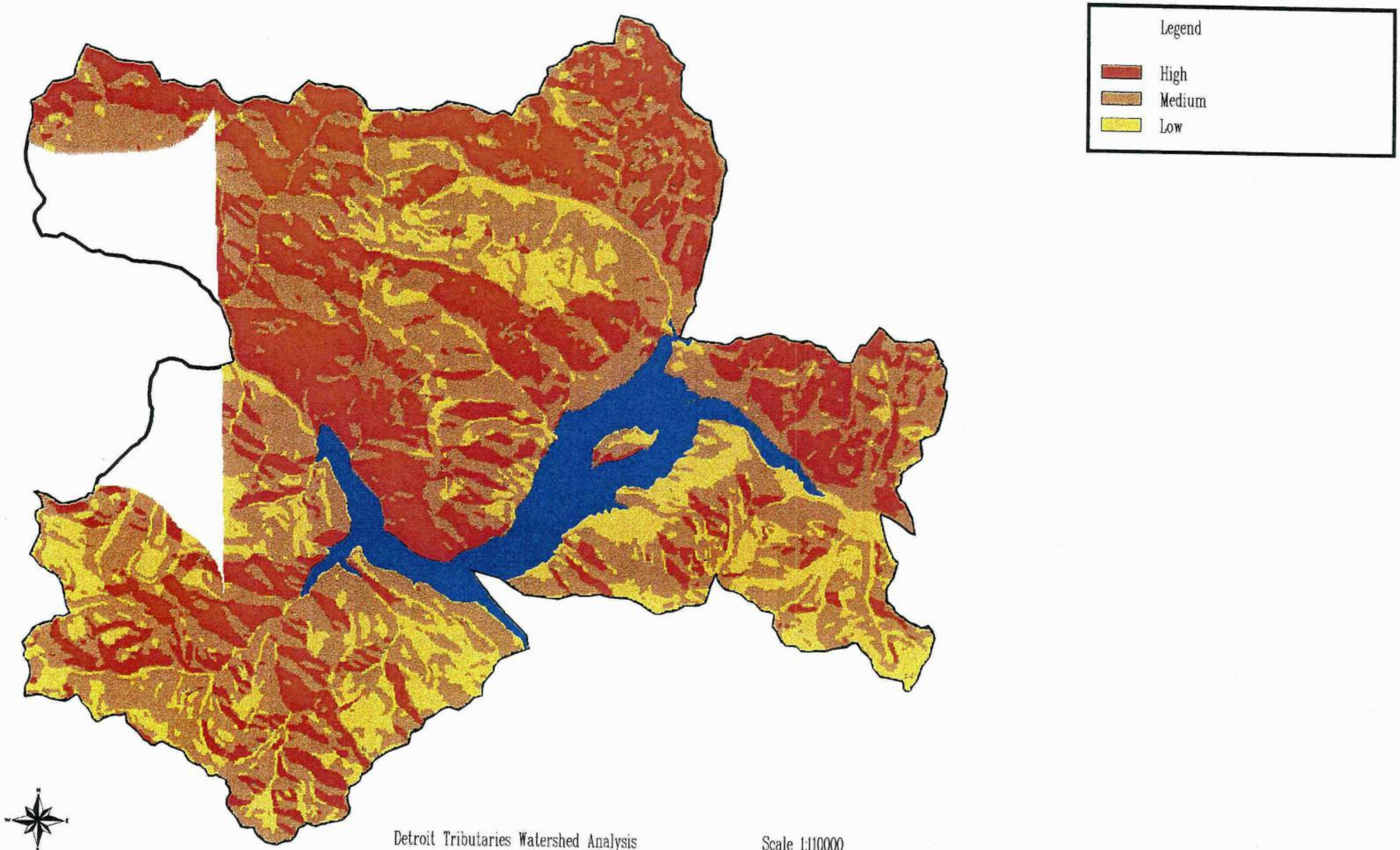


Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/03/97

MAP II-6 Request #1480

Fire Hazard Matrix

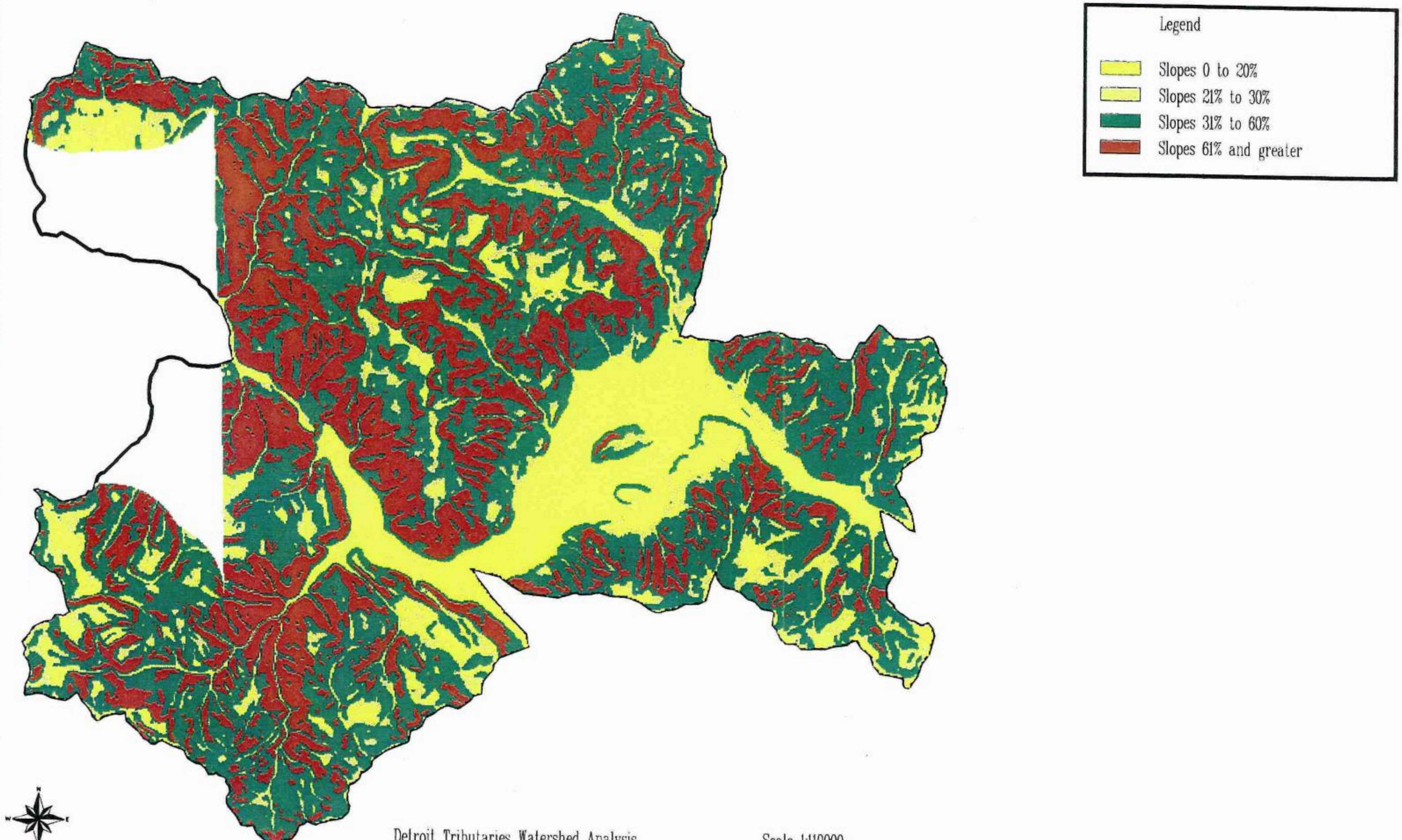


Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/03/97

MAP II-7 Request #1478

Slopes



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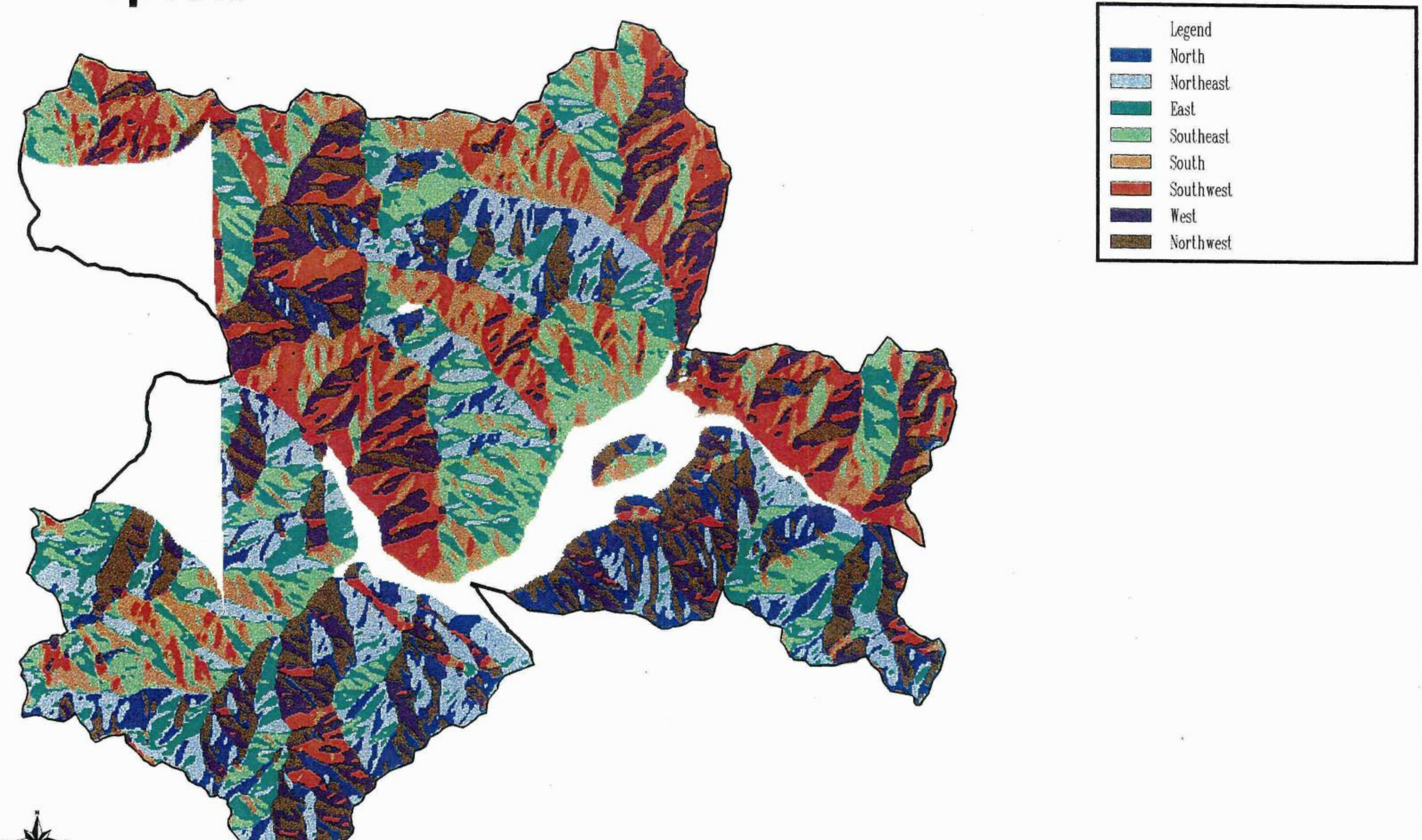
MAP II–8

Request #1486

Aspects



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MAP II-9

Request #1462

Topography: Topography in the watershed has been assigned High, Medium, and low hazard by the following characteristics:(See ***Table II-3 and Map II-7, Map II-8, and Map II-9***)

Table II-3:

Fire Hazard	Slope	Aspect(s)
High	over 40%	South, Southwest, Southeast, and West aspects
Medium	over 40%	North, Northeast, Northwest, and East aspects
	under 40%	South, Southwest, Southeast, and West aspects.
Low	under 40%	North, Northeast, Northwest, and East aspects.

Weather: Weather of the Detroit Tributary watersheds falls in the North Pacific fire climatic region. Rainfall in this coastal-mountainous slopes averages 80-100 inches of rainfall. Rainfall is concentrated in the winter months; summer rainfall is light. Combinations of high rainfall and moderate temperatures results in a buildup of extremely heavy fuel volumes.

The maritime influence, usually holds the fire danger to moderate levels during most seasons. However, some summers are very dry, and warm with high fire danger. During these periods, fires are characterized by high intensities, firewhirls, and long-distance spotting. The fire season usually runs from June through September. Lightning fires increase in number and severity closer to the mountains. High Fire Danger from strong, dry north to east winds in the late summer and early fall create the potential for stand replacing fires. This occurs when a cold front is followed by a Pacific High extending inland over the coast or when higher pressure develops east of the cascades at the time a trough lies along the coast intensifies the risk.

Fire Risk

Ignition sources within these watersheds are caused by lightning, human caused fires, sparks from machinery, and there is potential from downed power and telephone lines.

2. What value are associated with **fire control and management?**

- Preserving ecosystems that evolved with fire.
- Protecting values or resources at risk from stand replacing fires.

3. What are the highest priority issues or resource concerns associated with **fire control and management**?

Fire Hazard - physical features such as topography; the amount of fuel and how it lays on the landscape; and influences on the buildup of fuels such as winds, floods, insects, and diseases

- Recent wind storms and floods have resulted in an increase of downed timber throughout the watershed. This often results in increased bark beetle populations that eventually kill adjacent live trees. Furthermore, accumulations of downed and dead trees increase risk of stand replacing wildfire. The issue is whether management should actively respond to these events and reduce the fuel loadings by prescribed fire and/or mechanical removal of fuels or let nature run its course, taking the risk of a stand replacing fire occuring, given the effective weathers parameters, fuels present, and ignition takes place.

- Some of the high fire hazard areas are located in owl dispersal routes between Late Successional Reserves that occur to the north and to the south of the Detroit Tributary Watersheds. These areas also contain old growth. Although old growth conditions moderate the hazard, once a fire gets started in these areas, the probability of a large scale stand replacement fire is high. Of special concern are isolated patches of old growth surrounded by plantations.

Fire Risk - natural ignition source such as lightning; human ignition sources such as cigarettes, campfires, sparks from machinery.

- The Detroit Fire occurrence map shows that public use areas are prone to human caused fires. With increases in recreation use, there may be an increase in human caused fires.

- Fires beginning on private land from natural or human causes could spread onto public land , as well as fires starting on public lands spreading to private lands .

- The Cities of Detroit and portions of Idanha are surrounded by National Forest lands and are faced with urban-interface fire issues. Should a fire start on Forest Service land that surrounds Detroit City's municipal watershed, it has the potential to spread and significantly affect the quality and source of the city of Detroit's drinking water.

4. What and where are the management direction/activities, human uses, or natural processes that affect the **fire control and management?**

a. *Current Conditions*

ii-21. What is the current risk and hazard and the trends for fire within these watersheds? Where does it occur?

Table II-4: Fire Hazard in Detroit Tributary Watersheds (see ***Map II-10***)

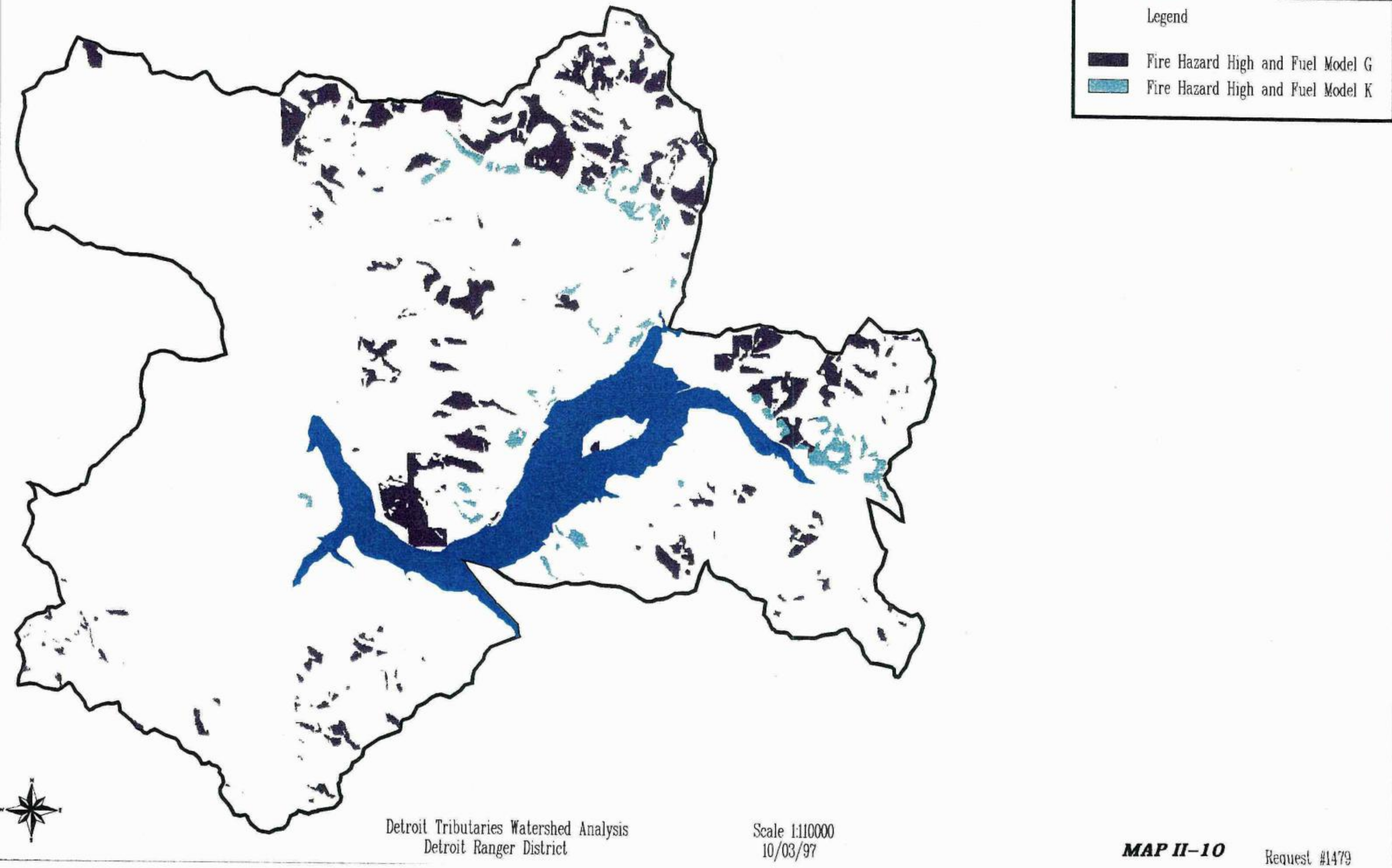
Fire Hazard*	Percentage of Watersheds	NFRDS fuel models	Topography (*Table II-3*)	Comments
High	13%	G , J, and K	High	Some of these High hazard areas have been identified as spotted owl habitat. Fuel loadings in as result of implementing Forest plan down woody requirements, run the risk of contributing to a stand replacing fire event, conflicting with the intent of Forest plan direction with regard developing and maintaining late successional structures in Late Successional reserves, Riparian reserves, green tree retention areas, and wildlife tree clumps.
Medium	63%	G , J, and K	Medium	
Low	24%	H, L	Low	

* This analysis does not include data for the private and state portion of the watershed existing outside of the forest service boundaries. Fire history maps suggest most of the private and state portions of the watershed last burned in the Sardine fire of 1951.

FIRE BEHAVIOR

Given what we know from PMR data (satellite imagery) that a large overview of the watershed is a Fire behavior fuel model 10, ***Aids to Determining Fuel Models for Estimating Fire Behavior*** (Hale E. Anderson , 1982) estimates that the fire behavior has the potential to be uncontrollable by direct attack by on the ground fire fighters. This is without factoring in steep slopes and the hotter s, sw, se, and west aspects that occur in this watershed. The possibility of an escaped stand replacing fire becomes high should a fire start and go undetected or initial attack is delayed. Decreased access into the watershed would delay initial attack.

Fuel Model and Fire Hazard Matrix



MAP II–10 Request #1479

c. Reference conditions

ii-22. What was the historical hazard and risk of fires within these watersheds? Where did fires occur?

Historically hazard (in respect to slope and aspect) was much the same as today, taken that the physical properties of slope and aspect remain the same as today, **13% high hazard, 63% medium hazard** and **24% low hazard.**

Fire history records (1800's) reveal a return interval of 10-30 years, indicating a low to moderate severity fire regime. The longer the interval, the higher the severity due to fuel buildup.

- **Moderate severity fire regime :** Fires are infrequent (25-100 yrs), they are partial stand replacement fires.
- **Low severity regimes:** Fires are frequent (1-25 years), they are low intensity fires with few overstory effects. (see Dave's fire history report for what historically the cause of fire was, ; i.e. risk)

d. Comparison of Current and Reference Conditions

ii-23. *What are the natural and human causes of change between historical and current* ***fire hazard and risk?***

Conditions

Reference- Prior to Forest Management:
Early fires in the area reveal a return interval of 10 - 30 yrs, indicating a low to medium severity fire regime.
Larger patches of smaller structural stages (early successional) across the landscape from **low frequency stand replacing fires**, especially on south, and west aspects. **Fires prevented fuels buildup on south and west slopes.** Larger patches of larger structural stages in portions of watershed sheltered from fire regime (north, east, aspects, draws)

Conditions	Major Causes of Change
	Fuel buildup from ***Fire Suppression*** *and natural events such as winds, and floods* ***Increase in Human Caused Fires***
Reference- Forest Management to 1994:	
Fire history records suggests a change in fire regime in the Detroit Tributary watersheds. Infrequent stand replacement fires since early 1900's suggest a **change to a high severity fire regimes.** High severity fire regimes are usually high intensity stand replacement fires. This fire regime is typically moist and cool; fires occur under unusual conditions, such as drought with dry hot winds (Pickford et al. 1980). Fires are of short duration (days to weeks) but of high intensity and severity. A cause for this change may be due to the success of fire suppression which has contributed to the build up of fuels.	
The **build up of fuels caused by fire suppression and by natural events** such as winds, floods contributes to the current hazards contributing to the risk of wild fire in the Detroit Tributary Watersheds.	
	Fuel buildup from ***Fire Suppression*** *and natural events such as winds, and floods* ***Increase in Human Caused Fires*** *from recreation, arson, and other human uses.*

Conditions

Current - 1994 to Present (see Reference- Forest Management to 1994)
Fire history and fire occurrence data show fire suppression to have been effective in the control of wild fire, although, it has contributed to the build up of fuels and the interruption of a needed disturbance in the balance of a functional ecosystem. This data presents **a low probability of fire in the watershed, although, the fuels present, combined with the topography, given the right supporting weather parameters, hazard does exist for a stand replacing fire in the watershed**. Should a fire start go undetected or there is a elapsed time of attack due to inaccessibility in this rough terrain or unavailability of resources, there is potential for a wildfire that is uncontrollable.
Fire occurrence records indicate a **increase in human caused fires**. This would be most probable due to the creation of the lake, rivers, and the access to recreational opportunities that the area provides. Human fires exist predominately around recreation sites, and of late, there has been an increase in premeditated set arson fires in high hazard areas in the Detroit area.

III. BIOLOGICAL DOMAIN

A. Vegetation

1. Characterization

iii-1. *What is the array and landscape pattern of plant associations and seral (structural) stages in the watershed (riparian and non-riparian)? What processes caused these patterns (e.g., fire, wind, mass wasting)?

Plant Association Series: There are two major plant association series in the watershed, the western hemlock series and Pacific silver fir series. About 55% of the watershed is in the western hemlock series, about 41% is in the Pacific silver fir series, and the remainder is mountain hemlock and Douglas-fir series. These series reflect differences in local environmental conditions as shown in ***Table III-1.*** The tree species which define each series indicate the potential climax species and not necessarily the species currently occupying the site at this time.

Table III-1:

Plant Association Series	*Percent of forested portion of watershed*	*Site Temperature*	*Elevation*	*Tree Growth*
Douglas-fir	*2*	*warm*	*low*	*high*
western hemlock	*55*	|	|	|
Pacific silver fir	*41*	V	V	V
mountain hemlock	*2*	*cold*	*high*	*low*

The distribution of the plant associations series across the landscape is depicted in ***Map III-1*** for the entire watershed and in ***Map III-2*** for riparian reserves.

* = core question and ** = core topic from the Federal Guide for Ecosystem Analysis at the Watershed Scale (version 2.2)

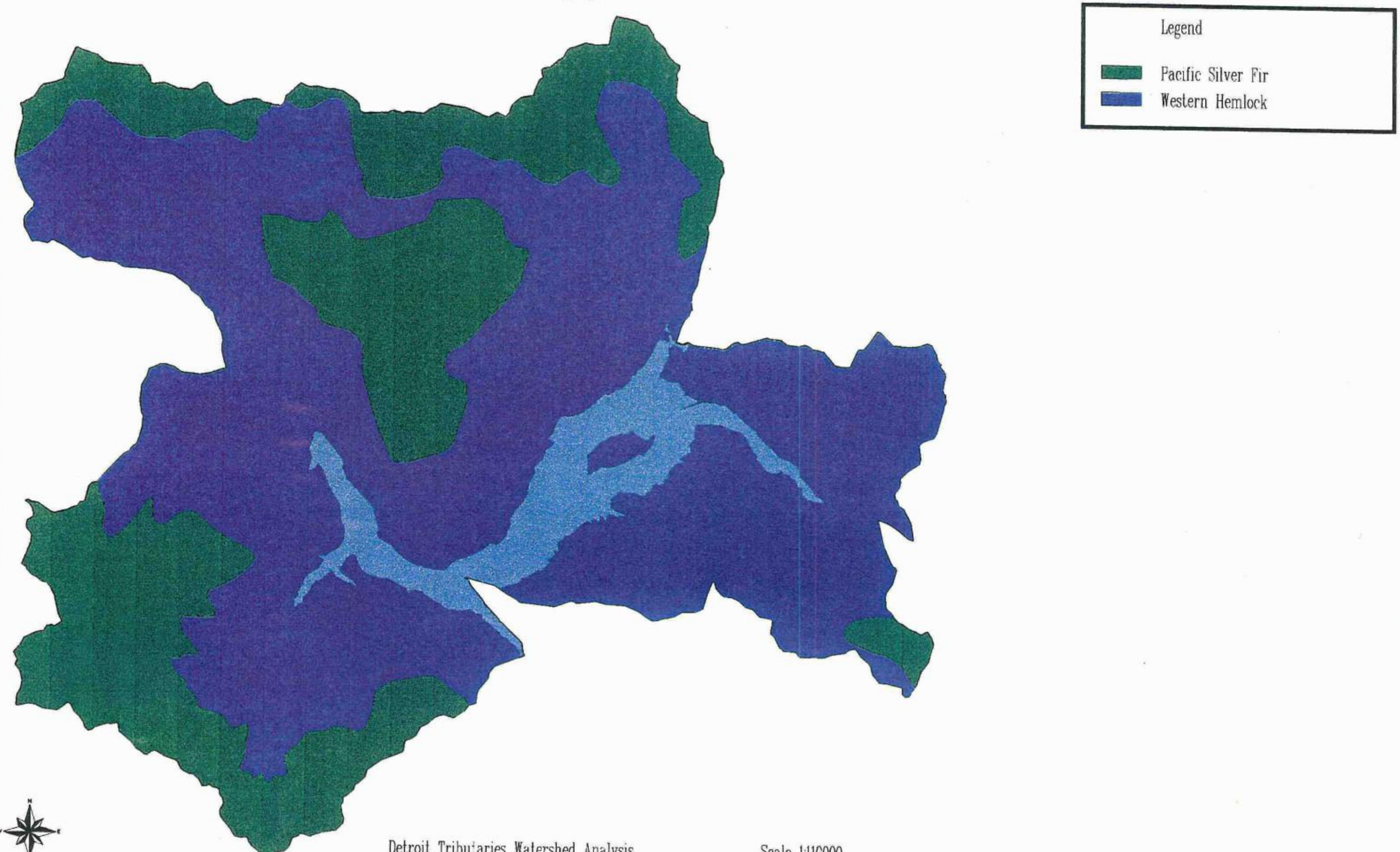
Differences in plant associations between riparian and non-riparian areas may vary in degree locally, depending on stream class, topographic features, water availability, air drainage, soils, and other factors. Differences in vegetation from riparian areas and upslope sites may be significant enough to classify adjacent sites in entirely different plant association series or there may be no difference at all. In general, riparian plant associations tend to be wetter and cooler than adjacent upslope sites, but these differences decrease or may disappear completely with intermittent streams. For clarification, Riparian Reserves widths may or may not represent the actual zone of influence that streams have on vegetation. In general, differences in vegetation from the upslope disappear in a shorter distance than that defined by Riparian Reserve widths.

Structural Stages: The structural stages represented in the Detroit Tributary watersheds today are generally the result of either timber harvest or past fires. There are four structural stages represented in this watershed: stand initiation, stem exclusion, understory reinitiating, and old growth. The following is a brief description of each structural stage:

- *Stand Initiation Stage* - In this stage, stand ages range from 1 to 20 years old depending on site conditions and degree to which the stand has been managed. Most stands in this stage were the result of timber harvest and almost all were planted. Harvest units were planted at a density of about 400 to 600 trees per acre with one or more tree species, generally Douglas-fir, noble fir, and western white pine, depending on site conditions. Commonly, additional tree species seeded into these plantations naturally. At the lower elevations, shade-tolerant species such as western hemlock, western redcedar and Pacific silver fir seeded in, while at the higher elevations mountain hemlock and Pacific silver fir seeded in.

  Many of the plantations have been precommercially thinned, leaving the largest, most damage free trees, as well as seedlings under one foot tall, free to grow in the plantations.

Plant Association Series



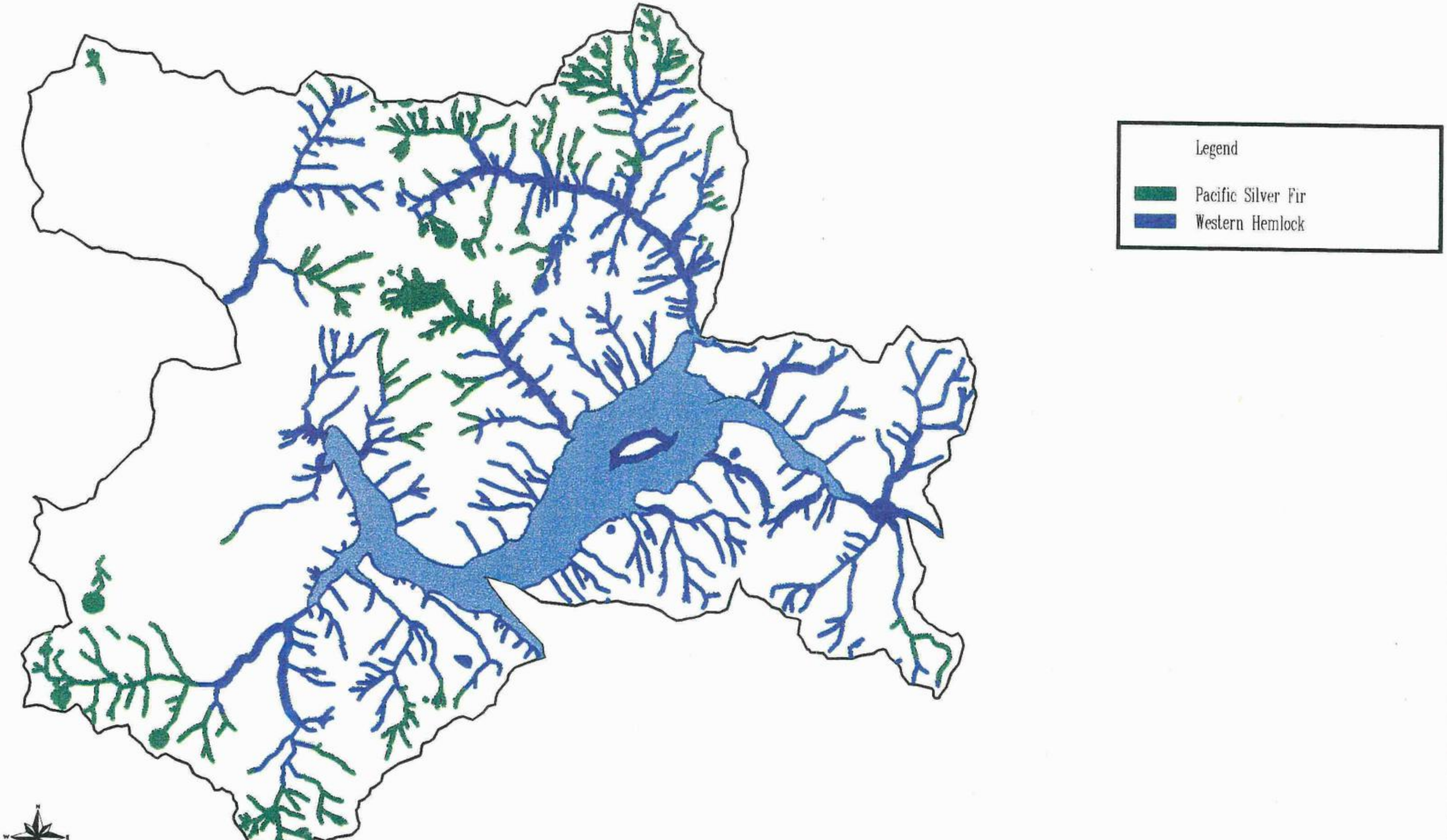
Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/05/97

MAP III–1

Request #1534

Plant Association Series in Riparian Reserves



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Scale 1:110000
10/05/97

MAP III-2

Request #1534h

Non-tree vegetation is also present in this structural stage, although species and numbers are highly variable. On most sites, species such as rhododendron and vine maple resprout after timber harvest and broadcast burning. At higher elevation, beargrass also survives timber harvest and burning and may cause severe competition for planted trees. Invasion of harvested sites by non-sprouting plants is highest at lower elevations, < 3000 feet, and on southerly and westerly aspects. Snowbrush invasion occurs on some sites, especially those with frequent fire return intervals.

The degree of plant species diversity declines with increasing elevation and coldness of site. Many of the sites in the mountain hemlock series undergo very little change in the composition of plant species following fire or logging.

Until about 1990 most of these plantations had very few snags, green trees, or significant levels of course woody debris. Almost all were broadcast burned. After 1990 most units that are in this structural stage have met the Willamette National Forest standards and guidelines for snags and down woody material.

- *Stem Exclusion Stage* - This structural stage includes a very large range of stand conditions and includes trees that range in age from about 20 to 150 years, with diameters from 5" to 20.9", depending on site conditions and degree of management. These stands have dense crowns which block out light to the forest floor, and limit additional tree regeneration in the understory. Typically, shade tolerant understory trees that are present persist but grow very slowly. Intermediate or suppressed trees that do not tolerate shade well, suffer from competition and have a high mortality rate. Shade intolerant shrubs and forbs frequently disappear during this stage.

  In natural stands, this stage is typically dominated by one or two tree species. Precommercial thinnings, which normally precede this stage, may reduce competition and mortality by favoring the best growers. Commercial thinnings further reduce competition and increase average stand diameter. Shade tolerant understory trees and other plants may benefit from increased light and respond with vigorous growth.

- *Understory Reinitiation Stage* - This stage is characterized by stands as young as 80 years to stands as old as 250 years, depending on site conditions. The vast majority of these stands have not been managed. In this stage, the dominant tree layer begins to break up due to mortality and a second, pole sized, canopy layer generally develops underneath. Although this may simply happen naturally, given enough time. In the, past underburning has created these stands in some areas, by killing sufficient overstory trees to stimulate regeneration underneath. This underburning was more prevalent in the past than has been generally recognized, partially because it was not of intense interest until recently and also because it is difficult to distinguish through querying of databases.

  In this watershed, management-induced understory reinitiation has resulted from old salvage logging and more recently, commercial thinnings. These practices have resulted in release of tolerant understory trees that are developing a second canopy layer at a much earlier age than would have developed under natural conditions, especially with fire suppression and a lack of natural underburning.

- *Old Growth* - These stands are the largest and oldest found in the watershed. They may range from over 200 to over 600 years old in this watershed. While a complete record of stand ages is not available, it is believed that over 90% of the stands, in this stage, date back to the 1600's. Most of these stands still have a high component of Douglas-fir or other fire regenerated species in the upper canopy layers. Second and third canopy layers are usually well developed with shade tolerant species. Other vegetation, primarily shrubs, may reach high levels because of more open canopies. Diseases such as dwarf mistletoe in hemlocks or true firs, and heart rots and root rots contribute to mortality and bole defects. In the oldest stands, especially those in the upper elevations, mortality and rots may occur at high levels. Heavy competition from rhododendron, other shrubs or beargrass may reduce replacement of mortality, leaving stands more open.

Table III-2 depicts the percentage of area occupied by each structural stage in the various plant association series for the entire watershed and for riparian reserves.

Table III-2:

Current Structural Stages by Plant Association Series					
Structural Stage	**Plant Association Series**				
	Western Hemlock (all owners)	**Western Hemlock (Federal)**	**Pacific Silver Fir (all owners)**	**Pacific Silver Fir (Federal)**	**Total (Federal)**
	% of watershed	**% of watershed**	**% of watershed**	**% of watershed**	**% of watershed**
Entire Watershed					
Stand Initiation	9	12	6	9	21
Stem Exclusion	43	31	15	10	41
Understory Reinitiation	4	5	2	2	7
Old Growth	4	6	7	10	16
Non-Forest	8	12	2	3	15
Totals	68	66	32	34	100
Riparian Reserves - Federal only					
Stand Initiation		8		6	14
Stem Exclusion		26		6	32
Understory Reinitiation		4		2	6
Old Growth		5		8	13
Non Forest		33		2	35
Totals		76		24	100

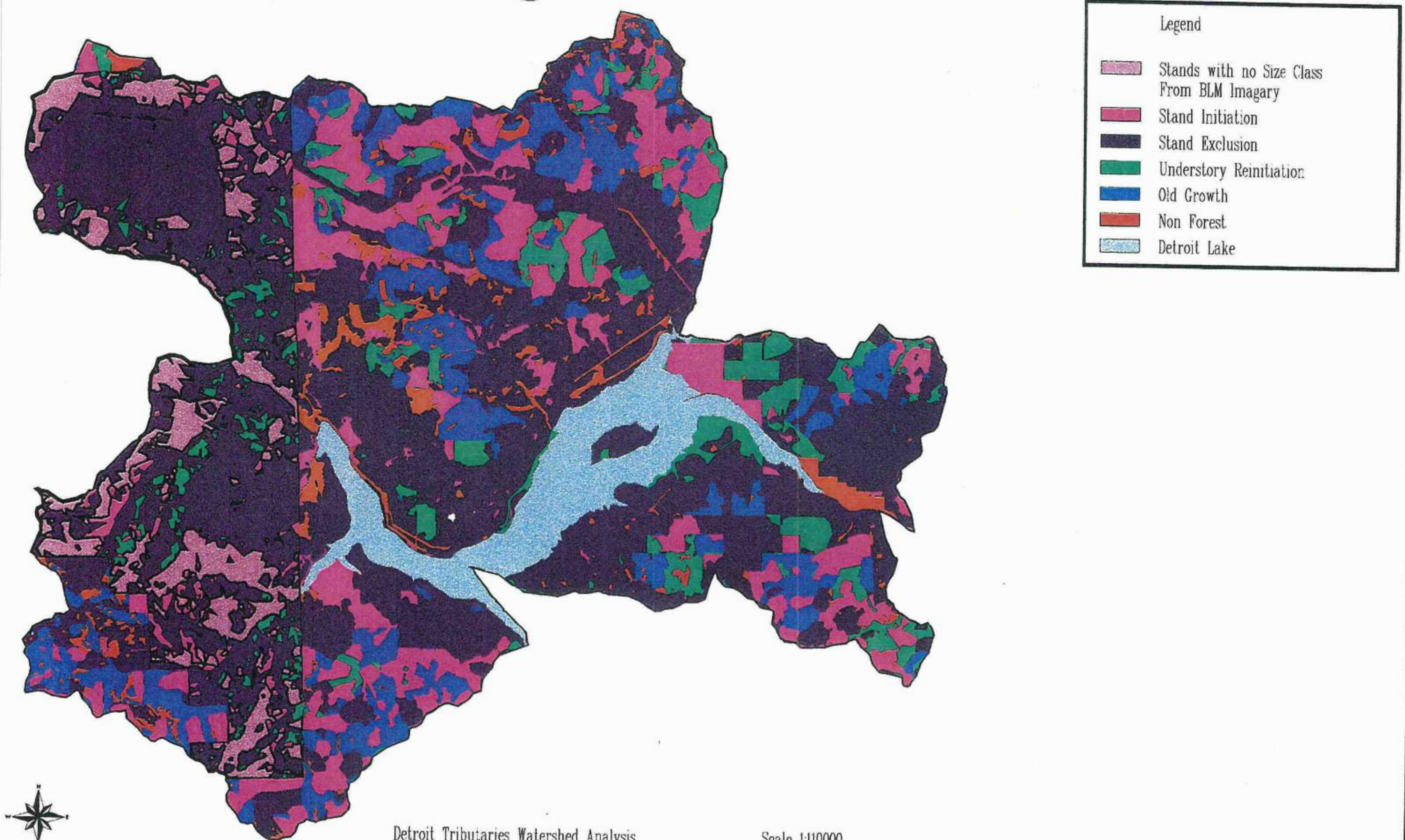
Structural Stage	*Plant Association Series*				
	Western Hemlock (all owners)	*Western Hemlock (Federal)*	*Pacific Silver Fir (all owners)*	*Pacific Silver Fir (Federal)*	*Total (Federal)*
	% of watershed	*% of watershed*	*% of watershed*	*% of watershed*	*% of watershed*
Non-Riparian - Federal only					
Stand Initiation		14		10	24
Stem Exclusion		33		12	45
Understory Reinitiation		6		3	9
Old Growth		6		11	17
Non Forest		2		3	5
Totals		61		39	100

From the chart above, it appears that structural stages in the riparian reserves differ from non-riparian in that there are significantly less stands in stand initiation and stem exclusion stages, and significantly more in non-forest due to the reservoir.

Map III-3 shows the landscape distribution of stand structural stages across the watershed. *Map III-4* depicts stand structural stages within riparian reserves.

Structural stage differences between riparian and non-riparian sites may vary and are influenced both by management activities and by similar factors that influence plant association distribution. Major disturbances such as fire and logging have had a differing level of influence on structural stage development which varies greatly by stream class. Except for early railroad logging in the lower elevations, larger streams were excluded from regeneration harvests. Salvage logging was practiced in these streams but this would not usually be significant enough to alter stand structural stage. Intermittent streams were generally not buffered from logging until the 1970's and many not at all, but may have received some differential yarding techniques.

Stand Structural Stages



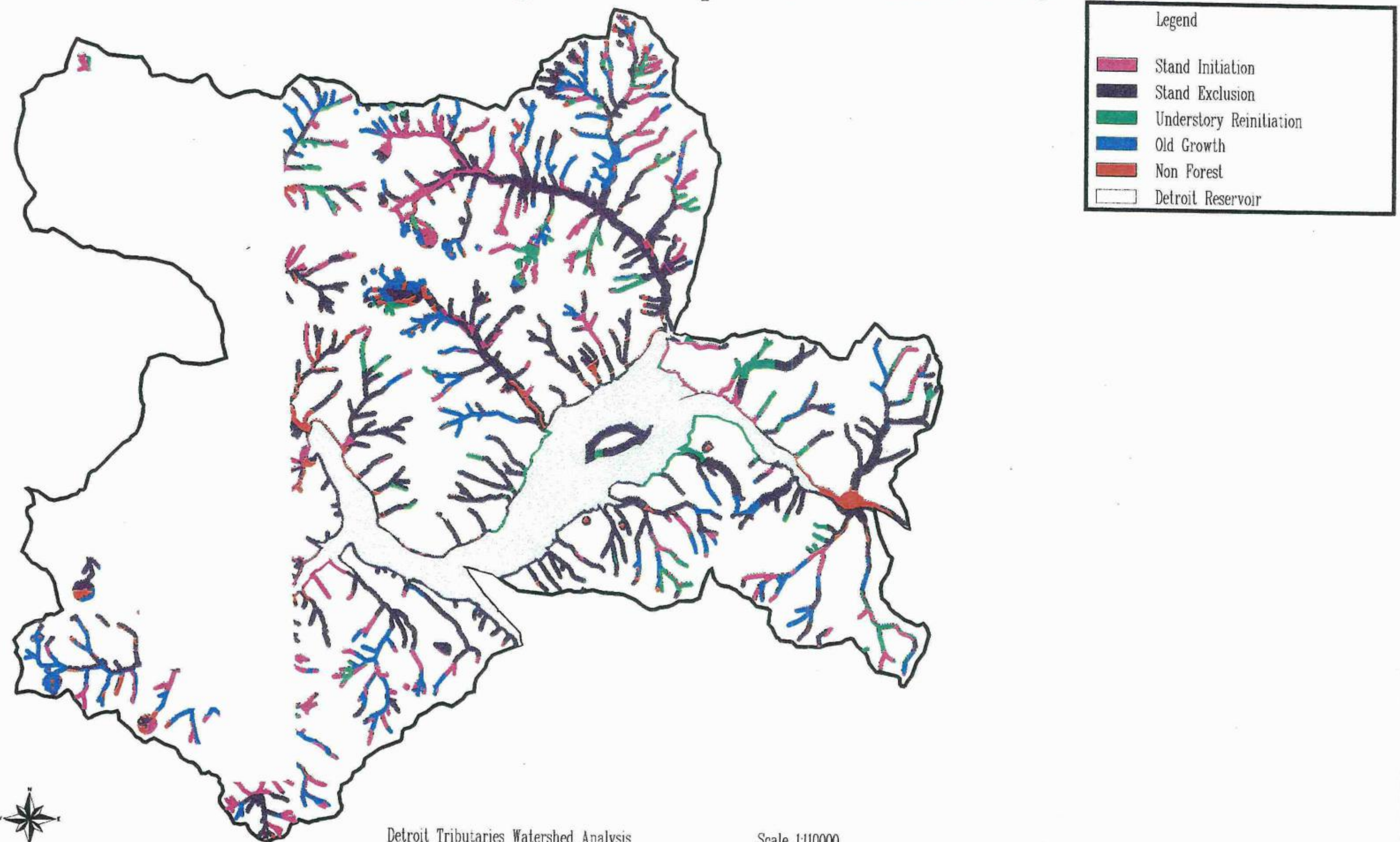
Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/03/97

MAP III–3

Request #1540

Stand Structural Stages in Riparian Reserves



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Scale 1:110000
10/06/97

MAP III–4 Request #1476

Past fires tended to burn in intermittent stream valleys as they did in upslope areas and may have burned with even greater intensity where heavy fuel accumulations were present. On larger streams, there was more of a tendency for fires to burn less intensely or to go out entirely. These fires were more likely to leave remnant trees or unburned islands of vegetation. Reinvasion of burned areas may have varied greatly or very little from upslope areas due to factors previously discussed.

Floods and debris torrents may have created significantly different vegetation in localized riparian areas, but overall these differences are probably not significant in the watershed.

Vegetation Diversity: Vegetative diversity is rather low in Detroit Tributaries due to the uniform nature of topography, climate, and hydrology that characterizes this analysis area. In addition, timber management in this predominantly low to mid-elevation and centralized area of the district has resulted in a large number of even-aged, uniform stands. Therefore the varied habitat types that normally exist in an area with large old growth stands and diverse topography are not present in Detroit Tributaries, and associated plant diversity is correspondingly low.

iii-2. What is unique about the vegetation in the Detroit Tributary watersheds?

Special Habitats: The special (non-forested) habitats found in Detroit Tributaries are mainly represented by rock type habitats including outcrops, vine maple/talus, and scree slopes (e.g., dry rock gardens). Plant diversity within these rock dominated special habitat types is generally low. Exceptions to this pattern include areas where there is a break in the topography (Tumble Lake, Detroit Lake flats), and the headwater portions of a few watersheds that occur in the Monument Peak area. The Monument Peak Botanical Special Interest Area provides a variety of special habitat types where segments of the Willamette Valley flora and the western Cascade flora are both represented. In addition, high elevation, sedge, and beargrass meadows are present, mostly on the upper portions of French Creek Ridge. Ponds are relatively infrequent, and aside from Detroit Reservoir only one large lake exists (Tumble).

There is only one known sensitive plant species within Detroit Tributaries. The largest number of populations and the largest population sizes of Gorman's aster (*Aster gormanii*) in its range occurs in this analysis area. Other Willamette National Forest plant species of concern found in Detroit Tributaries include maidenhair spleenwort (*Asplenium trichomanes*), fringed grass of Parnassus (*Parnassia fimbriata* var. *hoodiana*), Anderson's sword fern (*Polystichum andersonii*), and the Cascade daisy (*Erigeron cascadensis*).

Survey and Manage Species (C-3): A few survey and manage species from Table C-3 in the Northwest Forest Plan have been documented as occurring in Detroit Tributaries ***(Table III-3 in current condition under question iii-6)***. These species are associated with late-successional and old-growth forest and have been identified as needing status information gathered, monitoring, protection, or all three.

Noxious Weeds: Detroit Tributaries provides an entry point, numerous pathways, and good habitat for its share of the district's noxious weeds. St. John's-wort and Scotch broom present the largest problem, followed by Canadian thistle, tansy ragwort, and bull thistle.

2. What values are associated with vegetation?

a. Vegetation has economic, life-sustaining, aesthetic recreational and spiritual value (i.e. trees and other vegetation provide commodities, many plants provide food/shelter to humans, fish and animals, old growth provides aesthetic and spiritual value, huckleberries and cedar trees are important to Native American cultures for tribal ceremonies and basket making, etc.)

b. Natural species richness and diversity has ecological value. Plants are the oxygen providers and the base of the food chain that allows all other forms of life to exist. A variety of plant species supports a variety of other life forms. Plant/animal interactions can range from a simple indirect association as in the case of carnivores, to very complex interdependencies where neither the plant species nor the animal species can exist without each other (coevolution). Animals can use vegetation for food, shelter, camophlogue, poisons, and tools.

   Without variety, living systems become simpler, and are more prone to reduction or extinction during stochastic events such as environmental disturbance or disease outbreaks.

3. What are the highest priority issues or resource concerns associated with **vegetation?**

a. For a variety of reasons, **old growth** is a highly valued component of the ecosystem, so many people do not want to see any more of it harvested. Therefore, management activities that involve harvest of old growth timber, and for that matter, timber harvest of any kind have become very controversial.

b. Fire suppression has been a management goal for many decades, now the issue is whether fire suppression has significantly altered **plant community and structural stage distribution and timber stand conditions** within the watershed.

c. **Land allocations and management goals** are often based on compromise rather than science, so they are not always compatible with historic ecosystem conditions or **dynamic natural systems.** Management goals for land allocations such as late successional reserves (only owl activity centers), riparian reserves, scenic areas, summer home tracts, etc. require that vegetation be managed in ways that may be in conflict with historic ecosystem conditions within the watershed.

d. Recent wind storms and floods have resulted in **localized areas of downed timber** in the watershed. This may result in increased bark beetle populations that eventually kill adjacent live trees. Furthermore, accumulations of downed and dead trees increase risk of stand replacing wildfire.

e. **Noxious weeds,** such as scotch broom, and invasive non-native plants are a threat to native plant diversity in the watershed. These species are able to thrive in a new environment because they arrive without the complement of predators, disease, and other ecosystem components found in their native region of the world. Most of these species take advantage of disturbance gaps such as logged units, roads, rock quarries, burned areas, the areas surrounding human structures, and trails. Once established, these populations can serve as a seed source for further dispersal, generally along road and trail corridors.

f. There is a concern about maintaining natural **biodiversity** within the watershed. The occurrence of special habitats (non-forested communities) and their distribution across the landscape is important for biodiversity of plant and animal species. Diversity within this watershed is low, so this increases the importance of these special habitats.

- Preserving biodiversity has ecological value, as noted above, but it also has secondary societal value as well. Only a small percentage of plant species have been screened for compounds that may have medicinal, nutritional, or other commercial applications. Plants can be indicators of environmental quality, as in the case of certain lichens that are sensitive to air pollutants. In order to preserve the potential uses of plants, we must protect biodiversity at all three levels: genetic, within plant community, and between plant communities.

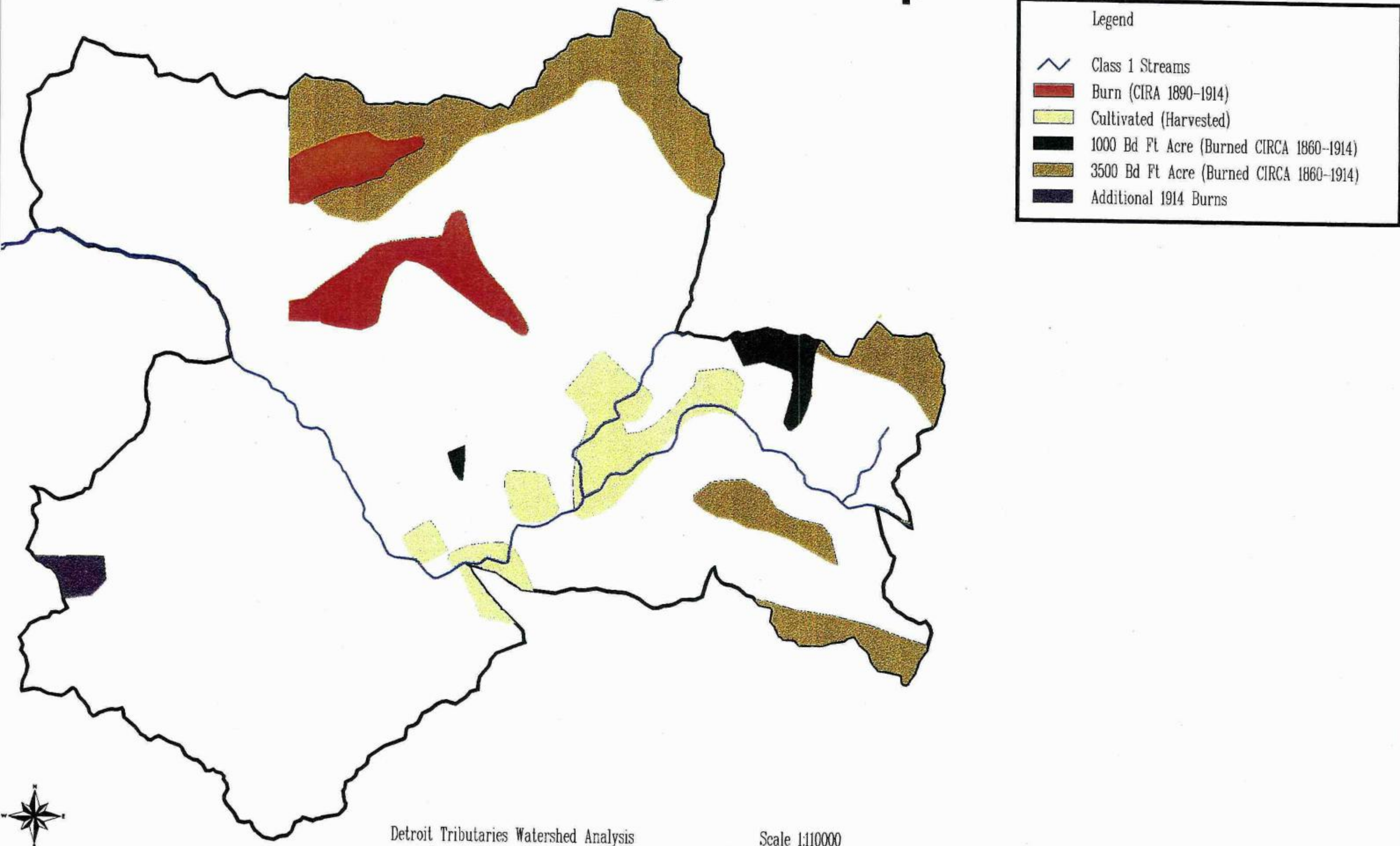
- Forest Service strategies for preserving and promoting biodiversity at all three levels includes reforestation and revegetation programs that emphasize genetic diversity in plant materials used, protection of within plant community diversity by precluding disturbance of species rich habitats, and maintaining representation of all plant community types across the landscape. The challenge is to find the most effective way to identify the species and areas on which to apply these strategies within the overall framework of forest management.

4. What are the management direction/activities, human uses, or natural processes that affect **vegetation?**

a. Current Condition

iii-3. *What were the disturbance factors that led to the current vegetative conditions in the watershed described in the characterization?

Information from the Historic 1901 and 1914 Vegetation Map



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/03/97

MAP III-5 Request #1475

Fire

1901 mapping of the the Central Cascades Forest Preserve indicted that about 6800 acres of the watershed within the National Forest Boundary was in a burned over condition in the previous 50 years (***Map III-5***). Panoramic fire lookout photos taken during the 1930's clearly show evidence of extensive burning that occurred from about the 1890's up until the photos were taken.

Based on the 1901 survey, historic photographs of burns and on the ground information, it appears that most of the large fires during this century burned stands that would be considered late successional or burned areas where late successional stands were previously. Difficulty in obtaining a greater degree of accuracy is limited by the completeness of stand information and by underburned stands which may be classified as either young or old depending on the severity of burning and the amount of older trees left as remnants. In general, it is felt that the amount of underburning is underestimated since it may be difficult to identify during aerial photo stand mapping.

There have been numerous large fires in the Detroit Tributary watersheds in the past 100 years (***Map III-6***) including the following (***Table III-4***):

Table III-4: Major Fires

Fire Name	Year	Acres*	Cause
1895 (several unnamed)	1895(est.)	3409	Lightning
Dome (Sardine Mtn)	1902,1914,1924	814	Lightning
Detroit	1919	5385	Lightning
Tumble	1919, 1941	2000	Lightning
1940 (Mackey)	1940	280	Unknown
Halls Ridge	1950	259	Human
Sardine	1951	4731	Human
Boulder	1985	82	Human
Total		16960	

* Acres include all ownerships within National Forest boundary only.

Fire suppression activities have been very successful in reducing the number of fires since the early 1950's. Public policy to minimize resource loss and threats to public safety have led to increasing abilities to keep fires small. Improved technology, personnel, road access, timber harvest and subsequent fuel treatment, have combined to reduce acres burned.

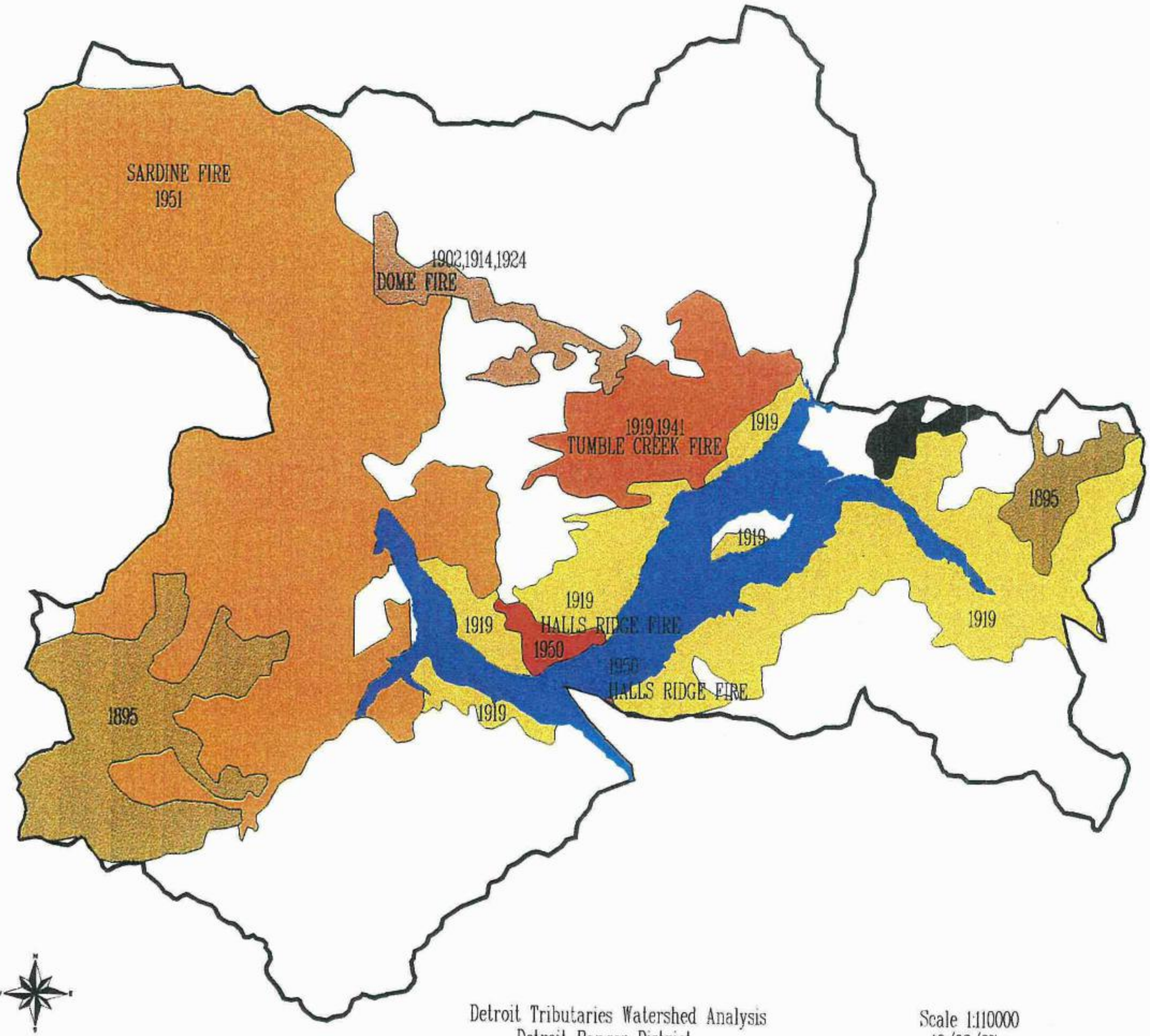
Lightning has been the primary cause for most of the historic large fires in the watershed. Although human-caused fires have been a factor since humans first occupied the area, there is no established evidenced that either deliberately or accidentally set fires have been of the scope that appears to be the case with lightning caused fires. Lightning is the probable cause for the large number of fires dating to the 1890's. Numerous stands across the Detroit Ranger District date back to this period and are so widespread that no other cause is likely. 1919 was another active year for lightning fires with sixteen fires over 200 acres occurring on the Willamette National Forest, including the Detroit Fire.

Timber Management

Map III-7 shows managed and natural stands within the Detroit tributary watersheds.

Logging: The first significant timber harvest began in the 1890's with railroad logging in what is now the Reservoir area. Later, in the 20's and 30's, the lower portions of French Creek, Hanson Creek, and Dry Creek were logged. Regeneration cutting, primarily clear cutting, was by far the most common method used and was viewed as both a disturbance comparable to stand replacement fires and as being the most economical. It was practiced as a successful method to regenerate Douglas-fir, the premier commercial species. Cattle grazing was also practiced on the early logged over lands in the Reservoir area.

Major Fires



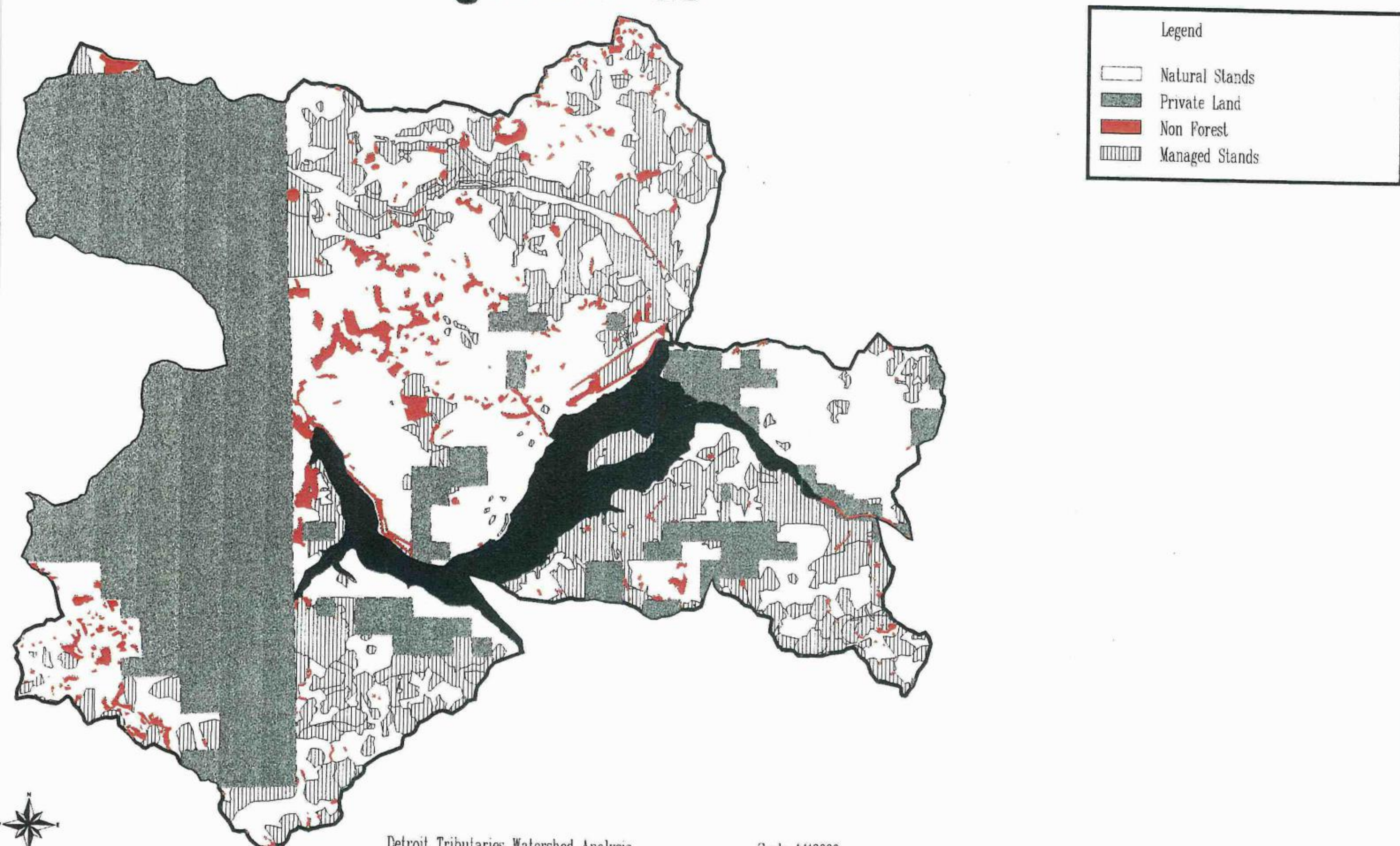
Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/03/97

MAP III-6

Request #1481

Natural and Managed Stands



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
09/30/97

MAP III-7 Request #1469

Table III-5: Decade timber harvest in the watershed was as follows: (***Map III-8***)

Years	**Clearcut Acres**	**Shelterwood Acres**	**Commercial Thinning Acres**	**Total Acres**
1901-1910	1335			1335
1911-1920	594			594
1921-1930	438			438
1931-1940	885			885
1941-1950	175			175
1951-1960	1186			1186
1961-1970	2164			2164
1971-1980	1329	28	47	1404
1981-1990	1397	20	909	2326
1991-1997	325	349	349	1023
Totals	9828	397	1305	11530

In general, logging practices from the early 1900's into the 60's consisted of logging the lower elevation, easier ground first. This permitted use of ground skidding with tractors and hi-lead cable yarding. The 1960's brought the use of skyline logging and road access into the higher elevation areas. The 1970's saw continued improvement in logging systems and increased use of partial cutting for both visual and reforestation reasons. The 1980's saw the end of machine piling and the beginning of restricting tractors to designated skid roads. It also began the practice of over-the-snow logging on overstory removal units, and the beginning of commercial thinning in second growth stands. The 90's brought regeneration modified to meet wildlife and long-term productivity objectives, increased stream protection and helicopter logging.

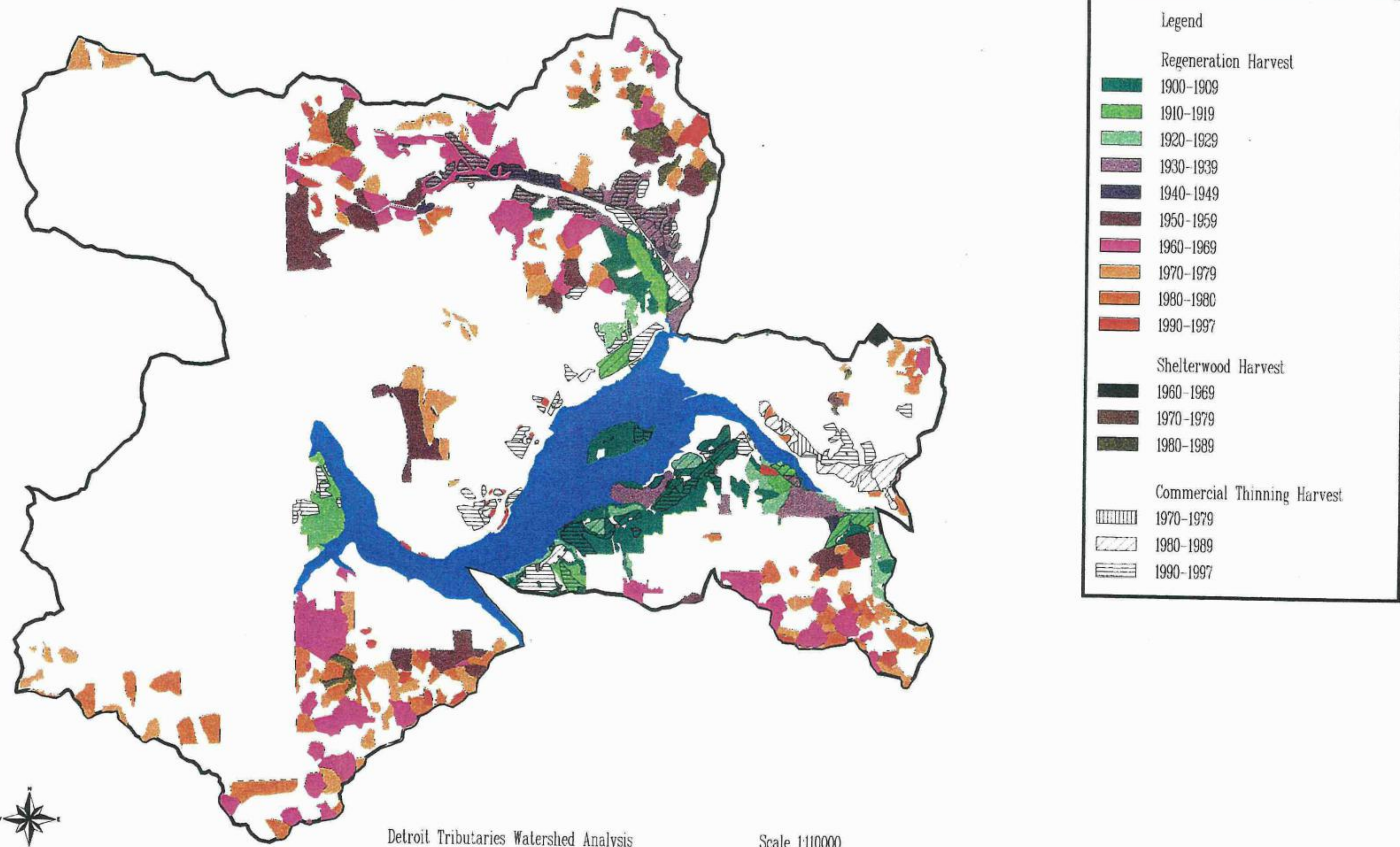
Reforestation: The first known reforestation effort appears to be planting in the late 1930's and early 1940's of the railroad logged areas previously mentioned.

Following World War II timber harvest became more consistent and as a result reforestation became a more sustained program. Both planting, and natural and artificial seeding were options used from the 1940's into the 60's. For example:

- *Seeding:* An extensive aerial seeding project was undertaken following the Sardine Fire in 1951
- *Planting:* Douglas-fir was the preferred species at lower elevations but was not always successful at higher elevations, especially in frost prone areas. Noble fir was a preferred planting species above 3000 feet elevation. Engelmann spruce and ponderosa pine were used on some severe frost pockets where Douglas-fir planting was not successful.

In the 1970's planting became the sole reforestation method due to its reliability and requirements in the National Forest Management Act to assure reforestation within five years after harvest. The shelterwood regeneration method was also used on sites with high frost potential and on warm droughty sites. The 1980's saw the addition of most of the indigenous conifer species to the list of species planted. The most notable species was the addition of rust-resistant Western white pine which had been significantly reduced in the watershed due to blister rust. Western redcedar, Western hemlock, grand fir, Pacific silver fir, sugar pine, mountain hemlock and lodgepole pine were also planted depending on local site conditions. The use of shade cards was introduced in the 1980's for seedling protection on warm droughty sites. The Forest Cultivator/subsoiler began operating during this period to help break up old compaction from prior logging and to help reduce vegetative competition. Also The 1990's have added increased hardwood planting on some local areas, especially in root rot pockets. Increased use of containerized versus bareroot seedlings has resulted in significantly increased survival for certain tree species.

Timber Harvest By Decade



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
09/30/97

MAP III-8

Site Preparation and Fuel Treatment: Throughout the period that timber management has taken place in the watershed, site preparation for planting and fuel treatment have been closely linked. Prior to the 1960's, the record of what fuel treatment was used is not particularly clear but it is generally recognized that the use of broadcast burning was much less than in recent decades and this coincided with less tree planting and therefore less need to prepare sites. Snags were felled for fire hazard reductions from the earliest harvest dates. Utilization standards for timber were relatively low during this period, so a great deal of large material was left following logging and if unburned additional material was left. On gentler slopes, tractor piling was also used with variable effects on soil productivity.

As tree planting became more or less standard practice, along with concern for minimizing fire hazard, broadcast burning became more prominent. During the 60's most of this burning was done in the Fall and frequently was associated with dry conditions which resulted in hot burns and excessive duff consumption. The 1970's saw the introduction of yarding of unmerchantable (YUM) material off of units and for a few years using this as a substitute for burning. This was discontinued as a substitute for burning because it did not treat the small diameter slash, was less than adequate as site preparation, and didn't set back vegetative competition. YUM yarding was continued to help reduce broadcast burn intensities and increasing timber utilization further increased reductions in wood from the sites. The broadcast burning season was extended late Spring to Fall and night burning instituted to take advantage of higher fuel moisture conditions to reduce burning impacts.

In the early 1980's tractor piling of slash was ended due to unacceptable impacts on soil productivity. Broadcast burning was the preferred treatment on most sites. From the late 1980's to the present brought the need to leave green trees, snags, Pacific yew, and logs on harvest units. This coupled with increasing restrictions aimed at meeting air quality standards, created conditions which necessitated a reduction in the number of acres burned. Grapple piling was also used increasingly on gentler slopes since it provided more flexibility in the timing of burning will minimizing soil damage.

Timber Stand Improvement: Timber stand improvement began in the early 1950's, with pruning and precommercial thinning. Both activities remained at fairly low levels through the 50's and 60's and pruning was discontinued by the mid-60's. Precommercial thinning accelerated during the 1970's and has continued at high levels into the 1990's at a rate of about 500 acres per year for the entire District (precise figures for the watershed alone were not analyzed). Fertilization began in the late 1970's and has averaged about 500 acres per year to the present. Some stands have had multiple treatments. Pruning was reintroduced in 1989 and has averaged 300 to 400 acres per year on the District. Brush release has been a very minor treatment on the District, with snowbrush, Ceanothus velutinus, pulling being the most common method.

Early precommercial thinning tended to leave stocking levels higher than are currently regarded as optimum for acceptable growth. Starting in the early 1970's, fewer trees, generally about 300 per acre were left and this level has continued until the present. Prior to the 1980's Douglas-fir was, in most cases, the preferred crop tree at lower elevations and with noble fir also favored at higher elevations. Other species were left if they were the largest and most healthy trees. In most cases the other species had not been planted and as a result were smaller and therefore not left as crop trees. Beginning in the 1980's provisions were taken to leave representatives of all species present which in some cases also resulted in additional trees being left. With the planting of a much wider selection of species, minor species also were in a better position to compete.

Insects and Diseases

Historic levels of diseases and insects are difficult to reconstruct, however, certain stand conditions are known to favor some of these agents. An understanding of past stand conditions may give an indication of what insects or pathogens were most prominent.

One disease, white pine blister rust, was introduced into the region in the early 1900's and has seriously affected both Western white pine and sugar pine. Whitebark pine is also susceptible but is not found in this watershed. Of the three susceptible tree species found here, white pine was the most widespread, being found at all elevations. In conjunction with mountain pine beetle attacks, upwards of 90 per cent of the original white pine population may have been killed by this disease.

In the early 1980's rust resistant white pine planting stock became available and has been a substantial component of planting since that time. Infection can also be reduced by thinning and pruning which makes micro climatic conditions less favorable for the rust.

Sugar pine, which is found in limited numbers in Dry Creek and the Stahlman Point area, is in serious decline due to blister rust and other factors. Reduced disturbance by fire, competition from more shade tolerant tree species, and bark beetles are also contributing to high mortality rates in sugar pine. Lack of disturbance is also creating few opportunities for regeneration of the species. Unlike white pine, rust resistant sugar pine have not been confirmed from trees sampled on the District. Limited planting of stock without confirmed resistance has been done to help maintain population levels.

The two primary bark beetles acting in the watershed are the Douglas-fir beetle and the mountain pine beetle. The Douglas-fir beetle is generally found at low levels except when other disturbances such as wind or fire create habitat conditions favorable to its buildup. This was the case following a major windstorm in 1990 and has likely been so when conditions were right in the past. Populations built up in downed trees and spread to standing trees which were additionally weakened by several years of drought. Tree kill was probably equal to or greater than the number of trees blown down.

Mountain pine beetle primarily attacks white pine, sugar pine, and lodgepole pine. It appears to be most active in older white pine and sugar pine, especially those that are experiencing high levels of competition or have received some mechanical damage.

Root rots, primarily *Phellinus weirii* and *Armillaria mellea*, are endemic to the watershed today and would also have been in historic periods. There is evidence from research that suggests short rotation, single species forest management may increase rates of infection. Certain tree species are less susceptible or resistant to root rots than others and multi-species stands have a greater ability to break root contact between infected and non-infected trees. Root rot infection centers tend to be more difficult to spot in older stands due to other mortality factors so that it may not appear to be as prevalent as in more uniform second growth stands. It is not clear whether the overall impact of infection is significantly greater than historic levels.

Other Disturbances

Other disturbances such as wind, floods, or landslides, are generally localized in their effects and not generally major factors in shaping vegetation patterns over broader areas. Recent wind storms such as the 1962 Columbus Day Storm and the 1990 windstorm severely impacted specific areas. The 1990 storm had its greatest affect adjacent to recently created openings, in partial cuts, along roads, power lines etc. Historically this effect may have been seen along edges of burned areas or other natural openings. During the 1990 storm it appeared than other considerations being equal, younger stands received less blowdown than older, larger stands. The level of blowdown in the past was probably also regulated by the pattern of natural fires, local stand conditions, and timing and location of wind events. As previously mentioned, subsequent Douglas-fir bark beetle kill may add to the direct blowdown mortality and be locally significant. Flooding impacts tend to be localized to a fairly restricted area except in such events as the 1964 flood where water levels could undercut trees and scour out other vegetation outside the seasonal floodplain. Large conifers may be replaced by smaller shorter lived red alder. Salvage of logs from the riparian area has widened flood plains and lengthened the recovery period for large confers.

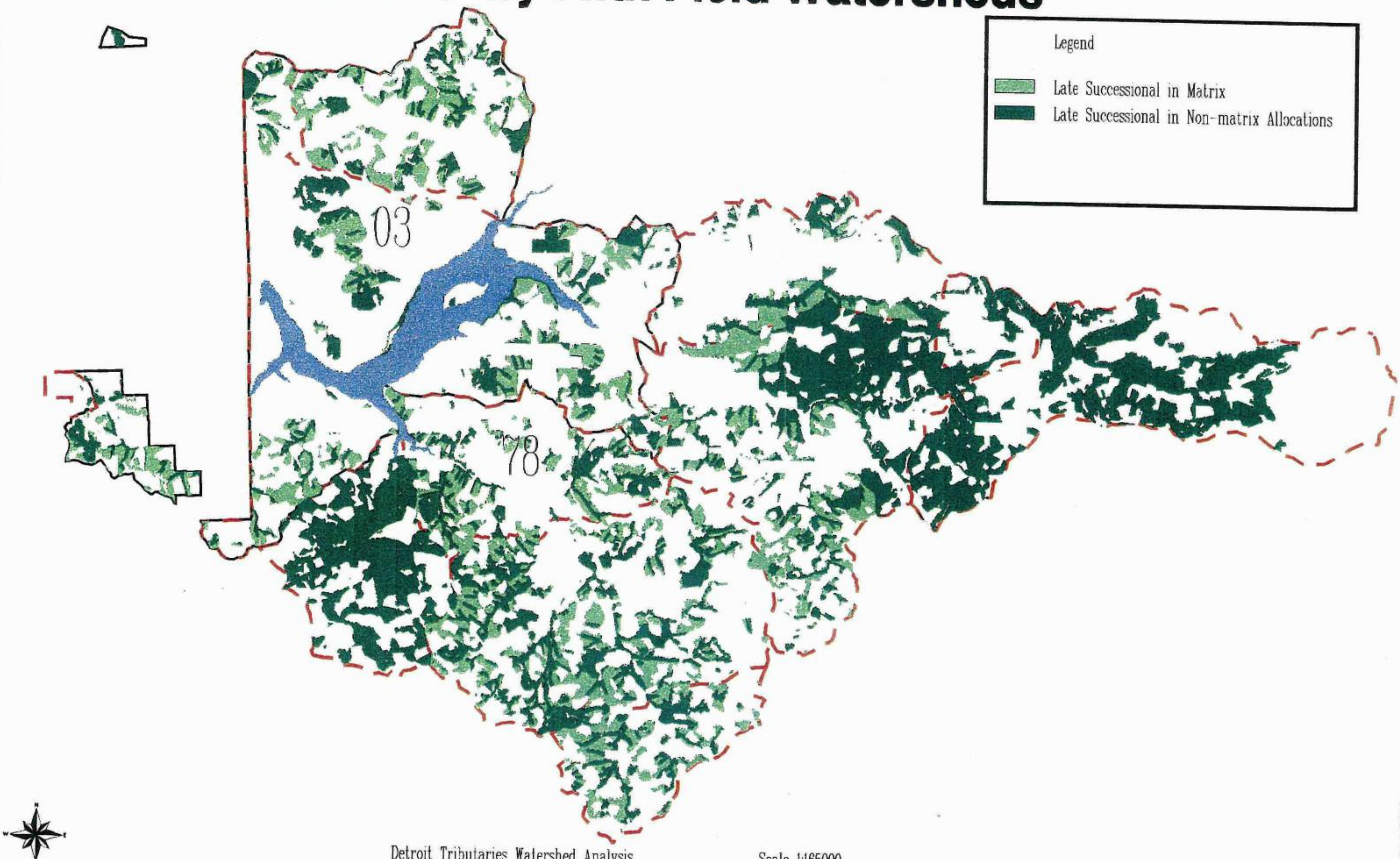
Heavy snow, during January 1996, has resulted in a lot of tree breakage in some stands; adding to fuel loadings and subsequent bark beetle kill.

iii-4. What is the current condition of late successional habitat?

Late Successional: The oldest stands of trees, for which there is documented information in this watershed, are approximately 400 years old. There may be older stands than this, but they have not been intensively inventoried. The vast majority of the older stands, found in the watershed, date from the early 1600's when fires burned over most of the watershed. This is consistent with stand ages found throughout the rest of the Ranger District.

The fire map (***Map III-6***) shows much of the watershed burned in the late 1800's, early 1900's. Portions that didn't burn date from the 1600's when fires burned over most of the watershed.

Late Successional by Fifth Field Watersheds



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:165000
10/09/97

MAP III-9 Request #1533

The harvest of late successional timber has slowed, in recent years as concerns over the dependence of various species on this forest stage have led to changes in land management allocations designed to protect older stands. The Northwest Forest Plan requires that a minimum of 15 percent of the federally owned forested portion of each fifth-field watersheds be retained in Late-Successional stands. The Detroit Tributary watersheds are within two fifth field watersheds, 03 and 78.

Table III-6 shows acres of late successional stands by the Fifth Field Watersheds. ***Twenty six percent*** of the federally owned forested acres in watershed 03 are in late Successional habitat and ***forty two percent*** of the federally owned forested acres in watershed 78 are in late Successional habitat. The last two columns of the following table show the percentage of late successional habitat in matrix and non-matrix land allocations. ***Map III-9*** shows late successional stands by fifth field watersheds.

Table III-6:

Late Successional Habitat = (Old Growth and Understory Reinitiation structrual stages)					
Fifth Field Watershed	**Federally owned Forested Acres**	**Acres of Late Successional Stands**	**% of Fifth Field Watershed in Late Successional Stands**	**% of Late Successional in Matrix Allocations**	**% of Late successional in non-Matrix allocations**
03: N.Santiam, Downstream Tribs.	21,150	5,615	**26%**	60%	40%
78: N.Santiam, Blowout-Woodpecker	65,250	27,795	**42%**	32%	68%

iii-5. What is the status of non-native plant species in the watershed? Where are non-native plant populations located? What factors have contributed to their spread?

Table III-7a lists some of the invasive non-native plants found in the Detroit Tributaries analysis area. The occurrence column indicates which species are most predominant. Five established noxious species occur in Detroit Tributaries (see ***Table III-7b***).

Table III-7a: Invasive non-native plants found in Detroit Tributaries.

Common Name	Scientific Name	Biological Control	Occurrence
ox-eye daisy	*Chrysanthemum leucanthemum*	No	Widespread
chicory	*Cichorium intybus*	No	Isolated
wild carrot	*Daucus carota*	No	Widespread
foxglove	*Digitalis purpurea*	No	Patchy
spotted cat's ear	*Hypochaeris radicata*	No	Widespread
wall lettuce	*Lactuca muralis*	No	Widespread
white sweetclover	*Melilotus alba*	No	Isolated
reed canarygrass	*Phalaris arundinacea*	No	Patchy
self-heal	*Prunella vulgaris*	No	Patchy
Himalaya blackberry	*Rubus discolor*	No	Isolated
evergreen blackberry	*Rubus lacinatus*	No	Isolated
red sorrel	*Rumex acetocella*	No	Widespread
curly dock	*Rumex crispus*	No	Patchy
common mullein	*Verbascum blattaria*	No	Patchy

Table III-7b: Established noxious weeds found in Detroit Tributaries.

Common Name	Scientific Name	Biological Control	Occurrence
Canada thistle	*Cirsium arvense*	Yes	Widespread
bull thistle	*Cirsium vulgare*	Yes	Widespread
Scotch broom	*Cytisus scoparius*	Yes	Widespread
St. John's-wort	*Hypericum perforatum*	Yes	Widespread
tansy ragwort	*Senecio jacobaea*	Yes	Widespread

Most noxious weed and non-native species migrate up from the Willamette Valley through the Canyon via Highway 22 and the power line corridor. Noxious weeds gain access to most of the rest of the district through Detroit Tributaries from the highway and powerline rights-of-way along Big Cliff and Detroit Reservoirs. So these locations are good places to concentrate control methods. Tansy ragwort and Scotch broom have established large populations on the reservoir banks and along the highway. This area has also provided habitat for the largest populations of spotted knapweed on the district, which presumably have come from east of the High Cascades.

Under the Willamette's integrated weed management program, spotted knapweed populations and other new noxious weed invaders are subject to spot herbicide spraying in order to prevent establishment. This program complies with and meets the intent of the Region 6 Environmental Impact Statement for Managing competing and Unwanted Vegetation and the associated Mediated Agreement. Biocontrol and manual control efforts focus on tansy ragwort and Scotch broom.

Tansy ragwort, a sunflower family member, releases massive amounts of seed into the wind similar to dandelion and can establish populations in most any disturbed area. Scotch broom has the tendency to dominate disturbed and semi-disturbed areas due to its size, large seed bank, and its ability to modify the surrounding environment.

iii-6. What is our current knowledge of Table C-3 (ROD) and Appendix J2 (FEIS) plant species occurrence in the watershed, and what is the current status of survey protocols for survey and manage species (C-3)? What other species of concern are found in the watershed?

A large number of late successional forest plant, animal, and fungal species were identified as needing protection or monitoring in the ROD and S&Gs for the Northwest Forest Plan.

The Regional Ecosystem Office (REO) is collecting location information and developing survey protocols. A survey and manage species database has been developed and is ready for field use in 1997. Survey protocols for bryophyte species are now ready for field testing, and all other survey protocols should be ready soon. Survey strategies include the following:

Survey strategy 1: manage known sites;
Survey strategy 2: survey prior to activities and manage sites;
Survey strategy 3: conduct extensive surveys and manage sites;
Survey strategy 4: conduct general regional surveys.

Activities implemented in 1995 and later must include provisions for known sites if the species is under survey strategy 1. For species under survey strategy 2, activities implemented in 1999 or later must have completed surveys. Survey strategies 3 and 4 are more general and must be underway in 1996. Surveys have not been initiated for the vast majority of these species. Mitigation measures for these species can be found in Appendix J-2 of the FEIS (Holthausen et al. 1994).***Table III-3*** lists species documented on the Detroit District.

Table III-3: Survey and manage species documented on the Detroit Ranger District. An * indicates species found in Detroit Tributary watersheds.

Category	Species	Location on the Willamette National Forest	Survey Strategy
False truffle	*Rhizopogon albietis*	Breitenbush watershed	3
Rare false truffle	*Alpova alexsmithii*	Mt. Jefferson Wilderness	1, 3
Rare undescribed false truffle	*Hydnotrya* sp. nov. #Trappe 787,792	Mt. Jefferson Wilderness (Jefferson Park)	1, 3
	Martellia sp. nov. Trappe 5903	Mt. Jefferson Wilderness	1,3
Nitrogen-fixing lichens	*Fuscopannaria leucostictoides*	Detroit, Blue River Ranger Districts	4
	Lobaria oregana *	Forestwide	4
	Lobaria pulmonaria *	Forestwide	4
	Lobaria scrobiculata *	Forestwide	4
	Nephroma bellum	Not on Lowell RD	4
	Nephroma helveticum	Not on Lowell RD	4
	Nephroma parile	Not on Lowell RD	4
	Nephroma resupinatum	Forestwide	4
	Peltigera collina *	Forestwide	4
	Pseudocyphellaria anomala *	Forestwide	4
	Pseudocyphellaria anthraspis	Forestwide	4
	Pseudocyphellaria crocata	Forestwide	4

Table III-3 (continued):

Category	Species	Location on the Willamette National Forest	Survey Strategy
Rare Nitrogen-fixing lichens	*Nephroma occultum*	Not on Oakridge RD	1,3
Rare Oceanic Influenced Lichens	*Hypogymnia oceanica*	Not on Rigdon RD	1,3
Pin lichens	*Calicium glaucellum*		4
	Stenocype major		4
Vascular plants	*Allotropa virgata* *	Forestwide	1, 2

The species locations that are documented on the Detroit District are from herbarium collections, the ecoplot data set, and incidental sightings. Most of the lichen locations come from regional air quality monitoring plots. Appendix J2 of the FSEIS (Holthausen et al. 1994) provides descriptions of the habitat and range of many of these species. Otherwise, no systematic surveys have been conducted by the Forest Service for any of these species. Vascular plants that are on both the C-3 list and the Region 6 Sensitive Plant List suspected or documented to occur on the Willamette National Forest (*Botrychium minganense* and *Botrychium montanum*) have been subject to survey during the normal course of field work. To this date, habitat descriptions for most C-3 plant and fungal species are not specific enough to determine probable locations with existing data.

iii-7. What Threatened, Endangered, or Sensitive (TES) plant species occur in the watershed, and what is the current condition of these populations?

Only one plant species found on the Region 6 Sensitive Plant List has been documented in Detroit Tributaries (***Table III-8***). Approximately 10-15% of the Forest Service land in the watershed has been surveyed for sensitive plants, mostly in conjunction with proposed timber sales and other projects. No surveys for rare plants have been done on private lands in the watershed.

Table III-8: Sensitive plant located in Detroit Tributaries.

Common Name	Scientific Name	Number of Pops.	Geographical Area	ONHP status
Gorman's aster	*Aster gormanii*	5	Tumble Lake, French Creek Ridge	1

The Oregon Natural Heritage Program (ONHP) maintains four lists of rare plants based on rarity: List 1 contains species which are endangered or threatened throughout their range. List 2 contains species that are threatened or endangered in Oregon but are more common or stable elsewhere. Lists 3 and 4 are explained below Table --.

Gorman's aster (*Aster gormanii*): Gorman's aster populations in Detroit Tributaries are located in the vicinities of Tumble Lake/Sardine Mountain, Marten Buttes, Phantom Natural Bridge and Boulder Peak. All populations appear to be stable.

Other Plant Species of Concern: In addition to those species that are sensitive, there are four plant species on Review or Concern Lists documented in the watershed (***Table III-9***). Definitions of these lists can be found below the table.

Table III-9: Plant species of review and watch lists that occur in Detroit Tributaries.

Common Name	Scientific Name	Number of pops.	Geographical Area	Status
maidenhair spleenwort	*Asplenium trichomanes*	1	Sardine Creek	Concern
Cascade daisy	*Erigeron cascadensis*	3	Tumble Lake, French Creek Ridge	Review
fringed grass-of-Parnassus	*Parnassia fimbriata* var. *hoodiana*	1	Heater Creek	Concern
Anderson's sword fern	*Polystichum andersonii*	1	Sardine Creek	Concern

The Review List (List 3) contains species for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range. The Watch List (List 4) contains species of concern that are not currently threatened or endangered. In addition, the Willamette National Forest maintains a Concern List for locally rare species that are not included in the above lists.

iii-8. What types of special habitats (rock outcrops, seeps, bogs, meadows, talus slopes, etc.) occur in this watershed?

The occurrence of special habitats (non-forested communities) and their distribution across the landscape contribute greatly to the biodiversity of plant and animal species. The forest land management plan standard and guideline FW-211 (WNF 1990) directs us to protect these habitats and the associated ecotones. The Special Habitats Management Guide (WNF 1996) provides descriptions of each special habitat and lists the wildlife associated with them. Rare forested plant associations are also considered under FW-211, to ensure representation of all existing forest habitat types through perpetuity.

Tables III-10a and 10b list the special habitats in Detroit Tributaries that have been mapped to date. ***Table III-10a*** contains information on condition of the habitat. Habitat types in this table were grouped based on how they might have been typed through aerial photo interpretation. ***Table III-10b*** is split into two parts, those habitats that have been field verified, and those that have been mapped during the normal course of vegetation typing, mostly through aerial photo interpretation. The difference between shrub and alder may not be accurate due to photo interpretation limitations; and the water type includes lakes and ponds. The effort to field verify all special habitats in Detroit Tributaries should continue to be a priority.

Table III-10a: Special Habitats in Detroit Tributaries ***(Map III-10)***

Habitat	**Special Habitat Designation**	**Number**	**Habitat adjacent to clearcut**	**Road runs through habitat**	**Road adjacent to habitat**	**Exotic Species occurs within habitat**
Wet meadows Sedge meadows Swamp Bog	WET MDWS	1				
Moist Meadows Moist rock gardens	MOIST MDWS	14				
Dry Meadows	DRY MDWS	1	1			
Dry rock gardens Vine-maple-talus Talus Cliff Rock outcrops	ROCK	43	4	1	9	1
Sitka alder Red alder	ALDER	1			1	
Vine-maple (rocky soil) Spirea-Willow/sedge	SHRUB	3				
Ponds	WATER					
Totals		63	5	1	10	1

Table III-10b: Vegetation typed

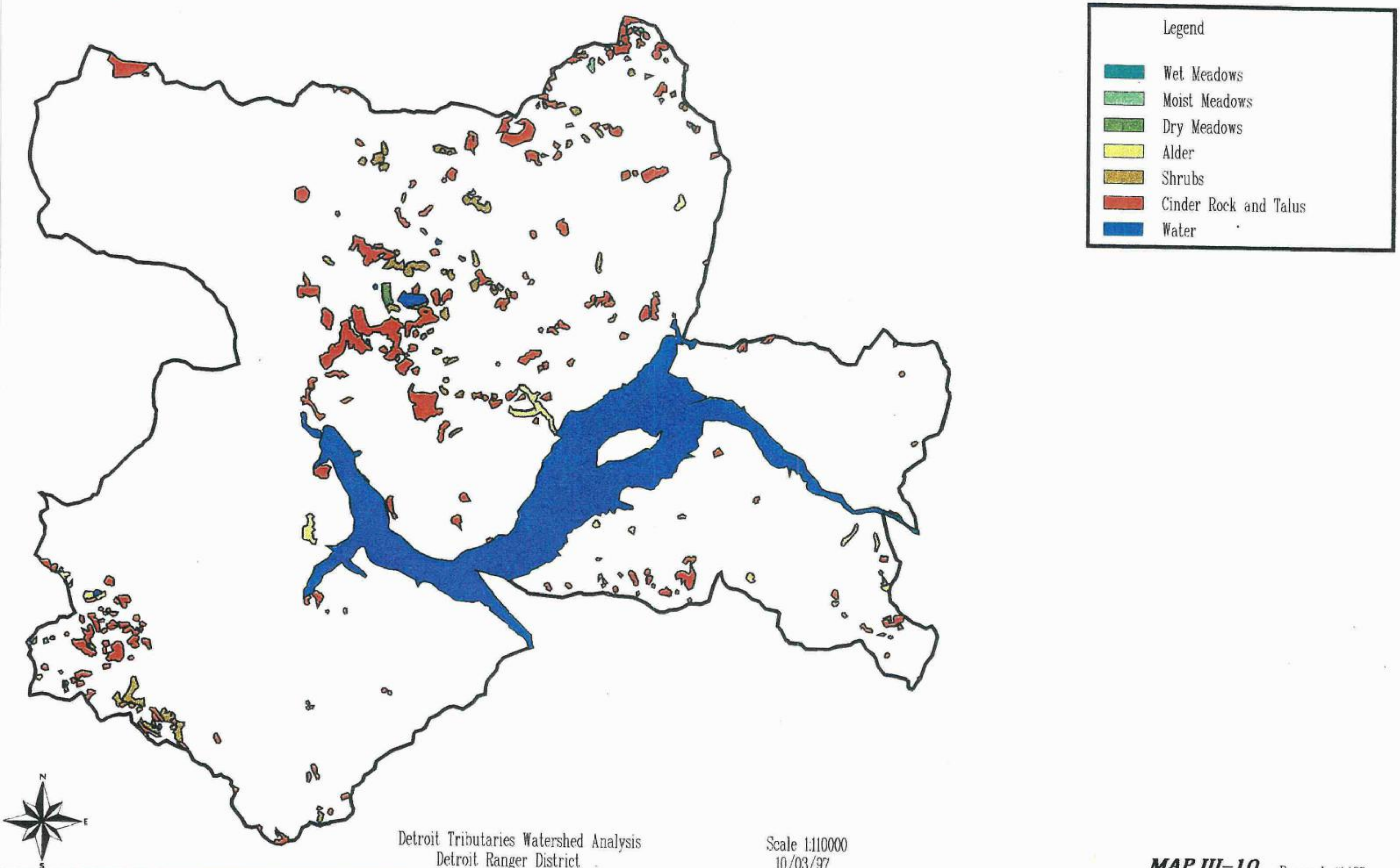
Habitat	Photo Typed		Field Verified*		Grand Totals	
	Number	Acres	Number	Acres	Number	Acres
WET MDWS	1	1	1	1	2	2
MOIST MDWS	6	14	14	64	20	78
DRY MDWS	4	17	1	15	5	32
ROCK	234	1050	43	210	277	1260
ALDER	22	103	1	1	23	104
SHRUB	66	225	3	13	69	238
WATER	9	3312			9	3312
Rare Forested Plant Assoc.	12	157			12	157
TOTALS	354	4879	63	304	417	5183

* Numbers refer to number of habitat types not represented on the vegetation typing map. Acres for field verified are ocular estimates.

Dry, rocky habitats are the predominant type in Detroit Tributaries. They generally occur on ridgetops and less often at midslope. The Detroit Tributary watersheds contain relatively few wet or dry meadows, but harbors an average number of moist meadows. Shrubby and alder dominated habitat types are well represented. These mostly occur in avalanche chutes at midslope (Sitka alder) and along the floodplains of the stream tributaries at lower elevations. Most of the water acres are attributed to Detroit Reservoir.

Three forested plant associations listed as rare in the Special Habitats Management Guide are found in Detroit Tributaries. These are: Douglas-fir-western hemlock/salal (8 stands), western hemlock/rhododendron/Oregon oxalis (1 stand), and silver fir/Cascade azalea/beargrass (3 stands).

Special Habitats



c. Reference Conditions

iii-9. *What is the historical array and landscape pattern of plant communities and seral (structural) stages in the watershed (riparian and non-riparian)? *What processes causes these patterns (e.g., fire, wind, mass wasting)?

The reference date is set at approximately 100 years ago because there was little human influence at that time and because of an active fire period at about that time period. Some of the discussion regarding reference conditions is interspersed in the current conditions section of this document.

Columns 2 and 3 of ***Table III-11*** is from a Sub-Regional Assessment done for the entire Willamette and Siuslaw National Forests. Its purpose was to estimate the range of natural conditions for each plant association series. It determined the percentages for each structural stage using information from fire studies on the Blue River Ranger District and in the Mount Jefferson Wilderness. The period analyzed was from 1600 to 1850. The values used in the tables below represent the mid-range given in this report. The Assessment figures given here are for the entire North Santiam subbasin.

Columns 4 and 5 of ***Table III-11*** shows the structural stages by plant association for the 1895 period. Figures were derived from a variety of sources, estimates and maps of historic burns, old photography, records of harvest activity, and on the ground knowledge of the area. A high degree of accuracy is not possible in this watershed without more extensive field examination. Early logging and fires this century have made piecing together historic vegetation conditions easier than has been possible on other parts of the District. The creation of the reservoir has also increased the difficulty in determining historic conditions in that area.

The distribution of plant associations throughout the watershed was previously discussed in the Characterization. The predominant factor affecting stand structure in pre-European settlement times was fire. Other disturbance factors such as wind or flooding may have had significant impacts in localized areas but not approaching the scale of large wildfires. Insects and diseases also effect stand development but knowledge of specific large scale impacts are not known for this watershed.

Table III-11: **Historical Structural Stages by Plant Association Series**				
Structural Stage	**Sub-Regional Assessment by Plant Association Series (1600-1850) for the North Santiam Subbasin**		**1895 Structural Stages by Plant Association Series for Detroit Tributary Watersheds**	
	Western Hemlock (Federal)	**Pacific Silver Fir (Federal)**	**Western Hemlock (Federal)**	**Pacific Silver Fir (Federal)**
	%	**%**	**%**	**%**
Stand Initiation	**18**	**18**	**21**	**21**
Stem Exclusion	**22**	**27**	**8**	**7**
Understory Reinitiation	**N/A**	**N/A**	**N/A**	**N/A**
Old Growth	**60**	**55**	**69**	**70**
Non-Forest	**N/A**	**N/A**	**2**	**2**
Totals	**100**	**100**	**100**	**100**

iii-10. In what ways have conditions changed from historical times to provide habitat more conducive to non-native plant evasion?

Oregon was settled by Europeans more than 100 years ago. There is evidence that early Detroit residents grazed their stock animals in the area that is now covered by Detroit Reservoir, and non-native feed may have been brought in by the late 1800's. Local gardens may also have been established. Grazing studies done by the Hammond Lumber Company show that by 1920 a number of non-native grasses and clovers had been seeded in logged over areas to create pasture, and had become established in the Detroit and Breitenbush areas. But because human caused disturbance was limited to the Detroit town area at the end of the 1800's, these non-native populations were probably insignificant at that time. Native invasive plants such as fireweed (*Epilobium angustifolium*), trailing blackberry (*Rubus ursinus*), and ceanothus (*Ceanothus* spp.) should have been more prevalent in naturally and human disturbed areas than they are now. As disturbance increased over time, however, the more competitive non-native species would recruit in and encroach on native plant populations.

iii-11. What was the historical relative abundance and distribution of plant species of concern (ROD, TES, others) and the condition and distribution of their habitats and other special habitats in the watershed?

Although there is no data regarding the status of these species 100 years ago, inferences can be made based on habitat. Indications are that late-successional forest habitat was far more prevalent a century ago than today. Timber management and large scale fires have substantially reduced the current amount of these habitat types. Survey and manage species (Table C-3, ROD) associated with late-successional habitat should have had correspondingly larger population sizes and distributions.

Formation and development of special habitats is mostly a function of changing geomorphology, in which changes are measured in millennia. The more important comparison to make to a 100 year reference point is changes in special habitat structure, function, and species composition.

c. Comparison of Current and Reference Conditions

iii-12. *What are the natural and human causes of change between historical and current vegetative conditions? How and where are current vegetation types and distribution different from historic conditions?

Table III-12: **Comparison Structural Stages by Plant Association Series over time**

Structural Stage	Sub-Regional Assessment by Plant Association Series (1600-1850) for the North Santiam Subbasin		1895 Structural Stages by Plant Association Series for Detroit Tributary Watersheds		Current Structural Stages by Plant Association Series for Detroit Tributary Watersheds	
	Western Hemlock (Federal)	Pacific Silver Fir (Federal)	Western Hemlock (Federal)	Pacific Silver Fir (Federal)	Western Hemlock (Federal)	Pacific Silver Fir (Federal)
	%	%	%	%	%	%
Stand Initiation	18	18	21	21	18	25
Stem Exclusion	22	27	8	7	47	30
Understory Reinitiation	N/A	N/A	N/A	N/A	8	7
Old Growth	60	55	69	70	9	30
Non-Forest	N/A	N/A	2	2	18*	8*
Totals	100	100	100	100	100	100

* Detroit and Big Cliff Reservoirs

Columns 2 and 3 of ***Table III-12*** is from a Sub-Regional Assessment done for the entire Willamette and Siuslaw National Forests. Its purpose was to estimate the range of natural conditions for each plant association series. It determined the percentages for each structural stage using information from fire studies on the Blue River Ranger District and in the Mount Jefferson Wilderness. The period analyzed was from 1600 to 1850. The values used in the tables below represent the mid-range given in this report. The Assessment figures given here are for the entire North Santiam subbasin.

Columns 4 and 5 of ***Table III-12*** shows the structural stages by plant association for the 1895 period. Figures were derived from a variety of sources, estimates and maps of historic burns, old photography, records of harvest activity, and on the ground knowledge of the area. A high degree of accuracy is not possible in this watershed without more extensive field examination. Early logging and fires this century have made piecing together historic vegetation conditions easier than has been possible on other parts of the District. The creation of the reservoir has also increased the difficulty in determining historic conditions in that area.

Columns 6 and 7 of ***Table III-12*** represents the current conditions.

Table III-12 shows that there are some significant changes in the percentages of each structural stage between the Reference and current conditions. There are currently far more stands in the stem exclusion stage due to large fires during the past hundred years and due to timber harvesting that is more than about 25 years old. There has been a large decrease in the amount of late successional stands for the same reasons. Stand initiation acreages appear to be similar to what they were about a hundred years ago. There has been an increase in the amount of non-Forest primarily due to the Reservoir and also the powerline right-of -way and other human developments.

Conditions

Major Causes of Change

Reference- Prior to Forest Management:

Larger patches of smaller structural stages (early successional) across the landscape from low frequency stand replacing fires, especially on south, and west aspects. Fires prevented fuels buildup on south and west slopes.
Larger patches of larger structural stages in portions of watershed sheltered from fire regime (north, east, aspects, draws)

Vegetation varied by Aspects, and other topography
North, east and Northeast facing slopes - Larger structural stages (late successional)
South, west and southwest facing slopes and ridge lines - Smaller successional stages (early successional)
Transitional - combination of structural stages.

55-70% of the watershed were in late successional stands. These stands were from stand replacing fires approximately 400 years ago.

Most down woody material could be found on north and east aspects. Less woody material could be found on south and west aspects due to the fire regime.

Disturbances episodic in the past with fires

Tree re-establishment after disturbance slower in the past prior to reforestation

Underburned conditions common in the past

Natural time frame for **Understory Reinitiation** slower prior to the advent of commercial thinning

Fewer snags and logs on harvested units in areas that have a long fire return interval, less difference where fires were frequent

Increased tree growth in managed versus natural stands at a comparable age.

***Fire Suppression** resulted in the retention vegetation, especially on south aspects.*
Timber harvest, road construction

Conditions

Major Causes of Change

Reference- Forest Management to 1994:
Smaller openings than prior to forest management: Smaller structural stages in small patches scattered across the landscape, interspersed with older stands due to fire suppression and Forest Management.

There is still a risk of low frequency stand replacing fires on south, west aspects.

In addition, Fire risk increased associated with management activities, and where people congregated.

Fuels buildup on south and west slopes where fires have not occurred, and due to fire suppression.

Fewer snags and down wood due to Forest management activities.

Disturbance continuous with timber harvest and sustained yields

Tree re-establishment after disturbance slower in the past prior to reforestation

No equivalent conditions to underburning, other than shelterwoods

Understory Reinitiation time line speeded up now by thinning versus natural time frame.

Increased abundance of shade tolerant tree species due to lack of fire.

Higher fire hazard, fuel buildup due to fire suppression in areas with short fire return interval

Timber harvest and road construction- *changes in standards have been implemented.*
Retention of more down wood.
Retention of wildlife trees (snags) and green tree retention (GTR) on harvest units
Fire Suppression *resulted in the retention vegetation, especially on south aspects.*
Past Fire History

Conditions

Current - 1994 to Present: Smaller structural stages in small patches scattered across the landscape, interspersed with older stands due to fire suppression and Forest Management.
There is still a risk of low frequency stand replacing fires on south, west aspects.
In addition, Fire risk has increased where people congregate.
Fuels buildup on south and west slopes where fires have not occurred in a long time, and due to fire suppression.
Fewer snags and down wood due to past Forest management activities. More snags, downwood, and green trees left on new harvest units
No equivalent conditions to underburning, other than shelterwoods
Understory Reinitiation time line speeded up now by thinning versus natural time frame.
Increased abundance of shade tolerant tree species due to lack of fire.
Multi-species planting results in more species at earlier age than usually found in natural fire regenerated stands or in the past single species plantings
Meadow and other special forest habitats currently being encroached by conifers with current fire suppression
Fewer snags and logs on harvested units in areas that have a long fire return interval, less difference where fires were frequent
Higher fire hazard, fuel buildup due to fire suppression in areas with short fire return interval
Increased growth in managed stands versus natural stands at a comparable age

iii-13. What are the natural and human causes of change between historical and current species distribution and habitat quality for plant species of concern in the watershed?

Based on the assumptions made under "reference conditions", species dependent on older forested habitats (the C-3 species) probably have seen decline in populations due to both permanent habitat conversion and the amount of habitat converted to an early seral stage. Moist rare forested plant associations such as western hemlock/rhododendron/Oregon oxalis and silver fir/Cascade azalea/beargrass may also have been affected. Anderson's sword fern (*Polystichum andersonii*) occurs in moist to wet forested plant associations and appears to be at the southern edge of its range. It occurs more frequently on no-harvest land allocations in the Little North Santiam drainage to the northwest.

Depending on whether substantial wetland habitat occurred along the banks of the North Santiam River where the reservoir now dominates, some wetland species may have been extirpated from the analysis area. It is also possible that the reservoir has created more wetland habitat than previously existed, although quality of this habitat is questionable. Otherwise, not much wetland exists in Detroit Tributaries, and it is doubtful that there would have been large shifts in wetland vegetation from the reference time frame to now. *Parnassia fimbriata* var. *hoodii*, the only wetland species of concern in the analysis area, is found in a wet meadow surrounded by cut over land and appears to be unaffected by the disturbance.

With the large amount of rock dominated habitat, the frequent fire regime, and the amount of timber management that occurred in Detroit Tributaries, conditions may have changed enough to favor drier forested habitat (e.g., Douglas-fir-western hemlock/salal) or even to convert to non-forest rock habitats. This condition would favor expansion of rock habitat species such as *Aster gormanii*, *Asplenium trichomanes*, and *Erigeron cascadensis*. These species may also have incurred some population loss based on incidental disturbance (road building) or habitat conversion for more limited uses (rock quarrying).

iii-14. What are the natural and human causes of change between historical and current special habitat quality and distribution in the watershed?

Management disturbance threats to field verified special habitats appear to be adjacent harvest units and adjacent roads (***Table III-10a***). The numbers in ***Table III-10a*** are intended to be a rough indication of the disturbance regime surrounding special habitats. Although current numbers of these habitats affected by disturbance are relatively low in Detroit Tributaries, a large number of special habitats in this analysis area are surrounded by either fire or management regenerated stands.

Management created openings will increase the exposure of meadows and wetlands to fluctuating wind, sun, precipitation, and temperature conditions that alter the micro environment which in turn can alter species composition and distribution (Chen 1994). The FW-211 standard and guideline now requires us to buffer habitats that may be adversely effected by disturbance. In addition to moderating micro climatic changes, buffering can provide a barrier to some human and animal disturbance, as well as invasive non-native seed dispersal. Conversely, fire exclusion may alter species composition and distribution in fire adapted habitats. Which habitats to protect and which habitats to prescribe burn is one of the challenges management faces.

Roads represent permanently disturbed openings that foster establishment and long term occurrence of invasive weeds, and harbor propagule sources for further weed expansion. The result is reduction and displacement of various stable native plant communities represented in the landscape. Drier special habitats are presumably less effected by created openings since they generally occur on exposed sites. However, hydrology changes and invasion of dry adapted weeds still needs to be monitored.

Excepting alder, rocky, and shrubby habitats, the scarcity of the other habitat types in Detroit Tributaries makes it imperative that these areas be protected from further disturbance.

iii-15. What are the effects of nonnative plant and animal species on diversity?

Compared to the reference condition 100 years ago, invasive weeds are much more common today. Most of these species originated in Europe, some in Asia, and were either intentionally introduced by humans, or accidentally introduced by humans via ship ballast dumping, stock feed, etc. This invasion of Europeans and the non-native plants they brought with them resulted in disturbance and establishment of the non-natives, displacing both the native vegetation that existed before the areas were disturbed and competing with invasive native plants. The increasing disturbance brought about by management and other human activities combined with natural disturbances in these same areas has caused a shrinking of areas dominated by native vegetation. The decline of native vegetation in turn, limits the distribution of associated animals.

III. BIOLOGICAL DOMAIN

B. Animal Species and Habitats- Aquatic

1. Characterization

iii-16. *What is the relative abundance and distribution of species of concern that are important in the watershed (e.g., threatened or endangered species, special status species, species emphasized in other plans)? What is the distribution and character of their habitats?

The Detroit Tributary watersheds were historical habitat for anadromous fish such as salmon and steelhead and migratory fish such as the bull trout. Detroit and Big Cliff dams blocked the migration patterns of these fish, when they were built in the 1950's. Another fish species also affected by the dams but not thought of as being migratory is the cutthroat trout. It wasn't generally understood at the time that the cutthroat trout also made migrations up and down the river systems. The completion of the Dams separated and isolated populations of cutthroat trout. It is unknown how the cutthroat population as a whole has been effected by this isolation. There is a also a landlocked population of spring chinook salmon in Detroit Reservoir that migrate up the North Santiam River to spawn. Some of the streams that flow into the reservoir contain cutthroat trout that probably relate back to the original populations that were in the system prior to the dams. Tumble Lake is the only natural lake of any size (20 acres) in the Detroit Tributary watersheds. Historically, it probably had no fish, but now has a brook trout population that is sustained by natural reproduction.

The reservoir has been stocked with hatchery rainbow trout and kokanee salmon, a land locked version of the sockeye salmon. The landlocked spring chinook salmon fishery in Detroit Reservoir has been maintained by stocking from the Marion Forks Hatchery. The chinook fishery is being evaluated at this time and may be dropped. These three species have been the backbone of the recreational fishery in Detroit Reservoir.

Species of Concern:

- **Spring chinook salmon** in the Willamette River System is on the US Forest Service, Region 6 sensitive species list.
- **Bull trout:** On June 13, 1997 the U S Fish and wildlife Service proposed to list the bull trout in the Willamette System as threatened.

- **Cutthroat trout:** ODFW considers the cutthroat trout a species of concern due to the lack of information about this species.

Habitat:

There are over 100 miles of perennial streams in the Detroit Tributary watershed, of which about 36 miles are fishbearing. Also in addition to the 100 miles of perennial streams there are well over a 100 miles of intermittent stream channels.

Streams located in the Detroit Tributary watersheds include the following:

Mayflower Creek - Non-fishbearing
Whitman Creek - Rainbow trout, extent of fish unknown.
Tumble Creek - Rainbow Trout
Feeder Creek - No fish
Ranger Creek - No fish
Mackey Creek - No fish 20% culvert
Hansen Creek - No fish
Hoover Creek - No fish
Sportsman Creek - No fish
Sauers Creek - Cutthroat Trout
French Creek - Rainbow and Cutthroat Trout
North Santiam River - Rainbow trout, whitefish, kokanee, landlocked spring chinook, and summer steelhead

Lakes and Reservoirs in Detroit Tributary watersheds

Tumble Lake - Brook Trout - Non-Native, natural production
Detroit Reservoir - Rainbow trout, kokanee salmon, landlocked spring chinook salmon, catfish and other non-game fish

Overall, the fish habitat in these watersheds has been modified more than any other watershed on the Detroit Ranger District. Tracks from historical railroad logging were laid up the bottom of the major drainages (French Creek, Tumble Creek, Sardine Creek and Blowout Creek), which removed most of the larger trees from these riparian areas. Roads have encroached on what are now riparian reserves, streams have been blocked by weirs, and have had trees removed for salvage. The Detroit dam and associated reservoir blocked migratory patterns and covered the system with a reservoir. Non-native fish were introduced to the reservoir and to the only natural lake in the watershed. This watershed is a long way from its natural condition.

2. What values are associated with aquatic species and habitats?

a. Species and habitats have aesthetic, economic, recreational, and spiritual value.

There is an inherent aesthetic value to viewing quality aquatic habitat whether it be a stream or a lake. The placement of a fish, especially something like a wild salmon or steelhead, within this context greatly increases that value.

The value of the aquatic habitat and the species that use it are not easy to quantify. The existence of this value is easy to see based on how people gravitate towards water to recreate and how fishing is usually a major part of this recreation.

Native Americans probably harvested salmon within this watershed for many years before the white man came to the Oregon. A possible use area in this watershed in relation to fishing is probably the bedrock cascade in the upper part of the North Santiam River arm of Detroit Reservoir. This area is covered with water when the reservoir is full. Although this site is not a migration barrier it probably acted as point of congregation for spring chinook salmon as they moved upstream to the spawning grounds. These traditional food gathering areas had high spiritual value to Native Americans.

b. The diverse components of highly complex aquatic habitat have ecological significance in sustaining the variety of species indigenous to the area.

c. Native wild gene pool has ecological value.

The native wild gene pools that have developed over thousands of years are important in providing species with the resilience to survive.

d. Native fish and wildlife have value to the functioning of the ecosystem.

Native fish and wildlife play an important roll in shaping the function of ecosystems they are a part of. An example of this is what probably happened in Tumble Lake when fish were introduced many years ago. The stocking of Eastern Brook Trout, a major predator, probably had significant impact on populations of aquatic insects, amphibians and indirectly phytoplankton.

3. What are the highest priority issues or resource concerns associated with aquatic species and habitats?

a. The major issue within this watershed is how far from historic natural conditions the system is in relation to aquatic habitat. Habitat components necessary to sustain historical fish populations do not exist in much of these watersheds anymore due to the dams and reservoirs.

b. The State of Oregon has long term plans to reintroduce spring chinook, winter steelhead and bull trout to the waters above Detroit Reservoir. It is difficult to envision how these historical fish populations, except for the bull trout, can be restored to the upper North Santiam and Breitenbush Rivers with the dams still in place. There are no upstream passage facilities at either dam and no provisions were made during construction to allow for juvenile movement downstream. Studies have been undertaken at other reservoirs to try to determine if there are reasonable solutions to these passage problems. The bull trout, if reintroduced, may be able to use the reservoir as part of an adfluvial life history.

4. What are the management direction/activities, human uses, or natural processes that affect aquatic species and habitats?

a. *Current Conditions*

*iii-17.*What are the current habitat conditions and trends for species of concern identified above?*

Information on population trends of cutthroat trout is sketchy at best. The Oregon Department of Fish and Wildlife(ODFW) considers the native cutthroat trout a species of concern due to this lack of information. Populations of rainbow trout in this watershed, including Detroit reservoir, are essentially maintained by State stocking. ODFW releases over 400,000 hatchery raised rainbow trout in Detroit Reservoir each year. There is no information on wild rainbow trout in the system. Cutthroat trout are found in several tributaries to Detroit Reservoir. Best guess is that cutthroat trout populations are holding their own. General field reviews of the major streams with cutthroat populations didn't seem to indicate any major damage from the 1996 storm event.

Specific information on current condition of fish habitat in the Detroit Tributary watersheds is very limited. Generally speaking the habitat is in a very altered state. Many of the stream side areas have been logged and the larger streams are paralleled by roads. The Detroit Dam was placed on the North Santiam River and the resulting reservoir covers the confluence of the North Santiam and Breitenbush rivers. There are 36 miles of fish bearing streams in the watershed at this time. Over 20 miles of streams and rivers were lost when Big cliff and Detroit Reservoirs were filled. The majority of fish present in this watershed have been stocked by the ODFW to provide a fishery for the thousands of recreationist that visit Detroit Reservoir and the surrounding area. The important wild spring chinook and winter steelhead that used to run up the North Santiam River have been replaced in part by hatchery fish that are spawned manually and the eggs hatched and reared at Marion Forks fish hatchery.

French Creek

French Creek is the only stream in this watershed that has had a comprehensive survey completed on it. This survey, done in 1992, may or may not reflect present day conditions due to the February 1996 storm and flood event that reshaped many stream channels in the basin. A general overview of French Creek doesn't seem to show any significant disturbance from the flood event. What exists right now, may be fairly close to what existed before the storm. A resurvey was completed in the summer of 1997. This information will allow comparison with information collected in 1992. Fish populations in 1992 included rainbow trout, sculpin and dace in the lower reach near the reservoir with larger numbers of cutthroat trout showing up in upper areas including the North and South Forks of French Creek.

Sardine Creek

Sardine Creek is a very high gradient stream(>10%) dominated by boulders, some as large as 20 feet in diameter. Upstream migration of fish is probably limited to about stream mile 1.2 where Sardine Creek drops about 25 vertical feet in 60 feet over a bedrock face. Aquatic habitat is dominated by plunge pools and cascades over boulders. There is little spawning gravel present and very little large wood, in the lower reach of this stream, that is actually interacting with the flow. There are numerous pieces of old cull logs and old logging slash that are above bankfull height of the stream. There are no large trees left in the lower part of this drainage. It will be 150 to 300 years before there are any trees that match up to some of the stumps found along the channel.

A major tributary, about a half mile upstream from Highway 22, blew out a culvert and probably moved a large amount of sediment into the stream. Indications are that very little would have settled out until it made it almost to the reservoir. Significant amounts of gravel are present above and below the Highway 22 bridge. These deposits are probably made up of material from several past events. They may include deposits from the 1964 flood, the 1976 flood and others farther in the past.

Tumble Creek

Tumble Creek is very similar to Sardine Creek. It is high gradient, dominated by plunge pools and cascades and has very little large wood down in the channel interacting with the stream. There are no large trees along the stream and similar to Sardine Creek it will be as much as 300 years before existing trees are as big as the stumps along the stream.

Tumble Creek is a Class I stream due to it suppling water for consumption at the Detroit Lake State Park campground and the Detroit Ranger District compound. Fish are probably found throughout most of its stream length. Rainbow trout enter it from Detroit Reservoir and there may be brook trout in the upper end as the ODFW stocked Tumble Lake with brook trout years ago. The brook trout naturally reproduce in the lake.

Mayflower Creek
Mayflower Creek is a small high gradient stream with no known history of fish production. Overall condition is unknown.

Whitman Creek
Whitman Creek is a small high gradient stream with no known history of fish production. Overall condition is unknown.

Kinney Creek
Kinney Creek is a fairly large drainage(~8000 acres) that enters the reservoir about 1.5 miles upstream from the dam. The majority of this drainage is under private ownership.

Hoover Creek
Hoover Creek is the water supply for Hoover Campground. It is not known to support a fish population but at least the lower 1/4 mile is accessable to fish that might migrate out of Detroit Reservoir. This stream blew out during the February 1996 storm and is in a very disturbed state at this time. The culvert at the Blowout Road crossing is in good shape and would allow for fish passage. Aquatic habitat condition is poor.

Sauers Creek
Sauers Creek supports a cutthroat trout population. It also sustained effects from the February 1996 storm event. The area above the Blowout Road crossing has obvious indications of disturbance. The concrete box culvert at the road crossing is a barrier to upstream migration. Fish may be able to move upstream from the resevoir as far as the culvert. No fish were found upstream of the culvert.

Tumble Lake

Tumble Lake, about 20 acres in size is the only natural lake of any size in this watershed. It has been stocked with brook trout and supports a naturally producing population. The placing of fish, a higher predator, in a system without fish could totally change the ecosystems dynamics. You could see major downward changes in zooplankton populations, in populations of larger aquatic insects and in amphibians. There could be changes in phytoplankton and other aquatic plants. Difficult to lay out all the potential changes that might take place. There is also a social change that has taken place due to stocking fish that relates to impacts to soil and vegetation from anglers around lake shores.

Mackey Creek

Mackey Creek is a small high gradient stream with no known fish populations. This stream is used as a municipal water source for the City of Detroit.

Hansen Creek

Hansen Creek is a small high gradient stream with no known fish populations.

Dry Creek

Dry Creek is a small to medium size stream at the east end of the watershed that dries up in the summer time before it enters the North Santiam River. Aquatic habitat in this stream is thought to be in fairly good condition and it supports a populatiion of cutthroat trout for about 1.5 miles. This stream was surveyed in 1997 but the report has not been completed.

Tom Creek

Tom Creek is a small stream that supports a population of cutthroat trout. The upstream extent of fish presence is unknown at this time. Past logging practices have affected the habitat condition of this stream.

Log Creek

Log Creek is a small stream that supports a population of cutthroat trout. The upstream extent of fish presence is unknown at this time. Past logging practices have affected the habitat condition of this stream..

Detroit Reservoir(North Santiam River and Breitenbush River)
Detroit Reservoir supports stocked populations of rainbow trout, kokanee salmon, and landlocked spring chinook. Problems do exist in relation to shoreline erosion. Projects have been undertaken to vegetate the shoreline but have not be very successful. Small plugs of sedge were planted and survived but didn't spread. Attempts were made to plant sedge seed in fiber mats but it was not successful.

Fish Stocking:

Detroit Reservoir provides a major sport fishery in the North Santiam Draiange. The Oregon Department of Fish and Wildlife has stocked over a half a million fish in the Reservoir every year to maintain this fishery. Up until 1996 the State released a 100,000 legal and 300,000 fingerling rainbow trout, a 100,000 kokanee salmon fingerlings and 100,000 prefingerling spring chinook salmon.

For the 1997 fishing season the spring chinook will not be stocked. The ODFW is evaluating the past effectiveness of the landlocked spring chinook salmon program and may drop it.

iii-18. Where are the year-round cold water sources areas for the streams in the Detroit Tributary watersheds, and where can their contribution be identified as important to the maintenance of cool stream temperatures?

There are no known significant cold water sources within this watershed. Temperature moderation may be a function of stream morphology and stream side vegetative cover. With most of these streams flowing directly into Detroit Reservoir, their effect on temperatures in that large body of water is probably minimal. Prior to the completion of Detroit Reservoir and logging in the tributaries, the shaded cooler tributaries may have been significant in maintaining cooler water temperatures in the North Santiam and Breitenbush Rivers.

iii-19. What is the condition of the riparian reserves in the watersheds and the distribution of those conditions with regard to fish habitat?

The conditions of riparian reserves vary across the watershed. Presence or absence of large woody material or standing large trees is greatly dependent on past road building, timber harvest, salvage logging, fire history, and major storm events. Detroit reservoir covered over 20 miles of stream riparian area. Roads, campgrounds and other developments have also impinged on riparian areas. Historical conditions have been greatly altered in this watershed.

iii-20. Where and how did recent flood events affect fish habitat in the watershed?

Major flow events that carry large amounts of bed load and large woody material can be detrimental to fish spawning success. Thousands of kokanee salmon from Detroit Reservoir spawned below Wind Creek in the Breitenbush River in the fall of 1995. If these eggs or alevins were still in the gravel when the flood happened, it is likely they would not have survived the disturbance.

While from one stand point these events are tearing things down, on the other side they are providing the streams with the building blocks for new habitat. They provide new large wood to the channel from debris flows and from undercutting of trees along the channel. They also provide new substrate from channel changes and debris flows to recharge and form new spawning areas. The short term can be pretty drastic but the long term can be beneficial. This is especially so in drainages with healthy intact riparian areas that have the replacement components a stream needs to maintain complexity and productiveness.

iii-21. What and where are existing fish habitat improvements in the watershed?

No fish habitat restoration or improvement projects have been done in this watershed.

iii-22. What is the current status of the landlocked spring chinook salmon the reservoir?

Spring chinook salmon are no longer being released in Detroit Reservoir. In the last few years the number of spring chinook juveniles and adults showing up in the fishery has gone down and the ODFW is evaluating the effectiveness of the program and may discontinue it all together.

iii-23. How does the current condition of the aquatic habitat relate to future reintroductions of winter steelhead, spring chinook salmon and bull trout?

Historic runs were in the thousands for winter steelhead and spring chinook in the upper North Santiam and Breitenbush Rivers. The potential production tied directly to this watershed is unknown. What is known is that as long as the dams are in place it will be very difficult to restore runs to the Upper North Santiam and Breitenbush Rivers.

There is essentially very little anadromous fish habitat left in this watershed. Detroit Reservoir covers most of the historic habitat. The remaining habitat is poor to good with the best probably being in French Creek.

If bull trout were reintroduced to the North Santiam River system, it is possible the reservoir would be used as a rearing area for sub adults and a holding area for adults.

b. Reference Conditions

*iii-24.*What was the historical relative abundance and distribution of species of concern and the condition and distribution of their habitats in the watershed?*

Prior to the construction of Detroit and Big Cliffs Dams and before the installation of the racks across the Rivers near the town of Detroit spring chinook, winter steelhead , bull trout, cutthroat trout, and whitefish moved freely in the North Santiam River system on their annual spawning runs. Between 5000 and 10,000 salmon and steelhead historically moved up the Breitenbush and North Santiam Rivers to spawn.

The steelhead spawned in the spring and then drifted back down the river towards the ocean. A small percentage probably survived to spawn again. Spring chinook and bull trout spawned in the late summer and early fall. The spring chinook die after spawning releasing their nutrients into the system, while most bull trout survive to spawn again. The cutthroat trout and resident rainbow trout spawned in late winter and spring, while the whitefish spawned in late fall and winter.

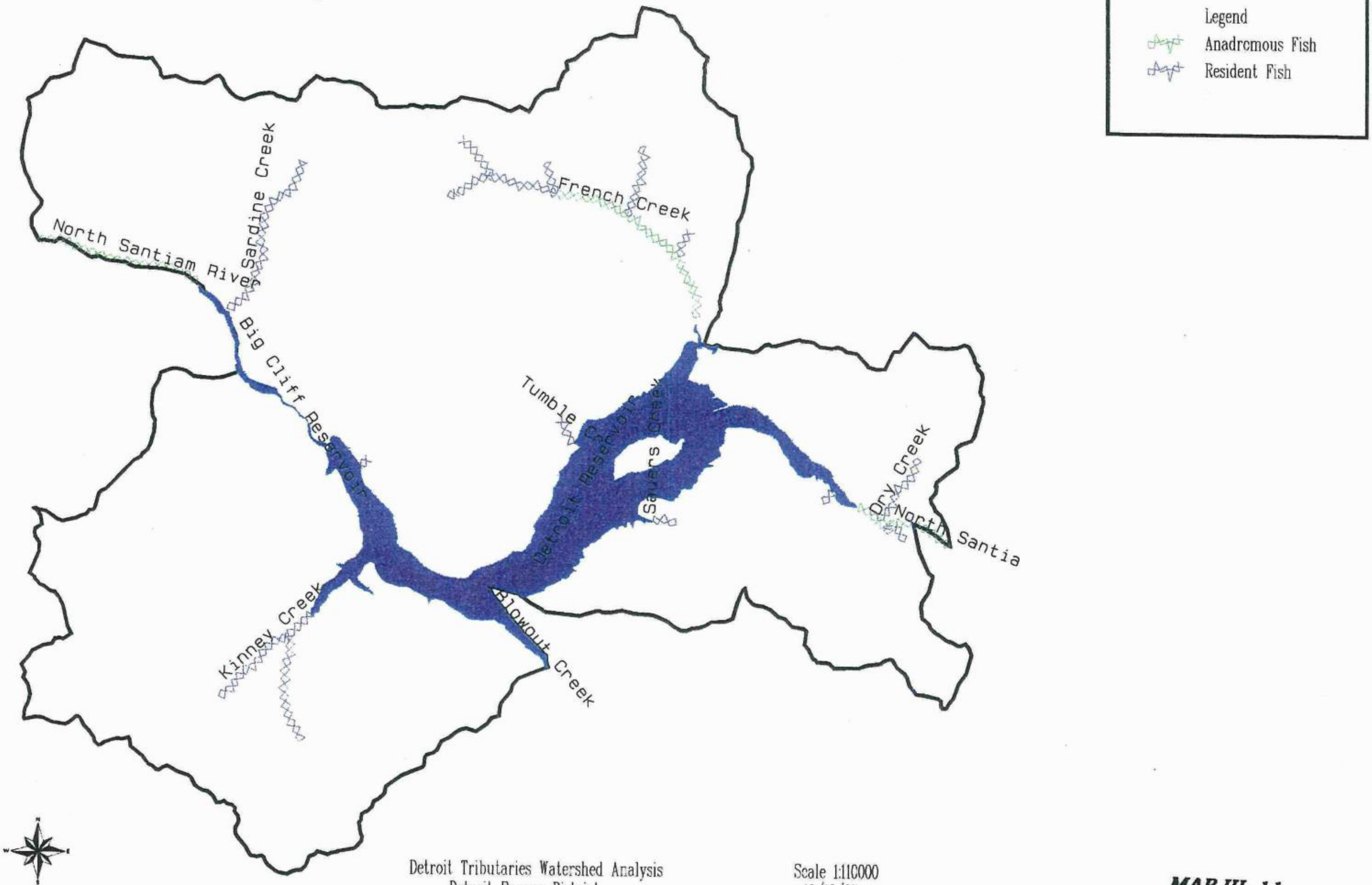
Bull trout were probably fairly abundant in the days when salmon and steelhead numbers were high. The bull trout, even though it doesn't migrate to the ocean, did historically migrate up and down the North Santiam River system. The bull trout, being a major predator in the system, would follow the salmon on their spawning run and feed on rearing fish in the river along with stray eggs when the salmon spawned. After the salmon spawned in late September the bull trout would move up into the tributaries of the Breitenbush and North Santiam Rivers to spawn. Old records indicate bull trout in the 5 -10 pound range were caught in the North Santiam River.

They required cold, clean water, with an abundance of large wood for successful spawning and rearing. Over time the bull trout, a fish with a bad reputation, cut off from it's natural spawning areas, its habitat being degraded and fishing pressure taking its toll, disappeared from the drainage. The last documented sighting of a bull trout in the North Santiam Drainage was in 1945. There have been several undocumented reports of bull trout over the years, with the most recent being in June of 1997 in Detroit Reservoir.

Resident cutthroat trout were probably fairly abundant in the upper reaches of the larger tributaries. Fluvial cutthroat trout from lower down in the North Santiam system probably passed through this watershed on their way to upstream spawning areas.

Resident rainbow trout were also fairly common. They were most likely related to the winter steelhead that didn't migrate to the ocean. They were found in the main river and the lower reaches of the major tributaries.

Existing Fish Habitat



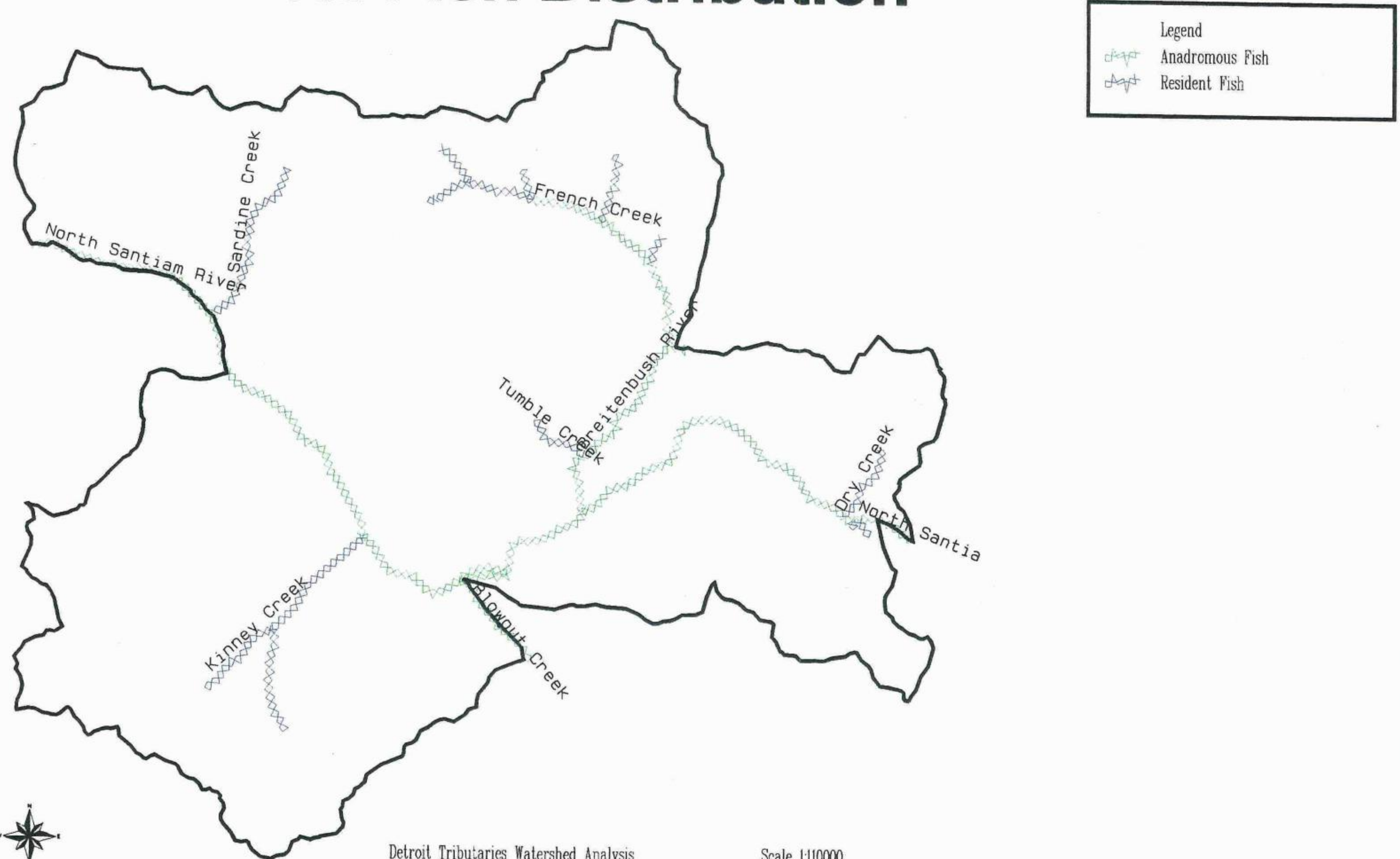
Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/10/97

MAP III-11

Request #1523b

Historical Fish Distribution



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/03/97

MAP III–12 Request #1523

The racks put in at Detroit, prior to 1920, blocked most salmon and steelhead from completing their migration to the spawning grounds. Fish were spawned artificially and were raised in a hatchery and released back to the river. The racks may very well have affected bull trout populations as bull trout were considered unwanted predators at the time and may have been killed when found at the racks. The racks probably had little effect on the other species of fish present.

The dams blocked upstream migration of all fish in the system and inhibited downstream migration as well. A hatchery was built at Marion Creek in the upper North Santiam River to partially mitigate for the loss of natural production of salmon and steelhead above the dams, but does not mitigate losses of the other species.

Habitat: Aquatic habitat conditions prior to the railroad logging in the late 1800's were probably very good. Streams were well shaded and large wood for stream channel complexity and productivity was abundant. In 1900 there was about 60 miles of fish bearing streams in this watershed.

Railroad logging and the removal of large wood from alongside the main river and tributary streams in the basin removed stream structure, and decreased habitat quality along these streams.

iii-25. What are the fish species that have had migration patterns blocked or disrupted due to the physical barrier of the dam and to what extent have these migration patterns been altered?

All native fish species probably had migrations disrupted by the completion of Detroit and Big Cliffs Dams. ***Maps III-11 and III-12*** show current and historic fish bearing streams. The obvious ones were the spring chinook and winter steelhead that could no longer reach historic spawning and rearing areas in the upper North Santiam River and the Breitenbush River. The lack of incorporation of fish ladders into the design and the resultant loss of production forced the construction of Marion Forks Fish Hatchery as partial mitigation for that loss.

Not so obvious at the time was the potential impacts to bull trout that were also migratory. The large adult fish probably spawned in the Upper Breitenbush and the Upper North Santiam River. After spawning, these adult fish would have moved back downstream to the larger rivers where they spent the majority of their time. The dams would have shut off this migratory pattern and may have been the final action that contributed to the loss of bull trout in the Breitenbush Watershed. In some systems a lake or reservoir is used by adults instead of a large river system. There doesn't seem to be any indication this has happened here as no bull trout have been documented in the North Santiam or Breitenbush Rivers for over 40 years.

Cutthroat trout in the Willamette Basin are also known to be migratory in that populations in larger systems tend to run up into tributaries to spawn. It is not really known how much interaction these migratory populations had historically with resident populations. This interaction may be important in maintaining healthy gene pools in both the resident and migratory populations. The building of the Dams severed this connection and there is no information on what the long term effects may be.

c. *Comparison of Current and Reference Conditions*

iii-26. *What are the natural and human causes of change between historical and current species distribution and habitat quality for species of concern in the watershed?

Conditions

Reference- Prior to Forest Management:
Populations: Anadromous and other migratory fish spawned in these watersheds or migrated through these watersheds to spawning beds upriver.
Habitat: Fire was the main disturbing mechanism on fish habitat. On south and west aspects fire affected the vegetation, and the amount of shade on the streams, affecting stream temperatures
On North and East aspects, sheltered from fire, trees shaded streams.

Conditions | **Major Causes of Change**

Reference- Prior to Forest Management (continued):

Down logs provided structure in streams. There was less structure on streams on south aspects

Human causes of aquatic habitat change include timber harvest, timber salvage, road building, dam building and other development near streams and rivers. Examples are:
***Construction of Detroit dam** and associated reservoir*
***Salvage and stream cleanout** within what is now riparian reserves*

Reference- Forest Management to 1994:

The reservoir covers most of the historic fish habitat

The dams are a barrier to fish migration

Stream cleanout and salvage activities removed down wood from the streams

***Timber harvest and road construction-** changes in standards have been implemented.*
*Retention of **riparian reserves***

Current - 1994 to Present:

The reservoir covers most of the historic fish habitat

Vegetation along riparian reserves has grown beyond reference levels on south and west aspects.

Down logs have been recruited for structure

Stream restoration projects are currently being assessed.

III. BIOLOGICAL DOMAIN

C. Animal Species and Habitats- Terrestrial

1. Characterization

iii-27. *What is the relative abundance and distribution of wildlife species of concern that are important in the watershed (e.g. threatened or endangered species, special status species, species emphasized in other plans)? What is the distribution and character of their habitats?

Habitat for the following species is present within this watershed:
(▸ = Known to occur within watershed)

Threatened and Endangered Species:	Record of Decision, Table C-3 Species:	
▸ Peregrine Falcon (Falco peregrinus anatum)	▸ Great Gray Owl	Silver-haired Bat
▸ Bald Eagle (Haliaeetus leucocephalus)	Black-backed Woodpecker	Long-eared Bat
▸ Northern Spotted Owl (Strix occidentalis caurina)	Red Tree Vole	Long-legged Bat

R-6 Willamette National Forest Threatened, Endangered and Sensitive Species List:		Appendix J-2 Species: (list does not mention species previously mentioned)	
Red-legged Frog	Townsend's Big-eared Bat	Cascade Torrent Salamander	▸ Common Merganser
Northwestern Pond Turtle	White-footed Vole	▸ Tailed Frog	Hoary Bat
▸ Harlequin Duck	Invertebrates	Clouded Salamander	Fisher
Greater Sandhill Crane		Oregon Slender Salamander	American Marten

ODFW's Sensitive Species List:	**Potential Additions to the Regional Forester's Sensitive Species List:**	
Wolverine	Dunn's Salamander	Northern Saw-whet Owl
▸ Barrow's Goldeneye	Spotted Frog	▸ Northern Pygmy Owl
	Cascade Frog	▸ Bufflehead
	▸ Golden Eagle	▸ Horned Grebe
	▸ Northern Goshawk	Greater Yellowlegs
	Mountain Quail	Loggerhead Shrike
	▸ Vaux's Swifts	Williamson's Sapsucker
	▸ Pileated Woodpecker	White-headed Woodpecker
	Lewis' Woodpecker	Three-toed Woodpecker
	▸ Western Meadowlark	Black-backed Woodpecker
	▸ Western Bluebird	Brazilian Free-tailed Bat
	▸ Mountain Bluebird	▸ Western Gray Squirrel
	Bank Swallow	Washington Ground Squirrel

Each list does not contain the full complement of species. If the species was mentioned in a previous list, it was not mentioned againlater on.

▸ Using the district wildlife observation database, the following species of concern are known to occur within the watershed. This is by no means a complete list of known species but of casual observations bydistrict personnel for the most part.

Wildlife Guilds

On the Willamette National Forest, wildlife species are grouped into guilds. Guilds are groups of species using the same habitat in a similar way (Mellon, 1995). Species are first divided into 3 groups: special and unique habitat obligates, riparian obligates, and terrestrial habitat obligates. The riparian and terrestrial habitat groups are further divided into guilds. These are then divided further based on seral class and associations with water bodies.

Within the Detroit Tributary watersheds, there are 24 wildlife guilds represented. See ***Table III-13*** for a list of guilds. These represent riparian habitats, special habitats to some degree and terrestrial habitats. This information is available in the district files.

Information for these databases was derived from Brown (1985) for the westside of the Cascade Mountains. This publication includes a series of complex matrices relating wildlife species to plant communities, stand condition or successional stage, and special habitats and life history information. This database attempts to show a relationship between animal species and landscape patterns.

These guilds are based on combinations of **home range size category, patch configuration use,** and use of open, small tree (8-21" dbh), or large tree (>21"dbh) **structural habitats.**

- **Home range size** categories include: small (<60 acres), medium (60-1000 acres), and large (>1000 acres).
- **Patch configuration categories** include: **patch** (tend to use 1 homogeneous patch), **mosaic** (aggregate patches), **contrast** (use 2 different structural stages in close proximity), and **generalist** (use a variety of structural stages).
- The **riparian habitat** group is divided into guilds based on combinations of association with **water body, aquatic** or **riparian vegetation** portion of riparian habitat, and **open or forested riparian structural stages.** Water body categories include **lakes, riverine, or lake and riverine.**
- **Aquatic/riparian** categories include association with **aquatic habitat** only, **riparian vegetation only**, or **both.**

Seventeen guilds are represented by this list of species of concern described above. These guilds should be considered for emphasis in future management activities to assess impacts to these species of concern's habitats (TLC, TLGG, TLML, TMML, TMGG, TSPL, TSGG, TSGML, TSME, TSC, TSPE, LKRVARML, LKRVARG, LKRVRML, LKRVRG, LKRVA, and SPCL). Eight of these guilds (TLC, TLML, TSGG, TSPE, LKRVARML, LKRVA, AND SPCL) have been documented in the watershed. More guilds would probably be found but surveys have not been conducted in the watershed. Surveys need to be conducted especially for those species of concern.

Table III-13:

GUILD	Habitat	Amount of Habitat Present *	Distribution	Species of Concern
LARGE HOME RANGE GUILDS:				
TLC	Terrestrial (T), large (L) home range, contrast (C) species.	Low Slightly more in PSF zone	French, Heater, Monument Pk. Log, Tom	Golden Eagle, Great Grey Owl
TLML	Terrestrial, large home range, mosaic, late seral stage user.	No Suitable, Unsuit. Mod. and Low	Marten Basin, Halls Rdg., Dome Rdg, Monument Pk., Dry, Mackey	Marten, Fisher, Pileated Wood-pecker, Spotted Owl, N. Goshawk
TLGG	Terrestrial, large home range, generalist species. Generalist guilds represent a wide range of species and habitats.			
TLME	Terrestrial, large home range, mosaic, early seral stage user.	Low, Slightly more in PSF	Higher elevation	None
MEDIUM HOME RANGE GUILDS:				
TMML	Terrestrial, medium home range, mosaic, late seral stage user	Low, most occurs in PSF zone	Marten Basin, Dry Cr., Tumble Creek	Black-backed Wood-pecker, Three-toed Wood-pecker
TMGG	Terrestrial, medium home range, generalist species. Generalist guilds represent a wide range of species and habitats.			
SMALL HOME RANGE GUILDS:				
TSGML	Terrestrial, small home range, generalist mid/late seral	Good, fragment. In PSF zone	Entire Water-shed but fragment. In areas	William-son's Sapsuck-er, Or. Slender Salaman der, Western Red-backed Vole
TSC	Terrestrial, small home range, contrast (edge) species	Low, 2/3 in PSF zone	Marten Basin, Sardine, Dome Rdg., Log Tom, Heater	Lewis' Wood-pecker Heather vole
TSGEM	Terrestrial, small home range, generalist early/mid seral.	Good, Most in WH zone	Occurs in entire water-shed	None
TSGE	Terrestrial, small home range, generalist early seral. Generalist guilds represent a wide range of species and habitats.			

GUILD	Habitat	Amount of Habitat Present *	Distribution	Species of Concern
TSGG	Terrestrial, small home range, generalist. Generalist guilds represent a wide range of species and habitats.			
TSME	Terrestrial, small home range, mosaic early seral	Moderate	Marten Basin, French, Sardine, Heater	Mountain Quail
TSPL	Terrestrial, small home range, patch species, late seral.Moderate to Good		Occurs in entire water-shed	Red Tree Vole
TSPE	Terrestrial, small home range, patch species, early seral.	Moderate to Good	Occurs in entire water-shed	Mountain Bluebird, Western meadow-lark
RIPARIAN HABITAT GUILDS:				
LKRVARE	Lake (LK) or River (RV), using the Aquatic (A) portion and terrestrial riparian(R) in the early (E) seral stage	See riparian structural stages (***Map III-4***)		Northwestern pond turtle
LKRVARG	Lake or river, using the aquatic portion and terrestrial riparian vegetation regardless of seral stage.			Dunn's salamander bald eagle
LKRVARML	Lake or river, using the aquatic portion and terrestrial riparian vegetation in the mid and late seral stages.			Barrow's goldeneye bufflehead harlequin duck common merganser tailed frog cascade torrent salamander
LKRVRML	Lake or river, using the terrestrial riparian vegetation only in mid and late seral stages.			white footed vole

GUILD	Habitat	Amount of Habitat Present *	Distribution	Species of Concern
SPECIAL HABITAT GUILDS:				
SPCL	Associated with a special habitat.			
	Wetlands	See special habitat map *(Map III-10)*		greater yellowlegs
	Cliffs			peregrine falcon
	Wet Meadows			sandhill crane spotted frog
	Caves			Townsends big-eared bat

* - PSF = Pacific Silver Fir zone, WH = Western Hemlock zone.

2. What values are associated with terrestrial animal species and habitats?

a. Species and habitats have aesthetic, economic, recreational, and spiritual value.
b. Native wild gene pools have ecological value.
c. Native species have value to ecosystem function.
d. Habitat components necessary to sustain the variety of species indigenous to the area has ecological values (i.e. habitat distribution, connectivity, etc.)

3. What are the highest priority issues or resource concerns associated with terrestrial animal species and habitats?

a. Portions of these watersheds may lack habitat components necessary to sustain a variety of species indigenous to the area.
b. Conflicting habitat needs for various species (i.e. big game and spotted owls) occur within these watersheds.
c. A human/wildlife interface occurs on certain sites along the lake front, because of high recreation use and high species use (e.g. Detroit Flats).

4. What are the management direction/activities, human uses, or natural processes that affect terrestrial animal species and habitats?

a. Current Conditions

iii-28. *What are the current habitat conditions and trends for the species of concern identified above?

Wildlife Guilds: Maps for the wildlife guilds described in the characterization were overlaid with the tree series map, snag map, down woody material map, special habitat map if applicable, and riparian reserve map if applicable. These were then analyzed to determine gaps in habitat, connectivity, etc. ***Table III-14*** describes current conditions of each guild.

Table III-14: Analysis of Guilds Within Watershed.

GUILD	Down Woody Debris	Snags	Special Habitats	Connectivity	Other Habitat Conditions / Species Use of guild
LARGE HOME RANGE GUILDS:					
TLC	High to Low	High to Low	Few meadows More rock and talus areas	Poor	There is virtually no Mountain hemlock zone in this watershed. This may eliminate one species within this group, the **Boreal Owl,** very rare in this area and may not occur here. **Golden eagles** occupy late-successional stands due to the structural components, and may also be associated with cliff habitat. . Meadows in this guild are limited within watershed and this may further reduce the probability of **great gray owls** being present in large numbers.
TLML	High to Medium	High to Medium	N/A	Poor	Most of these patches of suitable habitat lie in the higher elevation Pacific silver fir zone. **Fishers** occupy lower elevations mainly occurring within the western hemlock zone. This species is already rare and the limited habitat within the western hemlock zone may further keep populations of this species at low levels. Further surveys should be conducted to determine levels of use by species of concern in these watersheds.

GUILD	Down Woody Debris	Snags	Special Habitats	Connectivity	Other Habitat Conditions / Species Use of guild
TLME	N/A	N/A	N/A	N/A	Only three species are included in this guild: **red fox, rough-legged hawk, and Swainson's hawk.** The hawks are only casual visitors to the district primarily during migration times while the red fox is more suited for the valley, though there are rare sitings within these watersheds. The watershed may be used more during migration stop-overs.
MEDIUM HOME RANGE GUILDS:					
TMC	Low in early successional Areas, High to mod in late successional areas.	Low in early successional areas, High to mod in late successional areas.	Rock and Talus, Shrubs	Poor	There are several rock/talus areas and shrub areas associated with suitable habitat. The rock/talus areas may act as habitat for the bat species in this guild. Low numbers of snags in early successional stands may limit roost areas where foraging occurs for bat species.
TMME					This guild only contains two species, the badger and the merlin, neither of which are species of concern. Occurrences of these two species on the Detroit Ranger District are very rare. The badger would likely occur in the Sardine Creek, Marten Basin area, or Heater Creek while the merlin is a northern resident and would probably only utilize this area during migration.
TMML	High to Moderate	High to Moderate	N/A	Moderate to Poor	Associated Species are found primarily in upper elevations.

GUILD	Down Woody Debris	Snags	Special Habitats	Connectivity	Other Habitat Conditions / Species Use of guild
SMALL HOME RANGE GUILDS:					
TSGML	High to Low	High to Low	Limited, Rock and talus areas	Good	Fragmentation within the watershed may hinder dispersal for species such as the Oregon slender salamander and the western red-backed vole. The Williamson's sapsucker is the other species of concern within this guild. This species is primarily an east side species and may not occur in this watershed.
TSC	High to Low	High to Low	Limited in associa-tion with habitat	Poor	The mtn. hemlock zone is not present in this analysis area which may limit or exclude the presence of **Cassin's finch** and **flammulated owl** which are typically found at high elevations. The limited amount of special habitats, primarily meadows, may limit the presence of the **heather vole**. Riparian reserves dissect most of the habitat blocks. This may provide the hardwood component needed for species such as the **Nashville warbler**, especially areas along Tumble Creek. Abundance of **Lewis' woodpeckers** may be limited to areas of high snag levels.
TSGEM	Low to Moderate	Low to Moderate	N/A except for Flycatcher	Good	For this guild, special habitats may not be important except for the **willow flycatcher.** Riparian areas may contain the needed components for this species, especially Tumble Creek. Most of the riparian reserves are within the stem exclusion stage which should aid dispersal from one area to another and should favor this guild.

GUILD	Down Woody Debris	Snags	Special Habitats	Connectivity	Other Habitat Conditions / Species Use of guild
TSME	Low	Low	N/A	Good in Heater, Log Tom, French and Sardine	Dispersal for the reptiles and the western pocket gopher may be hindered but the remaining species within the guild should not be impacted as greatly. Riparian reserves are pre-dominantly in the stem exclusion stage which may hinder dispersal of some species
TSPL	High to Low	N/A	Moderate		Red tree vole abundance and distribution is highly associated with canopy closure and connectivity. Fragmentation is a problem for this watershed and may hinder dispersal where fragmentation is great
TSPE	Low	Low	Few	Moderate	The mountain bluebird and western meadowlark are highly associated with forest-shrub and forest-grass edges. The mountain bluebird also requires a snag component for reproduction.
RIPARIAN HABITAT GUILDS:					
LKRVARE LKRVRE	See riparian conditions				LKRVARE and LKRVRE (early seral) are concentrated mainly around the City of Detroit, Detroit Flats, a section along the Kinney Creek arm and a small area along Cumley Creek. There are also riparian areas which are fragmented. **Canada geese, killdeer, and mallards** have been known to nest at Detroit Flats. **Common yellowthroat and yellow-breasted chat** have also been seen there.

GUILD	Down Woody Debris	Snags	Special Habitats	Connectivity	Other Habitat Conditions / Species Use of guild
LKRVARML LKRVRML	See riparian conditions				Many species listed in these two guilds need large snags adjacent to the stream for nesting (**wood duck, harlequin duck, hooded merganser, etc.**). The common merganser and harlequin duck, two species of concern, both require cold, fast moving streams with largely mid to late successional riparians. Distribution of the **harlequin duck** in the past four to five years has been unknown. There has been one siting within the watershed around Piety Island in 1980. Surveys for harlequins have not occurred in the watershed. Distributions of **common mergansers** are found primarily in the lower reaches of the larger creeks and in Detroit and Big Cliff Lakes. Other species (**white-footed vole**) need either a hardwood component or some special habitat (**Cascade torrent salamander**). White - footed voles are typically low elevation coastal species and sitings here are rare. Cascade torrent salamanders and tailed frogs, two other species of concern, both require stable first-order streams with cold, clear water typical of high elevation late successional riparian reserves. The remaining two species of concern, **Barrow's goldeneye and bufflehead**, are tied closely to high elevation lakes. Suitable habitat may be limiting for these species. They are regularly seen on Big Cliff Lake in both the winter and early spring. Therefore, the riparian areas need to be somewhat diverse to provide adequate habitat for all species mentioned.

GUILD	Down Woody Debris	Snags	Special Habitats	Connectivity	Other Habitat Conditions / Species Use of guild
LKRVARG	See riparian conditions				This guild should be well provided for within the watershed. There is a mix of seral classes throughout the watershed.. The late seral habitat should provide adequate nest and roost trees for species like the bald eagle and osprey. .This size class is located around Detroit Lake. Several osprey and one bald eagle nest have been documented.
					Dunn's salamander requires special habitats in association with riparian reserves, especially splash zones of cold, clear perennial streams. Abundance of this species is unknown. Thus, headwater areas may be important, as are special habitats such as cliffs, one habitat component of the bank swallow. The beaver and warbling vireo require a hardwood component which seems to be isolated to Tumble, Log, and Tom Creeks and at Detroit Flats.

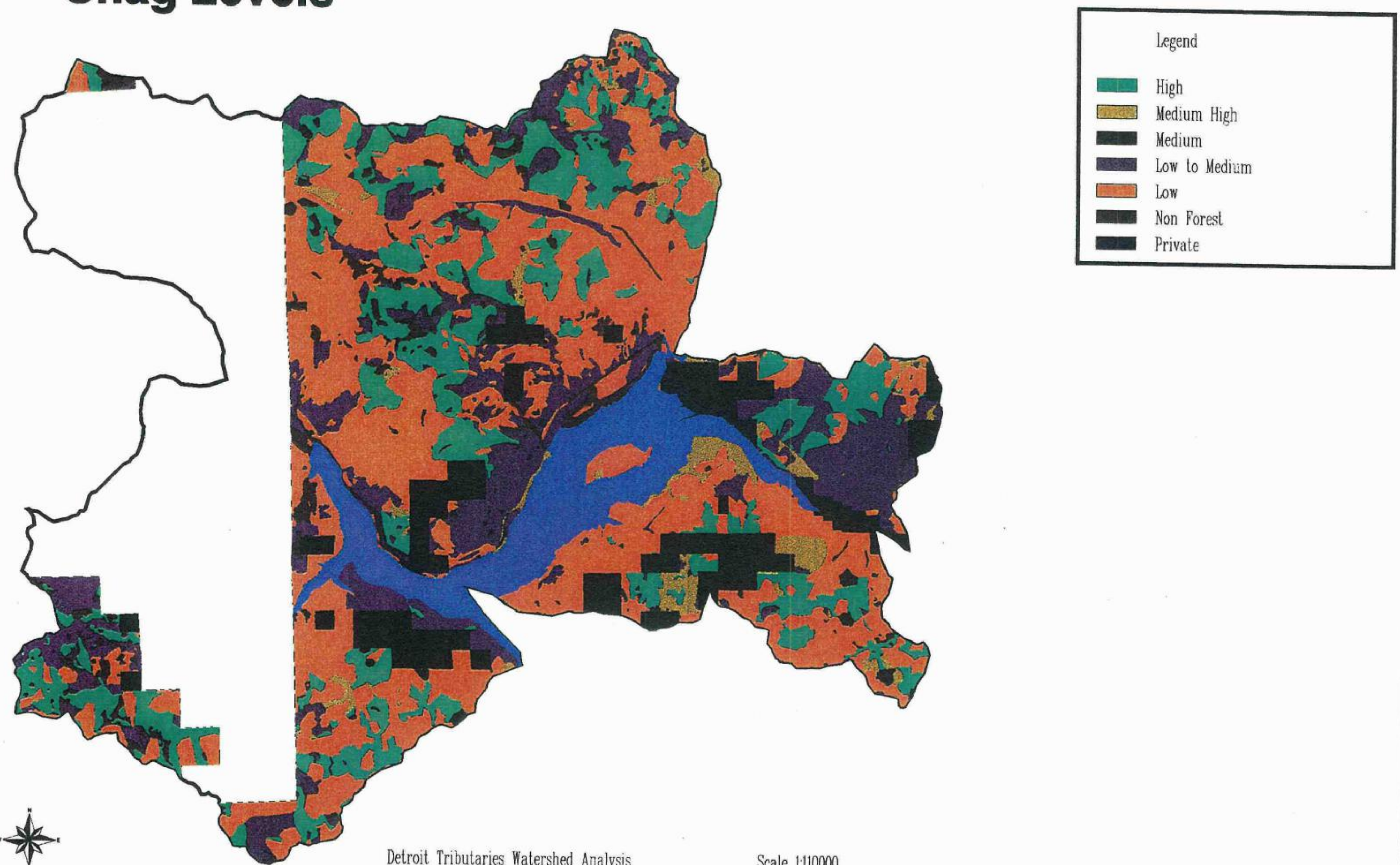
Snags and Down Woody Material:

Snags are an important structural component in forest communities. In forests of western Oregon, snags are used by nearly 100 species of wildlife, many of which are cavity nesters. The dependency of these species on dead trees ranges from absolute to incidental. Dead and down woody material is also an important habitat component of western forests. This material serves as sites for feeding, reproducing, and resting for many wildlife species. Over 150 species are known to utilize dead and down material as either a primary or secondary component of their habitat requirements.

Snags and down woody material are below levels outlined in Forest Plan standards and guidelines on many areas in the watershed, primarily on managed stands. Large cull logs were left on site in pre-1960's units. However, due to increased utilization after this period, few if any logs were left until the 1990's. Few snags were left during these periods also. Those that were left frequently were consumed by post slash treatments. ROD standards and guidelines require that snags and down woody material must be at least 20" dbh to count towards the totals. Only Class 1 and 2 logs can be counted and they must be at least 20 feet in length. A minimum of 240 lineal feet/acre is required in matrix land allocations. For snags, a minimum of 40% potential population levels must be met on all harvest units across the landscape.

In 1990, a major windstorm hit the District resulting in patches of heavy blowdown which increased levels of down material across the landscape. This also created additional snags as well, either by snap-outs or by damage incurred. In February of 1996, heavy snows fell on the district followed by a cold period. The heavy snow loading on the trees created numerous snap-outs across the landscape. This period was then followed by a warming trend and a flood. This event moved down woody material around on the landscape and may have deposited wood where levels were deficit. It may have pushed wood out of the channels onto the floodplains creating needed habitat for many small species, including amphibians. It also uprooted intact habitats, especially along riparian reserves. Small home range species and riparian habitat obligates such as amphibians and aquatic insects would have been impacted the greatest. This may have been a minimal factor in this watershed compared to other watersheds where it is more apparent.

Snag Levels



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/03/97

MAP III–13

Request #1463

Bark beetles are present within the watershed. These may increase snag levels and potential down woody material levels. The Douglas fir bark beetle is found at lower elevations and may be more prevalent where large concentrations of blowdown exist. Root rots are also present within the watershed and these may help to increase down woody material levels and provide for diversity.

Several historic fires have occurred within the Detroit Tribs analysis area. These areas generally have snags in the 3 to 21" dbh range for snags. Most areas affected by fire have either low or low/medium levels of snags occurring there suggesting that many of these events were stand replacing. Down woody debris levels are somewhat higher. Many areas have medium to medium/high levels present. Historic fire areas probably resulted in heavy down woody material levels where fires were not all consuming. The down woody material that resulted from fires in the early 1900's is breaking down and probably found in decay classes 3 and 4. The down woody material that resulted from fires in the mid 1900's is probably more intact and may be found in decay classes 2 and 3.

Map III-13 and ***Chart III-1*** show current Snag levels. ***Table III-15*** shows the number of snags per acre for each of four rating classes (low, low-medium, medium-high, and high)

Chart III-1:

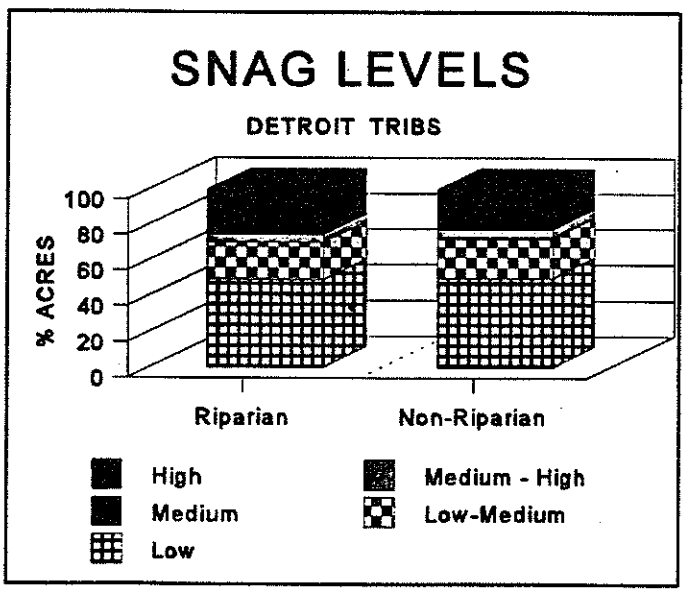
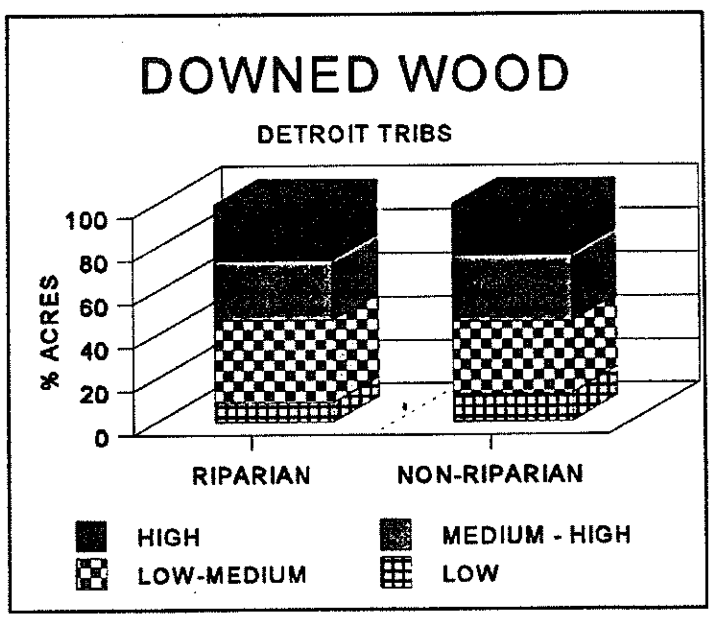


Table III-15: Snag Rating System

Rating Class	Snags (# per acre)	Comments
low	<1	pre-1990 harvested units
low-medium	1-4	stands 9.0"-20.9" dbh, natural stands
medium		post 1990 harvested units
medium-high	5-7	stands 21"-31.9"
high	8+	stands 32"+

Map III-14 and ***Chart III-2*** show current down woody material levels. ***Table III-16*** shows tons of down wood per acre for each of four rating classes (low, low-medium, medium-high, and high)

Chart III-2:



Down Wood y Material

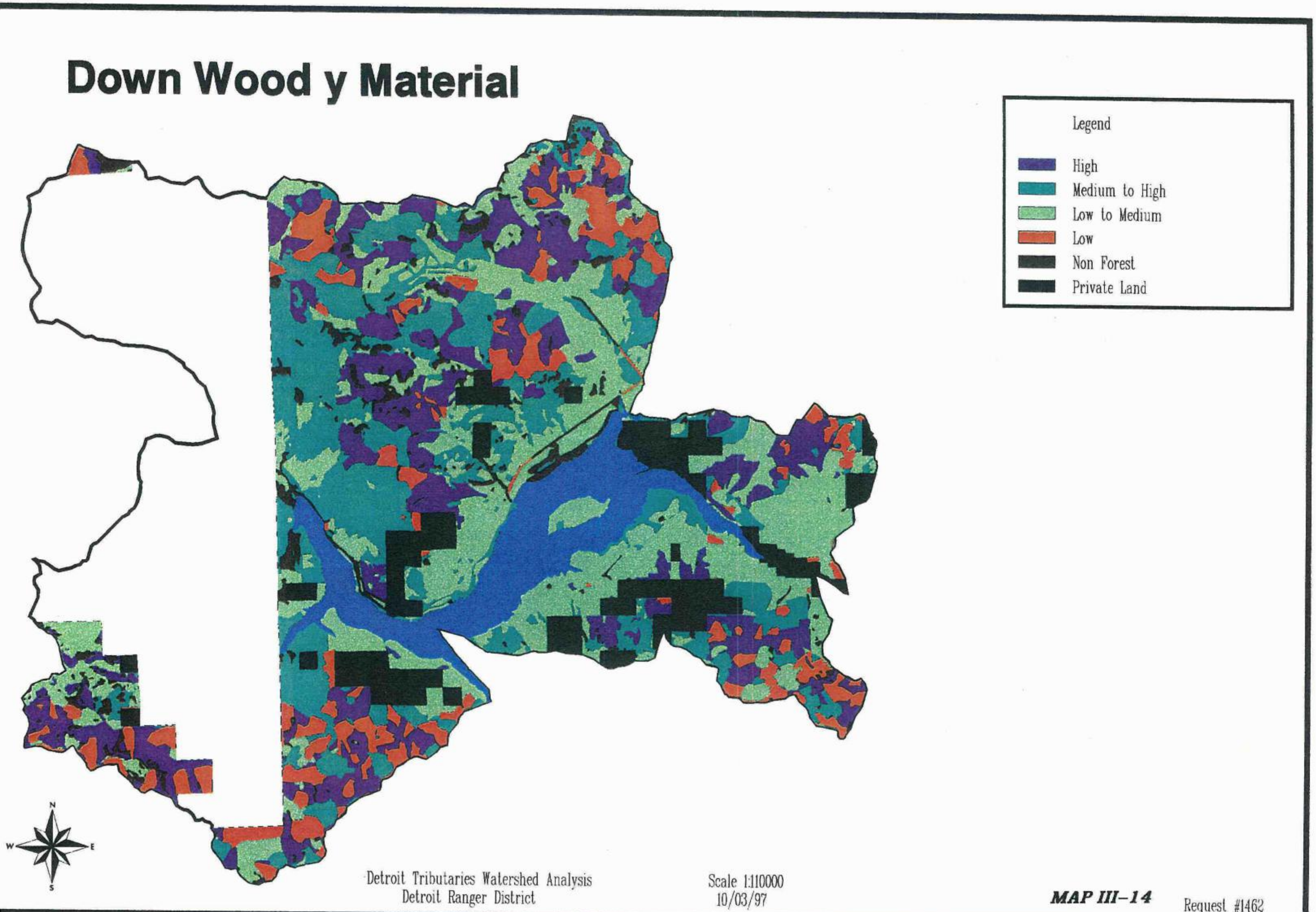


Table III-16 : Down Woody Material Rating System

Rating Class	Down Woody Material (tons per acre)	Comments
low	<5	harvested units (1970-1990)
low-medium	5-17	stands 9.0"dbh - 20.9" dbh, natural stands
medium-high	18-30	stands 21" -32" dbh, pre-1970 harvested units and post 1990 harvested units
high	30+	stands 32" + dbh

Trends

Snags: Snag levels will be retained in future harvest units to comply with ROD standards and guidelines. Snags will continue to be created either across the landscape by disease, wind, etc. Levels should average out across the landscape as snags are created in harvest units, but many natural snags will be lost due to harvest activities and OSHA requirements. Fire suppression will also continue which will allow stands to mature resulting in larger snags. However, the possibility of snags being created by fire may be lost. Fire used as a management tool is being analyzed and if executed, may create some snag habitat. The use of fire as a tool may emulate natural events possibly creating needed structure within these stands. Snags can be created in areas where levels are deficient that are adjacent to harvest units by means of KV funding.

Snag levels in riparian reserves will continue to increase as well. However, there are areas that may never produce the size and quantity of snags required. These include the Halls Ridge area and upper elevations that contain rocky soils. In summary, snag levels are still below Standards and Guidelines in most of the watershed. Marten Basin and other isolated areas may contain adequate amounts but may not be able to support the entire planning subdrainage.

Fire suppression and snags: Snags can pose a safety risk to fire fighters during a fire. However, levels of snags are extremely limited within this watershed. The need for this habitat component will be taken into account in reducing fire hazard and risk.

Down woody material: A minimum of 240 linear feet/acre will be retained on all future harvest units unless higher levels are prescribed. Down woody material will continue to be created across the landscape by wind, disease, etc. This will probably occur along edges of harvest units and ridgetops. As with snag levels, down woody material levels should even out across the landscape over time. Levels within riparian reserves will increase.

Fire suppression and down woody material: Fire suppression will allow habitat to mature creating larger diameter wood. Down woody material will not be consumed as frequently due to fire suppression efforts. If high intensity management fire is executed, it could destroy some existing down woody material, especially class 3 through 5 logs if the timing of the burn is right (when logs are at their driest point). This could eliminate this component from these stands if not carefully planned out. Less intensive fires, like those that would emulate historic underburning conditions may reduce this material but will have less effect than the higher intensity fires. Recruitment of new down woody material should also be analyzed prior to treatment. Pre-treating important areas may be one option in maintaining this habitat component on the landscape. Again, Halls Ridge and those upper elevation areas with rocky soils may not be able to produce desired levels or sizes of down woody material due to the inability of these areas to produce them.

Fire suppression has created a buildup of lighter fuels, thus increase fire hazard in some areas. Increasing down woody material levels may lead to increased fire intensity should a fire get started, and depending on the amounts left and the distribution on the landscape, may lead to a stand replacing fire event.
This is also true for late-successional stands as well. The need for this habitat component will be taken into account in reducing fire hazard and risk.

iii-29. What is the condition TES, Table C-3 ROD, and Appendix J-2 species habitat and known populations? What are the recovery needs of federally listed T&E species in the watershed?

Peregrine Falcons: The peregrine falcon (Falco peregrinus anatum) is currently listed as endangered on the Federal threatened and endangered species list and the Oregon T&E species list. As mandated by the Endangered Species Act of 1973, recovery plans for this species were created to formulate guidelines for Federal and State resource management agencies to enact management and protection policies. In accordance with these rules and regulations, the Pacific Coast American Peregrine Falcon Recovery Team was designated and appointed in 1976 to create and initiate regional recovery programs and to assist cooperating agencies in site specific management of peregrine falcon eyries.

Detroit Ranger District is within a Peregrine Falcon Management Unit in the Cascades. The management goal for this unit is two stable pairs. The Willamette National Forest, which is also within this same unit, has 11 established pairs, well over the established management goal for this area.

Peregrines subsist on a diet of 90-95% avian species. As peregrines are not forest-dwelling birds, but hunt in forest openings or above the forest canopy, a mixture of successional stages would provide ample hunting opportunities. Grass/forb, early successional stands, abundant snags, and hardwood patches would all be desired within a designed distance from suitable habitat. Overall, increased diversity means an increase in prey diversity and availability of prey for the peregrine falcon.

Suitable habitat is present within the watershed, especially around Tumble Lake and the Halls Ridge area. The Halls Ridge/Tumble Lake area is within good flight distance of water (Tumble Lake, French Creek, Tumble Creek, and Detroit Lake). Rock outcroppings are numerous in these locations. There are also other areas that have potential suitable habitat present but are not as numerous. Peregrines seem to locate their eyries approximately 1/4 to ½ mile from riparian reserves. This may be due to the diversity of avian species that can be found there.

Bald Eagle

The bald eagle is listed as threatened in Oregon. A team was assembled to form the Pacific Bald Eagle Recovery Team which then developed the Pacific Bald Eagle Recovery Plan signed in 1986. The primary objective of the recovery process is to provide secure habitat for bald eagles within a 7 state Pacific recovery area and to increase population levels in specific geographic areas to the extent that the species can be delisted. The 7 states consist of Washington, Oregon, California, Idaho, Nevada, Montana, and Wyoming. These goals can be achieved through protection and management of habitat, direct augmentation of populations, increased law enforcement, public awareness, and continued research on the biological requirements of eagles that will provide direction to managers and land planners.

The purpose of this management plan is to provide guidance on the maintenance and enhancement of bald eagle habitat in the vicinity of Detroit Lake in order to assist in the recovery of the Pacific bald eagle from the status of a threatened species. This site plan will assist the recovery process by maintaining a productive pair of eagles at the Detroit Lake site as well as providing another potential nest site. The ultimate regional goal is the delisting of the bald eagle in the state of Oregon. This plan addresses the following goals:

- Establish the importance of the site to goals set in the Recovery Plan for the Pacific bald eagle.
- Compile what is known and unknown about the history, breeding and reproductive success , and habitat use patterns of the eagles using this nest site.
- Establish management strategies that maintain and enhance bald eagle viability and meet the management goals of the U.S. Forest Service, the U.S. Army Corps of Engineers, and John Hancock Timber Resource Group.

The history of this site prior to 1989 is unknown, but since that date an accurate record of nesting outcome has been kept by the Oregon Cooperative Wildlife Research Unit (***Table III-17***). These eagles have successfully reproduced under current levels of human activity.

Table III-17: History of use at Detroit Lake bald eagle nest tree.

YEAR	OBSERVATION
1989	Nest site built; site occupied; 1 Fledgling.
1990	2 Adults, 1 fledgling
1991	2 Adults seen at nest
1991	2 Adults and 2 juveniles seen at nest
1992	2 Adults and 2 juveniles seen at nest
1993	2 Adults and 2 juveniles seen at nest
1994	2 Adults and 2 juveniles seen at nest
1995	2 Adults and 2 juveniles seen at nest
1996	2 Adults seen at nest core, one siting on nest

The Detroit Lake eagles have been observed hunting over the east end of the lake as well as the area below the Detroit Dam on Big Cliff Reservoir and the North Santiam River. Successful foraging attempts have been recorded on unknown fish species. The eagles have been observed scavenging on a road-killed deer carcass on the Blowout Road (10 road).

Current levels of human activity such as boating, skiing, fishing, and camping have not resulted in negative impacts on the eagles foraging success. The only foraging area currently restricted to boats is directly behind Detroit Dam inside the log boom. This encompasses approximately 120 acres but no difference in foraging rate has been observed.

It is assumed that structures and facilities currently located in the BEMA appear to pose little threat to nesting eagles or their young. The eagles have nested successfully despite the present locations of these structures and facilities and human use patterns in the area. However, no data is available for juvenile survival for this site.

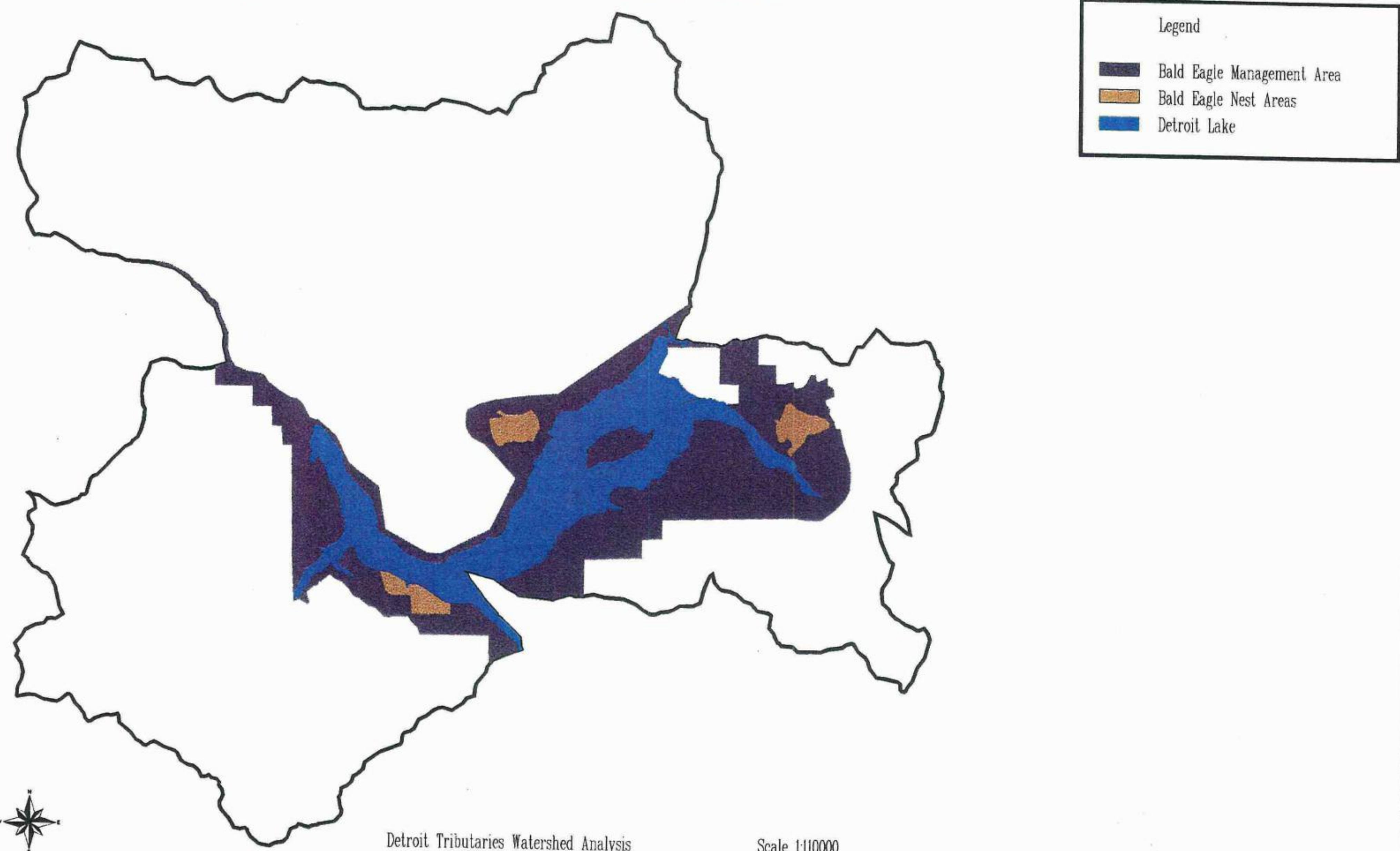
Eagles are highly susceptible to human disturbance primarily during the breeding season (McGarigal et al. 1991). Human activities near nesting and foraging sites may effect the eagles ability to reproduce and/or rear their young. Many types of recreational activities, such as rafting, fishing, boating and hiking, have been shown to adversely affect bald eagles (Mathisen, 1968; Andrew and Mosher, 1982; Knight and Knight, 1984; McGarigal et al., 1991; Buehler et al., 1991). Timber harvest activities are documented as having similar effects (Issacs, personal comm.). Such activities can result in eagles abandoning their nests or being unable to gather sufficient food to raise their nestlings. Altering the location, timing, intensity and/or duration of these types of activities can mitigate adverse effects.

The BEMA contains one primary nest zone and two potential nest zones, as well as all known or suspected foraging and roosting areas currently used by the resident eagles. (***Map III-15***) The BEMA does not automatically restrict human activity inside the boundary. Management emphasis should look at the BEMA as a whole and due to the potential for effect, projects may need to go through consultation with U.S. Fish and Wildlife Service Section 7 consultation for endangered and threatened species. General activities such as maintenance activities, lake clean up, group camping, boating, summer home maintenance, and facility maintenance for the Sportsman Club are exempt from evaluation and restriction.

The two potential nest zones, one in the Tumble Creek drainage and one in the Hansen Creek drainage are the only two area of suitable habitat remaining in the vicinity of Detroit Lake. All known perch trees within the BEMA shall be protected and marked. Activities within the primary/potential nest zones are restricted to provide security for nesting bald eagles. Prohibited activities within the primary/potential nest zones are the following: development of recreation sites, off-road vehicle use, development of trails within 1/4 mile of the nest tree, programmed timber harvest, firewood cutting, cone collection, special use permits, mineral extraction, and facility development.

Seasonal restrictions will be placed on other activities such as habitat enhancement activities, silvicultural activities, and others. See the Bald Eagle Management Plan for more information.

Bald Eagle Habitat and Reserves



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/03/97

MAP III-15

Request #1460

Several potential projects, planned by organizations other that the Forest Service, are proposed within the BEMA boundaries. These include but are not limited to the Detroit sewer system project, widening of the powerlines, and potential expansion of the City of Detroit in future years. All of these projects have the potential to effect bald eagles and/or their habitat. The sewer project poses the least affect to bald eagles. It will remove some overstory trees but will be minimal in nature. The project will occur in the French Creek area where eagles use has not been noted. The expansion of Detroit is not verified but may happen in the future. The City of Detroit is not within the BEMA boundaries but the BEMA does lie all around it. Expansion could further limit potential habitat within this area. This will also lead to increased use of the area which may deter the birds from using this area or disturb the birds during critical times of the year.

Expansion of the powerlines may affect the eagles the greatest in the short term. The power companies are proposing to increase the width of the powerline right-of-way to decrease the chance for damage to the lines. Increased widths are proposed up to 300'. This would significantly affect the BEMA on the north side of the lake. The powerline is the northern boundary for the BEMA. This project would also affect the potential nest zone in Tumble Creek. One boundary for the nest zone lies adjacent to the powerline. No scheduled timber harvest is supposed to occur in this area.

The amount and types of recreation use is predicted to increase. The eagles may not be accustomed to new types of use and may be effected by this. This is coupled with more traffic on Highway 22. Steady traffic may in time become an everyday occurrence for the pair. However, potential for harm may be increased. Eagles have been known to forage on carrion. With increased traffic, comes the potential for more road killed animals and the potential for harm to the eagles if they were to forage on the road.

The land in the immediate vicinity of Detroit lake has a long and repeated history of timber harvest as well as wildfire. This has reduced the number of potential nest, perch and roost trees located within close proximity of the shoreline. Also, since Detroit Reservoir is a man-made water body, it lacks the diversity of physical and biological components that normally occur in a natural lake ecosystem. This lack of diversity limits the complexity of the naturally occurring food web. Both fish and waterfowl provide prey base for eagles. The current food supply available to eagles is primarily comprised of stocked fish supplied by man. These conditions lead to potential habitat enhancement opportunities.

Northern spotted owl:

iii-30. How do existing habitat conditions provide for spotted owl dispersal in matrix allocations?

Owl habitat was mapped for the district in 1992 and 1993 using criteria established by the Interagency Scientific Committee (ISC) and the Willamette National Forest for nesting and foraging habitat. (***Map III-16 and Tables III-18 and III-19***)

Table III-18: Comparison of Owl habitat with the Vegetation size class map

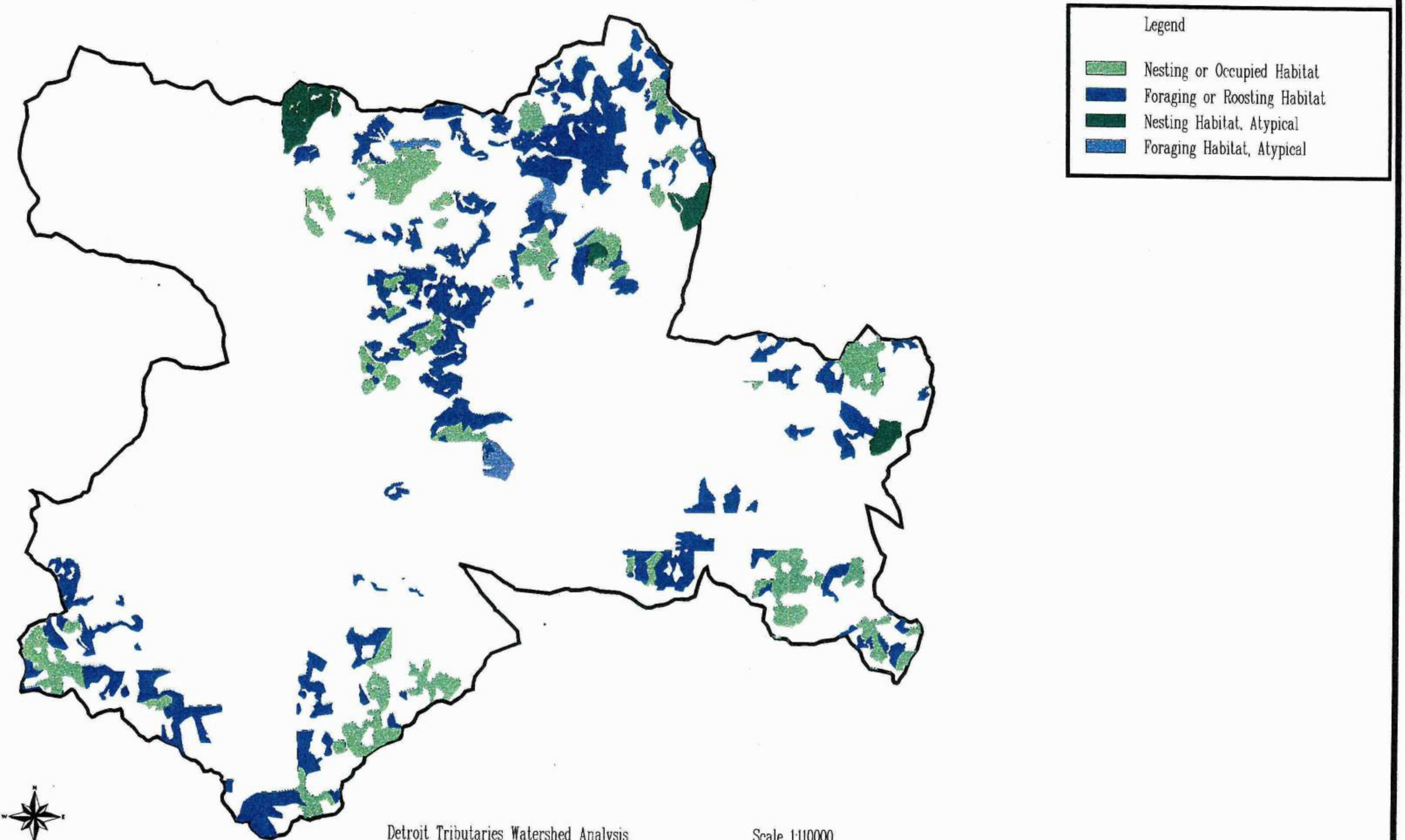
Owl Habitat	Percentage of Watershed Using ISC CRITERIA	Percentage of Watershed using Vegetation Size class
Nesting Habitat	6%*	21% is typed in the 4.5+ category which equates to 20.9" or greater dbh. This size class category includes both foraging and nesting habitat.
Foraging Habitat	9%*	
Dispersal Habitat	41%	41%
Total	56%	62%

* Atypical nesting and foraging habitat were included in the above totals. Atypical habitat is defined as use or presence of spotted owls in habitat that may not meet all the criteria for either foraging or nesting habitat.

Dispersal habitat is 11"dbh or greater with 40% crown closure. There is some overlap with foraging habitat due to the break off points used. So it is inferred that 56% to 62% of the watershed can provide some form of habitat for spotted owls, whether it be nesting, foraging, or dispersal habitat.

Nesting habitat within the watershed is scattered throughout the area in small patches averaging 60 to 100 acres. Nesting habitat is usually associated with foraging habitat within this watershed.

Owl Habitat



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/03/97

MAP III-16 Request #1466

Table III-19: Analysis of Owl Habitat within the Watershed.

AREA	HABITAT PRESENT	NESTING OR FORAGING	COMMENTS
Marten Basin	Large contiguous block remaining	Predominantly foraging	Smaller blocks are fragmented and do not form a connection to large patch or to LSR RO209.
French Creek	Moderate, was largest patch of nesting in watershed	Nesting, with foraging patches	Partially harvested as part of the Horse Byars timber sale
Tumble Creek Headwaters	Moderate	Predominantly foraging	Horse Byars timber sale harvested approx. 30 acres of owl core
Dry Creek	Low	Foraging	Provides continous canopy for dispersal and marginal foraging
Log Tom	Low	Both foraging and nesting	Heavily fragmented
Sauers Creek	Low	Foraging with little nesting	Isolated patches surrounded by marginal dispersal habitat
Heater Creek	Low	Foraging	Heavily fragmented
Monument Peak	Low	Predominantly foraging	Isolated from FS boundary and subject to increased pressure from surrounding lands

An owl core (100 acres) is located in the remainder of the patch along the 2223 road, however, a corridor to the south has been eliminated due to the implementation of the Horse Byars timber sale. The east side of Halls Ridge near the Tumble Creek headwaters habitat patches are more linear in nature to the presence of special habitats which cause the understory to be very open in places. These patches allow for some semblance of a corridor south but this is stopped due to Detroit Lake.

Recently, alot of harvest has taken place in this area (Flying Fish thinning, Reservoir Visual, and Horse Byars). With the harvest of the last two sales mentioned, dispersal may be hindered where dispersal is already a problem.

Most patches of owl habitat remaining in the Heater Creek area are surrounded by early seral stands. This scenario has created an increase in edge habitat and edge effect may be felt throughout whole stands. There are no known pairs here which may indicate that the remaining patches are not suitable. Dispersal from LSR RO213 is extremely hindered by this landscape. These patches may be suitable for short term dispersal but from here, you run into Detroit Lake which poses a different problem. This piece of land may only serve as dispersal habitat for the long term.

Detroit Lake may pose a difficult problem for dispersing individuals. Dispersing across the lake may subject individuals to increased predation due to the long distances traveled out of cover and potential starvation. Very little adequate habitat exists directly around the lake until you reach the headwaters of most creeks. Most of these areas are already occupied. This may lead to increased competition for resources and space. The City of Detroit and Highway 22 also may pose dispersal problems due to the potential for disturbance.

Lands outside Forest Service boundaries contain mainly dispersal habitat. This area is somewhat fragmented and there are areas where dispersal habitat has not developed yet. These are due to past fire events as well as historic logging. Little is known about the presence of spotted owls or dispersal capabilities on these lands.

Dispersal north to south may be hindered and take extra energy and have increased risk in order to achieve. This is unfortunate due to the presence of two LSR's on either side of the watershed. East to west dispersal may not be adequate in these watersheds. It may be best achieved from the Dry Creek area to French Creek and up that drainage. Many openings will be encountered through this area. Dispersal is also possible through the Tom Log and Sauers Creek areas.

Dry Creek will probably achieve late-successional characteristics in the shortest time frame, 80 to 100 years. Areas around the lake (Tumble Creek and Sauers Creek) may take longer, 100 to 150 years due the quality of habitat currently present. However, in these areas, commercial thinning has occurred and this may facilitate the development of late-successional habitat at a faster rate. Stands which are currently in the stand initiation phase will take the longest to achieve these characteristics, approximately 150 to 200 years.

Table III-20: High Fire Hazard Areas to Treat for Maintenance of Owl Habitat.

AREA	FIRE RISK	COMMENTS	PRIORITY TO TREAT
Marten Basin, Sardine Creek	High	Majority of owl habitat in watershed remains	1
Dry Creek	High	Greatest potential to become owl habitat in near future. Important for dispersal.	2
Halls Ridge	Moderate to High	Limited owl habitat present. Need to maintain	3
Dispersal habitat along Highway 22	Moderate to High	Poor quality habitat now but potential for large fire event to move up Halls Ridge and destroy existing owl habitat.	4
Heater Creek	Moderate	Proximity to LSR	5
Tom Log and Sauers Creek	Moderate to Low	Dispersal capabilities	6

Table III-20 shows that Marten Basin, Sardine, Halls Ridge, and Dry Creek areas are all predominantly high fire hazard with moderate fire danger mixed within. These are the areas where the majority of the owl habitat remains. They retain the largest intact patches of suitable habitat and Dry Creek has the potential to become owl habitat in the near future. This area may also be important for dispersal.

Halls Ridge is also an important area for fuels treatment. It contains more moderate fire risk but owl habitat is very limited in this area and retention of these patches is critical to long term survivability for this area. This then leads to the dispersal habitat along Highway 22 below Halls Ridge. This is poor quality dispersal habitat, however, this is all that exists in the area and there is great potential for a large stand replacing fire to move up Halls Ridge and burn the remaining habitat there.

Heater Creek area would be the next priority to treat due to the proximity of these stands to the LSR. Tom Log and Sauers Creeks have moderate to low fire risk. These should be done only after the above mentioned are treated and due to the lower risk. Monument Peak is an isolated piece of land and it may be difficult to avoid a fire situation if one were to occur on adjacent lands.

Riparian Reserves:

The intent of the National Forest Plan was that spotted owl dispersal between LSR's would occur and be connected primarily through intact riparian reserves and associated stands meeting and exceeding 11-40 conditions. Within the watershed there are several major streams as well as many small tributaries. These are Marten Creek, French Creek, Sardine Creek, Tumble Creek, Dry Creek, Mackey Creek, Tom Creek, Log Creek, Sauers Creek, Heater Creek, and Kinney Creek. Some of these streams are fragmented to some degree along the riparian reserve. However, the majority of streams within this watershed are in the stem exclusion stage. Overall, riparian reserves seem to have little diversity among them and this may hinder dispersal or occupancy by some species. Many of the headwaters of these streams are cut as well. These have been shown to be important for species, such as amphibians and aquatic insects.

Where streams are pre-dominantly in the stem exclusion stage, thinning may be proposed if deemed appropriate to advance creation of needed habitat components within the reserves such as large down wood and snags. Surveys should be conducted in these riparian reserves to locate unique spots and to help determine appropriate measures for treatment. Hardwoods should not be converted to conifers in all locations. This component is necessary for some species such as the white-footed vole and many neotropical migrant songbirds.

Dispersal:

One method of assessing dispersal habitat is to measure habitat by quarter township based on the 50-11-40 Rule. This requires a quarter township to have at least 50% of the habitat at 11" dbh or greater and 40% or greater canopy closure to provide adequate dispersal capabilities.

There are 15 quarter townships within the watershed. Only 3 quarter townships are fully encompassed within the watershed while some part of the remaining 12 fall outside the watershed boundary. There are a few quarter townships that have minimal acres within the watershed (<300 acres). These were analyzed to try and get the full picture. However, only the acres that fall on the Detroit Ranger District were analyzed. Information for areas outside the Detroit Ranger District has not been received and the numbers presented do not reflect the complete picture. Many of these stands have not been re-typed by a silviculturist as of yet and canopy closures are unknown for much of the watershed. However, percentages will include those stands that are still questionable but meet 11-40 conditions in all other aspects. The quarter townships in question are 09051, 09054, 10051, 10064, and 11054. 09041 will not be analyzed. This quarter township is entirely LSR and is not eligible for analysis under 11-40.

The following is a break out of the condition of the quarter townships *(see Map III-17)*. See ***Table III-21*** for a more complete analysis.

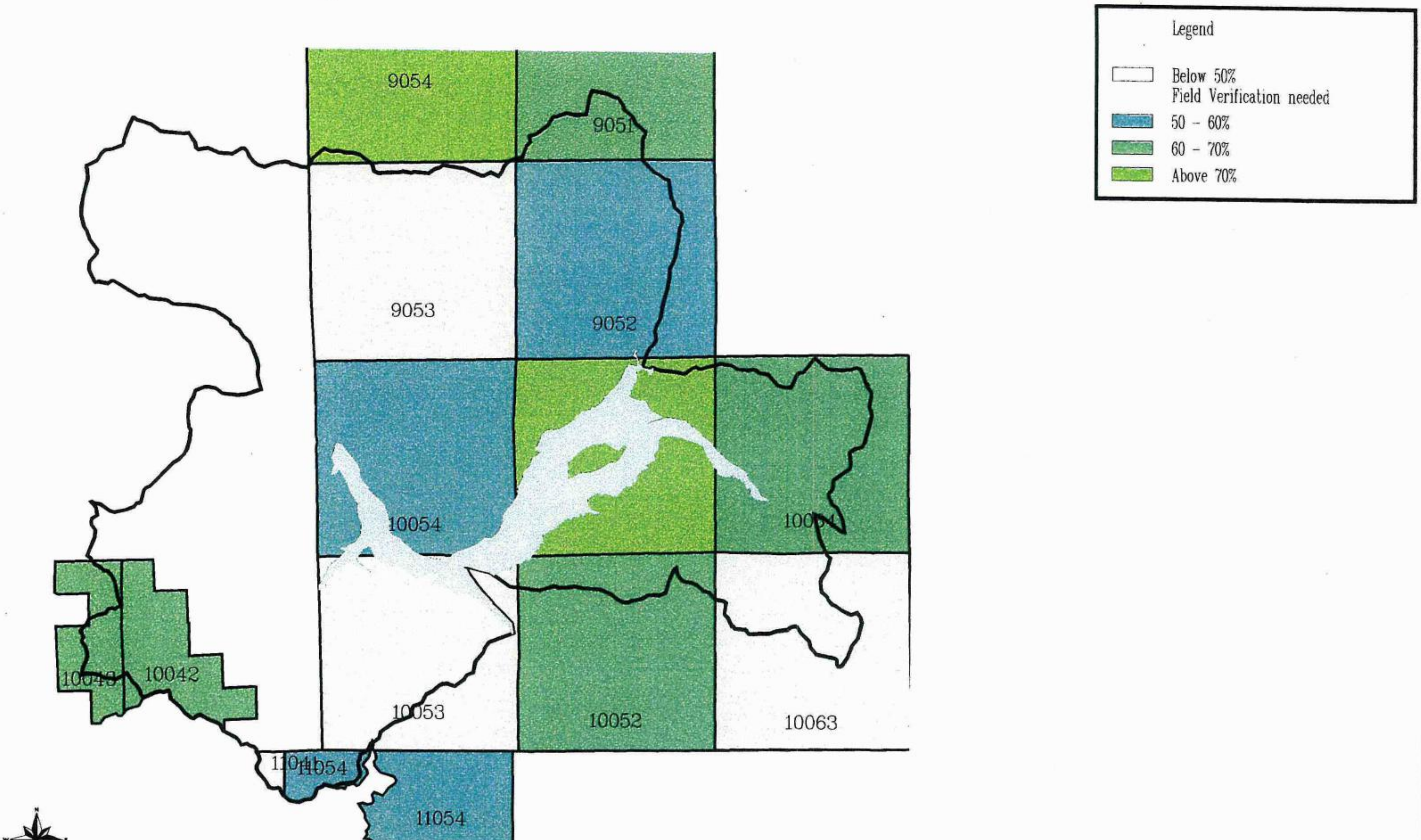
Above 70%	- 2 QT's
60 - 70%	- 5 QT's
50 - 60%	- 3 QT's
Below 50%	- 4 QT's

There are four quarter townships that are currently below 50%, 09053, 10053, 10063, and 11041. Additional field checking will be done during project level analysis to determine Riparian reserves within this quarter township show dispersal habitat being good to moderate in the majority of the watershed. Where this is not the case, it may be 40 to 50 years before dispersal habitat is attained. Active management of this area should be a priority to facilitate growth in order to provide adequate dispersal habitat for the future.

The two quarter townships that are above 70% may give a false impression. These are 09054 and 10051. Only 82 acres of this quarter township have been analyzed for this watershed. The remaining acres lie within LSR and are not counted in the 11-40 analysis. The Anchovy timber sale also lies within this area and may not have been accounted for during analysis due to the sale not being closed yet. This analysis will not give the true picture of the entire quarter township, only those 82 acres. Over two-thirds (approximately 3000 acres) of quarter township 10051 are Detroit Lake or private land (e.g. City of Detroit). This quarter township also encompasses the Ranger station and the many campgrounds along the lake. Dispersal may be extremely hampered in this quarter township due to the lake and the City of Detroit, but the analysis shows differently.

Quarter township 10052 is similar to 10051 in that approximately 2000 acres of private lands are interspersed within this area. Private lands are considered non-dispersal due to the frequent harvest regime. It is imperative that we maintain adequate dispersal habitat within this area to facilitate movement into and back from the Dry Creek area. This may be used as a dispersal corridor from LSR R0213 to avoid Detroit Lake.

Eleven Forty Conditions



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:165000
10/08/97

MAP III-17

Request #1539

Quarter townships 11041 and 11054 contain minimal acres within the watershed (136 acres and 456 acres respectively). It may not be advantageous to analyze these acreages due to the lack of information in the remaining area of the quarter township. 10042 and 10043 are pre-dominantly surrounded by private lands and it may be difficult to maintain adequate dispersal habitat in this area.

Table III-21: Percent of 11-40 by Quarter Township.

Quarter Township	Percent of 11-40 by Quarter Township.
09041	**All LSR**
09051	**62.7%**
09052	**57.8%**
09053	**42.5%**
09054	**88.5%**
10042	**61.3%**
10043	**61.4%**
10051	**88.7%**
10052	**68.7%**
10053	**46%**
10054	**53.6%**
10063	**49.2%**
10064	**67.4%**
11041	**49.3%**
11054	**52.4%**

* These stands have an average diameter of 11" dbh and are at an age that should have a canopy closure of 40%. Some areas need to be field checked for canopy closure and this will be done during project level analysis.

SANTIAM PASS AREA OF CONCERN (AOC):

The western edge of the Santiam Pass Area of Concern is located in part of the watershed and covers portions of quarter townships 10064, 10063, 10052, and 10051. This area was identified by U.S. Fish and Wildlife Service because of a concern for limiting intra-provincial movement and owl distributions. It was also noted that population levels are low within this area and that habitat quality and quantity are greatly reduced. Three of the four quarter townships are above 50% at this time. Only 10063 is below 50%. However, there is a need to maintain at least 50% habitat on the remaining quarter townships to facilitate dispersal through this area over time. Harvest within quarter township 10063 may only consist of commercial thinnings or harvest within areas that consist of stands not meeting 40% canopy closure. Commercial thinning may enhance existing habitat or improve habitat that does not contain dispersal habitat components yet. The Santiam Pass AOC does not encompass any of the deficit quarter townshps within this watershed except one. This may further add to dispersal problems in the future.

iii-31. What is the condition of the riparian reserves in the watershed in terms of spotted owl dispersal habitat and the distribution of those conditions? What is the condition of the riparian reserves in the watershed in terms of spotted owl dispersal habitat and the distribution of those conditions?

Dispersal habitat and connectivity are issues that are mentioned in the ROD. 50-11-40 is one method to calculate the amount of dispersal habitat available. However, this is not the only measure in which dispersal and connectivity were to be accounted for. Riparian reserves are areas where riparian dependent resources receive primary emphasis. However, there are other objectives set forth that encompass both the dispersal and connectivity issues. Riparian reserves are used to maintain and restore riparian structures and functions of intermittent streams, confer benefits to riparian dependent and associated species other than fish, enhance habitat conservation for organisms that are dependent on the transition zone between upslope and riparian areas, improve travel and dispersal corridors for many terrestrial animals and plants, and provide for greater connectivity of the watershed. The riparian reserves will also serve as connectivity corridors among Late-Successional Reserves.

Riparian reserves were analyzed using the 50-11-40 Rule to determine the amount of dispersal habitat available across the watershed and to determine if there are any problems areas for connectivity. ***Table III-22*** shows the quarter township, capable acres within riparian reserves, acres that do meet 11-40 conditions and the overall percentage of stands that do meet 11-40 within riparian reserves.

Table III-22: 11-40 Conditions within Riparian Reserves and a comparison of 11-40 percentages between the entire QT and the riparian reserve component.

Quarter Township	Capable Acres Within Riparian Reserves	Acres Meeting 11-40 Conditions-(1),(2)	% 11-40 in Riparian Reserves by Quarter Township (1),(2)	% 11-40 by Quarter Township (1),(3)
09041	All LSR	0	0	All LSR
09051	270	182	67.4	62.7%
09052	1161	694	59.7	57.8%
09053	1241	623	50.2	42.5%
09054	15	15	100	88.5%
10042	710	201	28.3	61.3%
10043	106	101	95.2	61.4%
10051	816	710	87.0	88.7%
10052	162	106	65.4	68.7%
10053	452	211	46.6	46%
10054	902	433	48.0	53.6%
10063	250	117	46.8	49.2%
10064	606	502	82.8	67.4%
11041	50	21	42.0	49.3%
10054	146	78	53.4	52.4%

(1) These stands have an average diameter of 11" dbh and are at an age that should have a canopy closure of 40%. Some areas need to be field checked for canopy closure and this will be done during project level analysis.
(2) These numbers need to be updated based on the latest 11/40 analysis, (3) These numbers are from the latest 11/40 analysis

Overall, if you look at the probable acres meeting 11-40, riparian reserves within the watershed are adequate. Out of the 14 quarter townships that were analyzed (09041 is all LSR), five do not meet the 50% guideline used for dispersal needs. These are 10042, 10053, 10054, 10063, and 11041. 09053 and 10054 are near this threshold.

10042 is below 50-11-40. Much of this occurs in the Kinney Creek headwaters which are heavily fragmented. 10053 lies in the Heater Creek area. This area is also heavily fragmented by past timber harvest activities. 10054 lies above Detroit Lake and riparian reserves may not have recovered from past fire events. Only minimal acres were analyzed in 11041 (50 acres). This does not give an accurate account of the whole quarter township. Stand enhancement for stands not currently meeting 11-40 conditions should be a priority.

Riparian reserves are generally slightly higher than the quarter township overall. 09054, 10043 and 10064 have riparian reserves that are significantly higher than the quarter township overall. There is a need to maintain these are due to the majority of the overstory may be present in these reserves.

Owl Habitat Connectivity:

Distance between LSR's: This watershed lies between LSR RO213S to the southwest and RO209S to the west. LSR RO213S and RO214S are 5.75 miles apart at the closest points. This occurs at the southern end of RO214S which lies within the Upper North Santiam watershed. LSR RO214S and RO209S are 9.5 miles apart at the closest points. However, these LSR's average approximately 7-10 miles apart through most of their length. ***Table III-23*** shows distances between LSR's and probable dispersal route distances.

Table III-23: Dispersal Distances from LSR RO214S to Surrounding LSR's.

LSR #	SIZE (AC)	Straight Line Distance (Mi) 1	Probable Dispersal Route Distance 2
RO213S	84,198 Acres	5.75 Miles	6.5 Miles
RO209S	60,570 Acres	9.50 Miles	10-10-5 miles

1 = The average distance between all LSR's in the Western Cascades Province is 6.42 miles.

2 = Probable dispersal route connects LSR RO214S and the next LSR with a line, avoiding physical barriers, such as reservoirs, large open areas, non-forested mountain peaks, and other non-dispersal habitats.

The distance between RO213 and RO209 is approximately 7.5 miles from the nearest points. This includes travelling across Detroit Lake. The most probable dispersal distance route is approximately 11 to 12 miles. This entails dispersing down French Creek into the Dry Creek area and then dispersing along Tom Creek into the Sauers Creek area to RO213.

There are 13 known spotted owl pairs and resident singles within the Detroit Tribs analysis area. Two known activity centers lie within Critical Habitat Unit OR-13, one within OR-14, and none within OR-12. A portion of all three Critical Habitat Units (CHU) lie within the watershed (***Table III-24***).

Table III-24. **:** CHU Information.

CHU	SHARED WITH	INCORPORATES	PURPOSE OF DESIGNATION
OR-12	Mt.Hood National Forest	LSR RO209	Maintain and provide nesting, roosting, and foraging habitat. Maintain range-wide distribution of suitable nesting habitat, aids in maintaining strong north-south distribution.
OR-13	Mt. Hood National Forest	LSR RO214, Santiam Pass Area of Concern (AOC)	Maintain nesting, roosting, and foraging habitat along AOC, provide dispersal habitat, maintain current suitable owl habitat.
OR-14	Salem District, BLM	Santiam Pass Area of Concern	Provide nesting, roosting, and foraging habitat, maintain existing habitat and owl pairs in northern part of AOC.

An additional six pairs/resident singles lie outside the watershed but have part of their home range overlapping inside the watershed boundaries. See ***Table III-26*** for these pairs.

Table III-25 depicts known spotted owl pairs and resident singles present in the watershed, their reproductive history, habitat remaining within their home ranges, connectivity within their home range, and their "Take" situation. An owl is in a "take" situation when there is less than 1182 acres of suitable habitat within 1.2 miles of the activity center. This table may aid in guiding future timber harvest and other activities to areas that are less critical to retain.

Table III-25: Spotted Owl Pairs Reproductive History, Take Situation, and Habitat within each Home Radius.

OWL PAIR	CIRCLE NO	REPRO HISTORY	% HABITAT REMAIN.*	CONNECT. WITHIN HOME RADIUS	TAKE .7 miles or 1.2 miles from activity center
French Creek	7	Low	21.50%	Moderate	Both
Dry	18	Low	12.80%	Good	Both
Marten	50	Low	35.80%	Poor	Both
Canyon Creek	51	Low	10.60%	Poor	Both
Whitman	56	Low	20.90%	Moderate	Both
Rainbow	58	Low	28.40%	Poor	Both
Tom	64	Low	15.00%	Moderate	Both
Reservoir Visual	73	Low	10.30%	Moderate	Both
Dry Creek	93	Low	37.50%	Good	Both
West French	94	Low	27.30%	Poor	Both
Kinney Creek	99	Low	19.10%	Moderate	Both
Anchovy	100	Low	10.60	Poor	Both
Sauer	105	Low	12.10	Poor	Both

* - The percentage of habitat remaining within each known home range was analyzed in 1995 and has not been updated to reflect changes since then.

Table III-26: Spotted Owl Pairs/Resident Singles Outside Watershed With Home Ranges Overlapping into Watershed.

Owl Pair	Circle No#	Repro History	% Habitat Remaining*	Take .7 or 1.2
Wind Creek	8	Low	23.5	Both
Lower Kay	39	Low	35.1	Both
Kay/Kapers	87	Low	31.3	Both
Geibler	102	Low	30.8	1.2
Heater	110	Low	52.9	None
Blowout Cliff	114	Low	11.2	Both

* - The percentage of habitat remaining within each known home range was analyzed in 1995 and has not been updated to reflect changes that have occurred

As you read ***Table III-25*** and ***Table III-26***, you can start to paint a picture of each pair or resident single's existence. Some pairs are in moderate shape while others are either lacking sufficient habitat or have not been reproductively successful when monitored. These elements can aid in placing harvest activities. Extra effort can be made to help retain successful pairs and focus our activities in areas where pairs are not as successful or have little habitat remaining. Those pairs/resident singles which have a poor reproductive history (to our knowledge), have little habitat remaining, and have poor connectivity within their home range should be "taken" first. Pairs/resident singles which have a good or moderate reproductive history, sufficient habitat remaining, and good connectivity within their home range should be avoided or activities should be reduced in these areas.

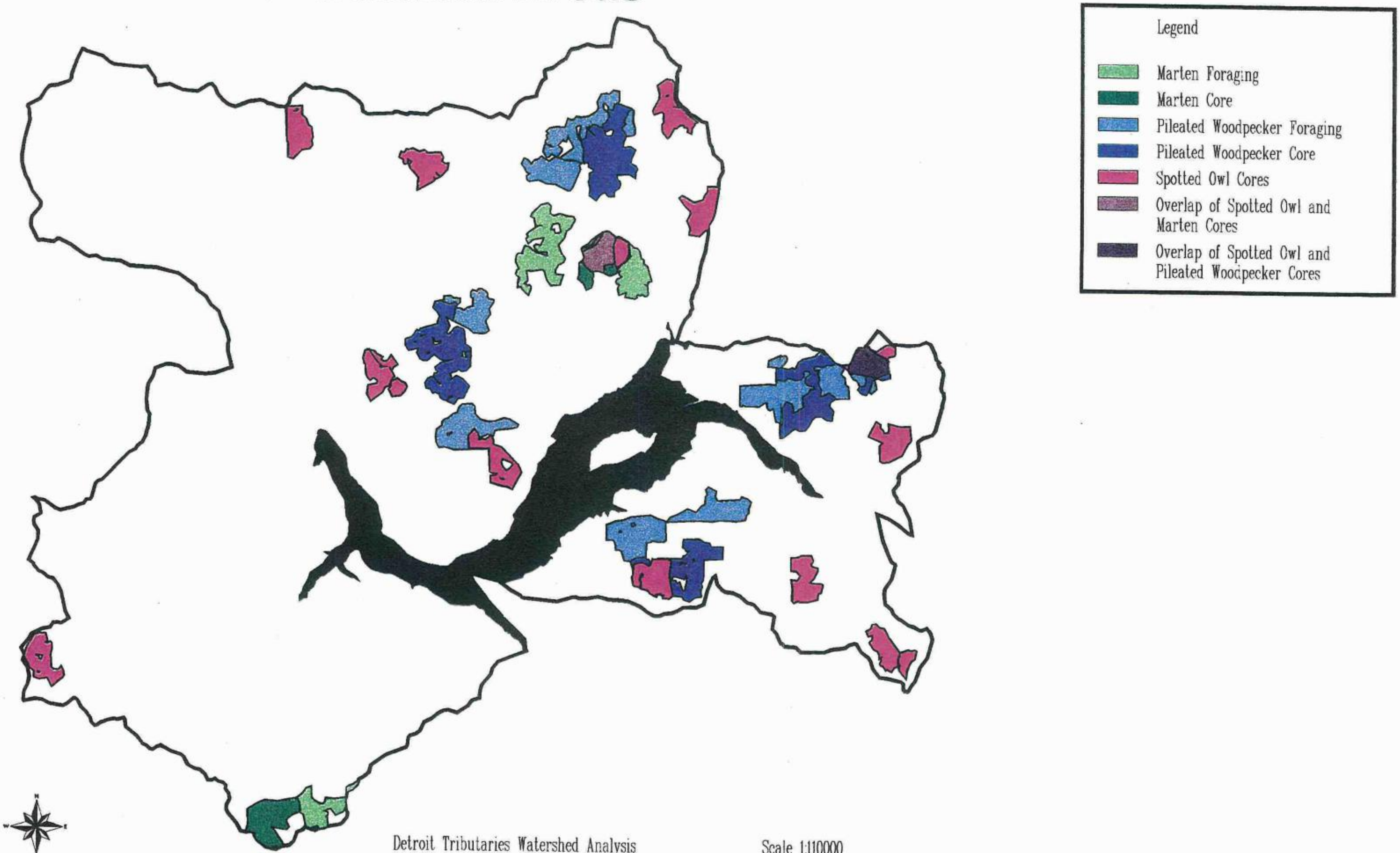
An analysis was performed using 4 screens to determine pairs/resident singles to "take" first. Screen 1 looked at the amount of habitat remaining within the home range and ranked them from the least amount to the most. Screen 2 addressed the reproductive history while Screen 3 ranked each one according to the connectivity within the home range. And Screen 4 looked at connectivity outside the home range. This analysis was only done on those pairs that lie within the watershed boundary. However, when planning activities, pairs outside the watershed boundary should also be analyzed.

Table III-27 outlines the order in which known pairs/resident singles should be taken based upon the screening process.

Table III-27:

Habitat Conditions	Owl Pair	Priority for the placement of management activities. These activities may result in "take".
Has the least habitat within its home range and the poorest reproductive history	Marten	1
▼	Sauer	2
	Whitman	3
▼	Anchovy	4
	Canyon	5
▼	West French	6
	Dry	7
▼	Rainbow	8
	Reservoir Visual	9
▼	Tom	10
	Kinney	11
▼	French Creek	12
Has the most habitat within its home range and best reproductive history	Dry Creek	13

Pileated and Marten Areas



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/03/97

MAP III-18

Request #1467

Pileated woodpecker and marten habitat areas and owl dispersal habitat: Mapped pileated woodpecker and marten habitat areas can also contribute to owl dispersal habitat (***Map III-18***). These were mapped across the forest on a grid to provide connectivity for these two indicator species. The ROD directs us to analyze these areas and determine if they are still needed. A screen developed by the Willamette National Forest was used to determine if the pileated woodpecker and marten areas within the Detroit Tributary watersheds are still needed to retain connectivity. A second screen developed by the wildlife biologist on the Oakridge Ranger District was used to further look at specific components of an area in order to allow a decision to be made. These screens allow for consistency forest-wide.

Six pileated woodpecker and marten areas lie within the Detroit Tributary watersheds. There is a need to retain four of these areas for connectivity. ***Table III-28*** outlines the name of the geographical area in which they lie, the location, and the decision to keep or drop them.

Table III-28: **Pileated woodpecker and marten habitat areas.**

NAME	LEGAL LOCATION	KEEP/DROP
Marten Basin	T.9S., R.5E., Sec. 22,23	Keep - 11-40
French Creek	T.9S., R.5E., Sec. 27,34,35	Keep - 11-40
Tumble	T.9S., R.5E., Sec. 33 T.10S., R.5E., Sec. 4, 5, 9	Keep - 11-40
Dry Creek	T.10S., R.6E., Sec. 6,7	Drop
Sauer	T.10S., R.5E., Sec. 13,14,23,24	Drop
Slate Creek	T.11S., R.5E., Sec. 6	Keep - connectivity

Marten Basin, French Creek, Slate Creek, and Tumble areas should be maintained for the short term until reserve allocations or surrounding areas recover to address connectivity issues for the area. 11-40 conditions should meet the 50% minimum requirement before they are dropped also. When conditions improve, they may be dropped.

Red Tree Vole

The red tree vole is a microtine rodent that feeds primarily on Douglas fir needles. It is restricted to forests west of the Cascades in Oregon. The vole is one of the prey species for the spotted owl as well as other owls, martens, and fishers. It is nocturnal and may spend its entire life in the canopy of trees. The red tree vole is commonly found in Douglas fir stands. It will occur in all structural stages but tends to be more abundant in mature and old growth stands. Old growth stands provide optimum habitat because they function as a climatic buffer and their high water holding capacity provides maximum food availability and free water. Fragmentation of habitat is a concern for this species.

The red tree vole is a survey and manage - Category 2 species as outlined in the ROD which directs us to survey prior to initiating activities and manage sites accordingly. The Mammal Subgroup of the Species Analysis Team was charged with developing a protocol via ROD direction for conducting surveys for red tree voles. The REO released revised protocols/screens as interim guidance for the red tree vole surveys and management in October of 1996. A screen was developed to determine if surveys were needed based on the amount of land in federal ownership within a fifth field watershed (each needs 10% to go to the next step) and the percentage of lands that meet the criteria for potential habitat.

The protocol defines potential habitat as stands below the 4,300 foot level, approximately 60% crown closure or greater, and approximately 10" or greater dbh trees. If the fifth field watershed has more than 40% potential habitat and this habitat is likely to be maintained through the end of the decade, surveys are not needed. Detroit Tributary watersheds encompasses portions of two fifth field watersheds, 03 North Santiam, downstream and 78 North Santiam, Blowout. These two fifth fields were analyzed to determine the amount of suitable habitat remaining. 03 North Santiam, downstream has 59% remaining while 78 North Santiam, Blowout has 57%. These percentages represent only those acres which are federally owned and managed by the Detroit Ranger District (Red Tree Vole Analysis WNF Nov 1996)

Big Game:

iii-32: What is the condition of big game habitat relative to land management planning standards and guidelines for habitat effectiveness? Does the current big game network meet standards and guidelines of the NW Forest Plan?

The Detroit Tributary watersheds is comprised of eight Management Emphasis Areas (MEA's) for big game (Heater, Log Tom, Slide, French, Dry, Tumble, Kinney, and Elkhorn) (***Map III-19***). Management objectives have been assigned to each MEA. These consist of one to several subwatersheds and range from 1,000 to 15,000 acres in size. Each emphasis area has been assigned a rating of high, moderate, or low. Standards and guidelines, developed in cooperation with Oregon Department of Fish and Wildlife, have been developed to ensure habitat is maintained or enhanced for big game.

Big game habitat analysis was performed through a combination of aerial photo interpretations and computer modeling. Computer modeling was accomplished using "A Model to Evaluate Elk Habitat in Western Oregon", also known as the "Wisdom Model" which evaluates the combination of several variables (forage and cover quality, road density, and size and spacing) to determine overall habitat effectiveness (HE) for elk management emphasis areas. Values for each variable and overall habitat effectiveness range from 0 to 1 with 1 being the highest effectiveness value.

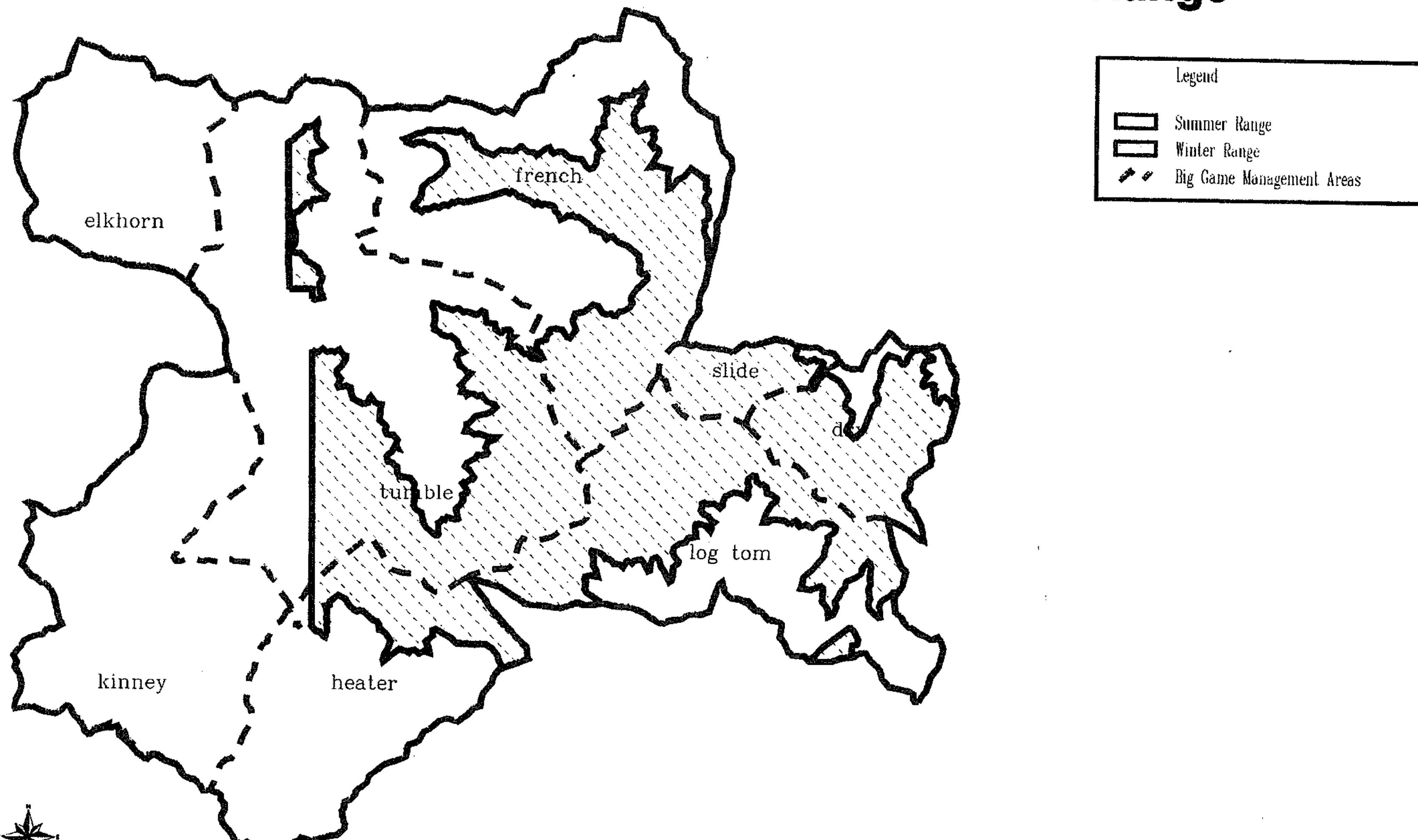
Differing HE values have been established for the eight MEA's in the Detroit Tributary watersheds. ***(Table III-29)*** Seven out of the eight MEA's contain winter range. Kinney is the only MEA not containing any winter range. MEA's contain both summer and winter range. However, there are different guidelines to follow for each. Winter range is managed as high emphasis which requires each variable to range from 0.5 to 1.0. Most of the MEA's within this watershed are managed at moderate emphasis. Moderate emphasis requires each variable to range from 0.4 to 1.0 with an overall habitat effectiveness value (HEI) to be maintained at 0.5 to 1.0. However, there are three MEA's that are managed at low emphasis in this watershed, Heater, Kinney, and Tumble. Low emphasis requires each variable to range from 0.2 to 1.0.

Table III-29: Represents the overall HE values for required standards and the current situation for both winter range and the MEA overall. *WR = winter range, SR = summer range

Elk Mgmt. Emphasis Area	Viability Range (HE Standard) *			Obj. Overall HE Value **	Current Overall HE Value
	High	Moderate	Low		
Heater: WR			0.2-1.0	0.60	0.30
SR				0.20	0.45
Log Tom: WR		0.4-1.0		0.60	0.31
SR				0.50	0.37
Slide: WR		0.4-1.0		0.60	0.44
SR				0.50	0.50
French: WR		0.4-1.0		0.60	0.32
SR				0.50	0.41
Dry: WR		0.4-1.0		0.60	0.44
SR				0.50	0.46
Tumble: WR			0.2-1.0	0.60	0.39
SR				0.20	0.45
Kinney: WR			0.2-1.0		
SR				0.20	0.57
Elkhorn: WR (outside FS)		0.4-1.0		0.60	0.35
SR				0.50	0.51
Heater: WR (outside FS)		N/A		N/A	
SR				N/A	0.44
Kinney: WR (outside FS)		N/A		N/A	
SR				N/A	0.55
Tumble: WR (outside FS)		N/A			0.43
SR					

*Habitat Effectiveness values relating to habitat condition. Range of HE values required to meet standards and guidelines detailed in the Willamette National Forest Land Management Plan, August, 1990.
1.0 = Optimal, 0.6 - 0.9 = Highly Viable, 0.4 - 0.5 = Viable, 0.2 - 0.3 = Marginal, 0.05 - 0.1 = Possible Non-viable

Elk Emphasis Areas with Summer and Winter Range



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/03/97

MAP III-19

HeS = size and spacing, HeR= roads, HeC = cover, HeF = forage, and HEI = Habitat Effectiveness Index.

Several trends are showing up from this analysis.

- Forage is limiting in all but two MEA's, Slide and Heater, even when the MEA is meeting Standards and Guidelines (S&G's). This means that even though the forage variable is above standard and guideline requirements, it is the variable with the lowest value. Clearcuts may not have recovered as of yet and may be providing needed forage although the model does not reflect this. But because these areas are of a certain age, they may be counted towards hiding cover, rather than forage. Due to the lack of forage in the watershed, special habitats may be over-utilized. However, special habitats are not plentiful, especially meadows within this analysis area. Shrubs and alders are the most plentiful and these areas would be affected the most. These areas should be monitored to determine if big game are having a negative affect on them.

  The Wisdom Model is being reassessed to incorporate additional treatments which may benefit forage creation and reassess values given to each treatment so the model may more accurately reflect what is on the ground. This will be an interagency project shared with Oregon Department of Fish and Wildlife. Elk populations are limited in some areas due to steep terrain and may not pose a problem. However, in areas such as Kinney Creek, elk populations are high and special habitats may be utilized heavier than realized.

- Roads are also below S&G's in three MEA's (Slide, Log Tom, and Heater). Only the Tumble MEA is meeting S&G's for the roads variable but all are below the requirements for cover and the Habitat Effectiveness Index (HEI).

MEA's:

Slide MEA: Only a small portion of this MEA is included within this analysis area. This portion is characterized as poor to moderate habitat for big game. The town of Detroit is included in this MEA but is avoided by big game except areas such as Detroit Flats in the winter when Detroit Lake is lowered. The town of Detroit is located on the flat while the remaining MEA is relatively steep.

Road densities are high within this area and thus are not meeting S&G's. This results in the HEI being at minimum levels. However, this may not be avoidable because the only roads occurring in this area are related to the town of Detroit and the 46 Road. These are unlikely to be closed so construction of new roads would be an issue if we are to still meet S&G's.

Roads are not meeting S&G's within winter range as well. Cover, forage and HEI are also below S&G's with forage being the most limited. Higher values are given to managed stands that have been burned, seeded and fertilized. However, none of the managed stands within winter range have had these treatments. These areas were only burned, thus resulting in a lower value being given for forage.

Log Tom MEA: This MEA ranges from poor to excellent habitat for big game. Both deer and elk are present in moderate numbers. The area is characterized by steep mid-slopes with gentle terrain in the lower elevations and near the ridgetops. The Log Tom MEA is especially true around the Hoover/Southshore campground areas and Beard saddle. This MEA is below S&G's for roads, cover, forage and the overall HEI. Again, most of the managed stands fall into the lower valued category for forage. Hiding cover represents over 58% of the area.

Roads, cover, forage, and HEI are in violation of S&G's for winter range. Roads existing in winter range consist primarily of the 10 and 1003 roads with very few spurs. These two roads are main arterials and are unlikely to be closed. Most of the forage available exists in commercial thinning units which is lower quality than burned, seeded, and fertilized units.

Heater MEA: This MEA is rated as low emphasis and is characterized as poor habitat for big game due to steep terrain. There are specific areas that provide moderate habitat for big game, especially portions of T.10S., R.5E., Sections 20, 28, and 29. The Cumley planning subdrainage is used heavily due to gentler terrain, hardwood patches, and wet areas that provide potential wallow areas. This MEA meets S&G's for all variables. However, there is very little optimal and thermal cover available (26% of the area together). Forage values are still low, however this may not be a problem due to the limited use by big game.

Winter range within the Heater MEA consists primarily of private and Corps lands. This area is almost entirely encompassed by the Bald Eagle Management Area (BEMA) which has specific standards and guidelines to follow and may conflict with big game objectives. This MEA is not meeting S&G's in the roads, cover, forage, and HEI variables. Forage is very low, however there is a new clearcut on private lands which may not be factored into the Model. Most miles of road are found in the 2212 road which again, is a main road and is unlikely to be closed. Cover may increase in time on Federal lands due to the BEMA objectives. This area is unlikely to change in the near future due to ownership patterns found here.

French MEA: Important areas for big game in this MEA seem to be focused in the stream bottoms near French Creek and the flats near the 2223-2207 junctions and the 2223-501 spur. Forage is extremely limited and in violation of S&G's which then brings the Habitat Effectiveness Index under S&G's. Most of the forage is in the lesser category and recently there has been a lot of commercial thinning and shelterwood harvest. This also results in a lower forage value. There is a good mix of optimal, thermal and hiding cover present. However, most of the management has occurred on the gentler terrain leaving steeper areas unharvested which may be under-utilized by big game for cover.

Winter range has been managed heavily or natural events have taken place which have resulted in roads, cover, forage, and HEI in violation of S&G's. Use within this MEA is stratified with deer utilizing the area between Tumble and French Creeks and elk utilizing the French Creek stream bottoms more. Less than 1% of winter range is in a forage condition and over 9% of the area is talus suggesting this area is undesirable for big game. Hiding cover also covers half the available cover acres leaving little optimal and thermal cover.

Dry MEA: This MEA is characterized as having moderate to good habitat for big game. Most of the MEA is winter range which is important to big game in the area. This area is steep but gradual terrain exists that makes it desireable. Again, forage and HEI are in violation of S&G's and the roads variable is at minimum levels. Several spurs exist that could be decommissioned which may improve the value for roads. Most of the forage is located in the lower valued category and approximately 19% has been commercial thinned or has had a shelterwood harvest. This is also a lower quality forage value. This MEA is predominantly thermal cover rather than hiding cover as seen in many of the other MEA's.

Very little forage exists within winter range which results in forage being in violation of S&G's. Roads and HEI are also below S&G's. 22% exists in commercial thinning however, much of this has grown in and is not providing adequate forage at the present time. This area is predominantly thermal cover and though there is not ample forage available, this is an important area for big game and receives moderate to heavy use.

Tumble MEA: This area provides poor to moderate habitat for big game. The area in and around Sardine Creek provides moderate habitat for a resident herd that moves from the French MEA to the Tumble MEA to Elkhorn MEA and back. This area is steep and heavily managed. Forage is below S&G's and talus represents about 15% of the MEA thus not providing adequate habitat conditions for big game. This is a very steep area and most of the ridges and flats have either been harvested or are not regenerated from previous events. Hiding cover is abundant with optimal cover existing in scattered patches. Thermal cover is lacking though.

Most of the winter range area probably goes unused due to the steep terrain and poor quality habitat. Cover, forage, and HEI are below S&G's with forage being very limited. The upper reaches of winter range are probably used more by the Sardine herd. However, now with the implementation of the Anchovy timber sale, much of the remaining optimal cover is being harvested. About half of the area consists of thermal cover, mainly along Highway 22. However, this thermal cover is of a poorer quality than other areas and gets little use by elk but is used some by deer.

Kinney MEA: This MEA is managed as low emphasis, however this area may be more important to big game than other MEA's. It provides moderate to good habitat with moderately isolated areas and a good mix of habitats. This area is also adjacent to a heavily used winter range area. Due to the low emphasis designation, no violations exist. Forage is still the lowest variable present. Optimal and thermal cover are present in adequate amounts.

Big Game Habitat and the Northwest Forest Plan: The Detroit Tributary watersheds contain several different land allocations but two main ones exist via the Northwest Forest Plan (matrix and riparian reserve). These land allocations require that different objectives be met over the landscape.

Some winter range lies within riparian reserves. Cover will continue to increase in quality and quantity but forage may decrease. Big game, along with many early seral associated species, will likely encounter population reductions under current guidelines until natural events or management activities create new habitat conditions.

The remainder of land lies primarily in matrix. Here the converse may be true. Cover will likely decrease while forage increases. Roads may decrease due to lack of funding for road maintenance. Many short spur roads will be targeted for decommissioning which will lesson disturbance. Carrying capacity may decrease somewhat overtime due to the limited amount of cover in matrix or the quality of habitat that is present. Hiding cover may be converted to forage overtime or may be enhanced to attain thermal cover in a shorter time period.

Habitat within the BEMA will vary. Cover will likely increase in both quantity and quality due to management direction for the BEMA. However, forage may decrease in this area. Along Highway 22, this may be beneficial to reduce the occurrence of potential road-killed animals.

Trends: Populations fluctuate over time, species come and go as the habitats they depend on change through succession, catastrophic events or land management practices. Change is an inevitable and necessary attribute of biological systems. Some species which occur in the watershed have well documented trends in population declines over part or all of their range. Bats, amphibians, neotropical migrant birds, many cavity dependent species and fur bearers are or have been represented in the watershed and all have seen a general decline in numbers and distribution through their range. However, population declines may be due to more than just the watershed. Outside conditions also play a role. Widespread use of DDT and deforestation in Central and South American countries continues to effect many neotropical migrant birds in addition to habitat impacts of the breeding habitat here in this watershed. Habitat loss throughout their range and loss of specific habitat components are beginning to show declines in many of these species.

The processes which shape the current forest landscape within the watershed also affect the species composition and abundance. Species which utilize a wide range of habitat types and seral stages such as the Roosevelt Elk or the American crow are more likely to maintain relatively stable populations over time than a specific habitat dependent species such as the northern spotted owl which may find itself homeless over large parts of its range due to catastrophic fires or continued harvest of old growth forests.

Now, mosaic, contrast, and patch species are favored such as the barred owl, great horned owl, and goshawk. Interior habitat is declining and edge habitat is increasing. We may be inadvertently increasing predator numbers, thus skewing populations. Connectivity may also be reduced with fragmentation of large patches of habitat into smaller patches due to harvest activities. Mid seral species also seem to favored more now such as the flying squirrel and hermit warbler due to harvest rotations. This may also be due to fire suppression efforts where frequent fires occurred.

iii-33. Which special habitats, described in the vegetation section, are important to terrestrial wildlife species? What and where are the unique special habitats in the watershed?

Special habitats represent 14% of these watersheds' acres. The majority of these special habitats are comprised of Detroit Lake. ***Table III-31*** depicts the different types of special habitats and the number of acres found in the watershed.

Table III-31: Special habitats and distribution throughout watershed.

SPECIAL HABITAT	ACRES	% IN WATERSHED
Alder	104	<1%
Cinder /Rock/Talus	1260	3%
Dry Meadows	32	<1%
Moist to Wet Meadows	0	0
Moist Meadows	78	<1%
Shrub	238	<1%
Water	3312	10%
Wet Meadows	2	<1%

The above table depicts only those special habitats that were mapped to date. This probably depicts an under-representation of habitats available within the watershed.

Water represents the largest component of the special habitats within the watershed. However, most of this is contained in Detroit Lake which may not serve as habitat the entire year. During the summer months, the lake is heavily used by recreationists and in the winter months, the lake is lowered for flood control.

Cinder/rock/talus is the second largest special habitat component in the watershed. Species dependent on this special habitat are primarily the yellow-bellied marmot and pika. Other species do use this habitat type but are not totally dependent on it. Certain species of amphibians and reptiles can also be found in talus areas.

Shrub is the third largest special habitat component in the watershed. However, it is limited. This habitat type provides habitat for a number of bird species and small mammals as well as some amphibians. Most of this component is associated with riparian reserves. It also provides a food supply for species like black bear and elk.

Moist and wet meadows comprise less than 1% of the watershed. Species like the sandhill crane and the spotted frog are dependent on this habitat type. Neotropical migrant songbirds also use this habitat type for hiding, nesting and foraging habitat.

Five species of concern are dependent on special habitats. Habitat for all but one of these occurs in the watershed. Pine habitat is absent and may limit the presence of white-headed woodpeckers.

Monument Peak has the highest concentrations of special habitats within the watershed. Rock/talus is the primary special habitat present but shrubs and alder areas also occur in higher percentages than other areas. A few wet and moist meadows and two small ponds are located in this vicinity as well. This area should be able to provide habitat for a host of species.

The Tumble Lake area is also a concentration for special habitats. Again, rock/talus is the primaryspecial habitat present but shrubs and a large dry meadow exist in this area. Tumble Lake can also be classified as a special habitat and this area should offer a slightly different habitat scheme for species occupation.

Along the perimeter of Marten Basin, you will find a large concentration of rock/talus areas. However, some shrub patches and small dry meadows can also be found. Special habitats in this area may aid in dispersal in and out of the watershed.

The Dry Creek and Heater Creek areas are virtually devoid of special habitats. A few rock/talus areas can be found in these areas but presence of special habitats are limited.

Connectivity of special habitats also limited in most of the watershed. However, from Marten Basin to Tumble lake down Tumble Creek, connectivity can be rated as moderate. The remainder of the watershed has very poor connectivity of these special habitats.

Detroit Flats

Detroit Flats represents several different habitats in one location - conifers, hardwoods, lake, grassy areas, shrubs, and wetlands. It is a unique area on the lake where several bird species utilize these habitats. It is especially important during both spring and fall migration. Several east-side species have been sited using this area as a stop-over. Over 154 species of birds in all have been noted using the area.

It was once used as a dispersed camping site where this activity, in addition to several others, was having a negative effect on both the resources and the species present. This area has been converted to day use, structures have been placed to curtail use of vehicles on the Flats during low pool and the peninsula road, and temporary sanitation facilities have been added which has led to the improvement of the area overall. Avian species are starting to use this area to nest again, western toads and other hepetiles are becoming more abundant, osprey are hunting regularly and eagles have even been seen using this area to forage. There is still strong recreation use of the area but humans and wildlife are both utilizing this area simultaneously.

Detroit Flats offers both recreational opportunities, as well as, suitable wildlife habitat. This creates an unique opportunity for wildlife viewing, interpretation, and education. A Challenge Cost Share project has been implemented for this area which is focusing on developing a kiosk and interpretive trail, improving parking, enhancing habitat, eliminating noxious weeds, and educating the public about the importance of this area. This has led to the implementation of small portions of the project, but an overall design plan and more money are needed to accomplish some of the larger tasks. Wildlife dollars have been utilized so far through the Challenge Cost Share program. It is hoped that recreation may be able to get additional funding to aid in the project. More planning, coordination, and design are needed to further this project.

A partnership with the Salem Audubon Society Chapter has been formed due to the implementation of this project. They are helping in habitat enhancement projects and helping determine the status of some of the bird species that use the Flats area. They will be an integral part in determining key nesting areas or unique habitats so we can avoid these areas when planning future projects.

iii-34: How and where do current road densities affect wildlife populations?

Roads provide both positive and negative effects to wildlife and their habitats. They provide hunters and anglers access to populations. This aids in reducing some populations of game animals to a more controllable number. Improved roads give them better access to areas but may detract from their experience by increasing the use levels and decreasing the feeling of wildness and isolation.

There are positive aspects to roads. They make wildlife surveys easier to conduct and provide better access to areas which may not get surveyed otherwise. They aid in providing more careful management of second growth stands. This may lead to late-successional characteristics being obtained at a faster rate. It also contributes to increased fire suppression efforts. This protects interior and late-successional habitats but it may not allow for the underburning that is necessary in some stands due to fire suppression efforts.

Use levels on forest roads is increasing. This leads to increased disturbance to wildlife populations from noise levels from traffic. This may not be significant in some areas and to some species, but may be very important seasonally. Nesting or denning may be interrupted which may cause certain species to abandon their young. There is also an increased probability of road kills. This may not be significant to certain species such as big game, but to small species who are less mobile, it might effect population levels locally. Roads also lead to increased hunting pressure and poaching due to extensive access.

Road construction is a source of ground disturbance. The amount of disturbance depends on road design and location. For roads in close proximity to riparian reserves, short term effects can include erosion and fine sediment transport into riparian areas, which degrades habitat for smaller species such as fish and amphibians. Sedimentation occurs by the filling in of interstitial spaces. This may lead to higher predation due to lack of cover and to lower population levels due to unsuitable rearing habitat.

Road building can fragment wildlife habitat. This does not affect highly mobile species as much as those that are less mobile. Roads may take out the better part of a home range of a small species where highly mobile species who have larger home ranges and are not effected as much. Roads create an edge effect which modifies temperature, light, wind, and vegetation. It may change the historic vegetation regime all together eliminating certain species from using these areas. With the edge effect in place, this allows greater access for predators. Edge effect is felt approximately 600 feet into forested stands. Roads also create habitat patches instead of allowing for contiguous blocks of habitat across the landscape. And depending on the size of the patch, it could be all edge effect.

Roads can benefit and degrade habitat. They can separate streams from flood plains and dissect wetlands or other special habitats. This directly affects riparian associated species from occupying this habitat.. This both reduces this habitat type and introduces more risk to the species that utilize these habitats. However, roads are designed to avoid riparian areas where possible, or if a riparian reserve cannot be avoided, special construction techniques are used to minimize effects. Roads also open canopies where bats feed on flying insects, provide a big game forage source from roadside shoulders, and provide access for predators to seek prey in some cases.

Roads may also present a physical barrier to migration and dispersal or to species. To small species such as amphibians, crossing a road is a major undertaking. It presents added risk by exposing them to predators, risk of being run over, and exposes them to the weather. Some species, such as the fisher, simply avoid roads which may confine these species to less than optimal habitat and/or packs them into smaller fragments which could lead to inbreeding or severe competition. Migrating species returning to breeding grounds are opened up to increased mortality due to predation and being hit at highly vulnerable times when energy supplies are spent on being safe rather than on the task at hand.

Road densities were calculated by sixth field watersheds. Average road densities were determined. In elk management emphasis areas, 1.5 miles/square mile is a goal we try to achieve when reducing road densities. The following shows the average miles per square mile for each 5th field.

03: 031 - 3.05 miles/square mile, 032 - 2.39 miles/square mile
78: 781 - 2.45 miles/square mile

031 - This area is located in the French Creek area and contains Forest Service roads 2223, 2225, and 520. These are the main roads and spurs of the area and probably will not be proposed for closure or decommissioning. There are several small spurs located in this area which could be closed in this area to aid in reducing road densities: 2225-503, 2225-455, 2225-560, 2225-458-470, 2225-458-469, 2223-501-503, 2223-501-512, 2223-501-514, 2223-502, 2223-610, 2223-613, 2223-536, 2223-542, 2223-537, 2223-520, and 2223-541. Many of these spurs are in bad shape and closing them either by decommissioning, obliteration or with a closure device would be beneficial to wildlife.

032 - This is located in the Heater Creek and Monument Peak areas. Several main roads exist and probably will not be proposed for closure: 2212, 640, 545, and the 540 spur. However, several spurs exist that do lend themselves to closure. These are 2212-634-037, 2212-634-637, 2212-634-635, 2212-545-544, 2212-545-546, 2212-545-547, 2212-545-528, 2212-625, 2212-640-642, 2212-640-645, 2212-640-646, 2202-718, 2202-726, 2202-738, and 202-770. Many of these spurs have closure devices on them currently but are still counted as open roads in the Wisdom Model for big game. Decommissioning these roads would be preferred.

781 - This area is found near the Stahlman summer home tract and Log and Tom Creeks. There are two main roads present, 10 and 1003. There are few opportunities to close roads in this area due to the high level of private land interspersed. Many spurs access this land. They may be able to be closed with a closure device but will not be able to be decommissioned at this time. However, three small spurs could be closed (1003-404, 1003-305, and 1003-306).

iii-35. What and where do conflicts exist between recreational use and wildlife in the watershed? What impacts do current levels of recreational use have on natural resources? Where are unacceptable impacts occurring?

Many recreational activities have minimal affects to wildlife. However, use within the watershed is predicted to increase dramatically over the next few years. With increased use comes increased affects. Soil compaction, vegetation loss and damage, reductions in down woody material, disturbance, and long recovery times to replenish areas of habitat components are some affects seen at heavily used recreation sites. Much of this use is concentrated in riparian reserves and or around special habitats, mainly meadows and lakes. Reductions in down woody material around special habitats may limit use by some down wood dependent species.

Detroit Lake shows the most recreation use in the watershed and effects to wildlife species are concentrated around this area.

The majority of use is associated with Detroit Lake and surrounding areas. The remainder of the watershed shows little use. Many facilities are located around Detroit Lake that tend to funnel people around the perimeter of the lake - Stahlman Summer Home tract, two marinas, the Sportsman Club, the City of Detroit, and all the existing campgrounds both State and federally owned. Most of these or portions of these facilities lie within the riparian reserves and within the BEMA. This concentrates approximately 90% of the use into a small area of the watershed. This may tend to limit use of species in this area or reduce the potential for successful nesting and denning that may occur here. Some guilds are solely dependent on this type of habitat around the lake and human interference may be limiting there occurrence here or at least in the most likely areas for them to occur.

The majority of use occurs in the summer months which may compound existing conditions. However, species using Detroit Lake and surrounding areas during the winter months probably do not encounter much disturbance from these sites.

Many conflicts do occur with wildlife and recreation in this watershed. Most of these occur around the lake and Highway 22. With increased numbers of people using the watershed, there is an increased amount of garbage. Garbage left at dispersed sites, campgrounds, and other recreational destinations attracts scavenger species to the area. Animals may become sick from this and may even cause mortality. Attracting animals to areas where humans are present opens them up to increased mortality due to road kills or predation. It could lead to specific individuals becoming accustomed to human presence which may lead to more problems.

Birds especially are prone to being caught in fishing line thrown aside. This has led to deaths which could have been prevented. Many people feed wildlife in the area, especially ducks. This leads to dependence on humans for a food source not normally eaten which may cause intestinal problems and subject them to increased risks such as predation. Often folks think that young wildlife left alone are without their mothers and consequently, pick them up and bring them in. Many species have been separated from their natural environments and placed in rehab centers.

Also, some wildlife species are killed each year by boats and cars. This eventually leads to these species being crowded into areas where competition for resources may be occurring. If they do not move to these areas, they may encounter disturbance during foraging bouts which may determine reproductive success or young survival. An emphasis needs to be placed on education of wildlife and their habitats to reduce the occurrence of the above mentioned activities.

Gains: Detroit Flats is one area where improvements have been gained. This area was converted to day use which limits the amount of disturbance and improvements to the area have been established to lessen effects on both species and habitats. This is proof that given the right conditions, wildlife and humans can co-exist in the same areas. Attempts should be made to enhance other areas to achieve similar results.

Dispersed sites: The majority of the dispersed sites lie within riparian reserves, most of them occurring around Detroit Lake. The presence of Highway 22 funnels visitors into this area and is already contributing to the disturbance and habitat degradation of the area. The dispersed sites along this stream course are probably not adding greatly to this. However, dispersed camping has the potential to affect the reproductive success of some species dependent on riparian habitats. This is very localized in nature and probably would not lead to a decline toward Federal listing.

Off road use under the powerline and other specified areas specifically leads to habitat degradation of early seral habitat and available forage for big game. It also adds to disturbance of animals. This form of recreation exposes the soil and allows for noxious weeds to invade, mainly scothbroom and tansy ragwort.

Vandalism of facilities, some of which protect wildlife from disturbance and harrassment, occurs frequently across the landscape. Gates and barriers are often destroyed. Human caused fires can lead to a reduction in habitat. This could reduce the amount of late-successional habitat available.

Holiday weekends such as Memorial Day, July 4th, and Labor Day see increased use from normal summer weekend use. July 4th presents another aspect to this dilemma. The City of Detroit annually puts on a fireworks show over the lake. These fireworks last around 30-60 minutes. These are extremely loud and the sound waves travel up and down the valley. This event may disturb some species during this time. It may also frighten those species who occupy areas near the fireworks. These species may tend to stay low and not move but those species who do move from cover may be subjected to increased risk. Habitat around the lake tends to get trampled during these events by people gathering to watch the show. Efforts should be made to deter use in areas of importance to reduce the amount of disturbance already occurring.

There is a great demand for more recreational facilities such as trails and campgrounds. These are generally proposed around Detroit Lake. Efforts should be made to deter some use around the lake or locate this use in areas less important for wildlife.

More information is needed on effects to wildlife species from recreation use. Recreation use in much of the watershed seems to be at acceptable levels. However, levels around Detroit Lake may not be. This should be monitored as use levels increase to determine the affects to wildlife and their habitats.

b. Reference Conditions

iii-36: *What was the historical relative abundance and distribution of wildlife species of concern and the condition and distribution of their habitats in the watershed?

In 1895, the structural stages were heavily skewed with the majority of the landscape being in stand initiation and old growth. Early and late seral species were probably favored in 1895, as well as, the large and medium home range species due to fire occurrence. Small home range species may have been eliminated or greatly reduced in areas due to the presence of fire, but these should have been very localized. Dispersal across these areas may have been difficult as well. During this period, mosaic and contrast species were probably not as abundant due to the nature of the openings. Fires tended to burn large areas. However, patchy fires may have provided habitat for these species though.

Most of the early seral habitat occurred in the Pacific silver fir zone. This would have benefitted higher elevation early seral species such as bluebirds, dusky flycatchers, and deer mice. Old growth species would have also been highly favored, especially species who depend on interior habitat like the northern spotted owl, marten, and the red tree vole. An assumption can also be made that special habitats would have been maintained due to the frequent fire cycle and that encroachment may not have been a problem for meadow areas and other special habitats. Species within special habitat guilds may have maintained stable populations due to this.

c. Comparison of Current and Reference Conditions

*iii-37: *What are the natural and human causes of change between historical and current wildlife species distribution and habitat quality for species of concern in the watershed?*

Conditions

Reference- Prior to Forest Management:
1. Larger openings in the past: In the past, openings were created from disturbance events such as fire on a larger scale and wind on a smaller scale. Early successional habitat was at basically at the same levels the past. However, this habitat was most prevalent on ridgelines and south aspects.
2. Disturbances episodic in the past with fires In the past, large amounts of time passed between episodic events. Reproductive success was probably not affected as much with these types of events other than habitat being lost in specific areas. These events were probably of short duration also which may or may not have disrupted reproductive success.
3. Tree reestablishment after disturbance slower prior to reforestation. In the past, early successional habitat was present for a longer period of time which may have been important due to the sporadic occurrence of this seral class. The same would be said of mid seral as early seral habitat matured. This may have allowed species to occur for longer periods of time in certain areas and provide a source for other areas as the landscape changed over time. Tree reestablishment also provided for natural regeneration and a natural species mix. Foreign diseases and species would not have been as much of a factor.

Conditions
Reference- Prior to Forest Management (continued):
4. Underburned conditions common in the past Underburning enhanced the understory and secured the regeneration of species like sugar pine. It also provided for pockets of diversity in which snags and down woody material were created. These habitat components are very important to many wildlife species. Underburning may have also created forage across the landscape for big game species. This may have supplemented early successional habitat. Underburning may have created many unique habitat niches also.
5. Understory reinitiation slower in natural timeframe. versus reinitiation speeded up by thinning In the past, the stem exclusion stage may have been present for a longer period of time. Thinning of the stand may have been prolonged but natural selection of healthy trees was guaranteed. Those trees less dominant would be shaded out and out-competed.
6. Less abundance of shade tolerant tree species due to fire regime. In the past, there was more Douglas Fir present within stands which created the needed structure for many species.
7. Fewer species found in natural fire regenerated stands compared to stands that have had **multi-species planting** .
8. Meadow and other special forest habitats maintained by fire regime In the past, reoccurring fires kept these areas in check. It removed encroaching conifers and other species from invading and taking over.
9. More snags and logs in areas that have had long fire return intervals, less difference where fires were frequent. Snags and down woody material were well distributed across the landscape if the fire was not all consuming. Legacies were left in early and mid seral stands for several decades. Many species require snags and down woody material for part or most of their life cycle.
10. Fire hazard lower in areas with a short fire return interval With frequent fire occurrences, small fuels were probably burned up periodically which reduced the chance for a large scale event to take place. Snags and down material were well distributed across the landscape. In the event of an all consuming fire, all fuels were eliminated or reduced

Conditions

Major Causes of Change

Reference- Prior to Forest Management (continued):
11. Tree growth less in natural stands the same age as managed stands. Early seral habitat would have been present for a longer period of time thus delaying the onset of mid and late-successional habitat.
Early seral wildlife guilds on south and west facing slopes.
Fire created **elk forage** on the southern aspects, in spite of the fact that many areas were steeper than what they would normally use. The presence of forage was more important.
Some **Bald Eagle** habitat may have been at confluence of the Breitenbush and North Santiam Rivers. May have been more of a food source then. Eagles may have had to compete with man for fishing. Fish runs confined to channel, less room for maneuvering.

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Fire Suppression** resulted in the retention vegetation, especially on south aspects.* ***Timber harvest, road construction

Reference- Forest Management to 1994:
1. Smaller openings: Due to harvest practices and fire suppression efforts, the landscape is more fragmented with smaller openings. This fragmentation created more habitat for contrast and mosaic species due to the high edge effect. It also reduced the amount of interior habitat available. Connectivity between stands may have been reduced. Early successional habitat is basically at the same levels in the past. However, the areas where this habitat type exists may not be the same. Early successional habitat type were scattered across the landscape. An assumption can be made that populations of species may have be more distributed across the landscape than in the past.

Conditions

Reference- Forest Management to 1994 (continued):
2. Disturbances continuous with timber harvest and sustained yields. With the onset of forest management disturbance became frequent. This may have had an effect on species ability to successfully reproduce and may have interrupted the timing of things.
3. Tree reestablishment after disturbance slower in the past versus reforestation. Mid to late seral habitat may have been attained at a faster rate due to silvicultural activities such as pre-commercial thinning, commercial thinning, etc. This is important due to habitat and interior habitat loss.
4. Underburning - no comparable condition other than shelterwoods. (See Current - 1994 to Present)
5. Understory reinitiation timeline speeded up by thinning versus natural timeframe (See Current - 1994 to Present)
6. Increased abundance of shade tolerant tree species due to lack of fire.(See Current - 1994 to Present)
7. Multi-species planting results in more species at an earlier age than usually found in natural fire regenerated stands. (See Current - 1994 to Present)
9. Fewer snags and logs on harvested units in areas that have had long fire return intervals, less difference where fires were frequent.(See Current - 1994 to Present)
10. Higher fire hazard, fuel buildup due to fire suppression in areas with short fire return interval (See Current - 1994 to Present)
11. Increased tree growth in managed versus natural stands at a comparable age (See Current - 1994 to Present) Some **Bald Eagle** habitat may have been at confluence of the Breitenbush and North Santiam Rivers prior to the construction of the dams. May have been more of a food source then. Eagles may have had to compete with man for fishing. Fish runs confined to channel, less room for maneuvering. Reservoir created more **Bald Eagle** habitat. More foraging room with lake. Retention of vegetation due to fire prevention created habitats on south and west slopes not previously there.

Conditions	**Major Causes of Change**
Reference- Forest Management to 1994 (continued): Railroad logging and the subsequent fires created **elk forage** in flat areas (Detroit Flats, up to French creek) so the elk may have favored this gentler terrain over the forage areas on the steep sideslopes.	
▼ ▼ ▼ ▼ ⇦ ⇦ ⇦ ⇦ ▼	***Timber harvest and road construction-*** *changes in standards have been implemented.* ***Retention of more down wood.*** ***Retention of wildlife trees (snags) and green tree retention (GTR) on harvest units*** ***Fire Suppression*** *resulted in the retention vegetation, especially on south aspects.* ***Past Fire History*** ***Increased Recreation Use***
Current - 1994 to Present:	
1. Smaller openings (see Reference- Forest Management to 1994)	
2. Disturbances continuous with timber harvest and sustained yields (see Reference- Forest Management to 1994) Today, Seasonal restrictions are based on dates of probable reproductive behavior. However, due to weather conditions, natural events, etc., reproductive timing could either be delayed or early, thus forest management may be affecting these individuals.	
3. Tree reestablishment after disturbance slower in the past versus reforestation. (see Reference- Forest Management to 1994) Today, a wide species mix is used to replant areas. These are native species but may not be indicative of particular stands. Diseases have also been introduced which have had an effect on some species, particularly white bark pine. This may have an affect on species that rely on this habitat type. However, with a wider variety of tree. species present, it may allow for more species to occupy the watershed.	

Conditions

Current - 1994 to Present: (continued):
4. Underburning - no comparable condition other than shelterwoods. Today, underburning is limited in scope. It is used primarily to lessen the chance for large scale habitat loss due to fire. Unique plants and trees are being reduced such as sugar pine which may be reducing certain wildlife species from occupying historic ranges. There may be an opportunity to re-introduce fire back into the ecosystem with prescribed natural fire. This may emulate natural conditions somewhat and restore needed components back into the landscape.
5. Understory reinitiation timeline speeded up by thinning versus natural time frame Today, we have faster growing trees which equates to mid and late seral habitat being attained sooner. This is important today due to the reduced amounts of mid and late seral habitat in the watershed. Today's practices can select and remove diseased trees and leave dominant trees within the stands. Snags and down woody material can also be created if levels are deficient.
6. Increased abundance of shade tolerant tree species due to lack of fire. However today, near climax stands are unique. These stands create a different habitat not often found. This may have an affect on wildlife species present within the watershed.
7. Multi-species planting results in more species at an earlier age than usually found in natural fire regenerated stands. Multi-species planting ensures biodiversity. This allows for a seed source for uncommon species in heavily managed areas where it may not be available.
8. Meadow and other special forest habitats currently being encroached by conifers due to fire suppression. Due to fire suppression, these habitats are being slowly lost. This is a natural process if all the elements are allowed to occur. Guilds may be lost or the number of species lost due to this. Endemic, rare species may be eliminated or reduced. Connectivity may be reduced between these areas which may hinder dispersal.

Conditions

Current - 1994 to Present: (continued):
9. Fewer snags and logs on harvested units in areas that have had long fire return intervals, less difference where fires were frequent. Reductions in these habitat components may lead to reduced populations from lack of denning, hiding, and foraging habitat. It may be several decades before replacement snags and down material will be on site that is of adequate size and diameter. With increased harvest activities and other land management activities, it could compound the problem of reduced numbers of snags and down material. This could further decrease populations. Many of the species who require down material and snags also prefer interior habitat. Or at least these species who do prefer it, will be decreased. Mosaics, patch and early seral species will benefit.
10. Higher fire hazard, fuel buildup due to fire suppression in areas with short fire return interval Today, there are higher numbers of snags and down material in unmanaged areas, mainly mature stands, due to insect and disease, harvest practices, and wind events. Risk for a stand replacement fire is growing. However, due to decreased amounts of interior habitat, increased levels of down material in these stands may make up for the lack of it in surrounding areas. However, if a stand replacement event occurs, down material and snag levels may be severely reduced causing populations of dependent species to decrease rapidly and may even eliminate some species from occupying the area for several decades. **11. Increased tree growth in managed versus natural stands at a comparable age.** Now with silvicultural activities, we can increase tree growth within stands in order to achieve late-successional habitat characteristics at a faster rate. This is done by aerial fertilization which may introduce more chemicals into the system than was previously here. However, due to the reduced amount of late-successional habitat, this is a preferred method. Levels of chemicals are relatively low and the benefits are greatly enhanced.
Elk utilize early seral patches created by management activities for forage in conjunction with cover, (size and spacing) .
Recreation use has also increased. This can lead to degraded habitat and disturbance. However, there is an opportunity to increase awareness and educate the public on wildlife needs and needs of habitat in general.

Conditions

Current - 1994 to Present: (continued):
Recent proposals have surfaced from the power companies to widen the powerline corridor. This will entail widening the corridor to approximately 300' in most areas to reduce the risk of a line accident. This may create a barrier to some species especially less mobile species and interior dependent species. In some regards, it will create additional habitat for early successional species, such as big game. Most of this powerline lies in winter range and will provide forage.

IV. SOCIAL DOMAIN

A. Human Uses

1. Characterization

iv-1. *What are the major human uses, including tribal uses and treaty rights? Where do they generally occur within the watershed (Maps IV-1a, IV-1b)?

A variety of human uses occur within the Detroit Tributary watersheds, including the following:.

- Supply of various forest resources such as timber, special forest products and firewood
- Recreation and Tourism
- Residential, commercial and industrial occupation
- Supplies domestic water within the watershed and downstream
- Power line transmission
- Detroit and Big Cliff Dams provide flood control, hydroelectric power generation, agricultural irrigation, reservoir and downstream recreation, and water supply (quantity) to municipal and industrial users.
- Hall's Ridge Communication Site provides local agencies with emergency two-way communication including Forest Service and law enforcement; and local cable television and regional cellular phone services
- Highway 22 transportation corridor

Socio-Economic

The North Santiam Canyon is a rural area located at the base of the west side of the Cascade mountains. It extends for approximately 30 miles along the North Santiam River and includes five small cities: Lyons, Mill City, Gates, Detroit and Idanha; and several unincorporated areas in two adjoining counties, Marion and Linn. The communities are clustered on either side of the North Santiam River and are between 25-50 miles from Salem, the nearest metropolitan area. The North Santiam Canyon serves as both a destination and a corridor for commerce. The total population of the region is about 6,617.

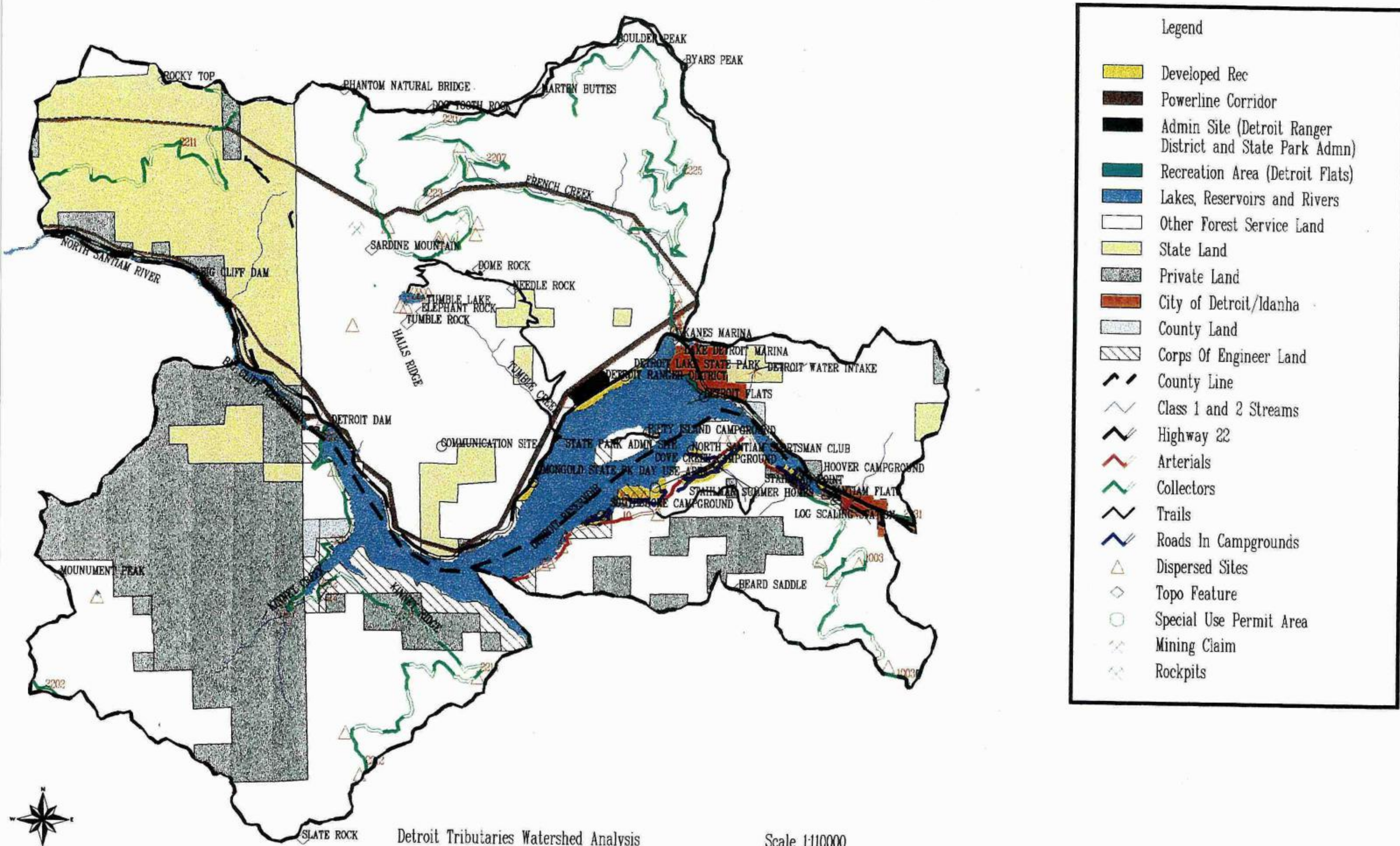
The forest products industry, and tourism generated from recreation in the Detroit Lake area and highway travel, provide the economic base for the Cities of Detroit and Idanha, and support the diversifying economies of other North Santiam Canyon communities. In 1996, 917 people were employed by private mills in the canyon. The regions forest resources are controlled by both public and private landowners. However, the vast majority of the land is managed by three public agencies, the Bureau of Land Management, USDA Forest Service and Oregon State Forestry Department (of which the latter two are in the watershed). In recent years, the communities have been affected by declining timber supplies, and have developed economic development strategies to adjust to a different future.

Recreation

Landscape Patterns of Use

State Highway 22, which is the primary access into this watershed, is also one of the most traveled east-west routes over the Cascades. Landform and topography are obvious influences on human use patterns, particularly the development of "human corridors." Essentially, we use the same corridors today that American Indians used for thousands of years, although we have changed their character greatly. Facilities are often developed in areas where prehistoric and historic uses occurred. People have always been drawn to areas along water, valley benches, meadows, unique topographical features and vista points, whether for recreation, sustenance, residence or cultural values. Future use patterns will likely follow the same corridors as long as access is provided and management direction allows use to continue.

Human Uses

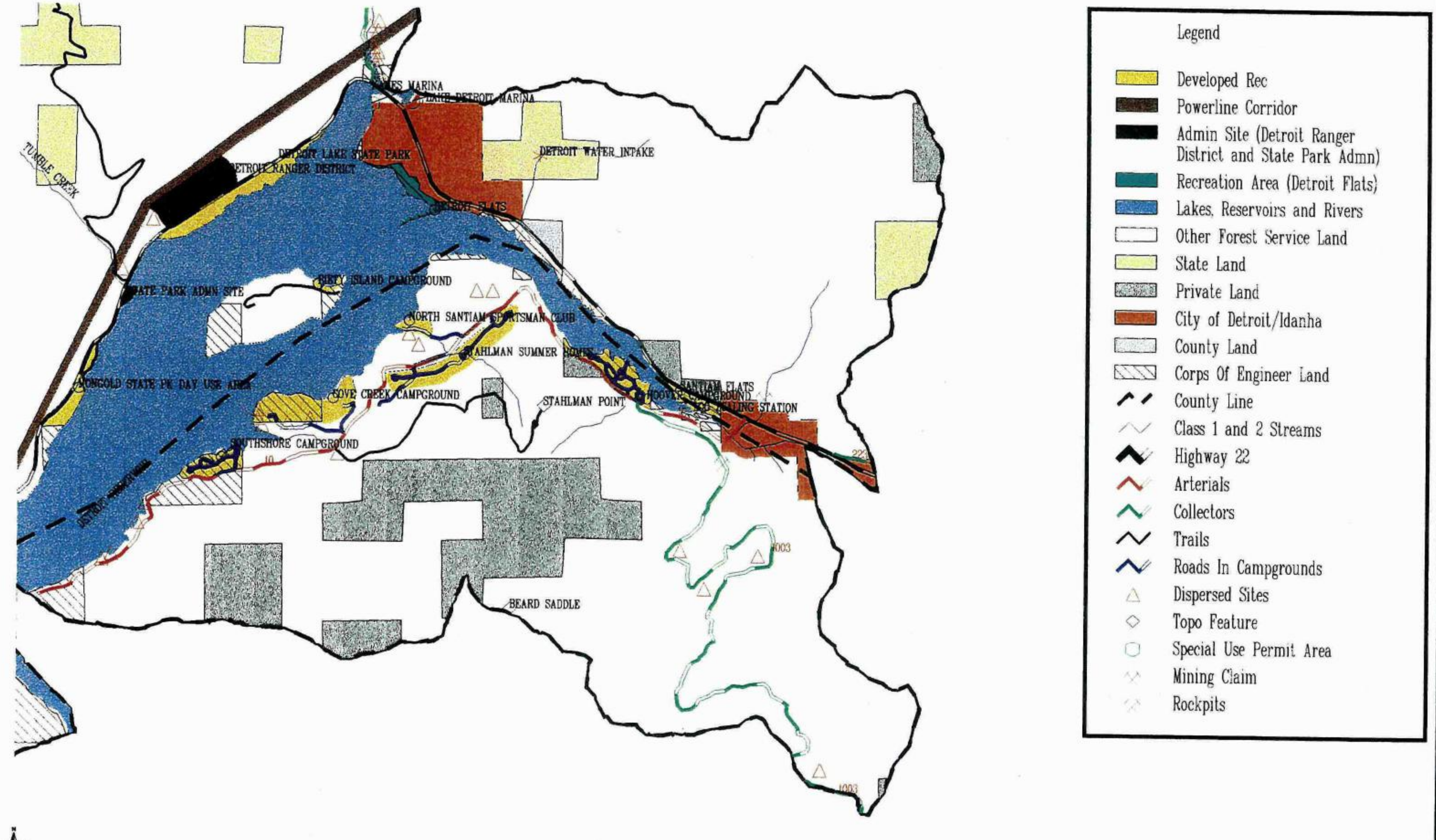


Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/07/97

MAP IV–1a Request #1459

Human Uses



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:55000
10/08/97

MAP IV–1b

Request #ri459

Primary landscape features which draw recreation use are lakes, rivers, streams (riparian reserves), scenic topographical features and vista points. Due to the steep topography of this drainage, the greatest concentration of use is along limited flat, accessible portions of the reservoir

Amount of Use and Primary Visitors

The key attraction in the Detroit Tributaries watershed is Detroit Lake. Detroit Lake ranks the second highest use lake in the state, and overall seventh among all water bodies in Oregon, just behind the Pacific Ocean. Detroit Lake is one of the most popular recreation areas in the western Cascades, and is the highest recreation use area on the Detroit Ranger District, attracting well over 500,000 people a year. The Detroit Tributary watersheds are within a two-hour drive of nearly 80% of Oregon's population. Because highway improvements over the years have made it more accessible, the Detroit Lake area has come to serve as a "back yard destination" for many Willamette Valley residents who once found it remote. Population growth in the Mid-Willamette Valley and Portland Metro area averages 1.9% during 1986-1990. This will likely lead to increasing numbers of visitors to the Detroit Lake recreation area in the future.

A market study found that 46% of Detroit Lake area visitors originate from the Portland-Metropolitan area and 43% from the Mid-Willamette Valley. The remaining 4% came from other regions within the state, and 7% came from other states, primarily California and Washington. The primary users are urban dwellers who like to take their urban comforts with them and like the modern day amenities provided at campgrounds and day use facilities. About 80% are repeat visitors, with a majority of overnight visitors staying for three to five nights. About two-thirds of visitors use some type of water craft. Most visitors are young families, with 30% of household heads age 35-44. Sixty percent of the visitors have children at living at home.

Kinds of Use and Where Use Occurs

The Detroit Tributaries watershed offers a variety of recreational opportunities and settings that are characterized as Roaded to more Urban recreational opportunity classifications. Generally, people who go to Detroit Lake enjoy the social experience. This watershed does not contain Semi-primitive to Primitive areas per se, however, some degree of solitude can be experienced in the uplands. Recreation in this watershed is characterized by two distinct areas; reservoir and upland areas of the watershed.

Recreational activities common to both areas are dispersed camping, hiking, fishing, picnicking, sightseeing, biking, berry picking, nature study, wildlife viewing, scenic driving, ORV use and incidental winter recreational use. The reservoir area provides a favorable setting for water-based recreation which are the highest in demand; including activities such as, sailing, motor boating, windsurfing, kayaking, canoeing, jet skiing, waterskiing, water tubing and swimming. The uplands provide launching areas on Hall's and Hoover Ridges for hang-gliders and para-gliders, which is a unique activity in the North Santiam basin. Big game hunting also occurs in some areas of the uplands within the watershed. Downstream of the reservoirs, is popular for fishing, the only place in the watershed to catch wild steelhead and chinook salmon (native anadromous fish runs); rafting, and kayaking.

The reservoir area provides the most urban-like experiences with its modernized developments and availability of conveniences. All recreational developments are located around the lake and include; six Forest Service campgrounds, two State Parks including one campground and a day use/boat launch area; Detroit Flats day use area; Detroit dam visitor facility and unimproved boat ramp; and two privately owned marinas that are under special use authorization. In addition, there are 70 recreation residences on the Stahlman summer home tracts which provides seasonal recreational occupancy; and the Sportsmens Club organization site which contains camping sites and moorage spaces for its club members. Detroit offers services such as lodging, RV parks, restaurants, gas and shopping to visitors.

Two major trails, Tumble Ridge and Stahlman Point, originate near the lake and access prominent peaks in the uplands of the watershed. These trails are part of an old trail system to former lookout points, and provide views of Detroit Lake, Mt. Jefferson and other prominent peaks and rock formations. Hoover Nature Trail located within Hoover Campground currently provides the only barrier-free trail on the District. Upland trails include Dome Rock, Phantom Natural Bridge, and Tumble Lake trails which access these features from French Creek Road. The French Creek Ridge Trail meanders in and out of this watershed to the north. The Monument Peak Botanical Special Interest Area is "isolated" from the rest of the watershed in that it's accessed from outside the Forest Boundary. This area is used primarily by locals and provides opportunities for plant study and scenic views. On State land is an old primitive lookout trail that accesses Rocky Top; and located on road 2211 above Sardine creek is a natural arch similar to Phantom bridge.

Four administrative sites are located within the analysis area including the Detroit Ranger Station, the State Park administrative site, Oregon Department of Transportation Road maintenance site, and the Army Corps of Engineers dams and associated facilities.

When Use Occurs

Detroit Lake is primarily a summer destination due to the favorable climate. One of the primary influences of when use occurs within the watershed is tied with the fluctuation of the reservoir level for flood control. Full pool is reached early May and drawn down begins after Labor Day. At the beginning of fishing season, normally in late April, all boat ramps, campgrounds and marinas are usually operating.

Prevailing winds also affect the lake's recreation patterns during the summer. Generally, the wind comes up the canyon in the early afternoon and continues through late afternoon, causing people to move to sheltered areas of the lake, particularly to the east or at any of the arms. When the wind subsides in the late afternoon and water becomes still, the lake becomes conducive to power boating. Because wind conditions at Detroit Lake are very predictable, the area is gaining a reputation as a good location for sailing and windsurfing, especially on the west end of the lake. In September, consistent winds and thermals also provide excellent opportunities for paragliding and hanggliding above the lake. The paragliding season is between June and September, whereas hanggliding relies on the lakes draw down in September for an adequate dry flat landing area.

Finally, recreation use is weather dependant. Weather is too cold during the fall through spring for most water sports, except for the fisherman. Use peaks on those weekends and holidays that have favorable sunny, hot weather, and even during the week in the heart of summer. A summer with poor weather results in dramatic decreases in use when compared with more fair-weathered years.

2. What values are associated with human uses?

- **Socio-economic Uses(e.g. sustainable communities, tourism, etc)**

  Quality of life; preserving the environment and its natural beauty; availability of natural resources for sustained commodity production and year round recreational opportunities for economic benefits; are valued by people in the North Santiam Canyon.

- **Recreational Uses**

  Recreational use of National Forest lands is valued for the experiences associated with the activity, such as the enjoyment, challenge, solitude or relaxation that it gives people. It refreshes people mentally, physically and emotionally. Canyon communities characterize forest and reservoir recreational "attractions" as a strength to their economic vitality.

3. What are the highest priority issues or resource concerns associated with human uses?

- **Socio-economic Uses (e.g. sustainable communities, tourism, etc)**

  - The Cities and unincorporated communities in the North Santiam Canyon depend on the Willamette National Forest for their livelihoods and economic well-being. The forest products industry, and tourism benefits generated from recreation in the Detroit Lake area and highway travel, provide the economic base for the Cities of Detroit and Idanha, and support the diversifying economies of other North Santiam Canyon communities.

- Species and watershed protection measures and changing public sentiment about selling forest resources (like old growth) as commodities, combined with a changing political climate, have resulted in a sharp reduction in the timber supply from National Forests and other public lands, to operate local mills. This reduction has threatened the economic sustainability of historically forest-dependent communities in the North Santiam Canyon, and have prompted them to developed economic development strategies to adjust to a different future.

- Detroit and Idanha are "landlocked" cities surrounded by National Forest land facing limited physical growth potential. Urban Growth Boundaries established for the Cities extend into these federal lands.

- Diversifying local economies and providing family-waged jobs are goals identified in the North Santiam Canyon's Economic Strategic Plan. One of the major challenges communities face in diversifying their economies, especially Detroit and Idanha, is inadequate infrastructure for supporting commercial, industrial and residential growth which leaves these communities continuing to be dependent on National Forest resources.

- There are conflicting ideas about the use and regulation of the stored water in Detroit Reservoir. (e.g. augmenting downstream flows for fish, agriculture, and municipal use; recreation and tourism in and around the reservoir; and flood control regulation).

- Decreasing firewood supplies are not able to keep up with the demand for fuel wood by people in the region.

• Recreational Uses

There is more demand for recreational opportunities, especially reservoir-based opportunities, than supply available. In addition, available facilities and infrastructure associated with these opportunities are inadequate to meet demand. Growing recreational demand has resulted in an impact to resources; scenic quality; user experiences such as social crowding and user conflicts; increased fire risk; and visitor safety.

4. What are the management direction/activities, human uses or natural processes that affect human uses?

a. Current Condition

- **Socio-economic Uses (e.g. sustainable communities, tourism, etc)**

iv-2. * What are the current conditions and trends of the relevant socio-economic uses in the watershed?

The timber industry is still an important component of the North Santiam Canyon economy, however, timber related employment is not expected to reach levels as in the past. Canyon communities realize they can no longer depend on wood products industry as their sole economic provider.

The North Santiam Canyon communities are working together to develop cooperative strategic plans for diversifying their economies. Several locally-based organizations have been formed to help these communities plan for their future. Some examples include the North Santiam Canyon Economic Development Corporation, the North Santiam Mainstreet Program, and the North Santiam Tourism Coalition. Common objectives of the communities include increasing the number of family wage jobs (through new business and business expansion), improving infrastructure, improving education and workforce job skills, maintaining and improving quality of life, and improving human resources services.

Community strategic and action plans were developed by residents, businesses and industry interests in the community and with assistance from various local agencies, including the Forest Service. The Forest Service is a partner with community economic and tourism organizations since many community goals, objectives and projects affect or depend upon National Forest lands.

Federal programs such as President Clinton's Northwest Economic Adjustment Initiative, made money available to local communities to begin seeking ways to diversify their economies. One of the first things the community began to do was look into ways of developing infrastructure so they could attract new businesses to the canyon.

One of the major challenges smaller communities face is infrastructure requirements for major manufacturing. As part of a federal effort to aid these timber dependent communities, special funding has been provided through various agencies as grants and low interest loans. This money has help to fund such projects as the construction of the Canyon Life Museum, the development of a special forest products inventory modeling system, infrastructure feasibility studies (water systems, sewage treatment), industrial and business recruitment plans, Mainstreet Program, etc.

Until needed infrastructure upgrades can be completed, some of these communities are exploring the feasibility of retrofitting old timber mills and sites for other manufacturing activities or as recreational facilities (proposed North Santiam RV Park in Idanha), tourism/retail businesses, value-added wood manufacturing, cottage industries and telecommuting. The cities of Detroit and Idanha are the most restricted in that they have limited residential, commercial and industrial growth potential due to lack of a community sewage treatment system. Many residential, commercial and industrial lots cannot be developed due to insufficient lot size to accommodate on-site sewage treatment.

The Canyon communities began exploring ways of attracting more tourism dollars. Having Highway 22, the main link between Salem and Bend, running alongside the North Santiam River and up through the middle of the canyon offers tremendous potential. The highway carries campers and water enthusiasts to Detroit Reservoir, skiers to the Santiam Pass and central Oregon, and others wanting to take advantage of the natural beauty of the canyon. Along with the tourist traveler, it also carries enormous business and commercial traffic which has become an important component of the North Santiam Canyon economy. Detroit and Idahna City Comprehensive Plans recognize the importance of recreation and encourage future economic growth relating to the tourism industry.

Both plans recommend pathways connecting communities, and adjacent campgrounds and day use areas. Tourism plans also incorporate this project and others including, expanding seasons at campgrounds, and developing a brochure on recreational opportunities in the Canyon and surrounding National Forest.

The North Santiam Canyon has also looked into economic diversification through secondary wood products manufacturing or through new markets in nontraditional forest products. The community received a grant to study market opportunities and developed methodology for companies and government agencies to evaluate available sustainable supplies of these products. A potential list of products could include: boughs, Christmas trees, bear grass, sword ferns, salal, prince's pine, mosses, Oregon grape, huckleberries, mushrooms, tree cones, post and poles, shakes and firewood.

Detroit has a full time resident population of about 400. Many home owners in Detroit are part time residents. The visitor population in Detroit is reported to climb to 2,000 or more people during the peak summer recreation period. The town has three small motels, two Bed and Breakfasts, three very small RV parks, two marinas with stores, three grocery stores, a hardware/sporting good store, gas station/mini-mart and a laundry mat. All of these businesses are heavily dependent on the tourist and recreational traffic through the area and at Detroit Lake. The number of vehicles using Highway 22 averages more than 4,000 vehicles per day. The Detroit Lake Recreation Area Business Association sponsors a number of successful events to attract people into the area, including the Fishing Derby in May, Fireworks Over the Lake in July (through a Forest Service Special Use Authorization), a new 1950's Cruise-In event in September, and a Holiday Festival in December.

The town is an obvious destination for thousands of people who come to the lake in the summer and for travelers heading to the nordic and alpine areas in the winter. People go to town to buy supplies and get visitor information. Few public improvements are available for the visitors. Parking is limited and there are no permanent public restrooms. Parking problems exist and conflicts occur with permanent residents of Detroit who don't like the traffic or the imposition of the weekend residents.

The Cities of Detroit and Idanha have Urban Growth Boundaries that extend onto National Forest Lands.

Firewood is a forest commodity used by local communities which has been provided historically from the Detroit Tribs area. Even though public demand for firewood remains high, ability to fulfill the need has diminished steadily since 1992 with the reduction of timber harvest and land management changes to protect habitat. Firewood will only be available where current and future needs for large woody material are met in the area.

- **Recreational Uses**

iv-3. *How and where are current levels of recreation use impacting resources, and visitor experiences and safety?

iv-4. *What are the current and future recreational demands?

Recreation Opportunity Spectrum

The Willamette National Forest Land Management Plan identified two land classifications of recreation experience in the Detroit Tributaries watershed analysis area. These classifications are based on the Recreation Opportunity Spectrum (ROS) (***Map IV-2***), a recreation planning and management framework that recognizes a continuum of recreation opportunities which include seven categories progressing from the most primitive to the most developed. In classifying recreation opportunities, ROS considers access, remoteness, naturalness, facilities and site maintenance, social encounters, visitor impacts and visitor management. The basic assumption underlying the Recreation Opportunity Spectrum is that quality recreational experiences are best assured by providing a diverse set of recreation opportunities (Clark and Stankey 1979).

Approximately 34 percent, 17,055 acres of the watershed is classified as Roaded Natural (RN) which includes: most all scenic allocations around Detroit Lake; special use areas including Stahlman summer homes and North Santiam Sportsmen's Club; recreation sites including developed campgrounds, day use areas, trailheads, and most dispersed campsites; Late-Successional Reserves; Tumble Lake Old Growth Grove; and Monument Peak and Phantom Bridge Special Interest Areas. Roaded Natural is characterized by predominantly natural appearing environments. Moderate social interaction can be expected. Resource modification and utilization practices are evident but harmonize with the natural environment.

Although recreational facilities around Detroit Lake are to be managed to meet the physical setting criteria for Roaded Natural, facility improvements are becoming more Rural to Urban in nature. All developed lakeside campgrounds and day use areas are designed or are being improved to meet access needs for people with disabilities, and some are designed for user comfort and conveniences such as flush toilets, showers, electricity, and increasing RV use. Social settings in these campgrounds and on Detroit Lake lean toward the Urban setting due to the large number of visitors and high interaction among users. Presently, no implementation guides have been developed for recreational developments for any Old Growth Groves or Special Interest Areas in the Detroit Tributaries Watershed. Future developments shall maintain the integrity of the Roaded Natural physical setting identified in the Forest Plan.

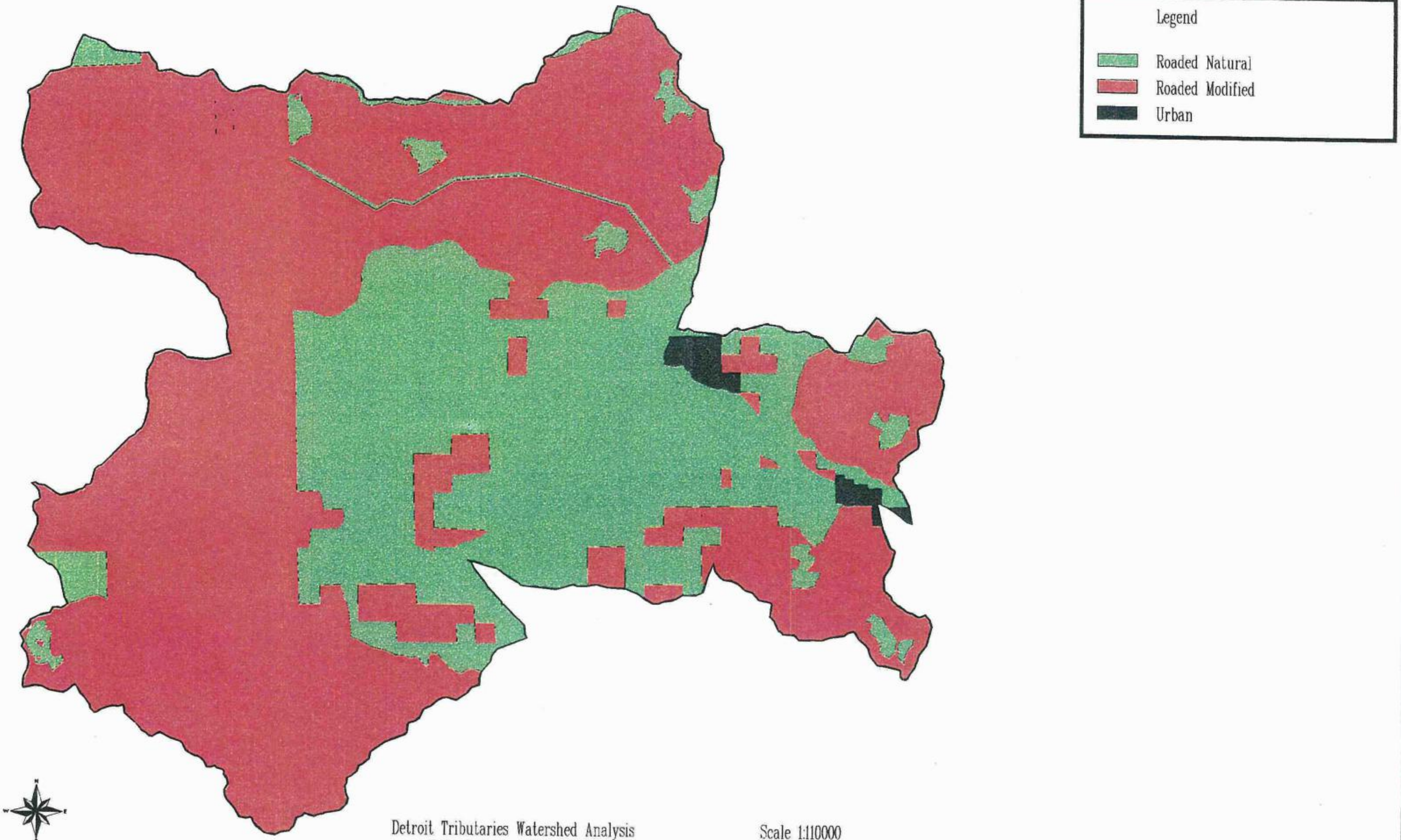
The predominant ROS class in this watershed is classified Roaded Modified (RM) and comprises 66% of the Detroit Tributaries Watershed or 31,840 acres. For the purpose of the analysis, it is assumed that State, County and private timber land is classified as Roaded Modified. This setting is characterized by a substantially modified natural environment which occurs in the General Forest and Scenic Modification Middleground management areas. Resource activities and structures are strongly dominant from most any point in the setting. Resource management activities, primarily timber production and moderate road densities, are prevalent throughout the area classified RM. Moderate social interaction is expected.

The cities of Detroit and Idanha can be classified as Urban in the Recreation Opportunity Spectrum and occupy 440 acres of the watershed. No areas have been delineated for semiprimitive and primitive settings in this watershed.

ROS Demand and Supply

The information on recreation demand that is reported in the Oregon State Comprehensive Outdoor Recreation Plan indicates a high and increasing demand for recreation settings featuring low levels of development and management activity, with relatively low levels of use, and where motorized access is not permitted (SCORP 1988).

Recreation Opportunity Spectrum



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/03/97

MAP IV-2

Request #1457

The 1994 SCORP goes on to state that there is a pronounced preference by the public for more semi-primitive and primitive settings, and that this issue requires greater examination and direction of efforts statewide to meet this demand. Thus, it is clear that settings catering to these recreational standards are especially valuable to the public. However, the Detroit Tributaries watershed offers limited potential for providing semi-primitive or primitive settings and may best be met in adjacent watersheds (e.g. current Opal Creek roadless area).

Portions of the Opal Creek Roadless Area lies within the Detroit Tributaries Watershed. According to the Forest Plan as amended by the 1994 President's Plan, no new roads will be constructed in remaining portions of inventoried (RARE II) roadless areas, however, management activities may occur within those areas. Thus, any developments that occur in roadless areas will change the characteristic of the landscape and may remove potential semiprimitive opportunities that could otherwise be available.

Developed Recreation

Current use of developed recreation sites in the Detroit Tributaries watershed has exceeded or nearing practical use capacities for most sites as indicated in ***Table IV-1***. Practical capacity is an expression of the maximum amount of use considered appropriate for well-managed sites. Use in excess of this amount would typically result in adverse impacts to resources, site facilities and user satisfaction.

Table IV-1: **Practical Capacities for Developed Sites**

Development	ROS	PAOT	Use Season	Visits	Theoretical Capacity*	Practical Capacity*	RVD's
Hoover Campground	RN	285	160	33,015	91,200	36,480	**53,891**
Hoover Group Campground	RN	70	160	2,760	22,400	8,960	4,870
Southshore Campground	RN	240	160	20,330	76,800	30,720	**32,243**
Cove Creek Campground ***	RN	335	160	12,655	107,200	42,880	22,080
Cove Creek Group Campground	RN	70	160	1,540	22,400	8,960	2,777
Piety Island Campground**	RN	60	160	3,061	19,200	7,680	4,272
Detroit Lake State Park CG	RN	1555	160	106,320	248,800	99,520	**146,523**
Mongold Day Use Area	RN	579	160	146,858	92,640	37,056	35,902
Santiam Flats Campground	RN	250	160	20,712	80,000	32,000	**34,785**
Detroit Flats CG/Day Use	RN	125	160	11,215	20,000	8,000	**14,981**
Stahlman Summer Homes**	RN	350	160	25,460	112,000	44,800	**45,257**
Kane's Hideaway Marina	RN	NA	160	23,500	NA	NA	10,711
Detroit Lake Marina	RN	NA	160	16,220	NA	NA	5,883
North Santiam Sportsman Club	RN	250	160	22,440	80,000	32,000	28,055
Station Visitor Info. Office	RN	15	300	37,370	4,500	1,800	1,750
Total				483,456			443,980

*Longcore, Robert M., *Process for Calculation of Developed Recreation Capacity,* 1/90.

** Visitor use is estimated. *** Cove Creek opened mid-season.

Campgrounds

Seven campgrounds, Hoover, Hoover Group, Southshore, Cove Creek, Piety Island, Santiam Flats and Detroit Lake State Park are located along Detroit Lake. There are 455 developed campsites within the campgrounds and approximately 50 undeveloped sites at Santiam Flats. Detroit Lake State Park campground has 311 campsites alone and has the highest campsite density level at 9 campsites per acre. All Forest Service Campgrounds except for Piety Island are operated by a concessionaire.

Detroit Lake is a popular recreation destination, making these campgrounds the most heavily used on the District.

Cove Creek is the newest Forest Service campground and provides modern conveniences such as showers and electricity in the restroom/shower buildings. The campground added an additional 63 campsites, one group site to accommodate 70 people, 36 parking spaces at the boat launch area, boat launch, and moorage for about 12 boats. Electric power was brought up the Blowout Road to serve Cove Creek Campground and the Stahlman summer homes in 1994.

Forest Service and Oregon State Park developed campgrounds account for an estimated 197,413 visitors annually.1] These campgrounds vary considerably in terms of recreation experience, amount of development, and size. The campgrounds range from fully developed facilities including rest rooms with flush toilets, showers, electricity, full RV hookups, boat ramps and docks, barrier free campsites, trails and fishing piers, and swimming areas; to minimally developed or undeveloped campsites with pit/vault toilets and no water or garbage services. During peak season in the summer, the Detroit Lake campgrounds reach capacity on the weekends and holidays, and most weekdays. Forest Service campgrounds are used by day use visitors as well due to limited day use facilities in the area. More visitors are recreating during the week to vacation away from the growing weekend crowds.

Current capacity of campgrounds may be insufficient to accommodate current peak season during the summer, and projected amounts of increased use. 2] The historic rate of annual growth for general camping activities on the Forest is 3.4%. The Oregon State Comprehensive Outdoor Recreation Plan for region 8 (Detroit Tributaries is within this region) projects a 3.7% average annual increase in the demand for camping activities for the period of 1991-2010. Developed camping or day use at developed sites has a relatively flat trend due to full occupancy conditions on summer weekends. Camping and day use are simply limited by the available facilities. Visitors frequently mention their frustrations about the difficulty of getting a campsite at Detroit Lake. Numerous visitors are displaced to developed and dispersed sites in the Breitenbush and North Santiam Drainage.

1] Detroit District Recreation Resource Information Database (1996)

2] Longcore, Robert: ***Process for Calculation of Developed Recreation Capacity*** (1990)

The 1992 Detroit Lake Composite Area Management Guide identified a need to develop 350 campsites and eliminate existing undeveloped sites to accommodate current demand. However, with the completion of Cove Creek Campground, 287 campsites would need to actually be developed. To meet future demand, 577 campsites will need to be developed by the year 2010 as a result of the market study.

In addition, demand for developed day use facilities is greater than the existing supply.3] In the future, with growing population and increasing demands for camping and day use facilities, there will be a need to develop more of these sites. The West Cascade Oregon State Scenic Byway bisecting this watershed, will be marketed on various tourism maps which will promote and encourage use of the watershed. This may create a need to develop additional facilities, camping, day use, and parking near the highway in the future.

The Detroit Lake CAMG proposed several campground locations, all located on the south shore of the lake, away from Highway 22 traffic and the town of Detroit to minimize conflicts with residents.

Day Use Areas

Mongold State Park day use area serves the majority of boaters at Detroit and fills to capacity during weekends and holidays in the summer. Since the Composite Plan was developed, the State Park had expanded their parking to accommodate an additional 53 vehicles to a total of 193 parking spaces. Launching lanes have been expanded and improved to accommodate boat launching pressure. The swimming area grass beach was created to accommodate increasing numbers of people. Even with the addition, the park still becomes full on summer weekends and holidays, and visitors often resort to parking in the no parking zones along Highway 22 or go to Hoover and Southshore Campgrounds to launch their boats. Visitors also launch at these campgrounds to avoid paying an entrance fee at Mongold. This impacts campground users and creates parking problems within the campground and on Blowout Road. Mongold provides the only formal general swimming area at the lake.

3] Walker and Macy: ***Detroit Lake Composite Area Management Guide*** (1992)

Detroit Flats was a heavily used dispersed camping area until recent years and had many problems including sanitation, resource damage, noise and conflicts with adjacent town residents. The area has slowly gone through transition, and this year is designated as a no overnight camping area. Most issues and conflicts have been resolved during this transition. "The Flats" serves as a popular day use area for fishing, picnicking, swimming and bird watching.

Although not in the analysis area but important to the large picture of the reservoir, Upper Arm recreation site, in 1996, was converted from a large undeveloped campground to a campground with 7 campsites and a day use area on the flats along the reservoir. This area also had many of the same issues that Detroit Flats had and has been resolved with this transition. The Detroit Lake CAMG recommended converting the whole area into day use.

According to the Detroit Lake Composite Area Management Guide, 70% of visitors surveyed indicated a need for more day-use areas and lake access, particularly beach and swimming areas. Proposed day use and parking areas are located on Highway 22 and in Detroit to attract short-term users, and reduce conflicts between residents and visitors in Detroit. Day use location recommendations were based on their limited size for campground development, and proximity to Highway 22 and Detroit.

Special Use Permits

There are 70 recreation residences that are located on the Stahlman tract which provide seasonal recreational occupancy within this area. Highest use occurs during the summer months with occasional use during the winter due to limited access. Winter access to the tract by homeowners is by snowmobile when the road is closed due to snow. A few summer homes are located in riparian reserves.

The North Santiam Sportsmen's Club is a private organization site that provides 50 camp spaces and about 40 boat slips. There is a small club house on the property.

Although recreation homes, private club and organization sites are in high demand, current policy prohibits issuing special use permits for new sites to private clubs and individuals. It is viewed as a private privilege and does not promote public use of the land.

Available moorage at Detroit Lake and Kane's Marinas do not meet current demand for long term (season) and short term moorage. According to a survey conducted by the Oregon Marine Board, respondents felt that Detroit Lake has a lack of short term tie-up facilities. Since the Composite Plan was developed, Kane's Marina has added 100 boat slips with a total of 331 slips; and Detroit Marina added 50 additional slips with a total of 255 slips. In addition, Detroit Marina constructed a large parking lot to accommodate vehicles for people that use their facilities. The Composite Plan recommended the development of 150-200 additional slips was needed to be developed to meet demand in 1992. The plan also recommended an additional marina to be developed adjacent South Shore Campground.

Interpretive/Information Facilities

No interpretive facilities exist in the Detroit watershed, although there are many potential opportunities to develop as identified in the Detroit Lake Composite Area Management Guide. The State Park and Forest Service offer interpretive talks on occasion. There is a demand for these activities and are needed to promote resource protection and appreciation.

Visitor information is available at the Detroit District office, State Park, local stores, and at information kiosks at the campgrounds. A multi-level system (staffed and unstaffed visitor information stations, publications, highway guide signs, etc) for orienting visitors and supplying additional information is needed.

Trails

Two major trails, Tumble Ridge and Stahlman Point, originate near the lake and access prominent peaks in the uplands of the watershed. These trails are part of an old trail system to former lookout points, and provide views of Detroit Lake, Mt. Jefferson and other prominent peaks and rock formations. Hoover nature trail located within Hoover Campground provides the only current barrier-free trail on the District. Upland trails include Dome Rock, Phantom Natural Bridge, and Tumble Lake trails which access these features from French Creek Road. The French Creek Ridge Trail meanders in and out of this watershed to the north.

A demand for hiking and biking trails near campgrounds and day use areas was identified in the Detroit Lake CAMG. Many visitors bicycle on Highway 22 and Blowout Road which poses safety concerns with vehicular traffic. In addition, the Detroit Lake CAMG recommends developing recreational opportunities away from the lake get people away from the shore. The proposals include developing a lake loop trail connecting campgrounds and the local communities, additional upland trails that connect to campgrounds, and a bike route to improve the safety for pedestrians.

Development Opportunities:

The major constraint on development is limited physical capacity of the upland areas to accommodate recreational facilities. Topography and soils are a major factor in determining whether areas can accommodate development. Steep slopes dominate the watershed and severely limit its development potential. The watershed provides little flat land. Slopes that are 0-15% are the most suitable for development. Most of these sites are located at the east end of the reservoir and associated with the old North Santiam River terraces. Many of the areas that have development potential are already used as undeveloped campgrounds. The Composite Plan identified 193 acres as having development potential for recreation. An additional 7 acres have recreational potential but is currently used by State Parks for administrative purposes. Land suitable for development is documented in the DLCAMG, and includes areas adjacent Mongold State Park, Tumble Creek outlet, Ranger Station, Southshore and Cove Creek Campgrounds, and Sportsmen's Club; and Detroit and Santiam Flats.

Dispersed Recreation Use

There is currently no data to support estimates of dispersed recreation visitations specifically for the Detroit Tributaries analysis area. Field observations indicate that summer visitation ranges from moderate in the upper portion of the drainage, and intensive use at Detroit Lake. Peak dispersed use occurs primarily during the summer months, June through September, with big game hunting activities occurring into the fall season.

Boating

The west end of the reservoir is not used nearly as much as the east end. Distance from marinas, campgrounds, and prevailing winds, limit use of this area by many. However, it has become a good site for sailing and windsurfing. Attracting people to use this end of the reservoir for motor boating would be difficult due to the lack of development potential upland and undesirable cruising conditions created by the wind. The four lake arms are best suited for anchoring and for slower boating because of their width and underwater obstructions. According to the Detroit Lake CAMG, Detroit Lake could never attain boater capacity on the lake due to the limited development capacity on land to accommodate visitors and boat use. This figure was based on the assumption that the lake is used "equally." However, the existing use patterns on the lake is not evenly distributed thus creating potential capacity issues at the east end of the lake and within each of the arms.

According to the Oregon State Marine Board records, boat registrations in the state and in the Detroit Lake market area are growing at a rate approximately double the rate of population growth. Boat use at Detroit Lake has been increasing at an annual rate of approximately 5%. Given population and boat registration growth rates, the numbers of visitors to Detroit Lake are projected to increase. According to the Detroit Lake Composite Area Management Guide, projected numbers of visitors to Detroit Lake are expected to grow 20% between 1990-2000, and an additional 20% by the year 2010.

Dispersed Camping

Dispersed camping predominately occurs at Detroit Lake, where access is relatively easy to level areas near the shore. Dispersed camping occurs at the French Creek, Hoover, Breitenbush, Blowout and Kinney Creek Arms and accessible areas below Blowout Road, and on Piety Island. Old access roads are used and social trails developed by users to reach desirable sites along the lake. Other dispersed campsite concentrations which have a high frequency of use occur around Tumble Lake. Other site locations are scattered throughout the watershed.

Many dispersed campsites within Detroit Tributaries are associated with riparian reserves. Approximately, 2/3's of the campsites found within the watershed are located within a riparian reserve.

The total disturbed area of the riparian reserve attributable to dispersed camp sites is less than one percent.

Access roads to these sites are not considered system roads and are not currently being tracked.

Generally, there is a direct correlation between frequency of use and impact from that use. Those campsites that receive the most frequent use, subsequently, receive the most impact to resources ranging from moderate to extreme damage. Conditions of the most heavily impacted dispersed camping sites within the Detroit Tributaries watershed include: soil compaction and large barren core areas, erosion, vegetation loss and tree damage. Many hazard trees are created as a result of recreational related damage. Vehicular access to sites is not limited which attributes to some of the degradation of these sites. Another contributing factor to the condition they exhibit is the amount of use individual sites receive each season due to their popularity or proximity to specific areas of interest such as the Detroit or Tumble Lake.

Dispersed campsites located away from riparian areas do not get the intensity of use or impact.
These are generally located in the upper portions of the watershed, and are used by big game hunters for a short season during the fall. Generally, these sites are often located where existing developments have occurred such as a rock pit, landing, turnout or end of a spur road. Generally, frequency of use is from infrequent to moderate while impact from previous use is light to moderate. Lightly impacted sites are indicated by a fire ring or scar, and no other impact from campers.

Dispersed campsite conditions suggests that scenic quality and user experiences at many sites are being affected by use patterns and behaviors that shape the size and condition of sites.

Popular locations often lead to concentrated campsites within a confined area which leads to campsites located within sight and sound of each other (e.g. French Creek, Southshore). At these popular dispersed sites, sanitation, litter, and conflicts between campers is a common occurrence. Generally, campsites occupied by large groups tend to have more resource impacts to the site than small groups which have been apparent at some of the sites.

Dispersed site conditions within the watershed exhibit other characteristics that are a function of visitor behavior. It is common to find human waste proximal to dispersed sites. In addition, often waste associated with the camping experience; product containers, cigarette butts, discarded hygiene products, retired camping equipment and furniture, and other assorted goods, are left behind at the site.

This residue left by dispersed users is a concern in terms of public health and safety, particularly during periods of peak concentrated use. During this period the presence of human waste and other debris around dispersed camp areas may pose a threat to the health and safety of the users present. While visitation is of relative short duration and seasonal nature, effects to lake water quality is unknown.

The presence of human waste and debris, tree damage and loss, denuded and compacted camp areas, suggests that both the scenic quality and the intended recreation experience opportunity have been diminished for a significant number of sites within the watershed.

The Detroit Lake CAMG recommends phasing out of dispersed camping around the lake, and accommodating people in developed campgrounds as the highest management priority. Not all dispersed camp users will camp in a fee campground, and prefer a more primitive camping experience.

Dispersed Recreation Trend

The primary recreation emphasis on the Forest is on the management of dispersed recreation opportunities.

With projections of increased population growth for the mid-Willamette Valley and Portland Metropolitan areas, increased recreation use of the Detroit Tributaries watershed can be expected for a wide range of dispersed recreation activities. For the period of 1980-1989, the Forest experienced an average 2.7% yearly increase in all forms of dispersed recreation use. With projections of increased use of 1.7-4.9% for all the different forms of dispersed recreation found in the Detroit Tributaries, an increased demand for dispersed activities is anticipated. Based on these factors and the general trends of past use, it seems appropriate to assume that future participation in dispersed activities in the Detroit Tributaries will increase as long as opportunities are provided.

The watershed will continue to receive a high intensity of dispersed use within accessible riparian reserves resulting in further needed management actions to resolve resource and social impacts.

The demand will place additional pressure on the resources of the Detroit Tributaries watershed and amplify the need for intensive management of recreational use within the watershed. A response to future use may require new strategies for responding to situations where human use exceeds ROS standards for extended periods of the normal use season or if resource degradation becomes a concern. This may possibly include: a change to a management area with standards more closely aligned with the type of use taking place or altering kinds of use based on resource driven issues; or hardening or development of the area to better accommodate the type and level of use.

Data Gap

Dispersed campsite inventories were conducted in 1988. In order to more accurately monitor campsite conditions, a need exists to reinventory the sites for more current information. It would also benefit to include other sites such as non-system access roads and social trails.

In addition, dispersed use data is insufficient to give an accurate picture of the kind of use patterns that occur on a watershed scale. Sampling dispersed use information within each opportunity class by watershed would enable managers to track the conditions and use patterns/trends in order to make better management decisions.

Water quality studies need to be conducted and monitored especially in areas that receive intensive use (e.g. Detroit Lake).

USER CONFLICTS

More people sharing a "static" resource is leading to increasing user conflicts. These conflicts arise from sheer numbers, different perceptions of what is an appropriate setting, user etiquette and user impacts on the recreation resource. Most of the conflicts occur between users at Detroit Lake.

According to the Detroit Lake CAMG, visitors perceived boating issues such as boat launch congestion, boater conduct and lake congestion as serious problems. Visitors also indicated better boater safety and law enforcement is needed. Boat crowding exists in desirable locations such as Hoover Arm and impacts are greater in these narrow arms of the reservoir. Instances occur when jet skiers will disregard the five mile per hour rule in the designated areas of the lake and upset those that are fishing from boats or shore. Jet skiers and water skiers like to play in the area adjacent to Detroit residents and Detroit Flats which causes conflicts in regards to noise. Non-boaters and adjacent residents feel excessive boat noise, boater conduct, boat speeds are problems. Poor conduct by a few jet skiers can affect the experience of many. Poor boating conduct has resulted in a no water play area in front of Kane's Marina. Jet skiers seek wakes for jumping and has caused safety issues with other boaters.

A variety of boating types and experiences occur on the lake which causes conflicts between the different boaters. Fifty percent of the visitors surveyed also favored more areas that restrict powerboat use or speed. The Detroit Lake CAMG recommended designating an area for jet skiing west of Piety Island.

The limited number of day-use and swimming areas, and their location next to boat launches crowd boaters and day users into the same areas, causing conflicts, safety issues and intimidation towards non-boaters.

Forest Service campgrounds are used by day use visitors which conflicts with campground occupants. For example, Hoover Campground receives the overflow of boat launch demand from Mongold and creates heavy traffic through the middle of the campground. Visitors also use the campground boat launch to avoid paying fees at Mongold. Day users occupy parking spaces and boat launch facilities that were designed for campground visitors. Constant traffic through the campground can diminish experiences of campground occupants.

In concentrated dispersed areas such as French Creek or Hoover Arm or the dispersed campsite adjacent Southshore Campground, conflicts exist when individuals and groups of people exhibit disruptive and disrespectful behavior to others and the resources. These include loud parties, fireworks, nuisance ORV use, and discharging of firearms in vicinity of other visitors.

Areas adjacent town residents such as Detroit Flats are sensitive to disruptive behaviors and nuisance ORV use in the area. In the past, this has been a serious problem. Although these are problems are improving, there are still occasions when these problems still arise. This use has caused resource damage.

According to law enforcement incidences documented by the Oregon State Marine Board, Detroit Lake shows as one of the highest incidences of excessive boat noise, violation of boat speeds and no-wake zones, careless and reckless boaters when compared to other waterbodies in the state. The 1996 report concluded that Detroit Lake is one of the top Oregon waterbodies with the most serious law enforcement problems. Detroit Lake has numerous incidences reported of boats that had an actual or near collision with floating and fixed objects, and other boats.

Future challenges will concern a wider range of visitors who demand high quality experiences. Their diverse interests will cause conflicts among users and uses to increase.

b. Reference Condition - All Uses

*iv-5. *What are the major historical human uses in the watershed, including tribal and other cultural uses?*

Detroit Tributaries-Past Human Uses: The Detroit Tributaries Watershed has been the setting for human activities for thousands of years. Evidence for prehistoric use exists in the form of obsidian and crypto chrystaline silicate lithic scatters. Euro-American use of the area is documented in the archives as occurring in the early 1800's. However, historic sites in this watershed range in time from the 1880's to around 1950. Historic sites include trails, wagon roads, railroads, telephone lines, fire lookouts, homesteads, shelters, mining and logging camps, bridges, and the historic town of Detroit.

PREHISTORY

Historically, the Molalla are reported to have inhabited the western slopes of the Oregon Cascade Range (Nilsson 1989, Snyder 1987). The Molalla were comprised of the following three subgroups: the Northern Molalla, Southern Molalla, and the Upper Santiam Molalla. The Detroit Tributaries area lies within the tribal area of the Upper Santiam Molalla (Nilsson 1989).

Additional human groups believed to have passed through the Detroit Tributaries Watershed area include the Warm Springs, Northern Paiute, Tenino, and Kalapuya Indians (Minor and Pecor 1977:95). The seasonal hunting, fishing, and plant resources would have drawn these groups to the area. The Detroit Tributaries watershed contains an abundance of culturally significant plant species which include the following: Alaska bunchberry, big huckleberry, dogwood bunchberry, and dwarf Oregon grape for food as well as, beargrass, Oregon grape, fool's huckleberry, and vine maple for utilitarian items. Twin flower and oxalis may have been used for medicine.

HISTORY

Euro-Americans appeared in the area in the early 1800's. Although they were not homesteading the Detroit Tributaries area, they were extracting natural resources from the mountains and utilizing the forest for recreational purposes(Minor and Pecor 1977:14).

In 1889, the Oregon-Pacific Railroad began to lay tracks along the north shore of the Santiam River. The small settlement of Coe was a result of this railway expansion. When the post office was officially established on October 16, 1891 the community was named Detroit to avoid confusion with the eastern Oregon town of Cove (Maxwell 1963). The name "Detroit" was chosen for the large number of immigrants from Michigan.

A historic 1891 map shows a number of homesteads and early trails in the Detroit Tributaries area. Among 2 unnamed cabins, were the homes of C.B. Winn, E.S. Hanson, Miss Hall, John Sinsbey, Neil McRay, a structure known as Hughe's cabin, and W.L. Maple's Stone Quarry. Additional homesteads were settled along the banks of French Creek. At the turn of the century, Detroit had a store owned by E.S. Hanson, four sawmills, and a population of 100.

In 1951 the town of Detroit was moved in order to construct a water reservoir and dam. Over 200 people and businesses moved from the south side of Peity Island to its present location on the northeast side of the lake.

TRAILS

To access these areas trails needed to be blazed. The earliest documented route to this area is the 1880 Minto Pass Trail also known as the Marion and Wasco Wagon Road. This feature is shown on the 1891 map as starting west of Niagra and ending about a mile south of the confluence of Sardine Creek and the North Santiam River. Additional early trails include the Settler's Trail from Santiam, a pack trail, and the Quartzville Wagon Road which was later called the Quartzville Trail. The 1937 Santiam Forest Map had a series of trails with and without insulators primarily transecting to lookout locations. Additional trails include the Cooper Ridge Trail which is also believed to be an earlier Native American route.

LOOKOUTS

Seven historic lookouts are located within or on the boundary of the Detroit Tributaries Watershed. The 1937 map indicates the presence of the Kinney Ridge Lookout, Whitman Ridge Lookout, Monument Peak Lookout, Slate Rock Lookout, Rocky Top Lookout, Dome Rock Lookout, and the Hoover Ridge Lookout. The Kinney Ridge Lookout was established as a cabin in 1936 and destroyed in 1950. Monument Peak had a camp in 1916, a cabin in 1921, and a L-4 cab atop a middle summit in 1942. In 1973 the Monument Peak Lookout was destroyed. The earliest record of the Slate Rock Lookout is the presence of a L-4 cab in 1935. All of these lookouts no longer exist.

CAMPS

The known camps in the Detroit Tributaries Watershed include Berry Forest Camp, Hall's Camp, Mardie Dunham Camp, and Camp Mongold. Camp Mongold was built prior to 1949 to house the workers and their families during the construction of the Detroit Dam. The camp consisted of forty-eight apartments, a mess hall, fire department building, and 48 trailer houses to accommodate 350 to 400 people.

SUSTAINABLE COMMUNITIES

Surrounded by forests, it was timber that drew the first white settlers to the North Santiam Canyon. While timber has been the backbone of the region's economy, it has been a fickle one. As early as 1893, the community had to adjust to mill closures, then boom periods of little or no unemployment.

The railroad provided a link between the communities when roads were impassable, making it possible to take logs and lumber down to the Willamette Valley, and bring goods and passengers back up the canyon. The earliest timber harvest occurred in this watershed during the first decade of the 1900's (see figure below). Watershed occupants relied on timber harvesting for their livelihoods and the forests - wood, fish and game - for their sustenance. In 1926, a road was constructed between Niagara and Detroit.

Access to the watershed was primitive and in places, very difficult to negotiate. Scenic quality was heavily altered early due to timber harvesting and history of large wildfires which is still evident today.

From the 1940's, the timber industry expanded, bringing more work and more residents to the canyon community. The local economy within the canyon has gone through boom and bust cycles since the 1940's and is very closely tied to a timber economy. Dependence on timber fueled, if not caused the boom and bust cycles of the economy, and consequently the local economy has been sensitive to changes in forest policy.

***Table IV-2:* Decade Timber Harvest in Detroit Tributaries**

Year	Clearcut Acres	Shelterwood Acres	Commercial Thinning Acres	Total Acres
1901-1910	1335	0	0	1335
1911-1920	594	0	0	594
1921-1930	438	0	0	438
1931-1940	885	0	0	885
1941-1950	175	0	0	175
1951-1960	1186	0	0	1186
1961-1970	2164	0	0	2164
1971-1980	1329	28	47	1404
1981-1990	1397	20	909	2326
1991-1997	325	349	349	1023
Totals	9828	397	1305	11530

Beginning in the 1960's, increasing conflicts arose as land policy changed. In the 1980's the combination of high-tech mills requiring fewer workers, and a decrease in the timber harvest caused by environmental concerns over spotted owl habitat, significantly cut employment opportunities in the timber industry.

The region was left with few employers that offered wages which could support families and unemployment began to rise. Communities began to realize the recreational potential of the area and have relied increasingly on tourism for their economic diversity and sustainability.

RECREATION

Historically, the Detroit Tributaries watersheds did not provide opportunities that were unique, when compared to other parts of the District that were already developed eg. Breitenbush Hot Springs, Mt. Jefferson Primitive Area. From the early 1900's through the 1950's, the Detroit Tributaries area was covered by an extensive trail network connecting trail shelters, guard stations and fire lookout stations. The primary use for the trail network and structures were for fire detection and control purposes rather than for recreation. Some of these trails are part of the recreational trail network that hikers enjoy today.

Prior to the 1950's, recreational activities were primarily enjoyed by local people for hunting and fishing. Hunting and dispersed camping opportunities expanded as the network of roads were created.

It wasn't until after completion of the new North Santiam Highway during 1948 and construction of Detroit and Big Cliff Dams in 1953, that created a significant change in recreation use in this watershed. In the first decade of the reservoir's existence, fishing from boats was the primary activity that occurred on the lake.

In the late 1950's, the Forest Service began to responding to the recreation need along the reservoir by developing Hoover and Southshore Campgrounds, and making Stahlman summer home tracts available to lease by the public. During the 1960's, visitors, typically family groups from the Santiam Canyon and mid-Willamette Valley, began to come to the lake for camping, waterskiing and swimming activities.

Since most recreational developments occur within the flood plains, many structures and facilities were affected or destroyed by the Flood of 1964. In 1996, Hoover Campground was impacted by a large mudslide.

Recreation use of the lake has steadily increased over the decades and changed with new equipment technology, and facilities upgraded to accommodate use.

c. Comparison of current and reference condition

• Socio-economic Uses (e.g. sustainable communities, tourism, etc)

iv -6. *What are the causes of change between historical and current socio-economic uses?

Conditions	**Major Causes of Change**
Reference- Prior to Forest Management : The Detroit Tributaries area lies within the tribal area of the Upper Santiam Molalla (Nilsson 1989). Additional human groups believed to have passed through the Detroit Tributaries Watershed area include the Warm Springs, Northern Paiute, Tenino, and Kalapuya Indians (Minor and Pecor 1977:95). The seasonal hunting, fishing, and plant resources would have drawn these groups to the area. The Detroit Tributaries watershed contains an abundance of culturally significant plant species which include the following: Alaska bunchberry, big huckleberry, dogwood bunchberry, and dwarf Oregon grape for food as well as, beargrass, Oregon grape, fool's huckleberry, and vine maple for utilitarian items. Twin flower and oxalis may have been used for medicine. Euro-Americans appeared in the area in the early 1800's. Although they were not homesteading the Detroit Tributaries area, they were extracting natural resources from the mountains.	
▼ ▼ ⇦ ⇦ ⇦ ⇦ ▼	Railroad Forest Management Detroit and Big Cliff Dams
Reference- Forest Management to 1994:	
Economy was timber based	
Recreation use of the watershed increased significantly, especially with the construction of the reservoir.	

Conditions	Major Causes of Change
▼ ▼ ⇦ ⇦ ⇦ ⇦ ▼	Change in management practices and policies Amount of timber sold to mills Technology in the mills require less people Communities recognizing the recreational potential of the area

Current - 1994 to Present:
Timber from public lands is being offered in much smaller quantities than in the past.
The percentage of high-wage forest product industry jobs has decreased over time.
Local communities are starting to diversify their economies more than they have in the past. New businesses are mostly associated with tourism at this time, but additional diversification is being investigated.
Special forest products offered from this watershed are on the increase and will likely continue to increase in the near future.
Recreation use of the watershed has increased significantly, especially with the construction of the reservoir. The tourism economy associated with recreation has increased and are likely to continue to increase over time.
Increased use of the watershed has created a need for improved infrastructure.

• Recreational Uses

*iv-7. *What are the causes of change between historical and current recreation uses?*

Conditions	Major Causes of Change
Reference- Prior to Forest Management:	
Prior to the construction of the dam that created the reservoir, there was not as much recreation use.	
▼ ▼ ⇦ ⇦ ⇦ ⇦ ▼	*Detroit Dam and reservoir and associated construction* *Highway 22 and other improved access*
Reference- Forest Management to 1994:	
Recreation Use Patterns: see current - 1994 to present	
Facility Construction Prior to the 1950's, Detroit Tributaries was considered remote to a majority of the population, including Mill City. The transportation network to the watershed was primitive and slow. The construction and improvements of the highway and other roads in combination with economical transportation (modern automobiles), made access much easier and has resulted in more people recreating in the National Forest than in historical times. In addition, construction of Detroit Dam created a highly demanded water-based recreational resource that did not exist.	

Conditions	Major Causes of Change
Reference- Prior to Forest Management (continued):	
Promotion of Recreation Opportunities/Increasing Use: In the 1920's-1950's, early national and regional efforts promoted National Forests for people to come and enjoy. Intensive use was not an issue as it is today. Conditions affecting leisure time and its use have changed quickly during the last 40 years. People began to have more leisure time, and better mobility through improved access and economical transportation. Considered Willamette Valley's "back yard," the watershed is receiving increase use.	
Changing Demographics and Recreational Demand: Changing demographics reflects on changing and increasing recreational use and demands. In 1910, the U.S. operated on a rural economy that had 90 percent of its population living in rural areas. The population had not achieved the mobility or the freedom from sustenance requirements that would give the time and means for recreation. After World War II, society became more affluent, urban growth started to boom, transportation systems improved and industrialization has been replaced by the information society resulting with more leisure time. Rapid population growth has the most dynamic influence on recreational use.	
New Technology and Recreational Demand: Prior to World War II, recreation uses were traditional, e.g. hunting and gathering, fishing and camping. Post World War II was marked by major changes in American recreational habits. The interest in various types of recreation has varied as the population's way of living has varied.	
	Increase of use and population growth *Access - backyard destination area for the Willamette Valley* *Regional recreation area* *Changing technology*

Conditions

Current - 1994 to Present:
Recreation Use Patterns: Essentially we use the same corridors today that American Indians used for thousands of years, although we have changed their character greatly. Campgrounds, resorts and trails were developed in areas where prehistoric and historic uses occurred. People have always been drawn to areas along water, meadows, unique topographical features and vista points, whether for recreation, sustenance or cultural values. Future use patterns will likely follow the same corridors as long as access is provided and management direction allows use to continue.
Facility Construction: see reference - Forest Management to 1994
Promotion of Recreation Opportunities/Increasing Use: Local communities, with the decline of the timber industry, are trying to build strong, diversified rural economies by promoting tourism and recreational opportunities in the area. Areas in the watershed have reached or nearing capacity levels. The information highway is paving the way for promoting recreation opportunities on the Internet. Promoting and encouraging use can have adverse affects on the resources or create social issues within the watershed.
Changing Demographics and Recreational Demand: Many societal changes have occurred in the last few decades. Our society is becoming increasingly older, better educated and ethnically diverse. Americans are becoming increasingly concerned with environmental quality, quality of life, and the responsiveness of government to public needs. There is heightened concern with fitness and health. Americans are more urban and mobile, many wanting higher levels of services, developments, and conveniences. Changing lifestyles include smaller families, two-income family households, single-parent households, and non-family households. With new legislation and accessible technology developments, people with disabilities are more "mobile" and able to visit the National Forest.

Conditions

New Technology and Recreational Demand: Accelerating technological advances, including the development of equipment, transportation, and sports, necessitated more space, and the need to set aside specialized areas for activities such as jet skis and water sports, cross-country skiing, snowmobiling, para/hanggliding, trail/mountain bikes, off-road vehicles, hi-tech backpacking/mountain climbing, whitewater boating, RV camping, and stream and lake fishing. This meant a need to develop more facilities for recreational groups enjoying the forest. Although difficult to predict, new uses will emerge in the future, but historical uses will continue. People have strong ties to traditional, long-standing activities and places they enjoy.
Funding Levels: Funding levels are decreasing and demand for recreation opportunities are increasing. In order to fulfill this demand, federal agencies are looking at new ways to provide recreational opportunities such as user fees and "privatization" of operation of facilities (concessionaires).

IV. SOCIAL DOMAIN

B. Facilities

1. Characterization

The transportation network, including roads, trails, accompanying drainage structures and bridges make up a large portion of the facilities in the Detroit Tributary watersheds. Other components include structures such as summer homes, and other improvements such as camp grounds, water systems, power lines, signs and gates, etc.

Roads have provided unlimited access to the forest lands for the forest users both recreational and commercial. The users of the forest lands became used to the good quality roads that allowed them travel almost any place in the forest with ease. In the three subwatersheds; Lower Detroit Reservoir, Upper Detroit Reservoir and French Creek GIS shows 317.93 kilometers (197.47 miles) of road. The roads are made up of a state highway, portions of two double lane forest roads and a network of arterial, collector and local forest roads.

Keeping the road systems maintained is becoming more and more difficult in light of reduced timber targets, resulting in less maintenance dollars for roads under cooperative maintenance. Roads that are maintained by the timber purchaser as prehaul, haul and posthaul maintenance all contribute to possible deficient sales. Limited appropriated road maintenance dollars is reducing the size of force account maintenance crews. All of these things contribute to the deterioration of forest roads.

To reduce the number of roads and miles of roads per square mile in this watershed, the obliteration or decommissioning of roads is necessary. By obliterating and decommissioning roads, we can reduce the miles of roads to maintain, improve water quality, and reduce the stress on all wildlife. The limited road maintenance dollars can then be used to maintain other system roads.

2. What values are associated with facilities?

a. Commercial, administrative, private and public access to National Forest lands is valued for the opportunities it provides for recreation, commercial, and administrative operations, etc.

b. Recreation facilities are valued for the comfort, safety and shelter they provide, as well as, for aesthetic and historic reasons.

3. What are the highest priority issues or resource concerns associated with facilities?

a. Conflicting management objectives and/or resource impacts resulting from construction, maintenance, protection and use of various facilities.

- Many roads, bridges and recreation facilities in the watershed are located in riparian reserves. Managing these facilities may be in conflict with Aquatic Conservation Strategy objectives.

- Some facilities were damaged in recent flood events, repair of these facilities may be in conflict with other resource objectives.

b. The ability to adequately maintain facilities and provide for public safety, given shrinking budgets.

c. Public access to public lands in light of reduced road maintenance budgets, etc.

4. What are the management direction/activities, human uses or natural processes that affect facilities?

a. Current condition

iv-8*What is the existing condition and trends of the facilities within the watershed? (Transportation facilities, road management, campgrounds, special uses, signs/gates, power lines, trails, Detroit domestic water intake, etc.)

1. Transportation Facilities and Road Management:

State Highway 22 divides the Detroit tributary watersheds north to south. Access is provided to these watersheds by the following roads (***Table IV-3***):

Table IV-3:

Portion of the Watershed	Road
Northwest one third	State Forest Road named Rocky Top
North (center) one third	Forest Road 2223
Northeast one third	Forest Roads 46 and 4695
Southeast half	Forest Road 10 and 1003
Southwest half	Forest Road 2212 and 2212-610

The remaining system of collector and local roads provides access to federal and private lands for public use, resource management and protection. The Forest Service maintains 212 kilometer's (132 miles) that access 31,826 acres Forest Service land. Other owners within the watershed are County with 61 acres, State with 6,741 acres, Coups of Engineers 1,126 acres and Private 9,581 acres for a total of 49,335 acres within the Detroit tributary watersheds.

Table IV-4 shows the total miles of road by category kilometers/miles are based on the GIS transportation data base.

Table IV-4: **Total Kilometers and Miles of Road by Category**

Road Owner	Kilometers of Road	Miles of Road	System Roads	Road Category
Forest Service	8	5	Yes	Arterial Roads
Forest Service	76	47	Yes	Collector Roads
Forest Service	129	80	Yes	Local Roads
Forest Service	34	21	No	Temporary roads not obliterated, power line access roads and roads to dispersed recreation sites, etc.
Private	45	28	N/A	
State	26	16	N/A	
Total	318	197		

There are probably additional kilometers/miles of private road and non-system Forest Service roads in the analysis area, but they have not been inventoried or tracked. Road miles included in this analysis area are those miles that are on the GIS system, TRAN layer. This information has not been field verified.

Highway 22: Highway 22 is a major east/west access route from the mid-Willamette Valley. Highway 22 is designated as an Access Oregon road which is targeted for improvements that will help move goods, services and travelers from one part of the state to another. These highway upgrades will continue to make it easier for people to make the trip from the valley to the lake. The road currently provides access for about 4000 cars a day.

People use many of the pull-off areas for parking and to enjoy the views. One of these turnouts provides an excellent view of Mt. Jefferson which could be formally developed as a viewpoint. This is the first place along the highway that affords eastern bound traveller a view of the mountain. Travelers have limited views of the reservoir due to vegetative screens except where vegetation has been managed along the highway. Because of limited parking opportunities around the lake, many people use the edge of the highway for parking although many areas are signed prohibiting this. According to the Detroit Lake Composite Area Management Guide, visitors surveyed indicated parking, safety on Highway 22 and automobile congestion are serious problems and needs improvement.

The Highway 22 committee, a citizens committee, made several recommendations for the Highway within the watershed to improve safety. They include: 1) constructing barriers or provide screening to prevent rocks from falling on the road. Some of this has been completed. 2) Bring Highway 22 shoulders to state standards and eliminate undersized turnouts. Define egress and ingress to the remaining turnouts. 3) Improve sightliness at the Blowout Road/Highway 22 intersection. 4) Improving pedestrian access on Blowout Road and Highway 22. The Detroit Lake CMAG also recommends providing additional parking along Highway 22 that is defined, paved and screened from the road.

Road Management: Management of the transportation system includes road resources protection, as well as, providing a variety of recreational experiences and management opportunities. Road Management Objectives determine purpose and use of each road, regulate traffic use during wet weather to prevent damage to riparian resources and the road infrastructure. ***Tables IV-5a and 5b*** show functional classes and road surfaces for these watersheds. ***Tables IV-6a and 6b*** show maintenance classes. Maintenance levels are based on the type and amount of use on each road.

Table IV-5a: **Surface Types and Functional Classes (in Kilometers) for Forest Service Roads.**

Subwatershed	Asphalt Surface	Aggregate Surface	Improved Surface	Native Surface	Total KM by Surface Type	Functional Class: Arterial	Functional Class: Collector	Functional Class: Local	Total KM by Functional Class
French Creek	6	40	9	4	59	N/A	35	24	59
Upper Detroit Reservoir	16	54	16	14	100	N/A	32	68	100
Lower Detroit Reservoir	12	28	10	5	55	8	10	37	47
Total	34	122	35	23	214	8	77	129	206

Table IV-5b: **Surface Types and Functional Classes (in Miles) for Forest Service Roads**

Subwatershed	Asphalt Surface	Aggregate Surface	Improved Surface #	Native Surface	Total Miles by Surface Type	Functional Class: Arterial	Functional Class: Collector	Functional Class: Local	Total Miles by Functional Class
French Creek	4	25	5	2	36	N/A	21	15	36
Upper Detroit Reservoir	10	34	10	8	62	N/A	20	42	62
Lower Detroit Reservoir	7	17	6	3	33	5	6	23	29
Total	21	76	21	13	131	5	47	80	127

Improved denotes a surface type of Pit Run or Grid-Rolled material other than crushed aggregate . Road could have only spot rock or be surfaced with this material full length

Table IV-6a: **Road Maintenance Levels (in Kilometers) for Forest Service Roads.**

Subwatershed	Maintenance Level 1	Maintenance Level 2	Maintenance Level 3	Maintenance Level 4	Maintenance Level 5	Total KM for Forest Service Roads
French Creek	15	29	14	N/A	N/A	58
Upper Detroit Reservoir	35	40	25	N/A	N/A	100
Lower Detroit Reservoir	16	15	14	10	less than 1 km	56
Total	67	86	56	10	less than 1 km	214

Table IV-6b: **Road Maintenance Levels (in Miles) for Forest Service Roads.**

Subwatershed	Maintenance Level 1	Maintenance Level 2	Maintenance Level 3	Maintenance Level 4	Maintenance Level 5	Total Miles for Forest Service Roads
French Creek	10	18	8	N/A	N/A	36
Upper Detroit Reservoir	22	24	16	N/A	N/A	62
Lower Detroit Reservoir	40	9	9	6	less than 1 mile	65
Total	72	51	33	6	less than 1 mile	163

Road Construction: During the planning phase of a district project (e.g. timber sale), access needs are determined. If road construction is necessary, a determination is made whether the road will be added to the transportation system, specified road construction, or if the road will be decommissioned /obliterated after harvest, temporary road construction. Less specified road construction is being done due to concerns about road densities, and because small timber sales do not create significant amounts of purchaser credits to construct or reconstruct the existing roads for removal of timber. One option that is available, is to construct the required roads as temporary roads and obliterate or decommission them after the timber has been removed. Temporary roads cost less to build than system roads and compensation is part of the timber appraisal.

Shrinking road maintenance funds has resulted in not being able to maintain the entire road system to Forest road standards. To provide safe access and reduce the probability of further damage to the roadways from heavy trucks, weather, etc., road reconstruction for project access is becoming more common.

Road Reconstruction: Reconstruction of forest roads is considered when any of the following conditions are encountered.

- For maintenance level 3, 4, and 5 roads when they are in noncompliance with the Highway Safety Standards Act.
- For maintenance level 2 roads that have unsafe conditions that will not allow commercial use.
- For maintenance level 1 roads if the road is to be used for commercial use.
- For any road that with continued use; commercial or public, will compromise the underlying framework or features such as the subgrade, base course and drainage structures.
- Roads damaged by storms that create any of the situations in the scenarios above.

Flood's Effects to Road System: The Detroit Tributary watersheds road system provides a broad range of access to areas within the watershed. The floods of 1996 has changed this scenario to some extent. At the present time a few assessments remain to be made although the majority of the assessments have been made. The full extent of damage will not be totally known until all assessments have been completed. ***Map IV-3*** illustrates where in the watershed damage to roadways is the most severe. The damage was not so severe as to close the roads 2207, 1003 and 2212-530 to travel, but these roads are to be traveled with caution. Many roads that were traversable by passenger car last year are now accessible only to high clearance vehicles.

In reality, the storms of 1996 have just accelerated the trend of roads closing due to lack of maintenance and use. The floods of 1996 damaged roads in all three of the subwatersheds, however, only the Upper Detroit Reservoir subwatershed sustained enough damage for sites to qualify for ERFO *(Emergency Relief [for] Federally Owned [roads])* funding. There are 6 sites on road 1003 which is located on the South side of the reservoir and 2 sites on road 2207 on the North side of the reservoir. All 8 sites are scheduled to be repaired in 1998. Until all repairs are made travel on these roads will be restricted.

Access and Travel Management

Current Road Densities: *Table IV-7.* Average densities of roads on Forest Service in Miles per Square Mile by Subwatersheds.

Subwatershed	Road Densities
	Miles per square mile
French Creek (031)	3.05
Lower Detroit Reservoir (032)	2.39
Upper Detroit Reservoir (781)	2.45

Future Road Network: Access to the watershed in the future will be determined by an Access and Travel management plan. Such a plan will not be done at this time, however, the following factors need to be considered in the development of this plan:

- User Needs and Access Conditions,
- Resource Protection,
- Road Maintenance Funding

User Needs and Access Conditions:
Below is a generalized description of user needs and access conditions

Fire:

- Response time for initial attack situations will increase until damage from the storm can be repaired.

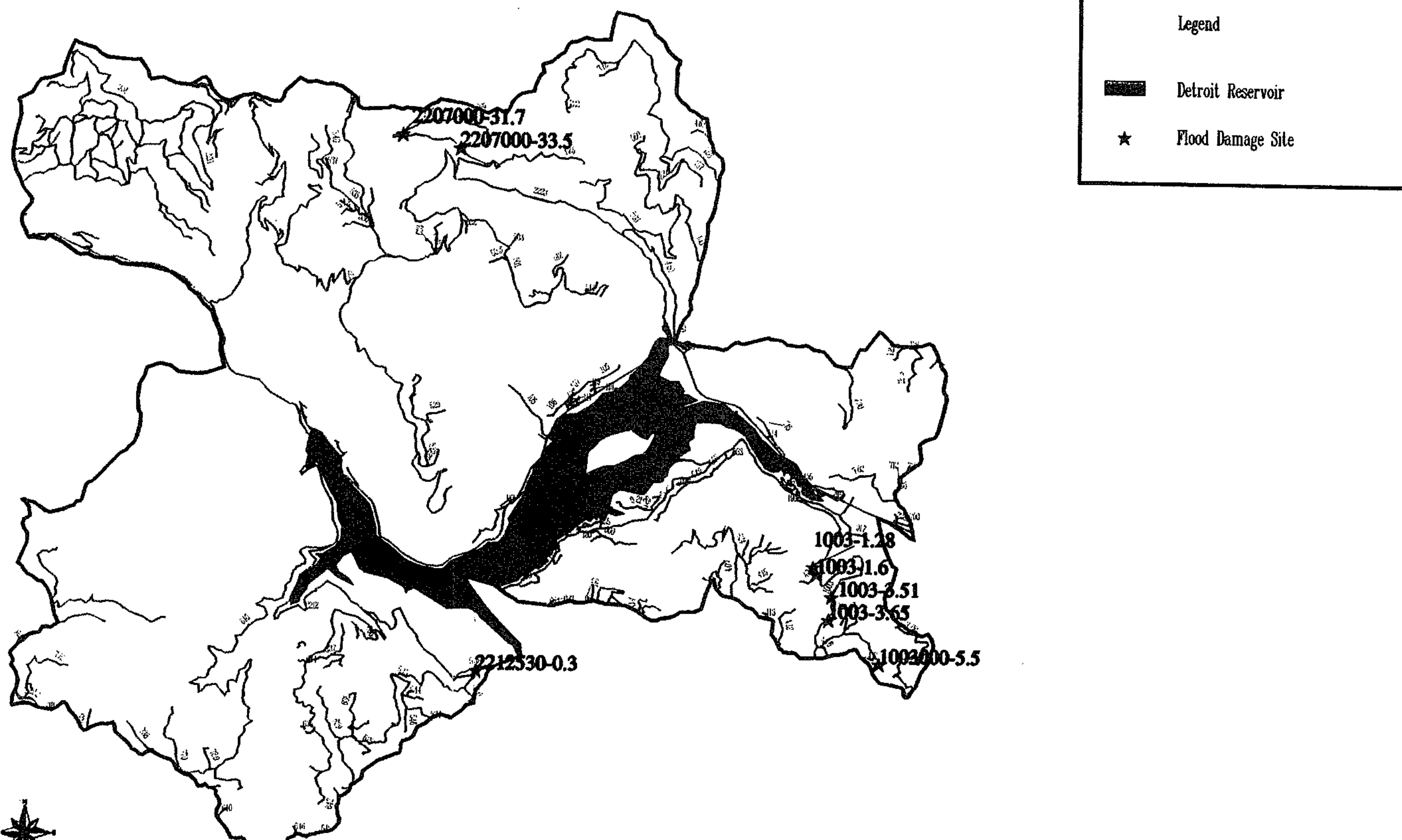
- Although roads are decommissioned access would still be possible. Roads would need to be opened by a piece of heavy equipment.

- Most pump chance access roads are still open.

Administrative:
- Preparation for commodities harvest;
- silvicultural and fuels treatments of managed stands;
- wildlife species and stream conditions surveys;
- habitat enhancement, mitigation and restoration projects are just examples of management activities that are impacted. There will be an increase in costs in performing almost all aspects of resource management activities. This was a trend already being felt.

Recreation: The road system provides for a broad range of recreational opportunities in a variety of settings.

Flood Impacted Roads



Detroit Tribs Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/05/97

MAP IV–3

Request #1537

The absence or presence of roads is one of the most critical aspects of a setting that affects people's recreation experience. Currently, there are more than enough roaded opportunities to support the current and future demand. The key is to provide a variety of opportunities which encompass all ranges of roaded and unroaded settings, that is consistent with use patterns, public demand and resource objectives.

Currently, there is access to all developed campsites and trail heads, though there is some localized damage to the roads that calls for extra caution by travelers. Forest Road 10 is open and provides access to Hoover camp ground, Southshore camp ground and the new Cove Creek camp ground at km. 5.64 (mi. 3.5). Forest Road 10 is closed at km 11.27 (Mi. 7.0) and will remain closed through the year 1999. The 7.08 km. (4.4 mi.) of road beyond will be obliterated and a new single lane route will be reconstructed and constructed higher up the hill, planned completion date late 1999.

Dispersed recreational opportunities have been reduced in areas behind gates that prohibit motorized travel due to wildlife or other resource concerns.

Conditions of roads play a factor in whether or not a visitor has a satisfactory experience. Visitors driving for pleasure in a standard automobile or RV would require a well-maintained route while off road vehicles would prefer a more rugged experience. Driving for pleasure is a growing and popular activity within the Detroit Tributary watersheds. Safety of roads is a concern within the roaded recreation settings. Currently, lack of maintenance from decreasing road maintenance funding is resulting in many roads becoming unsafe, requiring extra caution or closed to access.

In contrast these closed roads have increased opportunities to bike and hike free from interference with motorized vehicles. "Roads to trails" opportunities could arise for mountain biking, horseback riding or lowering standards for maintenance could provide opportunities for off-road vehicles use such as trail bikes or all-terrain vehicles.

Private Land: Access to private land is adequate at this time. With the decreased ability to maintain roads there is a need to renegotiate cooperative agreements to help meet the needs and management objectives of all parties.

Resource Protection:

Road management is especially important to implement Forest Plan standards and guidelines for wildlife and watershed protection.

Road Maintenance Funding:

Declining maintenance dollars are resulting in reduced access for all users in many areas of the watershed. Few of the local system roads receive annual maintenance. Over all, less surface, drainage and roadside maintenance is being done. At present roads are closing themselves through cut or fill slope failures, stream crossing failures and brush encroachment. These "closures through neglect" do not provide protection against resource damage or protection of the large capital investment made when the roads were constructed. Over time, only those roads where maintenance is performed will remain open.

Other roads may remain open depending on:
- Level of use that will discourage brush encroachment.
- Vegetative type not prone to brush encroachment.
- Soil stability or back and fill slopes that are not prone to sloughing of material that can block drainage or road prism.
- The condition and functionality of the drainage system.

The road network should be no larger than necessary to achieve management objectives consistent with legal requirements, user safety, environmental considerations and economics. Based on objectives and the ground conditions. Following are various techniques to be utilized.

Road Closures: No data is in GIS data base on how many kilometers/miles of road has been closed in these three subwatersheds. Road closures have not been widely implemented in this area but some roads have been closed.

- Roads are closed by a verity of devices including locked gates, guardrail barricades and aluminum non-locking pole closures.

- Motorized travel in most closure areas is restricted for the public, but administrative travel is not.

- Vandalism on closure devices is high and maintenance is expensive. Because of the reduction of maintenance funding maintenance is inadequate.

- Enforcement of closure, due to the condition of closure devices, lacks of adequate signing and the tendency for closures to be left open for long periods of time, is difficult.

- Roads behind closures have not been decommissioned to reduce maintenance obligations.

Road Decommissioning: Due to continued reductions in road maintenance funding and road kilometers per square kilometer (miles per square miles) is greater than the desired density decommissioning is a tool to be used to help restore the hydrologic features and reduce the kilometers/miles of road maintenance. Following is a discussion about what decommissioning is and how it can be accomplished.

- Entrance closure: This is accomplished in a variety of ways; earth berms, tank trap, barricade with logs and stumps, etc.

- Aggregate removal: This consists of windrowing aggregate surfacing for loading and hauling to stockpiles for later use.

- Water barring: The cutting of drainage ditches across the road to intercept water and get it off the road surface to prevent erosion. Usually includes intercepting the drainage ditches paralleling the road.

- Scarification: Scarify the road surface to facilitate establishment of vegetation.

- Revegetation: This usually consists of planting and seeding to control erosion and sedimentation and/or planting trees.

- Culvert removal: In drainage's with live streams, culverts are some times removed to eliminate risks of catastrophic failure should the culvert become plugged at a later date. Fills are normally removed to restore the natural channel and ensure stability.

- Overflow ditches: Sometimes used as an alternative to culvert removal in situations with low risk of culvert failure and high cost of culvert removal. This treatment consists of lowering grade over culverts so that if they ever plug the water will stay in the channel and not run down the decommissioned roadway. Rock or wood and brush may be placed in the overflow channel to prevent erosion.

- Sidecast pullback: Excavation of side cast road construction material that is now settling and/or failing. Priority for the pullback is normally in areas adjacent to anadromous fish habitat streams. The material may be placed along the road against the cut slope or transported to a permanent waste storage area, depending on site conditions. Settlement and failure maybe the result of decaying construction slash and vegetation buried within embankments.

Any or all of these techniques may be used on any given road segment.

The following categories of roads should be decommissioning priorities within this watershed:

- Roads adversely impacting riparian functions need to be upgraded or decommissioned.
- Where public safety is a concern.
- Where lack of maintenance is causing damage to the road investment.
- Road densities having an adverse effect on big game and hydrologic recovery.

Scenic Byways

A portion of the Oregon West Cascade Scenic Byway, along Highway 22 east of Detroit bisects the watershed. Communities are supporting these designations as a means to increase tourism, and to improve and diversify local economies. The most popular dispersed recreation activity in Oregon is scenic driving. This activity will continue to increase and bring more people into the watershed. The Byways will be marketed through various state tourism media and maps.

3. Developed Recreation Facilities

Developed recreation sites including campgrounds, day use areas, the Sportsmens Club and summer homes occupy approximately 400 acres and are located partly within riparian reserves. The area in riparian reserves dedicated to developed recreation facilities and use is 185 acres.

Developed sites are vulnerable to vandalism at times, and receive normal "wear and tear" through use and age, and incidental damage from weather events. The condition of developed recreation facilities is assessed annually and documented in the District's Infrastructure database. This assessment documents the specific conditions of all the facilities within a developed site area and identifies and schedules needed maintenance or replacement. Many of the pit/vault toilets are old and in need of replacement. A complete list of the facility condition assessment of individual sites in the Detroit Tributaries can be obtained from the District database.

According to the Detroit Lake CAMG, visitors surveyed responded condition of existing restrooms or lack of sanitary facilities in undeveloped areas as a problem. In addition, visitors desire for more extensively developed campsites and day use areas, including RV hookups, flush toilets, and showers.

The State Park's sewer system is presently operating over capacity. The State Parks system uses holding tanks to distribute the peak weekend flows.

In addition to natural causes, hazard trees are created as a result of recreational related damage. Public safety and liability is a concern within all developed sites including campgrounds, administrative sites, summer homes, trailheads, parking areas, and minimally developed dispersed sites. These areas receive highest priority for falling hazards to protect visitors.

Traditional appropriated funding for campground operation and maintenance is declining. Budget reductions may inhibit maintaining facilities to the levels of use they receive. The Forest Service is looking to the private sector to manage public campgrounds in order to keep campgrounds open. The "savings" incurred will allow the Forest Service to continue to manage the smaller, less "profitable" campgrounds.

Campground, trail and other facility construction and reconstruction have been funded through the Capitol Investment Program which too is facing cutbacks. Recreation managers will need to look at alternative ways of funding recreation development in the future. User fees will be implemented on National Forests in the future as a means to support recreation use on federal forests.

4. Detroit and Big Cliff Dams

Detroit and Big Cliff Dams provide flood control, hydroelectric power generation, agricultural irrigation, reservoir and downstream recreation, and water supply to municipal and industrial users. These dams are part of the Willamette Basin Reservoir System which consists of 13 water resources projects. The season of major flooding generally extends from mid-November through February. This is when maximum flood control storage space is provided in the Detroit Reservoir. The space reserved for flood storage is gradually filled to the maximum conservation pool by early May. During summer months, water may be released from the dam for meeting mainstem flow requirements. However, due to Detroit's high recreation demand, the reservoir is used last for this purpose. Currently, the Army Corps of Engineers and the Water Resources Department, is conducting a Willamette Basin Reservoir Study. The goals and objectives of the study focus on developing operational modifications to meet future water demands during the conservation season in the summer. Later an Environmental Impact Statement will be developed based on the findings of the feasibility study. Recreation activity associated with Detroit Lake is a major contributor to the local economy so maintaining maximum pool levels is desirable.

5. Power Lines

Two power line corridors maintained by Bonneville Power Administration (BPA) and Portland General Electric (PGE) transect the length of the watershed. BPA and PGE are concerned about maintaining the corridor free from trees and access to their facilities. BPA and PGE constructed system of spur roads to access the power line and towers for construction and maintenance. It is unknown how many miles of roads exists or their condition. Management of the power lines is done through Memorandums of Understandings between these agencies and the Forest Service. These Memorandums were last updated in 1982 and need to be revisited.

According to the agreements, BPA and PGE are responsible for all maintenance of the transmission line access roads which are not part of the Forest Service system. Most of these power line access roads have not been incorporated to the Forest Development Road System. maintenance by BPA and PGE should include water-barring of roads and seeding and fertilizing of cut banks or fills. As per agreement, Forest Service activities may not close or hamper access to transmission lines or towers for maintenance or emergency use.

The area under the power line is commonly used for ATV use, hunting, biking, camping and target shooting. The power line corridor is a concern because it detracts from overall scenic quality in the Detroit Tributaries watershed.

As per agreement, Forest Service activities may not close or hamper access to transmission lines or towers for maintenance or emergence use.

6. Public Water Use

The Detroit Tributaries serves as a domestic water source for the City of Detroit, watershed campgrounds, organization sites and summer homes, administrative sites, so water quality is very important to people. Detroit's water intake is located on Mackey Creek. The Flood of '96 brought some wood debris down the creek and blocked the intake. Detroit's water system is relatively new, however, the City lacks adequate water storage facilities to supply water volume during high use periods in the summer. Once a sewer system is constructed, housing developments will increase placing additional pressure on water needs. Detroit's water distribution system is old and needs to be replaced. Detroit's water needs projects are addressed in the North Santiam Canyon Economic Strategic Plan. Idanha received federal grants to construct a new water treatment and distribution system.

7. Sewer

Watershed cities and facilities are not currently served by a community sewer system. Individual campgrounds, residents, administrative sites and businesses have their own on-site sewer facilities. These facilities range from new septic systems, built according to state standards, to substandard cess-pools and seepage pits. A majority of Detroit and Idanha systems were installed prior to the revision of statewide DEQ requirements and therefore would not adhere to today's standards. Many residential, commercial and industrial lots cannot be developed due to insufficient lot size to accommodate on-site sewage treatment. The Detroit Lake State Park's system is presently operating over capacity. The State Park system uses holding tanks to distribute the peak weekend flows because drain fields cannot absorb the current capacity.
A Upper North Santiam River Canyon Sewage Treatment Feasibility Study was conducted and raised concerns about public health and water quality, especially during the peak recreation period. The study recommended an area-wide sewage collection and treatment system to serve the area. The report encompasses the alternatives for sewage collection, treatment and disposition within the cities of Detroit and Idanha, and all Oregon State Parks facilities and Forest Service, Detroit Ranger Station.

The study recommended the treatment site alternative located above French Creek. The collection system is a combination of gravity sewers and pumping stations within road rights of way. Treatment is provided by a facultative sewage lagoon augmented in the summer with surface aeration to accommodate seasonal loadings. Treated wastewater is stored during winter low-flow times and irrigated on forest land during the summer growing season. The states Three Basin Rule prohibits the point source discharge of sewage to the North Santiam River or it's tributaries.

8. Rock Quarries/Mining

The Detroit Tributaries area contains # developed quarries that provide rock material for administrative use. The area also has several locations where crushed rock is produced and stored for road maintenance purposes. Some quarries are frequently used for recreational target shooting and camping. One placer mining claim exists on Dry Creek.

9. Shoreline Stability

Shorelines along the east side of Detroit Lake are eroding from wave action caused by wind and boating. It is posing a threat to private landowners property and facilities. The shoreline is owned by the Army Corps. of Engineers and is managed by the Forest Service In the past, the Corps of Engineers has restored and riprapped banks that eroded onto private property. Some adjacent land owners have received permission to harden banks at their won expense.

b. Reference condition

*iv-9. *What were the major historical facilities in the watershed?*

Road network: Development of this transportation system has occurred primarily in the last 50 years. Prior to the 1940's most of the timber lands was accessible through a large trail system. Below is a synopsis of the major transportation events of the last 100 years that contributed to the development of the current Detroit Tribs transportation system.

Highway 22 splits the watershed in half and made possible to development of access into the Detroit Tributary watersheds. The following is a chronology of highway 22 development:

1913: Road in current Highway 22 location ending in Niagara.

1926: A road was constructed from Niagara to Detroit. Road was primitive and in places, very difficult to negotiate. Rail still the major access mode.

1935: Approximate time highway was built at present location from Detroit East through to the Santiam Junction. Access from the prior to this time was only by trail.

1948: The highway was built on it's present location from Gates to Detroit. This event opened up the upper canyon country as auto and truck access had been very difficult until then. When the highway was finished the railroad was dismantled at the site of the dam.

Road Construction 1950,s

In the 1950's roads began to be constructed into the forest using timber to pay for the road construction. Construction practices were to cut the right of way; remove the trees, side cast the excavation; (no mater how steep the side slopes) install the culverts and throw on some rock. The roads were built only for the removal of timber. Road construction cost; estimated by the Forest Service, was amortized out of the cost of the timber to the purchaser. Under this contract the Purchaser was very much in control of how the roads were constructed. The survey on many of these roads was a grade line marked with tags and located either by the Forest Service or the Purchaser. The contract was administered by the timber sale officer. During this time period road building was not well controlled by the Forest Service. No changes could be made with out agreement of both parties. Then the estimated dollar amount for road construction could not be changed, if the change resulted in additional work the purchaser's profit would be reduced. Under these conditions it was difficult to get both parties to agree. The kilometers of road construction in the 1950's was relatively small when compared to what was to come.

Road Construction 1960,s

In the early 1960's a new contract for Timber Sale Road Construction was implemented. The specifications were not a lot different than the previous contract but there were changes in how timber sale road construction was paid for and provisions were provided for the increase or decrease of dollars for the changes that were allowed to be made to the road construction costs estimated by the Forest Service. During this time, the construction practices of the 1950's did not change much for roads using timber generated dollars (Purchaser Credits). Under this contract the purchaser had less control over how the road was constructed than in the 1950's.

Appropriated dollars from Congress was becoming available for the construction of forest roads administered under Public Works Contracts, these contracts were held to higher standards than the timber sale contract. Most of the road surveys and all of the road design was accomplished by the Forest Service. Under this contract the road construction was better controlled by the Forest Service. Typically, the single district timber sale inspector would have all the on going timber sales on the district, be it 1 or 15 with no extra help. Each public works contract would have 1 to 3 inspectors depending on what work was going on. The kilometers of road constructed during 1960's was greater than those of the 1950's.

Road Construction 1970,s to Middle 1980,s

In the early 1970,s a new contract was implemented that could be used with both the Timber Sale contract and the Public Works contract. This new contract changed the way timber sale roads were constructed. The Forest Service now had control of how timber sale roads were constructed. The lines of contracting authority for the timber sale contract were changed giving engineering the road portion of the Timber Sale contract.

Some of the other major changes that allowed for control of the construction practices were:

- Clearing options that could be specified to best fit the needs of the area.
- Construction tolerances with maximum deviation from the lines and grades as staked.
- Compaction requirements for embankment materials.
- The haul and placement of excavated materials as a Pay Item.

It was determined that the Highway Safety Standard Act applied to all forest roads existing and new must comply with this act. The price of timber sale road construction increased greatly due to this determination and the use of the contract new options. Construction practices were improved by the use of the construction options and compliance with the Highway Safety Standards Act.

Control of the contract was established by the change in the contract lines of authority and an organizational change to zone engineering that provided additional personnel. Inspectors now had only 1 or 2 timber sales to inspect which allowed more time on the ground for each sale. From the early 1970,s to the middle 1980,s the construction of forest roads was at its height.

Road Construction Middle 1980,s to Present

In the middle 1980,s a Memorandum of Understanding between the Forest Service and the National Transportation Board was signed. This memorandum is an agreement that forest roads which are maintenance level 1 and 2 would not be required to meet the requirements of The Highway Safety Standards Act. Maintenance level 1 and 2 roads are maintained for travel by high clearance vehicles (pickups) and public travel is not encouraged. Maintenance level 3, 4 and 5 roads are maintained for low clearance (passenger cars) public travel is encouraged and must meet the requirements of The Highway Safety Standards Act. The 1970,s road construction contract has been revised three times since it was first implemented. The first and second revision; in 1979 and 1985, were minor not changing the basic requirements of the contract. The third revision in 1997 again did not change the basic requirements of the contract but it was rewritten in the Imperative Mood and the Method of Measurement was changed to Metric. The contract has always been very versatile providing the necessary specification to allow the Forest Service to construct any type of road needed. We are no longer building as many kilometers (miles) of road each year as in the past. Roads are still being built but they are short local roads, mostly less than a 1.6 kilometers (1 mile) long. Because of shrinking road maintenance funds it is not possible to maintain all of the system roads in our inventory For this reason existing roads in maintenance level 1 and 2 are bring considered for decommissioning. **The heydays of building kilometers and kilometers of forest roads every year is over.**

***Road Maintenance*:** Past emphasis on timber management has resulted in a large road system to gain access to timber and other Forest commodities. Timber sale revenues paid for the majority of road construction, reconstruction, and maintenance. As timber harvest activities have decreased so have the traffic generated funds for maintenance. In conjunction with timber revenue decreases, appropriated dollars from Congress are decreasing also.

c. Comparison of current and reference condition

*iv-10. *What are the natural and human causes of change between historical and current facilities?*

Conditions

Major Causes of Change

Reference- Forest Management to 1994:
Detroit and Big Cliff Dams were constructed in 1953 to meet the needs of a growing population living in the floodplains of the Willamette Valley.

Highway 22, constructed in 1948, provided access to the east side, these watersheds, and the North Santiam communities.

The development of the current forest road network began in the 1940's to extract timber and provide access to remote areas.

The powerline corridor was constructed in 1960 to provide electricity to the Northwest.

*Declining **road funds generated by timber sales** due to less volume harvested resulting in declining **appropriated road maintenance dollars***
Increased demand for facilities

Current - 1994 to Present:

Declining maintenance funding for publicly owned facilities are resulting in the degradation of facilities or closing of roads

Demand for accessibility, barrier-free access laws, resource protection, and change in user needs and preferences creates a need for upgrading and improvement of facilities.

Facility condition has been affected by age, natural elements and process (wind, floods), and human use, including normal "wear and tear" and vandalism.

Conditions

Current - 1994 to Present (continued):

Increasing use has placed pressure on existing septic systems raising concerns about public health and water quality. Community growth and economic diversification is dependant on adequate infrastructure.

Road Management: Management of the road system is changing due to current and projected federal road maintenance budget declines and multiple resource objective needs described in the amended Forest Plan.

Economics: Decreases in annual maintenance budgets are down 80% from 1989 through 1997. A direct correlation brings the kilometers/miles that can be maintained in this watershed from 213 Km. (132 Mi.) to an estimated 43 Km. (26 Mi.).

This 43 Km. (26 Mi.) is approximately 50% of the total length of the system of arterial and collector roads in this watershed. Based on this information approximately half of the collector roads would receive very little if any maintenance and the local roads which are 129 Km. (80 Mi.) of the total road system would receive no annual maintenance. As a result roads are closing themselves through cut or fill slope failures, stream crossing failures and brush encroachment.

Some of the damage that occurred in the 1996 storms events can be linked to the lack of adequate maintenance.

Increasingly roads will be closed for a variety of reasons or will naturally close themselves due to the absence of maintenance from decreasing road budgets. With declining road maintenance budgets, and concerns related to watershed quality and wildlife habitat effectiveness, road decommissioning and obliteration will be common in the future. Closed access will remove some roaded dispersed opportunities that presently exist.

Conditions

Major Causes of Change

Current - 1994 to Present (continued):

As roads are closed, more pressure may be placed on roaded areas outside of closures, and former roaded dispersed areas will probably not receive the use that previously existed. "Established" users of an area may be displaced to other areas that remain accessible. Roads with the highest use will result with the most significant impact on users. The public perception of access is that they have grown accustomed to the current access and may expect the same level of service.

IV. SOCIAL DOMAIN

C. Scenic Quality

1. Characterization

- The Forest Plan identifies the North Santiam Viewshed which is a dominating theme within this watershed, and is to be managed for a high level of scenic quality (see management allocation map). However, with the diverse land ownership within this watershed, it makes achieving overall scenic quality more difficult.

- The quality of the Forest's scenic resource is important to the existing local tourism economy.

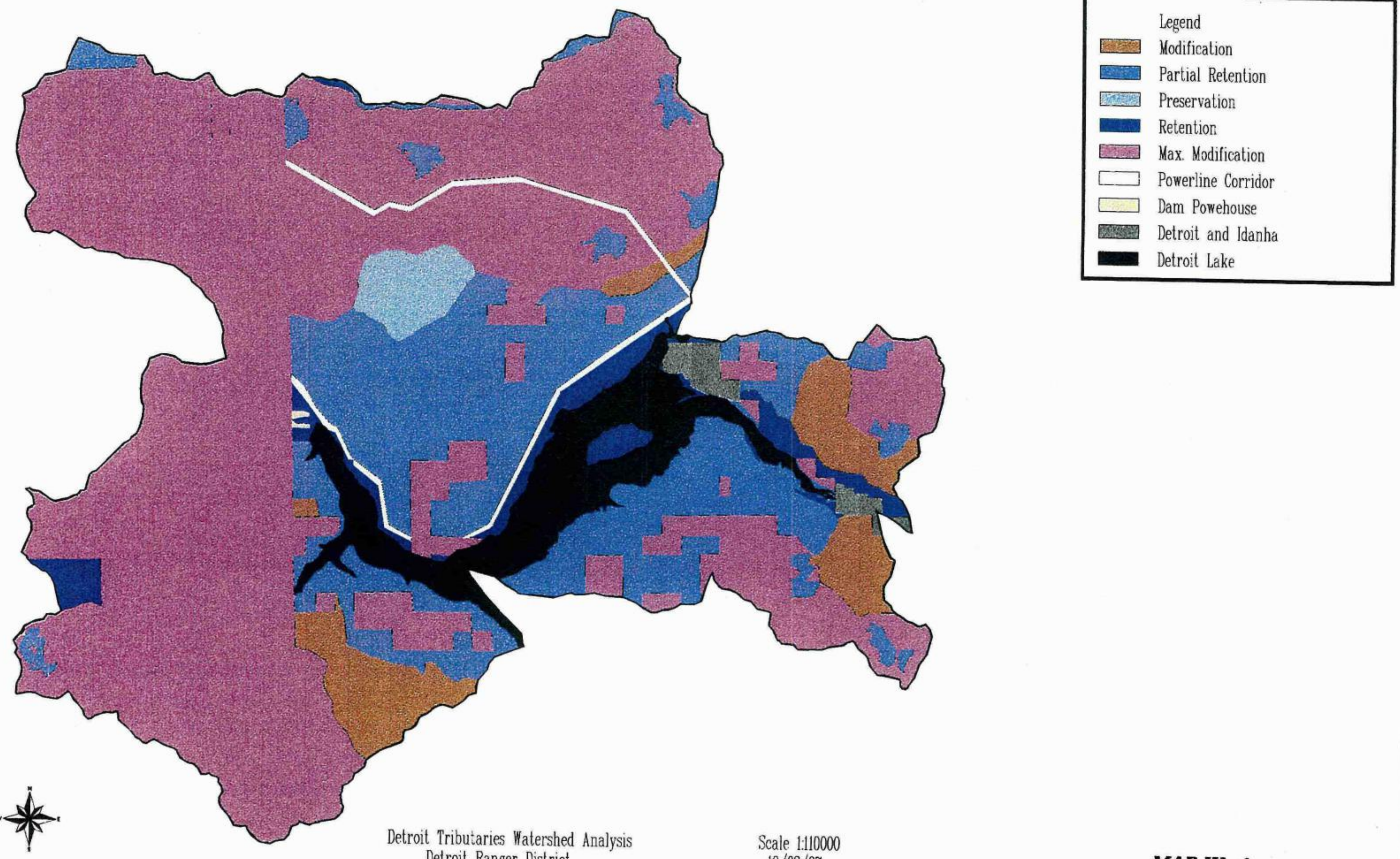
- Scenic features of this watershed include:
  - Detroit Lake
  - The first prominent viewpoint of Mt. Jefferson eastbound on Highway 22 overlooking Detroit Lake
  - Tumble Lake and Falls (Old Growth Grove)
  - Monument Peak Botanical Special Interest Area
  - Niagra Falls
  - Rock/geologic features, such as Phantom Bridge Special Interest Area, Stahlman Point and Dog Tooth, Elephant, Dome and Needle Rocks.

- Portions of the West Cascades Scenic Byway and Breitenbush-Clackamas National Scenic Byway lies within the watershed. It provides an alternative scenic driving route to Interstate 5.

Table IV-8: Visual Quality Objectives by Management Allocations (see *Maps I-4, IV-4*)

Management Allocation	Visual Quality Objective	Acres	Percent of Watershed
Tumble Lake Old Growth Groves (MA-7)	Preservation	827	2
Monument Peak and Phantom Natural Bridge Special Interest Areas (MA-5a) Scenic Retention Foreground (MA-11f)	Retention	1,598	3
Scenic Partial Retention Middleground (MA-11c) Scenic Partial Retention Foreground (MA-11d) Developed Recreation Sites (MA-12a/b) Corps of Engineers Land Administrative Sites (MA-13b) LSR/Riparian Reserves - Former Modification Allocations (General Forest and Scenic Modification Middleground)	Partial Retention	10,862	22
Scenic Modification Middleground (MA-11a)	Modification	2,970	6
General Forest (MA-14a) Private & State Timber Lands	Maximum Modification	28,853	58
Power line Corridor		468	1
Detroit Lake/Dam Powerhouse		3,318	7
Detroit and Idanha		440	1
Totals		49336	100

Visual Quality Objectives



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/03/97

MAP IV-4 Request #1456

2. What are the highest priority issues or resource concerns associated with scenic quality?

a. Given existing vegetation patterns and land allocations, an important issue is the management of the landscape to maintain and/or enhance the inherent beauty of the North Santiam Viewshed. In some places, the current land allocation does not meet the intent of scenic resource management.

b. Private lands visible from Detroit Lake are managed intensively for timber production, and do not consider the scenic sensitivity of the surrounding area. People often confuse these lands as being federally owned.

c. An important issue to reservoir users and highway travelers is preservation of the scenic backdrop of Detroit Lake, an important aspect of Detroit's economic well-being.

d. The power line corridor is a concern because it detracts from overall scenic quality in the Detroit Tributaries watershed.

e. US Army Corps of Engineers owns much of the land surrounding the reservoir, however, the land and its resources are managed by the Forest Service. Although management of these lands has considered scenic resources, no Management Area Standard and Guidelines have been officially adopted to these areas.

3. What are the management direction/activities, human uses or natural processes that affect scenic quality?

a. Current condition

iv-11: What is the existing condition of the scenic resource, and how do we manage the landscape to maintain and/or enhance the inherent beauty of the Detroit Tributaries viewshed?

Existing Visual Condition

At this time, 32% of the Detroit Tributaries is composed of stands in a mid seral stage with pole and small size tree classes *(Table IV-9)*. Seventeen percent of the watershed comprises a early seral stage with seedlings and sapling size stands while 15% of the area contains a mix of medium and large size trees in a late seral stage. Since size classes on private and state lands are not tracked, their condition is unknown for 27% of the watershed. Ten percent of land is non-forested such as lakes and meadows. Approximately, 5% of the total area has relatively new harvest units considered in disturbed condition.

***Table IV-9*: Existing Visual Condition - Size classes by Management Allocation**

Mgmt Area	Early Seral		Mid Seral		Late Seral		Non-Forest	Un-known	Total Acres
	Seed-lings	Sap-lings	Poles	Small Trees	Med. Trees	Large Trees			
5a	0	5	0	202	47	0	32	0	286
7	2	112	55	172	331	0	155	0	827
11a	213	794	340	806	807	0	9	0	2,969
11c	127	1025	1984	2467	1125	0	188	0	6,916
11d	2	39	31	1109	112	0	31	0	1,324
11f	52	11	89	712	27	0	116	0	1,007
12a	0	0	8	107	0	0	2	0	117
12b	0	0	0	205	0	0	23	0	228
13a	3	126	108	196	1	0	50	0	484
13b	0	0	9	35	0	0	33	0	77
14a	1480	3522	1196	2397	3535	98	577	0	12,805

Mgmt Area	Early Seral		Mid Seral		Late Seral		Non Forest	Unknown	Total Acres
	Seedlings	Saplings	Poles	Small Trees	Med. Trees	Large Trees			
16a	0	95	0	7	39	0	1	0	142
16b	24	13	77	290	924	2	10	0	1,340
Private	359	318	865	418	8	0	152	7491	9,611
County	26	0	18	105	0	0	0	0	149
State	2	8	340	493	150	0	23	5726	6,742
COE	61	180	103	601	14	0	51	0	1,010
water	0	0	0	0	0	0	3300	0	3,300
Acres	2,351	6,248	5,223	10,322	7,120	100	4,753	13,217	49,334
Percent	5%	12%	11%	21%	14%	<1%	10%	27%	100%

Detroit Lake is a prominent scenic attraction within this watershed. Views of the lake and surrounding landscape, including nearby Mt. Jefferson, can be seen from many points along Highway 22. Since the construction of the dam, many views are being obstructed by vegetation growth. Viewing opportunities have been created by implementing various vegetation management practices including, thinning, regeneration harvests and pruning.

The Power line corridor occupies 468 acres. This unnatural feature along with its high contrast towers dominates many segments along the highway. The wide clearances are noticed in several areas such as from Detroit Lake where the casual viewer can see an expansive view of the landscape. Areas where the electric transmission line is visible from the highway would normally be classified as retention foreground. It is obvious that these areas will never achieve this objective but modification at best.

Approximately 1,126 acres of land surrounding Detroit Lake is owned by Army Corps. of Engineers or are Forest Service lands withdrawn for COE purposes. The Forest Service administers these lands, however, no formal standards and guidelines have been developed for these areas within the Forest Plan. These lands are an important scenic resource and should be managed to maintain Visual Quality Objectives of retention to partial retention.

There are areas within the North Santiam Viewshed that are inconsistent with scenery management principles set forth by current handbook direction. For example, middleground land visible from the town of Detroit currently has a general forest allocation and meets all the criteria for scenic middleground management. Detroit Lake is a visually sensitive area due to the amount and nature of use it receives, and expansive views from the lake surface. In some areas, land allocation designations were not applied from the perspective of the lake. On the other hand, there are also areas within the Viewshed that are not visually sensitive due to their juxtaposition within the landscape, and currently have a designated scenic allocation.

The Detroit Tributaries has a history of large stand replacement fires which is still evident today. In the event of large fire or landslide, the visual character can dramatically change the landscape. In high risk areas for large events, short term visual degradation can occur until the area recovers with new regeneration.

Viewshed Condition Analysis

The Forest Plan's goal for scenic management areas are to "maintain desired visual characteristics of the forest landscape through time and space." Achieving long-term visual quality goals in a forest environment works in direct proportion to how well time and space are managed. Time sequence over a landscape involves combinations of old growth and younger age classes. This provides visual variety but will shift in location as trees are harvested and new ones grow to take their place. Planning this dynamic situation through space and time is important to achieve an attractive sequence of views. To address the time and space component, maximum disturbance rates and harvest rate objectives for each allocation was assigned to each subdrainage to determine area available for harvest over the landscape ***(Table IV-10)***.

IRO = Harvest Rate Objective outlined in Forest Plan Standards and Guidelines
:DC = Existing Disturbed Condition
4DC = Maximum Disturbed Condition
'P = Forest Plan
P = President's Plan

lote: Those subdrainages that have existing disturbed condition and harvest rates shaded, have rates in excess of the standard within that allocation.

'able IV-10: North Santiam Viewshed Condition Analysis

Mgmt Area/ Psub	HRO	EDC (FP)	EDC (PP)	MDC	Total Acres	Suited & Avail. (FP)	Suited & Avail. (PP)	Max Dis-turb-ed Allow-ed Acres (FP)	Max Dis-turb-ed Allow-ed Acres (PP)	Vis-ually Dis-turbed Acres (FP)	Vis-ually Dis-turbed Acres (PP)	Avail. Har-vest MDC (FP)	Avail. Har-vest MDC (PP)	Har-vest Rate Objec-tive Acres (FP)	Har-vest Rate Objec-tive Acres (PP)	Cur-rent De-cade Har-vest FP	Cur-rent De-cade Har-vest PP	Avail. Har-vest (HRO) FP	Avail. Har-vest (HRO) PP
11a	0.12	0.114	0.193	0.24	17810	12986	4894	3117	1175	1486	944	1631	231	1558	587	0	0	1558	587
*03I	0.12	0.00	0.00	0.24	65	23	20	6	5	0	0	6	5	3	2	0	0	3	2
*03J	0.12	0.10	0.11	0.24	1024	839	733	201	176	84	82	117	94	101	88	2	0	99	88
*03K	0.12	0.00	0.00	0.24	241	218	192	52	46	0	0	52	46	26	23	0	0	26	23
*03M	0.12	0.00	0.00	0.24	52	52	52	12	12	0	0	12	12	6	6	0	0	6	6
07U	0.12	0.47	0.40	0.24	1964	529	502	127	120	249	202	-122	-82	63	60	2	0	61	60
*78B	0.12	0.00	0.00	0.24	877	489	348	117	84	0	0	117	84	59	42	0	0	59	42
78C	0.12	0.00	0.00	0.24	207	108	76	26	18	0	0	26	18	13	9	0	0	13	9
78D	0.12	0.26	0.61	0.24	1080	605	102	145	24	159	62	-14	-38	73	12	45	1	28	11
78E	0.12	1.83	0.00	0.24	140	35	0	8	0	64	0	-56	0	4	0	0	0	4	0
78F	0.12	0.04	0.06	0.24	1304	846	18	203	4	35	1	168	3	102	2	2	1	100	1
78G	0.12	0.15	0.18	0.24	703	434	301	104	72	66	55	38	17	52	36	1	1	51	35

Mgmt Area/ Psub	HRO	EDC (FP)	EDC (PP)	MDC	Total Acres	Suited & Avail. (FP)	Suited & Avail. (PP)	Max Disturbed Allowed Acres (FP)	Max Disturbed Allowed Acres (PP)	Visually Disturbed Acres (FP)	Visually Disturbed Acres (PP)	Avail. Harvest MDC (FP)	Avail. Harvest MDC (PP)	Harvest Rate Objective Acres (FP)	Harvest Rate Objective Acres (PP)	Current Decade Harvest FP	Current Decade Harvest PP	Avail. Harvest (HRO) FP	Avail. Har-vest (HRO) PP
78H	0.12	0.08	0.14	0.24	308	184	102	44	24	14	14	30	10	22	12	15	14	7	-2
78I	0.12	0.03	0.04	0.24	816	611	429	147	103	16	16	131	87	73	51	0	0	73	51
*78J	0.12	0.11	0.13	0.24	592	370	300	89	72	39	39	50	33	44	36	39	39	5	-3
78L	0.12	0.11	0.05	0.24	453	163	101	39	24	18	5	21	19	20	12	11	2	9	10
78S	0.12	0.00	0.01	0.24	764	614	399	147	96	3	3	144	93	74	48	0	0	74	48
78T	0.12	0.02	0.00	0.24	679	380	2	91	0	6	0	85	0	46	0	0	0	46	0
78W	0.12	0.04	0.00	0.24	769	605	0	145	0	24	0	121	0	73	0	0	0	73	0
79A	0.12	0.00	0.00	0.24	457	367	0	88	0	0	0	88	0	44	0	0	0	44	0
79B	0.12	1.00	0.00	0.24	290	2	0	0	0	2	0	-2	0	0	0	0	0	0	0
79C	0.12	0.09	0.00	0.24	716	233	0	56	0	21	0	35	0	28	0	0	0	28	0
79D	0.12	0.00	0.00	0.24	91	0	0	0	0	0	0	0	0	0	0	0	0	0	0
79E	0.12	1.69	1.82	0.24	492	86	65	21	16	145	118	-124	-102	10	8	0	0	10	8
79F	0.12	0.63	0.58	0.24	1000	449	336	108	81	282	196	-174	-115	54	40	4	0	50	40
79G	0.12	0.30	0.40	0.24	319	210	127	50	30	62	51	-12	-21	25	15	0	0	25	15
79H	0.12	0.15	0.18	0.24	716	484	304	116	73	74	55	42	18	58	36	5	4	53	32
79I	0.12	0.03	0.04	0.24	451	336	266	81	64	10	10	71	54	40	32	0	0	40	32

Mgmt Area/ Psub	HRO	EDC (FP)	EDC (PP)	MDC	Total Acres	Suited & Avail. (FP)	Suited & Avail. (PP)	Max Dis-turb-ed Allow-ed Acres (FP)	Max Dis-turb-ed Allow-ed Acres (PP)	Vis-ually Dis-turbed Acres (FP)	Vis-ually Dis-turbed Acres (PP)	Avail. Har-vest MDC (FP)	Avail. Har-vest MDC (PP)	Har-vest Rate Objec-tive Acres (FP)	Har-vest Rate Objec-tive Acres (PP)	Cur-rent De-cade Har-vest FP	Cur-rent De-cade Har-vest PP	Avail. Har-vest (HRO) FP	Avail. Har-vest (HRO) PP
79J	0.12	0.32	0.30	0.24	379	191	114	46	27	62	34	-16	-7	23	14	0	0	23	14
79K	0.12	0.09	0.25	0.24	855	583	4	140	1	51	1	89	0	70	0	7	0	63	0
92Q	0.12	0.00	0.00	0.24	5	2	1	0	0	0	0	0	0	0	0	0	0	0	0
11C	0.10	0.141	0.130	0.20	12984	7063	3509	1413	702	994	456	419	246	706	351	0	0	706	351
*03A	0.10	0.00	0.00	0.20	47	40	40	8	8	0	0	8	8	4	4	0	0	4	4
*03B	0.10	0.00	0.00	0.20	604	288	241	58	48	0	0	58	48	29	24	0	0	29	24
*03C	0.10	0.14	0.12	0.20	949	464	312	93	62	65	38	28	24	46	31	0	0	46	31
*03D	0.10	0.08	0.13	0.20	897	534	339	107	68	43	43	64	25	53	34	23	23	30	11
*03E	0.10	0.03	0.04	0.20	1555	652	437	130	87	17	17	113	70	65	44	5	5	60	39
*03F	0.10	0.02	0.02	0.20	812	309	230	62	46	5	5	57	41	31	23	2	2	29	21
*03I	0.10	0.00	0.00	0.20	79	33	14	7	3	0	0	7	3	3	1	0	0	3	1
*03J	0.10	0.21	0.17	0.20	444	380	326	76	65	81	57	-5	8	38	33	4	0	34	33
*03M	0.10	0.00	0.00	0.20	202	150	132	30	26	0	0	30	26	15	13	0	0	15	13
*78A	0.10	0.00	0.00	0.20	305	231	167	46	33	0	0	46	33	23	17	0	0	23	17
*78B	0.10	0.00	0.00	0.20	118	98	92	20	18	0	0	20	18	10	9	0	0	10	9
78D	0.10	0.28	0.18	0.20	1077	465	106	93	21	128	19	-35	2	47	11	72	19	-26	-8

Mgmt Area/ Psub	HRO	EDC (FP)	EDC (PP)	MDC	Total Acres	Suited & Avail. (FP)	Suited & Avail. (PP)	Max Dis-turb-ed Allow-ed Acres (FP)	Max Dis-turb-ed Allow-ed Acres (PP)	Vis-ually Dis-turbed Acres (FP)	Vis-ually Dis-turbed Acres (PP)	Avail. Har-vest MDC (FP)	Avail. Har-vest MDC (PP)	Har-vest Rate Objec-tive Acres (FP)	Har-vest Rate Objec-tive Acres (PP)	Cur-rent De-cade Har-vest FP	Cur-rent De-cade Har-vest PP	Avail. Har-vest (HRO) FP	Avail. Har-vest (HRO) PP
78E	0.10	0.00	0.00	0.20	97	87	0	17	0	0	0	17	0	9	0	0	0	9	0
*78J	0.10	0.00	0.00	0.20	104	102	81	20	16	0	0	20	16	10	8	0	0	10	8
*78K	0.10	0.00	0.00	0.20	967	560	346	112	69	0	0	112	69	56	35	0	0	56	35
78L	0.10	0.00	0.00	0.20	115	50	28	10	6	0	0	10	6	5	3	0	0	5	3
78S	0.10	0.00	0.00	0.20	27	12	8	2	2	0	0	2	2	1	1	0	0	1	1
78T	0.10	0.03	0.00	0.20	245	166	1	33	0	5	0	28	0	17	0	0	0	17	0
78V	0.10	0.05	0.00	0.20	354	272	0	54	0	14	0	40	0	27	0	0	0	27	0
78W	0.10	0.14	0.00	0.20	489	257	0	51	0	35	0	16	0	26	0	0	0	26	0
79A	0.10	0.05	0.00	0.20	542	442	0	88	0	22	0	66	0	44	0	1	0	43	0
79B	0.10	0.00	0.00	0.20	22	21	0	4	0	0	0	4	0	2	0	0	0	2	0
79C	0.10	0.58	0.00	0.20	567	133	0	27	0	77	0	-50	0	13	0	0	0	13	0
79D	0.10	0.36	0.61	0.20	195	115	59	23	12	41	36	-18	-24	12	6	0	0	12	6
79E	0.10	0.35	0.40	0.20	1379	777	491	155	98	269	196	-114	-98	78	49	0	0	78	49
79F	0.10	0.80	0.78	0.20	113	70	58	14	12	56	45	-42	-33	7	6	0	0	7	6
79K	0.10	0.38	0.00	0.20	678	354	0	71	0	136	0	-65	0	35	0	19	0	16	0
11F	0.05	0.096	0.149	0.10	6396	4498	1845	450	185	433	274	17	-90	225	92	0	0	225	92

Mgmt Area/ Psub	HRO	EDC (FP)	EDC (PP)	MDC	Total Acres	Suited & Avail. (FP)	Suited & Avail. (PP)	Max Dis-turb-ed Allow-ed Acres (FP)	Max Dis-turb-ed Allow-ed Acres (PP)	Vis-ually Dis-turbed Acres (FP)	Vis-ually Dis-turbed Acres (PP)	Avail. Har-vest MDC (FP)	Avail. Har-vest MDC (PP)	Har-vest Rate Objec-tive Acres (FP)	Har-vest Rate Objec-tive Acres (PP)	Cur-rent De-cade Har-vest FP	Cur-rent De-cade Har-vest PP	Avail. Har-vest (HRO) FP	Avail. Har-vest (HRO) PP
*03B	0.05	0.00	0.00	0.10	47	13	12	1	1	0	0	1	1	1	1	0	0	1	1
*03C	0.05	0.00	0.00	0.10	27	1	1	0	0	0	0	0	0	0	0	0	0	0	0
*03D	0.05	0.11	0.10	0.10	170	93	68	9	7	10	7	-1	0	5	3	10	7	-5	-4
*03E	0.05	0.00	0.00	0.10	28	22	14	2	1	0	0	2	1	1	1	0	0	1	1
*03F	0.05	0.00	0.00	0.10	159	78	47	8	5	0	0	8	5	4	2	0	0	4	2
*031	0.05	0.00	0.00	0.10	25	20	17	2	2	0	0	2	2	1	1	0	0	1	1
*03J	0.05	0.00	0.00	0.10	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
*03M	0.05	0.00	0.00	0.10	28	2	2	0	0	0	0	0	0	0	0	0	0	0	0
07U	0.05	0.38	0.32	0.10	390	348	311	35	31	131	101	-96	-70	17	16	2	0	15	16
78A	0.05	0.00	0.00	0.10	20	18	12	2	1	0	0	2	1	1	1	0	0	1	1
*78B	0.05	0.19	0.25	0.10	329	166	123	17	12	32	31	-15	-19	8	6	0	0	8	6
*78C	0.05	11.00	0.00	0.10	12	1	1	0	0	11	0	-11	0	0	0	0	0	0	0
78D	0.05	0.19	0.18	0.10	702	356	100	36	10	67	18	-31	-8	18	5	24	0	-6	5
78E	0.05	0.00	0.00	0.10	101	37	0	4	0	0	0	4	0	2	0	0	0	2	0
78F	0.05	0.11	0.00	0.10	289	228	51	23	5	26	0	-3	5	11	3	0	0	11	3
78G	0.05	0.00	0.00	0.10	91	62	38	6	4	0	0	6	4	3	2	0	0	3	2

Mgmt Area/ Psub	HRO	EDC (FP)	EDC (PP)	MDC	Total Acres	Suited & Avail. (FP)	Suited & Avail. (PP)	Max Dis-turb-ed Allow-ed Acres (FP)	Max Dis-turb-ed Allow-ed Acres (PP)	Vis-ually Dis-turbed Acres (FP)	Vis-ually Dis-turbed Acres (PP)	Avail. Har-vest MDC (FP)	Avail. Har-vest MDC (PP)	Har-vest Rate Objec-tive Acres (FP)	Har-vest Rate Objec-tive Acres (PP)	Cur-rent De-cade Har-vest FP	Cur-rent De-cade Har-vest PP	Avail. Har-vest (HRO) FP	Avail. Har-vest (HRO) PP
78H	0.05	0.00	0.00	0.10	11	8	3	1	0	0	0	1	0	0	0	0	0	0	0
*78K	0.05	0.00	0.00	0.10	153	118	17	12	2	0	0	12	2	6	1	0	0	6	1
78V	0.05	0.02	0.00	0.10	447	335	0	34	0	7	0	27	0	17	0	0	0	17	0
78W	0.05	0.00	0.00	0.10	96	85	0	9	0	0	0	9	0	4	0	0	0	4	0
79A	0.05	0.06	0.00	0.10	205	141	0	14	0	8	0	6	0	7	0	0	0	7	0
79C	0.05	0.00	0.00	0.10	546	410	1	41	0	1	0	40	0	21	0	0	0	21	0
79D	0.05	0.03	0.04	0.10	90	75	28	8	3	2	1	6	2	4	1	0	0	4	1
79E	0.05	0.08	0.13	0.10	1564	1190	720	119	72	100	91	19	-19	60	36	0	0	60	36
79F	0.05	0.12	0.27	0.10	312	247	92	25	9	30	25	-5	-16	12	5	0	0	12	5
79G	0.05	0.00	0.00	0.10	33	32	8	3	1	0	0	3	1	2	0	0	0	2	0
79H	0.05	0.00	0.00	0.10	89	79	35	8	4	0	0	8	4	4	2	0	0	4	2
79I	0.05	0.00	0.00	0.10	70	55	26	6	3	0	0	6	3	3	1	0	0	3	1
79J	0.05	0.00	0.00	0.10	162	133	62	13	6	0	0	13	6	7	3	0	0	7	3
79K	0.05	0.11	0.00	0.10	119	72	1	7	0	8	0	-1	0	4	0	0	0	4	0
92A	0.05	0.00	0.00	0.10	15	13	10	1	1	0	0	1	1	1	1	0	0	1	1
92Q	0.05	0.00	0.00	0.10	65	59	45	6	5	0	0	6	5	3	2	0	0	3	2

Overall existing disturbed condition for all Scenic allocations within the North Santiam Viewshed is consistent with Forest Plan Standards. Currently within the North Santiam Viewshed, MA-11f has met the maximum disturbed condition percentage, and no regeneration harvests can take place until this management area recovers. An analysis was completed looking at existing disturbed conditions within Detroit Tributaries watershed by subdrainage to see how regeneration harvests were distributed ***(Table IV-10).*** Overall, Heater (03j), Hall's Ridge (03d), and Dry (78b) have the highest disturbed condition rate indicating where the most recent harvest activity has occurred. These subdrainages are above desired disturbed condition. The most restrictive acreage between harvest rates and maximum disturbance allowances should be used as a guideline for planning future regeneration harvests in the Detroit Tributaries in order to best distribute management activities. A portion of MA-11d along the French Creek Trail lies within this watershed. Currently, there are no created openings within this management area, and seven acres are potentially available for regeneration harvest.

Although recent harvest activities are currently consistent with Forest Plan standards, the sizes, arrangements, and geometric character of treatments over the past fifty years have had a lasting effect on the scenic quality of the area. The visibility, distribution and concentration of various treatments in contrast with older uncut stands contribute significantly to the current quality of the scenic resources. Currently, 206 stands are inconsistent with 1990 Forest Plan standards for maximum created opening sizes due to regeneration harvest activities. These stands were harvested prior to the current Forest Plan, primarily during the 1980's. Total acreage of these stands is 2,463 acres. To the casual viewer, the Existing Visual Condition of the landscape in the Detroit Tributaries can be described as ranging from Slightly to Heavily Altered.

Trend

The future visual condition of the watershed is expected to improve over current conditions when considering several developments and trends affecting Forest land management activities. As Forest managers begin to focus more attention on balancing human use and product extraction with management of natural processes the appearance of the watershed, in time, is expected to approach a Visual Condition of Moderately to Slightly Altered.

With the development of the Forest Plan and associated standards for management of scenic resources, including the control of harvest rates, unit sizes and shapes, treatment alternatives, and methods such as thinning and individual tree selection, the design and distribution of activities within the watershed are expected to be less apparent to the casual viewer.

Implementation of the Forest Plan as amended by the 1994 President's Plan; which allocated land for the preservation of Late Successional Reserves, increased the size of riparian reserves, reduced annual harvest rates, and established standards for management of a wide range of forest resources, is expected to have a beneficial effect on the quality of the scenic resources in the future.

This watershed contains many acres of second growth within scenic allocations. These stands will primarily have commercial thinning treatments prescribed which is less likely to impact the scenic resource than regeneration harvests.

c. *Reference condition*

iv-12. What is the historical scenic condition in the watershed?

Scenic quality was heavily altered early due to timber harvesting and history of large wildfires which is still evident today. For more information, refer to the reference conditions under Human uses.

d. *Comparison of current and reference condition*

iv-13. What are the natural and human causes of change between historical and current scenic conditions?

Conditions

Reference- Prior to Forest Management: Fire was the predominant mechanism controlling scenic quality.

Conditions	Major Causes of Change
	Construction of Detroit and Big Cliff dams, Highway 22 and the powerline corridor. *Settlement within the local area created the need for timber and jobs* *Improved Access and resources for fire fighting* *Demand for timber*
Reference- Forest Management to 1994: Scenic quality was heavily altered due to timber harvesting and a history of large wild fires. Human made features, such as the dams, Highway 22, and the powerline corridor significantly altered the landscape. Wild fires smaller than in the past due to improvements in access and resources. Private lands do not have scenic quality standards, and private timber management as an effect on the scenic quality of the viewshed. As of 1990, visual land allocations have changed the way visually sensitive areas are managed	
	Timber Management and Road Construction *1990 Forest Plan*
Current - 1994 to Present: See Reference- Forest Management to 1994	
Created opening size: Opening size, especially in visual allocations, limit options for current regeneration harvest due to past harvest activity.	

V. Management Implications

A. Synthesis

* Influences are rated ***Low (L), Medium (M),*** and ***High (H)***

v-1. *What are the influences and relationships between EROSION PROCESSES and other ecosystem processes (e.g., vegetation, woody debris recruitment)?			
Issue: Management Related Erosion Processes			
Influences	**Influence Rating*** ***H, M, or L***	**Likely to be changed by Management Actions** ***Y or N***	**Management Objectives that can moderate the influences rated *High (H)* or *Medium (M)***
Physical Influences: Fire, especially stand replacing fire, has been a primary physical influence on erosion processes in this watershed. This watershed has a history of large -scale, stand replacing fires. Some fires were stand replacing and others just underburned the stands.	*H*	*Y*	Prevent large scale stand replacing fires by decreasing fire hazard and risk *(See recommendations under Fire Hazard and Risk)*
After a fire has burned, gravity [topography (slope and aspect)] in combination with water and wind [Climate] influence the amount of erosion on the hillsides.	*M*	*N*	
Types of soils (natural instability) influence the amount of erosion on the hillsides.	*M*	*Y*	Restoration of erosion-prone areas
Biological Influences: The rate of vegetative reestablishment after natural or human events, is an important biological influence on erosion.	*M*	*Y*	Minimize erosion potential from management activities
In addition, vegetative material, especially large logs and intact root systems, help to stabilize slopes from erosion. Leaf litter and other organic matter, help to shield soils from raindrop impact and erosion. When stand replacing fires burn through an area, vegetation and its shielding effects are removed and erosion rates generally increase for a time.	*M'*	*Y*	

Issue: Management Related Erosion Processes (continued)			
Influences	**Influence Rating*** ***H, M, or L***	**Likely to be changed by Management Actions** ***Y or N***	**Management Objectives that can moderate the influences rated *High (H)* or *Medium (M)***
Social Influences : Fire suppression can increase the fuel loading on the landscape. In the absence of fire, fuel loadings gradually build up over time. With more fuel, wildfires will burn with greater intensity than under natural conditions when fires burned through areas with greater frequency and much less intensity. These intense fires tend to damage soils and consume vegetation, which when combined with climatic events, can increase erosion rates. Conversely, by having fire suppression, vegetation persists on the landscape to hold the soil in place and erosion rates may decrease well below some long term rates.	*H*	*Y*	Prevent large scale stand replacing fires by decreasing fire hazard and risk
Human-caused fires (see effects of fire)	*M*	*Y*	Reduce number of Human caused fires *(See recommendations under Fire Hazard and Risk)*
Land management activities such as timber harvest; road construction and maintenance; trail construction and use; etc. influence erosion processes as well. Harvest practices such as type of logging system, log suspension requirements, silvicultural prescription, etc. can influence erosion rates. Furthermore, road construction techniques and amount of road maintenance can influence erosion rates.	*M*	*Y*	Minimize erosion potential from management activities
Sunken grade on Highway 22: Cumulative effect of adding many layers of asphalt to repair road influence the amount creep down hill.	*L*	*N*	
Wave action on Detroit Reservoir shoreline: fluctuations of reservoir level affect shoreline erosion	*M/L*	*Y /N**	Reduce Shoreline erosion on flat areas such as Detroit Flats from wave action and fluctuations in the reservoir levels

* Corps of Engineers manages reservoir levels

v-2. What are the influences and relationships between HYDROLOGY and other ecosystem processes in the watershed (e.g., sediment delivery, fish migration)?			
Issue: Flow (both peak and minimum flows)			
Influences	**Influence Rating*** ***H, M, or L***	**Likely to be changed by Management Actions** ***Y or N***	**Management Objectives that can moderate the influences rated** ***High (H)*** **or** ***Medium (M)***
Physical Influences: Fire, topography, soil type and precipitation influence stream flows: fire removes vegetative cover, which can influence snow accumulation etc.; soil type influences water holding capacity, and precipitation type and intensity influences the amount of water entering the system that contribute to peak and low flows. Hotter burns resulted in potential headwall failures, channel bank erosion that can lead to increased high peak flows.	*H*	*Y*	Prevent large scale stand replacing fires by decreasing fire hazard and risk *(See recommendations under Fire Hazard and Risk)*
Biological Influences: Vegetation in combination with precipitation and topography influences stream flows: the size of tree canopies affect snow accumulation and the amount and timing of water reaching stream channels; root systems extract water; the spatial distribution of vegetation across the landscape and the topography, and the amount of large woody material influence how much water reaches the stream channels. Rate of tree growth influences the length of hydrological recovery. Canopy closure affects snow interception.	*H*	*Y*	Maintain desired level of minimum flows Minimize effects of peak flows Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands *(See recommendations under Land Management Goals and Dynamic Natural Systems)*

Issue: Flow (both peak and minimum flows) continued			
Influences	**Influence Rating*** *H, M, or L*	**Likely to be changed by Management Actions** *Y or N*	**Management Objectives that can moderate the influences rated** *High (H)* **or** *Medium (M)*
Social Influences: The biggest social influences on peak flows and low flows was the construction of the Detroit and Big Cliff reservoirs in the early 1950's. Placing a structure this size on the North Santiam River altered the flow regime and the hydrology for downstream users	*H*	*N*	
Regeneration timber harvest, road construction and the power line right-of-way can result in decreased vegetative cover in the short term, less precipitation intercept, and may result in increased peak flows. Based on the best information available, commercial thinning harvest to an average canopy closure of 70% should not affect precipitation intercept and should have minimal effect on peak flows.1] Prescribed Burning: Cool burning has little effect on hydrologic processes Hotter burns could result have the same results as historical stand replacement fires.	*M*	*Y*	Minimize effects of peak flows

1] ***Development and Use of Hydrologic Recovery, Willamette National Forest ,1980-1990*** (May 1991)

v-3. What are the influences and relationships between STREAM CHANNELS and other ecosystem processes in the watershed (e.g., in channel habitat for fish and other aquatic species, water quality)?			
Issue: Channel bank stability			
Influences	**Influence Rating*** ***H, M, or L****	**Likely to be changed by Management Actions** ***Y or N***	**Management Objectives that can moderate the influences rated *High (H)* or *Medium (M)***
Physical Influences: Rain-on-snow events which generate peak flows have a profound influence on channel bank stability and destabilize headwaters portions of streams.	*H*	*N*	
Fire can either consume wood and make it unavailable to stream channels or it can create downed wood for stream channel structure. The amount of available structure in the channel influences stability	*H*	*Y*	Prevent large scale stand replacing fires by decreasing fire hazard and risk *(See recommendations under Fire Hazard and Risk)*
Wave action from the fluctuating levels of the reservoir can increase shoreline erosion.	*M*	*Y/N**	Reduce Shoreline erosion on flat areas such as Detroit Flats from wave action and fluctuations in the reservoir levels *(See recommendations under Erosion Processes)*
Biological Influences: Natural mortality, insects or diseases, or other damaging agents to can kill large trees that can provide structure for stream channels and help to stabilize channel banks	*M*	*Y*	Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands *(See recommendations under Land Management Goals and Dynamic Natural Systems.)*

* Corps of Engineers manages reservoir levels

Issue: Channel bank stability (continued)			
Influences	**Influence Rating*** ***H, M, or L****	**Likely to be changed by Management Actions** ***Y or N***	**Management Objectives that can moderate the influences rated *High (H)* or *Medium (M)***
Vegetation and root strength can increase channel bank stability and headwater stability.	*H*	*Y*	Promote channel bank stability
Canopy closure affects snow interception during rain-on-snow events which generate peak flows, which have a profound influence on channel bank stability and destabilize headwaters portions of streams.	*H*	*Y*	Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands
Social Influences: Detroit reservoir and riparian areas attract recreation use. This recreation use has several influences on channel bank stability. For instance, access trails to water and removal of down wood for firewood can affect channel bank stability, boating causes shoreline erosion, and intense recreation use creates compaction problems. Use and resulting effects more intensive around reservoir. Use and resulting effects is less intense in dispersed sites along creeks.	*L*	*Y*	Decrease resource impacts and improve aesthetics at recreational areas *(See recommendations under Recreational supply and demand)* Promote channel bank stability
Facility protection often results in channel constriction, so the stream does not occupy its flood plain, which in turn can decrease channel bank stability.	*M*	*Y*	
Regeneration Timber harvest, road construction and other management activities that decrease vegetative cover and can decrease channel bank stability	*M*	*Y*	
Management Practices such as retention of riparian reserve widths can increase channel bank stability.			

v-4. What are the influences and relationships between WATER QUALITY and other ecosystem processes in the watershed (e.g., mass wasting, fish habitat, stream reach vulnerability)?			
Issue: Water Temperatures			
Influences	**Influence Rating*** *H, M, or L*	**Likely to be changed by Management Actions** *Y or N*	**Management Objectives that can moderate the influences rated** ***High (H)*** **or** ***Medium (M)***
Physical Influences: Solar radiation increases stream temperatures.	*M*	*N*	
Biological Influences: Vegetation distribution and development influences stream shade which can affect stream temperatures.	*H*	*Y*	Maintain year-round stream temperatures at 55 degrees F. or below Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands *(See recommendations under Land Management Goals and Dynamic Natural Systems)*
Social Influences: Recreation and timber management, road construction affect shade which can affect temperature.	*M*	*Y*	Maintain year-round stream temperatures at 55 degrees F. or below
Retention of riparian reserves provides thermal regulation of water.	*M/H*	*Y*	
Issue: Turbidity			
Physical Influences: Fire, in combination with vegetative cover and weather, produce erosion and sediment into stream channels that can increase turbidity	*H*	*Y*	Prevent large scale stand replacing fires by decreasing fire hazard and risk *(See recommendations under Fire Hazard and Risk)*

Issue: Turbidity (continued)			
Influences	**Influence Rating*** ***H, M, or L***	**Likely to be changed by Management Actions** ***Y or N***	**Management Objectives that can moderate the influences rated *High (H)* or *Medium (M)***
Type of soil (i.e. size of material- clay, etc) can influence the amount of turbidity, those prone to debris torrents introduce more sediments affecting turbidity than those that are not so prone.	*H*	*Y*	Minimize erosion potential from management activities *(See recommendations under Erosional Processes*)
Type and intensity of precipitation can influence erosion rates and thus turbidity.	*L*	*N*	
Biological Influences: Lack of large wood in stream channels can decrease sediment storage and can result in an increase in turbidity	*L*	*N*	Balance social and biological turbidity needs within the physical parameters of the watershed
Large wood in stream stores sediments which decreases turbidity.	*L*	*N*	
Vegetation distribution and development influences erosion processes which can affect turbidity.	*M*	*Y*	
Social Influences: Recreation, fire, and timber management, road construction potentially affects erosion causing sediments which can affect turbidity	*H*	*Y*	Prevent large scale stand replacing fires by decreasing fire hazard and risk
Issue: Biological Contaminants			
Biological Influences: Organic decomposition can introduce biological contaminants to water.	*L*	*N*	
Social Influences: Human waste, fish stocking, fertilization, and other substances are contributing factors to biological contaminants.	*L*	*Y*	Monitor biological contaminants

v-5. What are the influences and relationships between FIRE and other ecosystem processes in the watershed?			
Issue: Fire Hazard and Risk			
Influences	**Influence Rating*** ***H, M, or L***	**Likely to be changed by Management Actions** ***Y or N***	**Management Objectives that can moderate the influences rated *High (H)* or *Medium (M)***
Physical Influences: The climate */weather?* (e.g. microclimate, precipitation, wind, etc.) and topography (slope, aspect, etc.) have influenced fire history.	*H*	*N*	
Precipitation influences vegetation growth and fuel moisture, therefore fuels and rates of fire spread	*L*	*N*	
Should wind fan a fire in riparian reserves with steep side slopes and characteristic chimney effect topography, there is the risk of down woody material consumption (stand replacing fire)			Reduce potential fire intensity in Riparian Reserves Prevent large scale stand replacing fires by decreasing fire hazard and risk
Biological Influences: Insects and diseases can set the stage for stand replacing fires.	*M*	*Y*	
Vegetation on the slope determines fuel buildup	*H*	*Y*	
Social Influences: Fuels Reduction: Reduction of fuels will reduce the fire hazard in areas. Fuel reduction treatments along with prescribed burning can recreate cool underburns of the past, reducing the risk of a stand replacing fire.	*H*	*Y*	
Fire suppression: Fuel buildup can increase fire hazard and risk to resources. The amount and distribution of large down woody material left on the ground may increase fire intensity should a fire get started.	*M*	*Y*	
Human caused fires	*M*	*Y*	Reduce the number of human caused fires

v-6. What are the influences and relationships between VEGETATION AND SERAL PATTERNS and other ecosystem processes in the watershed (as they relate to the issues of old growth, plant community and seral stage distribution, insects and diseases, noxious weeds and biodiversity)?

Issue: Harvest of Old growth

Influences	**Influence Rating*** ***H, M, or L***	**Likely to be changed by Management Actions** ***Y or N***	**Management Objectives that can moderate the influences rated *High (H)* or *Medium (M)***
Physical Influences: Fire occurrence is one of the larger physical influences on *old growth* distribution in the watershed.	*H*	*Y*	Prevent large scale stand replacing fires by decreasing fire hazard and risk *(See recommendations under Fire Hazard and Risk)*
Biological Influences: Fuel loads, insects and diseases can set the stage for catastrophic fires, thus influencing amount and distribution of *old growth.*	*H*	*Y*	Reintroduce role of fire in the ecosystem
Social Influences: Management activities and road construction, as well as, human-caused fires influence the amount and distribution of *old growth.*	*H*	*Y*	Stratify treatment areas by slope and aspect to meet landscape management objectives
			Meet Forest plan standards and guidelines for old growth protection Meet Forest plan standards and guidelines for old growth harvest

Issue: Plant association and seral stage distribution
Issue: Land Management Goals and dynamic natural systems

Influences	**Influence Rating*** ***H, M, or L***	**Likely to be changed by Management Actions** ***Y or N***	**Management Objectives that can moderate the influences rated *High (H)* or *Medium (M)***
Physical influences: Fire, soil, slope, aspect, microclimate, precipitation, wind, etc.	*M*	*N*	Stratify treatment areas by slope and aspect to meet landscape management objectives
Biological Influences: Insects and diseases can have localized effects on stand seral stages (e.g. root rot)	*M*	*Y/N*	Reintroduce the role of fire into the ecosystem *(See recommendations under Fire Hazard and Risk)*
Social Influences: Management activities such as timber harvest affect seral stage distribution across the landscape	*H*	*Y*	
Riparian Reserves: Commercial thinning can develop desired stand structure within riparian reserves with emphasis on growing large trees and logs and other late successional characteristics.	*H*	*Y*	Develop late successional components in Riparian Reserves

Issue: Insects and diseases

Physical influences: Climate, especially drought, windstorms and the blowdown they bring, floods and the down wood resulting, have a significant physical influence on *insect and diseases* severity.	*M*	*N*	
Biological Influences: Vegetative competition, including inter-tree competition, can affect *insect and diseases* by increasing demands for nutrients, moisture and light	*M*	*Y*	Improve Stand Vigor *(See recommendations under Land Management Goals and Dynamic Natural Systems)* Reduce dwarf mistletoe and root rot infected stands

Issue: Insects and diseases			
Influences	**Influence Rating*** *H, M, or L*	**Likely to be changed by Management Actions** *Y or N*	**Management Objectives that can moderate the influences rated** ***High (H)*** **or** ***Medium (M)***
The amount of dead material can increase the severity of insects and diseases and contribute to their spread.	*H*	*Y*	Reduce the severity of insects and diseases by removal of dead material.
Issue: Noxious weeds			
Physical Influences: Soil disturbance and wind has a large influence on *noxious weed* spread.	*M*	*Y*	Minimize spread of noxious weeds
Biological Influences: Lack of competition from native plants, spread of seeds by animals, and lack of natural predators and diseases influence the rate of spread of *noxious weeds*.	*M*	*Y/N*	
Social Influences: Human movement, and travel corridors (Highway 22, powerlines) can spread seeds of noxious weeds from one place to another.	*M*	*N*	
Activities that create bare soil especially adjacent to roads and trails	*L/M*	*Y*	Re-establish vegetation in disturbed areas
Issue: Maintaining plant biodiversity			
Physical Influences: Fire, climate, wind, and topography influence landscape level *biodiversity*.	*H*	*N*	
Biological Influences: Insects and diseases, and vegetative competition influence *biodiversity*	*M*	*Y*	Reintroduce role of fire in the ecosystem
Social Influences: Management activities (most ground disturbing activities) can change, remove, or add vegetation, which influences biodiversity.	*H*	*Y*	Preserve and promote biodiversity at the following levels: genetic, within the plant communities, and between the plant communities
Prevention of large scale stand replacing fires may reduce plant diversity.	*L*	*Y*	Reintroduce role of fire in the ecosystem

v-7. What are the influences and relationships between AQUATIC SPECIES AND HABITATS and other ecosystem processes in the watershed?			
Issue: Maintaining habitat components for native aquatic wildlife species			
Influences	**Influence Rating*** *H, M, or L*	**Likely to be changed by Management Actions** *Y or N*	**Management Objectives that can moderate the influences rated** *High (H)* **or** *Medium (M)*
Physical Influences: Solar radiation and its influence on stream temperatures can affect the health of fish populations	*M*	*Y*	Prevent large scale stand replacing fires by decreasing fire hazard and risk *(See recommendations under Fire Hazard and Risk)*
Fire can remove shade and large wood from streams and riparian areas	*M*	*Y*	Maintain or restore habitat complexity
Erosion and the resulting sedimentation can affect survival and reproductive success	*M*	*N*	Maintain or reduce stream temperatures with regard to fish habitat
The complexity of stream channels (pools, riffles, and large wood) can affect carrying capacity of fish habitat	*H*	*Y*	
Biological Influences: Vegetation such as trees provide channel structure that can affect streambank stability; shade that can moderate stream temperatures; and organic matter input that can affect productivity	*H*	*Y*	
Salmon that die after spawning provide nutrient enrichment to streams and riparian vegetation.	*M*	*Y*	
Social Influences: Construction of Detroit and Big Cliff Dams blocked the migration of fish up the North Santiam River and led to the elimination of anadromous salmon and steelhead above the dams.	*H*	*N*	

Issue: Maintaining habitat components for native aquatic wildlife species

Influences	**Influence Rating*** *H, M, or L*	**Likely to be changed by Management Actions** *Y or N*	**Management Objectives that can moderate the influences rated** ***High (H)* or *Medium (M)***
Some road construction, timber harvest, and various other human uses may affect sediment input to stream courses and may affect fish survival and productivity	*M-H*	*Y*	Maintain or restore habitat complexity
			Manage amount and timing of sediment as a result of management activities
Recreation activities near streams and lakes can affect riparian habitat through compaction and the removal of stream side vegetation.	*L-M*	*Y*	Decrease resource impacts and improve aesthetics at recreational areas *(See recommendations under Recreation Supply and Demand)*

Issue: Reintroduction of Native Aquatic Species

Influences	**Influence Rating*** *H, M, or L*	**Likely to be changed by Management Actions** *Y or N*	**Management Objectives that can moderate the influences rated** ***High (H)* or *Medium (M)***
Physical Influences: Dams and Reservoirs can change habitat conditions and access and limit existence and reproduction in former habitat	*H*	*N*	
Biological Influences: Introduced fish species may outcompete native fish populations	*L-M*	*N*	

Issue: Reintroduction of Native Aquatic Species (continued)			
Influences	**Influence Rating*** *H, M, or L*	**Likely to be changed by Management Actions** *Y or N*	**Management Objectives that can moderate the influences rated** ***High (H)*** **or** ***Medium (M)***
Lack of retention of organic matter due to the lack of complexity can reduce the overall carrying capacity of a stream	*M-H*	*Y*	Provide adequate habitat to sustain populations of migratory fish when access around migration barriers (dams) have been resolved
Social Influences: Forest management activities such as stream cleanout, some timber harvest, and some road construction have reduced the potential carrying capacity of existing habitat	*M*	*Y*	
Recreational fishing pressure can affect native fish populations	*M*	*N*	
Stocking of Non-native fish species for angler use can affect native fish populations	*M*	*N*	
Detroit and Big cliff dams and the associated reservoirs have eliminated most of the anadromous fish habitat in the Detroit Tributary watersheds.	*H*	*N*	

v-8. What are the influences and relationships between TERRESTRIAL SPECIES AND HABITATS and other ecosystem processes in the watershed?			
Issue: Maintaining habitat components for native terrestrial wildlife species and wildlife biodiversity			
Influences	**Influence Rating*** ***H, M, or L***	**Likely to be changed by Management Actions** ***Y or N***	**Management Objectives that can moderate the influences rated *High (H)* or *Medium (M)***
Physical Influences: Fire can influence vegetative seral stages and affect habitat of species dependent on them	*H*	*Y*	Prevent large scale stand replacing fires by decreasing fire hazard and risk *(See recommendations under Fire Hazard and Risk)*
Topography (i.e. elevational differences, etc.) can influence vegetative species composition, etc. and therefore habitat types.	*H*	*N*	
Climate (wind storms, snow storms, etc.) can influence fragmentation of interior habitat and development of edge habitats through blowdown or snowdown.	*H*	*N*	
Biological Influences: Vegetative condition can influence species dispersal, foraging, and reproduction.	*H*	*Y*	Maintain habitat components for native terrestrial wildlife species
Species adaptation to certain habitat types can influence what species are present in given habitats	*M-H*	*N*	
Social Influences: Management activities such as timber harvest, road construction, powerline development, etc. can influence habitat effectiveness, connectivity, etc.	*H*	*Y*	
Human uses can influence habitat disturbance and degradation, reproductive success, habitat removal, animal harassment, predation, etc.	*M*	*Y*	Increase of awareness of wildlife needs and habitat characteristics

Issue: Maintaining habitat components for native terrestrial wildlife species and wildlife biodiversity (continued)			
Influences	**Influence Rating*** ***H, M, or L***	**Likely to be changed by Management Actions** ***Y or N***	**Management Objectives that can moderate the influences rated *High (H)* or *Medium (M)***
Riparian Reserves: Fire suppression has created a down woody material component that was not there before in high fire frequency areas. This buildup of down woody material can increase fire intensity, should a fire get started, increasing the risk of losing riparian habitat. On the other hand, the buildup of down woody material in these areas has led to increased use by wildlife populations that has lost its traditional down woody component through Forest management activities such as logging and stream cleanout. Salvage in riparian reserves that are in excess of down woody material requirements, especially on south and west facing slopes may reduce fire intensity within riparian areas, should a fire get started.	***H***	***Y***	Prevent large scale stand replacing fires by decreasing fire hazard and risk Reduce potential fire intensity in Riparian Reserves
Regeneration timber harvest, road building and salvage in some areas can further fragment late successional habitat and allow access into areas not previously accessed. This could lead to disturbance which may or may not affect reproductive success. These activities have changed mid or late seral habitat to early seral habitat reducing critical habitat components. Connectivity may be reduced and edge effects are produced.	***H***	***Y***	Maintain habitat components for native terrestrial wildlife species
The introduction of exotic species, both plant and animal, have non-desired effects. Non-native plant species out compete native vegetation and may eliminate or reduce desired vegetation. This may displace or reduce populations able to utilize these areas. These plants may also be toxic to wildlife such as tansy ragwort. These do not offer any forage value but species such as scotchbroom may add cover to an area.	***M***	***Y/N***	

Issue: Maintaining habitat components for native terrestrial wildlife species and wildlife biodiversity (continued)			
Influences	**Influence Rating*** *H, M, or L*	**Likely to be changed by Management Actions** *Y or N*	**Management Objectives that can moderate the influences rated** ***High (H)*** **or** ***Medium (M)***
Non-native animal species such as the brown-headed cowbird and bullfrog, introduce elements into the system not previously present. Native wildlife may not have defense mechanisms to deal with these species. This could lead to over-predation, low reproductive success, and undue stress.	*M*	*N*	
Historical fish stocking has occurred in the watershed. Tumble Lake has been stocked with brown trout which is a predator to many aquatic invertebrates and amphibians. Fish stocking can upset a natural lake ecosystem by introducing a foreign predator into the system. Many endemic and native amphibians are declining and fish stocking may have played a small part in this. Future proposals of stocking should be discussed between Oregon Department of Fish and Wildlife and the District.	*M*	*N*	
Issue: Conflicting habitat needs			
Social Influences: Prescribed burning (cool underburning) can reintroduce fire into the ecosystem for species dependent on larger vegetative structure: Bald eagle, spotted owl, etc	*H*	*Y*	Reintroduce role of fire in the ecosystem *(See recommendations under Fire Hazard and Risk)*

v-9. What are the influences and relationships Between HUMAN USES and other ecosystem processes in the watershed?

Influences	Influence Rating* *H, M, or L*	Likely to be changed by Management Actions *Y or N*	Management Objectives that can moderate the influences rated *High (H)* or *Medium (M)*
Issue: Sustainability of forest-product/tourism dependent communities			
Physical Influences: Soil, slope, aspect, elevation, climate, etc. influence vegetative growth, which in turn influences the potential products available from the forest.	*L*	*Y - soil productivity*	Improve soil productivity through fertilization
Soils and slopes affect potential for development (i.e. roads, recreation facilities, etc.)	*M*	*N*	
Local tourism economy is dependent on high water levels of Detroit Reservoir.	*H*	*Y*	Participate in the resolution of conflicts in Detroit Reservoir water level needs.
Biological Influences: Vegetation, especially trees, provide the primary forest product utilized by local communities	*H*	*Y*	Provide for a sustainable timber supply Provide a variety of forest products
Social Influences: Scientific research, public sentiment and political processes, etc. can influence forest management practices, which in turn, can influence the amount and types of products available to local communities.	*M*	*Y*	Increase public understanding of resource management
Detroit Reservoir created an important economic resource to local communities	*H*	*Y*	Participate in the resolution of conflicts in Detroit Reservoir water level needs.
Increasing use of the watershed has created a need for improved infrastructure, such as a community sewer treatment facility, in order to achieve economic diversification goals	*H*	*Y*	Participate in the improvement of infrastructure to achieve economic diversification goals
Issue: Recreation Supply and Demand			
Physical Influences: Detroit Reservoir is a major recreational attraction in the North Santiam Basin. Fluctuations of the reservoir level influences use of the lake	*H*	*Y*	Participate in the resolution of conflicts in Detroit Reservoir water level needs.

Issue: Recreation Supply and Demand			
Influences	**Influence Rating*** ***H, M, or L***	**Likely to be changed by Management Actions** ***Y or N***	**Management Objectives that can moderate the influences rated *High (H)* or *Medium (M)***
Landform and topography influence human use patterns. Steep topography concentrates use mostly in the flat valley bottom around the reservoir.	*M*	*N*	
Weather controls when people recreate and the type of activity in which they engage	*H*	*N*	
Biological Influences: Old growth or mature Douglas-fir forests and other vegetation provide the recreational setting and influence the type of recreational activities that occur in an area	*H*	*Y*	Maintain and enhance desirable recreation settings through various vegetation management practices
Wildlife and fish provide recreation opportunities such as hunting, fishing, and wildlife viewing	*H*	*Y*	Maintain habitat components for native terrestrial wildlife species Increase of awareness of wildlife needs and habitat characteristics *(See Recommendations under Maintaining habitat components for native terrestrial species)*
Social Influences: Construction of Detroit Dam, that formed Detroit Lake serves as a recreational destination and influences social crowding.	*H*	*Y*	Provide for a wide range of demanded recreational settings to achieve satisfactory user experience
Improved highway access and proximity to urban areas provided easier access to recreational opportunities and has increased social crowding.	*M*	*N*	
Population growth, socio-economic status and cultural background influences user demand	*H*	*N*	
Funding levels influence ability to provide for recreational demands.	*H*	*Y*	Provide stable funding to achieve recreational goals
Social capacity in excess of resource capacity increases resource impacts such as soil compaction, etc.	*M*	*Y*	Decrease resource impacts and improve aesthetics at recreational areas
User conflicts have occurred due to increasing use and the diversity of activities occurring in the same area.	*H*	*Y*	Reduce user conflicts

v-10. What are the influences and relationships between FACILITIES and other ecosystem processes in the watershed?

Issue: Maintaining facilities

Influences	**Influence Rating*** ***H, M, or L***	**Likely to be changed by Management Actions** ***Y or N***	**Management Objectives that can moderate the influences rated *High (H)* or *Medium (M)***
Physical Influences: Topography and soil types determine facility locations	*H*	*N*	
Weather such as snow, floods, wind, etc. can damage facilities	*M*	*Y*	Maintain facility condition at or above acceptable standards, and meet current public needs.
Facilities deteriorate with age	*L*	*Y*	
Biological Influences: Vegetation can damage facilities	*M*	*Y*	
Social Influences: Vandalism	*H**	*Y*	
Use (wear and tear)	*H**	*Y*	
Demand and need influences types of facilities created.	*H**	*N*	

H* = when road maintenance is deferred due to lack of funds

Issue: Public Safety

Physical Influences: Erosional Processes can create safety hazards or damage to facilities	*M*	*Y*	Restoration of erosion prone areas *(See recommendations under erosion processes)*
Biological Influences: Trees can create safety hazards or facility damage	*M*	*Y*	Provide for public safety
Social Influences: Lack of adequate facilities, signing and enforcement creates safety issues	*M*	*Y*	

v-11. What are the influences and relationships between SCENIC QUALITY and other ecosystem processes?

Issue: Management of the landscape for Scenic Quality

Influences	**Influence Rating*** *H, M, or L*	**Likely to be changed by Management Actions** *Y or N*	**Management Objectives that can moderate the influences rated** ***High (H)*** **or** ***Medium (M)***
Physical Influences: Fire, geology, topography and water all influence the scenic character of the area	*M*	*Y*	Prevent large scale stand replacing fires by decreasing fire hazard and risk *(See recommendations under Fire Hazard and Risk)*
			Improve soil productivity
			Restoration of erosion prone areas *(See recommendations under Erosion Processes)*
Biological Influences: Vegetative reestablishment following management activities and or catastrophic events influences scenic quality	*H*	*Y*	Reestablish vegetation promptly
Social Influences: Timber harvest, road construction, facility development such as the power line and dam, have altered natural scenic quality	*H*	*Y*	Implement management actions to minimize adverse impacts to scenic quality (e.g. harvest unit design, facility placement on the landscape)
Diseases such as phillenus affect management within visual allocations. Treatment of phillenus pockets (regeneration harvest) may conflict opening size within visual allocations.	*M*	*Y*	

V. Management Implications

B. Recommendations

v-12. What and where are the opportunities for management, restoration or improvement within the watershed?

Issue: Erosion Processes

Management Objectives	Potential Treatments	Priority *H, M, L*
Restoration of erosion-prone areas	Develop a road and traffic management plan which includes priorities for road decommissioning and storm proofing	*H*
	Aggressively decommission and storm proof high- risk local roads, to reduce risk of catastrophic failure during storm events. Priorities will be concentrated in areas with older sidecast roads, in areas with high hazard and low amounts of existing structure in streams. Protection of existing facilities also makes good economic sense. A small investment in storm proofing or storage can result in considerable savings in reconstruction.*(see road commissioning under facilities)*	*H*
	Sidecast pullback of unstable road fills on steep hillsides.	*H*
	Revegetate erosion-prone, denuded areas using native vegetation	*M*
Minimize erosion potential from management activities	Avoid management activities such as timber harvest on areas of active slope instability or potentially highly unstable (not necessarily unsuited) terrain. *Map II-1*	*H*
	Retain green trees on critical sites (e.g. stream headwalls, sites with land movement.	*H*
	Evaluate the reintroduction of large woody material into deficient stream channel reaches	*M*
	Retain duff and large woody material standards defined in the Forest Plan.	*H*
	Reduce fuel loading, by low-intensity prescribed fire (meeting standards and guidelines) or other method such as hand piling or machine, in identified hazard areas that threaten soil stability.	*M*
	Repair unstable road fills	*L*

Issue: Erosion Processes (continued)		
Management Objectives	**Potential Treatments**	**Priority *H, M, L***
	Repair cutbank problems (e.g. Kinney Creek, Heater Creek)	*L*
Reduce Shoreline erosion on flat areas such as Detroit Flats and Santiam flats from wave action and fluctuations in the reservoir levels	Plant willow and other vegetation Detroit Flats: extend shoreline back to original place and riprap to stabilize.	*L**

*Low priority due to past effectiveness

V-13. What and where are the opportunities for management, restoration or improvement within the watershed?

Issue: Peak flows and Minimum flows

Management Objectives	Potential Treatments	Priority H, M, L
Minimize effects of peak flows	Fire prevention and fuel treatment to minimize risk of vegetation loss, fire impacts of soil infiltration rates, etc. that contribute to peak flows	*H*
	Spatially distribute timber harvest across the landscape	*H*
	Within other resource constraints, encourage development of at least 70% canopy closure within managed stands to intercept snow, etc. thereby regulating the amount of precipitation reaching stream channels (highest priorities are in drainages below ARP thresholds)	*H*
	Reduce drainage network through actively decommissioning and storm proofing roads	*H*
	Optimize tree growth in plantations and fire regenerated young stands to reduce effects to peak flows. Activities such as pre-commercial thinning, and commercial thinning are tools to accomplish this goal. These activities will also optimize tree growth within riparian reserves that are in the same seral stage as other plantations and fire regenerated young stands.	*M*
Maintain desired level of minimum flows	In specific stream reaches and with interdisciplinary and public input, add structure to stream channels in the Detroit Tributary watersheds, stabilize the areas with large woody debris to reduce stream energies so sediments are deposited. This will reduce downcutting and the channels will begin to build up to the level of the floodplains	*M*
	Create additional water storage areas in the floodplain by reconnecting stream channels to the floodplains	*M*

V-14. What and where are the opportunities for management, restoration or improvement within the watershed? **Issue: Channelbank stability**

Management Objectives	Potential Treatments	Priority *H, M, L*
Promote channelbank stability	Prior to management activities, evaluate resistance of channelbank to erosion and design projects to fit the channel conditions	*H*
	Implement " Best Management Practices" as defined in the forest plan, during management activities such as timber harvest and road construction	*H*
	Restore unstable channelbanks through introduction of channel structure such as large wood and boulders and mechanically reshape channels to increase stability. (e.g. re-establish creek with flood plain)	*M*
	Facilitate vegetative growth on the channelbanks to promote stability	*H*
	Within other resource constraints, identify headwater areas for future large woody material recruitment into stream system.	*M*
	Revegetate broad flood plains with conifers, concentrate on portions that are stable.	*M*
	Evaluate fuel loading and fire risk within riparian reserves. Where appropriate, manage fuels to minimize risk of stand replacing fires.	*M*
	Mitigate channel bank destabilization that occurs in areas of high recreation use (e.g. reservoir near the City of Detroit), and other private properties.	*L*
	Apply Forest Plan riparian reserve widths during project implementation as this analysis did not identify any ecosystem process or species that would benefit from narrower widths.	*M*
	Monitor stream restoration work and stream dynamics for streams within Detroit Tributary watersheds	*M*

V-15. What and where are the opportunities for management, restoration or improvement within the watershed? **Issue: Water Temperatures**

Management Objectives	Potential Treatments	Priority *H, M, L*
Maintain year-round stream temperatures at 55 degrees F. or below	Maintain forest plan riparian reserves on springs, streams and also on seeps contributing significantly to temperature regulation , to provide thermal regulation of water	*H*
	In selected areas where large conifers are not present in riparian areas, implement silvicultural practices (e.g. commercial thinning, precommercial thinning, pruning) to stimulate growth so trees will eventually shade streams. Evaluate locations based on various resource considerations such as biodiversity, etc.	*H*
	Commercial thin within riparian reserves that will respond to thinning by increased growth, developing late successional characteristics at a faster rate than with no treatment.	*M-H**
	Revegetate streamside areas where vegetation is not providing adequate shade	*H*
	Evaluate fuel loading and fire risk, and manage fuels to minimize risk of catastrophic in order to maintain vegetative cover, etc.	*M*

*Some stands will respond better than others. Will concentrate on the stands that have the highest probability of responding to this treatment.

V-16. What and where are the opportunities for management, restoration or improvement within the watershed? **Issue: Turbidity**		
Management Objectives	**Potential Treatments**	**Priority *H, M, L***
Balance social and biological turbidity needs within the physical parameters of the watershed	Revegetate debris torrent prone headwall areas and other sites prone to erosion, where appropriate	***M***
	Minimize potential risk of wildfire through active fuels management and fuel treatment	***M***
	Implement standards and guidelines to retain large organic material (i.e. down logs) on the uplands	***H***
	Evaluate and design large wood placement opportunities within streams	***M***
	As directed by "Best Management Practices" as defined in the forest plan, and standards and guidelines, minimize erosion by careful selection of harvest units and other management activities outside of erosion-prone areas	***H***
	Clean out culverts and complete access and travel management plan to allow for road decommissioning and/or storm proofing.	***H***
	Develop a Fire/fuels Management Plan. Evaluate and treat areas at high risk for catastrophic fire, where appropriate.	***M***

What and where are the opportunities for management, restoration or improvement within the watershed? **Issue: Biological Contaminants**		
Objectives	**Potential Treatments**	**Priority *H, M, L***
Monitor biological contaminants	Study sources of contamination to determine what contaminants there are, where and why the occur, how they affect the ecosystem and develop methods to mitigate impacts	***M***
Mitigate impacts of biological contaminants	Implement recommended methods to decrease impacts of contaminants	***L***

***V-17. What and where are the opportunities for management, restoration or improvement within the watershed?* Issue: Fire Hazard and Risk**		
Management Objectives	**Potential Treatments**	**Priority *H, M, L***
Prevent large scale stand replacing fires by decreasing fire hazard and risk	Treat existing slash by prescribed fire, fuel breaks, prescribed natural fire	***H***
	Decrease fuel loading in areas where identified resources are at risk of being degraded by stand replacing fires.	
	Prioritize areas for the removal of down timber from recent windstorms and floods, where levels are in excess of Forest Plan Standards and Guidelines and where fire hazard is high.	***M***
Reduce the number of human caused fires	Continue to improve fire prevention patrols and fire prevention education.	***M***
	Monitor visitor use during high fire danger by prevention patrols	
Reintroduce role of fire in the ecosystem	Prescribed burning - Broadcast for site preparation, meadows enhancement, encouraging forage (e.g. elk) and fuels reduction Prescribed burning - underburning to take out fines for fuels reduction, thinning out stand, increasing wildlife habitat, forage. Possible areas for prescribed burning (underburning): • Areas with spotted owl habitat. For example vegetation in Dry Creek is good dispersal habitat. Most of the late successional habitat is within riparian reserves or rocks. It is the shortest dispersal route around the lake and will become foraging and nesting habitat in a shortest period of time. • South facing slopes such as Dome rock ridge. Fuel reduction treatments and prescribed fire can reduce the fuel buildup to levels prior to fire suppression. Vegetation influenced by past fire frequencies. There were a number of severe fires. There is now a fair amount of unsuited ground with vegetation that evolved with fire, yet this habitat is not getting the disturbance it needs to maintain these habitats.	***H***
Reduce potential fire intensity in Riparian Reserves	Priorities for salvage within riparian reserves with regard to potential loss of habitat from fire: • Those riparian reserves with south/west aspects with a large fuel buildup and risk of fire. • Edge habitat on Sw, W, and southern aspects • draws associated with steep canyons • draws off of W/SW facing ridges • Those riparian reserves with down woody material in excess of the amount needed to meet standards and guidelines.	***M***

V-19. What and where are the opportunities for management, restoration or improvement within the watershed? **Issue: Harvest of Old Growth**

Management Objectives	Potential Treatments	Priority *H, M, L*
Old growth protection	Implement standards and guidelines to protect late-successional characteristics in LSRS (owl activity centers), riparian reserves and in required acres within Matrix and appropriate land allocations.	*H*
Old growth harvest	Implement Forest Plan objectives in Matrix land	*M*

V-20. What and where are the opportunities for management, restoration or improvement within the watershed? **Issue: Plant association and seral stage distribution**

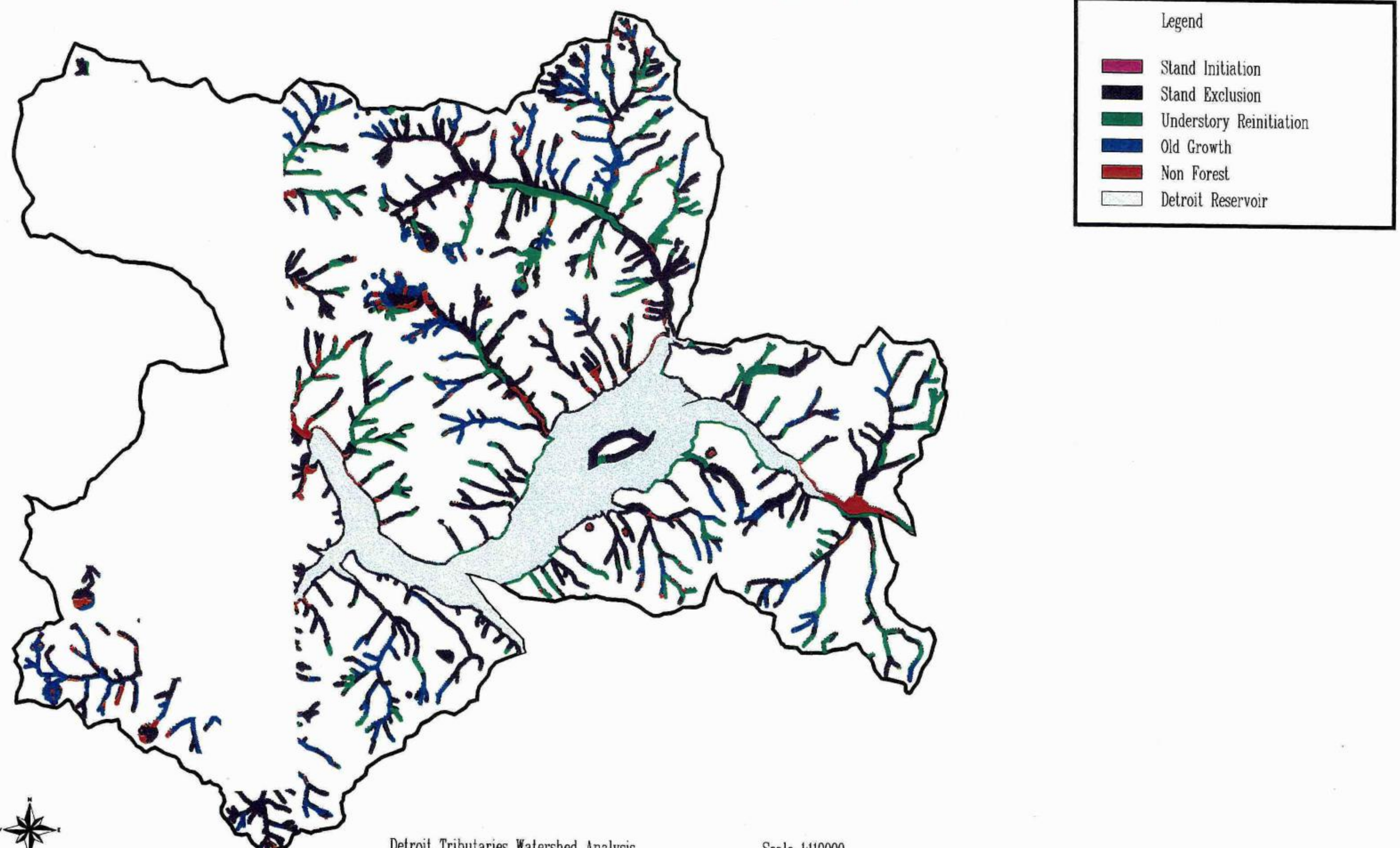
Management Objectives	Potential Treatments	Priority *H, M, L*
Stratify treatment areas by slope and aspect to meet landscape management objectives	North Slopes - In sheltered drainages, such as French Creek Implement thinning prescriptions with the long term goal of longer rotations to emulate reference conditions on North slopes. Retain more sensitive areas, that usually occur on North slopes South Slopes - reduce fuel loading by variety of treatments including the reintroduction of fire (e.g. Dome Rock ridge, Dry Creek)	*M*

V-21. What and where are the opportunities for management, restoration or improvement within the watershed? **Issue: Land Management Goals and dynamic natural systems**		
Management Objectives	**Potential Treatments**	**Priority *H, M, L***
Land Allocation: Riparian Reserves		
Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate winter and summer thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of course woody debris sufficient to sustain physical complexity and stability	Salvage when present and future coarse woody debris needs are met and other Aquatic Conservation Strategy objectives are not adversely affected.	*H*
Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian dependent species.	Apply Silvicultural practices for Riparian Reserves to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives. Examples would be commercial thinning, precommercial thinning.	*H*
Develop late successional components in Riparian Reserves by developing desired stand structure with emphasis on growing large trees and logs and other late successional characteristics. *Maps v-1a-1d* **show the comparison of structural stages within riparian reserves at years 30 and 60 with and without silvicultural treatment.**	Commercial Thinning (Maximum potential acres): Riparian -size class 3.5 - 4.0, not in LSR = 5262 acres Commercial thin in riparian reservess when: • Riparian reserves are intact but not do not have late successional structure. • In places where fire exclusion created more stems, and the development of late successional characteristics may delayed	*H*

Management Objectives	Potential Treatments	Priority *H, M, L*
Land Allocation: Matrix		
• **Production of commercial yields of wood (Commercial timber sales)**	Timber Harvest: regeneration, partial, salvage, and commercial thinning harvests	*H*
• **Retention of moderate levels of ecologically valuable old-growth components such as snags, logs, and relatively large green trees**	Regeneration Harvest: • Stands which have reached 95% of culmination of mean annual increment • Stands too old or stagnated to respond to release from thinning. • Stands where regeneration harvest will address insects, diseases and wind throw • Stands where creating openings meet other resource objectives (e.g. wildlife, recreation, etc) • Late successional stands, if in excess of 15% of specific 5th field watersheds. Total matrix in 21" + d.b.h. stands = 10,181 acres (maximum potential acres)	*M*
• **Improve Stand Vigor**	Commercial Thinning: In matrix, stands in these size classes will be considered for thinning if they need stocking control to achieve recommended stocking levels for optimum growth or to maintain stands for longer periods. Matrix - size class 3.5 - 4.0 (9.0 - 20.9) " d.b.h. = 8087 acres (Maximum potential acres)*	*H*
	Post harvest activities: reforestation, pre-commercial thinning, fertilization, pruning, vegetation control, and animal control.	*H*

* These acres represent the maximum total possible. Any decision on actual treatment would need to be field verified and meet all resource objectives. Many stands will not meet size or stocking level requirements for thinning.

Structural Stages in Riparian Reserves Year 30 with No Silvicultural Treatment



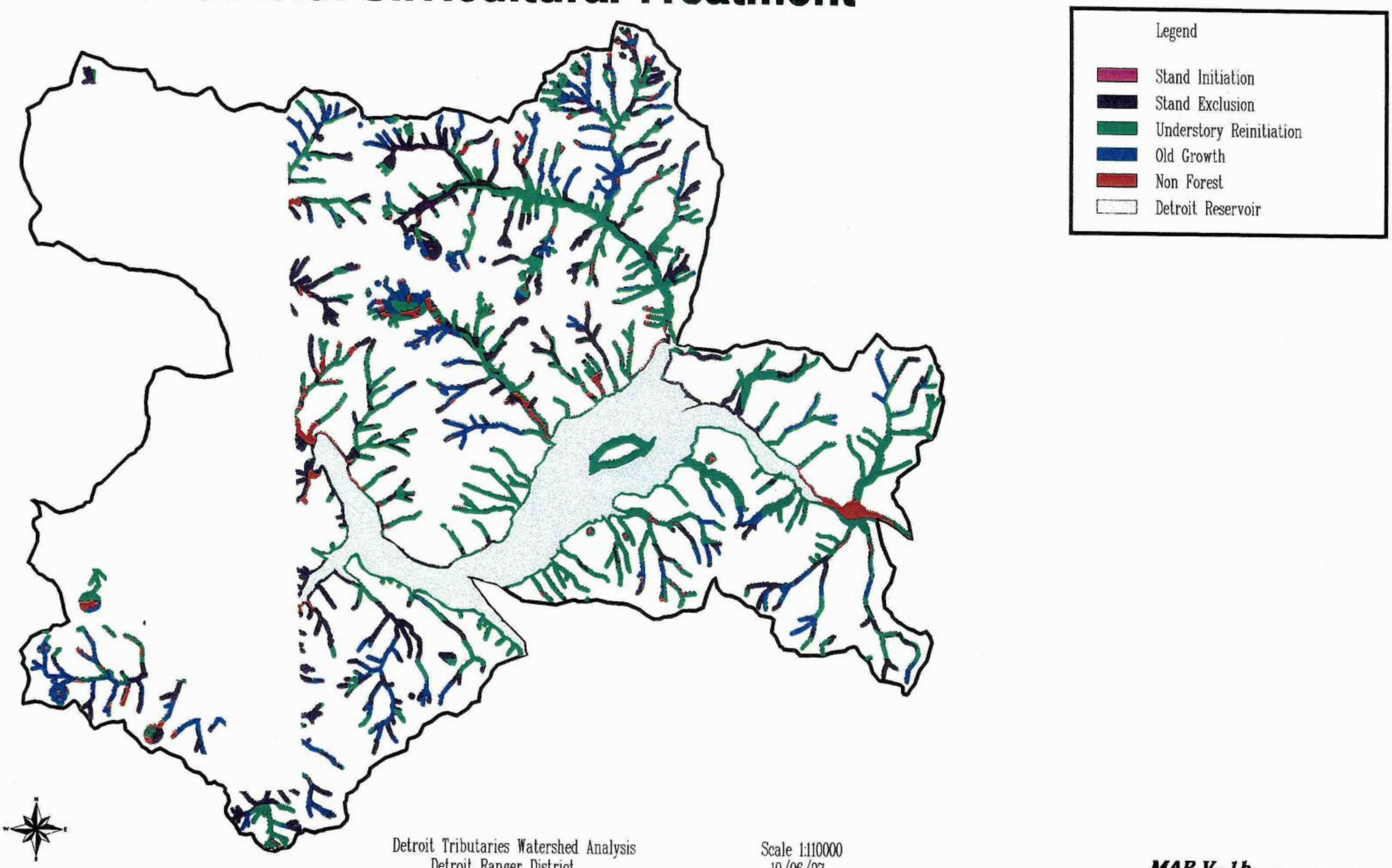
Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/06/97

MAP V-1a

Request #1538

Structural Stages in Riparian Reserves
Year 30 with Silvicultural Treatment



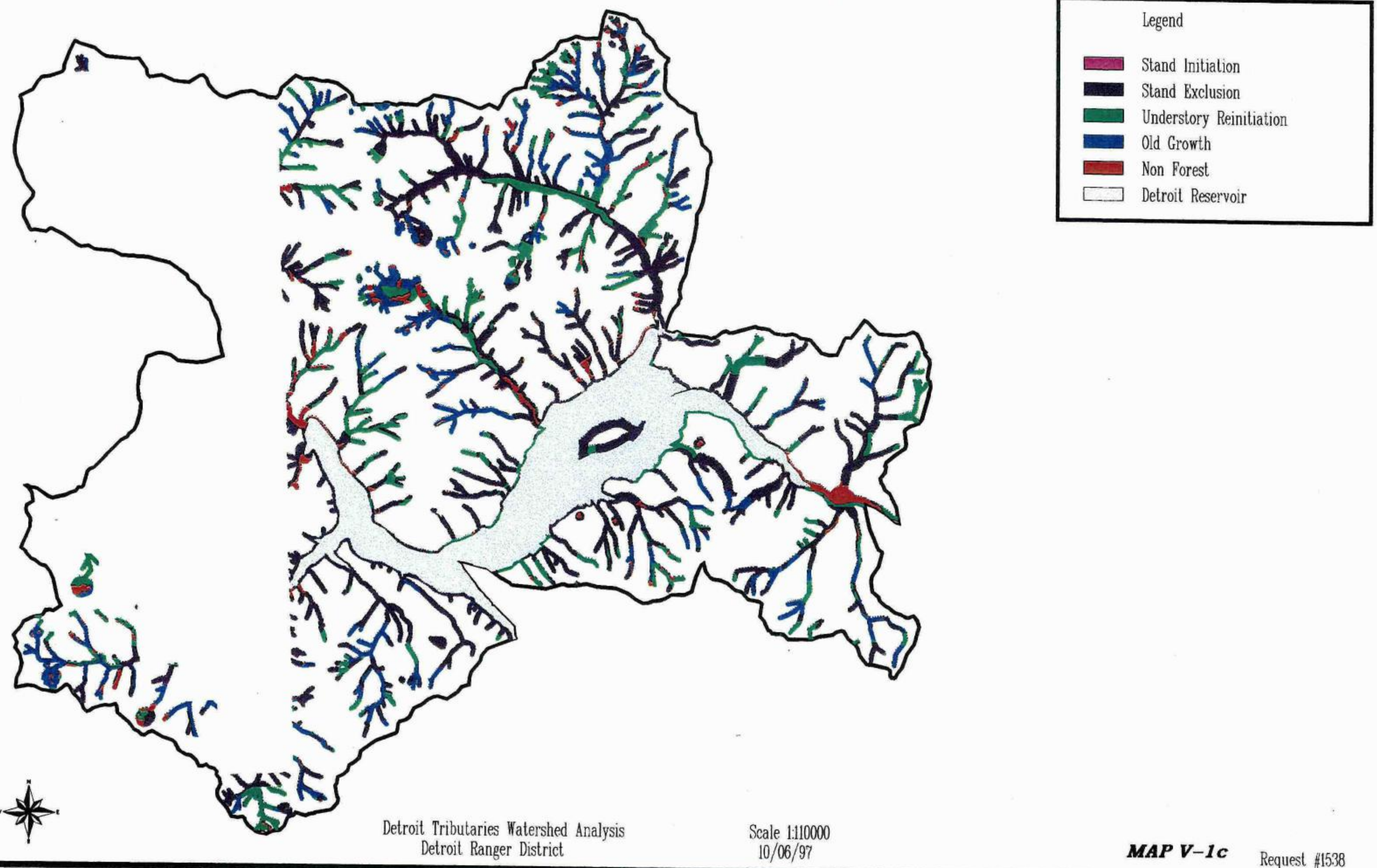
Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/06/97

MAP V-1b

Request #1538

Structural Stages in Riparian Reserves Year 50 with No Silvicultural Treatment



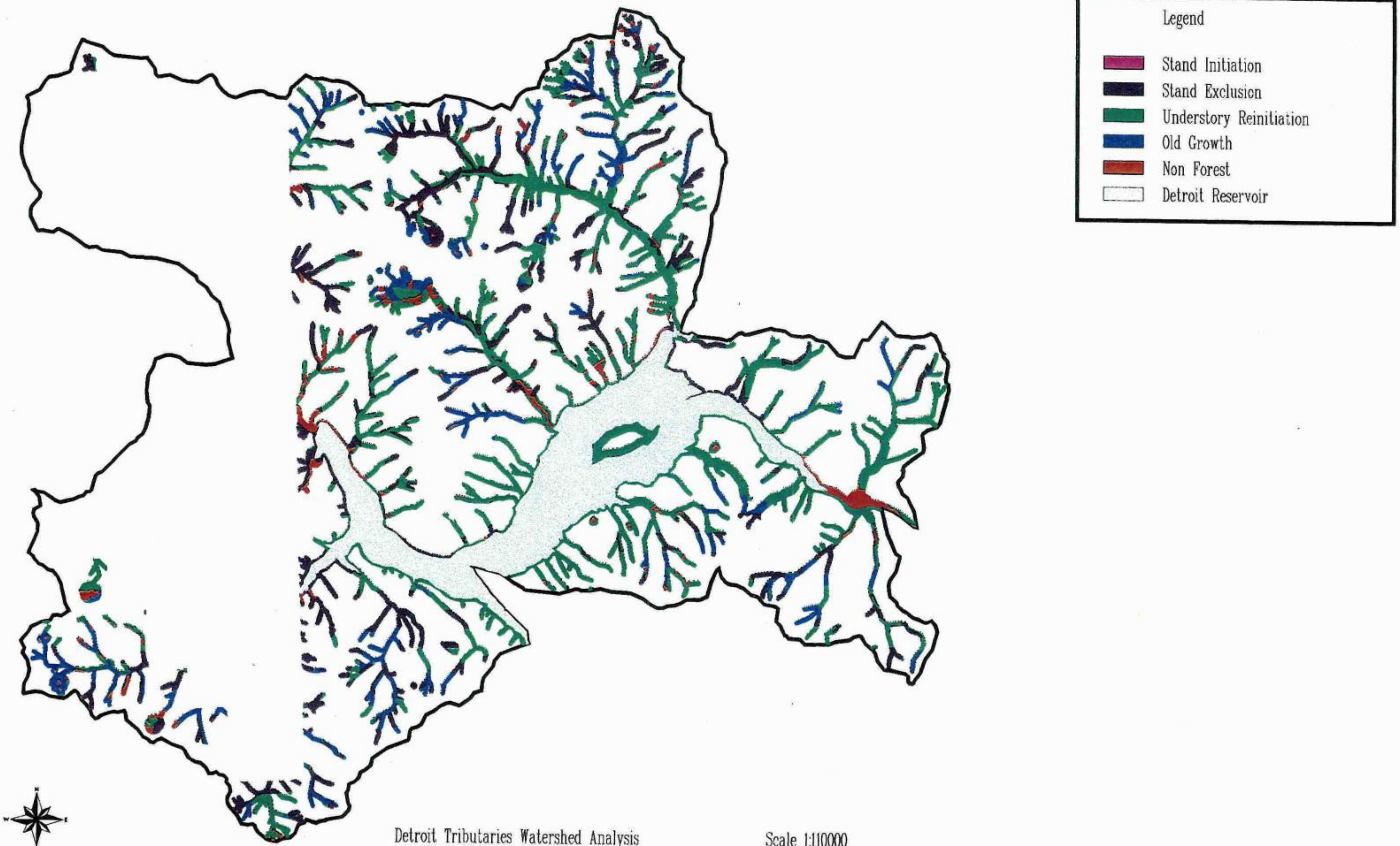
Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/06/97

MAP V-1c

Request #1538

Structural Stages in Riparian Reserves Year 50 with Silvicultural Treatment



Detroit Tributaries Watershed Analysis
Detroit Ranger District

Scale 1:110000
10/06/97

MAP V-1d Request #1538

Issue: Land Management Goals and dynamic natural systems (continued)		
Management Objectives	**Potential Treatments**	**Priority H, M, L**
Special Forest Products: • Stocking control of trees, thinning and post and pole harvest, which may increase tree growth, reduce canopy closure and stimulate understory vegetation. • Pruning which may reduce canopy closure and stimulate understory vegetation, increase future wood quality, reduce blister rust frequency on white pine and sugar pine • Clipping of plants may increase new shoot growth which may either reduce competition to other plants or provide available forage for animals. • Provides employment, economic diversity, and revenue to the Government. • Allows for harvest for personal use.	Special forest products represent a wide variety of commercially valuable products that may have a variety of effects on vegetation depending on the nature of the activity or the level of harvest. In some cases, harvesting is used to meet Silvicultural objectives and uses similar techniques such as thinning or pruning to generate products. In these cases, the previous discussions applying to these Silvicultural treatments would follow for special forest product harvesting. Since there is a wide variety of existing and potential products, it is difficult to generalize as to their specific effects. A potential list of products includes: boughs, Christmas trees, beargrass, sword ferns, salal, princes's pine, mosses, Oregon grape, clippings of various shrub species, huckleberries, mushrooms, tree cones, and posts and poles. Harvest is acceptable where compatible with Forest Plan Standards and Guides and with objectives for Riparian Reserves and LSR's. Specific harvesting and removal effects will be analyzed as part of the Environment Analysis process.	*M-H*

V-22. What and where are the opportunities for management, restoration or improvement within the watershed? **Issue: Insects and Diseases**

Management Objectives	Potential Treatments	Priority *H, M, L*
Reduce the severity of insects and diseases by removal of dead material.	Salvage harvest in areas with a buildup of dead material in excess of forest plan standards and guidelines for snags and down woody material	*M*
Reduce dwarf mistletoe and root rot infected stands	Stand replacement harvest and replanting with non-host species can reduce dwarf mistletoe and root rot infected stands.	

V-23. What and where are the opportunities for management, restoration or improvement within the watershed? **Issue: Noxious Weed Control**

Management Objectives	Potential Treatments	Priority *H, M, L*
Minimize the spread of noxious weeds	Highway 22 along both Detroit and Big Cliff reservoirs are good places to concentrate manual, biological, and minimal chemical control on knapweeds, scotch broom, tansy ragwort, and sweet clover.	*M*
Direct non-native plant control efforts to maximize effectiveness		
Re-establish vegetation in disturbed areas	Plant competitive species in areas where there is a risk of noxious weed spread.	*L*

v-24. What and where are the opportunities for management, restoration or improvement within the watershed? **Issue: Plant Biodiversity**

Management Objectives	Potential Treatments	Priority *H, M, L*
Preserve and promote biodiversity at the following levels: genetic, within the plant communities, and between the plant communities.	Implement reforestation and revegetation programs that emphasize genetic diversity in plant materials used(e:g. use of native plant species, multiple species tree planting)	*H*
	Protect of within plant community diversity by precluding disturbance of species rich habitats. (e.g. maintain special habitat buffers)	*H*
	Maintain representation of all plant community types across the landscape (e.g.)	

Issue: Plant Biodiversity (continued)		
Management Objectives	**Potential Treatments**	**Priority *H, M, L***
Increase ecological diversity by providing early successional habitat	Create big game forage by regeneration harvest, seeding in winter range . Converting stands in the stem exclusion stage to stand initiation stage.	*H*
Restore role of underburning	Understory removals and underburning Underburning in Dry Creek.	*M-H*

v-25. What and where are the opportunities for management, restoration or improvement within the watershed? **Issue: Habitat Components necessary to sustain Native fish populations**		
Management Objectives	**Treatment/Opportunity**	**Priority *H, M, L***
Maintain or restore habitat complexity	Evaluate current habitat conditions and determine appropriate restoration projects, such as large woody material placement.	*M*
Maintain or reduce stream temperatures with regard to fish habitat	Manage riparian reserves on fish bearing streams to provide adequate shade to maintain streams temperatures appropriate for salmonid spawning and rearing.	*M-H*
Manage amount and timing of sediment as a result of management activities	Follow recommendations for timing of in stream work issued by the Oregon Department of Fish and Wildlife Continue to implement Forest Plan standards and guidelines	*H*
Issue: Reintroduction of Native Species		
Provide adequate habitat to sustain populations of migratory fish when access around migration barriers (dams) have been resolved	Evaluate current habitat conditions in relation to their ability to support historic fish populations and apply appropriate restoration projects where needed.	*L*

v-26. What and where are the opportunities for management, restoration or improvement within the watershed? **Issue: Maintaining habitat components for native terrestrial wildlife species**
Issue: Conflicting Habitat Needs

Management Objectives	Potential Treatments	Priority H, M, L
Maintain habitat components for native terrestrial wildlife species by:		
Determining which species of concern exist in the watershed	Conduct surveys for species of concern within the Detroit Tributary watersheds	*M*
	Conduct surveys for species of concern in the watershed that have little or no known presence to determine abundance and distribution.	
Maintaining habitat components for mid and late successional Species Guilds	All Guilds: Enhance and maintain mid and late seral habitats. Most problems with these guilds deal with the lack of habitat or fragmentation of this habitat. Specific habitat requirements for species of concern should be concentrated on to provide adequate habitat. Refer to the following guilds for more information: TLC, TLGG, TLML, TMML, TMGG, TSPL, TSGG, TSGML, TSME, TSC, TSPE, LKRVARML, LKRVARG, LKRVRML, LKRVRG, LKRVA, AND SPCL.	*M*
	Survey riparian reserves to identify unique areas and treat accordingly. should not convert all hardwood areas to conifer	*H*
	Permanent meadows could be created, where appropriate, to provide for forage opportunities and provide habitat for special habitat guilds.	*L*
Maintaining habitat components for snag dependent species	Create snags in deficit areas by means of KV funding (e.g. adjacent to harvest units).	*H*
Maintaining habitat components for Peregrine Falcon	Enhance areas surrounding suitable habitat for peregrine falcons to attract a wide diversity of avian species. This may help in maintaining an ample food supply for an adult pair. An opportunity exists to maintain diverse riparian reserves near suitable habitat or enhance these areas to provide a more diverse mix of vegetation.	*L*

Management Objectives	Potential Treatments	Priority H, M, L
Maintaining habitat components for Peregrine Falcon (continued)	Surveys are needed in this watershed of suitable habitat before implementation of proposed projects. Consultation with U.S. Fish and Wildlife Service will be necessary if peregrines are found.	*H*
Maintaining habitat components within the Detroit Lake Bald Eagle Management Area (BEMA) for species associated with Detroit Lake	Further monitoring of the bald eagle management area to better identify actual habitat use patterns throughout the year	*H*
	Mark protect these all known Bald Eagle perch trees within the BEMA	*M*
	Design enhancement opportunities for the BEMA: • Installing and maintaining waterfowl nesting structures where suitable habitat conditions exist. The area around Detroit Flats would be a likely area for this type of project. Other Areas: Upper Arm campground, and the area near Hoover campground/ the wildlife viewing platforms. An inventory should be conducted on an identified pond on the north side of the lake near the dam to determine if this area is suitable for waterfowl enhancement.	*M*
	• Reservoir bank stabilization along Detroit Flats and other areas affected by the flood and protection of existing stumps would preserve natural fish cover and could protect current and potential fish population levels.	*L**
	• Planting of sedges and other aquatic vegetation in reservoir draw down areas could provide sites for aquatic insect breeding, as well as, cover for fish. Providing for fish food and cover will support increasing numbers of naturally reproducing fish stocks for eagle prey base and lessen the dependence on introduced fish supply.	*L**

* Assess effectiveness

Management Objectives	Potential Treatments	Priority *H, M, L*
Maintaining habitat components within the Detroit Lake Bald Eagle Management Area (BEMA) for species associated with Detroit Lake (continued)	• Much of the BEMA is not suitable for roosting or nesting. Commercial thinning, selective harvest, or other measures should be designed to increase structure within these stands. The potential nest zones may also benefit from thinning. Silvicultural treatments which encourage the development of large diameter conifers and will enhance the development of future nest, perch and roost trees. Such treatments include thinning, pruning, selective limbing, and eventually, snag creation. These treatments should be considered whenever timber harvest is planned within the BEMA Closing and decommissioning of roads in the immediate area of the nest site can prevent disturbance of breeding eagles.	*H*
Maintaining habitat components for northern spotted owl	Stand enhancement should be targeted for stands within known spotted owl pairs or resident singles that are deficient of habitat. Pre-commercial thin young plantations and commercial thin older stands to achieve late-successional characteristics sooner. Variable spacing should be looked at to create more diversity within these stands.	*H*
	Riparian: Stand enhancement should be focused on areas where dispersal is extremely limited, within known spotted owl home ranges, and probable dispersal corridors. Stand enhancement for stands not currently meeting 11-40 conditions should be a priority. 09054, 10043 and 10064 have riparian reserves that are significantly higher than the quarter township overall. There is a need to maintain these are due to the majority of the overstory may be present in these reserves.	
	Fire Management: Treat fuels in owl habitat stands that have a high fire danger especially in those areas where there are large patches of intact mature forest. Marten Basin and Dry Creek would be first priorities to treat. Fuel loading reductions may be necessary in some areas to prevent a large scale loss of habitat. Adequate amounts of down woody material should be left on site though.	*H*

Management Objectives	Potential Treatments	Priority *H, M, L*
Maintaining habitat components for northern spotted owl (continued)	Design enhancement projects for riparian reserves to achieve owl dispersal habitat at a faster rate. (see commercial thinning within riparian reserves)	*H*
	Retain pileated woodpecker/marten areas in Marten Basin, French Creek, Slate Creek, and Tumble areas ***(Table III-28)*** the short term until reserve allocations or surrounding areas recover to address connectivity issues for the area. . When owl dispersal conditions improve, they may be dropped.	*H*
Maintaining habitat components for big game	Improve forage, especially in winter range for big game. Forage enhancement could be captured along closed roads	*H*
	Reduce number of road miles in both winter and summer range.	*H*
	Due to lack of forage in the watershed, special habitats should be monitored to determine if big game are negatively affecting these areas.	*M*
	To achieve a higher quality of forage, fertilization and seeding with a big game forage mix should be added to future activities.	*H*
	In the BEMA: Forage is already limited within winter range, and where forage occurs, special notice should be given to increase the quality by burning, seeding, and fertilizing.	*M*
	Elk Management Emphasis Areas (MEAs)	*H*
	Convert hiding cover to forage MEAs: Slide, Log Tom, French	
	Enhance hiding cover to accelerate development into thermal cover MEAs: Log Tom	
	Additional recommendations by MEA	
	Slide Mea: Future treatments should choose to burn, seed, and fertilize to increase forage quality within the area. Hiding cover represents over 40% of the available cover present. Treating hiding cover could raise both forage and cover values thus resulting in an upward trend in habitat effectiveness.	

Management Objectives	Potential Treatments	Priority *H, M, L*
Maintaining habitat components for big game (continued)	Log Tom MEA: Hiding cover needs to be treated to increase both the forage and cover variables to convert hiding cover into more desirable habitat for big game. This in turn may increase the habitat effectiveness index for this MEA. There are several small spur roads that lie on private lands. Decommissioning may not be possible but they could be closed by a closure device if deemed necessary. This may increase the roads variable by decreasing road densities.	*H*
	French MEA: Treatment should occur in hiding cover stands.	
	Kinney MEA: Most of the existing forage is located in a lower valued category and even though this is managed at low emphasis, special attention should be given to upgrading the quality of forage in the future.	
Increase of awareness of wildlife needs and habitat characteristics.	Develop a wildlife interpretive plan	*M*

v-27. What and where are potential opportunities within the watershed that will contribute to sustainable communities, and assist with reaching economic development goals identified in the Canyon's strategic plan? **Issue: Timber Supply**

Management Objectives	Treatments/Opportunities	Priority H, M, L
Provide for a sustainable timber supply	Set appropriate harvest level within the management allocation requirements and the ecological limits of the watershed	*H*
	Use commercial timber harvest as one method of achieving a variety of ecosystem objectives such as thinning to increase growth and therefore development toward late-successional habitat	*H*
	Issue: Community Economic Stability	
Provide a variety of forest products	Provide post and poles through pre-commercial thinning, beargrass, boughs, rocks, Christmas trees, etc.	*H*
	Work with local communities to help determine ways to diversify their economies	
Balance communities needs for increased tourism/recreational opportunities with other resource objectives	Work with local tourism organizations to analyze potential tourism opportunities on National Forest land and marketing strategies for these opportunities	
	Create partnerships with local communities and organizations to develop recreational opportunities that benefits local economies	
	Update the Detroit Lake Composite Area Management Guide and complete the interpretive plan.	*M*
Increase public understanding of resource management	Use current science and educate the public about resource management.	
Participate in the resolution of conflicts in Detroit Reservoir water level needs.	Work with other agencies and entities to resolve conflicts in Detroit Reservoir water level needs. (e.g. local recreation vs. downstream water quality and quantity needs)	
	Work with COE and other communities on COE's Willamette Basin Reservoir study.	
Participate in the improvement of infrastructure to achieve economic diversification goals	Support and provide technical assistance to local communities to help them implement a community sewer treatment facility proposal	*H*

Issue: Recreational Supply and Demand

Management Objectives	Treatments/Opportunities	Priority H, M, L
Provide for a wide range of demanded recreational settings to achieve satisfactory user experience	Monitor and evaluate the effectiveness of recent recreational developments around the reservoir and update the Detroit Lake Composite Area Management Guide.	*H*
	Implement a carrying capacity study of the reservoir to help determine future development (eg. marina and launching expansion, parking, etc) and management strategies around Detroit Lake (eg. restrictions, designated use areas, etc.	*M*
	Develop a management and design guide for the Detroit Flats day use area	*H*
	Provide for existing demands where resource objectives can be met, For Example: • Improve parking around Detroit Lake; • Develop a bike path system that interconnects the lake area recreation facilities with Detroit and Idanha; • Improve and create accessible recreational opportunities, • Provide boat mooring at campgrounds, • Improve day use areas; etc.	*M/H*
	Convert the State Park administrative site to a recreational site.	*H*
	Develop an area interpretive plan	*L*
Maintain and enhance desirable recreation settings through various vegetation management practices	See Vegetation Recommendations	*M*
Decrease resource impacts and improve aesthetics at recreational areas	Restore and rehabilitate resource damage in high use campsite areas around the Detroit and Tumble Lakes, especially within Riparian Reserves. Provide sanitary facilities where feasible.	*M*
	Control access to damage sites	
	Eliminate or reduce dispersed camping in areas where resource objectives cannot be attained, eg. French Creek.	*H*
Reduce user conflicts	Increase administration, management, education and law enforcement in areas where conflicts area occurring.	*H*
	Eliminate or reduce dispersed camping in areas where user conflicts occur, eg. French Creek, Southshore.	*H*

Issue: Recreational Supply and Demand (continued)		
Management Objectives	**Treatments/Opportunities**	**Priority *H, M, L***
	Implement the carrying capacity study of the reservoir to help determine future development and management strategies around Detroit Lake. Strategies could include designating areas for particular activities.	***M***
Reduce user conflicts (continued)	Control launching and parking at Forest Service campgrounds to reduce impacts on campground visitors.	***H***
	Reduce boating/non-boating user conflicts at recreation facilities (day use boat launch) by designating areas for specific uses	***H***
Gather information that is currently lacking	Update all campsite inventories to monitor current campsite conditions.	***M***
Provide stable funding to achieve recreational goals	Find alternative funding sources and partnerships	***H***

v-28. What and where are the opportunities for management, restoration or improvement within the watershed? **Issue: Facility Maintenance**

Management Objectives	Potential Treatments	Priority H, M, L
Maintain facility condition at or above acceptable standards, and meet current public needs.	Replace and maintain facilities reported in the Recreation Facilities Conditions Assessment.	*H*
	Upgrade sanitary facilities at campgrounds and day use areas to meet public expectation. Install sanitary facilities at dispersed areas that have sanitation problems, where feasible.	*H*
	Improve parking spaces in campgrounds to accommodate RV use.	*L*
	Improve parking around the reservoir to accommodate current demand.	*H*
	Develop Access Travel Management Plan. **031** Decommissioning Opportunities: Roads 2225-503, 2225-455, 2225-560, 2225-458-470, 2225-458-469, 2223-501-503, 2223-501-512, 2223-501-514, 2223-502, 2223-610, 2223-613, 2223-536, 2223-542, 2223-537, 2223-520, and 2223-541 **032** Decommissioning Opportunities: Roads 2212-634-037, 2212-634-637, 2212-634-635, 2212-545-544, 2212-545-546, 2212-545-547, 2212-545-528, 2212-625, 2212-640-642, 2212-640-645, 2212-640-646, 2202-718, 2202-726, 2202-738, and 202-770. **781** Decommissioning Opportunities: Roads 1003-404, 1003-305, and 1003-306 See facilities discussion for other road decommissioning criteria.	*H*
	Encourage and participate in plans to implement the proposed sewer treatment system that will meet demands of Detroit, Idanha, Detroit State Parks and Forest Service compound facilities	*H*
	Up grade forest road 10 to provide shoulders on both sides for pedestrian and bicycle traffic from State Highway 22 to the junction of forest road 1000-060.	*M*

Issue: Facility Maintenance (continued)		
Management Objectives	**Potential Treatments**	**Priority *H, M, L***
Maintain facility condition at or above acceptable standards, and meet current public needs.	Minimize road failures and long-term resource impacts by decommissioning roads that cannot otherwise be maintained.	*M*
	Monument Peak road 2202-701(road going into the Monument peak SIA needs reconstruction to trail specs., and a possible gate.	*L*
	Concentrate on ERFO project revegetation.	*M*
Inventory and monitor facilities	Survey facilities for repair and maintenance needs.	*H*
Issue: Public Safety		
Provide for public safety	Remove hazards (e.g. hazard trees) within developed recreation and organization sites, popular dispersed camping sites (especially those with minimal developments) and within approximately 1 tree length from the prism of well traveled roads.	*H*
	Eliminate undersized pullouts or improve turnouts along Highway 22 to meet state standards. Define egress and ingress to improved turnouts. Develop Mt. Jefferson viewpoint among other viewpoint parking opportunities.	*L/M*
	Improve sight line at the Blowout Road/Highway 22 junction.	*H*
	Create pedestrian/bike access along Blowout Road and Highway 22 that connect recreation facilities with Detroit and Idanha.	*H*
	Improve entrance to Santiam Flats	*M*
	Improve parking around the reservoir to reduce congestion along highway and Blowout Road.	*M*
	Fire prevention and fuels management to reduce risk.	*M*
	Post warning signs of dangerous situations or facilities.	*H*
	Provide road maintenance on roads used by the public	*H*

Issue: Power Line Corridor and Dam		
Management Objectives	**Potential Treatments**	**Priority *H, M, L***
Provide direction for management of the power line corridor	Update Memorandum of Understanding with BPA and PGE for the powerline corridor	***H***
	Develop a management plan for the power line right of way corridor considering; noxious weeds, scenic resources, wildlife/forage habitat, recreation opportunities, heritage site protection, special forest products, etc.	***H***
	Inventory to determine condition of existing power line right of way access	***M***
	Participate in the Willamette Basin Reservoir Study and Environmental Assessment	***M***

What and where are the opportunities for management, restoration or improvement within the watershed? **Issue: Scenic Quality**

Objectives	Treatments/Opportunities	Priority H,M,L
Maintain and enhance the inherent beauty and integrity of the watershed **Implement management actions to minimize adverse impacts to scenic quality (e.g. harvest unit design, facility placement on the landscape)**	Develop a North Santiam Viewshed Implementation Guide. The plan would provide a method for implementing principals set forth in the new Scenery Management Handbook and Forest Plan standards and guidelines. Due to the commitment of portions of land base for LSR's and Riparian Reserves there is increased demand for timber production from scenic corridors in matrix lands. This makes it essential to provide planners guidelines to optimize resource benefits as described in the Forest Plan.	***M***
	Implement the recommended guidelines defined in this watershed analysis for regeneration harvests. (e.g. spatially distribute timber harvest across the landscape rater than concentrating the disturbance within individual subdrainages)	***H***
	Develop a West Cascade Scenic Byway Management Plan.	***M***
	Update the power line corridor management plan addressing scenic concerns and guidelines for timber management	***H***
	Develop (scenic) standards and guidelines for Army Corps of Engineers lands that are managed by Forest Service	***M***
	Maintain and improve scenic overlooks of the reservoir along the highway and Blowout Road	***M***
	Amend Forest Plan to change existing land allocation in areas to a more appropriate scenic allocation (eg. middleground land visible from Detroit currently has a general forest allocation and meets all the criteria for scenic middleground management)	***H***