AN ASSESSMENT OF POTENTIAL IMPACTS FROM THE PROPOSED STATE STREET (SALEM, OREGON) WIDENING PROJECT ON BIOTIC RESOURCES

by

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AN ASSESSMENT OF POTENTIAL IMPACTS FROM THE PROPOSED STATE STREET (SALEM, OREGON) WIDENING PROJECT ON BIOTIC RESOURCES

ABSTRACT: The proposed widening of State Street between Lancaster Avenue and 25th Street in Salem, Oregon was evaluated regarding potential construction impacts on the biotic resources (vegetation, fish, wildlife, and wetlands) in the immediate area. The existing setting was surveyed to establish a base level from which to measure changes, and potential impacts were assessed. The area's natural environment is already compromised by urban encroachment and agricultural practices, and only limited additional impact is expected. The riverine system, which supports Fall Chinook salmon, and the associated riparian woodlands merit the most concern due to the relative scarcity of such habitats and associated wildlife in urban areas.

INTRODUCTION

The purpose of this report is to assess the probable impacts from the State Street widening project on biotic resources in the area and suggest mitigation for adverse impacts. Though the stated area of concentration is biotic resources, limited coverage is given to the physical environment since it influences the biotic resource base. This paper compiles, integrates and organizes existing data and personal field observations to provide a basis for an official environmental assessment report.

BACKGROUND

The proposed project calls for the widening of State Street between 25th Street and Lancaster Drive from two lanes to a four-lane arterial street. This includes widening two bridges over Mill Creek in the vicinity of the State Penitentiary and construction of a bike path. Widening of the underpass beneath I-5 may also be required. The 143 acres of land plus the channel of Mill Creek downstream to the Willamette River that comprise the study area are within the current city limits of Salem, Oregon (Fig. 1). The project study area occurs on lands already compromised by varying degrees of urbanization; consequently, species inhabiting the area already exist under altered habitat conditions. Future alterations are expected even without construction of this project.

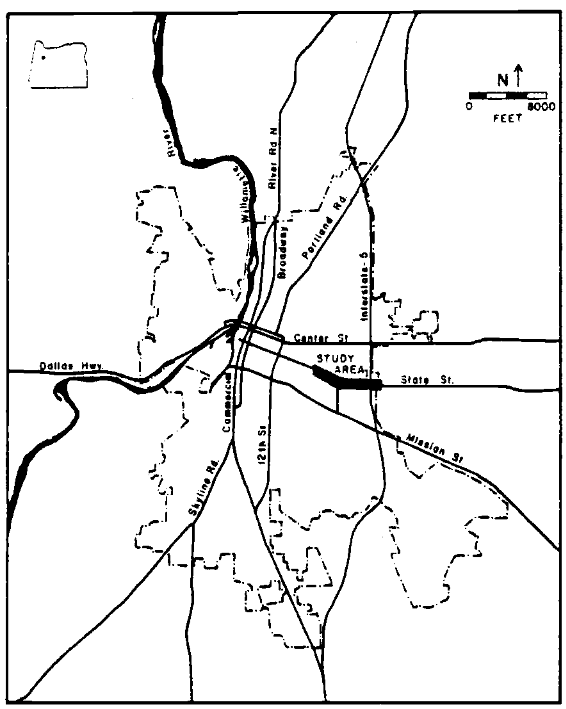

Figure 1: Location of the State Street Project

The least impacted areas consist of Mill Creek and the narrow strip of associated natural riparian woodland which also probably supports the densest populations of wildlife relative to the surrounding landscape due, in part, to the greater habitat diversity. Therefore, these areas merited major attention.

METHODS

To delineate the specific boundaries of the study area, a brief description of the proposed project was studied and the information used to predict the spatial extent of expected construction impacts. The terrestrial system was already substantially altered by development so impacts were not expected to extend much beyond the actual construction area. The lotic system, however, would allow impacts to be carried downstream from the project. With these observations as a guide, the arbitrary boundaries were delineated (Fig. 2).

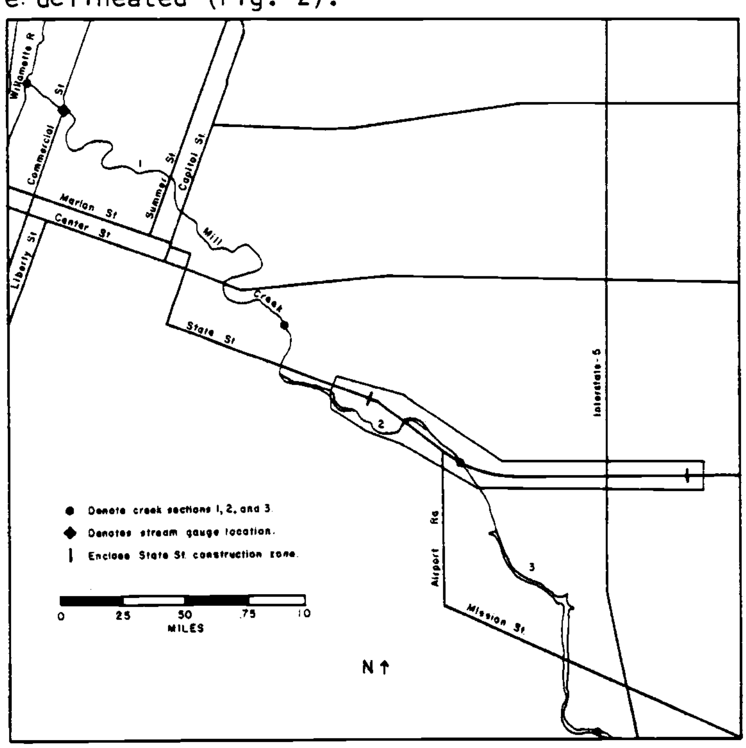

Figure 2: State Street Study Area

The study area consists of a narrow strip of land on either side of the highway corridor and the channel of Mill Creek downstream to the confluence with the Willamette.

Within the study area, physical and biological components were inventoried and organized through field observations, mapping, literature review and personal communications with experts in appropriate fields (See Appendix A). Citizen input was a consideration. However, information from this sector is absent due to lack of both a Citizens Advisory Committee for this project and response from letters sent to private groups.

Expert opinion in the form of documents or personal communication was gathered primarily from government agencies including the U.S. Fish and Wildlife Service (USFWS), Soil Conservation Service (SCS), Oregon Department of Fish and Wildlife (ODFW), Oregon Water Resources Department (OWRD), and the Oregon Department of Transportation (ODOT).

The vegetation map and the wetlands map were prepared through site visitation and air photo interpretation. Criteria for the vegetation classes was based on a classification system used in a previous biotic report by the Mid-Willamette Valley Council of Governments[1] while the wetland classifications were derived from guidelines prepared by the U.S. Fish and Wildlife Service.[2] Following the inventory of existing conditions and analysis of the proposed project, technical expertise of various specialists was tapped as to the potential impacts applicable to this project. Potential mitigation measures were gathered concurrently through the same sources.

EXISTING SETTING - PHYSICAL COMPONENTS

The soils, topography, natural hazards, hydrology and water quality are covered to describe the study area and to establish the physical conditions under which the biotic resources persist. More detailed information on these subjects plus geology and groundwater can be obtained in the official technical biotic report for this project.[3] Impacts to physical components will be covered as they relate to the biotic resources affected by such impacts.

Soils

Soils in the area have characteristics that require some consideration during construction in order to insure minimum alteration and proper revegetation. The soils in the area have probably developed in material of lacustrine and/or riverine origin. They tend to be deep, poorly drained and underlain by subsoils with high gravel content. Important features common to most of the soils include seasonal high water tables, low permeability, low bearing capacity and low stability. A number of the soils also have low shear strength and high shrink-swell potential. Soils of this type tend to occur in wetland areas and are susceptible to compaction under heavy loads. The erosion potential is not high due to the lack of slope in the area.

Topography

The study area is on the flat lowland of the Willamette Valley Basin. The slope generally ranges between 0 and 5% with the exception of the eastern segment of State Street which encounters a localized 5 to 10% slope between I-5 and 37th Avenue, N.E. as it ascends to an alluvial terrace of slightly higher elevation. The lack of slope substantially reduces the possibility of mass wasting.

Natural Hazards

In addition to mass wasting, other natural hazards to be considered include seismic activity and flood hazard. Earthquakes and other seismic phenomenon are not a major concern since this region is characterized by only sporadic and low intensity seismic activity. No known active faults occur near the project area. Flooding is more of a concern since 40% of the area lies within the 100-year flood plain. Narrow flood zones occur along Mill Creek as well as large flood plain areas north and south of State Street between I-5 and Mill Creek.

The surrounding lowland not only serves to detain flood waters but also acts as a recharge area for groundwater. (Though the permeability of the overlying soil is very low, the water persists for long periods of time thus allowing recharge.) Water that does not infiltrate to the groundwater runs off through a modified drainage system.

Hydrology

This area lies within the Mill Creek drainage basin; however, pathways to that waterway and the waterway itself have been substantially altered by storm sewers, drainage ditches, and channelization. In addition, discharge has been altered by increased runoff from impervious surfaces and augmentation from the North Santiam River.

Mill Creek drains approximately 110 square miles (285 square kilometers) of primarily agricultural land. The flow is augmented by irrigation water originating in the North Santiam and also by a direct contribution from the North Santiam through the Salem Power Canal near Stayton. The canal diverts 100 to 200 cubic feet per second (cfs) which is later routed into the Salem Canal (Mill Race) at 19th Street for use by the Boise Cascade paper mill on Commercial Street. The diversion from the

North Santiam is halted during high rainfall periods to reduce the incidence of flooding. Water is also diverted from Mill Creek into the Shelton Flood Bypass (Shelton Ditch) approximately 3.3 river miles upstream from the Willamette River.

The annual discharge averages 138 cfs with the flow regime closely resembling the annual precipitation pattern for Western Oregon. The maximum discharge occurs between November and April with low flows during July, August and September. This pattern is graphically illustrated by the Mill Creek hydrograph (Fig. 3). The low flows in the summer tend to accentuate water quality problems due to reduced dilution and transport capacity.

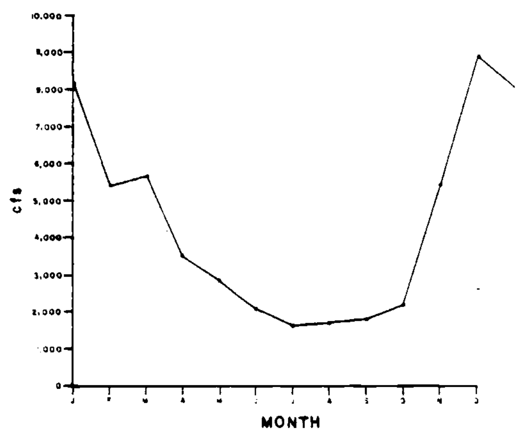

Figure 3: Mill Creek Hydrograph

Water Quality

Current water quality data for Mill Creek is not available; however, inferences can be made from past studies of the Mill Creek system. Limited historical data from Mill Creek indicate occasional elevated water temperatures, relatively high pH (8.0), and satisfactory amounts of dissolved oxygen (DO).[4] The elevated temperature condition occurs primarily during the summer as a result of reduced flows. The pH levels, though high, are still within DEQ general standards for the Willamette Basin and the special water quality standards for the Santiam River Basin. Though water quality problems tend to fluctuate due to the flow regime, water quality in general appears to be good. Current data is needed to verify this statement.

Though the quality is probably good, there have been problems in the past and the potential for future problems does exist. In August and September of 1968 two water samples were taken containing fecal coliform levels that exceeded Santiam Basin standards of 300 mpn/100 ml. (Current standards are 240/100 ml. except during high flows). That condition was probably the result of seepage from two upstream sanitary landfills and/or rural septic fields and was accentuated by low flow conditions. This may still be a problem. According to a 1976 Areawide Wastewater Treatment Management Plan,[5] the major pollution problems in Mill Creek are urban stormwater runoff from Salem, and non-point source pollution primarily from the agricultural land dominating the upper reaches of the basin. These lands contribute fertilizer contaminants primarily through irrigation water runoff, particularly in the spring and summer. No current information on loading levels of such contaminants exists, but a 1974 water sample indicated elevated levels of both nitrates and phosphates.[6] Problems with urban stormwater are primarily the result of storm drains discharging runoff directly into stream channels. According to a 1972 report on street surface contaminants, "runoff from the first hour of a moderate-to-heavy storm would contribute considerably more pollutional load than would the same city's sanitary sewage during the same period of time," (based on a hypothetical city of 100,000).[7] The extent of urban runoff contaminant loadings and consequent chemical modification of the water in the lotic system is not currently known, but it is known that continuing urbanization increases the potential for further degradation of water quality from such contaminants. A table analyzing water samples from Mill Creek (Table 1) indicates reasonably good water quality, but more importantly, shows the increased concentrations of pollutants after heavy rains. Zinc, in particular, displays a drastic change from unmeasurable concentrations to a concentration exceeding both the quality criteria (EPA) and federal regulation limit of 5 parts per billion (ppb).

Table 1

Water Quality Data for Mill Creek [(a)]
Just East of Commercial Street.

1. Data for samples collected 1 December 1972 following clear and dry period (Discharge - 271 CFS):

2. Data for sample collected 5 January 1973 after heavy rainfall (Discharge - 163 CFS):

Sample	1.	2.
pH	7.0	6.9
Total solids-ppm	56.8	79.8
Susp. solids-ppm	4.6	29
Zinc - ppb	0	25
Cadmium - ppb	0	0
Lead - ppb	0	0
C.O.D. - ppm	0	15.2
B.O.D. - ppm	all samples negligible, less than 5 ppm	
Oil and grease - ppm	0	0
Spec. conductance - mhos/cm	137	63

Two sets of water samples were collected and analyzed.
Source: 3rd Bridge Environmental Impact Statement
(a) The sampling site is shown on Fig. 2.

BIOLOGICAL COMPONENTS - EXISTING SITUATION

Vegetation

The classification of land into different categories on the basis of vegetation assists in determination of what biota exist in the area and in their relative abundance (Fig. 4). Most, if not all, of the vegetation is a result of varying intensities of past land use; consequently, the

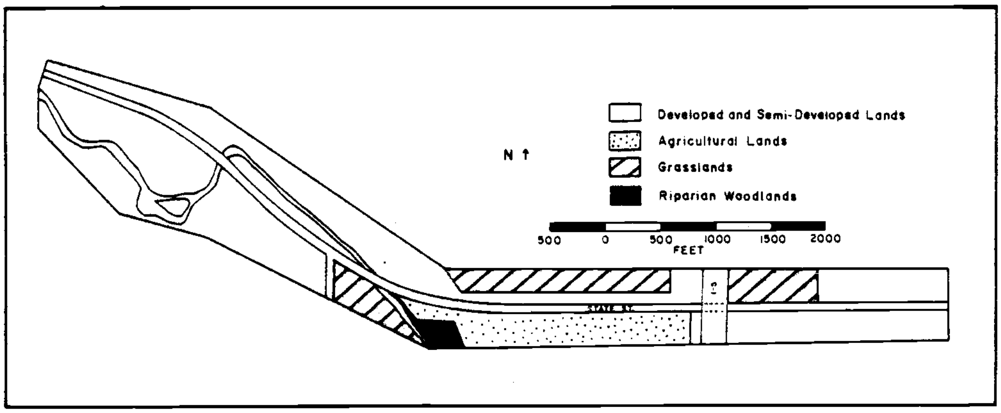

Figure 4: Vegetation Classes in the Study Area

classification scheme developed is reflective of current state only. The categories, ranging from most intensive to least intensive past use and consequent modification, include:

1. Developed and semi-developed lands, 78.1% (132.1 acres);
2. Agricultural lands, 7.8% (112 acres);
3. Grasslands, 12.1% (17.3 acres);
4. Riparian woodlands, 2.0% (2.4 acres).

See Appendix B for class criteria.

The vegetation occurring in these classes reflects, in part, the degree of human modification. In developed lands the vegetation is predominantly lawns and exotic species of flora (landscaped). Natural succession is no longer a major factor in determining species. Agricultural lands have maintained an early successional stage by harvesting and plowing while grasslands are maintained at that stage by mowing. The grassland is primarily state-owned land that is committed to continued alteration. The agricultural classification includes only the narrow strip of cultivated land along the south edge of the project area which is part of a planned industrial area.

The riparian woodland classification was difficult due to the removal of the understory in developed areas. This eliminated the natural riparian composition of vegetation whereas in other locations, more natural vegetation existed. An attempt was made to exclude landscaped trees and shrubs, which are ubiquitous in the Salem area, and concentrate on the more unique natural riparian community. The riparian woodland overstory includes Oregon ash (Fraxinus latifolia), Black Cottonwood (Populus trichocarpa), White Alder (Alnus rhombifolia), and miscellaneous associated hardwoods with an understory of young ash and cottonwood, Willow (Salix spp.), Hawthorne (Craetegus spp.), Pacific serviceberry (Amelanchier florida), Snowbrush (Symphoricarpus albus), Wild rose (Rosa spp.), Himalaya berry (Rubus ursinus) and other associated plants; one small patch of natural riparian woodland exists just upstream from the Women's Penitentiary (W.P.) Bridge on Mill Creek. This strip is approximately one tree wide on the west bank and varies between that and approximately 20 yards on the east bank.

Endangered Species. Within the project area, no listed threatened or endangered species were located. However, six candidates for the federal plant lists supposedly occur in the Salem area. The six species along with ecological requirements and distributional notes are presented in Table 2.

Table 2

Candidates for Federal Endangered Plant Lists - Salem Vicinity

Name	Ecological Requirements	Distributional Notes
Aster curtus	Moist, generally saline ground at low elevations	Only one known site - near Eugene
Cardamine penduliflora	Wet meadows and swamps	
Cirsium hallii*		Very widespread
Lomatium bradshawii	Moist, low ground	Only 5 sites - bet. Corvallis-Eugene
Sidalcea campestris	Dry meadows and roadsides	Concentrated in Salem area
Sidalcea nelsoniana	Gravelly well-drained soil in open ground	Only known sites are near Eugene

* Cirsium hallii is the common thistle of the Oregon coast and is now considered too widespread to be listed.

Only Cardamine penduliflora (bitter cress) and Sidalcea campestris (tall wild hollyhock) appear to be of concern in the study area. A field check by a botanist is needed to verify their presence or absence.

Wetlands

For the purpose of this report, the definition of wetlands formulated by the U.S. Fish and Wildlife Service in December, 1979, was used for identification purposes within the project areas. The definition is quite broad:[8]

> Wetlands are lands transitional between terrestrial and aquatic systems where the water table is at or near the surface or land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly drained by hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water during the growing season of each year.

The U.S. Fish and Wildlife Service is currently preparing a list of indicative hydrophytes and the Soil Conservation Service is preparing one of hydric soils; however, they are not yet available.

Using this definition, the U.S. Fish and Wildlife Service has begun an extensive wetland inventory; however, the project areas have not yet been mapped. Consequently, an attempt was made by the Mid Willamette Valley Council of Governments (MWVCOG) to identify wetlands in the project area using the same definition. This project was complicated by the lack of listings of indicative hydrophytes and hydric soils. The study resulted in tentative identification of two wetland ecosystems. These were: Riverine (R) and Palustrine (P).

The Riverine classification includes streams such as Mill Creek and the Palustrine system encompasses freshwater marshland and shallow ponds. Palustrine systems occur along the section of Mill Creek upstream from the W.P. Bridge, and in a narrow strip adjacent to the southern edge of State Street between I-5 and Mill Creek where a drainage canal supports aquatic vegetation (Fig 5). The low-lying vacant fields to the north and south of State Street may also be wetlands but alterations to the environment and lack of information regarding indicative plants and soils prevent inclusion of these areas. As a percentage of wet ecosystems in south Salem, these wetlands constitute a very minor fraction; however, wetland ecosystems in general are scarce in urbanized areas and support diverse populations of plants and wildlife, particularly riparian woodlands (Forested Wetlands).

Fisheries

The fish species known to occur in Mill Creek are listed in Table 3. In addition to those listed, other rough fish may be present. No rare

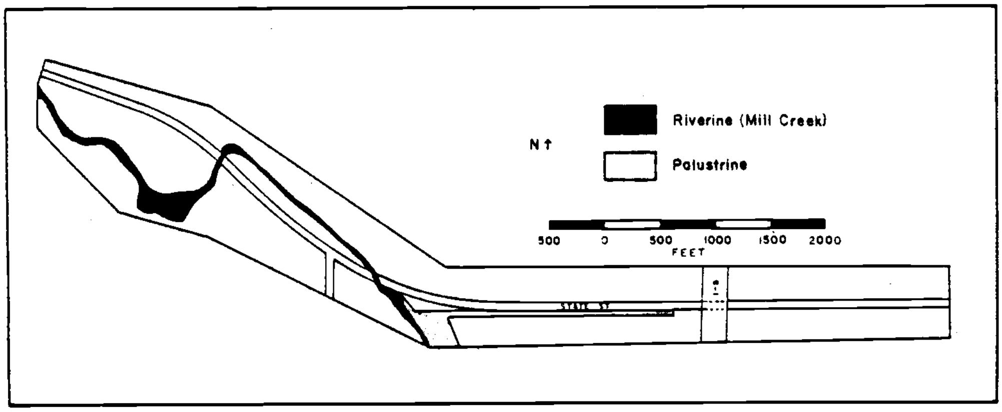

Figure 5: Wetlands in the Study Area

Table 3

Fish Species Occurring in Mill Creek

Chislemouth Chub	Acrocheilus alutaceus
Suckers	Catostomus sp.
Squawfish	Ptychocheilus oregonensis
Shiners	Richard sonius sp.
Sculpin	Cottus sp.
Stickleback	Gasterosteus aculeatus microcephalus
Brook Lamprey[a]	Lampetra richardsoni
Dace	Rhinichthys sp.
Brown Bullhead (Catfish)	Ictalurus nebulosus
Largemouth Bass	Micropterus salmoides
Bluegill (Bass)	Lepomis macrochirus
Mountain Whitefish	Prosopium Williamsoni
Cutthroat Trout	Salmo clarki clarki
Rainbow Trout	Salmo gairdneri
Steelhead	Salmo gairdneri gairdneri
Chinook Salmon[b]	Oncorhynchus tshawytscha
Coho Salmon[c]	Oncorhynchus kisutch

[a]not a true fish Source: Oregon Dept. Fish and Wildlife

[b]includes both spring and fall chinook

[c]recent evidence limited to two carcasses.

or endangered species inhabit this creek.

In the following discussion of fisheries in the Mill Creek system, emphasis will be on the Fall Chinook salmon populations because of the importance of the Creek to the population in the Willamette River system.

Three factors were considered to determine the exclusion of serious discussion of other fish species. Those factors were: (1) flowing water as an open system; (2) the local impacts of the proposed projects; and (3) the distribution of these fish in the Willamette River system. The conclusion was that the impacted area will be quickly repopulated from other areas provided needed habitat is not destroyed. The game fish populations do not constitute a major source of recruitment to the total populations of game fish in the Willamette system nor is the stretch of channel within and downstream of the proposed construction a major sport fishing area.

Anadromous fish species, excepting Fall Chinook, appear to be few in number and are not known to spawn in the Mill Creek system; they instead use the creek for migration to or from the North Santiam River. For this activity, they require a channel free of obstruction by physical or water quality barriers. According to the ODFW, present water quality is not a threat to any populations of fish in Mill Creek.

Management activities concentrating on specific fish populations have been limited to Rainbow Trout, Coho Salmon and Fall Chinook Salmon. The Rainbow Trout management is a public service activity involving stocking of 500 to 1,000 legal-sized trout in Cascade Gateway Park immediately prior to the opening of fishing season in April. Efforts directed at boosting the Coho Salmon population in the Willamette River system were intense during the early 70s but have declined lately due to the poor return from stocking and consequent search for a stock better suited to the Willamette system. No Coho have been released in Mill Creek since about 1971 and their current existence in the creek is questionable.

Substantial management effort was expended in the mid to late 60s and through the 70s to establish a self-sustained run of Fall Chinook Salmon in the Willamette River system. Mill Creek played an important role as a release site because of the close proximity to rearing ponds at Stayton, Aumsville and Cascade Gateway Park and also because gravel deposits in the creek could be utilized as spawning beds by returning 'planted' fish.

Between 1968 and 1978 almost 8.5 million early-spawning juvenile Fall Chinook Salmon were released into Mill Creek. Additional releases directly from the ponds to the creek also probably took place. The releasing of planted fish has tapered off in the last few years as emphasis in the program shifted from development to evaluation.

As spawning fish began to return to Mill Creek in 1970, a boat survey to count redds (spawning sites) was instituted to determine the program success and to estimate the size of the Fall Chinook run. Aerial surveys were already being conducted for the rest of the Willamette Basin. The results of the survey along with other accumulated data are presented in Table 4. The last column in the table indicates the relative importance of Mill Creek by listing the estimated percentage of the Willamette Basin population that returned to Mill Creek. From 1969 through 1971, over 40% of the Fall Chinook return over Willamette

Table 4

Tabular Summary of Fall Chinook Population Estimates and Redds for the Willamette Basin and Mill Creek

Year	WILLAMETTE SYSTEM Adults	jacks	total*	redds	fish/redd	MILL CREEK redds	est. pop.	% of total pop.
1965	77	2	79					
1966	771	255	1026		-			
1967	1901	111	2012					
1968	4043	203	4246					
1969	6817	140	6957	982	7.08			
1970	7457	101	7558	2348	3.22	961	2094	40.94
1971	4880	210	5090	1382	3.68	600	2208	43.38
1972	11614	212	11826	3223	3.67	1354	4969	42.02
1973	21861	376	22237	7282	3.05	1992	6076	27.32
1974	33924	265	34189	9597	3.56	1900 [a]	7084	20.72
1975	32877	895	33772	8524	3.96	2819	11136	33.05
1976	29269	931	30200	6642	4.55	1656	7535	24.95
1977	25742	382	26124	6739	3.88	1410 [b]	5465	20.92
1978	17437	465	17901	6581	2.72	1261	3430	19.16
1979	9905	436	10341	2616	3.95	305	1206	11.66

* Counts of fish passing Willamette Falls at Oregon City
a Conservative estimate due to turbid waters
b Includes 265 redds in the 4.8 km. of Shelton Ditch

Source of data: Oregon Department of Fish and Wildlife

Falls is estimated to have terminated in Mill Creek, From that year on, the percentage has declined steadily to the 1979 estimate of 11,66%, Thus, Mill Creek has been suffering from a severe reduction in Fall Chinook populations in excess of the general Willamette system decline, Despite the decline, the 1977 redd survey showed Mill Creek to have an average of 35.07 redds per kilometer, This was the third highest figure recorded for the 12 waterways surveyed and far exceeded the overall mean of 11,56 redds/km, In addition to the table, a graph of population numbers (Fig, 6) has been included to show trends,

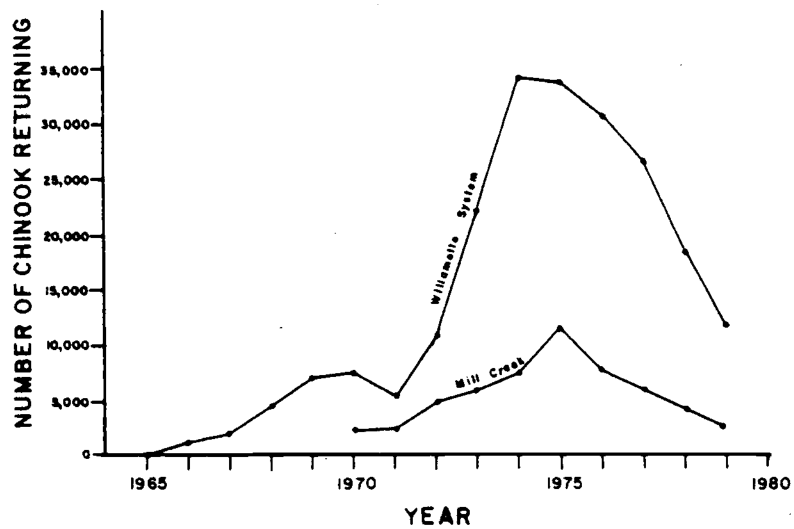

Figure 6: Returning Population of Fall Chinook, 1965 - 79

The graph indicates a slow buildup in the Willamette system between 1965 and 1972 at which time the population began a dramatic increase to the peak years of 1974 and 1975. Since that year, the population has been steadily declining. The cause for the decline is not known though it appears to be a problem associated with the marine phase of the life cycle.

Information on numbers of spawning sites within the study area is scant but does document the existence of redds in the impacted segment of Mill Creek. In reference to the river sections noted on the study area map (Fig. 2), the 1972 boat survey came up with the following figures: Section 1, (mouth to 19th Street) -93 redds; Section 2, (19th to W.P. Bridge) -43 redds; Section 3, (W.P. Bridge to Cascade-Gateway Park) -108 redds. The survey counted 1110 additional redds between the park and Stayton to bring the total to 1354 redds. These figures indicate about 25% of the redds occur below Cascade-Gateway Park with about 10% occurring in or downstream of the project area. 1978 data is limited but shows the stretch between the mouth and the park containing 30% of the total spawning sites indicating fairly stable spatial distribution.

The ecology and living requirements of Fall Chinook can be roughly divided into needs of the spawning adults and needs of the developing eggs, fry and smolts. The migrating adults and subyearlings (smolts) both require a route free of barriers. Migration times as well as other life cycle periods are indicated on Table 5 for Fall Chinook, Spring Chinook and Winter Steelhead.

Table 5

Periodicity of Anadromous Fish in Mill Creek

```
Fish Species      JA FEB MAR APR MAY JN JU AUG SEP OCT NOV DEC

Winter Steelhead -----------------                   ----------
Fall Chinook     00///////////////               ----xxx000000000
Spring Chinook              -----------
```

---- Migration Periods
xxxx Spawning Period

0000 Incubation of Eggs
//// Hatching and Rearing Period

Source: 13th Street Extension Final Environmental Impact Statement

In order to protect spawning Fall Chinook salmon, all angling in Mill Creek is prohibited between September 1 and October 31.

The gravel beds required for spawning must be fairly free of silt or sediment. Since the eggs are buried in the gravel, it must be unsilted to allow to allow passage of oxygenated water through the interstitial spaces of the gravel to insure proper development of the brood. The USEPA criterion for salmonid spawning beds is a minimum of 5.0 mg/l of dissolved oxygen (DO) in the interstitial waters.[10] This criterion is applicable only to permeable gravel with an abundant flow of water. Slower flows or reduced permeability require higher minimum levels of DO to prevent developing fish and other organisms from depleting the oxygen supply to harmful levels. The problem is compounded in areas of heavy biological and/or chemical oxygen (BOD and COD). Current (1980) DEQ requirements for salmonid-producing waters of Willamette Basin streams state that "DO concentration shall not be less than 90% of saturation at seasonal low or less than 95% of saturation in spawning areas during spawning, incubation, hatching, and fry stages of salmonid fishes."[11] Since eggs or developing fry are present in the gravel from early September to early June, that entire period requires high DO content and clean, undisturbed gravel. Currently, Mill Creek spawning beds appear to be in adequate condition.

Wildlife

Rather than attempt to list exact species, population numbers and locations of wildlife in the area, the research prior to this report concentrated on determining the existence of any rare and endangered species. No such species appear to exist. A letter of intent has been filed with the U.S. Fish and Wildlife Service regarding the State Street project. If the possibility exists that any rare and endangered species are present in the project area, the Fish and Wildlife Service will provide consultation and technical advice.

Organisms surviving in the study area must be able to live and reproduce in a very limited space. Hence, urbanization has reduced the species present to a small fraction of those present before urban encroachment. Even the modification of existing open space by cultivation or mowing reduces the quality of the habitat by periodically reducing food, cover and exposing nests, burrows and runways during the prime growing season. Thus existing vegetation and wildlife habitat is primarily the result of past alterations. For this reason the dominant groups of organisms present are probably songbirds and small mammals such as rodents. These concentrate in the riparian woodlands due to diversity of habitat and relative lack of disturbance.

ADVERSE IMPACTS TO BIOLOGICAL COMPONENTS --

SUGGESTED MITIGATION PROCEDURES

Vegetation

Impacts. The direct impact will be elimination of vegetation in the construction area. Some will be permanent where the ground surface is to be overlain with pavement while other areas can be replanted after construction. Temporary or permanent reductions may occur in all vegetational classes; but due to the relative scarcity of Riparian Woodland in and adjacent to the study area and its relative importance because of plant and animal diversity, any loss will be substantial.

In addition, two candidates for federal listing of threatened and endangered plant species may occur within the study area and could be destroyed. However, highway right-of-way could also provide habitat suitable for Sidalcea campestris, (though it is highly susceptible to herbicides).

Indirect impacts may result from environmental modification by impaired air and water quality, loss of topsoil and soil compaction in replantable locations. Water quality degradation through runoff from street surface contaminants could affect sensitive downstream aquatic vegetation. Air quality changes are beyond the scope of this report, but the proximity of the study area to I-5 and the current status of State Street as an arterial highway with associated traffic volumes reduces the probability of substantial alterations.

Soil compaction from heavy machinery may occur and may limit species that could eventually revegetate those areas. The loss of topsoil through removal or erosion from unstabilized areas could also prevent or delay proper revegetation.

Mitigation. Riparian woodlands should be avoided due to their relative scarcity and importance to wildlife. Soil erosion should be carefully controlled and compaction should be avoided where possible by careful designing and locating of facilities for heavy equipment parking and turning. A field check for the two candidate endangered plant species should be made. If such species are encountered, damage to those areas should be avoided.

Wetlands

Impacts. Part of the natural riparian vegetation along Mill Creek and the narrow palustrine system along the southern margin of State Street may be eliminated if the pavement is extended in that direction. Drainage (surface or subsurface) will not be significantly altered from the present state, thus wetlands should not be affected by reduced water supplies.

Mitigation. The Riparian woodland along Mill Creek should be avoided. If the narrow palustrine strip is covered, similar habitat can be created in the new right-of-way.

Fisheries

Impacts No regional impacts on fisheries will occur from this project. Impacts will be localized, temporary and indirect. Most resident fish populations are mobile and will react to disturbance by vacating the impacted area. This will create pressure in adjacent areas by exceeding the carrying capacity and should eventually cause a population reduction. This will be a temporary condition provided impacted habitat is restored quantitatively and qualitatively.

Non-mobile organisms inhabiting the study area will suffer higher attrition locally due to inability to remove themselves. This situation is particularly applicable to the eggs and fry of the Fall Chinook salmon which, if severely impacted, would affect future populations. Even if eggs and fry were not present, degrading the quality of gravel spawning beds could have the same effect.

Physical disturbance of habitat in general and spawning beds specifically will occur primarily during alteration of bridge supports. Compaction of gravel can destroy developing eggs or fry and can reduce flow of water through the interstitial space of the gravel, thus reducing the quality of the spawning beds. Moving the gravel within the stream or removing it from the stream can also destroy young fish and may reduce available spawning grounds in the future if such disturbed beds are not replaced or rehabitated.

In addition, certain project design features can indirectly affect beds by increasing scour. Smooth-sided bridge supports parallel to the water flow reduce friction relative to normal channel sides. This causes water passing by the supports to increase velocity. When the water reaches the other side, it is slowed by the increase in frictional resistance of the uneven channel perimeter. The slower moving water causes the fast-moving water behind to pile up which creates a standing wave and greatly increases turbulance and erosive potential. Depending on the design of storm sewer outlets, this same problem can exist at a localized level. Widening or placement of bridge supports will also cover stream bed surface causing loss of habitat.

Construction will contribute increased amounts of silt and sediment to the creek. If silt or sediment settles out on gravel spawning beds, high mortality rates may occur. Silt can prevent the flow of DO into the interstitial water of gravel, trap young fish, damage invertebrate populations (fish food) and, if organic, deplete DO levels in the water. It is hypotehsized that silt attached to eggs inhibits the exchange of oxygen and CO_2 between the egg and surrounding water thus damaging the egg. In some cases, it was found that salmonids will not spawn in silted beds.[12] When in transport, the silt causes a turbid condition that is also detrimental to fisheries.

Physical water quality can be degraded temporarily by increased turbidity with adverse consequences for fish growth. Fish cannot see their food sources, primary productivity of plants is light limited, fish gills are clogged and turbidity increases the temperature of water by preventing mixing. In turbid waters, the near-surface layer experiences elevated temperatures due to the greater total heat absorbency of the excess particulate matter. This tends to stabilize the water column preventing vertical mixing and consequently decreasing the dispersion of DO and nutrients to lower layers of the water body.[13] Impaired quality through chemical means may also be encountered.

The lack of a current study from which to establish a base level for evaluating water quality makes it somewhat difficult to assess the degree of impact to the system from added chemical pollution. This is especially true in the case of urban runoff that discharges directly into the waterways through the storm sewer system and for which the current loading level of pollutants is not know. Therefore, the following section will focus on possible problems and will discuss at what levels adverse effects occur and what those effects are.

Chemical water quality could be temporarily degraded locally by the addition of pollutants from construction machinery either indirectly from runoff or directly if such machinery passes through flowing water. These pollutants would be primarily oil and grease. During construction, possibility of a major fuel spill from machinery or a tanker truck is also enhanced. Lime leached from concrete during the curing process could also cause a localized temporary toxic situation.

In dealing with criteria for oil and grease levels, the EPA encountered difficulty due to non-definitive categorization. Oil and grease include thousands of organic compounds with varying physical, chemical, and toxicological properties. They may, or may not, be volatile, soluble or degradable. For oil and grease in general, sublethal effects on fish have been shown to occur at the 10 to 100 ug/l level while aquatic life in general can be damaged at levels as low as 1 ug/l.[14]

In relation to fish, oils of any kind can cause: (1) attrition due to increased biochemical oxygen demand and consequent decreased DO, (2) attrition due to coating of the epithelial surfaces of gills thus preventing respiration, and (3) asphyxiation of benthic life forms by bottom surface accumulation which also blankets spawning beds. Settled out oil and grease retain their toxicity even when incorporated into sediments and can, therefore, have long-term adverse effects.

Long-term water quality degradation may result from higher loadings of street surface contaminants due to increased runoff from additional impervious surface and from the use of herbicides to control right-of-way vegetation. Again, the lack of current loading information makes it difficult to assess impacts from this project. However, since the stream system involved already receives storm sewer discharge from a large section of the city, and irrigation runoff from most of the drainage basin, the elevated pollutant loading from increased runoff as a result of this project would be negligible in comparison. But pollution by street surface contaminants is a growing problem in Mill Creek; consequently, impacts from any project should be assessed.

Street surface contaminants include: fuel, lubricants, and hydraulic fluids all with lead, nickel and/or zinc compounds; particulate matter from brake linings, gears and rusting vehicle bodies; organic and inorganic compounds from anti-skid mixtures, deicing salts and chemical spills; litter such as glass and paper products; and particulate matter from road sanding and sediment spills. Oils and grease have already been discussed in general; but zinc, lead and nickel specifically can all be toxic to aquatic organisms at high levels. The 1972-73 water quality information for Mill Creek (Table 1) indicated normal levels of zinc and lead were far below EPA water quality criteria for fish. However, zinc levels temporarily exceeded the criteria by approximately an order of magnitude following a heavy rainfall.

In reference to the other contaminants mentioned, particulate matter contributes to turbidity, inorganic and organic matter increases chemical and biological oxygen demand, and herbicides can be toxic to fish and aquatic organisms.

<u>Mitigation</u>. The sources of material contributing to turbidity will be either exposed soil, particularly near the stream banks, or sediment already settled on the channel bottom that is disturbed during the

construction process. To prevent large amounts of sediment from entering the waterways, all exposed soil should be seeded and mulched as soon as possible or protected in some other way. Fill material near the stream banks should be limited to rip-rap, thus eliminating a sediment source. Disturbing the stream bottom should be limited to minimize downstream impacts. Control of roiled water by cofferdamming and construction of temporary bridge systems to prevent machinery passing through flowing water could substantially reduce the disturbance and consequent sediment loading as well as helping to prevent chemical pollutants from machinery from entering the stream.

The prevention of premature drying of concrete in the curing process should be accomplished by the covering of such surfaces with canvas or burlap as opposed to constant sprinkling or flushing, particularly on structures adjacent to or within the waterways.

In addition to controlling sources of water pollution, construction activities directly adjacent to and within the waterways should be scheduled between mid-June and the first of September to protect the Fall Chinook population. In this way, temporarily impaired water quality would occur during a period not critical to the Fall Chinook. Also, temporary disturbance of gravel would not impact eggs and fry though it may destroy spawn of other fish in the system. Other problems may occur since this is a low flow period, so the sediment transport capacity and dilution potential of the stream is reduced.

Gravel spawning beds should be located and monitored to assess siltation. Natural flushing will remove some of the sediment buildup, but the amount that can be naturally handled is unknown; it depends on factors that fluctuate annually such as timing and volume of discharge. If sedimentation does occur to the point of fouling spawning beds, artificial flushing could rehabilitate the beds prior to the influx of spawning salmon in the fall. Any beds altered by construction should be replaced or rehabilitated prior to September first of that year. In addition, bridge supports and storm sewer outlets should be designed to prevent increased erosion and scour.

Long-term impacts from urban stormwater runoff are negligible in reference to this project. However, it is a situation that can potentially destroy the aquatic life in Mill Creek. Storm sewer discharge points should be located away from gravel spawning beds to prevent, to some degree, localized siltation, turbulence, and pollution. Future impacts from herbicides can be mitigated by severely restricting their use.

Wildlife

Impacts. There will be no regional impacts to wildlife populations. Localized impacts will occur; but, due to the existing degree of development in the project area, consequent tolerance of resident species and the relatively minor nature of the project in terms of environmental alteration, the impacts will be minimal. Direct short-term and long-term loss of habitat from paving the ground surface and maintaining the right-of-way will be the primary impact. Since riparian woodlands represent a system with the greater diversity of both plant and animal species of the four classes listed, and the amount of habitat is already small, any loss in that category will be substantial. The right-of-way vegetation will replace destroyed habitat to some degree, particularly since it offers an opportunity to maintain a strip of natural vegetation in an urbanized area.

Indirect impacts will primarily be the result of changes in physical components which in turn affect the wildlife. These include alteration of air and water quality and increased noise levels which could degrade the quality of the habitat and eventually eliminate some wildlife populations. Wildlife mortality will also increase due to more road kills.

Mitigation. Riparian woodlands and scrub should be maintained if possible. Trees and shrubs that must be eliminated should be removed during the fall or winter when birds are not actively nesting. However, caution should be exercised to prevent increased erosion at the removal sites due to baring of soil or other disturbance of the ground surface. Right-of-way revegetation should be focused on providing habitat for wildlife.

CONCLUSION

This report has attempted to survey the biotic resources in the study area of the State Street project and assess the probable impacts to these resources from construction of this project. Mitigation measures have been suggested where possible.

This report has concluded that areas of special concern include:

1. Vegetation - possibility of proposed threatened or endangered plant species in the study areas;

   - Presence of scarce riparian woodland habitat, important to wildlife.

2. Fish

   - presence of spawning beds of Fall Chinook salmon.

3. Wetlands

   - Federal requirement (protection of wetlands)
   - Includes previously mentioned riparian woodlands

The study area as a whole exhibits low sensitivity due to past human-related modifications that have already impacted the area to a substantial degree. Native floral and faunal communities have been reduced primarily to native species tolerant of urbanization and exotics. The riparian woodlands and stream system are among the least altered communities and represent the most unique habitats in terms of area. They also tend to support much of the fish and wildlife populations in the area and thus require careful consideration.

Future modifications are inevitable. The agricultural field south of State Street between I-5 and Mill Creek is to be an industrial development; the open space at the corner of Airport Road and State Street is state land on which the new State Printing Office is being built; another residential subdivision has been platted off of Hawthorne Avenue; and the land between I-5 and Hawthorne extension right-of-way is zoned for an industrial park. Impacts to the natural environment from these future modifications will occur whether this project is built or not, and the collective impact from these alterations will be substantially greater than the impacts from the project discussed in this report.

FOOTNOTES

1 Mid Willamette Valley Council of Governments. Salem Parkway and Corollary Projects: Technical Report 16-7, Impact Analysis Biotic Resources. 1976.

2 U.S. Fish and Wildlife Service. Classification of Wetlands and Deepwater Habitats of the United States. (USDI, Washington, D.C. 1979)

3 Mid Willamette Valley Council of Governments. State Street Widening Project: Technical Report (in progress). Biotic Resources. 1980.

4 Priscilla Harney. ODOT. Personal communication.

5 Mid Willamette Valley Council of Governments. Areawide Wastewater Treatment Management Plan. 1976.

6 Oregon Department of Transportation.

7 J.D. Sartor and Gail B. Boyd. Water Pollution Aspects of Street Surface Contaminants. (USEPA Report #R2-72-081, 1972) pp. 1-2.

8 U.S. Fish and Wildlife Service. Classification of Wetlands and Deepwater Habitats of the United States. (USDI, Washington, D.C , 1979)

9 Bill Day; Fisheries Biologist in charge of the Fall Chinook Program for the Oregon Department of Fish and Wildlife; Personal Communication.

10 USEPA. Quality Criteria for Water. (Office of Water Planning and Standards, Washington, D.C., 1976). p. 125.

11 Department of Environmental Quality. Oregon Administrative Rules. (340-41-445), (1977), p. 179.

12 USEPA. Quality Criteria for Water. (Office of Water Planning and Standards, Washington, D.C., 1976). p. 211.

13 ibid. p. 211

14 ibid. p. 112

APPENDIX A

List of Contacts

Audubon Society: Mrs. Beverly Klock (Letter - no reply)

City of Salem Parks Department: Darrell Belcher

City of Salem Public Works Department: Lyle Huffaker, Water Source Foreman

City of Salem Public Works Department: Ralph Lambert, Garry Seeley, Jerry Wymore

Isaac Walton League: Stan Kirk (Letter - no reply)

Marion County Planning Department

Oregon Department of Transportation: Gordon Alcock, Geologist; Donna Brown, Biologist; Priscilla Harney, Water Quality; Roger Powers, Biologist

Oregon Fish and Wildlife Department: Bill Day, Aquatic Biologist; John Hacksten, Aquatic Biologist; Jim Heinz, Biologist; Roy Sams, Aquatic Biologist; Joe Weatherbee, Aquatic Biologist

Oregon State Highway Department: Bill Fretwell, Regional Geologist, Region 2; Eddie Welsh, Regional Environmentalist, Region 2

Oregon State Department of Geology and Mineral Services (Letter - no reply)

Oregon Department of Environmental Quality: Dale Wolffenstein, Water Quality

Oregon Natural Area Preserves Advisory Committee: Jean L. Siddall

Oregon State University: Dr. Gordon Matzke, Geography Department

Oregon Water Resources Department: Robert Almy; Cliff King, Watermaster for Marion and Polk Counties; Glen Strachan, Hydrogeologist

Oregon Native Plant Society: Wilbur Bloom (Letter - no reply)

U.S. Army Corps of Engineers: Patrick Keough (Letter)

U.S. Environmental Protection Agency: Ken Mauleg, Aquatic Biologist; Ibrahim Hindawi, Air Quality

U.S. Fish and Wildlife Service: Janet Hohn, Botanist, endangered species; Dennis Peters, Regional Director of the National Wetlands Inventory Project; Larry Safly, Biologist, endangered species

U.S. Soil Conservation Service: Fred Gilderman, soils; Doug Price, soils.

APPENDIX B

Vegetation Classification Criteria

Developed and Semi-Developed Lands

a. All impervious surface (buildings, pavement)
b. All parks, lawns, and landscaping
c. All land stripped of vegetation through construction activities

Agricultural Lands

a. Land recently cultivated
b. Farm residences

Grasslands

a. Grassland
b. Transitional scrub/brush grassland

Riparian Woodlands

a. Groups of native tree species and associated vegetation within approximately 20 yards of a waterway.