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Appendix 1.

Stream mile indices for Dairy Creek and major tributaries. Tributary confluences and other landmarks are used as reference points. Information comes from the Washington County watermaster's office and is based on OWRD GIS overlay on Washington County Assessor Maps. Mileage figures do not necessarily correspond with those given elsewhere in the watershed analysis report, which were based on other sources.

DAIRY CREEK
STREAM MILE INDEX
(02114003000480)

Mile	Description
0.00	Confluence with Tualatin River at mile 44.73 - (0211400300)
1.65	Southern Pacific RR Bridge
2.06	State Highway 8 Bridge
	Dairy Creek at TV Hwy Recording Stream Gage (14206200)
2.20	Oregon Electric RR Bridge
2.26	McKay Creek (LB - 02114003000480020)
3.53	Council Creek (RB - 02114003000480040)
6.02	Susbauer Road Bridge (CR 196)
7.39	BPA Power Line Crossing
8.51	Cornelius-Schefflin Road Bridge (CR 2161)
	Rated Staff Gage for Stream Flow
10.55	Start of Dairy Creek
	Confluence of East Fork Dairy Creek (02114003000480080)
	West Fork Dairy Creek (02114003000480090)

EAST FORK DAIRY CREEK
STREAM MILE INDEX
2114003000480080

Mile	Description
0.00	Confluence with West Fork Dairy Creek - (02114003000480090)
	Start of Dairy Creek RM 10.56 - (02114003000480)
1.24	Roy Road Bridge (CR A-159)
	Rated Staff Gage for Stream Flow
2.34	Port of Tillamook Bay RR Bridge
3.04	Bledsoe Creek (RB-02114003000480080030)
3.20	Harrington Road Bridge (CR 1989)
4.80	SP&S RR Bridge
5.56	US Highway 26 Bridges
6.91	Mountaindale Road Bridge (CR 12)
6.97	Baker Creek (LB-02114003000480080080)
8.44	Dairy Creek Road Bridge (CR 2067)
	Rated Staff Gage for Stream Flow
8.55	Discontinued USGS Gage 14205500 (10/40 to 9/51)
	East Fork Dairy Creek at Mountaindale, OR (drainage area 43.0 sq mi.)
9.62	NW Uebel Road Bridge (CR 304)
12.50	Murphy Lane Bridge (Private)
	Rated Staff Gage for Stream Flow
12.82	Big Canyon (RB-02114003000480080150)
13.00	ISWR C-59525 5/25/66
13.95	Murtaugh Creek (RB-02114003000480080170)
14.04	Meadow Brook Creek (LB-02114003000480080180)
14.17	Meacham Road Bridge (CR 742)

15.55	Plentywater Creek (LB-02114003000480080200)
	ISWR C-59527 5/25/66
16.52	Denny Creek (RB-02114003000480080210)
	ISWR C-59526 5/25/66
16.56	Bacona Road Bridge (CR 422)
	Snooseville Corner
17.21	Greener Road Bridge (CR 1990)
17.34	Rock Creek (LB-02114003000480080260)
17.50	Little Bend Park
17.60	Fern Flat Road Crossing (CR 241)
18.15	Panther Creek (LB-02114003000480080280)
18.31	Fern Flat Road Crossing (CR 241)
18.84	Roundy Creek (RB-02114003000480080290)
19.10	Campbell Creek (RB-02114003000480080310)
21.30	Washington County - Columbia County Line
21.48	BPA Power Line Crossing
22.0 +	Headwaters

WEST FORK DAIRY CREEK
STREAM MILE INDEX
211400300480090

Mile	Description
0.00	Confluence with East Fork Dairy Creek (02114003000480080)
	Start of Dairy Creek RM 10.55 - (02114003000480)
1.96	Evers Road Bridge (CR A-187)
	Rated Staff Gage for Stream Flow
2.09	Lousignant Canal (RB - 02114003000480090010)
2.82	State Highway 47 Bridge
5.28	Greenville Road Bridge (CR A-159)
6.20	State Highway 6 Bridge
6.22	Cedar Canyon Creek (RB - 02114003000480090110)
7.53	Cedar Canyon Road Bridge (CR 1938)
	City of Banks to SE
7.70	State Hwy 47 Bridge - Rated Staff Gage for Stream Flow
	Discontinued USGS Gage 14205000 (10/40 to 9/43)
	West Fork Dairy Creek at Banks, OR (drainage area 47.5 sq mi)
7.72	Port of Tillamook Bay RR Bridge
9.30	US Highway 26 Bridge
10.60	NW Green Mountain Road Bridge (CR 127)
11.02	Garrigus Creek (LB - 02114003000480090180)
12.19	NW Turk Road Bridge (CR 233)
12.36	Kuder Creek (RB - 02114003000480090190)
12.90	NW Pihl Road Bridge (CR 1045)
	Community of Manning
13.33	Port of Tillamook Bay RR Bridge
13.48	Port of Tillamook Bay RR Bridge
13.58	Witcher Creek (LB - 02114003000480090200)
14.37	Port of Tillamook Bay RR Bridge
14.50	US Highway 26 Bridge
15.00	NW Fisher Road Bridge (CR 394)
15.11	Mendenhall Creek (LB - 02114003000480090220)
15.58	Burgholzer Creek (RB - 02114003000480090230)

15.60	US Highway 26 Bridge
16.00	Community of Buxton - r mile east
17.02	Williams Creek (LB - 02114003000480090240)
17.98	Cummings Creek (RB - 02114003000480090250)
18.10	State Highway 47 Bridge
18.85	Port of Tillamook Bay RR Bridge
22+	Headwaters

McKAY CREEK
STREAM MILE INDEX
21140030000480020

Mile	Description
0.00	Confluence with Dairy Creek at mile 2.26 - (02114003000480)
1.31	Padgett Road Bridge (CR 2245)
2.25	Hornecker Road Bridge (CR 2393)
	Rated Staff Gage for Stream Flow
2.30	Southern Pacific RR Crossing
4.32	Glencoe Road Bridge (CR A-146r)
	Rated Staff Gage for Stream Flow
4.46	BPA Transmission Line Crossing
5.34	Waibel Creek (LB - 02114003000480020040)
6.30	NW Old Scotch Church Road Bridge (CR A-66)
8.00	US Hwy 26 Bridge - Sunset Highway
9.36	NW West Union Road Bridge (CR 2496)
	City of North Plains to West
9.38	Southern Pacific RR Crossing
10.94	Jackson Creek (LB - 02114003000480020100)
12.80	NW Shadybrook Road Bridge (CR A-110)
15.56	NW Collins Road Bridge (CR 1889)
	Rated Staff Gage for Stream Flow
16.56	Brunswick Canyon (RB - 02114003000480020179)
16.66	EF McKay Creek (LB - 02114003000480020180)
24.0+	Headwaters

River Miles based on OWRD GIS Database overlay on Washington County Assessor Maps Prepared by: Tualatin Basin Watermaster - December 1996
111 NE Lincoln, 220L MS 49
Hillsboro, OR 97124
(503) 693-4881 with corrections or omissions

Appendix 2.

Streamflow and water temperature tables and graphs at assorted sites in the Dairy Creek watershed. Data compiled from OWRD, USGS, and USA.

Gage 14206000. McKay Creek near North Plains, Oregon.

Flow duration statistics based on mean daily discharge, 1941-1956. Source, OWRD.

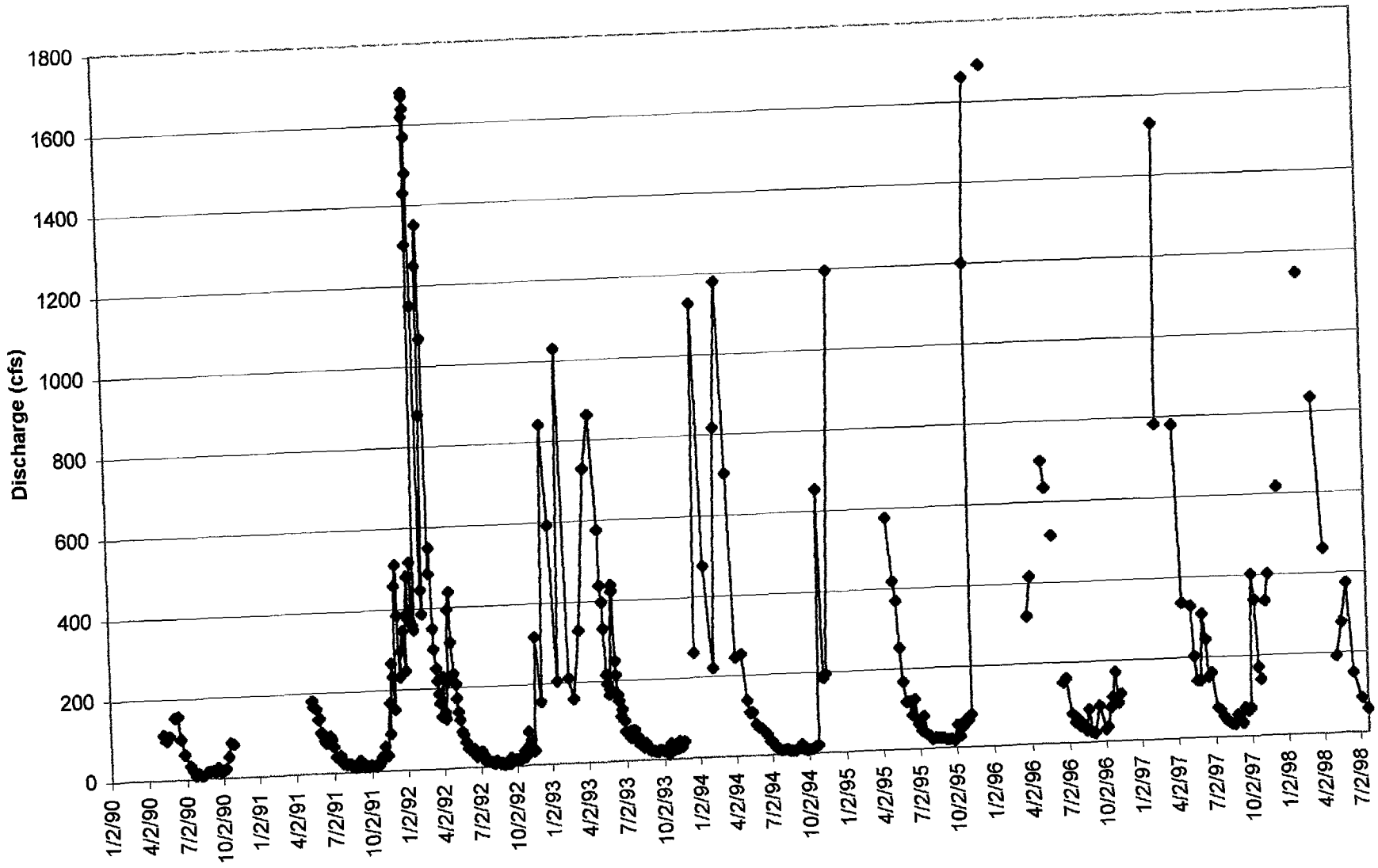
Discharge, in cubic feet per second, which was equaled or exceeded for indicated period of time.															
95	90	85	80	75	70	60	50	40	30	25	20	15	10	5	# of years
2.2	2.9	3.4	3.8	3.8	4.4	5.0	5.0	6.9	8.4	9.4	12	14	18	33	11
4.3	5.2	5.9	7	8.8	11	16	27	43	73	96	139	174	219	284	11
24	33	47	56	64	74	98	130	162	213	244	274	305	396	522	11
35	45	52	59	67	74	93	116	152	205	237	285	335	397	540	11
31	41	50	55	59	67	84	113	157	223	259	288	356	507	667	11
22	28	31	35	40	45	55	77	103	124	145	174	210	253	332	11
17	19	20	22	24	27	33	39	47	57	66	77	89	108	152	11
11	12	14	14	15	16	17	20	23	27	29	32	36	44	52	11
5.8	6.3	6.8	7.4	7.4	8.0	8.6	10	12	13	14	15	16	21	28	11
1.9	2.2	2.5	2.9	3.1	3.5	4.0	4.6	5.2	5.9	6.3	6.3	7.2	8.2	8.8	11
1.4	1.8	2	2.2	2.2	2.4	2.7	2.9	3.4	3.6	3.9	3.9	4.2	4.5	5.6	11
1.5	1.8	2	2	2.2	2.4	2.8	3.0	3.2	3.5	3.5	3.8	4.1	5.1	6	11
1.9	2.9	2.9	3.6	5.2	6.3	12	20	35	58	76	103	144	209	319	

Gage 14205500. East Fork Dairy Creek at Mountaindale, Oregon.

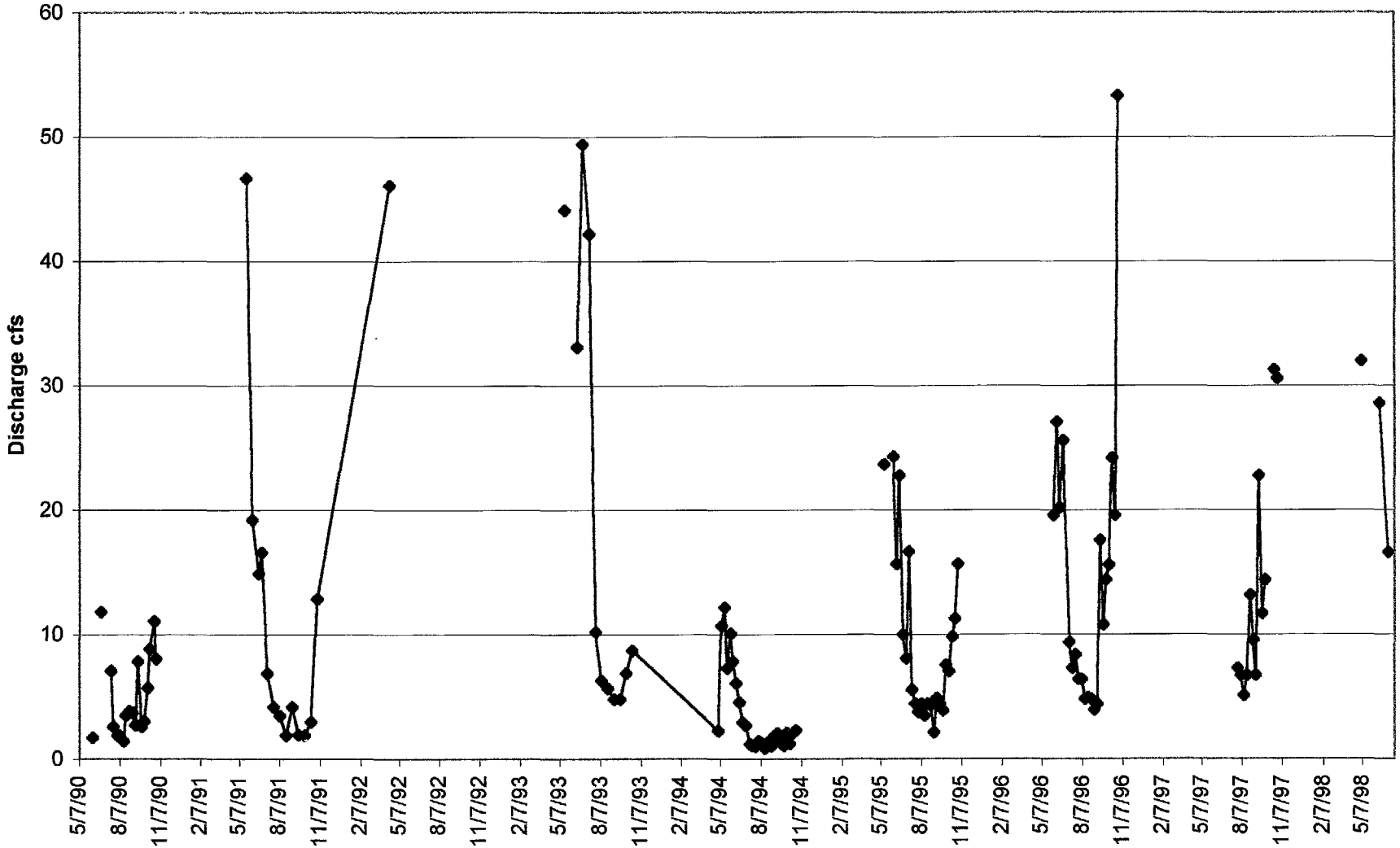
Flow duration statistics based on mean daily discharge, 1941-1952. Source, OWRD.

	Discharge, in cubic feet per second, which was equaled or exceeded for indicated period of time.															
Month	95	90	85	80	75	70	60	50	40	30	25	20	15	10	5	# of years
Oct	9.0	11	11	12	12	13	14	15	18	21	23	25	31	39	70	11
Nov	16	18	20	22	24	27	38	50	72	114	135	175	219	270	364	11
Dec	33	51	58	71	80	99	125	161	206	253	279	302	330	413	564	11
Jan	69	80	86	93	103	111	129	153	190	237	271	322	395	493	590	11
Feb	73	88	100	111	118	128	165	203	264	329	390	478	565	704	893	11
Mar	59	67	76	84	88	94	111	138	170	218	250	282	321	384	492	11
Apr	47	55	58	62	66	71	82	91	102	119	128	137	149	173	230	11
May	35	38	40	43	45	46	51	55	60	64	67	72	78	91	125	11
Jun	22	24	26	27	28	29	32	34	37	40	41	43	46	51	57	11
Jul	13	14	15	16	17	17	19	20	21	22	23	24	26	28	31	11
Aug	9.0	11	11	12	12	12	13	14	14	15	15	16	16	18	19	11
Sep	7.8	8.6	11	11	11	12	12	12	13	13	14	14	15	17	20	11
Annual	11	12	13	15	18	21	33	51	73	106	128	159	206	277	407	

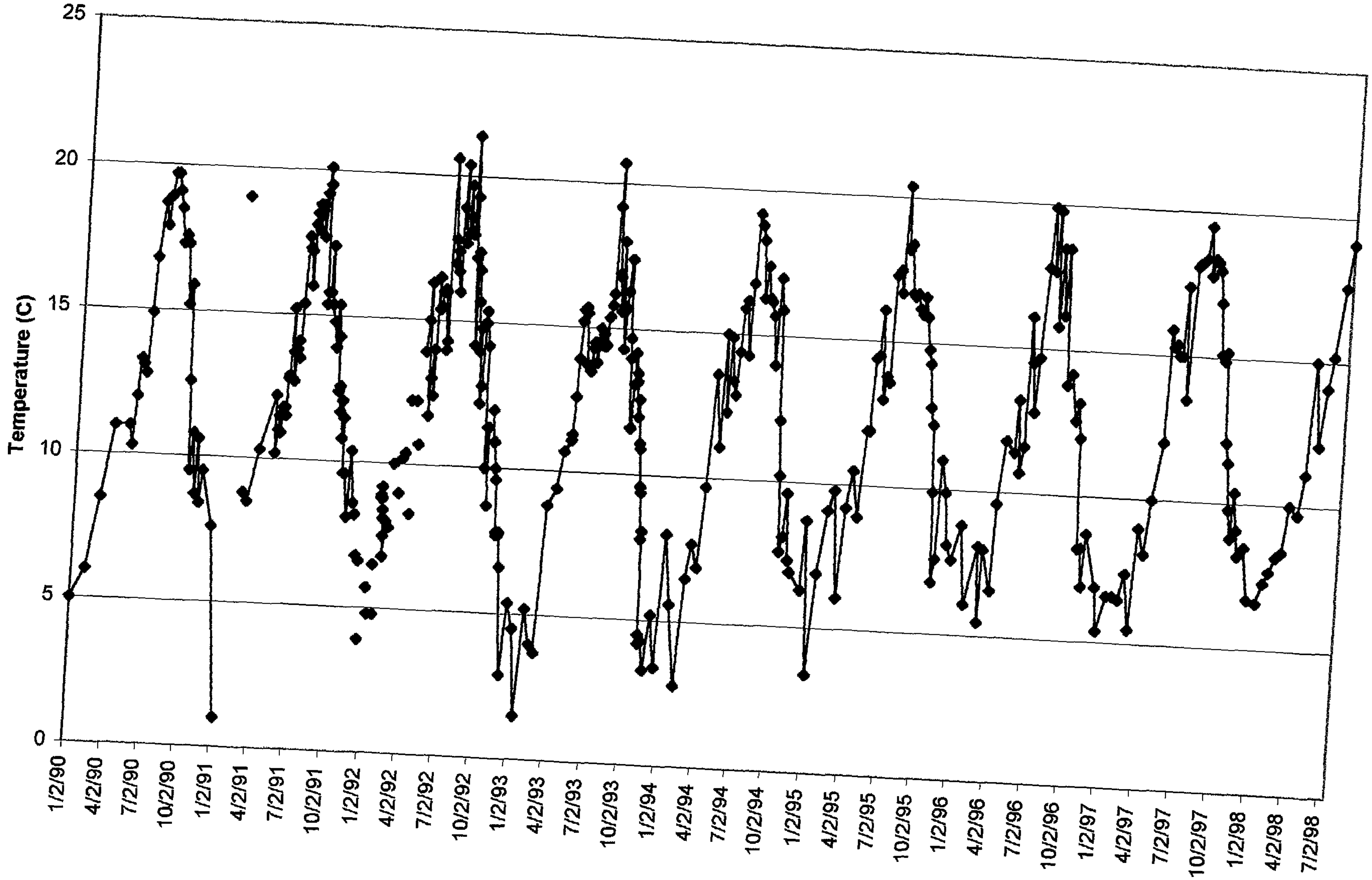
Flow: Dairy Creek at Highway 8

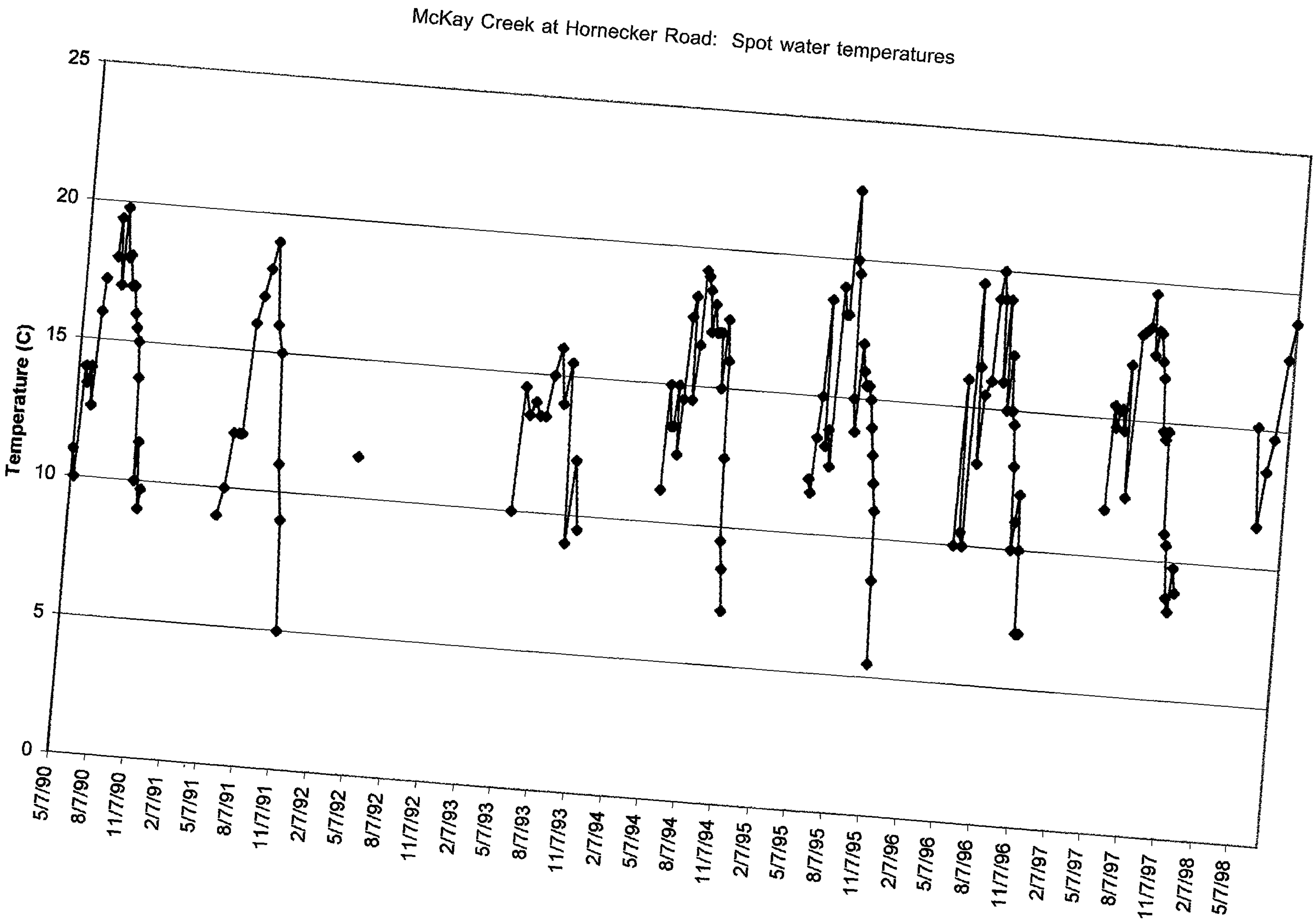


Flow: McKay Creek at Hornecker Rd.



Dairy Creek at Highway 8: Spot water temperatures




McKay Creek at Hornecker Road: Spot water temperatures
Temperature (C)
25
20
15
10
5
0
5/7/90
8/7/90
11/7/90
2/7/91
5/7/91
8/7/91
11/7/91
2/7/92
5/7/92
8/7/92
11/7/92
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5/7/96
8/7/96
11/7/96
2/7/97
5/7/97
8/7/97
11/7/97
2/7/98
5/7/98

Appendix 3.

Oregon Administrative Rules 603-095. These rules implement the provisions of Senate Bill 1010 and form the basis of the Tualatin River Subbasin Agricultural Water Quality Management Area Plan.

Oregon Administrative Rules
1998 Compilation

DEPARTMENT OF AGRICULTURE

DIVISION 95

AGRICULTURAL WATER QUALITY MANAGEMENT PROGRAM

603-095-0010

Definitions

Unless otherwise required by the context, as used in this Division:

(1) "Active Channel Erosion" means gullies or channels which at the largest dimension have a cross sectional area of at least one square foot and which occur at the same location for two or more consecutive years.
(2) "Adequate vegetative buffer" means an area that is maintained in vegetative cover that maintains at least 70 percent ground cover.

(3) "Agency of this state" has the meaning given in ORS 568.210(1).

(4) "Agricultural use" means the use of land for the raising or production of livestock or livestock products, poultry or poultry products, milk or milk products, fur-bearing animals; or for the growing of crops such as, but not limited to, grains, small grains, fruit, vegetables, forage grains, nursery stock, Christmas trees; or any other agricultural or horticultural use or animal husbandry or any combination thereof. Wetlands, pasture, and woodlands accompanying land in agricultural use are also defined as in agricultural use.

(5) "Agricultural Water Quality Management Area Plan" or "area plan" means a plan for the prevention and control of water pollution from agricultural activities and soil erosion in a management area whose boundaries have been designated under ORS 568.909.

(6) "Approved Voluntary Water Quality Farm Plan" or "approved voluntary plan" means a Voluntary

Water Quality Farm Plan which has been developed according to standards and specifications developed by the department and which has been approved by the Local Management Agency with jurisdiction in the area for which the plan was developed.

(7) "Best Management Practice" means a practice, or combination of practices, that is determined to be the most effective practicable (including technological, economical, and institutional considerations) means of preventing or reducing the amount of pollution generated by nonpoint sources of pollution to a level compatible with water quality goals. Best Management Practices may include structural and nonstructural practices, conservation practices, and operation and maintenance procedures.

(8) "Confined Animal Feeding Operation" has the meaning given in ORS 468.687.

(9) "Department" means the state Department of Agriculture.

(10) "Designated Management Agency" means a public agency which possesses the legal authority, technical competence, organizational ability, and financial resources to carry out all or part of the nonpoint source control program as stipulated in an agreement with the Department of Environmental Quality.

(11) "District" or "soil and water conservation district" has the meaning given in ORS 568.210.

(12) "Erosion, soil" means the general process by which soils are removed from the surface of the land by the action of water, wind, ice, or gravity.

(13) "Erosion rate, sheet and rill" means the annualized amount of soil material lost from a field or parcel of land due to sheet and rill erosion, expressed in tons of soil eroded per acre per year, and calculated according to the Universal Soil Loss Equation (USLE) or the Revised Universal Soil Loss Equation (RUSLE).

(14) "Erosion, rill" means an erosion process in which numerous small channels only several inches deep are formed and which occurs mainly on recently disturbed soils. The small channels formed by rill erosion would be obliterated by normal smoothing or tillage operations.

(15) "Erosion, sheet" means the removal of a fairly uniform layer of soil from the land surface by runoff water.

(16) "Erosion, streambank" means erosion within a perennial stream or river which is caused by the action of water flowing in a concentrated stream acting against the soil confining its flow.

(17) "Excessive soil loss" means soil loss that is greater than the standards set forth in Oregon Administrative Rules adopted by the Oregon Department of Agriculture to implement any Agricultural Water Quality Management Area Plan adopted pursuant to ORS 568.900 through 568.933. Excessive soil loss may be evidenced by sedimen-tation on the same parcel of land, on adjoining land, in wetlands or a body of water, or by ephemeral, active channel, or streambank erosion; or by calculations using the USLE or RUSLE showing soil loss exceeding the soil loss tolerance factor.

(18) "Field Office Technical Guide" means the localized document currently used by the soil and water

conservation district and developed by the United States Department of Agriculture, Natural Resources Conservation Service which provides:

(a) Soil descriptions;

(b) Sound land use alternatives;

(c) Adequate conservation treatment alternatives;

(d) Standards and specifications of conservation practices;

(e) Conservation cost-return information;

(f) Practice maintenance requirements;

(g) Soil erosion prediction procedures; and

(h) A listing of local natural resource related laws and regulations.

(19) "Formal complaint" means a complaint against a landowner or operator alleging a violation of a requirement of any Water Quality Management Area Plan adopted pursuant to ORS 568.900 through 568.933 at a specific site. The complaint shall be submitted in writing stating the nature and location of the violation and shall be filed with the department or by agreement with the department, with the Local Management Agency with jurisdiction over the site in question.

(20) "Highly erodible lands" means soils with a potential erodibility of eight times the soil loss tolerance factor.

(21) "Informal complaint" means a water pollution complaint, not formally filed with the department.

(22) "Irrigation water discharge" means the release of irrigation return flows to surface waters.

(23) "Land disturbing activity" means any activity not directly related to general farming resulting in a disturbance of the natural condition or vegetative covering of the earth's surface.

(24) "Landowner" includes any landowner, land occupier or operator as defined in ORS 568.903.

(25) "Load allocation" has the meaning given in OAR 340-041-0006(19).

(26) "Local Management Agency" means any agency of this state, including but not limited to a soil and water conservation district, which has been designated by the department through an interagency agreement to undertake activities within a management area whose boundaries have been designated under ORS 568.909.

(27) "Near-stream management area" means the area extending 25 feet as measured along the ground surface from the top of the streambank of a perennial stream or river, or the ordinary high-water mark of a pond or a lake.

(28) "Nonpoint sources" has the meaning given in OAR 340-041-0006(17).

(29) "Operator" has the meaning given in ORS 568.900(2).

(30) "Ordinary high-water mark" means the point on the streambank or shore up to which the presence and action of surface water is so continuous as to leave a distinctive mark such as by erosion, destruction or prevention of terrestrial vegetation, predominance of aquatic vegetation, or other recognizable characteristics.

(31) "Pasture" means land with a permanent, uniform cover of grasses or legumes used for providing forage for livestock. A pastures does not include any area where supplemental forage feeding is provided on a regular basis.

(32) "Perennial stream" means a natural channel in which water flows continuously and which is shown on a United States Geological Survey quadrangle map.

(33) "Point source pollution" means water pollution which emanates from a clearly identifiable discharge point.

(34) "Pollution" or "water pollution" has the meaning given in ORS 468B.005(3).

(35) "Prohibited condition" means a condition of the land which is not allowed under Division 95 rules.

(36) "Runoff" means the portion of rainfall, other precipitation, or irrigation water that leaves a location in the form of surface water.

(37) "RUSLE" means the Revised Universal Soil Loss Equation, which is a method used to estimate soil loss by sheet, rill, and wind erosion.

(38) "Sediment" means soil particles, both mineral and organic, that are in suspension, are being transported, or have been moved from the site of origin by flowing water or gravity.

(39) "Sewage" has the meaning given in ORS 468B.005(4).

(40) "Sloughing" means a slip or downward movement of an extended layer of soil resulting from the undermining action of water or the earth disturbing activity of man.

(41) "Soil" means unconsolidated mineral or organic material that overlies bedrock, on the immediate surface of the earth, that serves as a medium for the growth of plants.

(42) "Soil disturbing activity" means any agricultural use resulting in a disturbance of the natural condition of vegetative surface or soil surface exceeding 10,000 square feet in area, including, but not limited to tilling, clearing, grading, excavating, grazing, and feedlot usage, but not including such minor land disturbing activities as home gardens and individual landscaping and maintenance.

(43) "Soil loss" means soil moved from a given site by the forces of erosion and redeposited at another site, on land or in a body of water.

(44) "Soil loss tolerance factor" or "T" means maximum average annual amount of soil loss from erosion, as estimated by the Universal Soil Loss Equation (USLE) or the Revised Universal Soil Loss Equation (RUSLE), and expressed in tons per acre per year, that is allowable on a particular soil. This represents the tons of soil (related to the specific soil series) which can be lost through erosion annually without causing significant degradation of the soil or potential for crop production.

(45) "Streambank" means the boundary of protected waters and wetlands, or the land abutting a channel at an elevation delineating the highest water level which has been maintained for a sufficient period of time to leave evidence upon the landscape; commonly that point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial. For perennial streams or rivers, the streambank shall be at the ordinary high-water mark.

(46) "Total Maximum Daily Load" or "TMDL" has the meaning given in OAR 340-041-0006(21).

(47) "USLE" means the Universal Soil Loss Equation, which is a method used to estimate soil loss by sheet, rill, and wind erosion.

(48) "Vegetative cover" means grasses or other low growing plants grown to keep soil from being blown or washed away.

(49) "Voluntary Water Quality Farm Plan" or "voluntary plan" means a plan for the prevention or control of water pollution from agricultural activities and soil erosion for an individual landowner.
(50) "Wasteload allocation" or "WLA" has the meaning given in OAR 340-041-0006(20).

(51) "Wastes" has the meaning given in ORS 468B.005(7) and includes but is not limited to commercial fertilizers, soil amendments, composts, animal wastes, vegetative materials or any other wastes.

(52) "Waste discharge" or "waste discharges" means the discharge of waste, either directly or indirectly, into waters of the state.

(53) "Water" or "waters of the state" has the meaning given in ORS 468B.005(8).

(54) "Water quality limited" has the meaning given in OAR 340-041-0006(30).

(55) "Woodland" means an area with a stand of trees that has a canopy cover as shown on the most recent aerial photographs of at least 50 percent, being at least one acre in size and having a minimum width measured along the ground surface of at least 132 feet.

Stat. 561.190 & 568.909
Stats. Implemented: ORS 561.190 & 568.900 - 568.933
Hist.: AD 3-1996, f. & cert. ef. 4-9-96

603-095-0020

General Purpose

(1) These rules have been developed to effectuate the implementation of water quality management area plans pursuant to authorities vested in the department through ORS 568.900-568.933.

(2) The purpose of these rules is to outline requirements for landowners conducting agricultural activities in areas for which the department designates boundaries for the purpose of developing and implementing a water quality management area plan pursuant to ORS 568.900-568.933.

Stat. 561.020, 561.190 & 568.909

Stats. Implemented: ORS 568.900 - 568.933

Hist.: AD 3-1996, f. & cert. ef. 4-9-96

603-095-0030

General Policies

It is the policy of the department that:

(1) Cooperation between private and public entities be encouraged during implementation of agricultural water quality management area plans for the prevention and control of water pollution from agricultural activities and soil erosion;

(2) Voluntary adoption of best management practices to prevent or control water pollution from agricultural activities and soil erosion be encouraged through education programs, demonstration projects, and availability of technical assistance; and

(3) Enforcement action to achieve compliance with water quality management area plans and rules be pursued only when reasonable attempts at voluntary solutions have failed.

Stat. 561.140 & 561.190

Stats. Implemented: ORS 568.900 - 568.933

Hist.: AD 3-1996, f. & cert. ef. 4-9-96

603-095-0040

Appeals

Any appeals of specific actions required of a landowner or operator by the department under Division 095 rules shall may be pursued according to the provisions of the appeals process in OAR 603-090-0040.

Stat. 568.912

Stats. Implemented: ORS 568.912

Hist.: AD 3-1996, f. & cert. ef. 4-9-96

Tualatin River Subbasin

603-095-0100

Purpose

(1) These rule
s have been developed to effectuate the implementation of a water quality management area plan for the Tualatin River subbasin pursuant to authorities vested in the department through ORS 568.900-568.933, due to a determination by the Environmental Quality Commission to establish Total Maximum Daily Loads and allocate a load to agricultural nonpoint sources. The area plan is known as the **Tualatin River Subbasin Agricultural Water Quality Management Area Plan.**

(2) The purpose of these rules is to outline requirements for landowners in the Tualatin River subbasin, for the prevention and control of water pollution from agricultural activities and soil erosion. Compliance with Division 095 rules is expected to aid in the achievement of applicable water quality standards in the Tualatin River subbasin.

Stat. 568.909

Stats. Implemented: ORS 568.900 - 568.933

Hist.: AD 3-1996, f. & cert. ef. 4-9-96

603-095-0120

Geographic and Programmatic Scope

(1) The Tualatin River subbasin includes the drainage area of the Tualatin River upstream from the confluence with the Willamette River near West Linn. The physical boundaries of the Tualatin River subbasin are indicated on the map included as **Appendix 1** of these rules.

(2) Operational boundaries for the land base under the purview of these rules include all lands within the Tualatin River subbasin in agricultural use and agricultural and rural lands which are lying idle or on which management has been deferred, with the exception of activities which are subject to the Forest Practices Act.

(3) Current productive agricultural use or profitability is not required for the provisions of these rules to apply. For example, highly erodible lands with no present active use are the purview of these rules.

(4) The provisions and requirements outlined in these rules may be adopted by reference by Designated Management Agencies with appro-priate authority and responsibilities in other geographic areas of the Tualatin River subbasin.

(5) For lands in agricultural use within other Designated Management Agencies' or state agency

jurisdictions, the department and the appropriate Local Management Agency shall work with these Designated Management Agencies to assure that provisions of these rules apply, and to assure that duplication of any services provided or fees assessed does not occur.

[ED. NOTE: The Appendix referenced in this rule is not printed in the OAR Compliation. Copies are available from the Department of Agriculture.]

Stat. 568.909

Stats. Implemented: ORS 568.900 - 568.933

Hist.: AD 3-1996, f. & cert. ef. 4-9-96

603-095-0140

Prohibited Conditions

All landowners or operators conducting activities on lands in agricultural use shall be in compliance with the following criteria. A land occupier shall be responsible for only those prohibited conditions caused by activities conducted on land managed by the landowner or occupier. Criteria do not apply to conditions resulting from unusual weather events or other exceptional circumstances which could not have been reasonably anticipated.

(1) Sheet and rill erosion:

(a) By January 1, 1998, no agricultural land management or soil disturbing activities shall be conducted in such a way that the estimated sheet and rill erosion rate exceeds five times the soil loss tolerance factor.

(b) By January 1, 2000, no agricultural land management or soil disturbing activities shall be conducted in such a way that the estimated sheet and rill erosion rate exceeds the soil loss tolerance factor, except as provided in subsection (c) of this section.

(c) The department shall establish an alternate sheet and rill erosion control standard for any lands in agricultural use which the department determines cannot practically or economically achieve the soil loss tolerance factor. Any alternate sheet and rill erosion control standard established by the department shall assure that delivery of sediment to adjacent watercourses is reduced to the maximum extent practicable. Any lands in agricultural use which the department determines cannot practically or economically achieve the soil loss tolerance factor shall meet the alternate sheet and rill erosion control standard by January 1, 2000.

(2) Active channel erosion: by January 1, 1996, no agricultural land management or soil disturbing activity shall cause active channel erosion. A land occupier shall be responsible for only that portion of the active channel erosion that is caused by agricultural land management or soil disturbing activities conducted on land managed by the landowner or occupier.

(3) Near-stream management area: by January 1, 1998:

(a) No agricultural land management or soil disturbing activities within near-stream manage-ment areas in agricultural use shall be conducted in a manner which results in the placement, delivery, or sloughing of suspended solids (i.e., nutrients, soil, sediment, manure) into waters of the state.

(b) The technical standards to be used to determine compliance with subsection (a) of this section are:

(A) The affected landowner shall establish and maintain an adequate vegetative buffer, or an equally effective pollution control practice, in the near-stream management area. When a vegetative buffer is established, the plant variety or seed mixture shall be one of those listed in field office technical guide standard 342 (Critical area planting). If any activity disturbs a vegetative buffer in the near-stream management area, the landowner shall replant or restore the disturbed area to an adequate vegetative buffer as soon as practicable.

(B) Activities associated with the establishment or reestablishment of a crop during the period of May through September annually are exempt from paragraph (b)(A) of this subsection, provided that an adequate vegetative buffer or equally effective erosion control practice is provided during the months of October through April.

(C) Pastures shall comply with field office technical guide standard 510 (Pasture and hay land management) for pastureland and continuous grazing as applicable.

(D) Livestock barnyards, feedlots, drylots and other non-pasture areas cannot be located within the near-stream management area unless a barnyard runoff control system meeting field office technical guide standard 312 (Waste management system) is installed and maintained.

(E) Agricultural lands within the near-stream management area that receive manure and other nutrients through application of sludge, commercial fertilizer and other added nutrient inputs shall meet field office technical guide standard 590 (Nutrient management).

(c) Field office technical guide standards referred to in subsection (b) of this section are those standards which are current as of the date of the adoption of these rules. Copies shall be made available to the public upon request to the department through its central office location.

(d) A landowner shall not be considered out of compliance with subsection (b) of this rule if the department determines that a failure to meet the standards is a result of land use or actions by another landowner.

(e) Except for operations governed by the Forest Practices Act, no activities related to the conversion of woodland to non-woodland agricultural uses that require removal of the majority of woody material from a parcel of land such that the land no longer meets the definition of woodland, shall be conducted in a manner which results in the placement of soil, the delivery of sediment, the sloughing of soil into waters of the state, or the initiation or aggravation of streambank erosion.

(f) Limited duration activities related to construction, restoration, or maintenance may be exempted from section (3) of this rule subject to prior written approval by the department.

(4) Irrigation water discharges: By May 1, 1997, no activities shall result in irrigation water discharges to waters of the state during the period May 1 through October 31 annually, except as provided in this section. Irrigation water discharges may be allowed upon submittal and written approval by the department of a monitoring program to be conducted by the landowner or operator. Such monitoring program shall provide reasonable assurance that the quality of the irrigation water discharge meets all applicable water quality standards.

(5) Waste discharges: Effective upon adoption of these rules:

(a) No person conducting agricultural land management or earth disturbing practices shall cause pollution of any waters of the state or place or cause to be placed any wastes in a location where such wastes are likely to escape or be carried into the waters of the state by any means.

(b) No person conducting agricultural land management or earth disturbing practices shall discharge any wastes into any waters of the state if the discharge reduces the quality of such waters below the water quality standards established by rule by the Environmental Quality Commission.

(c) No person conducting agricultural land management or earth disturbing practices shall violate the conditions of any waste discharge permit issued pursuant to ORS 468B or ORS 568.

Stat. 568.912

Stats. Implemented: ORS 568.900 - 568.933

Hist.: AD 3-1996, f. & cert. ef. 4-9-96

603-095-0160

Voluntary Water Quality Farm Plans

(1) Content: Voluntary Water Quality Farm Plans shall be designed to meet criteria in OAR 603-095-0140. At a minimum, Voluntary Water Quality Farm Plans shall include the following information:

(a) General components:

(A) Such maps, aerial photographs, and soil survey, water resource and other natural resource inventory information which may be necessary to develop a Voluntary Water Quality Farm Plan. Such items shall be included to the extent that the information is pertinent and necessary in the formulation of the Voluntary Water Quality Farm Plan to assure it achieves the criteria in OAR 603-095-0140.

(B) A list of fields, crops grown (including typical rotation), and other land uses, with the area in acres for each field or land use; and

(C) Any agreements entered into by the landowner or operator involving any agency providing technical or financial assistance in the completion of the best management practices included in the Voluntary Water Quality Farm Plan.

(b) Depending on the nature of the operation, any or all of the following specific components shall be included in the Voluntary Water Quality Farm Plan. If any of the components do not apply to the operation, the plan shall indicate as such:

(A) Sheet and rill erosion component: a detailed list of proposed practices for each field or land use, showing the Field Office Technical Guide number (as available) for each practice and the date of application, and the estimated rate of soil loss before and after application of the practices for each field.

(B) Active channel erosion component: a detailed list of proposed practices for each field or land use, showing the Field Office Technical Guide number (as available) for each practice and the date of application, and the estimated rate of soil loss before and after application of the practices for each field.

(C) Near-stream management area component:

(i) A list of activities conducted in the near-stream management area; and

(ii) A detailed list of proposed practices for each field or area, showing the Field Office Technical Guide number (as available), and indicating the date of application.

(D) Irrigation discharge component:

(i) Irrigation water: source of water, amount of water used, how it is applied, and how it is stored;

(ii) Drainage system: indicate whether the drainage system is open or closed;

(iii) A list of proposed practices and measures taken to prevent discharge, and indicating the date of application.

(iv) Plans filed with the department pursuant to letters of intent submitted by operators of container nurseries may serve to meet the requirements of the irrigation discharge component of a Voluntary Water Quality Farm Plan, provided that such plans meet other requirements under section (1) and (2) of this rule.

(E) Waste discharge component:

(i) Nature of the waste material;

(ii) Estimated volume of waste handled quarterly;

(iii) Specifications and procedures for waste collection, handling, retention, storage, treatment, and disposal;

(iv) A list of measures taken to prevent discharge, and indicating the date of application.

(2) Preparation:

(a) The landowner or operator may arrange with a Local Management Agency to prepare a Voluntary Water Quality Farm Plan, or may prepare the plan with assistance, or may contract with another person or agency to prepare the plan. If the plan is not prepared by the Local Management Agency:

(A) The Local Management Agency may require certification by a professional soils scientist or soils conservationist, or a registered professional engineer that it meets the standards of the technical guide for conservation plans, and that completion of the best management practices included in the plan will enable the land owner or operator to meet the criteria in OAR 603-095-0140; or

(B) The Local Management Agency may require proof from the preparer of the plan that he or she is qualified to prepare such a plan.

(b) The Local Management Agency may require such additional documentation as is necessary to identify in detail the best management practices listed.

(3) Implementation schedule: Any portion of a Voluntary Water Quality Farm Plan designed to meet the criteria in OAR 603-095-0140 shall allow the owner or operator to phase in installation of best management practices until compliance with OAR 603-095-0140 is accomplished.

(4) Approval:

(a) The Local Management Agency shall approve or disapprove Voluntary Water Quality Farm Plans and plan amendments at its regularly scheduled meeting and shall maintain a record of its actions as part of the meeting minutes. Approved Voluntary Water Quality Farm Plans and plan amendments shall be signed by the chair or the chair's designee. All approved voluntary plans shall meet the criteria in OAR 603-095-0140 and the criteria for plan preparation contained in section (1) and (2) of this rule.

(b) In the event that the Local Management Agency finds that a Voluntary Water Quality Farm Plan or a plan amendment does not meet the criteria in OAR 603-095-0140 or the criteria for plan preparation contained in sections (1) and (2) of this rule, the Local Management Agency shall provide a written explanation, by certified mail, to the landowner or operator who submitted the plan, listing all the deficiencies to be corrected.

(C) Unless the Local Management Agency determines that a more frequent review is necessary, any Voluntary Water Quality Farm Plans or plan amendments approved by a Local Management Agency under subsection (a) of this section shall be approved for a period of three years. At the end of the approval period, if the landowner or operator wants to continue the Voluntary Water Quality Farm Plan or any plan amendments, the Local Management Agency shall review the plan or plan amendment as provided in section (4) of this rule.

(5) Appeal:

(a) Any landowner or operator may request reconsideration of the Local Management Agency's decision to disapprove a Voluntary Water Quality Farm Plan or a plan amendment by submitting a request for a hearing before the next regularly scheduled Local Management Agency meeting. If an appeal is filed, the Local Management Agency shall reconsider its decision at its next regularly scheduled meeting and may either affirm, modify or reverse its previous decision. The purpose of the hearing shall be to present

relevant information or evidence that the Local Management Agency's action was not based on an appropriate or adequate evaluation of the voluntary plan or plan amendment. The Local Management Agency shall maintain a record of its action regarding reconsideration as part of the meeting minutes.

(b) A landowner or operator may appeal the Local Management Agency's denial of reconsideration within seven days of the date of the reconsideration decision by filing a hearing request with the department. If the landowner or operator appeals within the prescribed period, the department shall notify the Local Management Agency. The Local Management Agency shall forward its action and rationale to the department within seven days of such notification.

(c) Within seven days of a Local Management Agency's denial of an appeal by a landowner or operator, the Local Management Agency shall notify the department of its action and rationale.

(d) Within 30 days of receiving an appeal request, the department shall schedule a hearing between the landowner or operator, a designated representative of the Local Management Agency, and a representative of the department. The purpose of the hearing shall be to review the Local Management Agency's reconsideration decision. If the representatives of the department and the Local Management Agency can reach agreement, they shall forward a joint recommendation to the Local Management Agency for approval at its next regularly scheduled meeting. The Local Management Agency shall maintain a record of its action as part of its meeting minutes.

(e) If the representatives of the department and the Local Management Agency cannot agree on a joint recommendation, the department may approve or disapprove the Voluntary Water Quality Farm Plan or plan amendment. The department shall forward a copy of its approval decision to the Local Management Agency.

(6) Amendments to an existing plan: Any amendments to an existing Voluntary Water Quality Farm Plan shall be approved by the Local Management Agency in accordance with sections (4) and (5) of this rule.

Stat. 561.400 & 568.909

Stats. Implemented: ORS 568.900 - 568.933

Hist.: AD 3-1996, f. & cert. ef. 4-9-96

603-095-0180

Complaints and Investigations

(1) To be considered as a formal complaint, any person allegedly being damaged or otherwise adversely affected by agricultural pollution or alleging any violation of OAR 603-095-0140 shall do so by filing a written complaint with the department. The complaint shall be signed and dated by the complainant and shall:

(a) Indicate the location and description of:

(A) The property and/or waters of the state allegedly being damaged or impacted; or

(B) The property allegedly being managed under conditions violating criteria described in OAR 603-095-0140.

(b) Indicate the nature and extent of damage; and

(c) Identify the alleged sources of pollution.

(2) Each formal complaint shall be evaluated in accordance with the criteria in OAR 603-095-0140 to determine whether an investigation is warranted.

(3) Action initiated by the department: when the department finds an apparent occurrence of agricultural pollution through its own observation, through notification by another agency, or through a formal complaint from an individual, the department shall inform the appropriate Local Management Agency in writing of:

(a) The location and nature of the occurrence;

(b) The location and description of the agricultural operation alleged to be causing the pollution occurrence or where prohibited conditions are alleged to have occurred; and

(c) The nature and extent of damage, if known.

(4) Action by a Local Management Agency

(a) Formal complaints:

(A) By written agreement with the department, the Local Management Agency may receive formal complaints and evaluate and investigate them on behalf of the department;

(B) A Local Management Agency which is authorized by the department to evaluate and investigate formal complaints shall evaluate the formal complaint and investigate it in a timely manner, if warranted. Within 30 days of receipt of a formal complaint, the Local Management Agency also shall inform the department of the status of its investigation of the complaint and provide any information relevant to it;

(C) In the event the Local Management Agency is unable to investigate a formal complaint as per section (2) of this rule, the Local Management Agency shall request assistance from the department. The department shall investigate the complaint.

(b) Informal complaints:

(A) By written agreement with the department, the Local Management Agency may receive informal complaints and investigate them on behalf of the department;

(B) Within 30 days of receipt of an informal complaint, the Local Management Agency also shall inform the department of the status of its investigation of the complaint and provide any relevant information to it.

(5) Actions based on investigation findings:

(a) If the department determines that a violation of OAR 603-095-0140 has occurred and an approved Voluntary Water Quality Farm Plan exists and the operator is making a reasonable effort to comply with the plan:

(A) The department shall inform the landowner and the Local Management Agency of the non-compliance with OAR 603-095-0140; and

(B) The department shall acknowledge the existence of the Voluntary Water Quality Farm Plan and direct the landowner to seek appropriate technical assistance and revise the plan and its implementation in a manner necessary to eliminate the violation.

(b) If the department determines that a violation of OAR 603-095-0140 has occurred and an approved Voluntary Water Quality Farm Plan exists and the operator is not making a reasonable effort to comply with the plan; or

(c) If the department determines that a violation of OAR 603-095-0140 has occurred and an approved Voluntary Water Quality Farm Plan does not exist; or

(d) If the department determines that a landowner has not revised a plan per paragraph (a)(B) of this section within the time specified by the department:

(A) The landowner shall be subject to the enforcement procedures of the department outlined in OARs 603-090-0060 through 603-090-0120; and

(B) The department shall inform the Local Management Agency of its determination that a violation has occurred.

Stat. 568.915, 568.918 & 568.933

Stats. Implemented: ORS 568.900 - 568.933

Hist.: AD 3-1996, f. & cert. ef. 4-9-96

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Appendix 4.

Location and characteristics of BLM-managed lands in the Dairy-McKay watershed. Information gathered from BLM sources and analysis of USGS 7-1/2 minute topographic quads. Land cover percentages for each parcel are visually estimated from the BLM stand age map.

Appendix 4. Index of BLM parcels in the Dairy Creek watershed. Land cover percentages for each parcel are visually estimated from the BLM stand age map.

T	R	S	Subsec1	Subsec2	Acres	RR?	Stand Composition	Steep slopes 30%	60%	Access	rural/urban visual interface?	class?	Allocation	Other
2N	2W	3	NW1/4	W1/2	80	Y	100% 60-80	y		y			GFMA	
2N	2W	3	NE1/4	N1/2	80	Y	90% 60-80, 10% 0-20	y	y	y			GFMA	
2N	2W	7	N1/2		240	n	90% 60-80, 5% 90-110, 5% 30-50	y	y	y			GFMA	
2N	2W	9	W1/2		160	Y	100% 60-80	y		n			GFMA	
2N	2W	17	SW1/4	SW1/4	40	Y	100% 60-80	y		y	y	III	GFMA	
2N	2W	15	S1/2		120	Y	90% 60-80. 10% NF	n		y	y	III	GFMA	
2N	2W	21	SW1/4	N1/2	80	Y	40% 0-20, 40% 30-50	y		y	y	III	GFMA	
2N	2W	21	NE1/4	SE1/4	40	Y	100% 60-80	n		y	y	III	GFMA	
2N	2W	29	NE1/4	SW1/4	40	Y	90% 60-80, 10% 90-110	y		n	y	III	GFMA	
2N	3W	1			420	y	100% 60-80	y	y	n (ls)			Connect	
2N	3W	3			320	y	80% 60-80, 20% 30-50	y		y			GFMA	
2N	3W	5	S1/2		280	y	40% 60-80, 30% 90-110, 30% 0-20	y		marginal			LSR	Big Cyn
2N	3W	9	NE1/4	NE1/4	40	y	80% 60-80, 20% 90-110	y		y			GFMA	
2N	3W	17	E1/2		200	y	35% 0-20, 35% 30-50, 30% 60-80	y		y			GFMA	
2N	3W	21	E1/2		200	y	100% 60-80	y		y			GFMA	Girl Scouts use
3N	2W	19					100% 60-80	n	n				GFMA	Most in Scappoose watershed
3N	2W	29	SW1/4	SW1/4	40	y	100% 60-80	y		y			GFMA	
3N	2W	29	SE1/4		120	n	90% 60-80, 10% NF	n		y			GFMA	Most outside watershed
3N	2W	31			360	y	60% 60-80, 20% 30-50, 20% 0-20	y		y			GFMA	
3N	3W	3			360	y	80% 60-80, 10% 0-20, 5% 90-110	y		y-unsurf.			GFMA	access best if roads reopened
3N	3W	3	NW1/4		80	y	85% 60-80, 15% nf	y		y unsurf.			GFMA	access best if roads reopened
3N	3W	5			400	y	90% 60-80, 5% 90-110, 5% 30-50	y		y			GFMA	
3N	3W	9	NE1/4	NE1/4	40	n	100% 60-80	y	y	n			GFMA	
3N	3W	11			520	y	90% 30-50, 10% nf	n		y			GFMA	Most in Scappoose watershed
3N	3W	13			560	y	80% 30-50, 10% 60-80, 10% nf	y		y			Connect	Most in Scappoose watershed
3N	3W	19	E1/2		320	y	45% 60-80, 25% 30-50, 10% 90-110	y		y			GFMA	
3N	3W	21	N1/2		160	y	90% 60-80, 10% 90-110	y		y			GFMA	
3N	3W	21	S1/2		200	y	60% 60-80, 20% 30-50, 20% 0-20	y		y			GFMA	

Appendix 4. Index of BLM parcels in the Dairy Creek watershed. Land cover percentages for each parcel are visually estimated from the BLM stand age map.

T	R	S	Subsec1	Subsec2	Acres	RR?	Stand Composition	Steep slopes 30%	60%	Access	rural/urban visual interface?	class?	Allocation	Other
3N	3W	23			440	y	90% 60-80, 10% 30-50	y		y			GFMA	
3N	3W	25	NW1/4	N1/2	80	y	80% 60-80, 20% 90-110	y		y			GFMA	
3N	3W	25	SW1/4	SW1/4	40	y	60% 90-110, 40% 60-80	y		ls			GFMA	
3N	3W	27	E1/2		120	y	60% 30-50, 40% 60-80	y		y unsurf.			GFMA	
3N	3W	29	NW1/4		160	n	80% 30-50, 15% 60-80, 5% 90-110	y	y	y			GFMA	pond habitat in unit and nearby
3N	3W	29	NE1/4	E1/2	80	y	100% 60-80	y		n			GFMA	
3N	3W	31	NE1/4	W1/2	80	y	80% 30-50, 15% 0-20, 5% 90-110	y		ls			GFMA	
3N	3W	33	NW1/4	NW1/4	40	y	50% 0-20, 45% 60-80, 5%90-110	y		y			GFMA	
3N	3W	33	SE1/4	NW1/4	80	y	100% 60-80	y		y			GFMA	
3N	3W	35			200	y	100% 60-80	y		ls			GFMA	
4N	3W	31	SE1/4		160	y	80% 60-80, 15% 0-20, 5% 30-50	n	n	y			GFMA	
4N	3W	33			640	y	85% 60-80, 10% 30-50, 5% nf	n	n	y			GFMA	

Appendix 5.

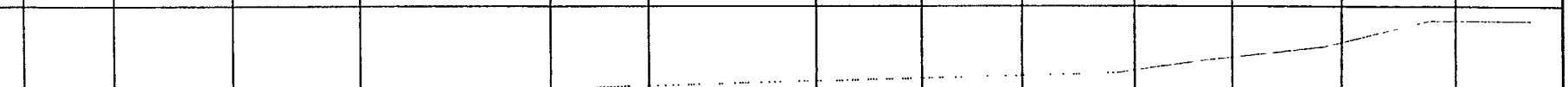
Channel habitat typing tables from the draft 1997 GWEB assessment manual.

Table CHT-1: Draft Channel Habitat Type descriptions and fish utilization.

Channel Habitat Type	Description	Fish Utilization
	Stream Channel Habitat Types	
Wide, Lowland Floodplain Channel (FP1)	Lowland and valley bottom unconstrained channels of large to very large watersheds, can include small adjacent wetlands (£1%, 4th -6th order, Large & Medium)	Anadromous: Important coho, steelhead spawning, rearing & migration corridor. Resident: Important spawning, rearing & overwintering
Low-Gradient Floodplain Channel Large-Medium (FP2)	Mainstem streams in broad unconstrained valley bottoms; bounded by low terraces or gentle landforms (<2%, 4th -6th order, Large & Medium)	Anadromous: Important coho, steelhead spawning & rearing. Resident: Important spawning, rearing & overwintering
Low- Gradient Floodplain Channel Small (FP3)	Low gradient unconstrained floodplain channels often occupy the floodplains of larger streams or rivers (<2%, 2nd -3rd order, Small)	Anadromous: Important coho, steelhead spawning & rearing. Resident: Important spawning, rearing
Alluvial Fan (AF)	Transition from steep mountain slopes to valley floor, unconstrained or entrenched at fan head (2-12%, 2nd – 3rd order, Medium)	Anadromous: Important coho, steelhead rearing, potential spawning in lower gradients Resident: Important spawning, rearing
Low-Gradient Constrained Channel (LC)	Low to moderate gradient hillslopes with limited floodplain, relatively straight valley, partial or complete barriers may occur at bedrock knickpoints. (<2%, 3th – 5th order, Large or Medium)	Anadromous: Potential coho, steelhead spawning & rearing. Resident: Potential spawning, rearing and overwintering.
Moderate Gradient, Moderately Constrained Channels (MM)	Alternating hillslope and/or high terraces limit channel migration. Bedrock steps with cascades may be present forming partial or complete barriers. (2-4%, 3rd - 5th order, Large & Medium)	Anadromous: Limited coho spawning & rearing. Potential steelhead spawning & rearing Resident: Potential spawning, rearing and overwintering.
Moderate Gradient Constrained Channel (MC)	Narrow open to mod v-shape valley, hillslope constrained or hillslope-terrace constrained (2-4%, 3rd - 5th order, Large, Medium or Small)	Anadromous: Potential steelhead spawning & rearing Resident: Potential spawning, rearing and overwintering.
Moderately Steep, Narrow Valley Channel (MV)	Narrow valley, hillslope constrained but can develop narrow floodplain (3-10%, 2nd - 5th order, Large Medium or Small)	Anadromous: Potential steelhead spawning & rearing Resident: Potential spawning & rearing
Bedrock Canyon Channel (BC)	Very narrow v-shape, bedrock constrained, Migration barriers, can occur anywhere within drainage system. (4- > 20%, 2nd – 4th order, Large, Medium or Small)	Anadromous: Lower gradient segments may provide limited rearing (if accessible) Resident: Limited resident spawning & rearing

Channel Habitat Type	Description	Fish Utilization
Steep Narrow Valley Channel (SV)	Narrow v-shape, hillslope constrained (8-16% , 1st -2nd order, Small)	Anadromous: Lower gradient segments may provide limited rearing (if accessible) Resident: Limited resident spawning & rearing
Very Steep, Headwater Channel (VH)	Narrow v-shape, hillslope constrained (>16%, 1st -2nd order, Small)	Very limited resident rearing.
Moderate Gradient Headwater Channels (MH)	Open v-shape, hillslope constrained. Common to plateaus in Columbia River basalts, young volcanic surfaces, or broad drainage divides; common sites of headwater beaver ponds; can include glacial cirques (1-~6%, 1st - 2nd order, Small)	Anadromous: Potential steelhead spawning and rearing (if accessible) Resident: Important resident spawning and rearing
Estuary Habitat Types		
Narrow Estuarine Channel (EN)	Broad unconstrained sinous or multiple channels minor estuaries (≤2%, 3rd -5th order, Small or Medium)	Anadromous: Potential coho rearing Resident: Not typically used by resident salmonids
Large estuarine channel (EL)	Broad major estuaries can be river dominated: Columbia or Rouge Rivers, or drowned river mouths; Coos, Siletz or Yaquina Bays (≤2%, 5th - 6th order, Medium or Large)	Anadromous: Potential coho rearing Resident: Not typically used by resident salmonids
Wetland & Other Habitat Types		
Connected, Formerly Connected Wetland (WC)	Broad floodplain or low relief landforms, may be lake inlet or outlet channel; includes sloughs & oxbow channels adjacent to active flood plains or river terrace lowlands of large rivers & tributaries (<1%, 1st - 6th order)	Anadromous: Potential coho, steelhead rearing & overwintering (if accessible & large enough) Resident: Potential rearing and overwintering (if accessible & large enough)
Unconnected, Isolated Wetland (WU)	no surface outlet to stream system (<1%)	Not typically used by salmonid fish.
Natural Lake (L)	May be found at any position in the drainage network (<0.005, 1st - 6th order)	Anadromous: Important coho, steelhead rearing & overwintering (if accessible & large enough) Resident: Important rearing and overwintering (if accessible & large enough)
Reservior (R)	Man-made lakes & impoundments (<0.005, 4th to 6th order)	Anadromous: Important coho, steelhead rearing & overwintering (if accessible) Resident: Important rearing and overwintering

Table CHT-2 : Channel Habitat Type Descriptions (does not include lakes/reservoirs)

	UNCONFINED					VARIABLE CONFINEMENT	CONFINED						
Channel Habitat Type	**Estuary** EN/EL	**Wide floodplain** FP1	**Wetland connected/ unconnected** WC/WU	**Floodplain -lrg /med Floodplain -small streams** FP2, FP3	**Alluvial fan** AF	**Moderate terrace/hillslope confinement** MM	**Low gradient constrained** LC	**Moderate gradient constrained** MC	**Moderately steep, narrow valley** MV	**Bedrock canyon** BC	**Steep headwater** SV	**Very steep headwater** VH	**Moderate gradient headwater** MH
Valley Shape	broad	broad, well-defined floodplain	flat landforms, depressions	broad, well-defined floodplain; multiple terraces may be present but gen. don't constrain	transition between hillslopes & valley floor	broad valley; moderately confined between terraces and/or open to mod V-shape valley	low to mod gradient hillslopes, limited floodplain	gentle to narrow v-shaped valley, min. floodplain	narrow mod V-shape valley; narrow floodplain	very narrow, steep v-shape valley	steep v-shape	steep v-shape	open v-shape; gentle to mod land-forms or broad drainage divides
Channel Pattern	Sinuous, single or multiple	single or multiple channels; meandering or high sinuosity	single, sinuous or ponded	meandering; single, occasionally split channel; braided (high sediment supply)	single to multiple chnls in fan pattern	single channel, low sinuosity to relatively straight; (with high sed. supply-braided)	single channel, low sinuosity to straight	single, rel. straight, or conforms to hillslope	single channel, relatively straight, similar to valley	straight	relatively straight same as valley	relatively straight	low sinuosity, straight
Channel Profile / Positon in Drainage													
Gradient	≤1%	<0.5-1.0%	<1%	<2%	2-12%	2-4%	<2%	2-4%	3-10%	4->20%	8-16%	>16%	1-6%
Substrate Size	sand to cobble	small gravel, sand, silt	organic silt, sand and fine gravel	gravel & sand to cobble	gravel to small bldrs	large gravel to small boulders; bedrock	boulder, cobble, bedrock, pockets of gravel/cob	coarse gravel to bedrock	cobble, boulder; bedrock	bedrock, large bldrs	bldr, cobble bedrock	boulders bedrock	variable: wetland peat to boulders
	SEDIMENT DEPOSITION						**SEDIMENT TRANSPORT**			**SEDIMENT SOURCE**			

Appendix 6.

Analysis of riparian vegetation.

Methodology

Aerial photography was analyzed to delineate riparian vegetation in agricultural portions of the Dairy/McKay Creek watershed. The streams delineated in this way included all of Dairy and Council creeks, McKay Creek below the East Fork of McKay Creek, East Fork Dairy Creek below Rock Creek, and the West Fork Dairy Creek below Cummings Creek. Additionally, riparian areas on adjoining reaches of numerous tributaries were also delineated. A total of 47 Farm Service Agency (FSA) slide reproductions of aerial photography were projected at a scale of 1:8,000. For each slide, tracing paper was overlaid upon the projection plane and the boundaries of the riparian zone were transferred to the tracing paper. The riparian zone was subdivided into vegetational types based upon the structural characteristics of the riparian vegetation.

Each vegetational type was further classified according to the width of riparian vegetation. In order to form classes consistent with various regulatory buffer zones, width classes were based upon 25-foot increments. Five width classifications were used: Less than 25 feet, 25-50 feet, 50-75 feet, 75-100 feet, and greater than 100 feet. Contiguous areas of similar vegetative type and width class were defined as riparian units.

The length of each riparian unit was measured using a digital map wheel. As there was substantial overlap in coverage of each FSA slide, limits to measurement were marked on each sheet of tracing paper to allow complete measurement coverage without overlap. For the area measured on each FSA slide, the total riparian length on each stream bearing similar vegetation and width characteristics was summed separately. Portions of a stream intersected by the confluence of a major tributary were summed individually. In order to provide easily recognizable reference units and to facilitate transfer to GIS, the sum totals for each riparian class were aggregated to stream reaches bounded by tributary intersections.

The data were tabulated and analyzed for the presence of the shading function along each stream reach. Of all riparian functions, this function was considered to be the most amenable to quantitative analysis using the available resources. For purposes of this analysis, the four forested vegetational classes were used. To simplify data presentation, the numerous non-forested riparian classes identified from the aerial photography were aggregated into a class designated as "other". The ability of each stream reach to provide shading was determined by summing the two narrowest tree width classes (<25 feet and 25-50 feet) with the "other" class. These classes were considered to provide suboptimal stream shading. Stream reaches with greater than 25% of their length providing suboptimal stream shading were assigned to classes denoting various stages of impairment[1]. Reaches with 25-49% of their length in this condition were considered moderately impaired, reaches with 50-74% were considered severely impaired, and reaches with 75% or greater of their length in such condition were considered very severely impaired. These reaches were also prioritized according to the degree of impairment.

Results and discussion

The results of this analysis for mainstem reaches are given in Appendix Table 6.1. Council Creek and West Fork Dairy Creek have consistently severe impairment of the shading function. East Fork Dairy Creek has consistently moderate impairment of this function, while McKay and Dairy Creek have lower and varying degrees of impairment.

Results for various tributaries are given in Appendix Table 6.2. Although these tributaries did not receive extensive analysis, these results indicate that riparian condition is worse for these streams than for the mainstem reaches. The greatest lack of riparian canopy occurs in minor and intermittent tributaries, which have the least regulatory protection. In the case of intermittent tributaries, this may not pose significant shading problem because of lack of flow during the warmest time of year. However, the limited vegetation in these reaches may have implications for erosion and nutrient control.

The 50 foot buffer limit was chosen as the outside limit for suboptimal shading for the analysis based on previous scientific studies. Appendix Figure 6.1 shows the degree of riparian functions provided by varying buffer widths (given in terms of tree height) as determined by FEMAT (1992). Although this graph was specifically developed

for forested conditions, it is believed to have applicability for the present discussion. As shown by this graph, about 90% of total potential shading benefit will be afforded by a buffer width equivalent to 0.75 tree heights from the channel. The benefit rapidly diminishes below this buffer width. Assuming a reference alder or ash forest of 50 foot height, 90% of total shading benefit would be reached with a forested buffer 35-40 feet from the streambank[2]. However, most of the buffer zones delineated in the aerial photographic analysis had an outer riparian zone of shrub and herbaceous growth. The forested portion of the delineated zone was generally less. Thus, the 50-foot figure allows for the shrub-herb zone, as well as allowing a margin for measurement error.

These results indicate that if shading were the only consideration, then restoration efforts should concentrate upon Council Creek and the West Fork of Dairy Creek. However, other considerations are important, both in terms of other riparian functions and in degree of effectiveness to accomplish other beneficial objectives.

Other riparian functions include sediment retention and habitat considerations. The amount of stream habitat able to provide protection from erosion and sedimentation will be greater than that available for shading. However, the resolution of the available aerial photography and transcience of land uses in herbaceous riparian zones limits the accuracy of any quantitative analysis of the sediment retention function of these zones. Qualitatively, the mainstem and tributary reaches providing the least shading also have the greatest potential for bank erosion, although in many cases they may have sufficient herbaceous vegetation to retain surface sediments carried in runoff.

Riparian zones in the watershed provide diverse habitat opportunities. The riparian forests provide potential habitat for several sensitive species. In some herbaceous reaches, such as those along Council and Waibel creeks, much of the vegetation may have been naturally herbaceous wetland vegetation. Some of these reaches continue to provide wetland habitats, with values that are not accounted for under the shading analysis. Thus, any riparian restoration efforts should evaluate existing wetland benefits at restoration sites and should be conducted so as to maintain these benefits. Habitat values for other important species may also be found in other herbaceous and shrub-dominated riparian areas.

Many riparian habitat concerns are associated with the ability to provide shading, cover, and food sources for salmonids and other aquatic species of concern. Riparian restoration will provide the most beneficial effects on these species if it is conducted where these species are most commonly present or in streams draining to these locations. In the Dairy Creek watershed, the greatest benefit to salmonids is likely to be experienced in the Tualatin Mountains and in adjacent gravel-substrate reaches of the Tualatin Valley. Pacific lamprey will additionally benefit from increased shading in lower portions of the watershed.

In summary, the previous discussion indicates several recommendations for riparian restoration.

1. Both degree of riparian degradation and ability to accomplish restoration objectives should be taken into account when choosing sites for restoration. For example, restoration intended to improve salmonid habitat should concentrate on degraded alluvial reaches near the Tualatin Mountains.

2. Tributary streams in alluvial portions of the watershed generally have a high degree of riparian degradation and should be analyzed for effects upon water quality and aquatic resources.

3. Where feasible, riparian reforestation efforts should include the planting of both fast-growing deciduous species and slower-growing conifers. This will optimize both short-term and long-term shading, and increase the potential for long-term recruitment of Large Woody Debris.

[1] Technically, some parts of these reaches may not have an "impaired" shading function, as the function may not have been naturally present.

[2] This should not be taken to mean that a 40-foot buffer would provide the maximum possible benefit for shading and other functions. A wider buffer dominated by conifers would provide riparian conditions superior to those described under the reference forest.

Appendix Table 6.1. Summary of riparian vegetation types and ability to provide the riparian shading function, mainstem streams.

Reach	Stream	Percentage of stream length in width class						Total suboptimal	Impairment Class
		0-25 ft	25-50 ft	50-75 ft	75-100 ft	>100 ft	Other		
Dairy Creek		**1%**	**11%**	**28%**	**17%**	**41%**	**2%**	**15%**	
McKay Cr to Tualatin R	Dairy Creek	0%	1%	20%	26%	45%	8%	9%	
Council Cr to McKay Cr	Dairy Creek	0%	13%	43%	26%	17%	0%	13%	
Head to Council Cr	Dairy Creek	1%	14%	28%	12%	44%	1%	16%	
McKay Creek		**4%**	**22%**	**21%**	**6%**	**39%**	**8%**	**34%**	
Waibel Cr to Dairy Cr	McKay Creek	1%	20%	23%	5%	51%	1%	22%	
Jackson Cr to Waibel Cr	McKay Creek	4%	18%	21%	9%	45%	3%	25%	Moderate
E.F. McKay Cr to Jackson Cr	McKay Creek	7%	29%	20%	3%	21%	20%	56%	Moderate
Council Creek		**7%**	**5%**	**6%**	**1%**	**9%**	**71%**	**84%**	
Council Reservoir to Dairy Cr	Council Creek	6%	5%	11%	2%	14%	62%	73%	Severe
Head to Council Reservoir	Council Creek	8%	6%	1%	0%	3%	81%	95%	Extreme
East Fork Dairy Creek		**5%**	**23%**	**18%**	**8%**	**35%**	**10%**	**38%**	
Dairy Creek to Bledsoe Cr	EF Dairy	5%	35%	28%	7%	23%	3%	43%	Moderate
Bledsoe Cr to Gumm Cr	EF Dairy	6%	35%	29%	8%	19%	4%	44%	Moderate
Gumm Cr to trib (Sec16, NE1/4,LB)	EF Dairy	8%	26%	15%	9%	31%	11%	44%	Moderate
Sec 16 trib to Big Canyon	EF Dairy	2%	6%	9%	8%	41%	34%	42%	Moderate
Big Canyon to Murtagh Creek	EF Dairy	6%	14%	6%	8%	53%	13%	33%	Moderate
Murtagh Creek to Plentywater Cr	EF Dairy	3%	9%	13%	13%	55%	8%	20%	
Plentywater Creek to Denny Creek	EF Dairy	1%	15%	11%	3%	54%	16%	32%	Moderate
Denny Creek to Rock Creek	EF Dairy	0%	0%	5%	3%	86%	6%	6%	
West Fork Dairy Creek		**11%**	**32%**	**13%**	**5%**	**11%**	**28%**	**70%**	
Dairy Creek to Lousignont Canal	WF Dairy	10%	35%	27%	1%	4%	22%	68%	Severe
Lousignont Canal to Cedar Canyon	WF Dairy	9%	47%	12%	4%	8%	20%	77%	Extreme
Cedar Canyon to Garrigus Creek	WF Dairy	16%	28%	5%	5%	6%	41%	85%	Extreme
Garrigus Creek to Whitcher Creek	WF Dairy	13%	34%	14%	16%	10%	13%	60%	Severe
Whitcher Creek to Mendenhall Cr	WF Dairy	8%	17%	23%	3%	22%	28%	52%	Severe
Mendenhall Creek to Burgholzer Cr	WF Dairy	0%	20%	12%	4%	26%	37%	58%	Severe
Burgholzer Cr to Williams Creek	WF Dairy	9%	6%	4%	5%	12%	64%	79%	Extreme
Williams Cr to Cummings Cr	WF Dairy	2%	21%	11%	6%	55%	5%	28%	Moderate

Appendix Table 6.2. Summary of riparian vegetation types and ability to provide the riparian shading function, sampled portions of tributary streams.

	Percentage of stream length in width class							
Stream	0-25 ft	25-50 ft	50-75 ft	75-100 ft	>100 ft	Other	Total suboptimal	Impairment Class*
Jackson Cr	0%	0%	0%	0%	17%	83%	83%	Extreme
Waibel Cr	0%	0%	0%	0%	17%	83%	83%	Extreme
DC Canal	0%	4%	8%	2%	7%	78%	82%	Extreme
connector canal	0%	35%	18%	0%	17%	31%	66%	Severe
Lousignont Canal	11%	11%	0%	0%	0%	78%	100%	Extreme
Garrigus Cr	0%	0%	0%	0%	0%	100%	100%	Extreme
Cedar Canyon	0%	0%	20%	0%	0%	80%	80%	Extreme
Whitcher Cr	3%	7%	0%	0%	0%	90%	100%	Extreme
Burgholzer Cr	15%	30%	19%	0%	0%	35%	80%	Extreme
Mendenhall Cr	22%	17%	12%	5%	17%	27%	66%	Severe
Williams Cr	22%	14%	0%	4%	22%	38%	74%	Severe
Bledsoe Cr	8%	1%	0%	0%	2%	88%	97%	Extreme
Bausch Cr	0%	0%	0%	0%	0%	100%	100%	Extreme
Gumm Cr	6%	8%	15%	1%	18%	52%	66%	Severe
unnamed tribs	2%	3%	4%	2%	7%	83%	88%	Extreme

* Care should be taken in interpretation of this table. These figures generally represent the portions of these tributaries that are adjacent to larger streams. Usually, this was a small portion of the tributary that fit onto the same FSA slide area as the larger stream. Numbers may not be representative of the tributary as a whole.

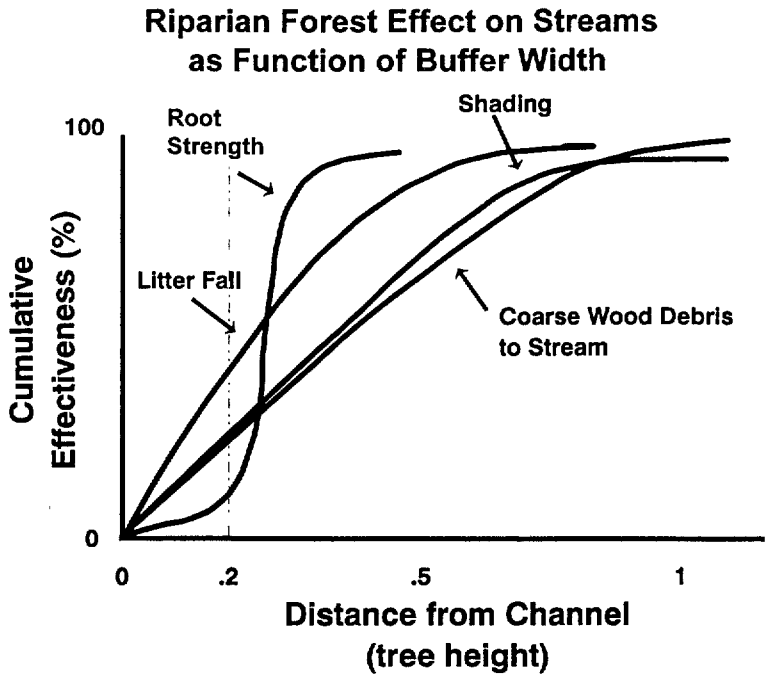


Figure V-12. Generalized curves indicating percent of riparian ecological functions and processes occurring within varying distances from the edge of a forest stand.

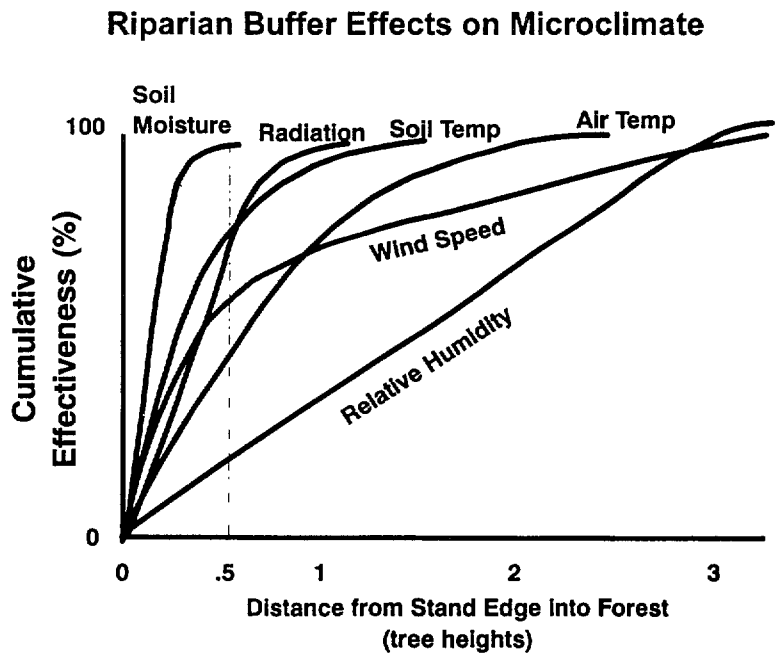


Figure V-13. Generalized curves indicating percent of microclimatic attributes occurring within varying distances of the edge of a riparian forest stand (after Chen, J 1991).

Appendix 7.

Summary of the culvert survey performed by Washington County. The source data for this table did not include surveys performed on McKay Creek.

Appendix 7. Culverts surveyed by Washington County. (Table excerpted from Washington County database.)

OK?	Road	RM	?	Stream	Subbasin	Basin	Owner	Type	Length	Diam	Drop	Depth	Slope	Above	Below
FALSE	156700	2.6	FALSE	Un Cr	Panther Cr	Dairy Cr	WASH	CCL	35	48	0	5		6	16
FALSE	Hwy 26	45.63	FALSE	Mendenhall Cr	West Fk	Dairy Cr	ODOT	CMP	92	72	0	8	4	3	1
FALSE	154300	0.1	FALSE	Kuder Cr	West Fk	Dairy Cr	WASH	CMP	45	36	0	6	2	2	1
FALSE	Hwy 26	42	TRUE	Cummings Cr	West Fk	Dairy Cr	ODOT	CCL	250	48	0	2		5	
FALSE	Dingheiser Rd	0.2	FALSE	Kuder Cr	West Fk	Dairy Cr	WASH	CCL	40	48	30	10	0.5	3	3
FALSE	223520		FALSE	Un Cr	West Fk	Dairy Cr	WASH	CMP	60	60	12	30	1	4	3
FALSE	160400	0.9	FALSE	Kuder Cr	West Fk	Dairy Cr	WASH	CMP	100	48	0	12	.5	2	2
FALSE	199300	1.25	FALSE	Un Cr	West Fk	Dairy Cr	WASH	CMP	120	48	60	12	2	6	4
FALSE	Hwy 47	74.8	TRUE	Un Cr	West Fk	Dairy Cr	ODOT	CCL	60	48	60	4	1	3	6
TRUE	Hwy 47	73.5	TRUE	Un Cr	West Fk	Dairy Cr	ODOT		0	0	0	0			
TRUE	Hwy 47	75.84	FALSE	Williams Cr	West Fk	Dairy Cr	ODOT		0	0	0	0			
TRUE	Hwy 47	79.38	FALSE	Kuder Cr	West Fk	Dairy Cr	ODOT		0	0	0	0			
FALSE	223520	2.15	FALSE	Un Cr	Un Cr	W Fk Dairy Cr	WASH	CMP	60	36	0	20	3	3	2
TRUE	Strassel Rd		FALSE	Poliwaski Canyon	Burgholzer Cr	W Fk Dairy Cr	WASH		0	0	0	0			
FALSE	196600	0.25	FALSE	Un Cr	Sadd Cr	Cedar Canyon Cr	WASH	CMP	40	24	0	6	.5	2	2
FALSE	126500		FALSE	Sadd Cr	Cedar Canyon Cr	W Fk Dairy Cr	WASH	CCL	50	48	0	1		3	3
FALSE	196600	0.2	FALSE	Sadd Cr	Cedar Canyon Cr	W Fk Dairy Cr	WASH	CCL	40	48	0	8	.5	2	2
FALSE	Hwy 6	45.82	FALSE	Cedar Canyon Cr	Sadd Cr	W Fk Dairy Cr	ODOT	ARCH	80	72	42	10	.5	2	6
TRUE	Hwy 6	44.92	FALSE	Cedar Canyon Cr	Sadd Cr	W Fk Dairy Cr	ODOT		0	0	0	0			
TRUE	Cedar Canyon		FALSE	Park Farms Cr	Sadd Cr	W Fk Dairy Cr	BENT		0	0	0	0			
FALSE	135700		FALSE	Plentywater Cr	East Fk	Dairy Cr	WASH	RCBC	75	48	20	12	1	8	6
FALSE	196200	0.05	FALSE	Murtaugh Cr	East Fk	Dairy Cr	WASH	CMP	45	72	18	20	2	10	8
FALSE	135700		FALSE	Un Cr	East Fk	Dairy Cr	WASH	CMP	80	48	24	2		8	8
FALSE	156700	1.1	FALSE	Rock Cr	East Fk	Dairy Cr	WASH	CMP	40	48	0	6	6	7	6
TRUE	Dairy Cr Rd		FALSE	Un Cr	East Fk	Dairy Cr	WASH		0	0	0	0			
TRUE	Dairy Cr Rd		FALSE	Un Cr	East Fk	Dairy Cr	WASH		0	0	0	0			
TRUE	Woolen Rd		FALSE	Un Cr	West Fk	Dairy Cr	WASH		0	0	0	0			
FALSE	Hwy 26	51	FALSE	Bausch Cr	Bledsoe Cr	E Fk Dairy Cr	ODOT	CMP	100	36	2	6	1	6	4
FALSE	181400		FALSE	Bausch Cr	Bledsoe Cr	E Fk Dairy Cr	WASH	CMP	80	36	16	8	1	7	6
FALSE	132600	0.5	FALSE	Un Cr	Gumm Cr	E Fk Dairy Cr	WASH	CMP	40	48	0	2	1	2	2
TRUE	Davidson Rd		FALSE	Wirtz Br	Bledsoe Cr	E Fk Dairy Cr	WASH		0	0	0	0			