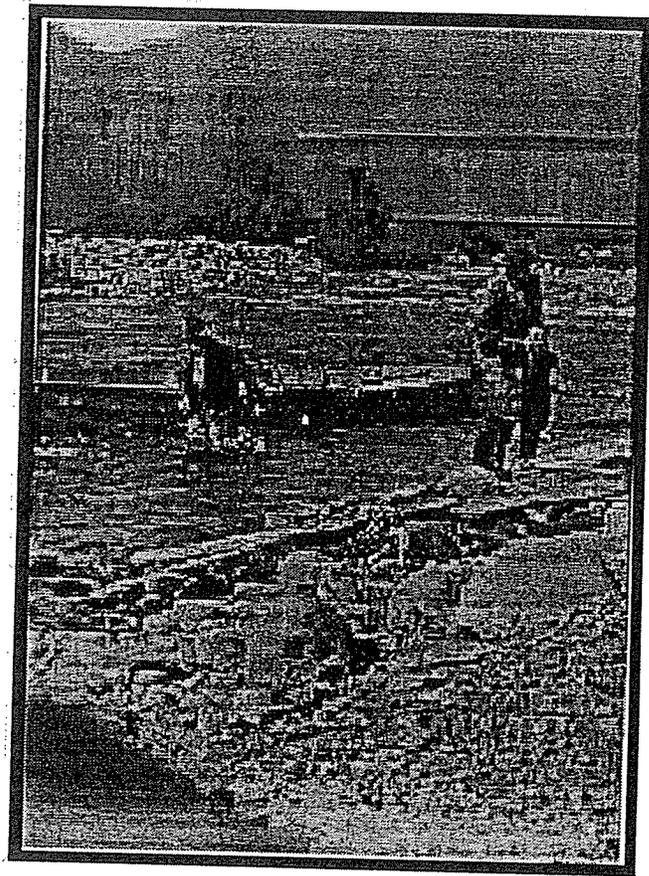


III. Wildlife - Aquatic Species



Salmon above Breitenbush fish racks- 1920's

III. BIOLOGICAL DOMAIN

B. Animal Species and Habitats- Aquatic

1. Characterization

- a) **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?*

There are over 75 miles of known fish bearing streams and over 150 acres of fish bearing lakes in the watershed. The lakes range in size from unnamed ponds less than 5 acres to Breitenbush Lake that is over 50 acres.

Game fish presently found in the Breitenbush Watershed include rainbow, cutthroat, and brook trout; whitefish; and kokanee salmon. Rainbow and cutthroat trout are considered to be stocks of concern by the Oregon Department of Fish and Wildlife due to a lack of information on populations. Historically, populations of spring chinook salmon, winter steelhead trout and bull trout were found in the watershed. See *figure III- 6* for existing and historic fish distribution in the watershed.

2. What values are associated with species and habitats?

- a) Species and habitats have aesthetic, economic, recreational, and spiritual value.
- b) Habitat components necessary to sustain the variety of species indigenous to the area has ecological significance.
- c) Native wild gene pool has ecological value.
- d) Native fish and wildlife have value to the functioning of the ecosystem.

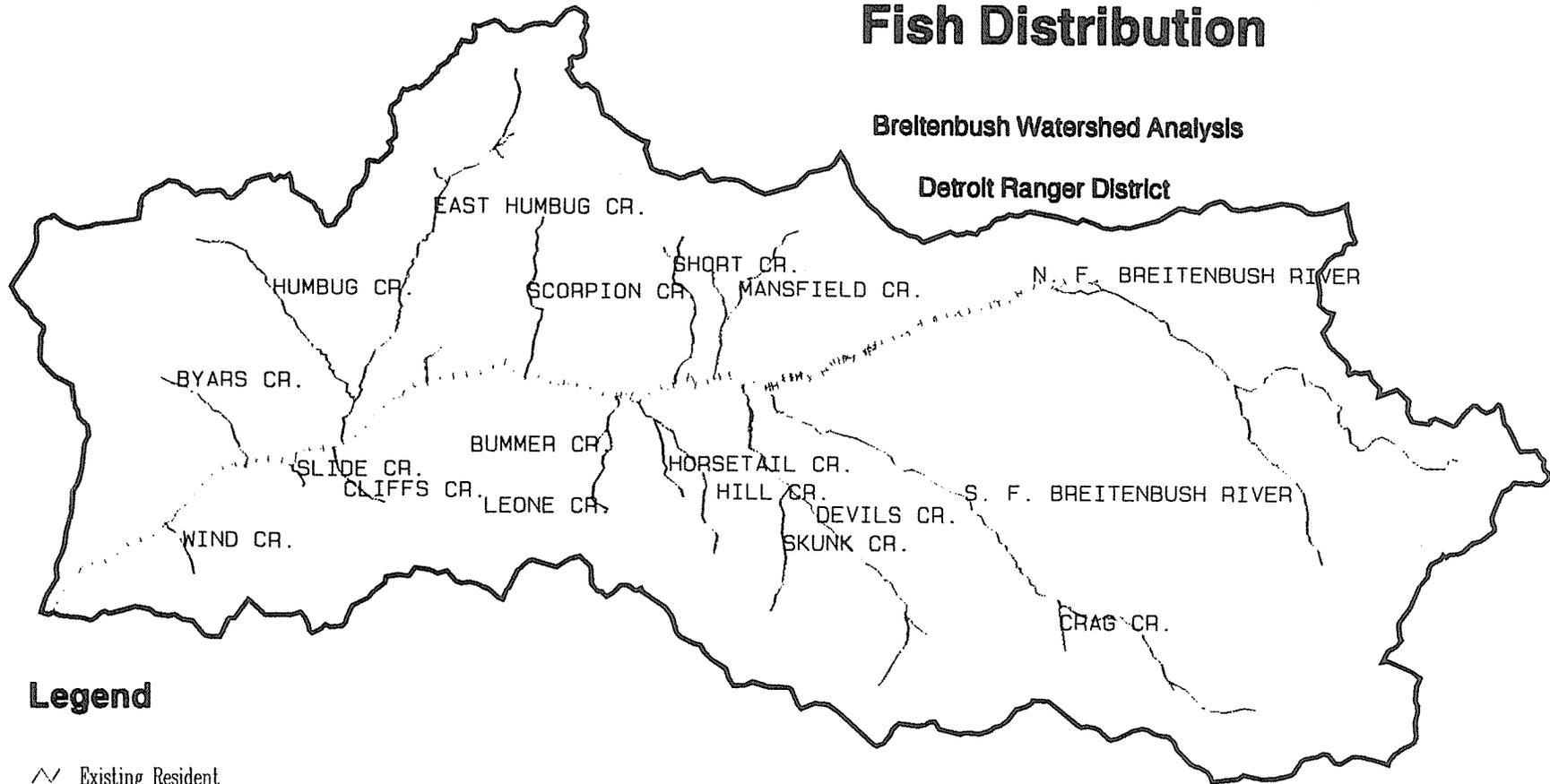
3. What are the highest priority issues or resource concerns associated with species and habitats?

- a) Maintaining or restoring habitat components necessary to sustain native fish populations.
- b) Resource concerns about reintroduction of native fish species such as bull trout, spring chinook salmon and winter steelhead to the Breitenbush River.

Historical and Existing Fish Distribution

Breitenbush Watershed Analysis

Detroit Ranger District



Legend

- Existing Resident Fish Distribution
- - - Historical Anadromous and Existing Resident Fish Distribution

Scale 1:140000

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- c) Resource concerns about introduction of non-native fish species into the Breitenbush watershed and introduction of fish into fishless lakes.
- 4) **What are the management direction/activities, human uses, or natural processes that affect aquatic species and habitats?**

a) *Current Conditions*

I) **What are the current habitat conditions and trends for species of concern identified above?*

A survey of over 30 miles of streams in 1995 indicated fish habitat was in good condition, on the whole. The 1995 survey showed that Leone, Hill, Horsetail, and Mansfield Creeks, along with the North Fork of the Breitenbush River all had pretty good fish habitat. These streams averaged over 76 pieces of large wood per mile, had significant amounts of pool habitat, and had stream temperatures 55° F or lower. Fish habitat was not as good in Humbug and East Humbug Creeks, as well as some other smaller streams such as Wind, Bummer, Cliffs and Short Creeks because of a shortage of large wood. These streams had fewer than 30 pieces of large wood per mile. Tables 1 and 2 (below) describe habitat conditions at the time of the 1995 survey.

The condition of fish habitat in 1996 is highly variable. Some of the streams surveyed in 1995 have changed as a result of a flood event in February 1996. A resurvey was done in August of 1996 and has not been fully analyzed at this time. Preliminary information indicates that Mansfield Creek, upper Short Creek and lower Leone Creek were heavily impacted by debris flows. The debris flow in Mansfield Creek started in the upper part of the drainage and passed through an area classed as excellent fish habitat in 1995. It scoured the channel leaving a cobble/boulder lined channel that is relatively poor habitat today.

The 1996 flood had a wide variety of affects on fish habitat. It ranged from those mentioned above in Mansfield Creek to creation of new habitat. On one hand, events such as this flood can tear things down, on the other hand, they provide the streams with the building blocks for new habitat. They supply new large wood to the channel from debris flows and from undercutting of trees along the channel. They also bring in new substrate, from channel changes and debris flows, to recharge and form new spawning areas. The short term impacts can be pretty drastic but the long term effect are generally good.

Table 1. Comparison of habitat characteristics from the Level II survey done in 1995.

Stream	Miles	Flow CFS ①	Wetted Width Feet	Gradient %	Substrate Dom/Sub ②	Max Temp p F	Pools/ Mile	Pools % Area	Fish Species ③	Large Wood/ Mile ④
Bummer Creek	0.3	0.2	9	25	GR/CO	48°	71	29	1	18
Cliffs Creek	1.0	0.3	8	9	CO/GR	52°	68	38	1	28
Leone Creek	2.1	1.2	10	13	LB/CO	52	41	19	1,4	93
Hill Creek	3.2	1.8	11	9	CO/LB	54°	46	17	1,2,3	100
Horsetail Creek	1.4	1.0	10	13	CO/LB	52°	51	19	1	110
Humbug Creek	3.9	8.1	26	5	CO/GR	52	25	25	2,3	3
E. Humbug Ck.	5.2	2.5	19	4	LB/CO	55°	27	31	1,2,3	21
Mansfield Ck.	2.5	.6	12	9	CO/GR	55°	48	26	2,3	96
NF Breitenbush	8.3	39.6	25	2	CO/GR	52°	18	19	2,3	76
Short Creek	2.5	0.5	9	7	CO/LB	54°	58	26	1,2,3,5	28
Wind Creek	0.7	0.4	8	15	CO/GR	52	59	19	1,2	19

① CFS = Cubic Feet Per Second

② GR = Gravel, CO = Cobble, LB = Large Boulder

③ Fish Species: 1 = Cutthroat trout, 2 = Rainbow Trout, 3 = Sculpin, 4 = Eastern Brook Trout, and 5 = Dace.

④ Large wood is defined as at least twice the bank full width or 50 feet and at least 24 inches in diameter at that length.

Table 2. Riparian vegetation characteristics within 100 feet of selected streams in the Breitenbush Watershed.

Stream	Inner Rip ① Veg Width (Feet)	Size ② Class	Dom Veg Types③	Outer Rip④ Veg Width (Feet)	Size Class	Dom Veg Types⑤
Bummer Creek	24	SP	HV/CH	76	LT	CD/CC
Cliffs Creek	15	ST	HV/HB	85	LT	LT/CD
Leone Creek	39	SP	HW/CH	61	ST	CD/CH
Hill Creek	45	SP	HV/HA	55	ST	CD/CC
Horsetail Creek	38	SP	*****	62	ST	CD/CH
Humbug Creek	22	ST	HA/HV	68	LT	CD/CH
E. Humbug Ck.	27	SP	HA/HV	63	ST	CD/CC
Mansfield Ck.	32	SP	HA/HV	68	LT	CD/CC
NF Breitenbush	46	SP	HA/HV	54	ST	CD/CC
Short Creek	12	SP	HV/HA	88	ST	CD/CH
Wind Creek	20	SP	HA/SS	80	SP	CH/CC

① Hardwood dominated riparian zone.

② Size classes(d.b.h.): SS = Shrub/Seedling, SP = Sapling /pole(<8"), ST = Small Tree(8"-20.9"),

LT = Large Tree(21"-32")

③ Dominate Vegetation types: HV = Vine Maple, HA = Alder, HW = Willow, HB = Bigleaf Maple,

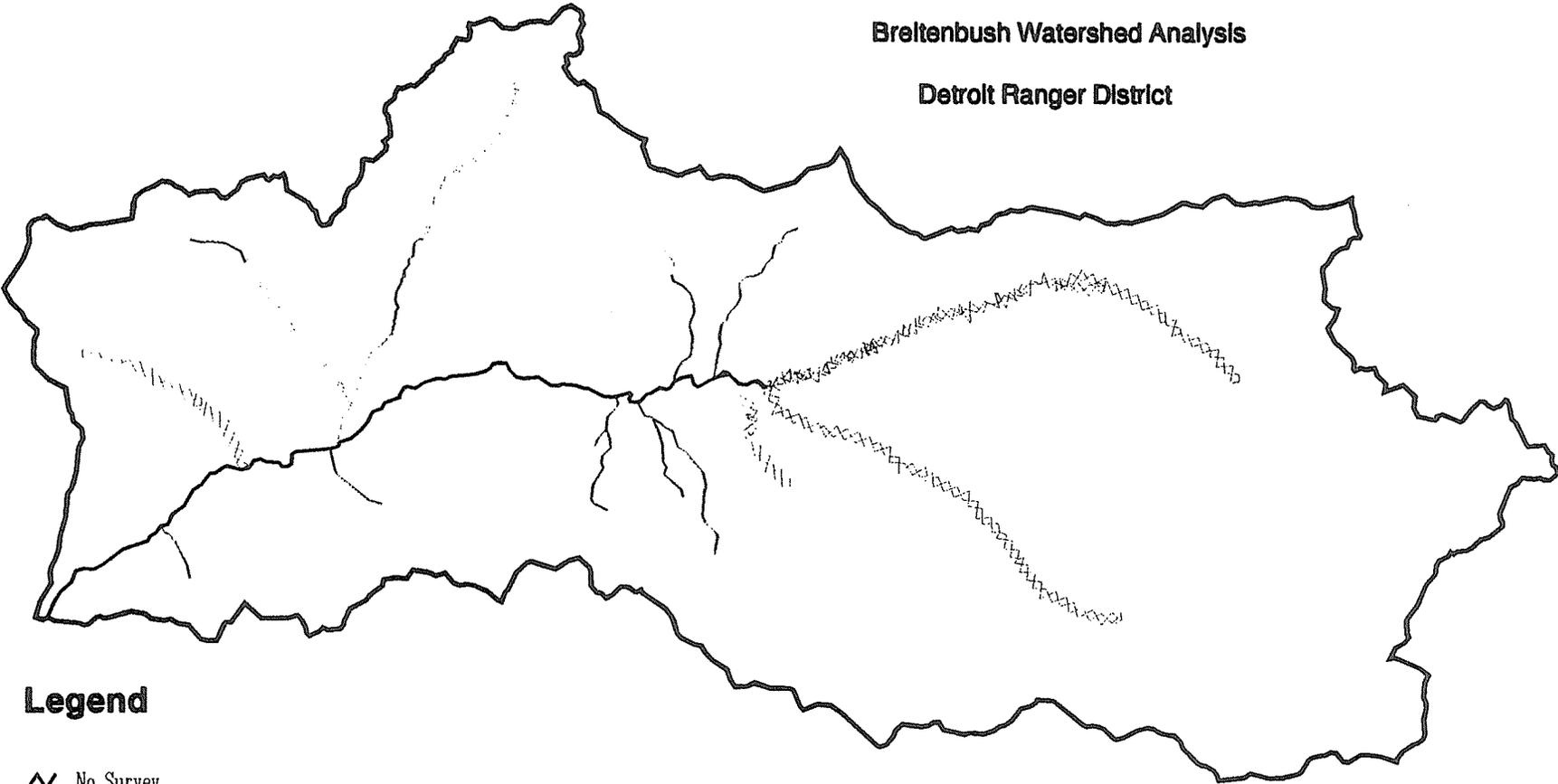
④ Conifer dominated riparian zone.

⑤ Dominate vegetation types: CD = Douglas Fir, CH = Hemlock, CC = Cedar

Pools Per Miles

Breitenbush Watershed Analysis

Detroit Ranger District



Legend

- No Survey
- ||| 0 - 9
- |||| 10 - 19
- ||||| 20 - 29
- |||||| 30 - GT



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Streams in the watershed range in size from Cliff Creek, only a few feet across to the main stem of the Breitenbush River which is more than a 100 feet across in places. Detroit Reservoir, at full pool, covers about one mile of the lower Breitenbush River within the watershed analysis area and about one mile outside. Stream gradient ranges from 2% or less in the North Fork of the Breitenbush River, to 25% in Bummer Creek. Structure in the form of large wood varied greatly in 1995. The largest amount (110 pieces/mi) was found in Horsetail Creek and the lowest (3 pieces/mi) in Humbug Creek. In general the larger streams have lesser amounts of large wood than some of the smaller streams. The one exception is the North Fork of the Breitenbush River, where large wood averaged 76 pieces per mile. The lower reaches of the North Fork are broader depositional areas that wood from upstream areas tends to settle out on. This probably accounts for the higher amounts of large wood.

Fish were found in all of the streams surveyed in 1995. Salmonids were the most common and were found in all of the surveyed streams.

Cutthroat trout were generally found in the smaller streams and higher reaches of larger streams. There is no good information detailing their population trends, but it is estimated that cutthroat population levels are relatively stable. Flood impacts may have heavily impacted populations in some streams such as Leone Creek and Mansfield Creek, however.

Rainbow trout were found in the larger streams and in the lower reaches of the smaller streams. Population trends for wild rainbow trout in the mainstem of the Breitenbush River may be masked by the stocking of 20,000 hatchery raised rainbow trout each year. The condition of wild rainbow trout is unknown at this time.

Sculpin species were found scattered around the watershed. They were probably more abundant than the surveys indicated as they can be difficult to shock and to see while snorkeling. One dace was found in Short Creek and a lone Eastern Brook trout was found in Leone Creek, below Leone Lake. Leone Lake is stocked with Brook trout.

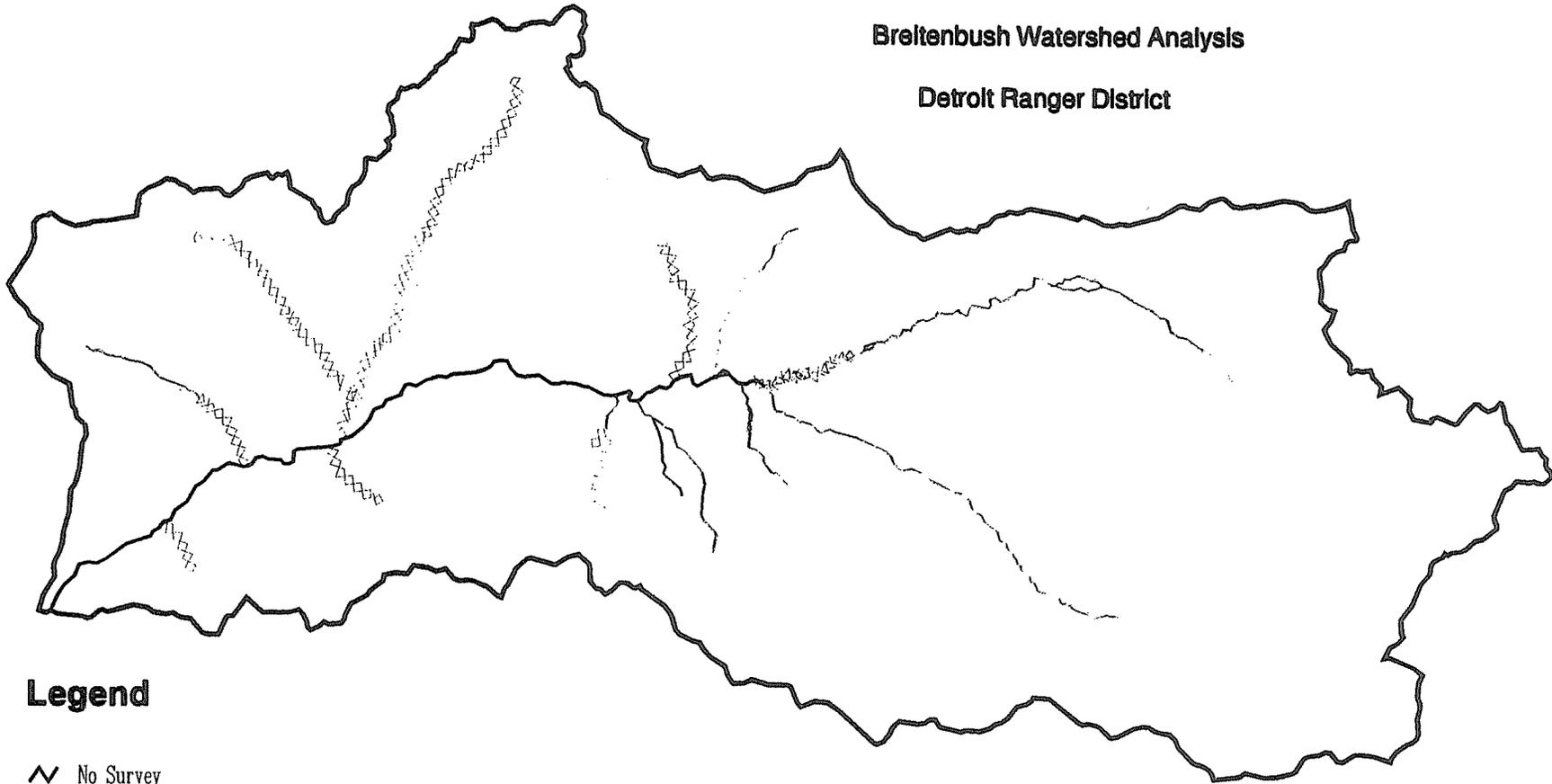
Kokanee salmon were introduced into Detroit Reservoir and run a short distance up the Breitenbush River in the fall to spawn just below a small falls near the mouth of Wind Creek. The success of this spawning is not fully known. At this time the Oregon Department of Fish and Wildlife regularly stocks kokanee in Detroit Reservoir to maintain the population at fishable levels. Spring chinook salmon and winter steelhead used to pass easily above the falls but kokanee are poor jumpers so are restricted to below the falls.

Besides the stocking of 20,000 rainbow trout each year, in the mainstem Breitenbush, the lakes in the watershed are stocked with fingerling size rainbow, cutthroat and brook trout on two to three year rotations. The primary stocking

Large Woody Pieces Per Mile

Breitenbush Watershed Analysis

Detroit Ranger District



Legend

- No Survey
- 0 - 19
- 20 - 59
- △ 60 - 79
- ▽ 80 - GT



Scale 1:140000

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method is helicopter for the lakes and truck for the streams.

- ii) *Where are the year-round cold water sources areas for the streams in the Breitenbush, and where can their contribution be identified as important to the maintenance of cool stream temperatures?*

A review of temperature data gathered in 1995 for 11 streams in the watershed indicates that no one stream seems to dominate temperature for the drainage. There are a number of other streams that haven't been monitored for temperature that may contribute to maintenance of cold stream conditions. It may be there are no significant cold water streams due to the geology of this system. Temperature moderation may be a function of stream morphology and stream side vegetative cover.

- iii) *What and where are existing fish habitat improvements in the watershed?*

Fish habitat improvements in the Breitenbush watershed are found primarily in Devils Creek. A section of stream approximately one mile long, near the Devils Creek summer homes, was improved in the early 90's through the introduction of large woody material and boulders. This increased habitat complexity, increased the number of pools, and helped to stabilize eroding banks. These structures generally held up well during the 1996 flood event.

Logs and boulders were also placed below a culvert in Humbug Creek to improve fish passage. These structures were moved around during the flood and will need maintenance to regain full effectiveness.

- iv) *How does the current condition of the aquatic habitat relate to future re-introductions of winter steelhead and spring chinook salmon?*

While conditions are not optimal for fish production, the habitat should be able to support populations of spring chinook and winter steelhead.

b) Reference Conditions

- I) **What was the historical relative abundance and distribution of species of concern and the condition and distribution of their habitats in the watershed?*

Spring chinook, winter steelhead, bull trout, cutthroat trout, and whitefish historically moved up the North Santiam River system on their annual spawning runs. Literally thousands of salmon and steelhead then came up the Breitenbush River 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 all died after spawning but most bull trout survived 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. The migratory populations of these fish probably moved up from the lower river to spawn in tributaries in the Breitenbush watershed.

The Racks: Fish racks, installed at Detroit in the early 1900's, blocked most salmon and steelhead from completing their migration to their spawning grounds. 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 affect on the other species of fish present.

The Dams: With the construction of Detroit and Big Cliffs Dams in the mid-1900's, fish migration was again disrupted, as there were no fish ladders incorporated into the design of these dams. Spring chinook and winter steelhead, could no longer reach historic spawning and rearing areas in the upper North Santiam River and the Breitenbush River. Marion Forks Fish Hatchery was constructed as mitigation for the resultant loss of fish production.

Not so obvious at the time, was the potential impacts to bull trout that was also migratory. The large adult fish may have spawned in the upper Breitenbush River as well as the larger tributaries to the river. After spawning the large 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 seen in the North Santiam or Breitenbush Rivers for over 30 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 historically interacted 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 has severed this connection. There is no information on what the long term effects may be, if there are any.

Stocking Fish in Lakes: There are over 100 lakes and ponds found in the Breitenbush watershed. They range in size from unnamed ponds less than 5 acres to Breitenbush Lake that is over 50 acres. Historically these lakes and ponds were probably devoid of fish life. Their primary inhabitants were aquatic insects and amphibians along with transient visitors such as waterfowl and mammals. As European man moved into the area fish were introduced into the more accessible lakes. Starting in the 1920's, the old Oregon Fish Commission, with help from the U. S. Forest Service, began a major push to introduce fish to as many lakes as possible.

Little thought was spent on how this activity might be affecting these natural

ecosystems. The only questions that came up during this process were primarily in relation to what fish was best adapted to survive in the lakes and provided anglers a good catch. Numerous native and non-native fish species were tried, including rainbow trout, cutthroat trout, brown trout, and Eastern Brook trout. The brook trout, a non-native species, did the best in many of the lakes and became an legacy of these early days of fish management. It is very competitive with other fish in streams and lakes it is adapted too. To date, brook trout have not established themselves outside of the lakes in the Breitenbush watershed. The 1995 survey only found one brook trout in Leone Creek below Leone Lake. The only known, well established brook trout population in the North Santiam River system is in the upper North Santiam in the Big Meadows area.

c) Comparison of Current and Reference Conditions

*I) *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?*

Natural causes of change include fire, wind and major flood events. Over hundreds and thousands of years these actions have modified fish habitat, both positively and negatively. Populations of rainbow and cutthroat trout in the Breitenbush watershed have reacted accordingly.

Human causes of aquatic habitat change include timber harvest, timber salvage, road building and other development near streams and rivers. These activities have affected fish habitat through direct disturbance of streams, input of fine sediment, removal of stream side cover, increased temperature, removal of large woody material, removal of future large woody material, and by straightening and simplifying stream channels.

Major human causes of changes in fish species distribution include the construction of Detroit and Big Cliff dams and the placement of the racks on the river in the early 1900's.

Fish stocking, especially in previously fishless ecosystems, could totally change the ecosystems dynamics. For instance, 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, etc.