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# Watershed Survey of O. O. Denny Creek

## Appendices



This document contains appendices for the O. O. Denny Creek Watershed Assessment Report, prepared by the Watershed Committee of the Denny Creek Neighborhood Alliance.

## List of Appendices

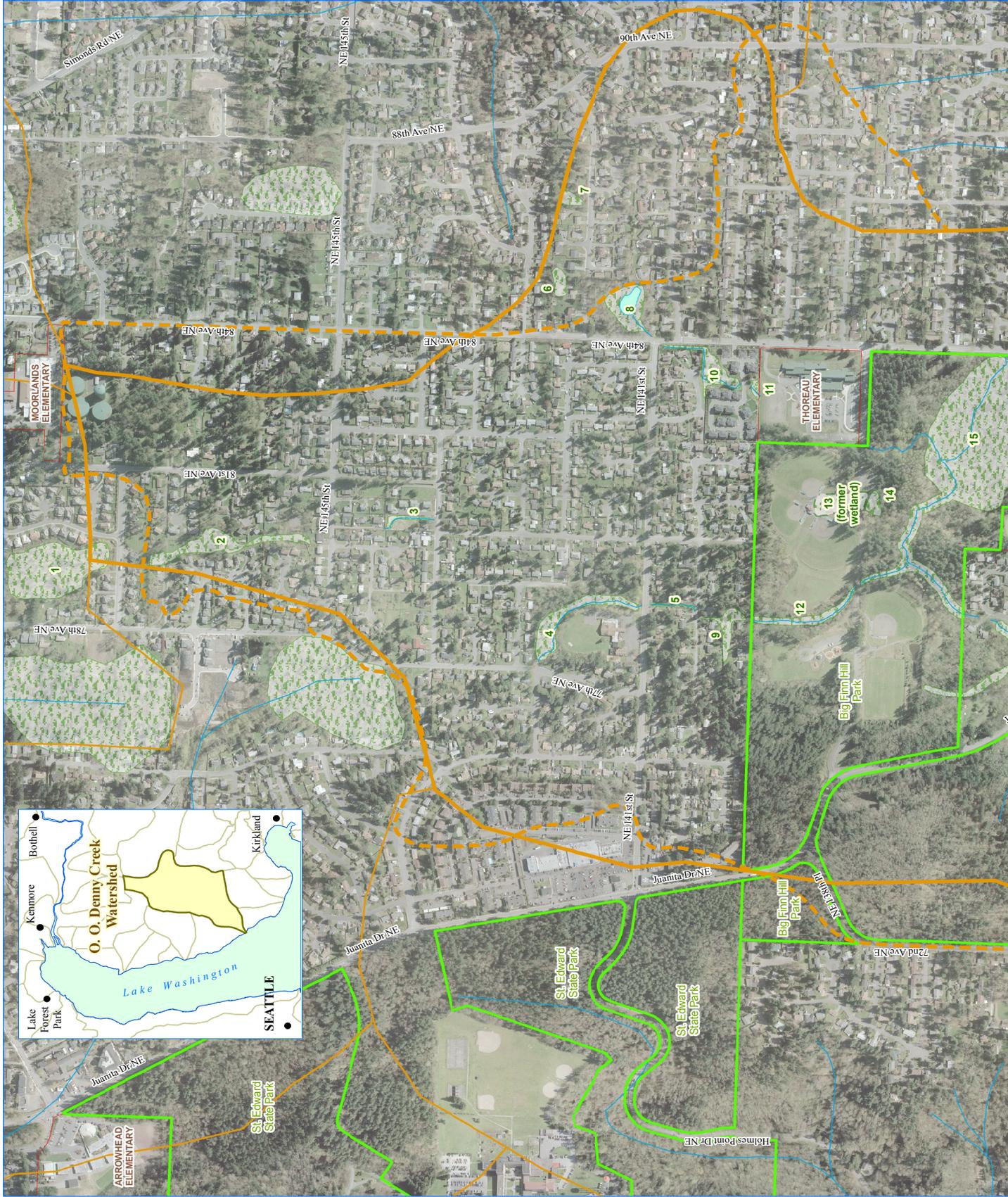
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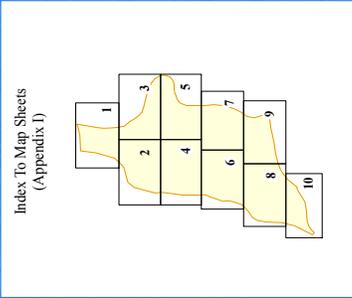
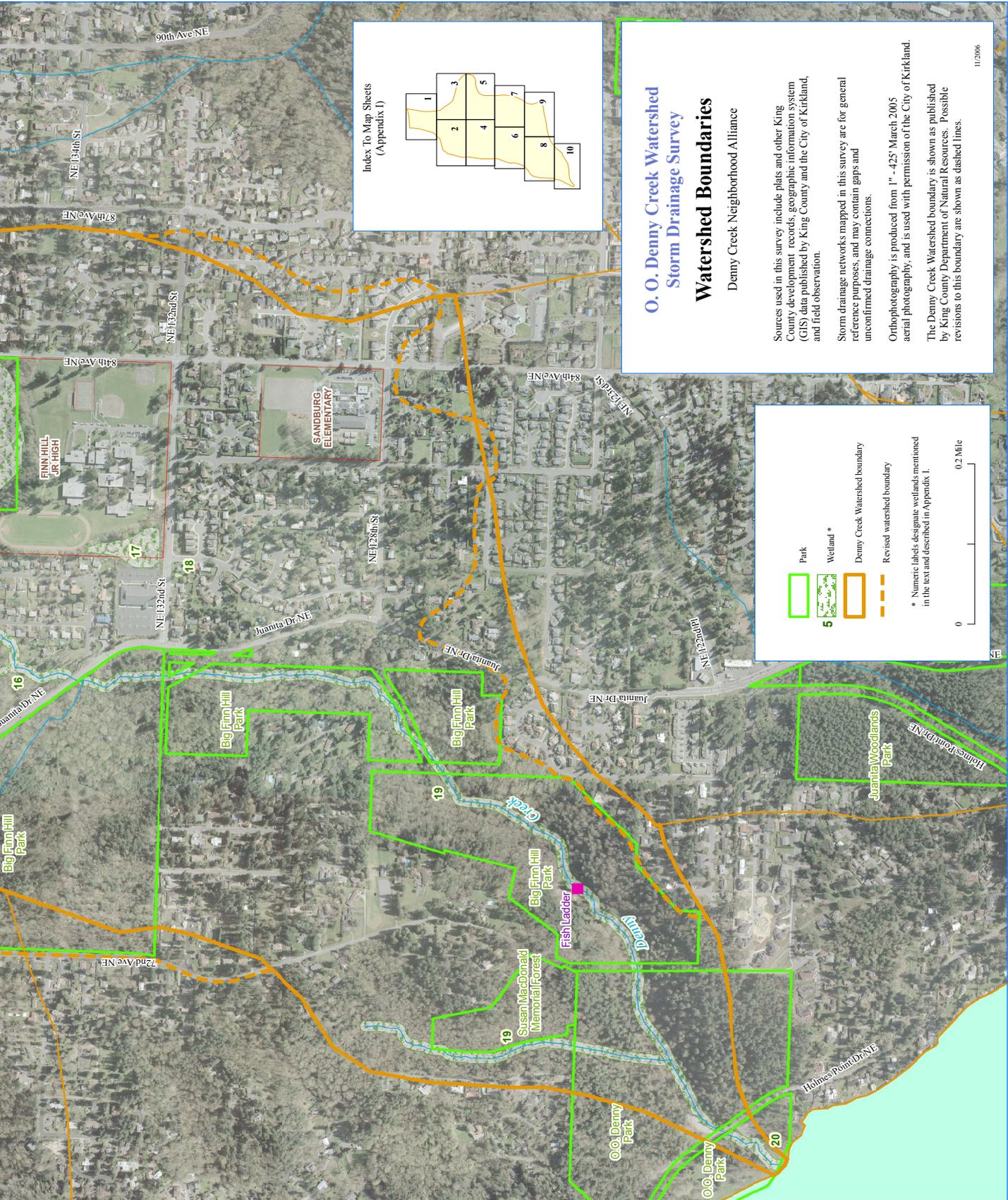


## Appendix A: Map of the O. O. Denny Creek Watershed

The map that follows delineates the O. O. Denny Creek Watershed boundaries. A high-quality 11x17 version of the map can be found on an accompanying CD with a file name beginning with “BasinMap”

Appendix A: Map of the O.O. Denny Creek Watershed





### O. O. Denny Creek Watershed Storm Drainage Survey Watershed Boundaries

Denny Creek Neighborhood Alliance

Sources used in this survey include plats and other King County development records, geographic information system (GIS) data published by King County and the City of Kirkland, and field observation.

Storm drainage networks mapped in this survey are for general reference purposes, and may contain gaps and unconfirmed drainage connections.

Orthophotography is produced from 1" - 425' March 2005 aerial photography, and is used with permission of the City of Kirkland. The Denny Creek Watershed boundary is shown as published by King County Department of Natural Resources. Possible revisions to this boundary are shown as dashed lines.

11/2006

Park  
 Wetland \*  
 Denny Creek Watershed boundary  
 Revised watershed boundary

\* Numeric labels designate wetlands mentioned in the text and described in Appendix I.

0 0.2 Mile



# Appendix B: Riparian Zone Vegetation

## Vegetation at Various Locations in the Riparian Zone

This plant list records vegetation observed in various locations within the riparian zone of O. O. Denny Creek and is not an exhaustive listing of all vegetation within the watershed. Noxious weeds are listed separately, as are those plants obtained for re-vegetation at the stream mouth.

### TREES

Douglas Fir	<i>Pseudotsuga menziesii</i>	Western Yew	<i>Taxus brevifolia</i>
Red Cedar	<i>Thuja plicata</i>	Red Alder	<i>Alnus rubra</i>
Hazelnut	<i>Corylus Americana</i>	Big Leaf Maple	<i>Acer macrophyllum</i>
Atlas Cedar	<i>Cedrus atlantica</i>	Cottonwood	<i>Populus balsamifera</i>
Western Hemlock	<i>Tsuga heterophylla</i>	Mountain Ash	<i>Sorbus aucuparia</i>
Shore Pine	<i>Pinus Contorta</i>	Pacific Willow	<i>Salix lasiandra</i>
Grand Fir	<i>Abies grandis</i>	Garry Oak	<i>Quercus garryana</i>
Sitka Spruce	<i>Picea sitchensis</i>	Pacific Madrone	<i>Arbutus maeziesii</i>
English Holly	<i>Ilex Aquifolium</i>		

### SHRUBS

Black Gooseberry	<i>Ribes lacustre</i>	Salal	<i>Gaultheria shallon</i>
Oregon Grape	<i>Mahonia nervosa</i>	Salmonberry	<i>Rubus spectabilis</i>
Nootka Rose	<i>Rosa nutkana</i>	Scouler's Willow	<i>Salix scouleriana</i>
Baldhip Rose	<i>Rosa gymnocarpa</i>	Snowberry	<i>Symphoricarpos albus</i>
Clustered Wild Rose	<i>Rosa pisocarpa</i>	Stink Currant	<i>Ribes bracteosum</i>
Golden Currant	<i>Camas leichtinii</i>	Red Flowering Current	<i>Ribes sanguineum</i>
Orange Honeysuckle	<i>Lonicera ciliosa</i>	Hairy Honeysuckle	<i>Lonicera hispidula</i>
Indian Plum	<i>Oemleria cerasiformis</i>	Douglas Hawthorne	<i>Crataegus douglasii</i>
Red Elderberry	<i>Sambucus racemosa</i>	Ocean Spray	<i>Holodiscus discolor</i>
Red Osier Dogwood	<i>Cornus stolonifera</i>	Western Sword Fern	<i>Polystichum munitum</i>
Twinberry	<i>Lonicera involucrate</i>		

### HERBACEOUS

Broad-leaf Stonecrop	<i>Sedum spathuliforium</i>	Reed Canary Grass	<i>Phalaris arundinacea</i>
Butterfly Milkweed	<i>Asclepias tuberosa</i>	White Clover	<i>Trifolium repens</i>
Canada Goldenrod	<i>Solidago Canadensis</i>	Bird's Foot Trefoil	<i>Lotis corniculatus</i>
Cardwell's Penstemon	<i>Oenstemon cardwellii</i>	Bleeding Heart	<i>Dicentra formosa</i>
Costal Strawberry	<i>Fragaria chilosensis</i>	Cat's Ear	<i>Hypochaeris radicata</i>
Cow Parsnip	<i>Heraculum lanatum</i>	Youth-on-age	<i>Tolmiea menziesii</i>
Davidson's Penstemon	<i>Penstemon davidsonii</i>	Douglas Aster	<i>Aster subspicatus</i>
Fireweed	<i>Epilobium angustifolium</i>	Western Buttercup	<i>Ranunculus occidentalis</i>
Giant Camas	<i>Camas leichtinii</i>	Smooth Hawksbeard	<i>Crepis capillaris</i>
Sea Thrift	<i>Armeria maritime</i>	Scouring-rush	<i>Equisetum hyemale</i>
Bitter-Cress	<i>Cardamine ologosperma</i>	Pacific Water Parsley	<i>Oenanthesrmentosa</i>
Brooklime	<i>Veronica Americana</i>	Licorice Fern	<i>Polypodium glycyrrhiza</i>
Common Plantain	<i>Plantago major</i>	Large-leaf Avens	<i>Geum macrophyllum</i>
Colley's Hedge Nettle	<i>Stachys cooleyae</i>	Lady Fern	<i>Athyrium filix-femina</i>
Creeping Buttercup	<i>Ranunculus repens</i>	Horsetail	<i>Equisetum aevense</i>
Duckweed	<i>Lemna minor</i>	Enchanter's Nightshade	<i>Circaea alpina</i>
Foam Flower	<i>Tiarella trifoliata</i>		

## Re-Vegetation and Butterfly Garden at Mouth of O. O. Denny Creek

In the spring of 2005, the Denny Creek Delta enhancement project was begun. The goal of the project is to provide shading over the stream at its entry into Lake Washington to cool the stream water and provide additional cover for fish. A portion of this area has been designed as a butterfly garden with vegetation specifically to attract and provide habitat for all phases of the butterfly life cycle. All plants are Northwest natives and indigenous to the local area, although some are not otherwise found in the immediate vicinity.

### EVERGREEN TREES

Shore Pine	<i>Pinus contorta</i>
Douglas Fir	<i>Pseudotsuga menziesii</i>
Western Red Cedar	<i>Thuja plicata</i>
Sitka Spruce	<i>Picea sitchensis</i>
Grand Fir	<i>Abies grandis</i>

### DECIDUOUS TREES

Big Leaf Maple	<i>Acer macrophyllum</i>
Red Alder	<i>Alnus rubra</i>
Oregon Ash	<i>Fraxinus latifolia</i>
Pacific Willow	<i>Salix lasiandra</i>

### SHRUBS

Red-Osier Dogwood	<i>Cornus stolonifera</i>
Douglas Hawthorne	<i>Crataegus douglasii</i>
Ocean Spray	<i>Holodiscus discolor</i>
Nootka Rose	<i>Rosa nutkana</i>
Salmonberry	<i>Rubus spectabilis</i>
Gooseberry	<i>Ribes Hirtellum</i>
Twinberry	<i>Lonicera involucrate</i>
Snowberry	<i>Symphoricarpos albus</i>

### GROUND COVER

Western Sword Fern	<i>Polystichum munitum</i>
Oregon Grape	<i>Mahonia nervosa</i>
Kinnikinnick	<i>Arctostaphylos uva-ursi</i>
Sea Thrift	<i>Armeria maritime</i>
Coastal Strawberry	<i>Fragaria chilosensis</i>
Salal	<i>Gaultheria shallon</i>
Butterfly Milkweed	<i>Asclepias tuberosa</i>
Giant Camas	<i>Camas leichtinii</i>
Cow Parsnip	<i>Heraculum lanatum</i>

## Listed Invasive Noxious Weeds Present Within the O. O. Denny Creek Watershed

Morning Glory	<i>Convolvulus sepium</i>
Scotch Broom	<i>Cytisus scoparius</i>
Herb-Robert	<i>Geranium robertianum</i>
English Ivy	<i>Hedera helix</i>
Yellow Iris	<i>Iris pseudoacorus</i>
Reed Canary Grass	<i>Phalaris arundinacea</i>
Japanese Knotweed	<i>Polygonum cuspidatum</i>
Himalayan Blackberry	<i>Rubus discolor</i>

## Appendix C: Reported Watershed Fauna

The following animals have been reported by reliable sources, although not necessarily independently verified, as having been seen in the waters or parkland surrounding O.O. Denny Creek.

### **Birds**

COMMON LOON	PIED-BILLED GREBE
WESTERN GREBE	DOUBLE-CRESTED CORMORANT
GREAT BLUE HERON	AMERICAN COOT
CANADA GOOSE	MALLARD
WOOD DUCK	AMERICAN WIGEON
CANVASBACK	LESSER SCAUP
BUFFLEHEAD	COMMON MERGANSER
HERRING GULL	RING-BILLED GULL
COOPER'S HAWK	RED-TAILED HAWK
BALD EAGLE	OSPREY
NORTHERN BOBWHITE	CALIFORNIA QUAIL
MOURNING DOVE	BAND-TAILED DOVE
BELTED KINGFISHER	GREAT HORNED OWL
BARRED OWL	WESTERN SCREECH OWL
ANNA'S HUMMINGBIRD	RUFIOUS HUMMINGBIRD
PILEATED WOODPECKER	NORTHERN FLICKER
DOWNY WOODPECKER	HAIRY WOODPECKER
WESTERN FLYCATCHER	STELLER'S JAY
AMERICAN CROW	TREE SWALLOW
BARN SWALLOW	BLACK-CAPPED CHICKADEE
CHESTNUT-BACKED CHICKADEE	BUSHTIT
RED-BREASTED NUTHATCH	AMERICAN DIPPER
HOUSE WREN	WINTER WREN
BEWICK'S WREN	NORTHERN ORIOLE
EVENING GROSBEAK	RUFIOUS-SIDED TOWHEE
AMERICAN GOLDFINCH	OREGON JUNCO
HOUSE SPARROW	FOX SPARROW
SONG SPARROW	RAVEN
RUBY-CROWNED KINGLET	TOWNSEND'S SOLITAIRE
HOUSE FINCH	PINE SISKIN
VIOLET-GREEN SWALLOW	EUROPEAN STARLING
SHARP-SHINNED HAWK	AMERICAN ROBIN
VARIED THRUSH	CEDAR WAXWING
YELLOW WARBLER	COMMON YELLOWTHROAT
REDWINGED BLACKBIRD	

## ***Mammals***

COYOTE  
MUSKRAT  
RACCOON  
DOUGLAS SQUIRREL  
TOWNSEND'S CHIPMUNK  
LONG-TAILED WEASEL  
LITTLE BROWN BAT  
HOUSE MOUSE  
MOUNTAIN BEAVER  
TROWBRIDGE SHREW  
TOWNSEND'S VOLE

WHITE-TAILED DEER  
OPOSSUM  
GRAY SQUIRREL  
NORTHERN FLYING SQUIRREL  
EUROPEAN RABBIT  
NUTRIA  
DEER MOUSE  
POCKET GOPHER  
NORWAY RAT  
COAST MOLE

## ***Amphibians***

LONG-TOED SALAMANDER  
PACIFIC TREEFROG  
ROUGH-SKINNED NEWT

## ***Reptiles***

WESTERN GARTER SNAKE

## Appendix D: Hydrologic Effects of Development

**TABLE 1**

**Baseline: distribution of rainfall for a given land use category**  
 (based on a Seattle average rainfall of 40.7 inches per year) <sup>1</sup>

	Surface Runoff	Interflow	Groundwater	Evapo- transpiration	Total
Forest	0.09"	8.46"	13.40"	18.75"	40.7"
Pasture	0.29"	13.26"	10.15"	17.00"	40.7"
Lawn	0.81"	16.72"	8.69"	14.48"	40.7"
Suburban Residential	9.30"	12.37"	6.58"	12.45"	40.7"
Impervious Surfaces	34.06"	0"	0"	6.64"	40.7"

<sup>1</sup> Presented by Phil Noppe, a hydrologist with Adopt-A-Stream Foundation, in a lecture on Hydrology and Stormwater Management 101, with reference to a presentation by Douglas Beyerheim and Joseph Brascher entitled “Traditional Alternatives: Will More Detention Work?”

TABLE 2

## Geographic Subareas Used for Historical Analysis

Sub-area	Boundaries	Acreage
<b>A</b>	<b>Stream mouth, West - 72nd Ave to 138th Pl North - 138th Pl to Juanita Dr East - Juanita Dr to South boundary of watershed</b>	<b>258</b>
<b>B</b>	<b>West - Juanita Drive North - 132nd St. East - East boundary of watershed South - South boundary of watershed</b>	<b>102</b>
<b>C</b>	<b>West - Juanita Drive North - South boundary of Big Finn Hill Park East - 84th Ave South - 132nd St.</b>	<b>58</b>
<b>D</b>	<b>All within Big Finn Hill Park West - Juanita Drive North - North boundary of Big Finn Hill Park East - 84th Ave (exclude Thoreau School) South - Park boundary North of Finn Hill Jr. High</b>	<b>87</b>
<b>E</b>	<b>Watershed E. of 84th Ave and N. of 132nd St.</b>	<b>109</b>
<b>F</b>	<b>West - Just East of Juanita Drive North - 141st St. East - 84th St. South - Big Finn Hill Park boundary (including Thoreau School)</b>	<b>64</b>
<b>G</b>	<b>Watershed N. of 141st St. and W. of 84th Ave</b>	<b>182</b>
	<b>TOTAL</b>	<b>860</b>

**TABLE 3**

**Land Use Categories in O. O. Denny Creek Watershed**  
 1936 - 1960 - 1980<sup>2</sup> - 2002<sup>3</sup>  
 - by number of acres and percentage of watershed -

Total acreage = 860 A

	1936	1960	1980	2002
<b>FOREST</b>	<b>564 A</b> 66%	<b>580 A</b> 67%	<b>340 A</b> 40%	<b>296 A</b> 34%
<b>PASTURE</b>	<b>259 A</b> 30%	<b>210 A</b> 24%	<b>19 A</b> 2%	<b>2 A</b> <1%
<b>GRASS/PLAYFIELDS</b>	<b>-</b> <1%	<b>-</b> <1%	<b>27 A</b> 3%	<b>45 A</b> 6%
<b>SUBURBAN RESIDENTIAL</b>	<b>10 A</b> 1%	<b>27 A</b> 3%	<b>379 A</b> 44%	<b>414 A</b> 48%
<b>IMPERVIOUS</b>	<b>21 A</b> 3%	<b>31 A</b> 4%	<b>95 A</b> 11%	<b>103 A</b> 12%

2 Based on aerial photographic maps from Walker and Associates, 12652 Interurban Ave. S., Seattle WA 98168

3 Based on orthophotography of the Denny Creek Watershed from the KC Dept of Natural Resources and Parks Water and Land Resources Division ([\\dnrp\projects\wlrld\3102\Denny\\_Ortho.mxd](\\dnrp\projects\wlrld\3102\Denny_Ortho.mxd))

**TABLE 4**

**Calculated Distribution of 40.7 Inches of Average Annual Rainfall in O.O. Denny Creek Watershed in Each of 4 Analyzed Years**

(applying Table 1 distribution percentages by land use to Table 2 actual acreage for each land use category in O. O. Denny Creek watershed)

Year	Surface Runoff	Interflow	Groundwater	Evapo- Transpiration	Total
1936	0.85"	9.90"	12.07"	17.88"	40.7"
1960	1.80"	9.50"	11.80"	17.60"	40.7"
1980	7.91"	9.60"	8.75"	14.44"	40.7"
2002	8.62"	9.80"	8.26"	14.02"	40.7"

TABLE 1

**Comparative Water Quality Data from North Lake Washington Tributaries**

The following is a summary of water quality data collected from North Lake Washington tributaries on 11 September 2006 by King County DNR and the Denny Creek Neighborhood Association. Units are mg/L unless indicated otherwise.

Sampler	Creek	Fecal Coliforms (CFU/100ml)	Dissolved Oxygen	pH	Temp (°C)	Conductivity (µmhos/cm)	Total Phosphorus	Soluble Phosphorus	Total Nitrogen	Ammonia
DCNA	Denny	22	9.6	7.3	11.9	240	0.049	0.041	0.34	0.005
KCDNR	Juanita	350	9.8	7.7	13.7	210	0.132	0.114	1.26	0.144
KCDNR	Thornton	370	9.7	7.5	13.1	248	0.087	0.050	1.22	0.029
KCDNR	Forbes	88	3.9	7.3	13.4	237	0.094	0.055	0.53	0.040
KCDNR	Lyon	310	10.1	7.7	12.1	249	0.066	0.040	1.21	0.012
KCDNR	McAleer	290	10.5	7.8	11.6	244	0.072	0.045	1.88	0.012
Mean		238	8.9	7.5	12.6	238	0.083	0.057	1.07	0.040

**TABLE 2****Denny Creek Turbidity Readings**

Turbidity readings were taken on two occasions using a hand held LaMotte 2020 Turbidimeter. Water samples were taken at 9 sites as listed below. The results of first set of samples are listed in column A. These were taken on January 5, 2005. The weather was clear and cold, it had not rained in 5 days. The second set (column B) was obtained on January 17, 2005, between 3 and 4 PM. It had been raining heavily earlier in the day and was raining lightly at the time of sampling (2"+ rainfall in 24 hour period). The temperature was 50°F. All samples were taken in mid-current. Turbidity readings are in Nephelometric Turbidity Units (NTUs).

The results in column B are the average of 5 readings each. Variation was +/- 1%. An effort was made to minimize settling of sediment.

SAMPLE SITES	Turbidity (NTUs)	
	A Jan 5, 2005	B Jan 17, 2005
1. Stream mouth (foot bridge)	0.20	226
2. East of Holmes Pt. Drive NE	0.40	210
3. Downstream of 72nd Ave NE Tightline	0.50	174
4. 50 ft. above fish ladder	0.40	171
5. At big rock above old RSI site	0.25	119
6. Downstream of NE 128th St.	0.43	36*
7. At NE 132nd St.	0.70	22
8. At foot bridge N of Finn Hill JH football field	1.15	12
9. At 'Beaver Pond' south of Thoreau School	1.17	12
10. Distilled water	0.00	0
11. Kitchen tap water	0.00	0

\* This was actually taken a little upstream from the 128th St. inflow

**TABLE 3**

**State Standards for Water Quality**

The following data were supplied by King County Department of Transportation, Road Maintenance Section.

State standards for water quality	
Temperature:	below 17.5 degrees C
pH:	6.5 - 8.5
Dissolved oxygen (DO):	greater than 8 mg/L
Turbidity:	less than 5 NTU
Specific conductivity:	no state standard specified

**TABLE 4****Baseline Water Quality (BLWQ) Program Data**

The following data were supplied by King County Department of Transportation, Road Maintenance Section for two sites on O. O. Denny Creek from readings taken monthly, from 1999 to 2004, and biannually, from 2005 to 2006, for two sites:

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E1108	Juanita Drive NE, downstream of 24 inch concrete culvert outlet at plunge pool tail out
E1111	Holmes Point Drive NE, upstream side of culvert inlet near King County Dept. of Natural Resources stream gauge

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Measure	Range of findings (1999 to 2006)
Temperature	2.7 to 17.4 degrees C (mean = 9.4 degrees C)
pH	6.8 to 8.18
DO	6.75 to 13.99 mg/L (mean = 11.35 mg/L) 6 of 196 readings were below 8 mg/L, all at site E1108
Turbidity	
Site E1108	30 of 96 readings above 5 NTU
Site E1111	17 of 98 readings above 5 NTU
Site E1108	highest reading during rainstorm - 62.6 NTU (3/9/04)
Site E1111	highest reading during rainstorm - 270 NTU (11/28/01)
Sp. Conductivity	
Site E1108	0.050 to 0.212mS/cm (mean = 0.144mS/cm)
Site E1111	0.070 to 0.264mS/cm (mean = 0.196mS/cm)

**TABLE 5**

Independent Water Quality Analysis of O.O. Denny Creek  
(samples taken at stream mouth)

AMTEST <sup>1</sup> Summary Report for Samples Taken on 9/11/06 and 10/24/06				
	9/11/2006	10/24/2006	<i>units</i>	
<b>Microbiological</b>				
Fecal Coliform	22	210	CFU/100ml	
E. coli	22	190	CFU/100ml	
<b>Conventionals</b>				
Total Suspended Solids	3	20	mg/l	
<b>Minerals</b>				
Alkalinity (CaCO <sub>3</sub> )	94	16	mg/l	
Hardness (CaCO <sub>3</sub> )	110	24	mg/l	
Calcium	16	6.1	mg/l	
Potassium	2.6	1.6	mg/l	
Magnesium	17	2.1	mg/l	
Sodium	8.4	2.5	mg/l	
<b>Nutrients</b>				
Ammonia Nitrogen	<0.005	0.1	mg/l	
Total Nitrogen (TKN)	0.34	0.48	mg/l	
Nitrate+Nitrite	2.2	0.44	mg/l	
Ortho-Phosphate	0.041	0.048	mg/l	
Total Phosphorus	0.049	0.068	mg/l	
<b>Dissolved Minerals</b>				
Dissolved Calcium	16	5.8	mg/l	
Dissolved Potassium	2.6	1.5	mg/l	
Dissolved Magnesium	17	1.9	mg/l	
Dissolved Sodium	8.3	2.1	mg/l	

**Notes:**

- 1) Conditions on 9/11/06: low stream flow (base flow)
- 2) Conditions on 10/24/06: moderate stream flow (recent rain)
- 3) Levels of 29 metals were also obtained and are available on CD. No significant levels were found in either sample.

<sup>1</sup> Am Test Laboratories Inc. 14603 NE 87th St., Redmond, WA 98052



## Appendix F: Index of Biological Integrity

*One composite sample was collected from each of the following sites in October of each year sampled. Sample contents were completely enumerated. The B-IBI was generated using genus level taxonomic identification.*

TABLE 1

**O. O. Denny Creek B-IBI Analysis – Site 1<sup>1</sup>**  
 (10 meters upstream from Holmes Point Drive)

	2003		2004		2005		2006	
	Measure	Score	Measure	Score	Measure	Score	Measure	Score
Total Organisms	192				289			521
Total Taxa	27	3	3	3	23	3	3	21
Ephemeroptera Taxa	3	1	1	1	2	1	1	2
Plecoptera Taxa	5	3	3	1	2	1	1	5
Trichoptera Taxa	4	3	3	1	1	1	1	2
Long Lived Taxa	5	3	3	2	2	1	1	3
Intolerant Taxa	1	1	1	1	1	1	1	0
Percent tolerant Taxa	12.5%	5	5	22.8%	5	37%	5	3
Clinger Taxa	10	3	3	6	1	1	7	1
Percent Predator Taxa	4.6%	3	3	5.5%	3	7%	3	3
Percent Dominance	42.2%	5	5	60.9%	3	68%	3	3
Total B-IBI Score*		30		20		20		20
% of Highest Possible B-IBI Score		60%		40%		40%		40%

\* Total B-IBI score

33-45 = good (natural conditions)

23-33 = fair (slight impairment)

0-21 = poor (obvious impairment)

<sup>1</sup> Data for 2004 were lost due to inadequate sample preservation.

TABLE 2

O. O. Denny Creek B-IBI Analysis – Site 2  
(near fish ladder)

	2003		2004		2005		2006	
	Measure	Score	Measure	Score	Measure	Score	Measure	Score
Total Organisms	157		101		512		166	
Total Taxa	28	3	15	3	29	5	17	3
Ephemeroptera Taxa	4	3	2	1	3	1	2	1
Plecoptera Taxa	6	5	3	3	3	3	4	3
Trichoptera Taxa	4	3	1	1	3	3	2	1
Long Lived Taxa	5	3	1	1	3	1	2	1
Intolerant Taxa	1	1	0	1	1	1	0	1
Percent Tolerant Taxa	17.8%	5	13.9%	5	41.6%	3	46%	1
Clinger Taxa	11	3	2	1	7	1	5	1
Percent Predator Taxa	11.5%	5	15.8%	5	5.9%	3	8%	3
Percent Dominance	38.8%	5	57.4%	3	68%	3	77%	1
Total B-IBI Score*		36		24		24		16
% of highest Possible B-IBI Score		72%		48%		48%		32%

\* Total B-IBI score  
 33-45 = good (natural conditions)  
 23-33 = fair (slight impairment)  
 0-21 = poor (obvious impairment)

TABLE 3

**O. O. Denny Creek B-IBI Analysis – Site 3<sup>2</sup>**  
 (in Big Finn Hill Park near Thoreau School)

	2003		2004		2005	
	Measure	Score	Measure	Score	Measure	Score
Total Organisms			143		41	
Total Taxa			7	1	5	1
Ephemeroptera Taxa			0	1	0	1
Plecoptera Taxa			0	1	0	1
Trichoptera Taxa			0	1	0	1
Long Lived Taxa			0	1	0	1
Intolerant Taxa			0	1	0	1
Percent Tolerant Taxa			86.0%	1	19.0%	5
Clinger Taxa			0	1	0	1
Percent Predator Taxa			0.7%	1	0%	1
Percent Dominance			93.0%	1	80%	1
Total B-IBI Score*				10		14
% of highest Possible B-IBI Score				20%		28%

- \* Total B-IBI score  
 33-45 = good (natural conditions)  
 23-33 = fair (slight impairment)  
 0-21 = poor (obvious impairment)

<sup>2</sup> Data were not collected in 2003 or 2006 for this site.

**TABLE 4**  
**Juanita Creek B-IBI Analysis – Site 1<sup>3</sup>**  
 (10 meters east of Juanita Drive)

	2003		2004		2005	
	Measure	Score	Measure	Score	Measure	Score
Total Organisms			168			
Total Taxa			14	3		
Ephemeroptera Taxa			1	1		
Plecoptera Taxa			0	1		
Trichoptera Taxa			1	1		
Long Lived Taxa			1	1		
Intolerant Taxa			0	1		
Percent Tolerant Taxa			17.9%	5		
Clinger Taxa			3	1		
Percent Predator Taxa			0.6%	1		
Percent Dominance			82.1%	1		
Total B-IBI Score*				16		
% of highest Possible B-IBI Score				32%		

\* Total B-IBI score  
 33-45 = good (natural conditions)  
 23-33 = fair (slight impairment)  
 0-21 = poor (obvious impairment)

<sup>3</sup> Data were only collected in 2004 for this site.



TABLE 1

**Observed Stream Flows**  
(Measured using Global Water Flow Probes)

DATE	TIME	STREAM FLOW BY LOCATION (cfs)						WEATHER	RECENT RAINFALL <sup>1</sup>
		Juanjita Dr. Culvert	128th St. Culvert	Fish Ladder Weir	Holmes Point Drive Culvert	72nd Ave. Tightline	138th St. 18" Culvert	138th St. 36" Culvert	
10/15/2005	8-9 AM	0.1	0.5	1.4				CLOUDY	6-8 HRS PAST HEAVY RAIN
11/2/2005	9-10 AM	0.3	0.0	0.6	1.5			CLOUDY	0.25" 24 HRS
11/4/2005	10:00 AM	0.3	0.6	1.4				LIGHT RAIN	0.12" 24 HRS
11/5/2005	4:00 PM	2.6	1.3	6.6	7.6			HEAVY RAIN	0.51" 24 HRS
12/4/2005	10:00 AM	0.9	0.0	1.4	1.5			OVERCAST	0.0" 12 HRS
12/26/2005	11:00 AM	? 8.2	0.4	7.3	9.7			OVERCAST	0.39" 24 HRS
12/28/2005	2:00 PM	2.7	4.6	4.8				CLOUDY	0.31" 24 HRS
1/2/2006	3:00 PM	3.4	0.7	6.0	6.2	0.2		LIGHT RAIN	0.24" 24 HRS
1/4/2006	2:00 PM		3.1	3.8				CLOUDY	0.0" 24 HRS
1/5/2006	12:00 PM	8.5	1.3	9.4	? 13.7			STEADY RAIN	0.51" 24 HRS
1/9/2006	1:00 PM	4.6	0.9	9.0	12.0	1.5		LIGHT RAIN	0.47" 12 HRS
1/10/2006	4:00 PM	14.0	2.8					HEAVY RAIN	0.67" 16 HRS
1/30/2006	12:00 PM	24.5	2.6	? 42	3.3			HEAVY RAIN	1.06" 12 HRS
5/28/2006	10:00 AM	4.5	5.2	0.6	4.3			MODERATE RAIN	0.28" 3 HRS
5/28/2006	11:00 AM	2.7						MODERATE RAIN	0.28" 3 HRS
		? Data believed to be questionable							

<sup>1</sup> Rainfall measures were obtained from a Kirkland weather station that is within 10 miles of the watershed: KirklandWeather.com

**TABLE 2**

**Maximum and Minimum Flows – October 2004 to May 2005**  
(As recorded by the King County - maintained stream flow gage at  
Holmes Point Drive)

MONTH	HIGHEST FLOW RECORDED (cfs)	LOWEST FLOW RECORDED (cfs)
OCTOBER 2004	6.97	0.23
NOVEMBER 2004	19.76	0.06
DECEMBER 2004	23.37	0.06
JANUARY 2005	20.07	0.08
FEBRUARY 2005	9.32	0.06
MARCH 2005	16.04	0.06
APRIL 2005	11.50	0.10
MAY 2005	8.78	0.12

**TABLE 3**

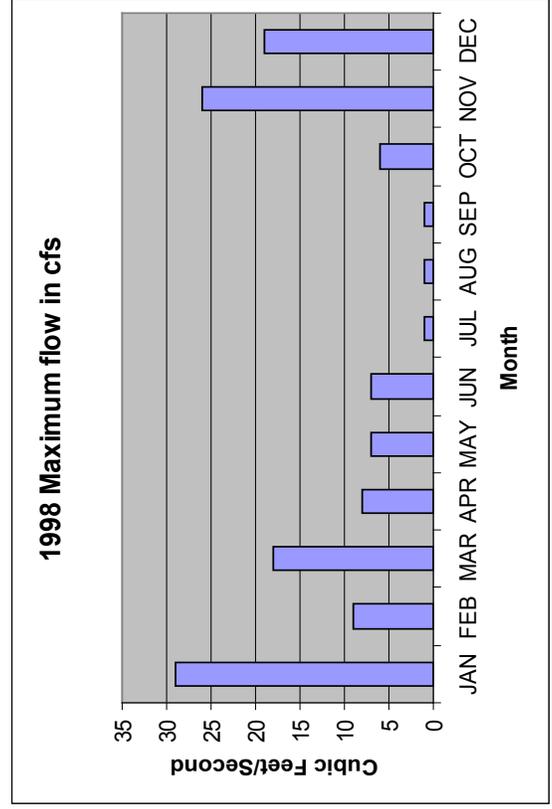
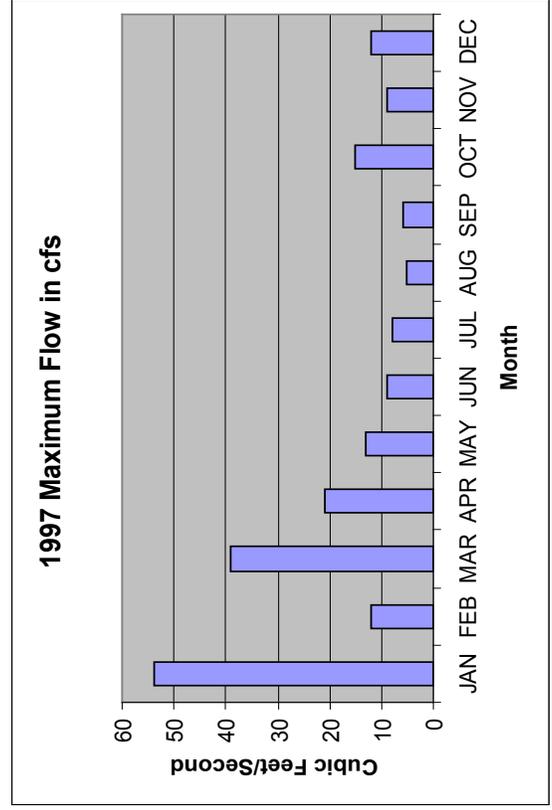
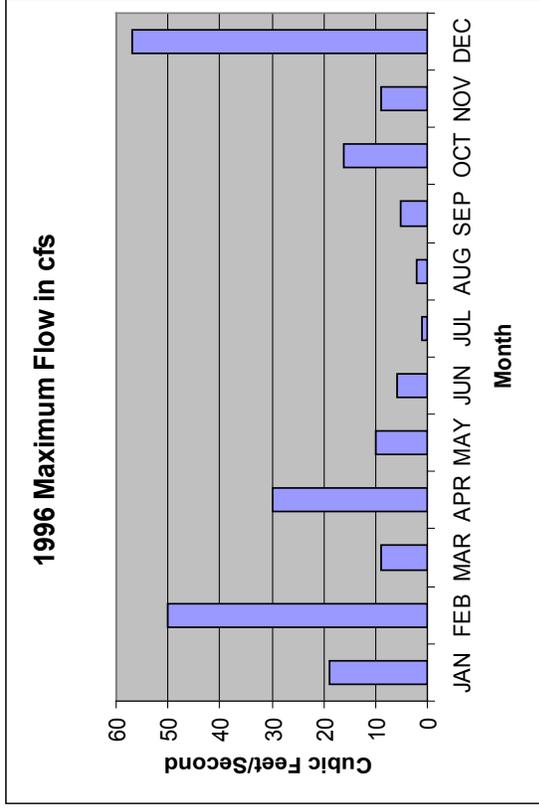
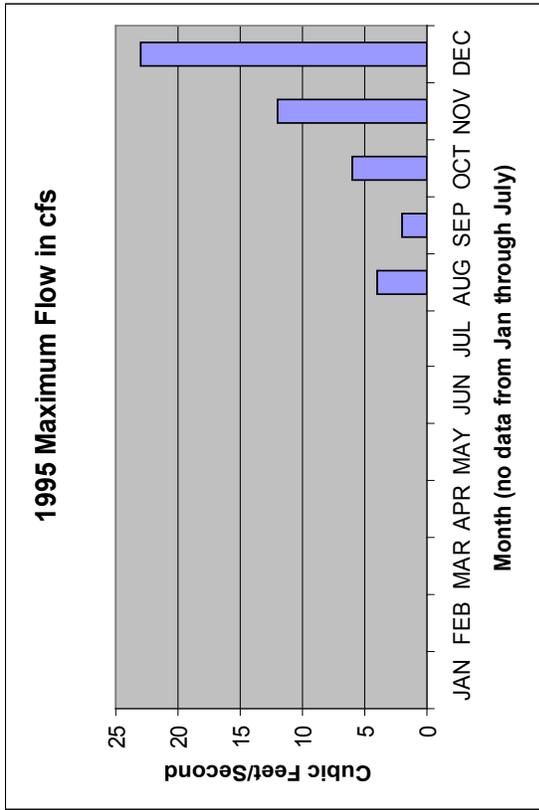
**Twelve-Year Maximum Flows 1995 – 2006  
and**

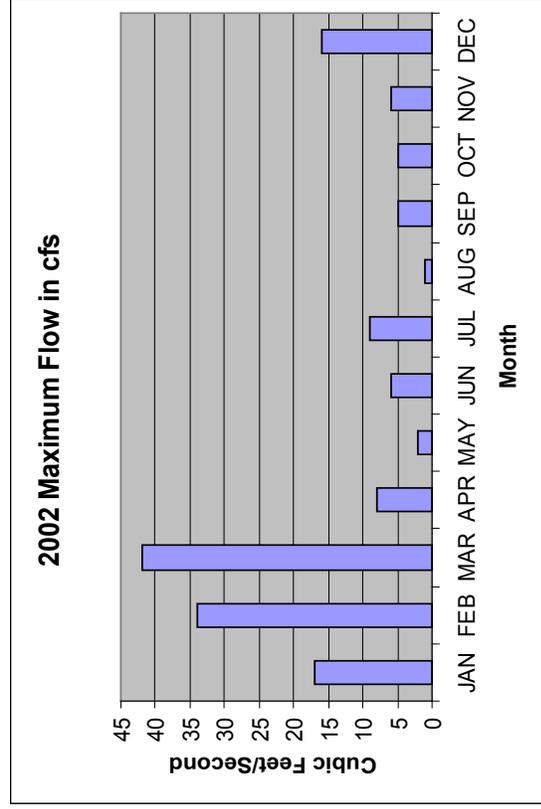
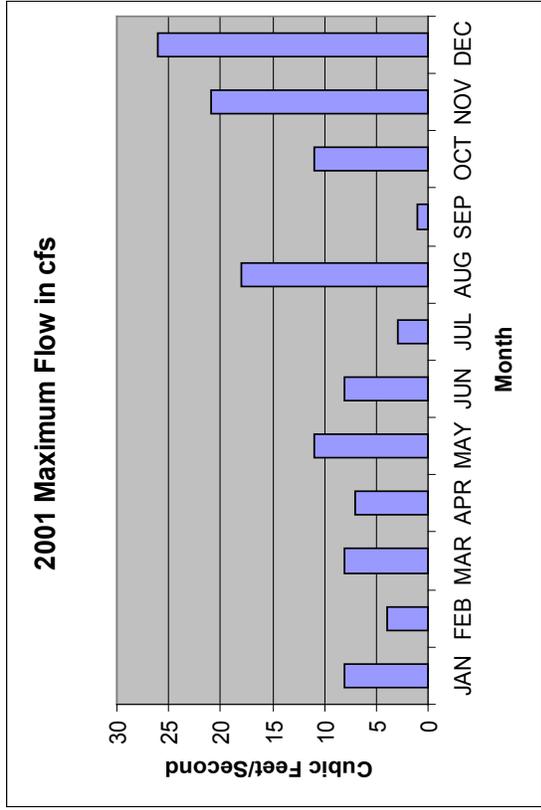
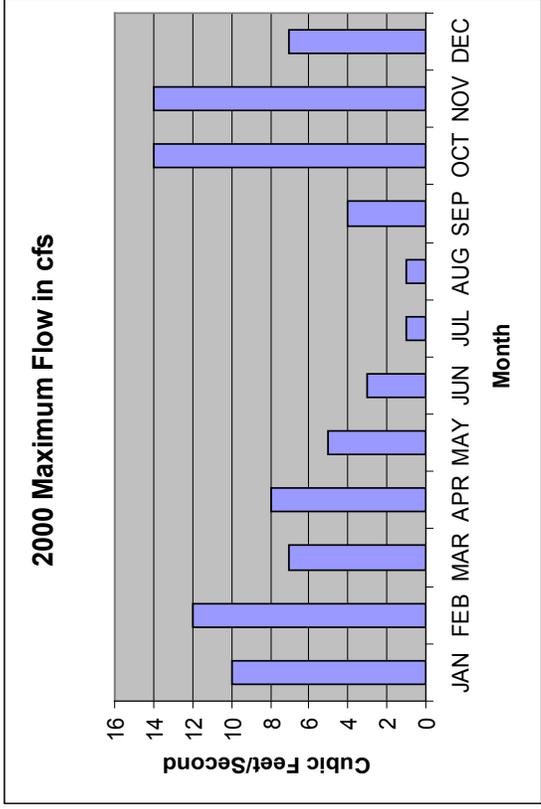
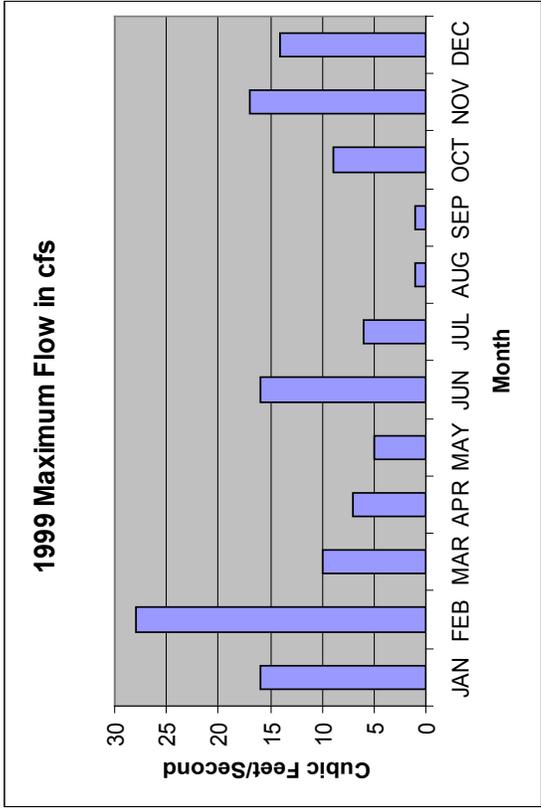
**Number of Days in Each Year Where Flow Exceeds 9 cfs**

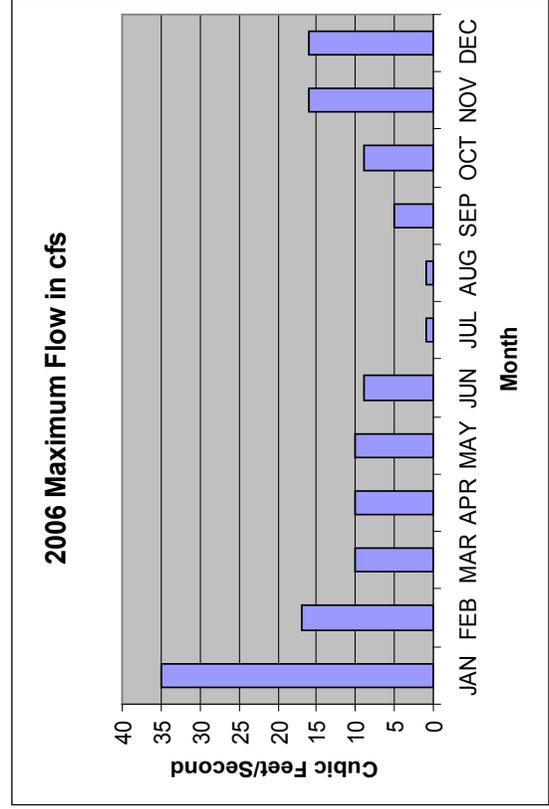
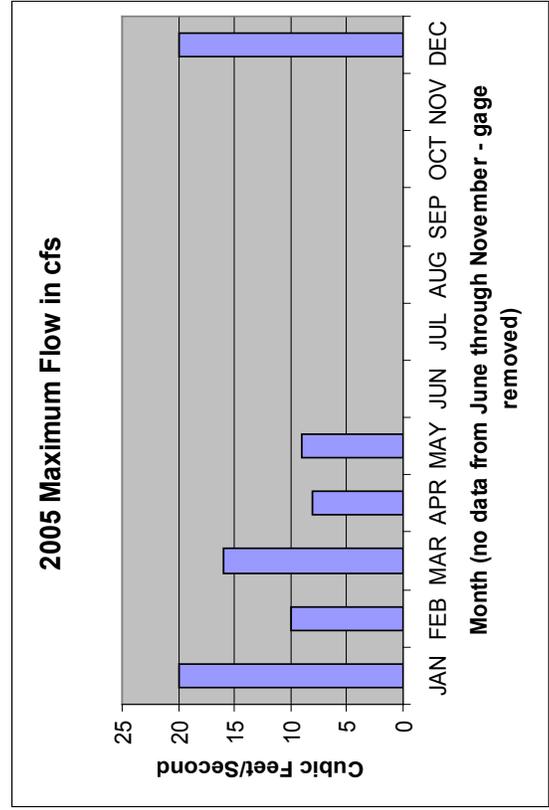
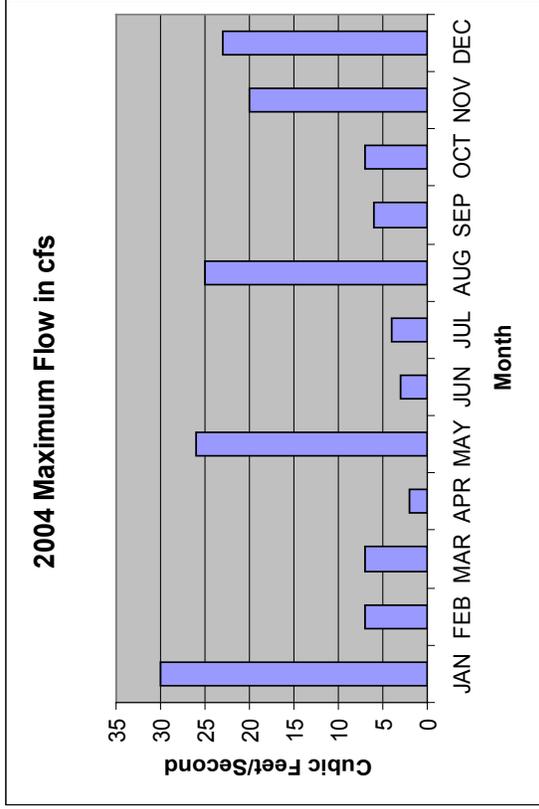
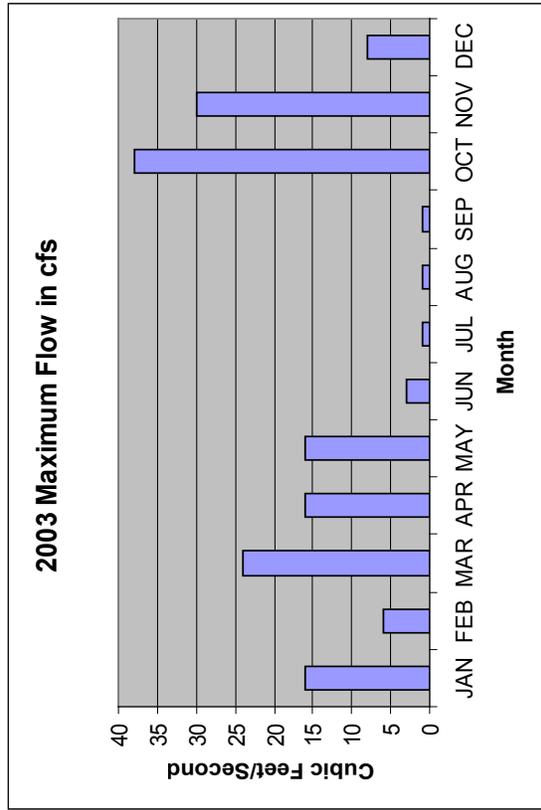
(As recorded by the King County - maintained stream flow gage at Holmes Point Drive)

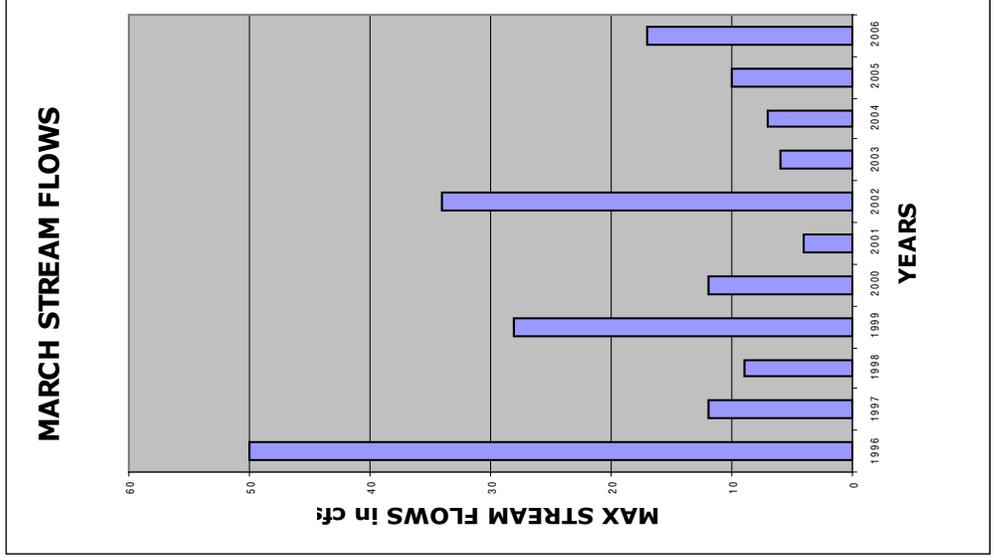
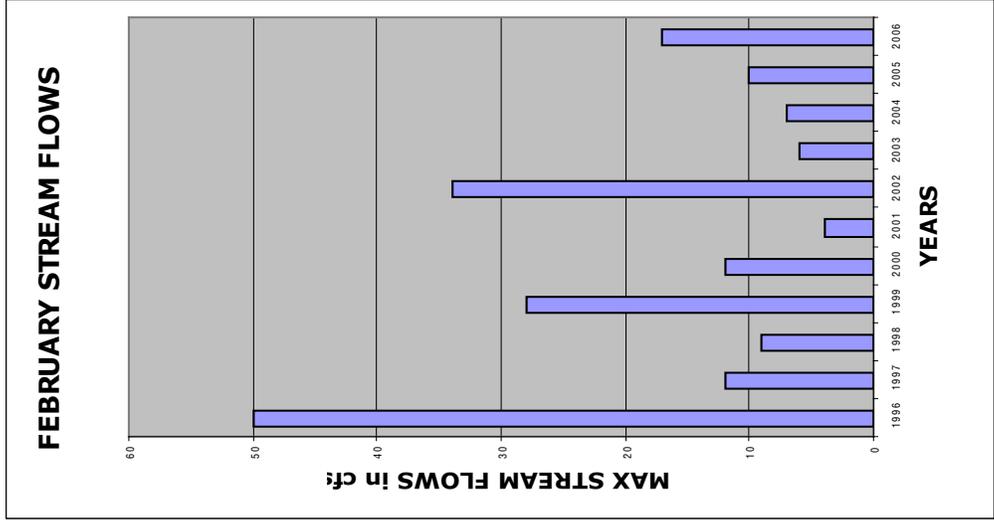
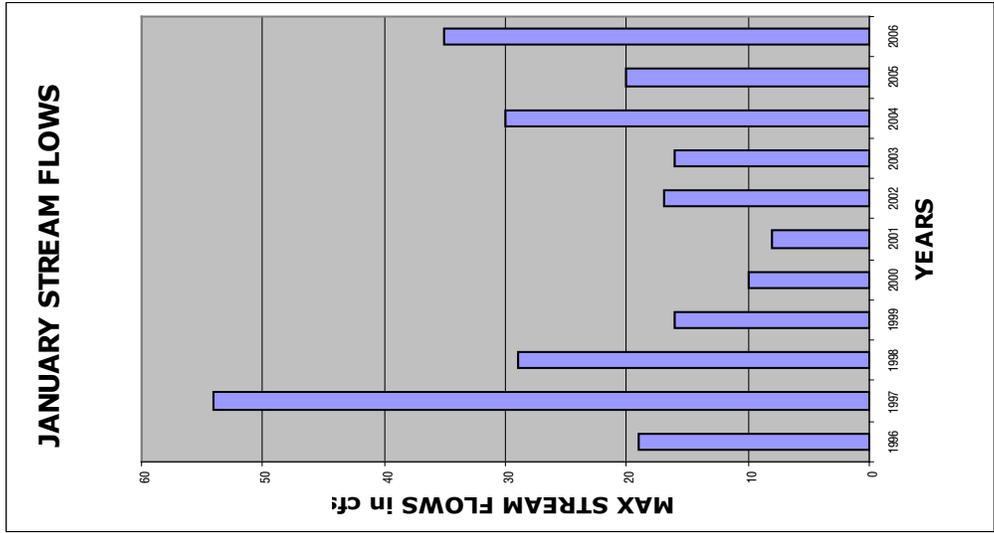
Ten Year Maximum Flows												Number of Days of Flow >9cfs	
Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV		DEC
1995	*	*	*	*	*	*	*	4	2	6	12	23	8
1996	19	50	9	30	10	6	1	2	5	16	9	57	4
1997	54	12	39	21	13	9	8	5	6	15	9	12	7
1998	29	9	18	8	7	7	1	1	1	6	26	19	3
1999	16	28	10	7	5	16	6	1	1	9	17	14	9
2000	10	12	7	8	5	3	1	1	4	14	14	7	3
2001	8	4	8	7	11	8	3	18	1	11	21	26	10
2002	17	34	42	8	2	6	9	1	5	5	6	16	0
2003	16	6	24	16	16	3	1	1	1	38	30	8	2
2004	30	7	7	2	26	3	4	25	6	7	20	23	1
2005	20	10	16	8	9	*	*	*	*	*	*	20	
2006	35	17	10	10	10	9	1	1	5	9	16	16	21

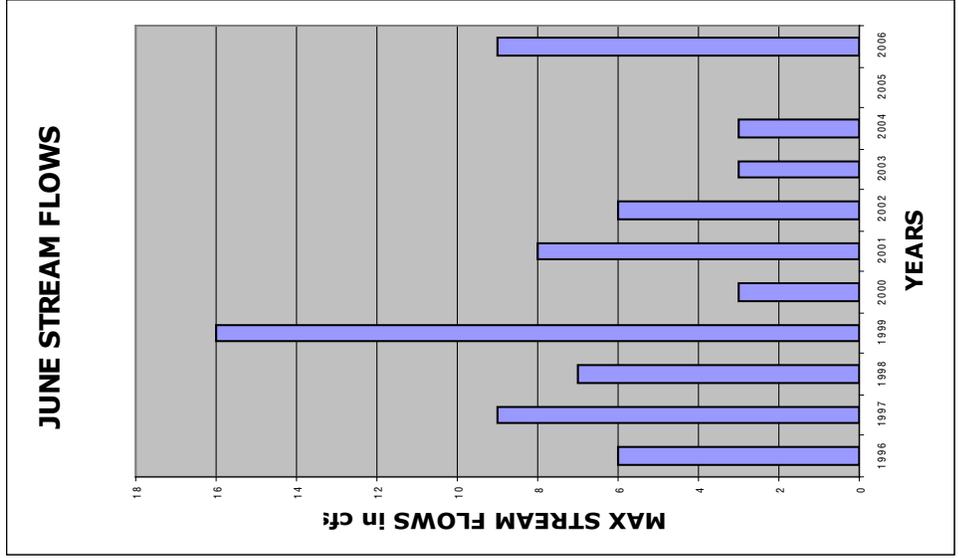
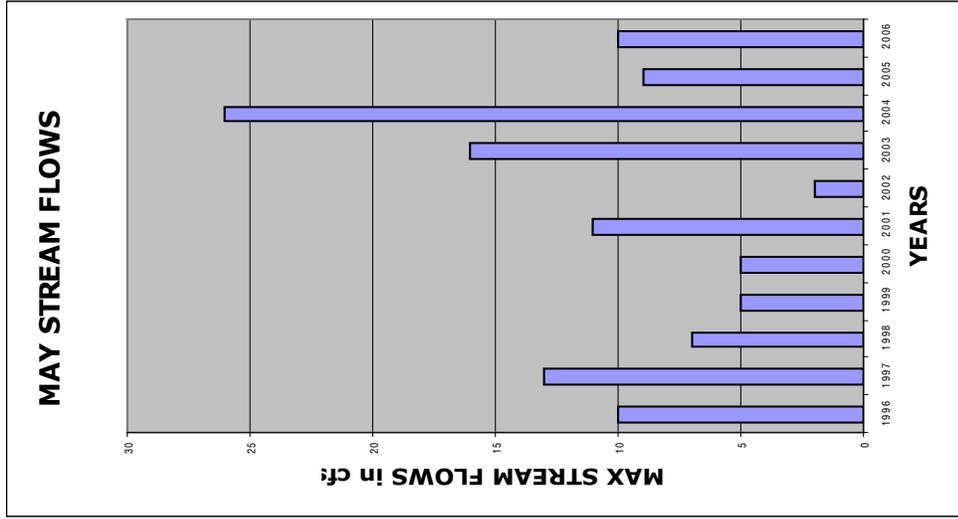
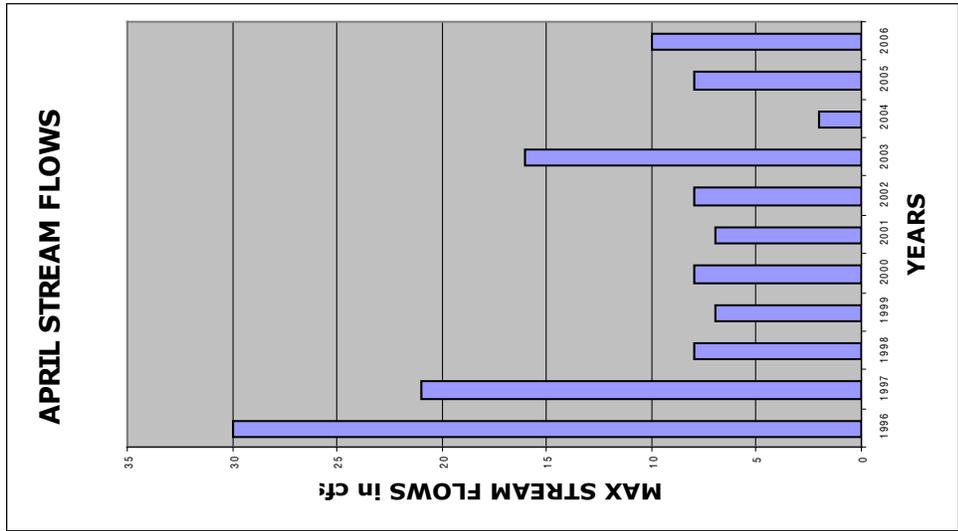
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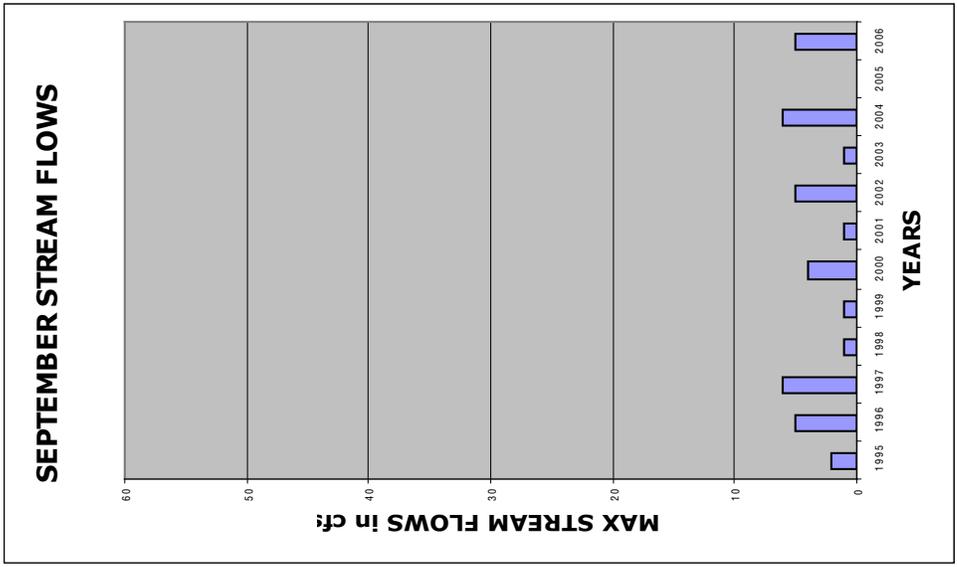
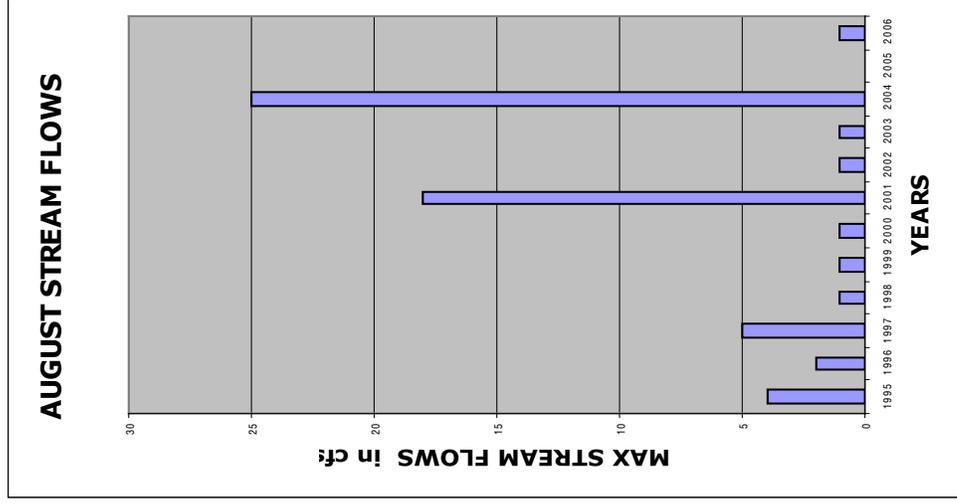
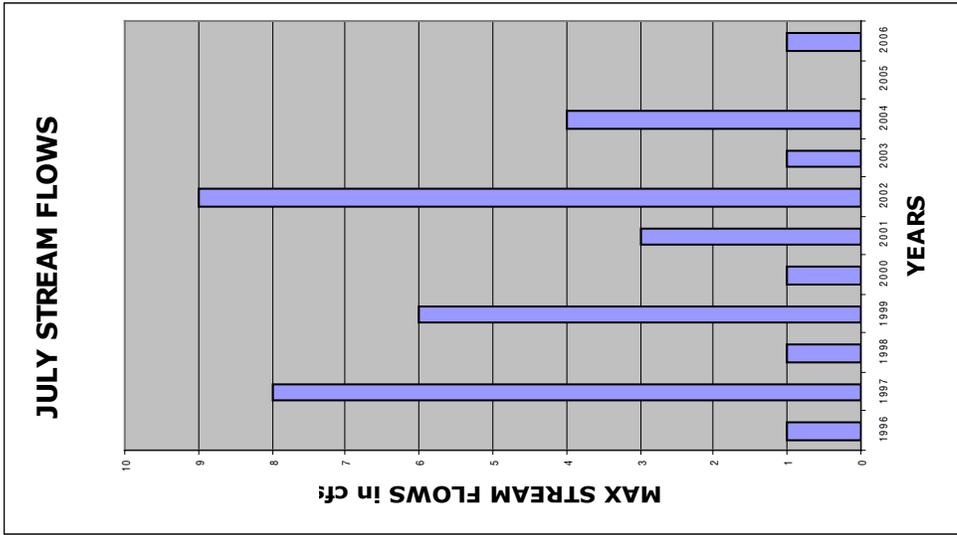


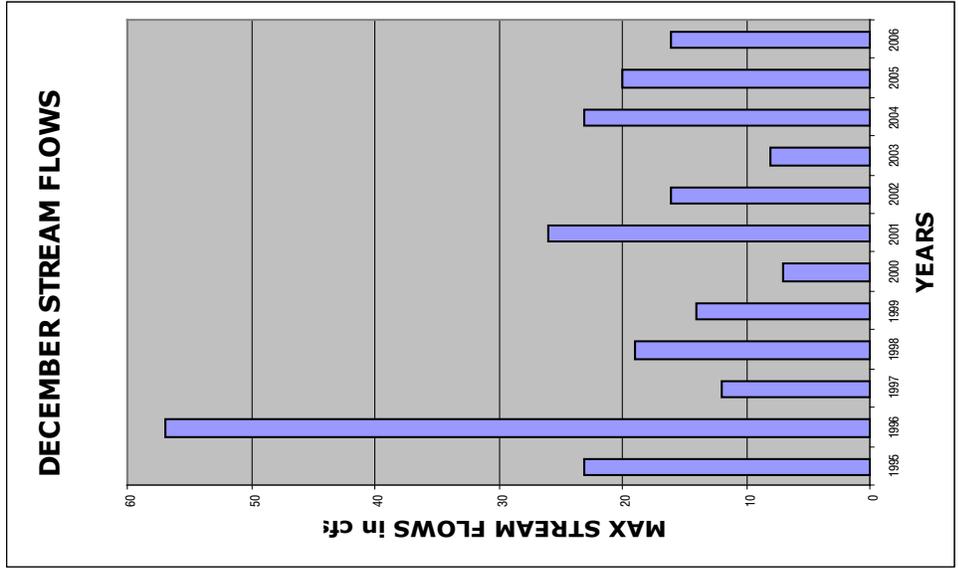
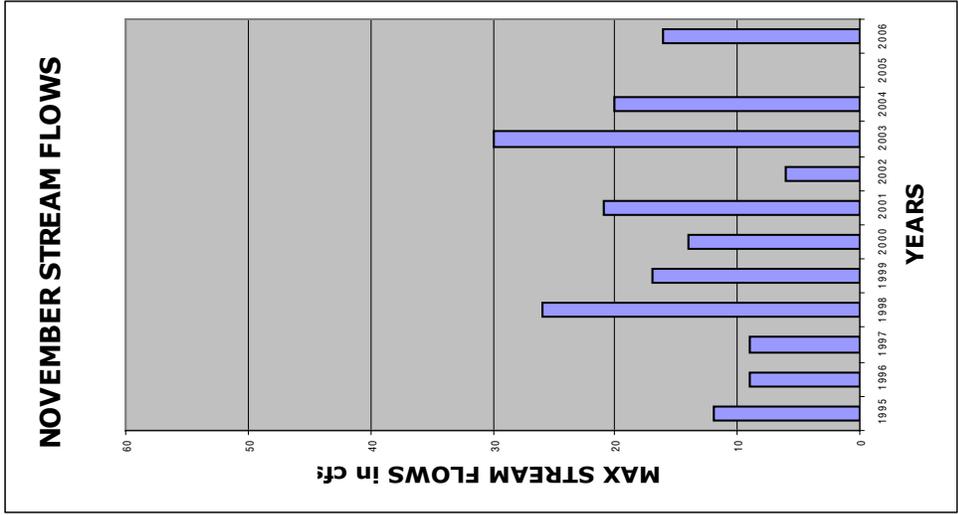
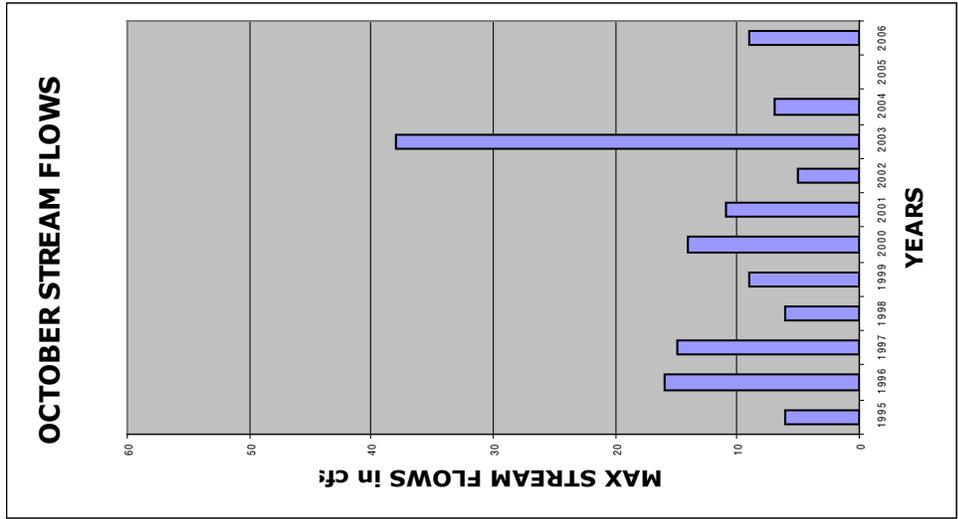












## Appendix H: Fish Ladder Weir Rating Curve

The curves on the next two pages are an approximation of the volume of water going over the fish ladder weir, which is installed downstream of the concrete culvert as the stream enters the fish ladder. Water depths are measured about 1 ½ feet upstream of the weir.

Use the first graph for depths over ½ foot and the second for depths under ½ foot (curve is not valid for depths exceeding 1 ½ feet).

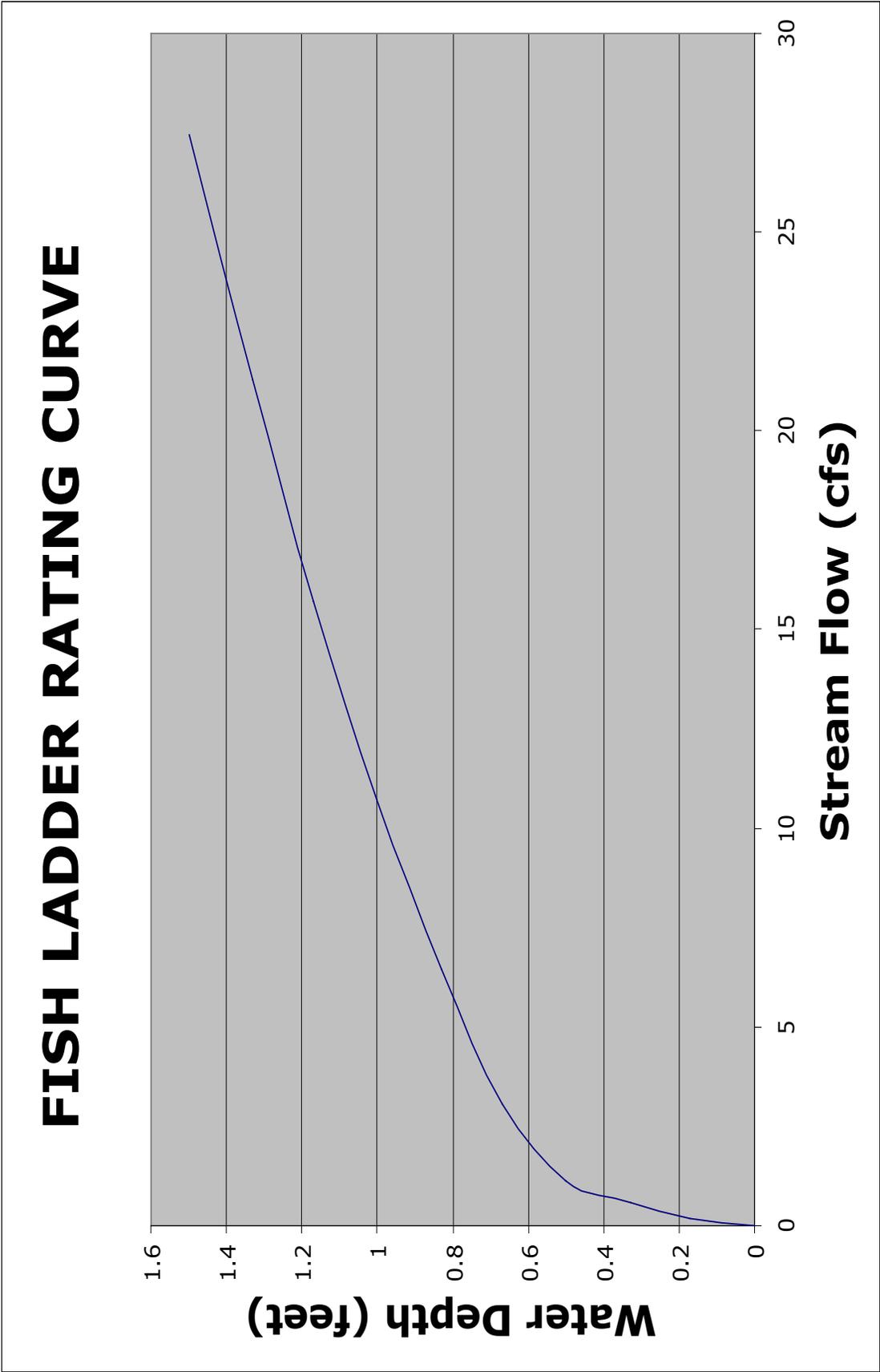


Figure 1 - Fish ladder rating curve for water depths over 6 inches

# FISH LADDER RATING CURVE

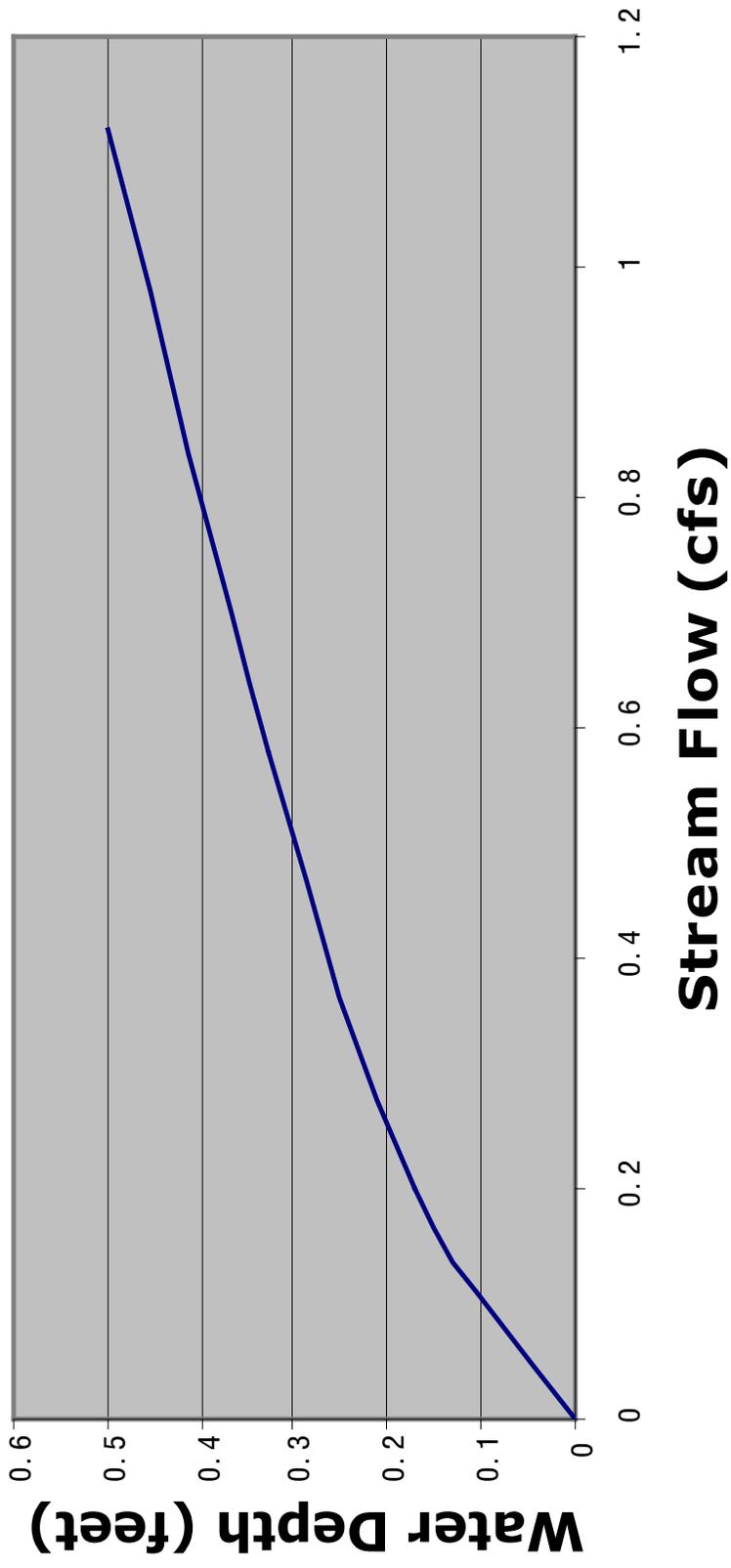


Figure 2 - Fish ladder rating curve for water depths under 6 inches



# Appendix I: Wetland Inventory

**TABLE 1**

**O. O. Denny Creek Watershed Wetland Inventory<sup>1</sup>**

Wetland #	Previously Mapped?	Map Source	Habitat Contains	In Watershed?	Stormwater Detention	Water Quality Function	Wildlife Habitat
1	N		N/A	Lost	N/A	N/A	N/A
2	N		pf,r	Y	minimal	minimal	limited
3	N		pe	Y	minimal	minimal	limited
4	Y	1	pf,r	Y	minimal	minimal	minimal
5	N		r	Y	limited	limited	minimal
6	N		pf	Y	some	some	minimal
7	N		pf	Y	some	some	minimal
8	Y	1, 2	pf, pub	Y	some	some	likely
9	N		pf	Y	minimal	minimal	likely
10	Y	1	ps, pe	Y	minimal	minimal	likely
11	Y	1	ps, pe	Y	some	some	likely
12	Y	1	pf, r	Y	limited	limited	high
13	Y	1	none	Destroyed	none	none	none
14	Y	1	pf	Y	some	some	moderate
15	Y	1, 2	pf, ps	Y	limited	some	high
16	N		r	Y	limited	limited	moderate
17	Y	1	pf	Y	some	some	moderate
18	N		pe	Y	minimal	minimal	minimal
19	Y	1	r	Y	limited	limited	high
20	Y	1	r	Y	minimal	minimal	minimal

Reconnaissance of basin was conducted on 11/20/06 and 11/22/06. Final report was submitted to DCNA on 12/01/06. Wetland number corresponds to wetland described in the full Wetland Inventory report found on the CD.

**Map Source Key**

- 1 – US Fish & Wildlife Service National Wetlands Inventory
- 2 – King County Sensitive Area Map

**Habitat Code Key**

- pe = palustrine emergent
- pf = palustrine forested
- ps = palustrine scrub-shrub
- pub = palustrine unconsolidated bottom
- r = riverine

<sup>1</sup> Evergreen Aquatic Resource Consultants, LLC