Mid-Willamette River:
Boundary Conditions and Model Setup

DRAFT

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Introduction

The Mid-Willamette River system under consideration runs from the Salem, Oregon (RM 85.4) down to the Willamette Falls in Oregon City (RM 26.8) as shown in Figure 1.

The Portland General Electric (PGE) and the Oregon Department of Environmental Quality are interested in a water quality model for the mid-Willamette River system for use in identifying the impact of the dam and flashboards at Willamette Falls on the water quality upstream. The goals of this modeling effort are to:

- Gather data to construct a computer simulation model of the mid-Willamette system including the Newberg pool and upstream.
- Ensure that the model accurately represents the system hydrodynamics and water quality (flow, temperature, dissolved oxygen and nutrient dynamics);

A hydrodynamic and water quality model, CE-QUAL-W2 Version 3 (Wells, 1997), is being applied to model the mid-Willamette River system. CE-QUAL-W2 is a two dimensional (longitudinal-vertical), laterally averaged, hydrodynamic and water quality model that has been under development by the Corps of Engineers Waterways Experiments Station (Cole and Wells, 2000).

In order to model the system, the following data were required:

- Willamette River flow, water level and water quality data at the upstream system boundary (Salem)
- Tributary inflows and water quality
- Meteorological conditions
- Bathymetry of the Willamette River
- Point source (wastewater treatment plants, WWTPs) inflows and water quality characteristics
- Dam and flashboard characteristics at the Willamette Falls

Data have been primarily collected from the summer of 2001. This report summarizes the data used in the modeling effort. Information provided in this report was organized in the following sections:

- Rationale for using CE-QUAL-W2 Version 3
- Model geometry for the mid-Willamette River
- Willamette River flow and water level data
- Meteorological data
- Point Source flow and water quality data
- Tributary inflow and water quality data
- Groundwater flows and water quality data

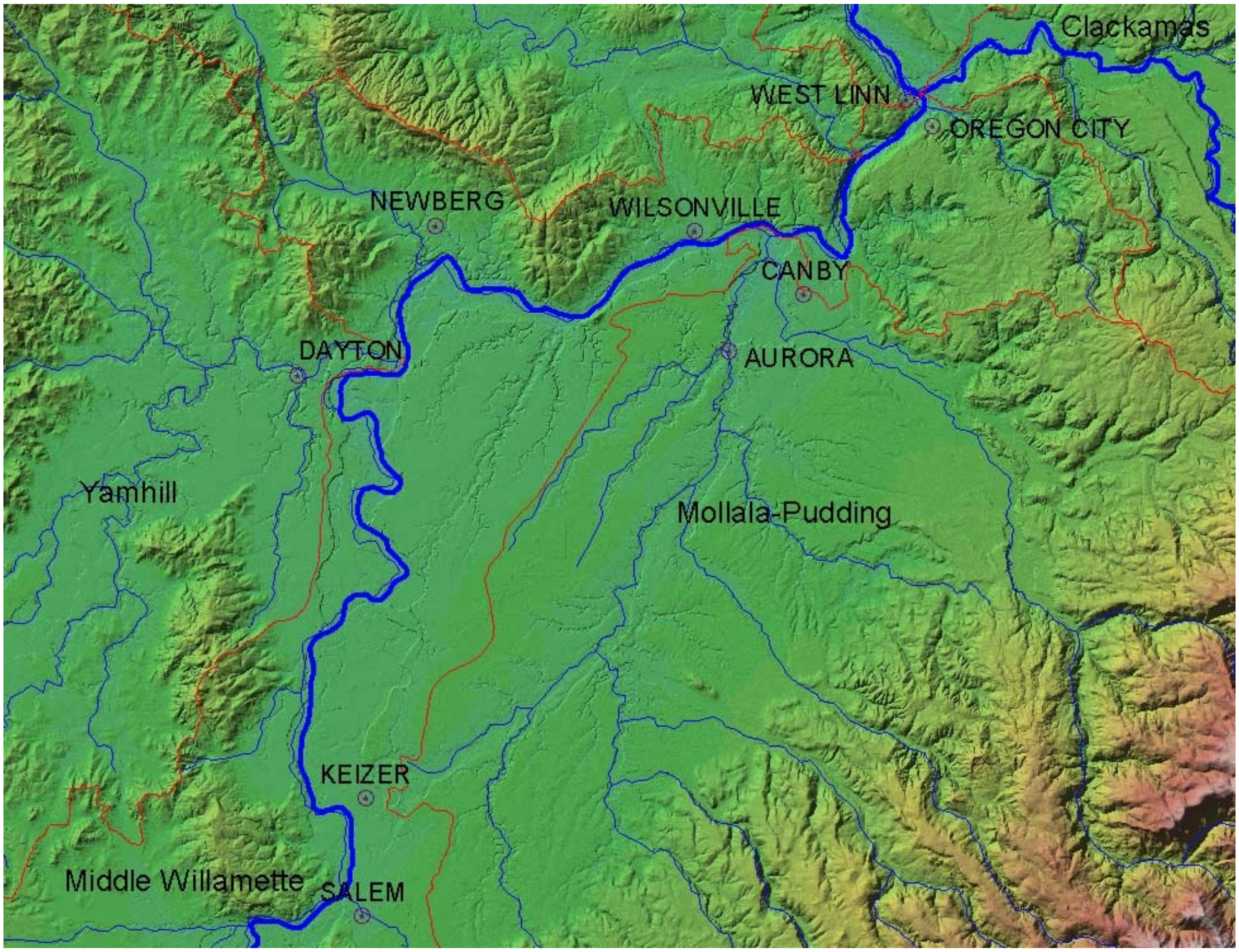

Figure 1. Model study area from Salem, OR to the Willamette Falls in Oregon City, OR

Model Selection

Selection of the appropriate water quality model is a function of properly identifying the water quality problem ("conceptualization") and selecting a model which appropriately describes the water quality changes in the water body, is theoretically valid, and can be easily adapted to site-specific physical characteristics of the water body.

The performance of a mathematical model in predicting the existing and future water quality dynamics of a system is dependent on the following steps:

(i) identification of the problem
(ii) selection of model type and relationship of model to the problem
(iii) computational representation
(iv) model response studies or model sensitivity analyses
(v) model calibration
(vi) application of model to evaluate management strategies

Because there are many water quality models available, a choice of the appropriate model would be made after considering the following questions: What physical processes are represented in the model and which are ignored? How are physical processes included in the model? What processes are represented by model coefficients? For example in defining the problem, the following questions could be asked:

(i) What are the dominant physical processes at work and can the chosen model represent those processes? (such as, how does the water move? Is there stratification, wind-driven currents, and/or selective withdrawal?)
(ii) What are the spatial and temporal scales of these processes and can the model represent them? (such as, is steady-state representation adequate, is 1-D, 2-D, or 3-D spatial discretization necessary?)

The choice of the proper model is also based on answering
(1) site specific questions (physical characteristics of the each system component - river or reservoir reach, water quality cycles, algal types),
(2) management objectives (required accuracy, use for future studies),
(3) project resources (data availability, staff constraints, time limitations).

The model chosen for the mid-Willamette River system was the Corps of Engineers model CE-QUAL-W2 Version 3.1. CE-QUAL-W2 Version 2 is a dynamic 2-d (x-z) model developed for stratified water-bodies (Cole and Buchak, 1995). This is a Corps of Engineers modification of the Laterally Averaged Reservoir Model (Edinger and Buchak 1978). CE-QUAL-W2, whose grid is shown in Figure 2, consists of directly coupled hydrodynamic and water quality transport models. Hydrodynamic computations are influenced by variable water density caused by temperature, salinity, and dissolved and suspended solids. Developed for reservoirs and narrow, stratified estuaries, CE-QUAL-W2 can handle a branched and/or looped system with flow and/or head boundary conditions. With two dimensions depicted, point and non-point loading can be spatially distributed. Relative to other 2-D models, CE-QUAL-W2 is efficient and cost effective to use. This model allows the user to use the Quickest numerical scheme for constituent transport rather than upwinding.

In addition to temperature, CE-QUAL-W2 Version 2 simulates as many as 20 other water quality variables. Primary physical processes included are surface heat transfer, short-wave and long-wave radiation and penetration, convective mixing, wind and flow induced mixing, entrainment of ambient water by pumped-storage inflows, inflow density stratification as impacted by temperature and dissolved and suspended solids. Major chemical and biological processes in CE-QUAL-W2 include: the effects of DO of atmospheric exchange, photosynthesis, respiration, organic matter decomposition, nitrification, and chemical oxidation of reduced substances; uptake, excretion, and regeneration of phosphorus and nitrogen and nitrification-denitrification under aerobic and anaerobic conditions; carbon cycling and alkalinity-pH-CO2 interactions; trophic relationships for total phytoplankton; accumulation and decomposition of detritus and organic sediment; and coliform bacteria mortality.

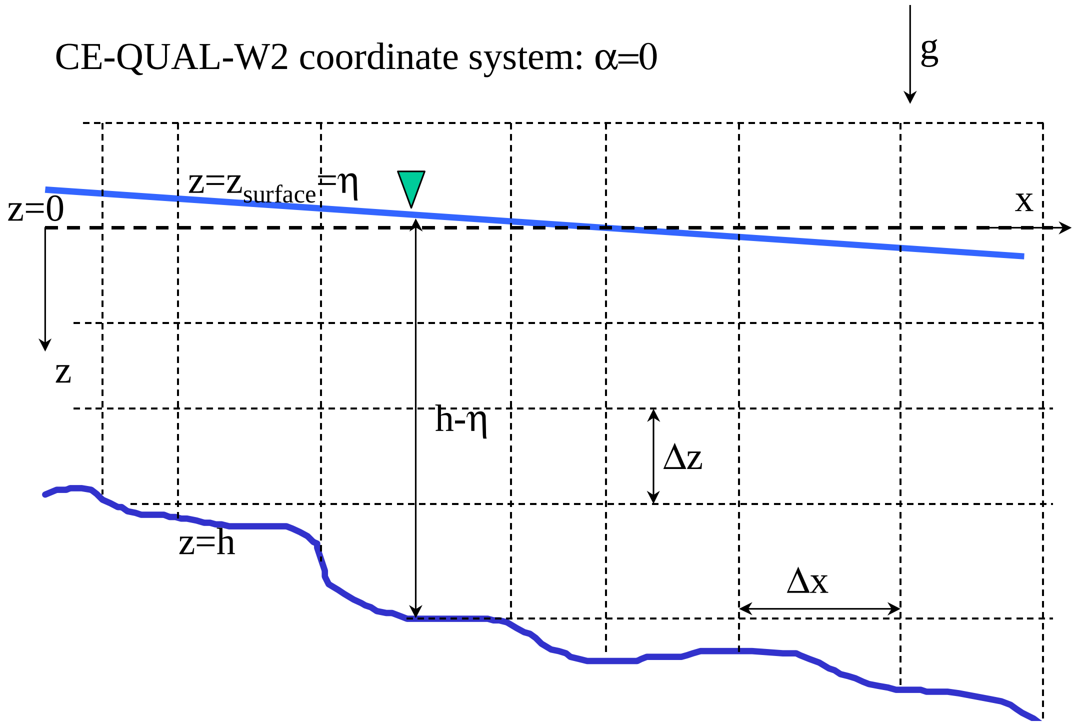

Figure 2. Coordinate system for CE-QUAL-W2 Version 2.

Building on the foundation of Version 2, CE-QUAL-W2 Version 3.1 is essentially the same as Version 2 except with these following enhancements:

- Ability to specify the channel slope and model sloping river channels in 2-D and use a sloping channel grid (see Figure 3).
- Use of Ultimate Quickest Numerical Scheme for improved numerical accuracy
- Implicit Solution of Vertical Momentum Transfer allowing for water surface solutions in river channels
- Conservation of Longitudinal Momentum at all branch intersections
- Ability to add dams and reservoirs in series with rivers and estuaries
- A user-defined number of water quality model parameters. In addition to Version 2 parameters includes: a user-defined number of algal types, inorganic suspended solids types, dissolved and particulate silica, labile and refractory particulate organic matter, and arbitrary constituents subject to decay and sedimentation, and BOD groups
- Ability to output numerous model derived variables such as TKN, TSS, TOC that can be compared directly to field data
- In addition to existing sediment oxygen demand and first order sediment decay model, there will be an option to model complex sediment diagenesis
- Choice of model reaeration coefficients and evaporation formulae based on water body type
- Model kinetic coefficients are now variable as a function of water body
- Ability to add hydraulic structures between model branches such as dams, spillways, pipes, gates, and float-activated pumps
- All withdrawals now use selective withdrawal theory to compute the outflow distribution

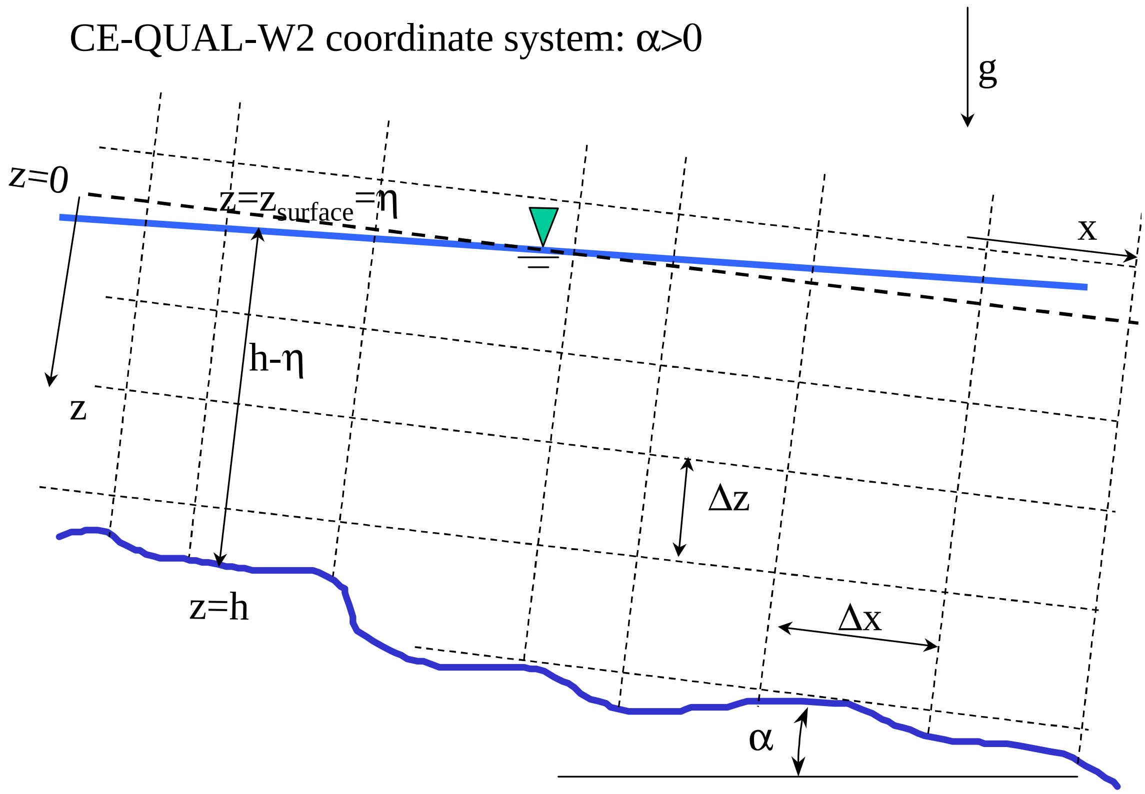

Figure 3. Coordinate system for CE-QUAL-W2 Version 3.1.

Models, such as WQRSS (Smith 1978), HEC-5Q (Corps of Engineers 1986), and HSPF (Donigian, et al. 1984), have been developed for river basin modeling but have serious limitations. One issue is that the HEC-5Q (similar to WQRSS) and HSPF models incorporate a one-dimensional, longitudinal river model with a one-dimensional, vertical reservoir model (one-dimensional for temperature and water quality and zero dimensional for hydrodynamics). The modeler must choose the location of the transition from 1-D longitudinal to 1-D vertical. Besides the limitation of not solving for the velocity field in the stratified, reservoir system, any point source inputs to the reservoir section are spread over the entire longitudinal distribution of the reservoir layer.

Also, other one-dimensional reservoir models, such as the HEC WQRRS (Water Quality River-Reservoir Simulation) model and the Corps's CE-QUAL-R1, are also not adequate to compute 2-D circulation within pool areas. These models conceptualize a pool as well mixed in each horizontal slab, i.e., over the length and the width of the system. By making this assumption, the vertical and longitudinal circulation patterns within a pool cannot be resolved.

Based on the depth of section of the Newberg pool, a one-dimensional reservoir model of the river system would not be adequate because of possible longitudinal and vertical gradients in water quality. Also, because the Willamette River system is relatively narrow, lateral homogeneity can be assumed without loss of resolution.

The advantages of CE-QUAL-W2 Version 3.1 to other river models were illustrated in Wells (1999) where one primary advantage of CE-QUAL-W2 was that the Manning's friction factor did not need to be varied as the river stage increased.

For this project, the CE-QUAL-W2 River Basin Model Version 3.1 (as schematized in Figure 4) is proposed as the most appropriate for modeling the Mid-Willamette River system since it contains the following elements:

- Two-dimensional, dynamic hydrodynamics and water quality capable of replicating any density stratified environment that might exist in the Newberg pool.
- Multiple suspended solids groups to assess particles settling under different management scenarios
- The hydraulic elements at Willamette Falls (dams and flashboards) can be accurately represented
- The model is a state-of-the-art tool with features not found in other models
- The model has a seamless linkage between rivers, pools and reservoirs.

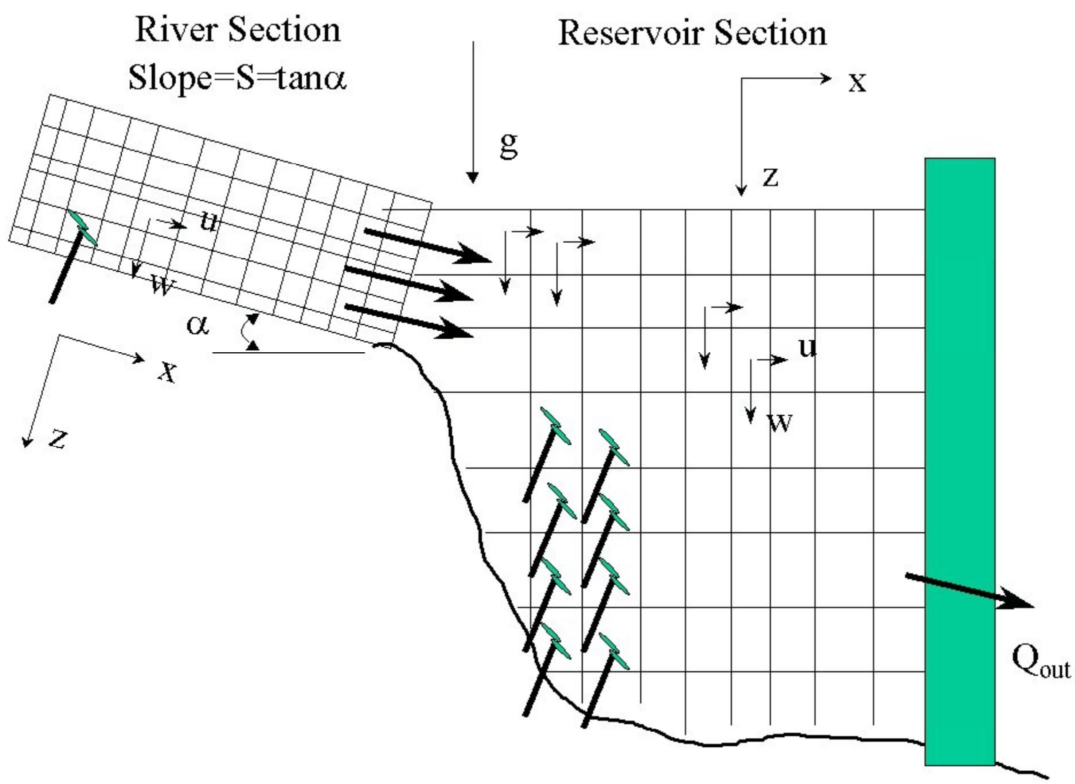

Figure 4. Conceptual schematic of river-reservoir connection in CE-QUAL-W2 Version 3.

This model has been under development for many years and is a public-domain code maintained by the Corps of Engineers, Waterways Experiments Station (WES), located in Vicksburg, Mississippi. The current version, Version 2 (Cole and Buchak, 1995), has been superceded by Version 3.1 developed by WES and Wells (1997). Version 3 has and is undergoing rigorous testing and has been successfully applied to many river basin systems. Further information about CE-QUAL-W2 Version 3 is shown at http://www.ce.pdx.edu/w2.

Model Forcing Data

The model simulation period is from June 11th to September 30th, 2001 (Julian days: 162.50 – 273.5). The data need to support the model consists of three components: the river channel bathymetry, the meteorological conditions and the boundary condition inflows, temperature and concentration. Each of these model forcing components is discussed in this report.

Bathymetry

A detailed discussion and layout of the grid is shown in Appendix 1. An overview of the grid and the data sources are documented in the following section.

Bathymetry Development

Bathymetric data for the mid-Willamette river came from multiple sources as shown in Figure 5. PGE collected detailed bathymetric data just upstream and downstream of the Willamette Falls (RM 26.8) as shown in Figure 6. The PGE data set extended upstream to just above the confluence with the Tualatin River. NOAA maintains a navigation hart of the stretch of the Willamette River from the Willamette Falls to Ash Island (RM 53). Figure 7 shows a sample section of a NOAA navigation chart for the area surrounding the Tualatin River confluence with the Willamette River. Upstream of the NOAA navigation chart data from RM 53 to RM 85.4 (Salem) bathymetric data consisted of cross sections taken by the USGS, as shown in Figure 8, QUAL2E model trapezoidal cross sections, and thalweg data surveyed by USGS. The stream banks and floodplain data were developed from a USGS digital elevation model data.

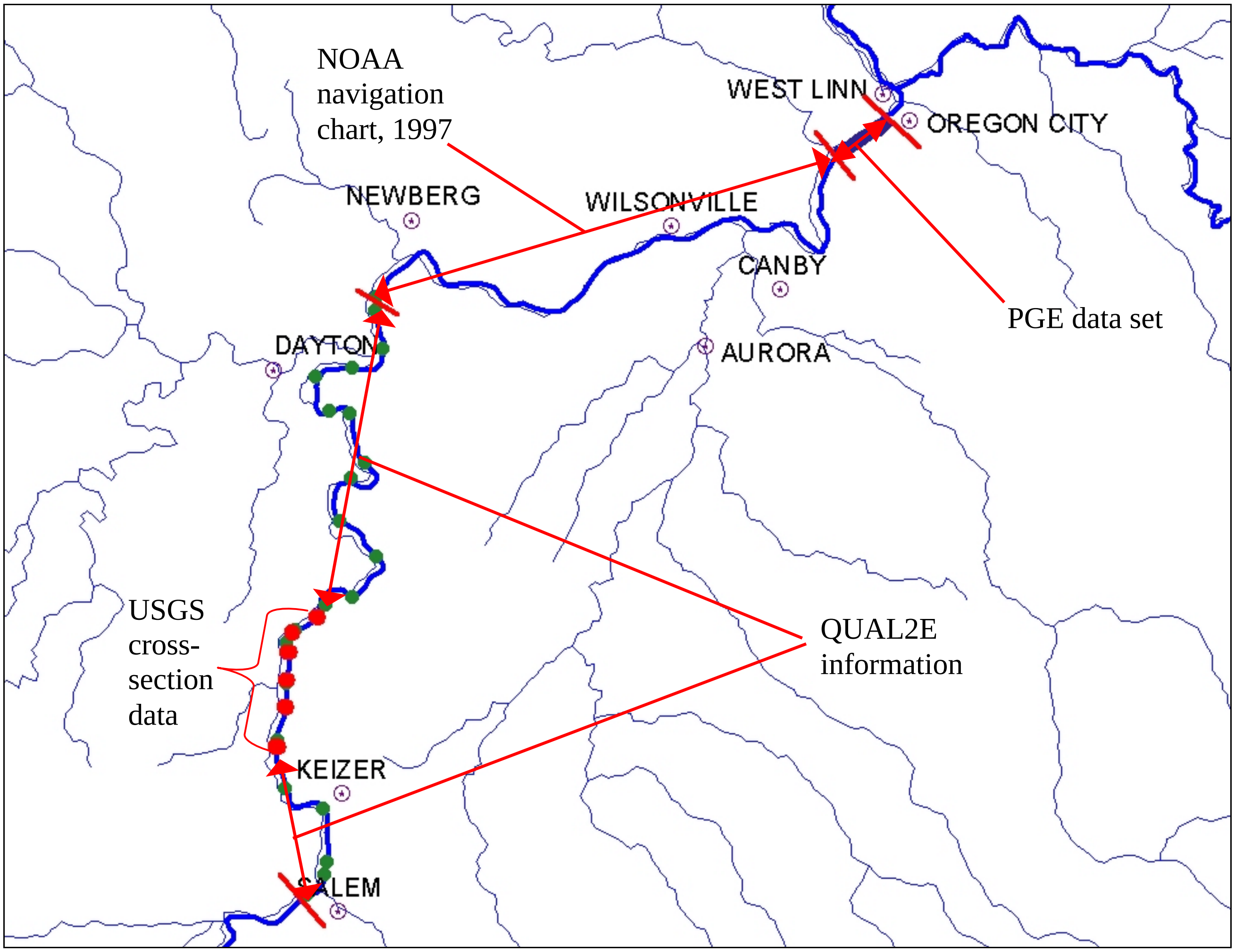

Figure 5. Sources and extent of bathymetric data

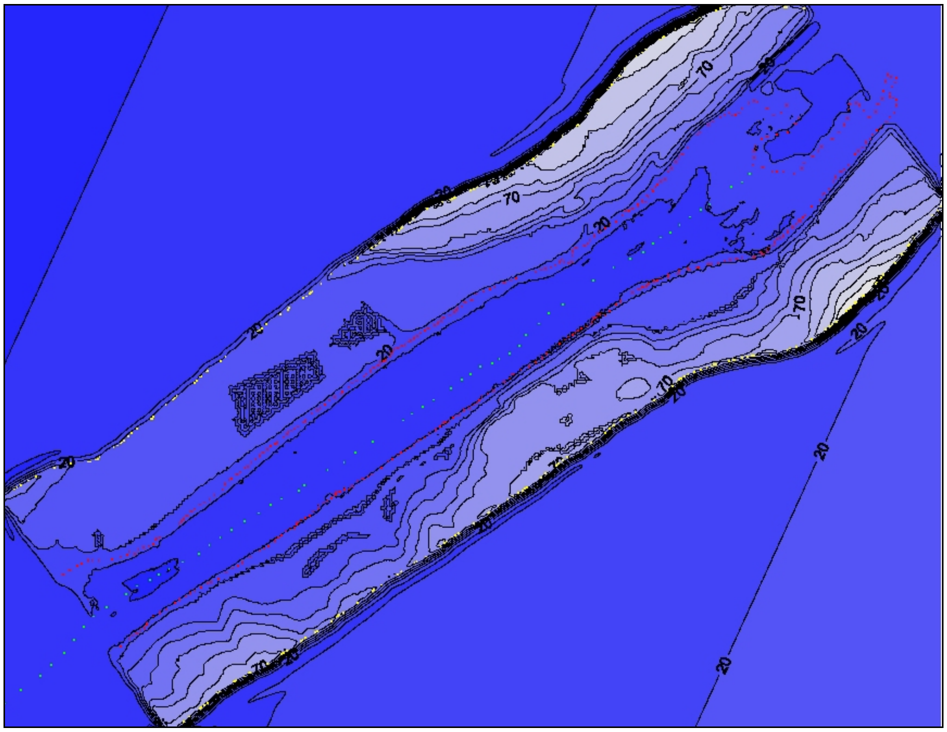

Figure 6. Contour plot of Willamette River bathymetry just upstream of the Willamette Falls, PGE 2002

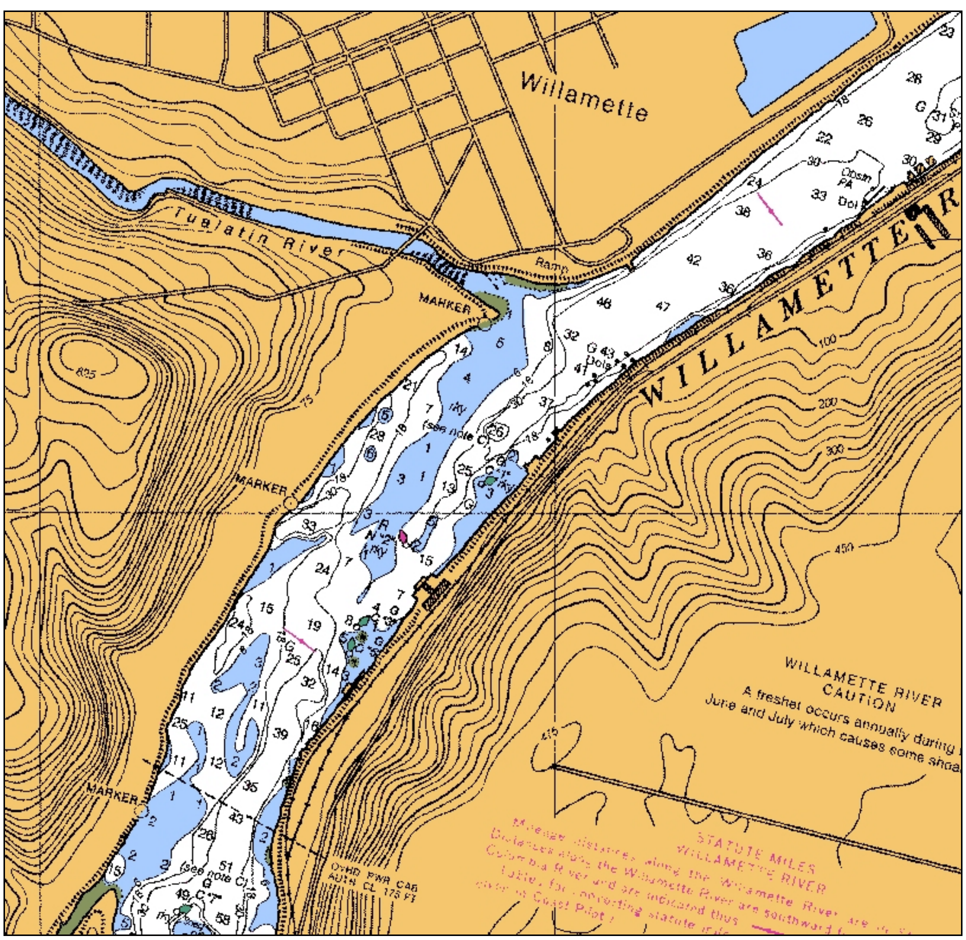

Figure 7. NOAA navigation chart of the Willamette River from the Willamette Falls to Ash Island, RM 53

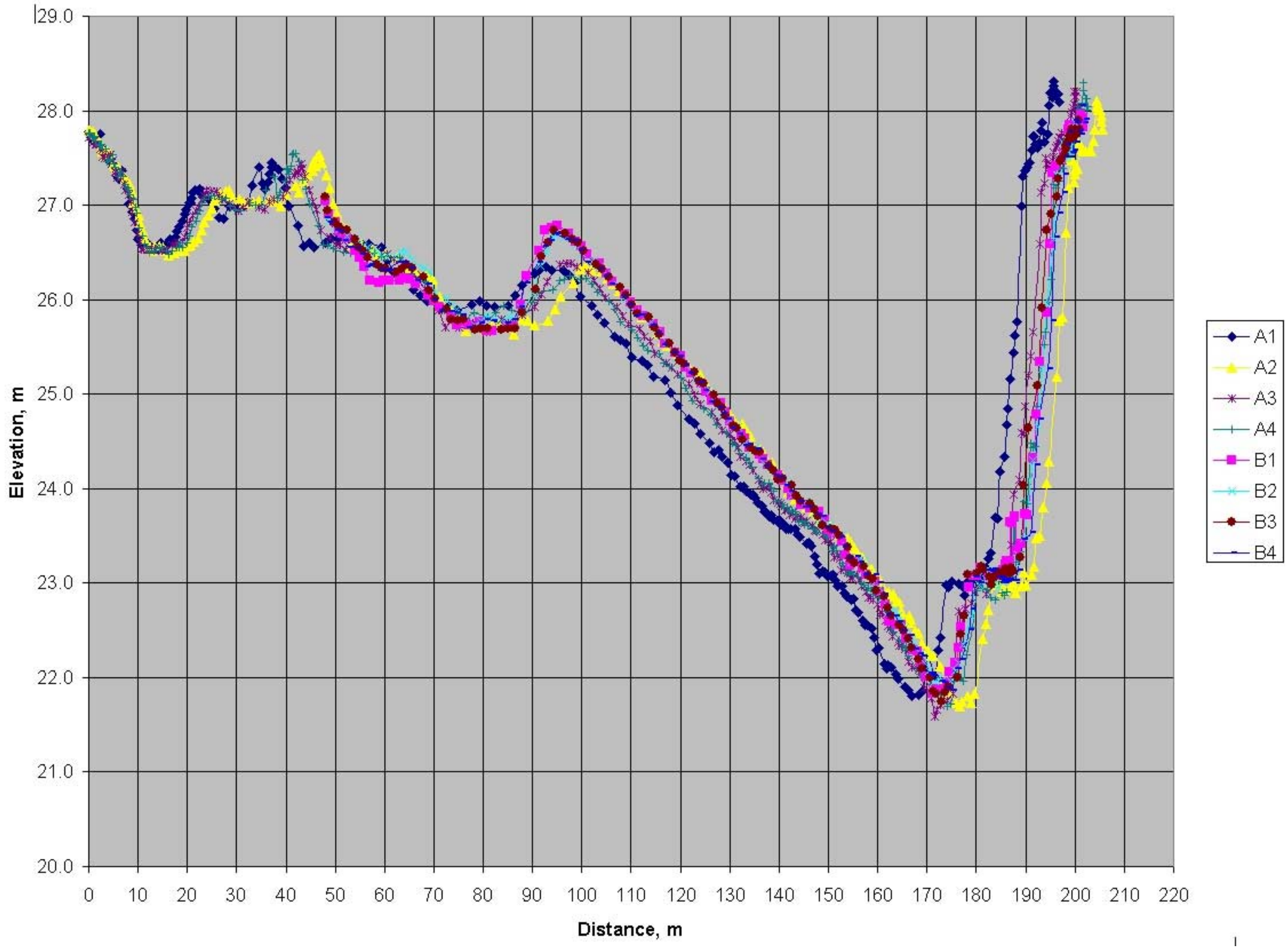

Figure 8. Sample USGS bathymetric cross section

Grid Layout

The data was combined and used to create a contour plot of the stream channel in SURFER contour program and used to generate the model grid. The model grid consists of 3 water bodies and 6 branches as shown in Figure 9 with grid layout specifications provided in Table 1. Appendix 1 shows the details of each section of grid used to construct the entire model.

Table 1. Model grid layout

Water Body	Branch	Description	Seg ment Start	Segm ent End	Number of Segments	Segment Length, m	Layer Thickness, m	Length, mi	Start RM	End RM
1	1	Salem to Wheatland	1	85	85	250.2	1	12.90	85.50	72.59
2	2	Wheatland to Dayton	86	179	94	250.2	1	14.30	72.59	58.29
	3	Dayton to upstream end of Ash Island	180	213	34	254.1	1	5.05	58.29	53.24
	4	Side channel around Wheatland Bar	214	226	13	257.3	1	1.76		
3	5	Upstream end of Ashland Island to Willamette Falls	227	397	171	251.0	1	26.48	53.24	26.76
	6	Side channel around Ash Island	398	407	10	268.2	1	1.33		

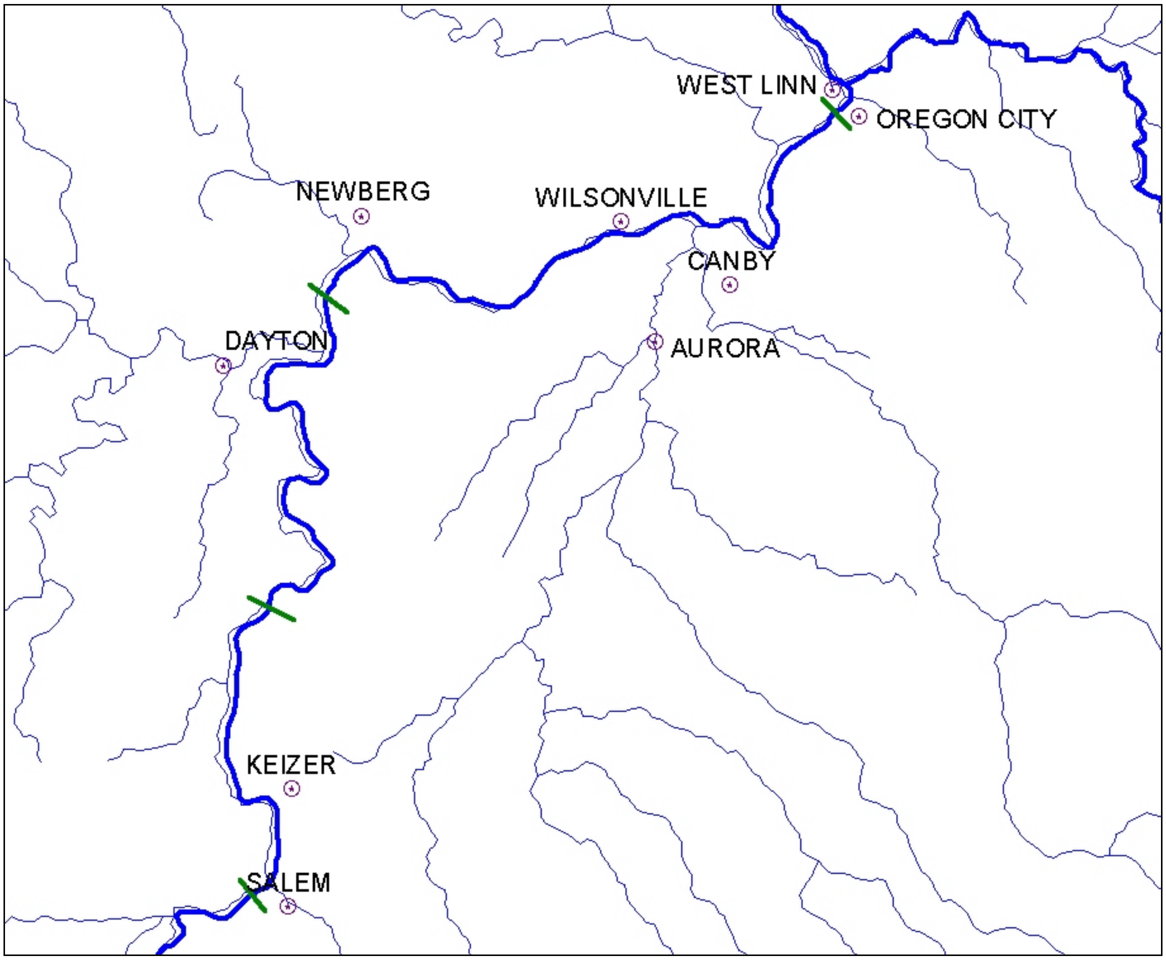

Figure 9. CE-QUAL-W2 model grid layout showing the breaks between model water bodies

Boundary Conditions

The boundary conditions for the model were developed by combining flow, stage, temp, and water quality data for various sources to develop boundary condition files for all of the tributary rivers to the mid-Willamette River, the upstream boundary conditions and for calibration at in-stream locations. Figure 10 shows a map the location of various monitoring sites along the mid-Willamette River, which were used for developing the boundary conditions or for model calibration.

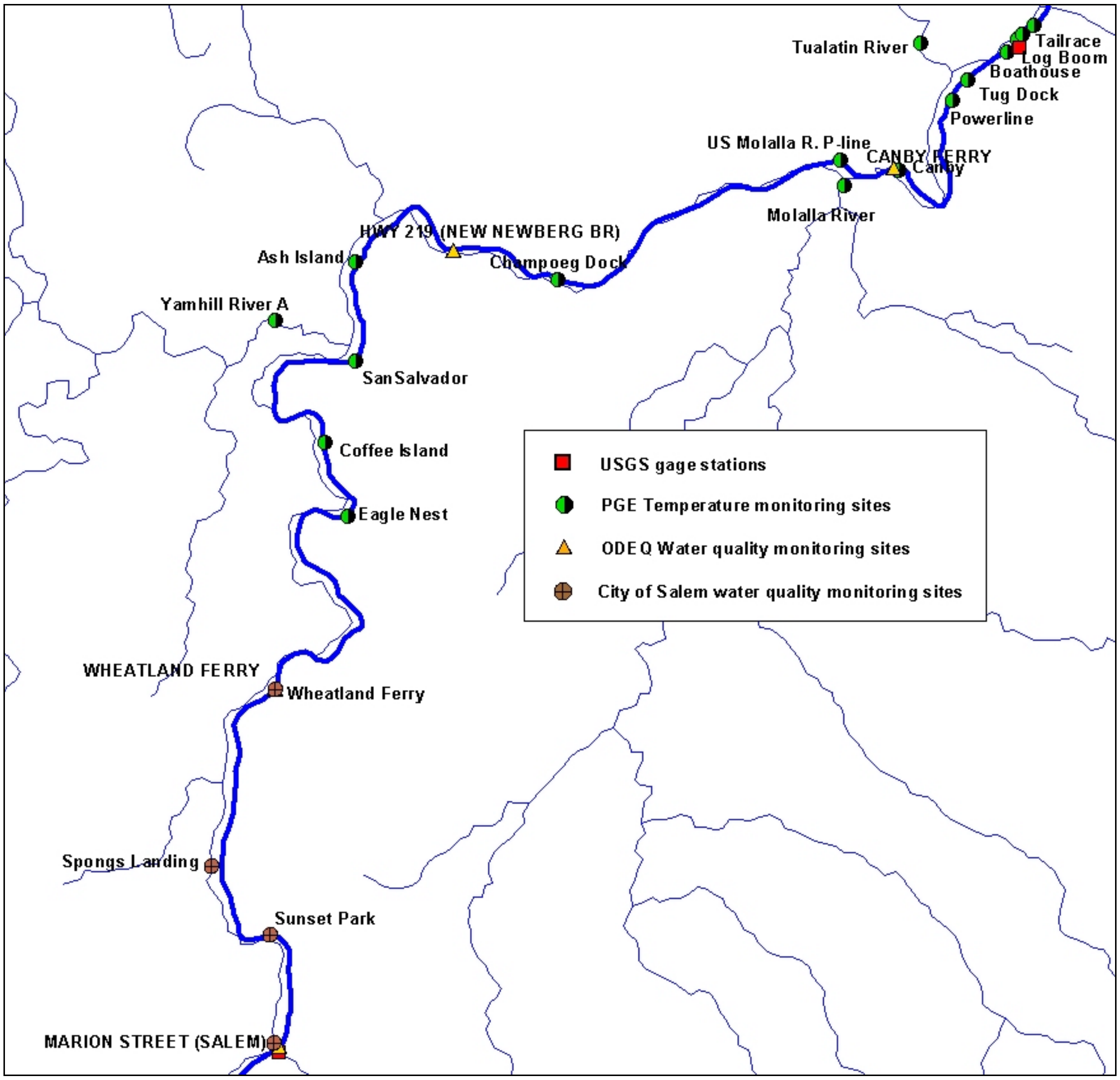

Figure 10. In-stream and boundary condition monitoring sites

Willamette River at Salem

The Willamette River at Salem was used as the upstream boundary condition for the model because there was continuous record of flow, stage, and temperature data at the site. The USGS maintains a gage station (14191000) at RM 85.4 on the Willamette. Figure 11 shows the continuous flow data recorded at the gage station from April to October 2001. Figure 12 provides the water level elevation data at the same gage station. Water temperature was recorded at the gage station during 2001 but there was a large gap in the data from July to September, as shown in Figure 13. Figure 13 also provided water temperature data recorded at Keizer on the Willamette (RM 82) and at a site just upstream of the confluence of Rickerall Creek and the Willamette River (RM 88). Based on the data sets shown in Figure 13 a correlation was developed between the temperature data at Salem at the site upstream of Rickerall Creek. The correlation relationship and equation are shown in Figure 14. Using the correlation a the data gap in the Salem water temperature time series was filled and the entire record is plotted in Figure 15 showing which data set was calculated which was measured.

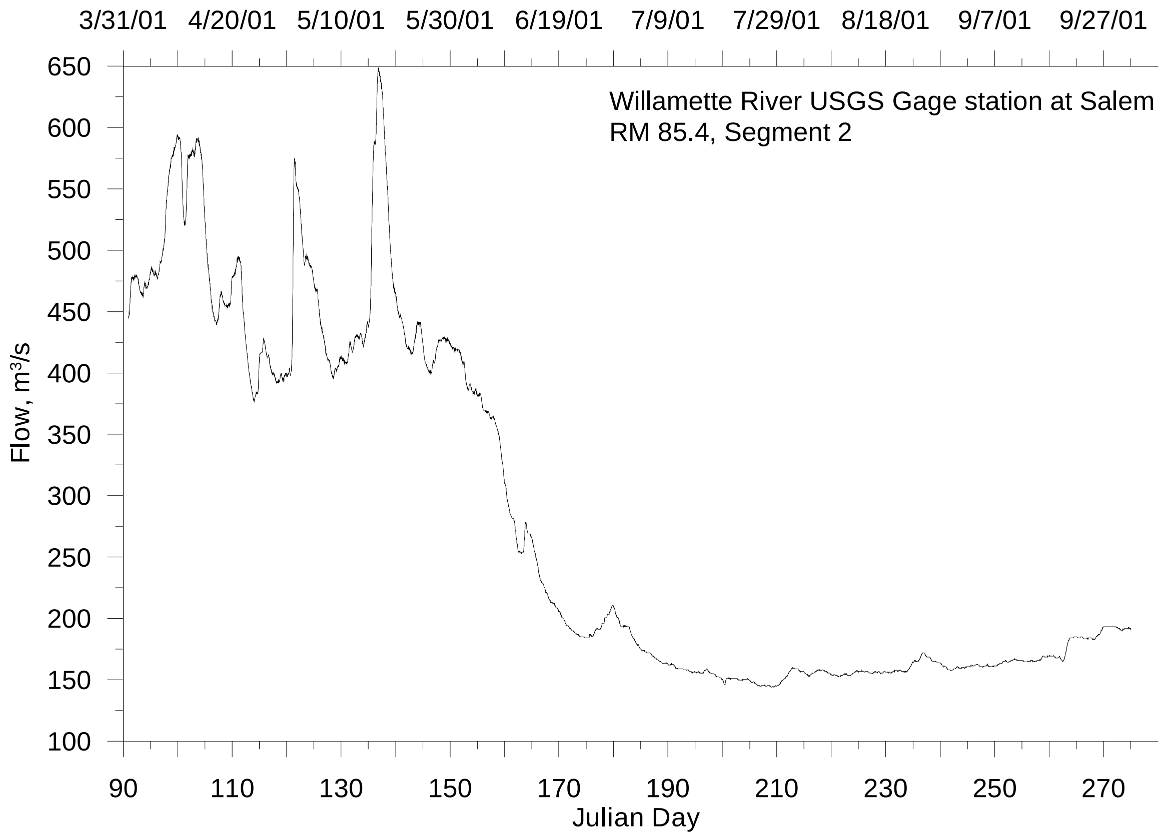

Figure 11. Flow at USGS gage station (14191000), Willamette River at Salem, RM 85.4, April to October 2001

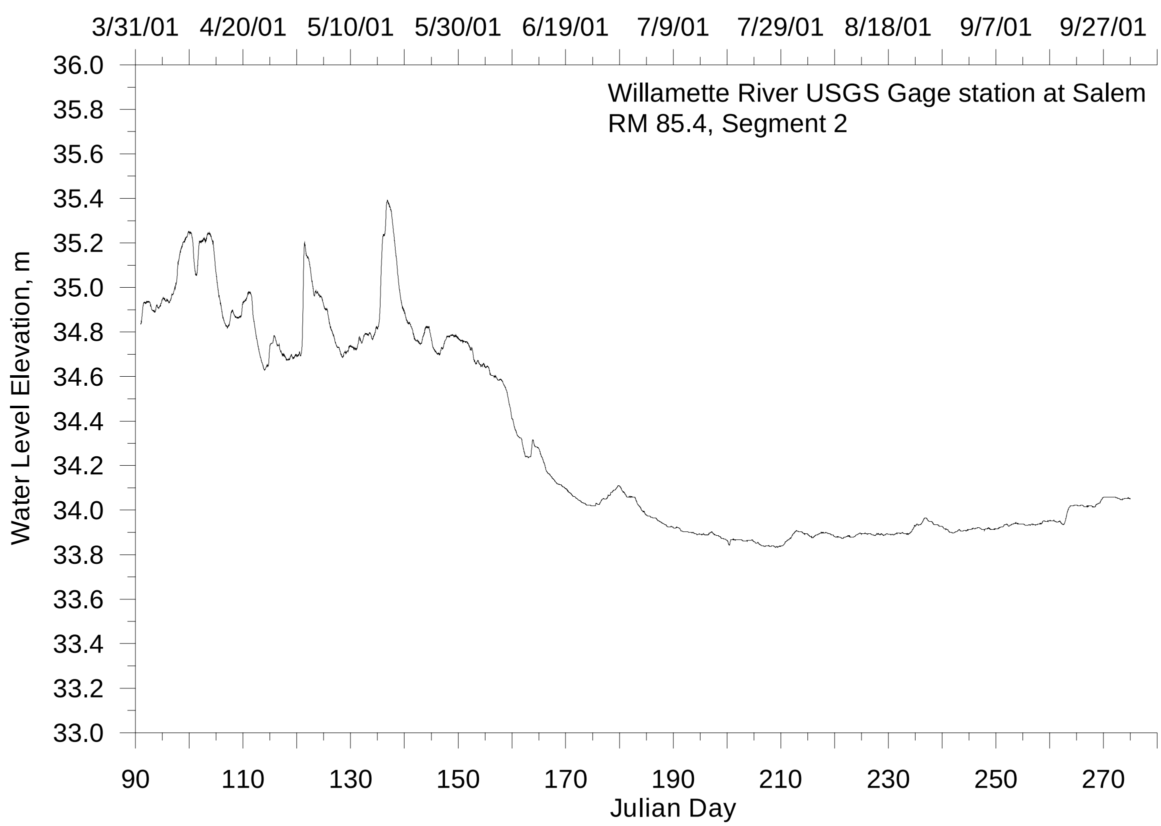

Figure 12. Water level elevation at USGS gage station (14191000), Willamette River at Salem, RM 85.4, April to October 2001

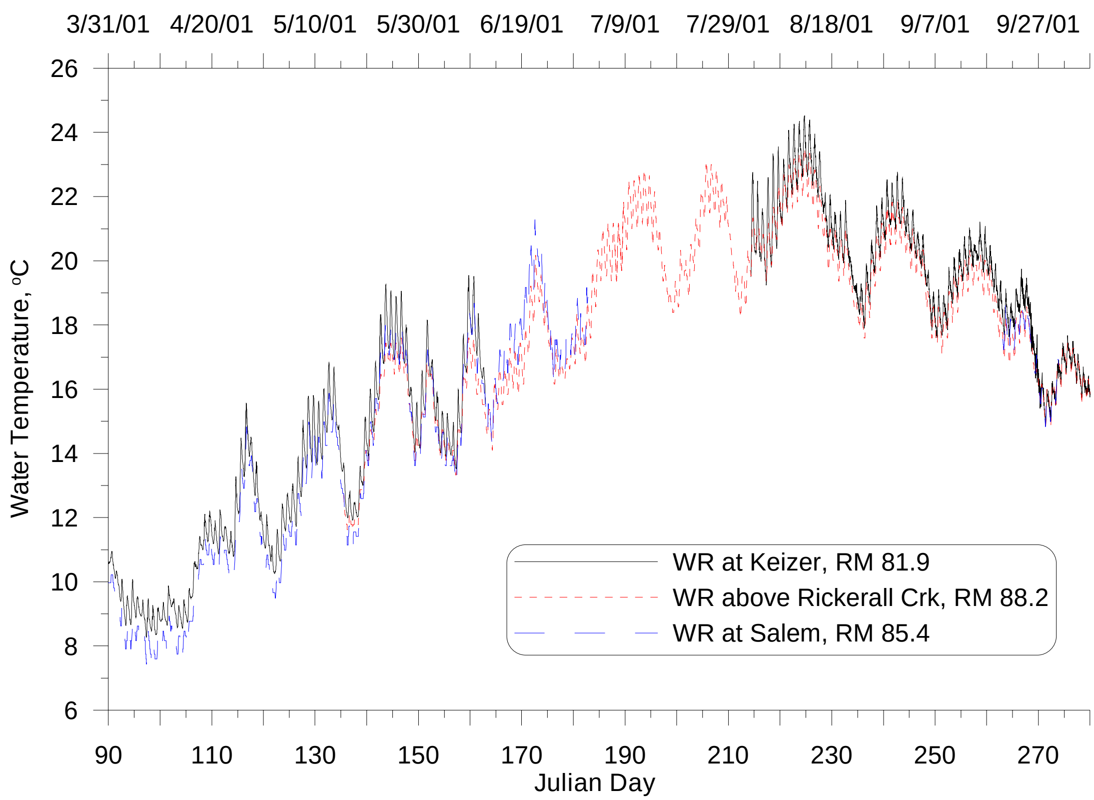

Figure 13. Water temperature data in the Willamette River near Salem, April to October 2001

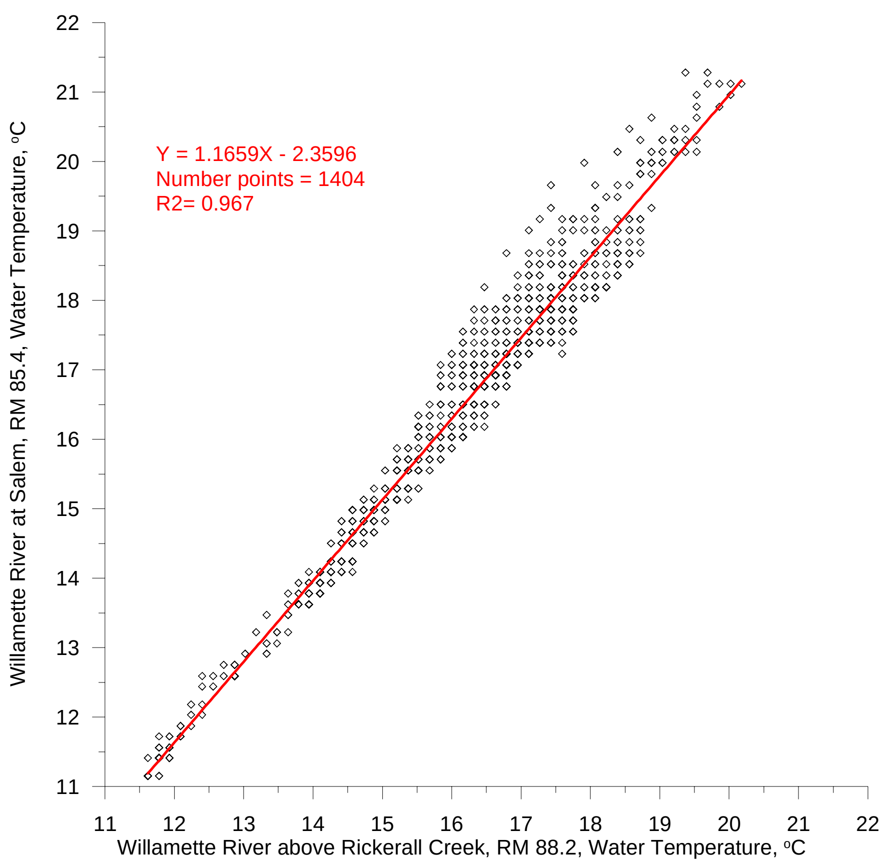

Figure 14. Water temperature correlation between data above Rickerall Creek (RM 88.2) and at Salem (RM 85.4)

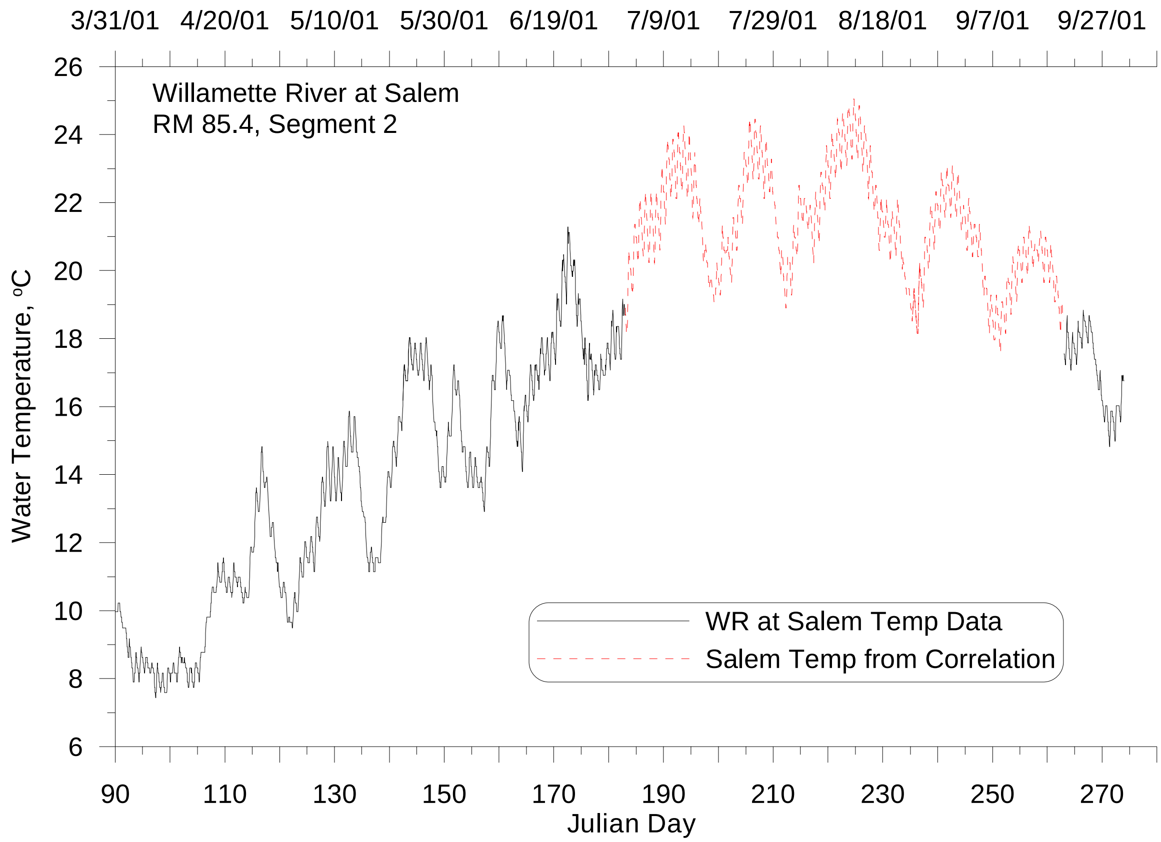

Figure 15. Water temperature at Salem, April to October 2001

Water quality data for the upstream boundary condition on the Willamette at Salem was developed from data from Oregon Department of Environmental Quality's (ODEQ) monthly monitoring program and from the City of Salem's bi-monthly monitoring program. Table 2 provides a list of the water quality constituents incorporated in the model.

Table 2. Water quality constituents incorporated in the model

Water Quality Constituents	Water Quality Constituents
Total dissolved solids	Refractory dissolved organic matter
Tracer (dye)	Labile particulate organic matter
Conductivity	Refractory particulate organic matter
Inorganic Suspended solids	Algae
Ortho-Phosphorus	Total inorganic carbon
Ammonia	Alkalinity
Nitrate-Nitrite	Dissolved oxygen
Labile dissolved organic matter	

The procedure used to develop the water quality input file for the upstream boundary condition is discussed in Appendix 2. Figure 16 through Figure 18 provide the water quality values used in the model during 2001.

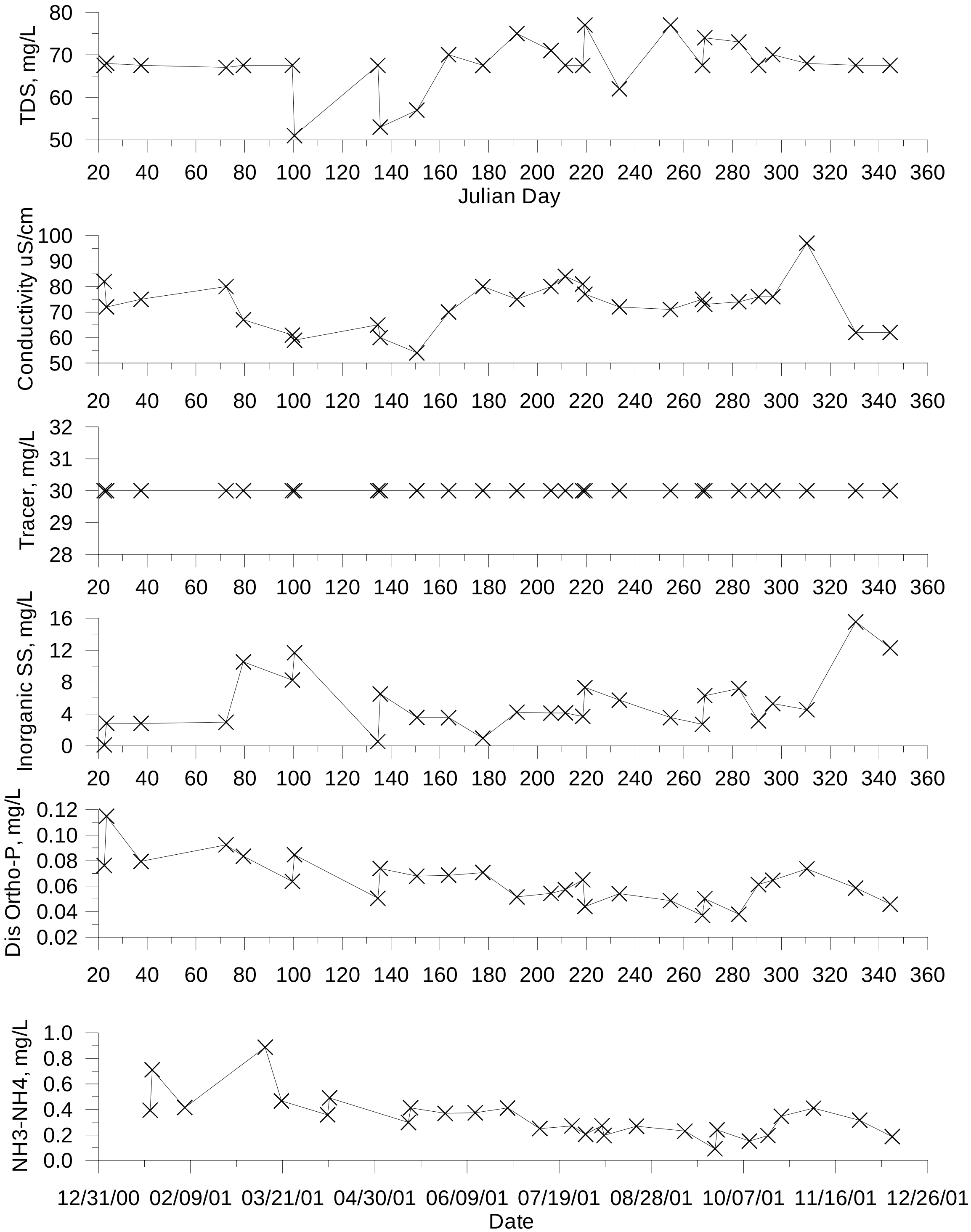

Figure 16. Water quality constituents at Salem (part 1)

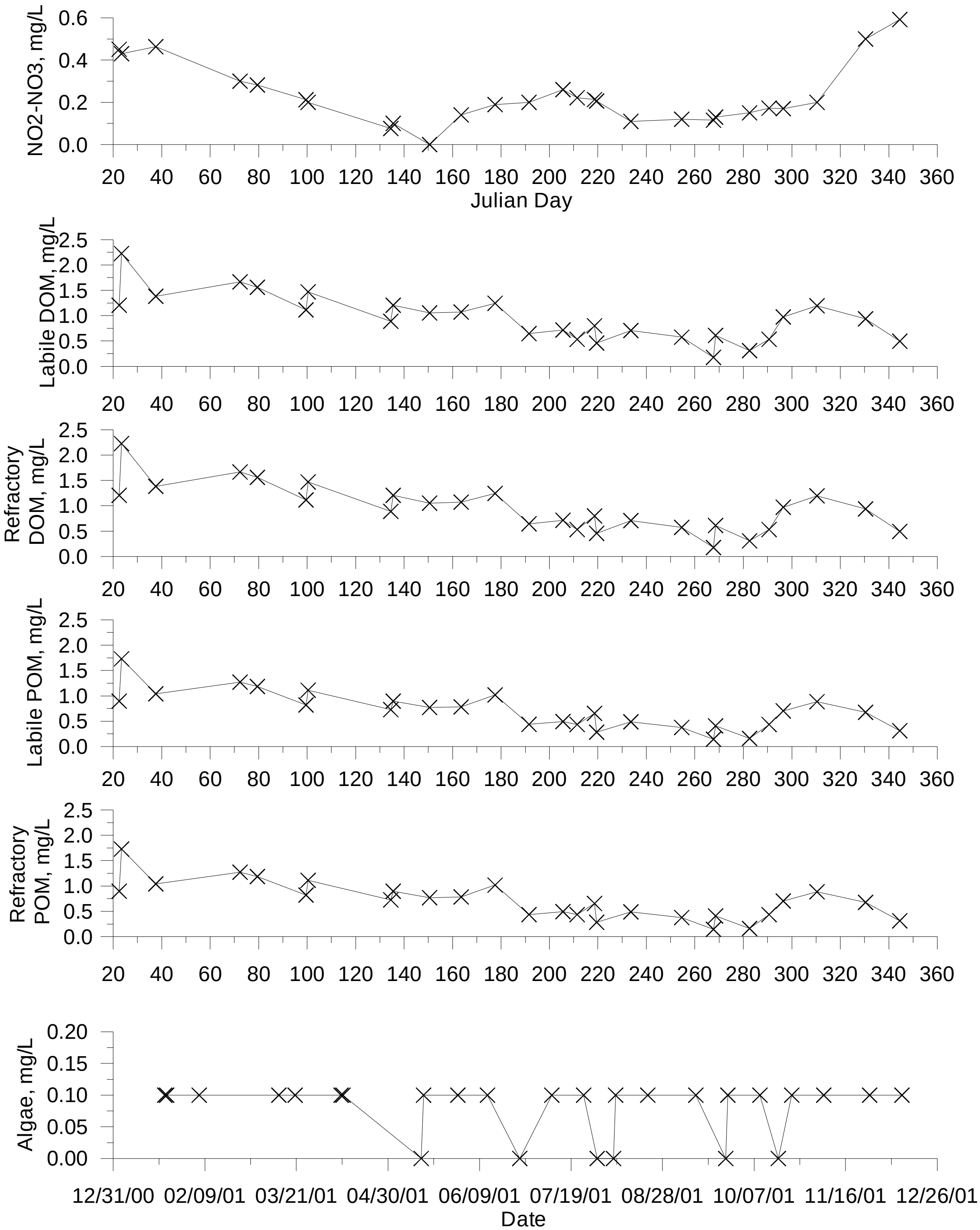

Figure 17. Water quality constituents at Salem (part 2)

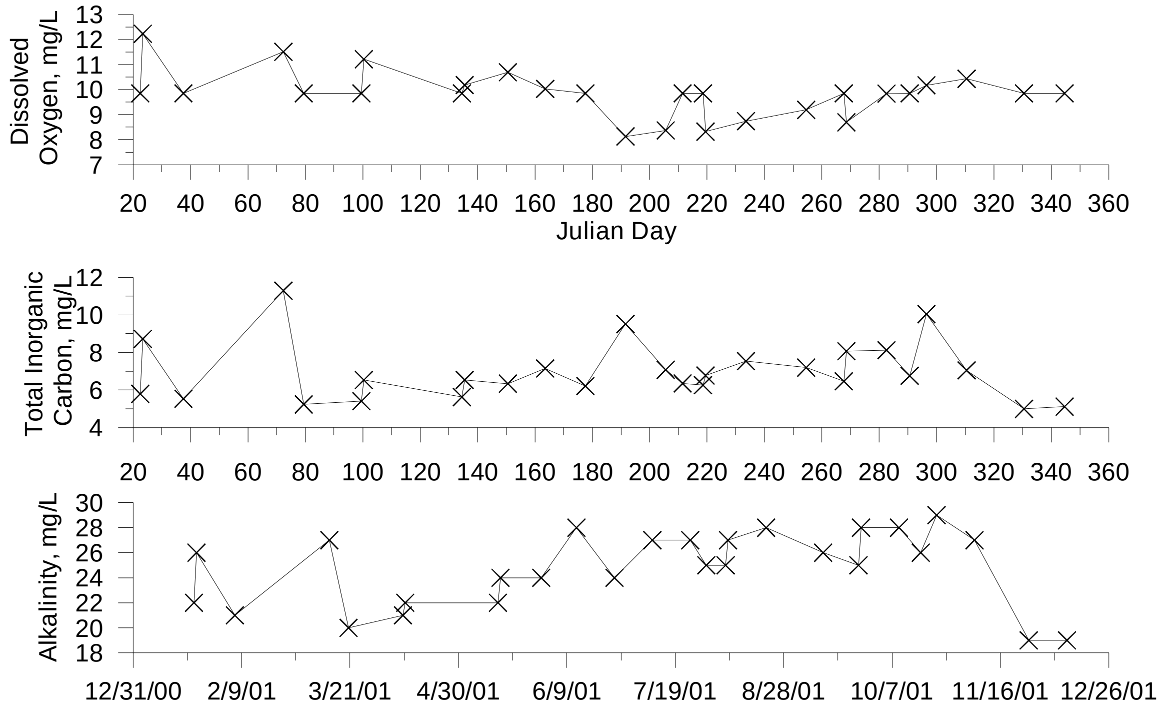

Figure 18. Water quality constituents at Salem (part 3)

Willamette River at the Willamette Falls

The downstream boundary condition for the mid-Willamette River model was developed using the water level elevation data at the USGS gage station just upstream of the Willamette Falls (14207740). Model results at the furthest downstream segment will be compared with this data record to ensure the model has calibrated hydrodynamics.

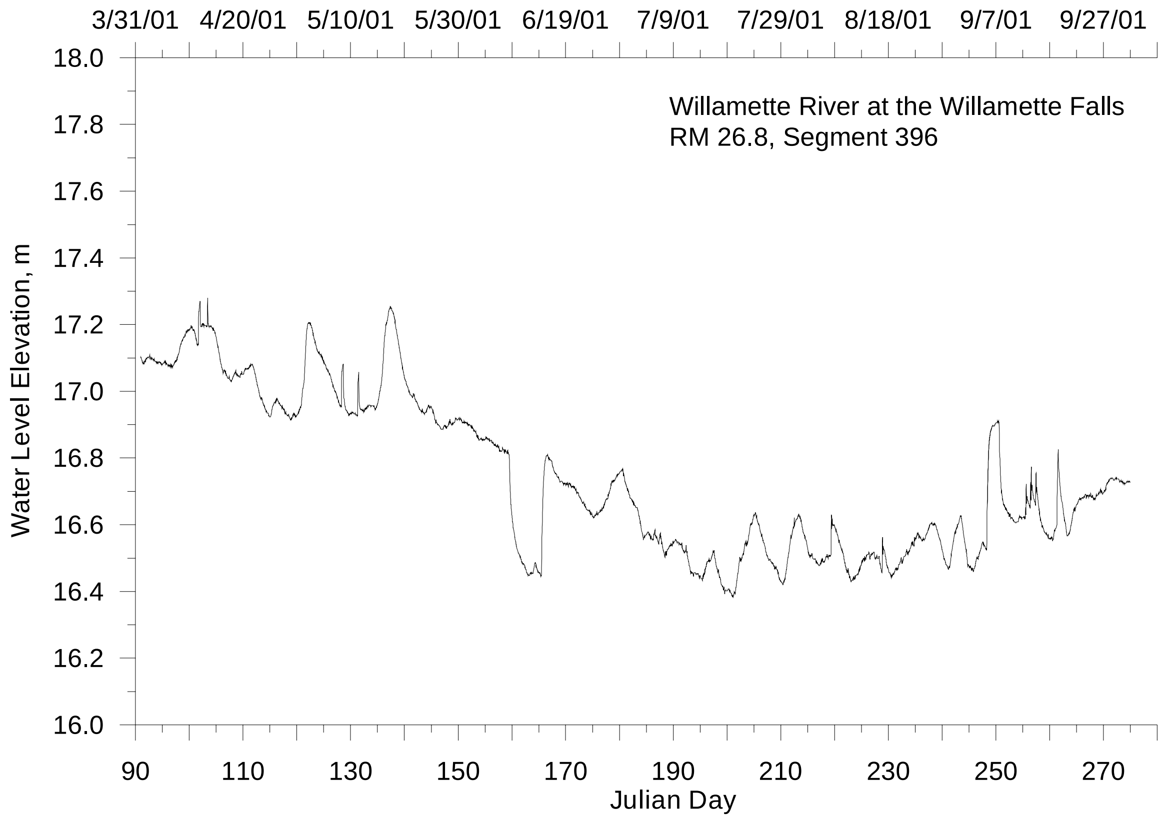

Figure 19. Water level elevation at the Willamette Falls, April to October 2001

Tributaries

Three are three main tributaries and one small tributary included in the model. Figure 20 shows the location of the tributaries along the mid-Willamette and Table 3 shows the RM location for each tributary. In Appendix 3 there is a list of all tributaries in the study region.

Table 3. Tributary locations

Tributary	RM
Mill Creek	84.5
Yamhill River	55.1
Molalla River	35.6
Tualatin River	28.4

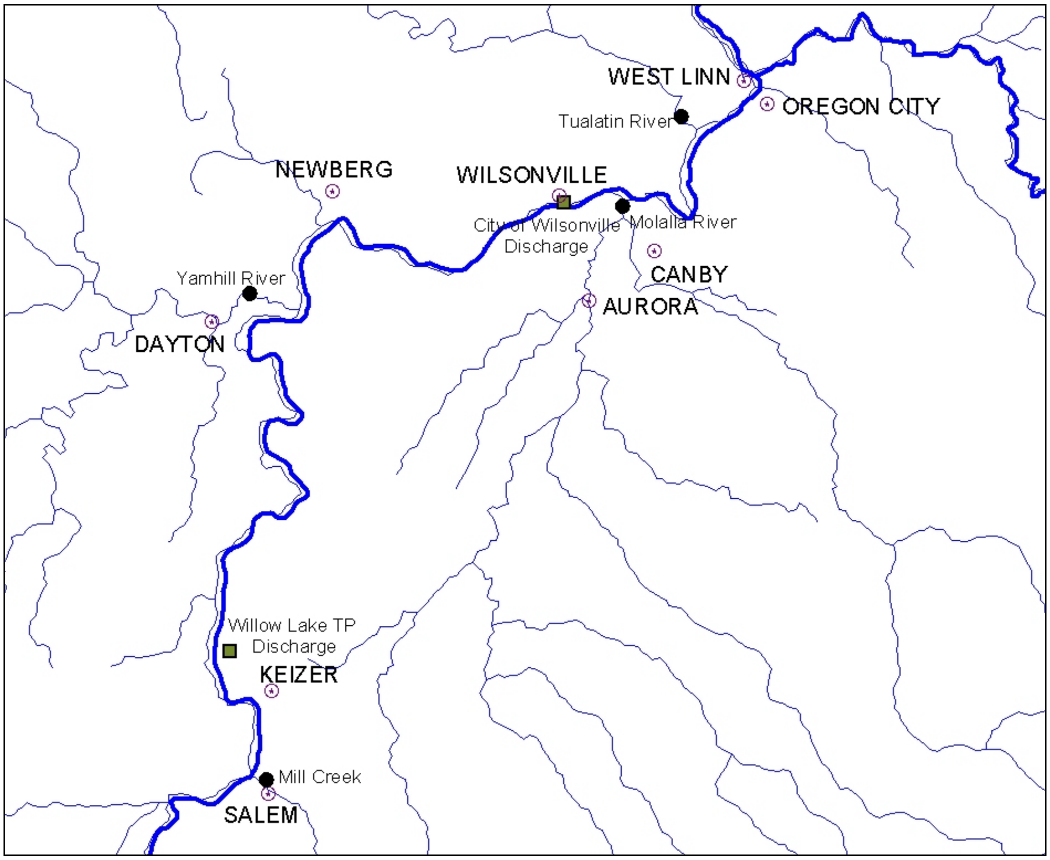

Figure 20. Tributary and point source inflows to the Willamette River

Yamhill River

There is currently no gage station on the lower end of the Yamhill River. In order to develop a flow record for the Yamhill River basin the gage station on the South Yamhill River (14194150) was used with the drainage basin ratio between the south basin and the total Yamhill basin in the following equation:

$$TotalYamhillQ = SouthYamhillQ\left(\frac{TotalYamhillArea, 772\_mi^2}{SouthYamhillArea, 528\_mi^2}\right)$$

Figure 21 shows the Yamhill River flow from April to October 2001. The Yamhill River water temperatures were based on data collected for PGE by Normadeau and Associates, Inc. The temperature data is from the monitoring site with the Site Key 5500 (Thermistor: B759). Figure 22 shows the Yamhill water temperatures from April to October 2001.

Water quality data for the Yamhill River was obtained from ODEQ. The procedure used to develop the water quality input file for the river is discussed in Appendix 2 and Figure 23 through Figure 25 plots the water quality constituents used in the model.

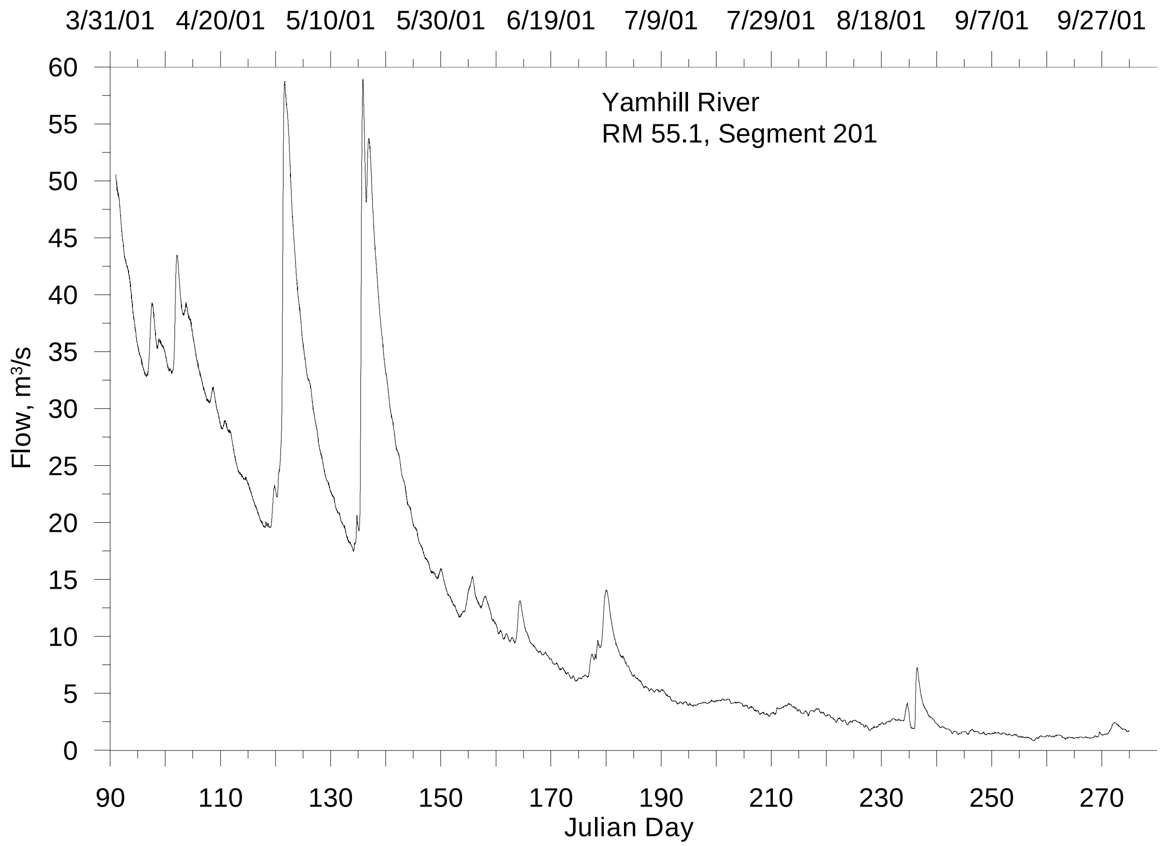

Figure 21. Yamhill River flow, April to October 2001

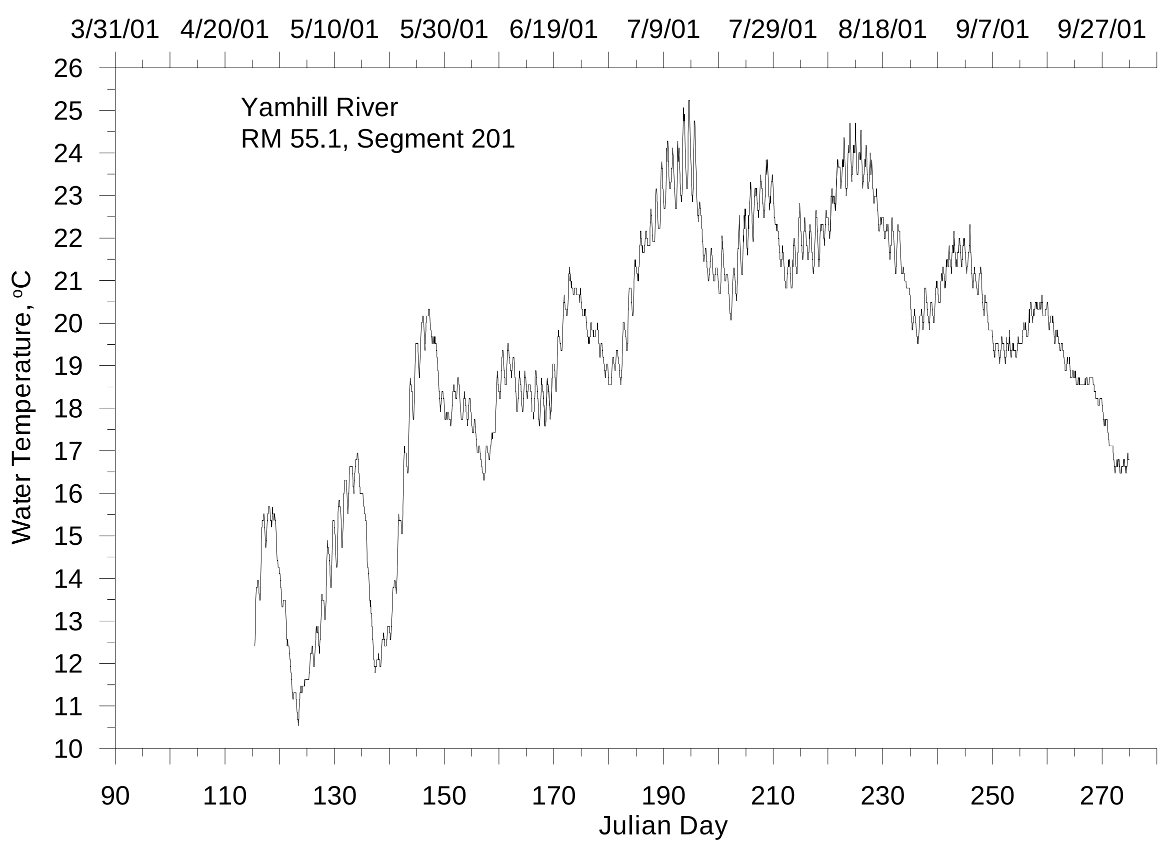

Figure 22. Yamhill River water temperature, April to October 2001

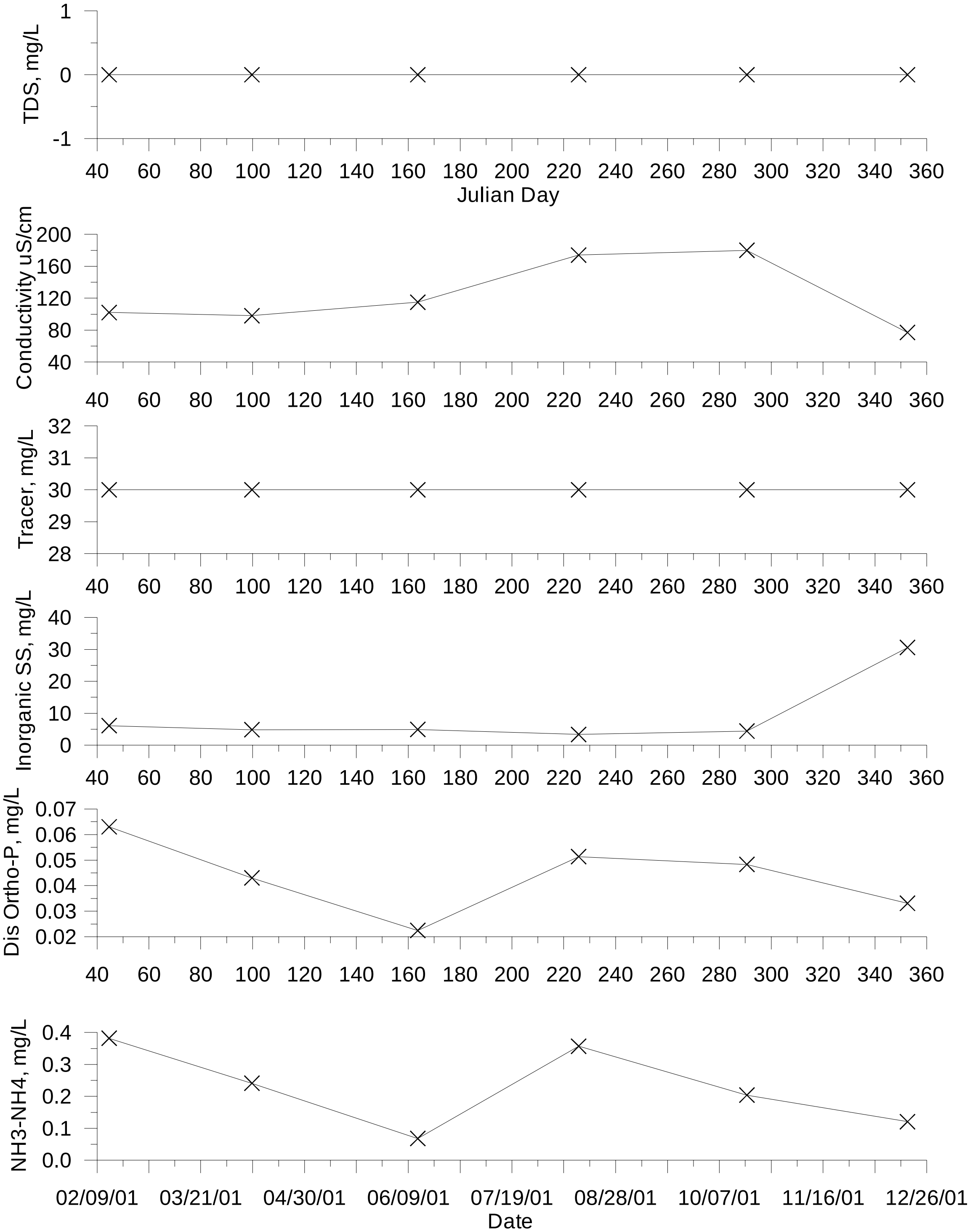

Figure 23. Yamhill River water quality constituents (part 1), February to December 2001

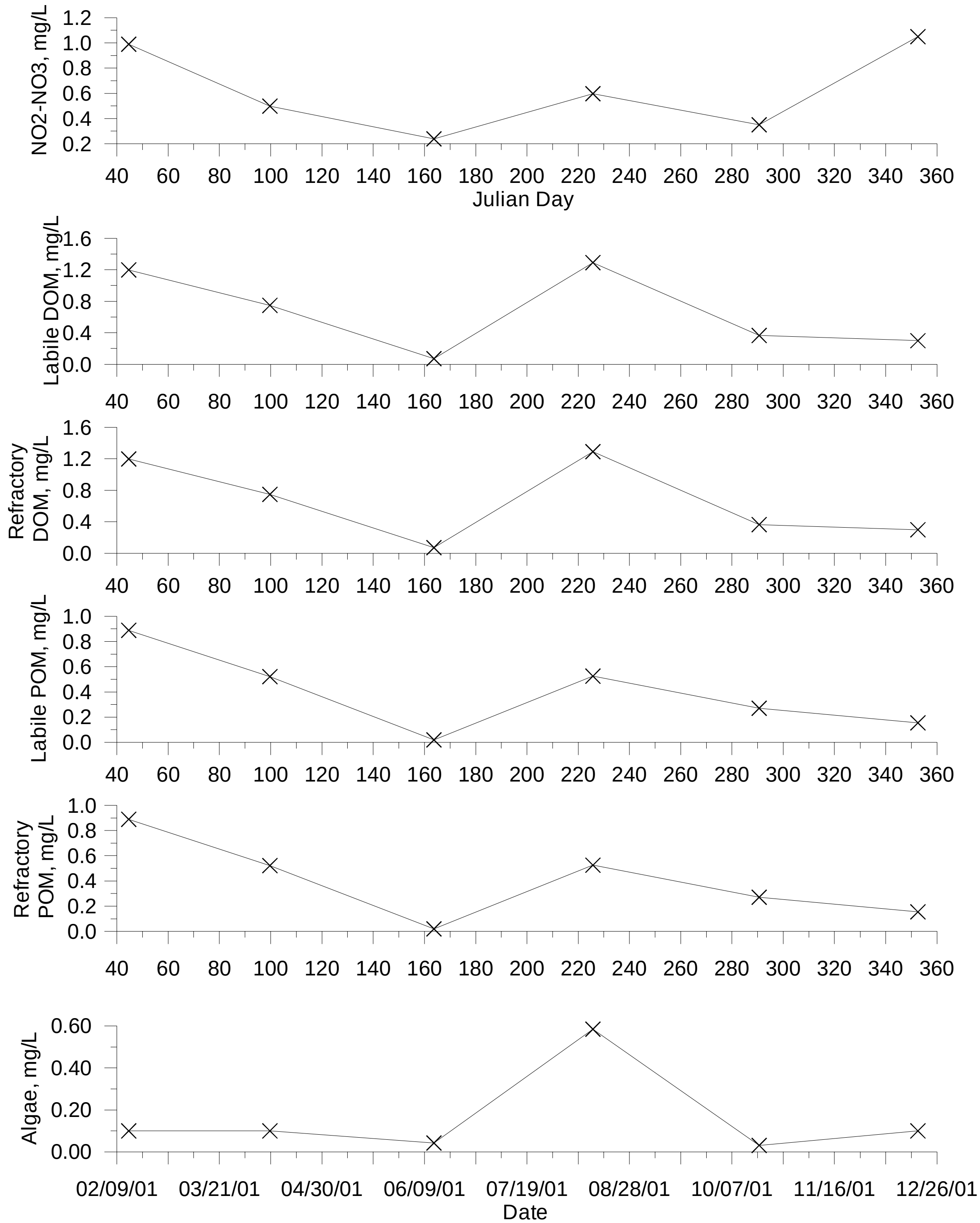

Figure 24. Yamhill River water quality constituents (part 2), February to December 2001

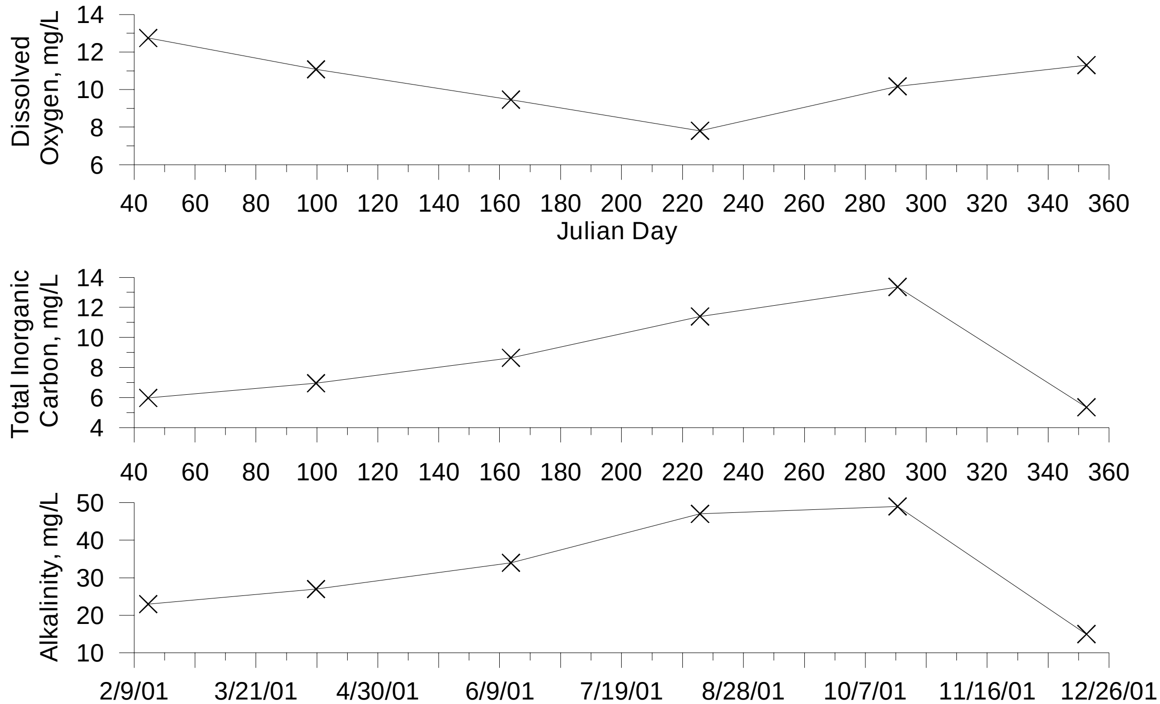

Figure 25. Yamhill River water quality constituents (part 3), February to December 2001

Molalla River

The Molalla River basin consists primarily of the Molalla and Pudding river basins. Flow on the Pudding River used to be monitored at Aurora which is near its confluence with the Molalla River but since 1997 the Pudding River has been monitored at Woodburn (14201340) which is further upstream. Flows at Aurora were estimated using the same relationship shown above for the Yamhill basin.

$$Pudding\_AuroraQ = Pudding\_WoodburnQ\left(\frac{\text{PuddingAuroraBasin}\_Area,479\_mi^2}{\text{PuddingWoodburnBasin}\_Area,314\_mi^2}\right)$$

The Pudding River flows calculated with this method were then added to flows from a gage station on the Molalla River near Canby (14200000). The combined flows, representing the Molalla-Pudding basin are plotted in Figure 26.

The Molalla River water temperatures were based on data collected for PGE by Normadeau and Associates, Inc. The temperature data is from the monitoring site with the Site Key 3590 (Thermistor: B569). Figure 27 shows the Molalla River water temperatures from April to October 2001.

Water quality data for the Molalla River was obtained from ODEQ. Samples were collected on a monthly or less frequent basis. The procedure used to develop the water quality input file for the river is discussed in Appendix 2 and Figure 28 through Figure 30 plot the water quality constituents used in the model.

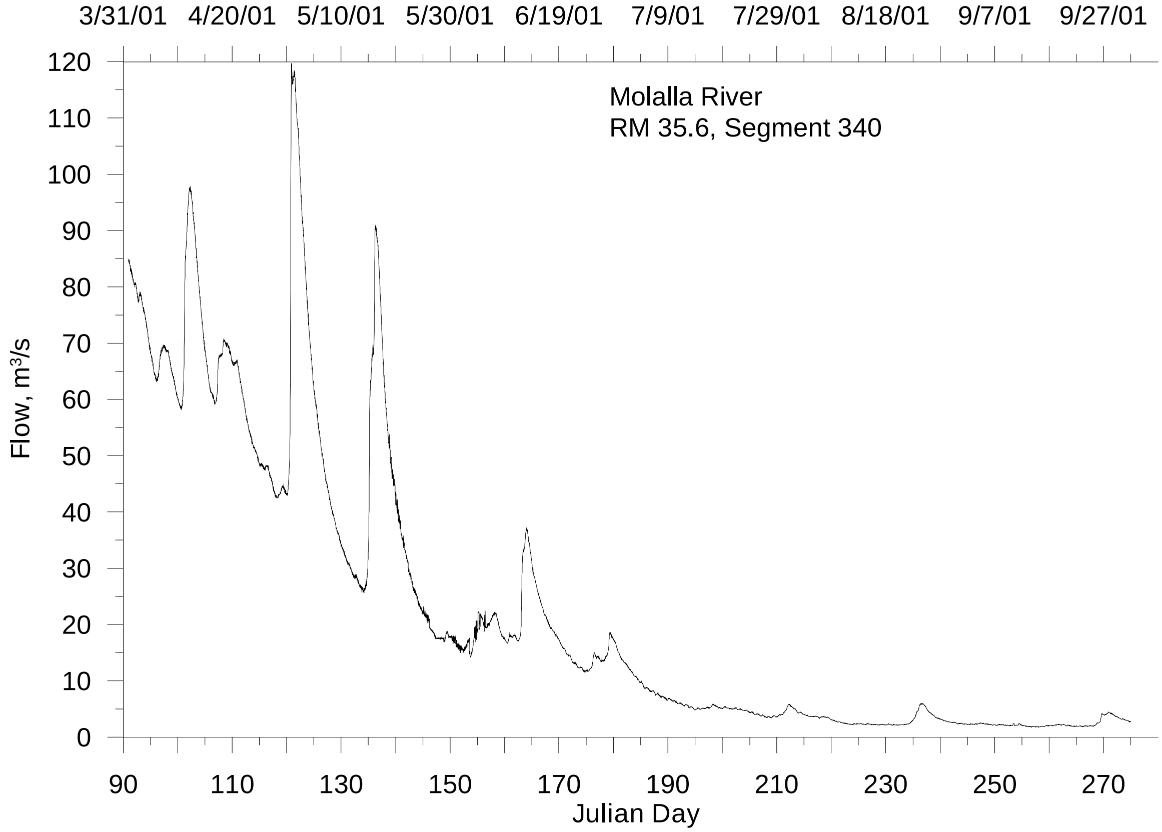

Figure 26. Molalla River flow, April to October 2001

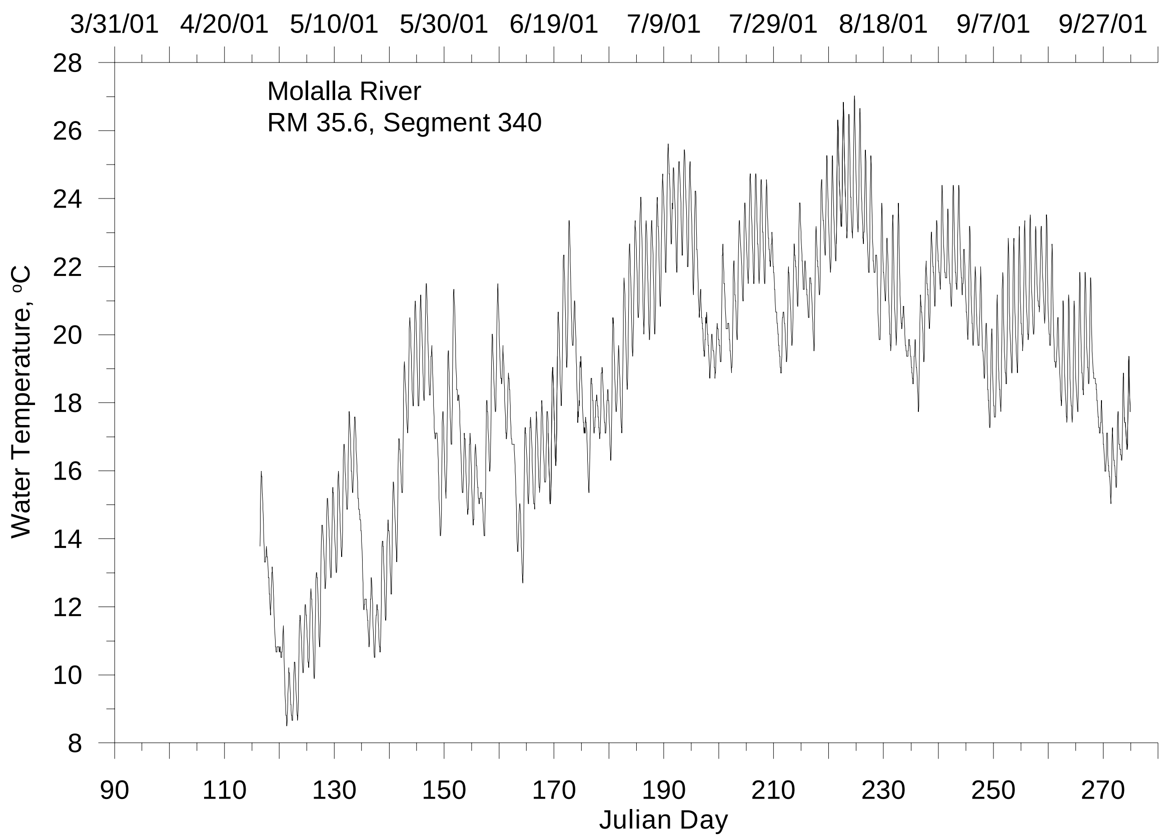

Figure 27. Molalla River water temperature, April to October 2001

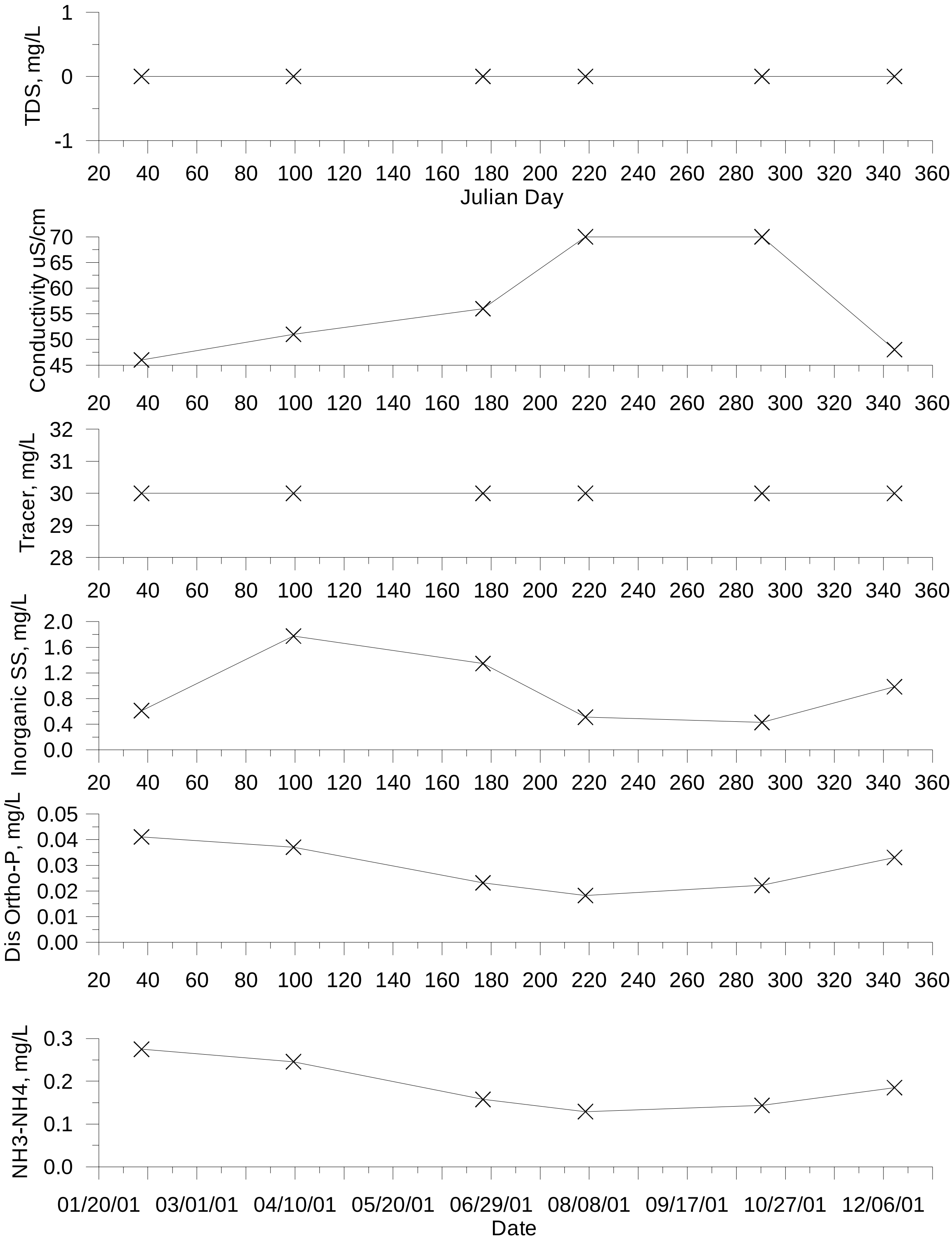

Figure 28. Molalla River water quality constituents (part 1), February to December 2001

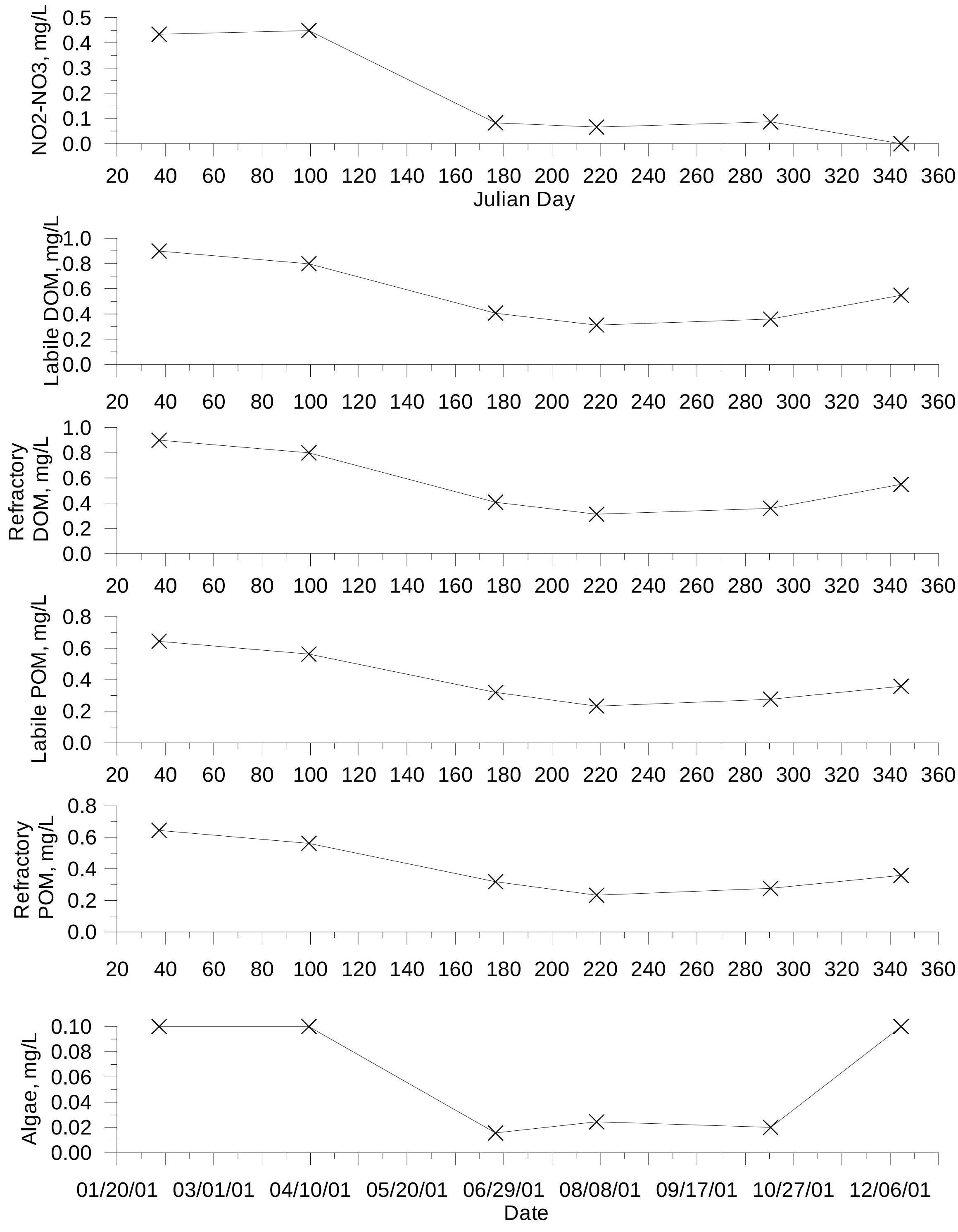

Figure 29. Molalla River water quality constituents (part 2), February to December 2001

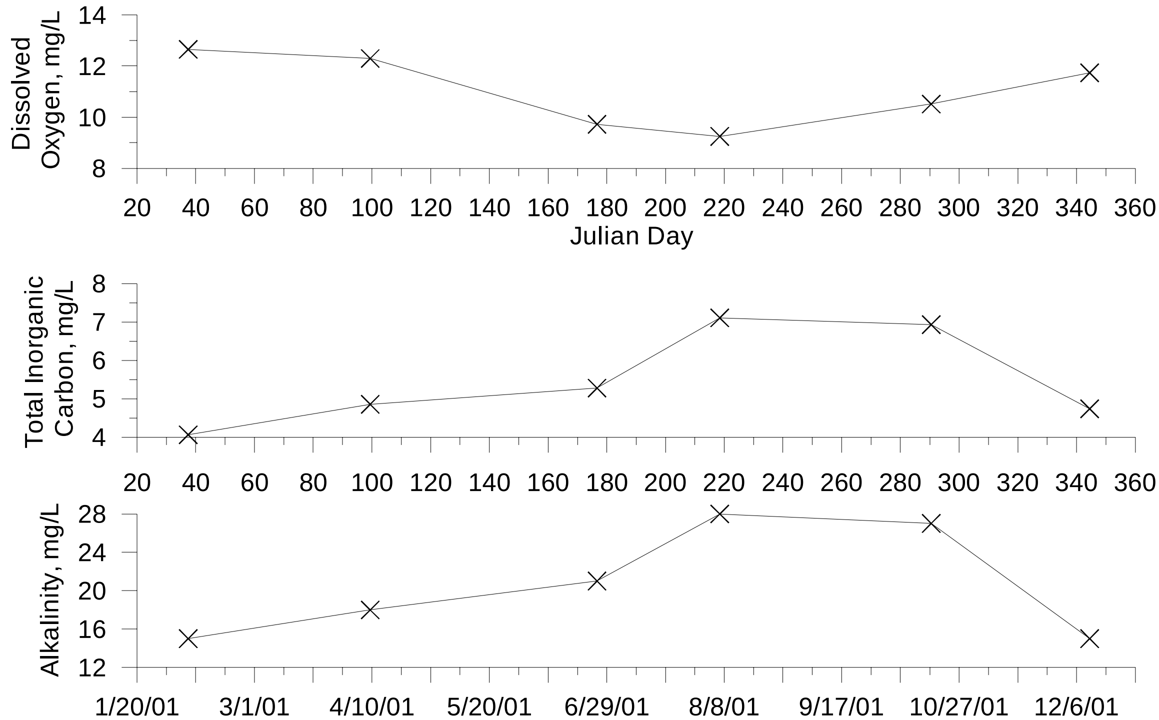

Figure 30. Molalla River water quality constituents (part 3), February to December 2001

Tualatin River

Tualatin River flows were obtained from the USGS gage station in West Linn, OR (14207500). Figure 31 plots the flows from April to October 2001. Water temperature data for the Tualatin River primarily cam from data monitored for PGE by Normandeau and Associates, Inc (Site Key: 2850) but there were data gaps at the beginning and ending of summer. Figure 32 shows a temperature correlation between the data at the PGE monitoring site and the USGS gage station, RM 1.8. The resulting correlation was then used to calculate temperature for the beginning and ending periods of the summer. Figure 33 shows the river temperature from April to October 2001.

Water quality data for the Tualatin River was obtained from Clean Water Services of Washington County. Samples were collected on a twice a month at Weiss Bridge (RM 0.3). The procedure used to develop the water quality input file for the river is discussed in Appendix 2 and Figure 34 through Figure 36 show the water quality constituents used in the model.

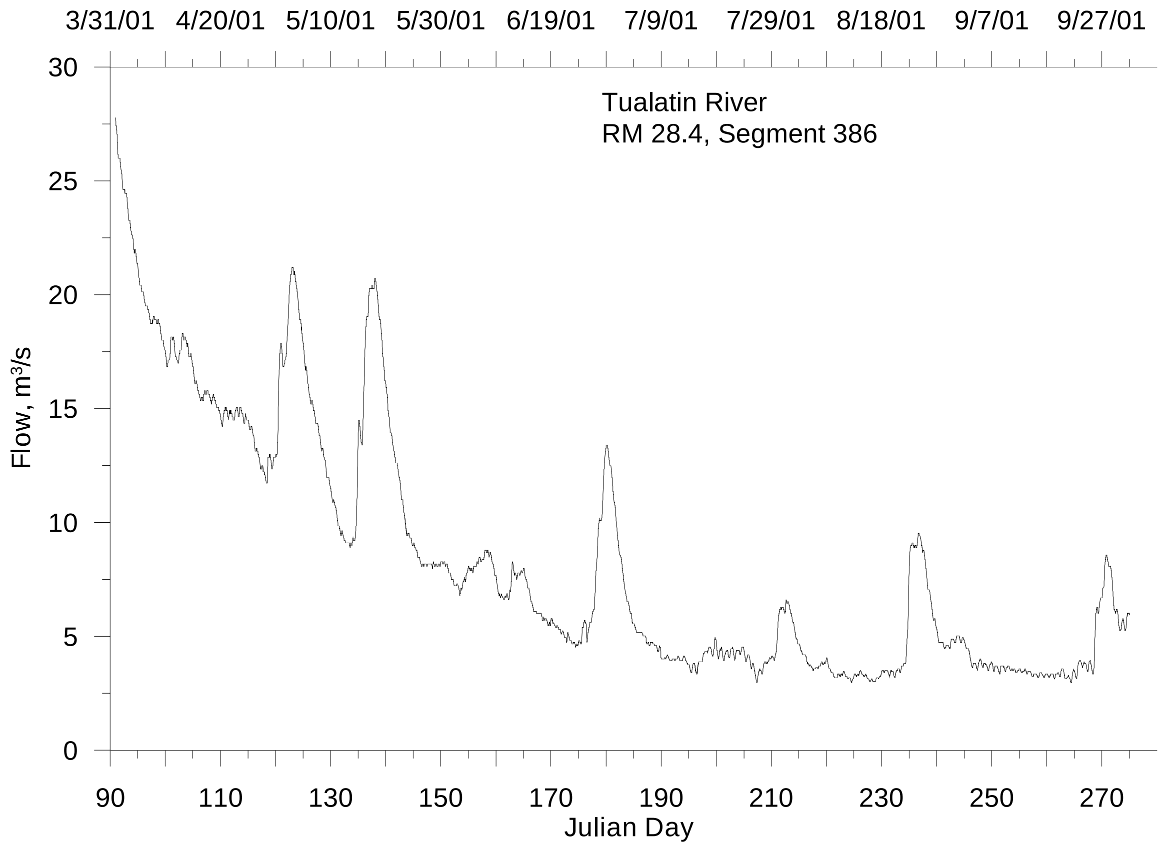

Figure 31. Tualatin River flow, April to October 2001

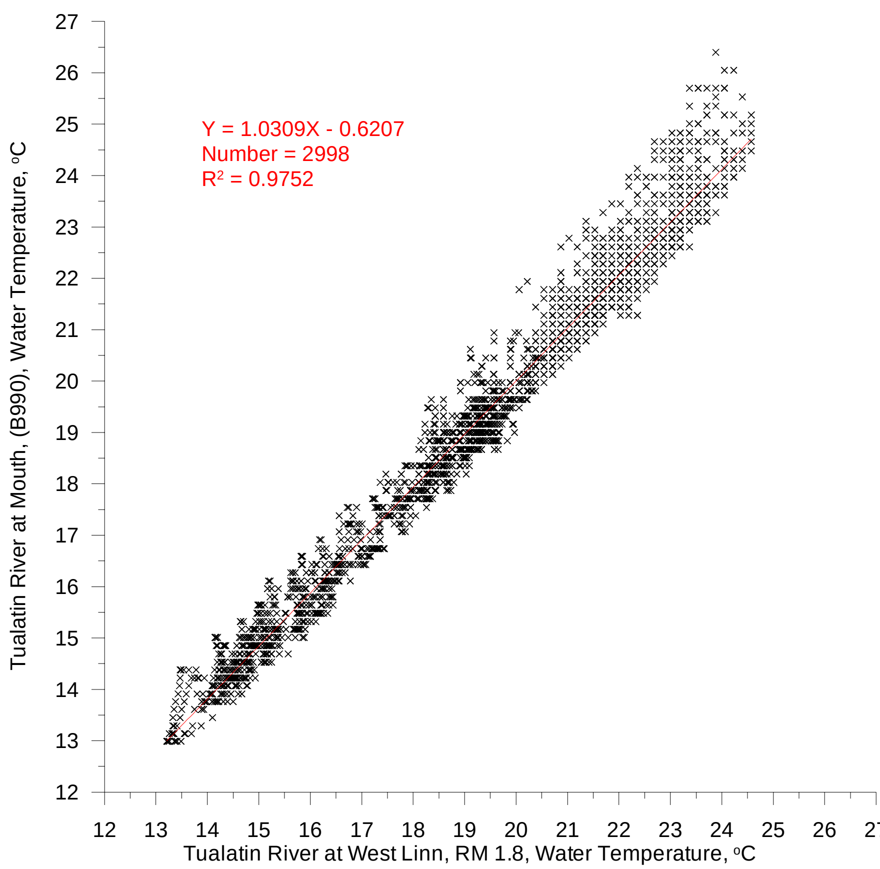

Figure 32. Water temperature correlation for two sites on the lower Tualatin River

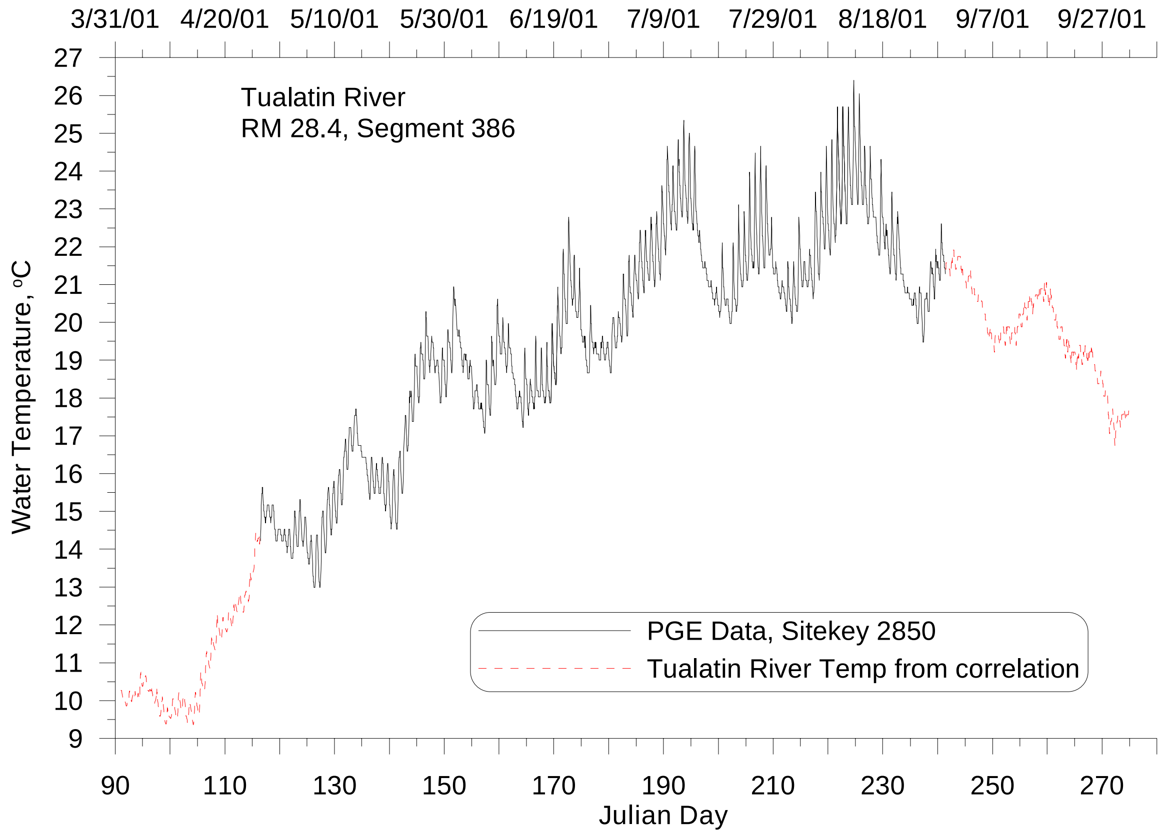

Figure 33. Tualatin River water temperature, April to October

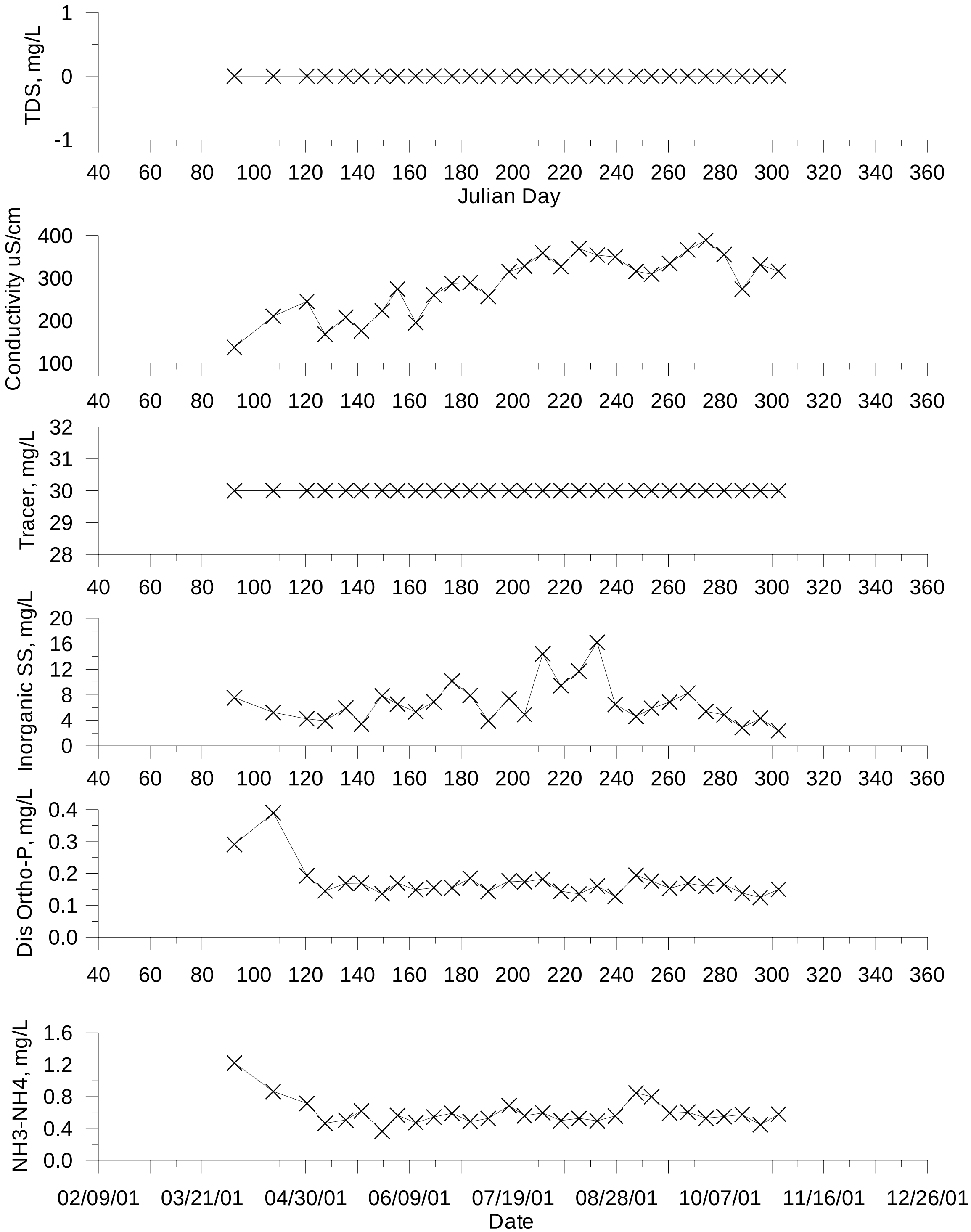

Figure 34. Tualatin River water quality constituents (part 1), March to October 2001

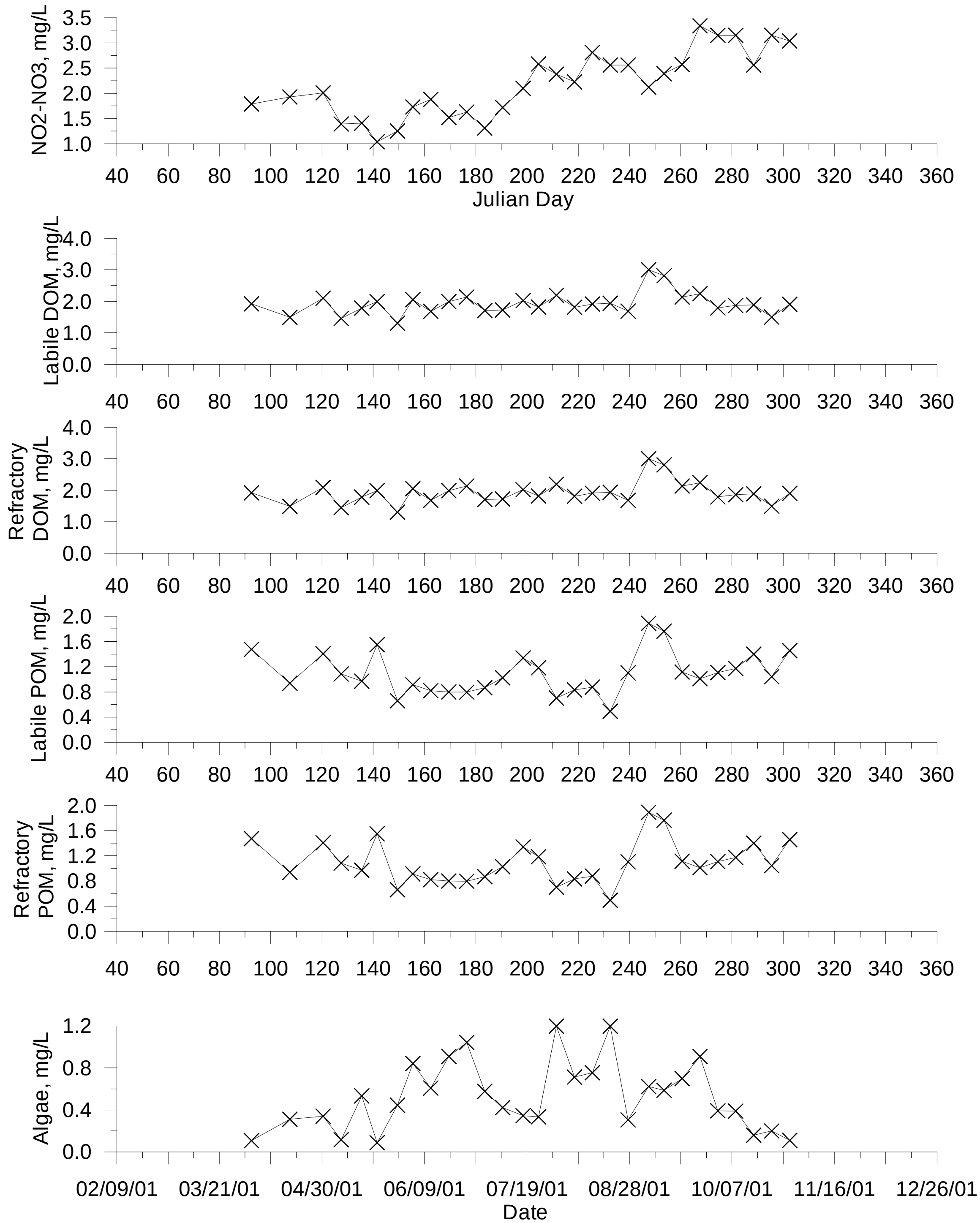

Figure 35. Tualatin River water quality constituents (part 2), March to October 2001

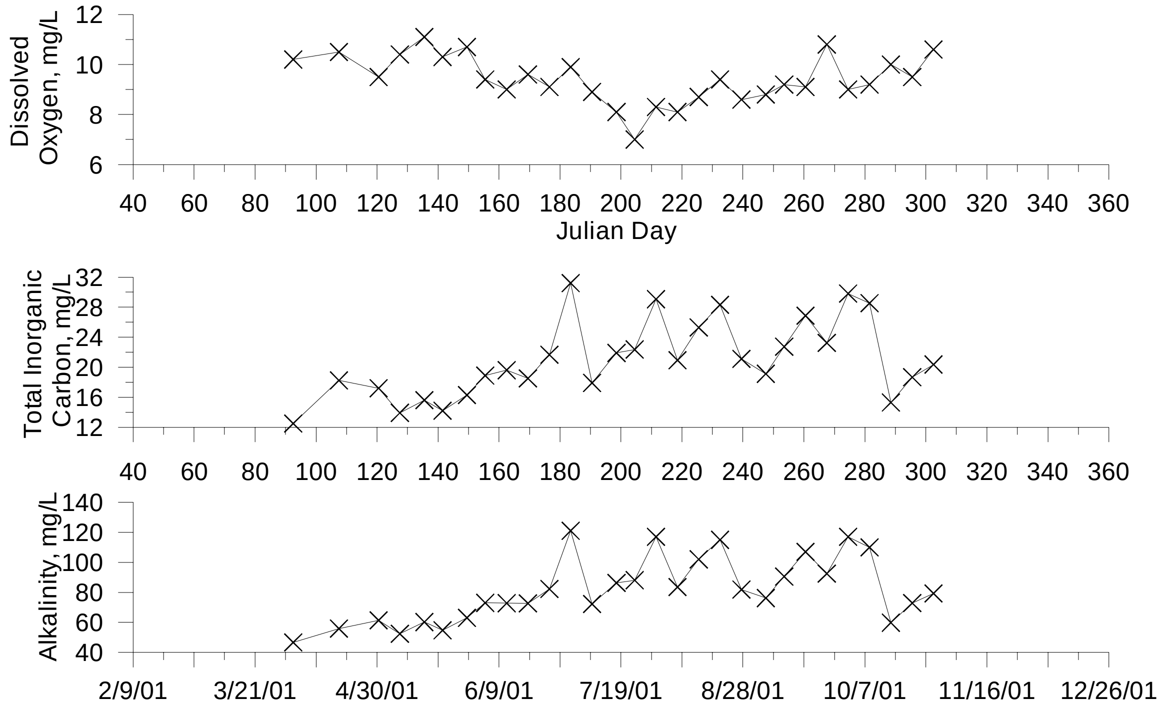

Figure 36. Tualatin River water quality constituents (part 3), March to October 2001

Mill Creek

Although Mill Creek has a small inflow contribution due to the basin's size continuous temperature data was recorded on the creek. From the 1940s to 1978 flows were monitored on Mill Creek. Using daily flow values for Mill Creek (14192000) and the Willamette River at Salem (14191000) the correlation in Figure 37 was developed. The correlation was then used to estimate flows for 2001 as shown in Figure 38.

Temperature data for the creek was monitored on a continuous basis during 2001 by ODEQ (LASAR: 26759). Figure 39 shows the temperature time series data used for the model input. There was no water quality data available for Mill Creek so the water quality file developed for the Molalla basin was used.

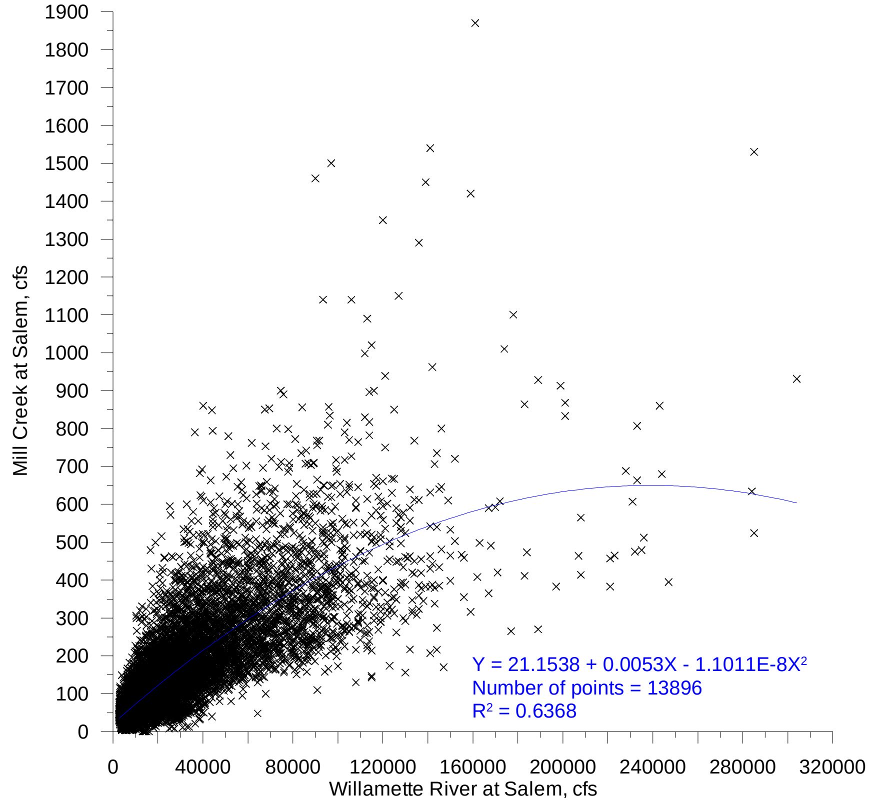

Figure 37. Willamette River - Mill Creek flow correlation

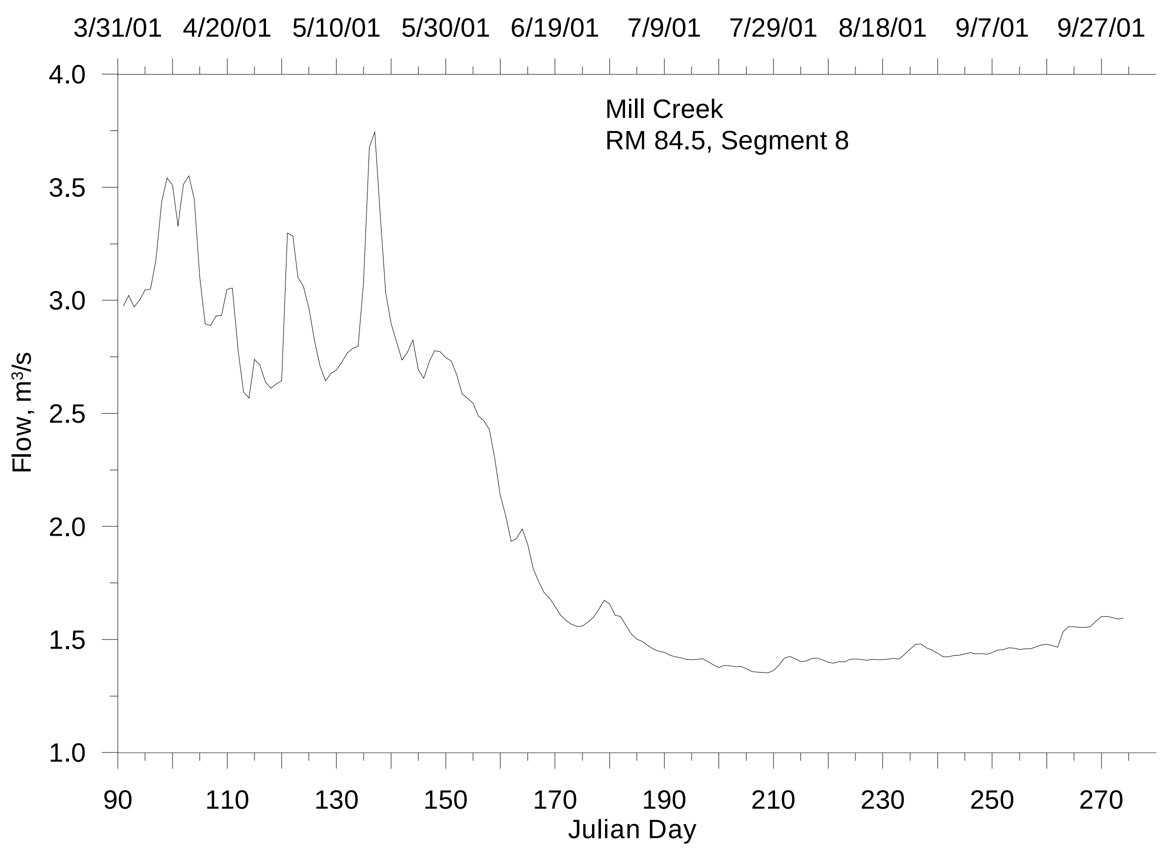

Figure 38. Mill Creek flow, April to October 2001

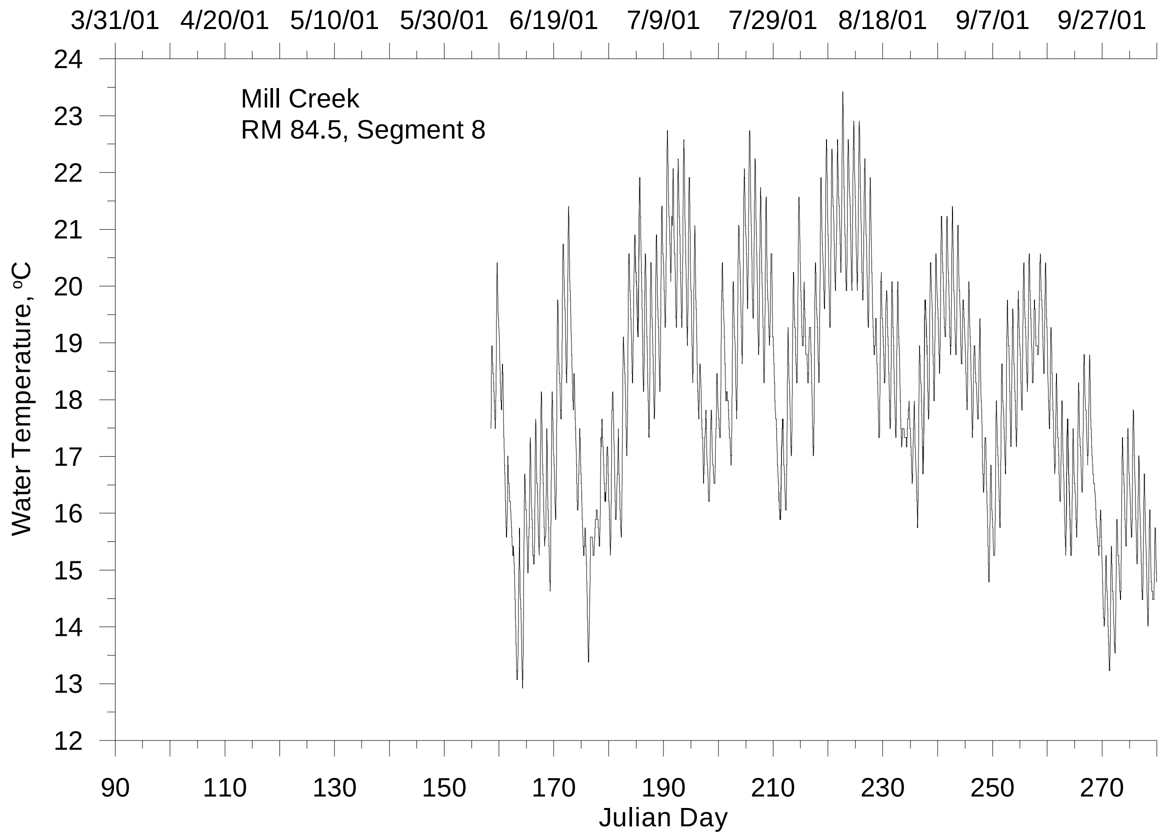

Figure 39. Mill Creek water temperature, June to October 2001

Distributed Tributaries

Although the majority of the inflows to the mid-Willamette River come from the tributaries and the Willamette River upstream distributed inflows were also incorporated in the model. The distributed inflows also incorporated any inflows from the small tributary, Chehalem Creek.

The U.S. Army Corps of Engineers developed a UNET Model for the Lower Columbia (Knutson, 2000). The modeling effort included developing a routing method to estimate the daily flows in the Willamette River at Portland. The flow routing model incorporated a correlation for estimating the ungaged flow between Salem and the Willamette Falls. The equation from Knutson, 2000:

$$UngagedQ = PuddingRiver\_AuroraQ\left(\frac{Unagaged\_drainage\_area{,}377\_mi^2}{PuddingRiver\_Aurora\_drainage\_area{,}479\_mi^2}\right)$$

Daily flows were used from the gage station on the Pudding River at Woodburn to estimate flows at Aurora, as was done for the Molalla River basin flow. The flows were then used with equation above to estimate the total distributed inflows. Since the drainage area in question is adjacent to the river from Salem to the Willamette Falls and crossed 3 model water bodies the flows were divided between the 3 water bodies using the fraction lineal distance along the river. For example, Branch 5 represented 45% of the total lineal distance from Salem to the Willamette Falls so 45% of the distributed inflow was allocated to Branch 5. Figure 40 shows the total and allocated distributed inflows for each model branch. Similar to Mill Creek there was no data available to represent the distributed inflows so the water quality characteristics from the Molalla River basin were used.

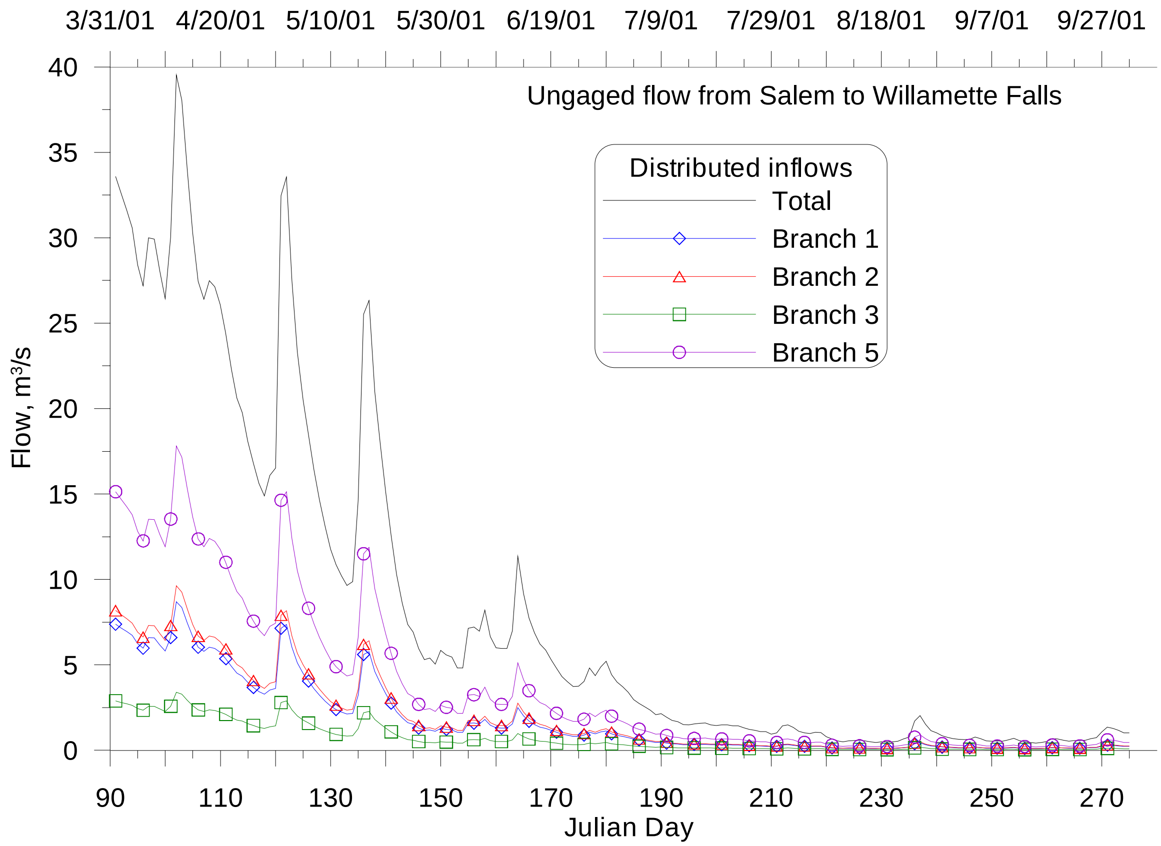

Figure 40. Distributed tributary inflow

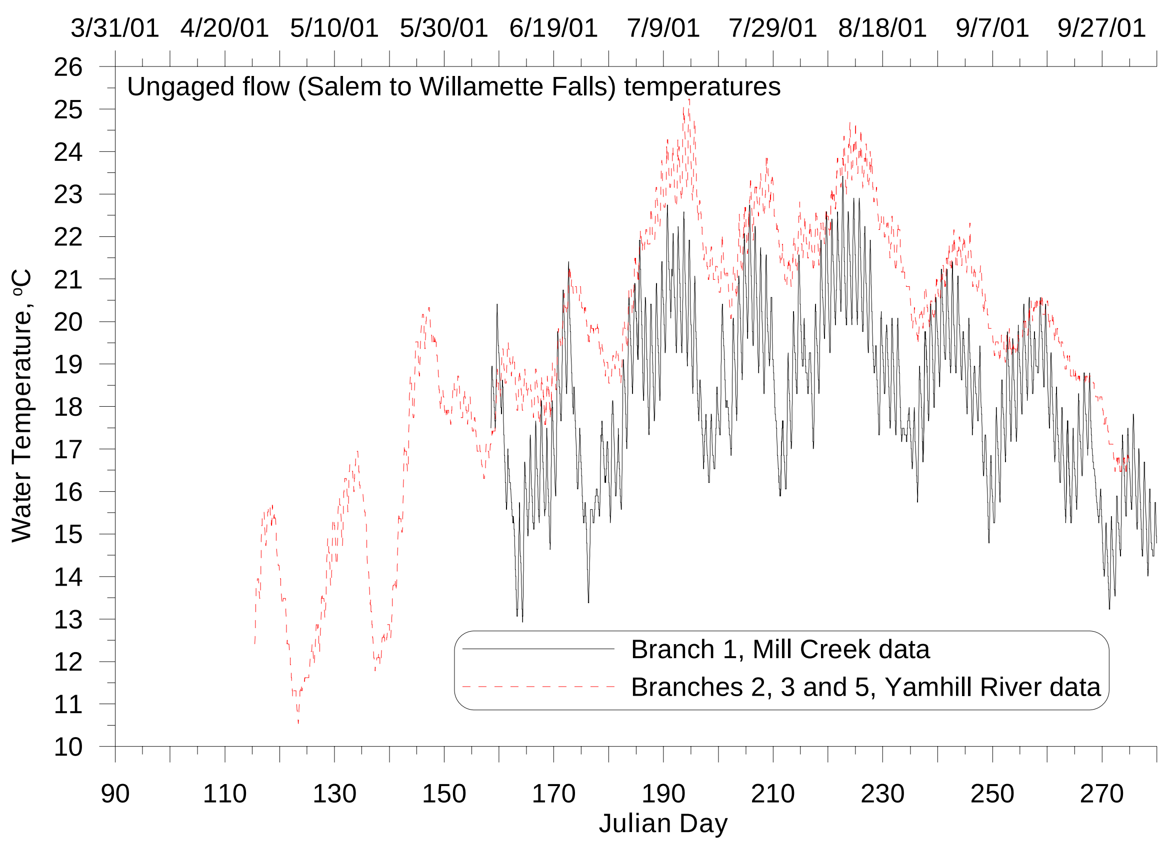

Figure 41. Water temperature data associated with distributed tributaries

Point Sources

There are several potential point sources to the mid-Willamette but only two of the largest sources were incorporated, the City of Salem and the City of Wilsonville wastewater treatment plant discharges. Figure 20 shows the location of the two treatment plant discharges.

City of Salem

Flow, temperature and water quality data for the City of Salem wastewater treatment plant discharge (Willow Lake treatment plant) were provided by the City of Salem and represent daily recorded data. Figure 42 shows the discharge flow recorded over 2001 and Figure 43 shows the discharge temperature.

Although the water quality data is different than the monthly grab samples on the tributaries the same procedure was used to develop the water quality input file for the discharge as discussed in Appendix 2 with several modifications. Figure 44 through Figure 46 show the water quality constituents used in the model.

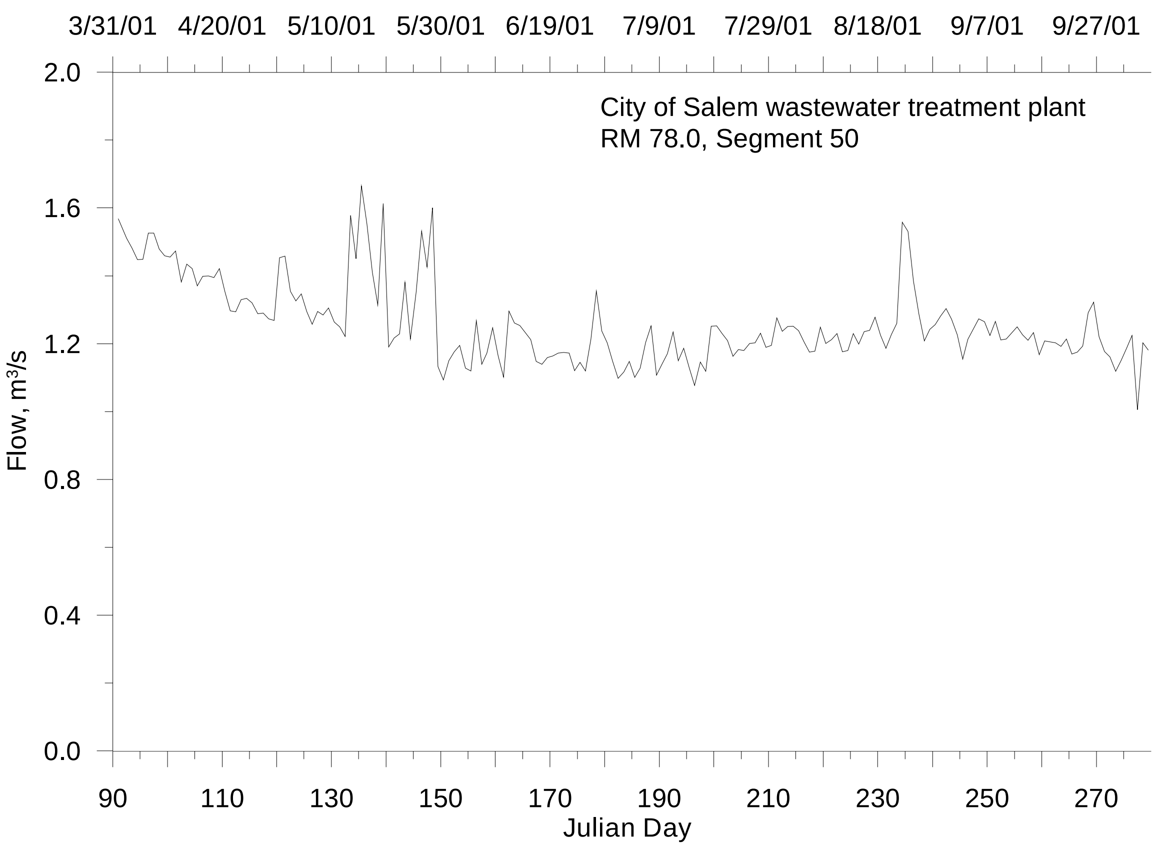

Figure 42. City of Salem, Willow Lake Treatment Plant discharge flow, April to October 2001

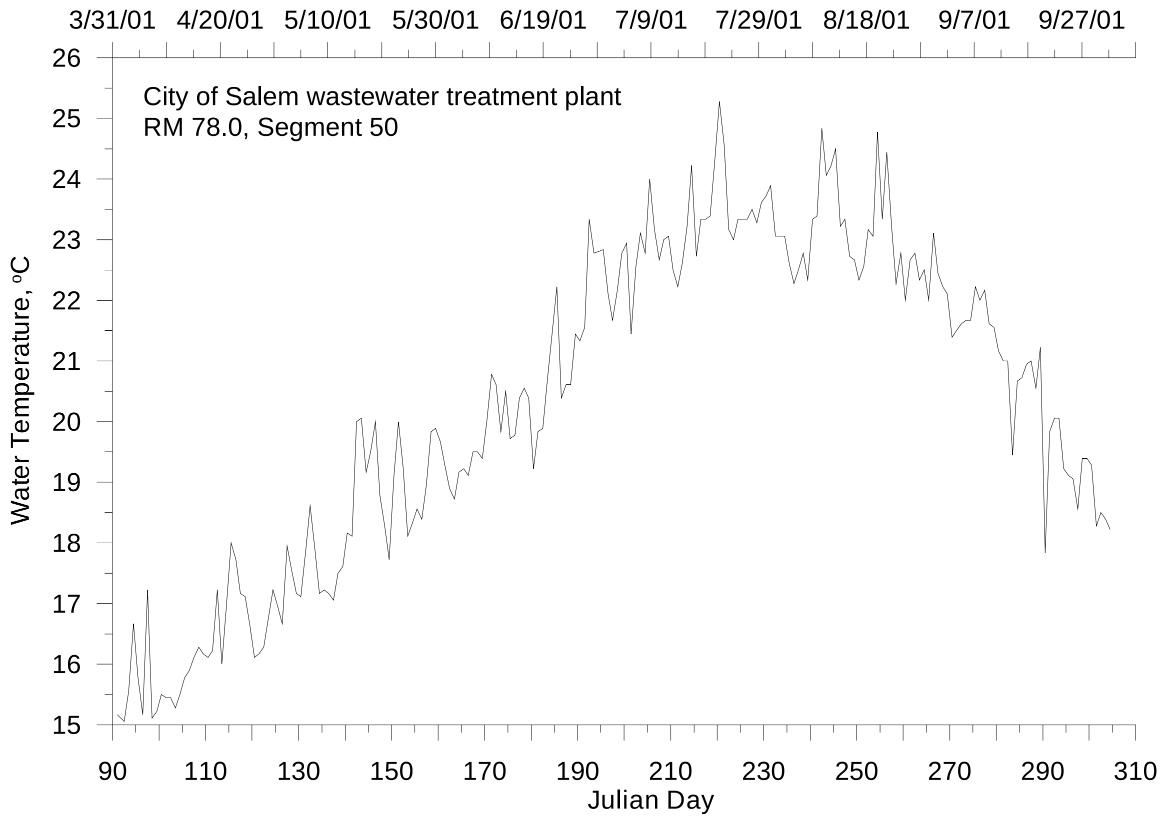

Figure 43. City of Salem, Willow Lake Treatment Plant discharge temperature, April to October 2001

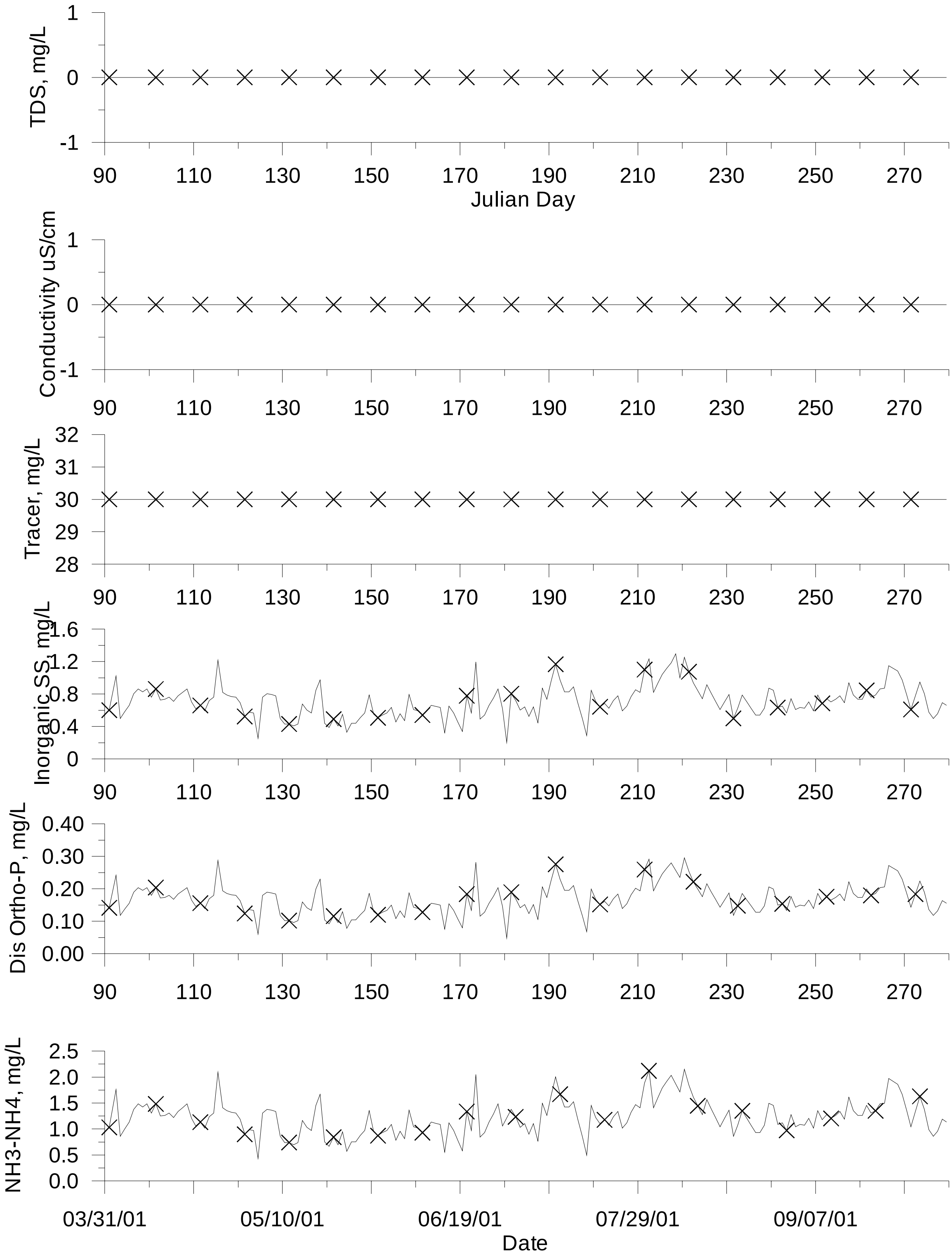

Figure 44. City of Salem, Willow Lake Treatment Plant discharge water quality constituents (part 1), April to October 2001

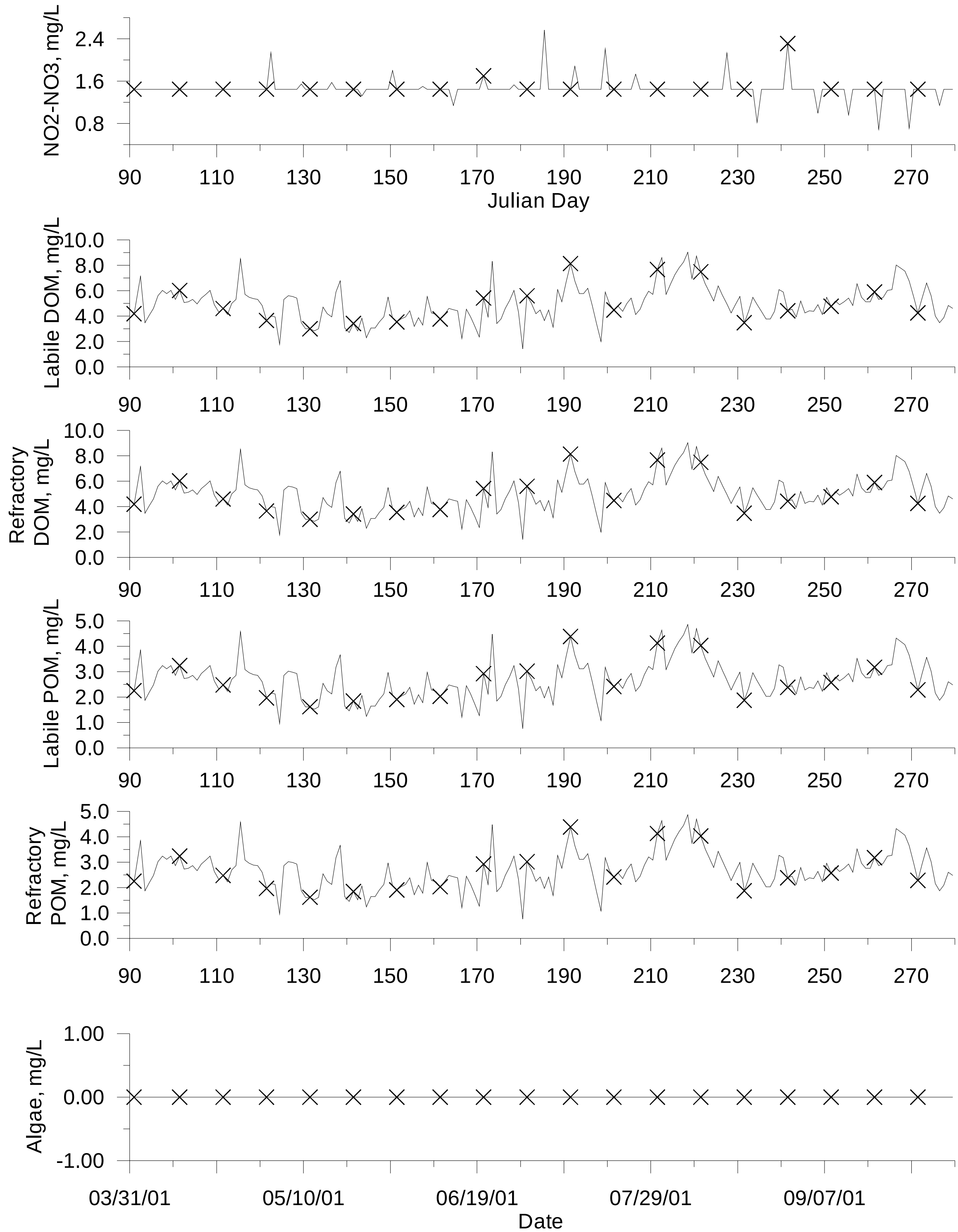

Figure 45. City of Salem, Willow Lake Treatment Plant discharge water quality constituents (part 2), April to October 2001

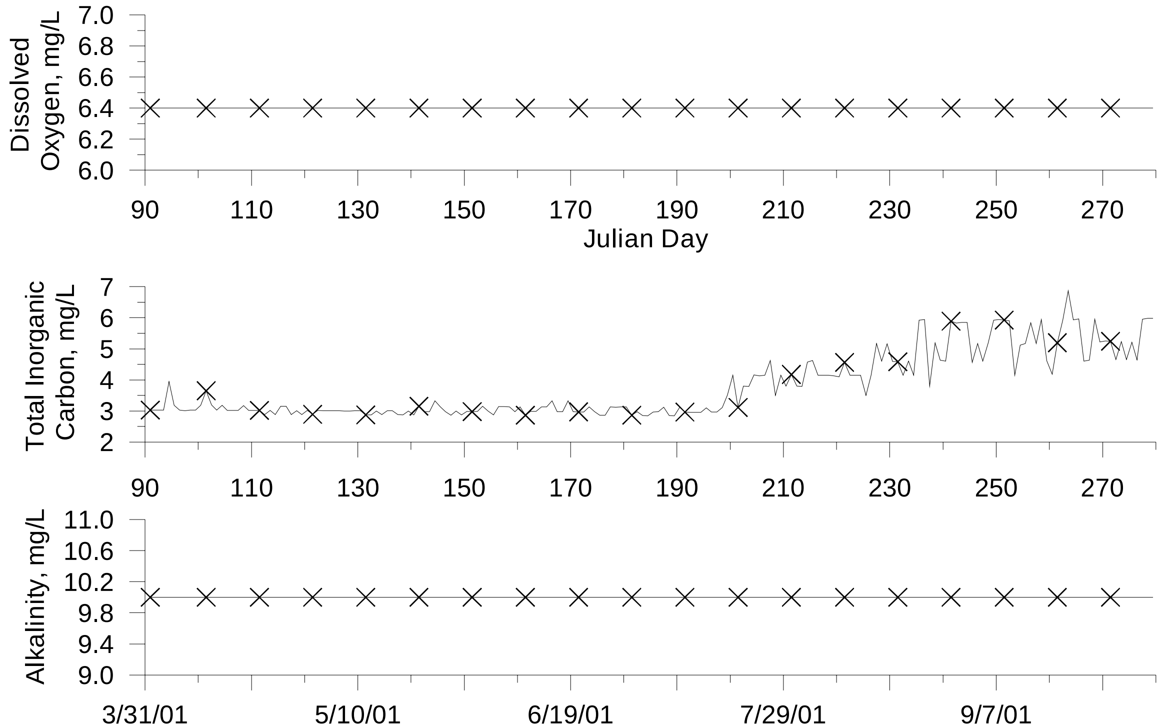

Figure 46. City of Salem, Willow Lake Treatment Plant discharge water quality constituents (part 3), April to October 2001

City of Wilsonville

Flow, temperature and water quality data for the City of Wilsonville wastewater treatment plant discharge were obtained from the Daily Monitoring Reports (DMRs) submitted to the ODEQ. Figure 48 shows the discharge flow recorded over 2001 and Figure 49 shows the discharge temperature.

Although the water quality data is different than the monthly grab samples on the tributaries the same procedure was used to develop the water quality input file for the discharge as discussed in Appendix 2 with several modifications. Figure 49 through Figure 51 show the water quality constituents used in the model.

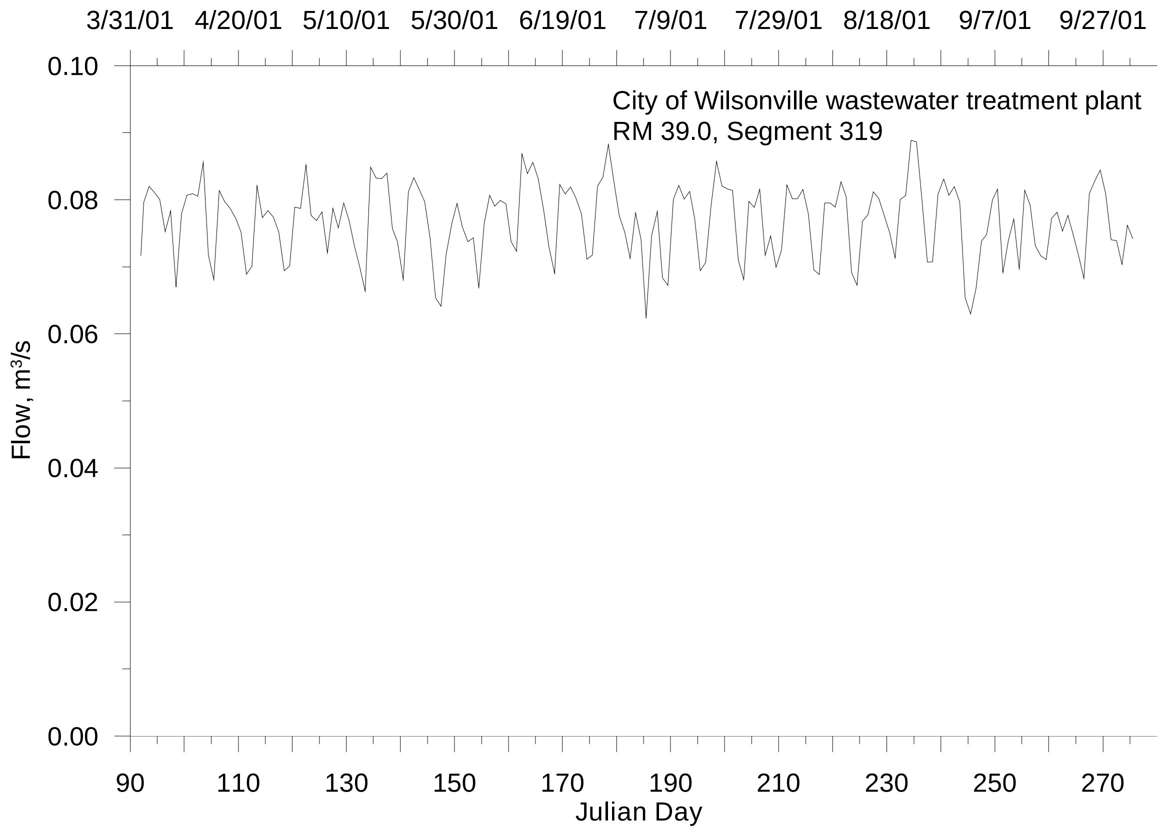

Figure 47. City of Wilsonville Treatment Plant discharge flow, April to October 2001

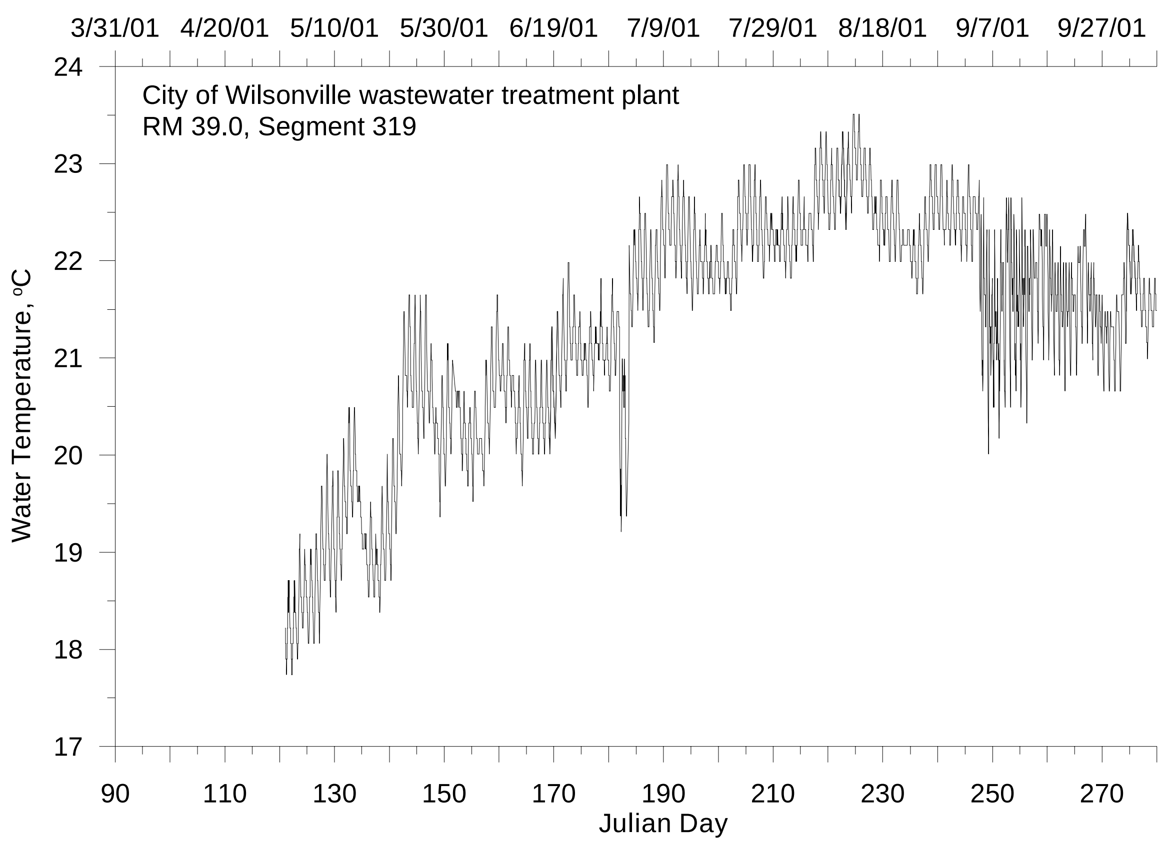

Figure 48. City of Wilsonville Treatment Plant discharge temperature, May to October 2001

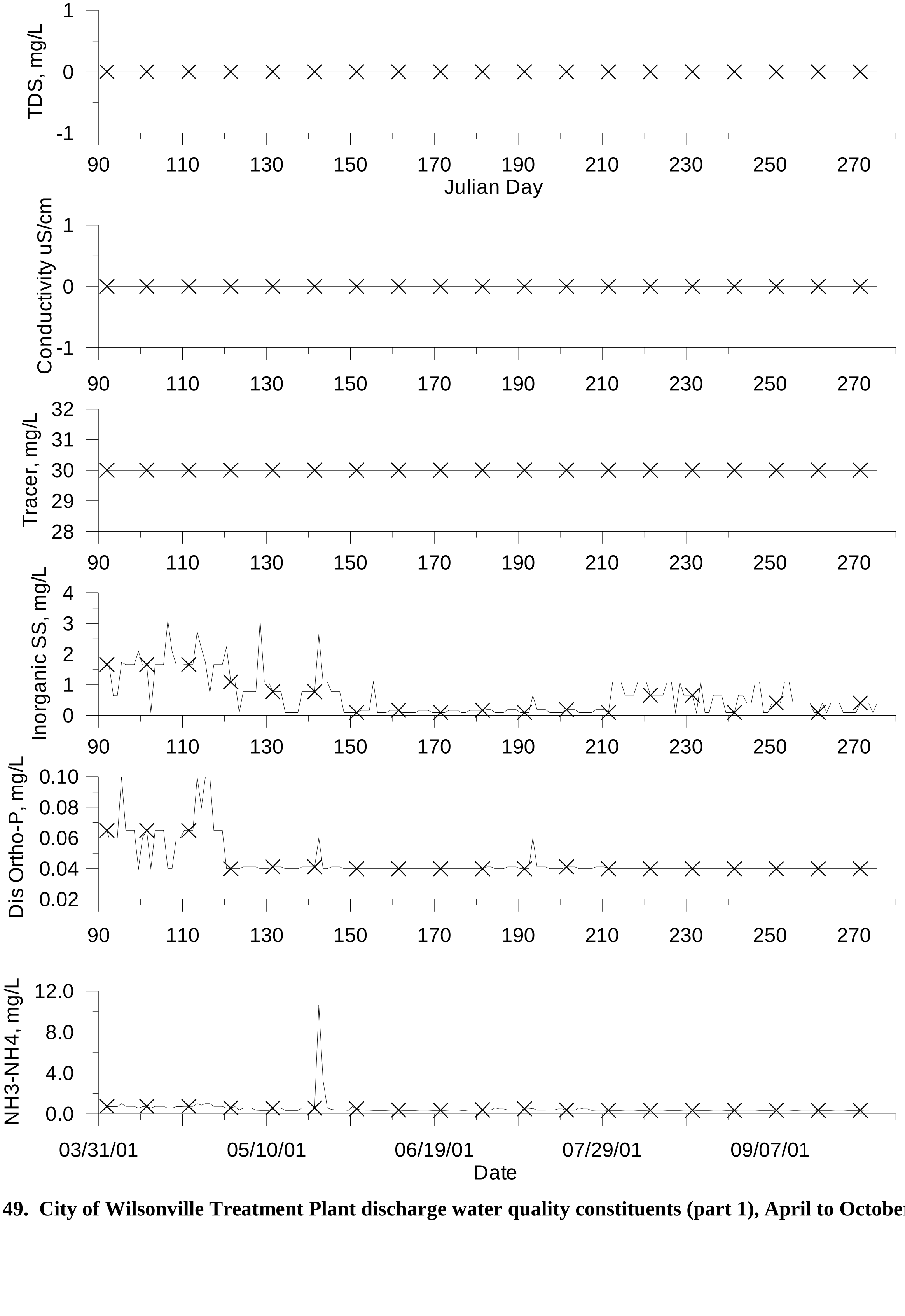

Figure 49. City of Wilsonville Treatment Plant discharge water quality constituents (part 1), April to October 2001

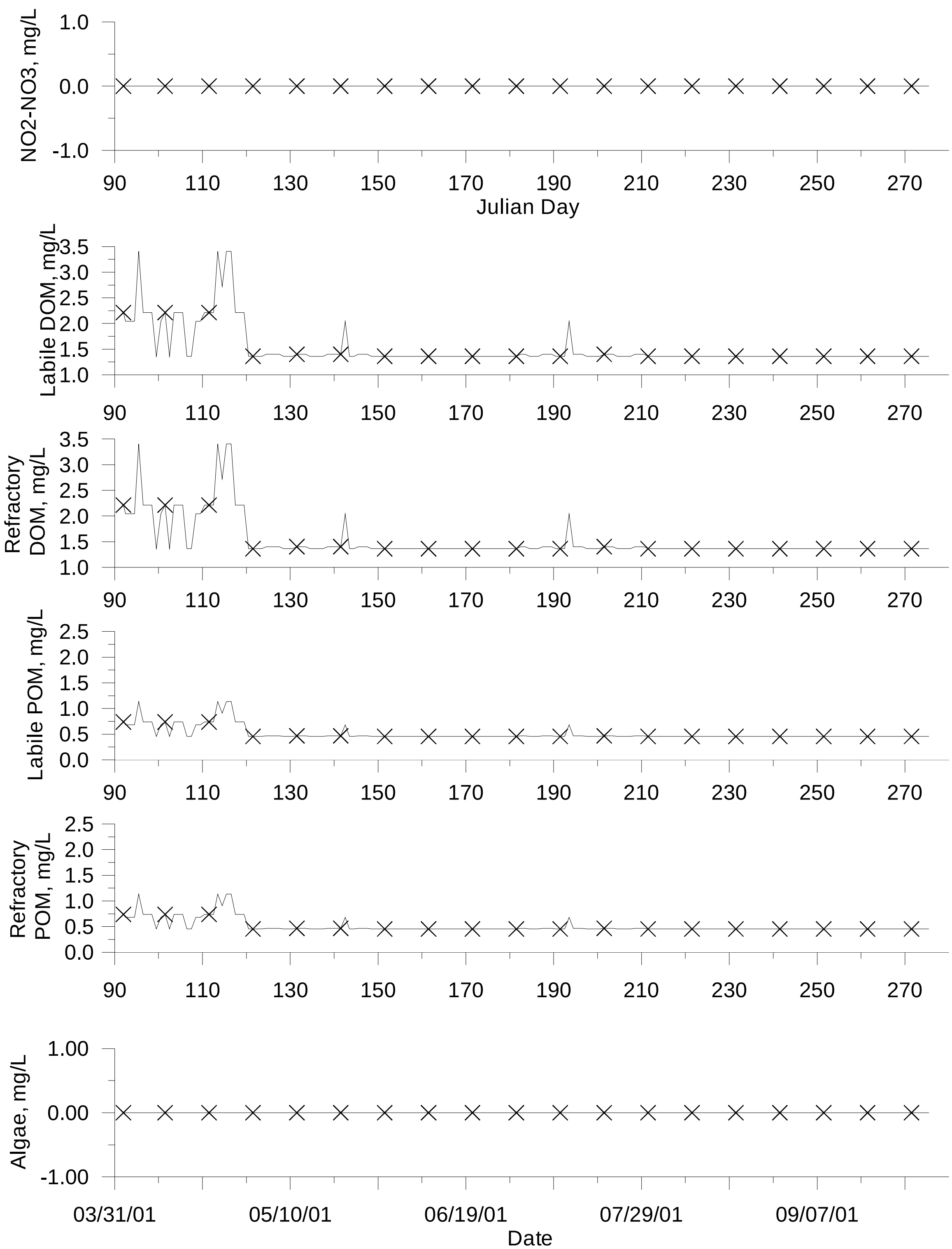

Figure 50. City of Wilsonville Treatment Plant discharge water quality constituents (part 2), April to October 2001

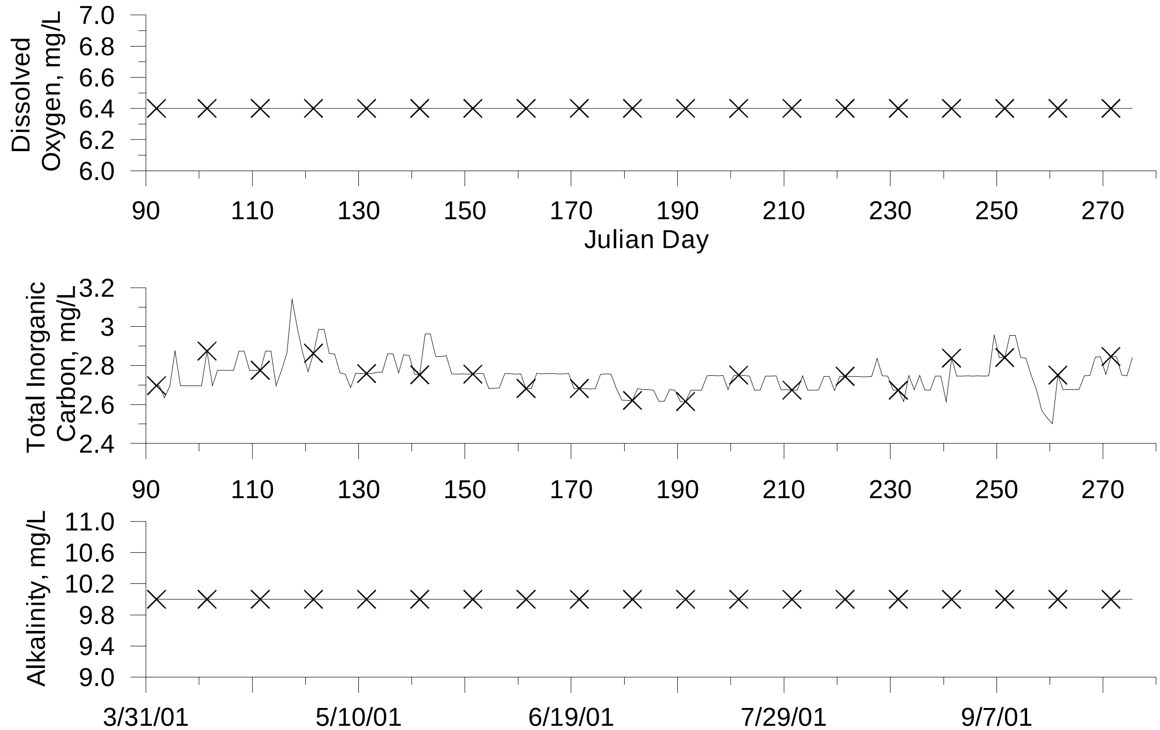

Figure 51. City of Wilsonville Treatment Plant discharge water quality constituents (part 3), April to October 2001

Meteorological Data

CE-QUAL-W2 uses air and dew point temperature, wind speed and direction, and cloud cover or solar radiation in the model. Since the system is large, covering RM 84 to RM 26.5 several meteorological data sets were utilized as shown in Figure 52. Each model water body can have a separate meteorological data set so water body 1 used the meteorological data at the Salem airport, water body used the meteorological data at the McMinnville airport and water body 3 used the data at the Aurora airport.

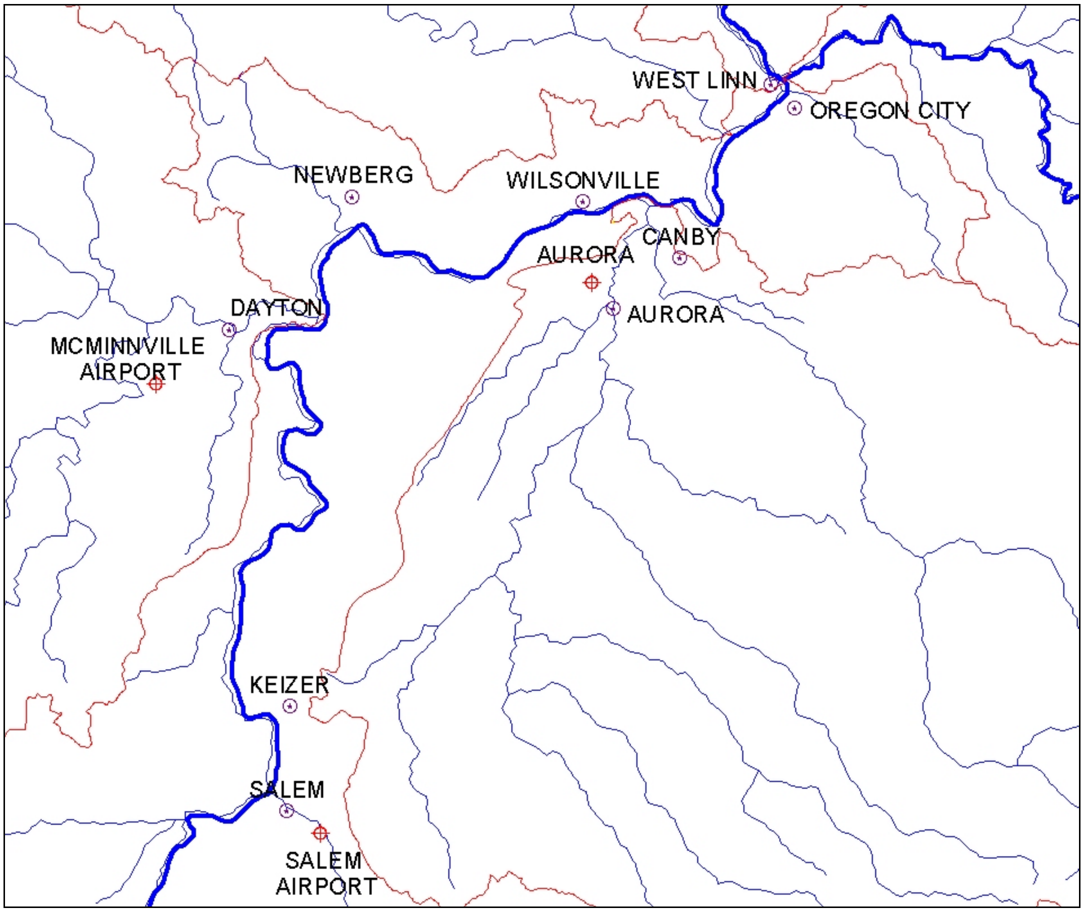

Figure 52. Meteorological sites along the mid-Willamette River

Aurora Municipal Airport

Aurora municipal airport provided hourly data for air and dew point temperature, wind speed and direction, cloud cover and solar radiation. Figure 53 and Figure 54 show the air and dew point temperature respectively, over the period of April to October 2001. Figure 55 and Figure 56 show the wind speed and direction, respectively. Figure 55 indicates the minimum wind speed-recording threshold is about 1.5 m/s. The rose diagram in Figure 56 indicates the predominantly wind direction is from the North. Figure 57 shows the coarseness of the cloud cover data recorded at the airport with only about 5 different cloud cover designations. Figure 58 shows the solar radiation recorded at the Aurora airport.

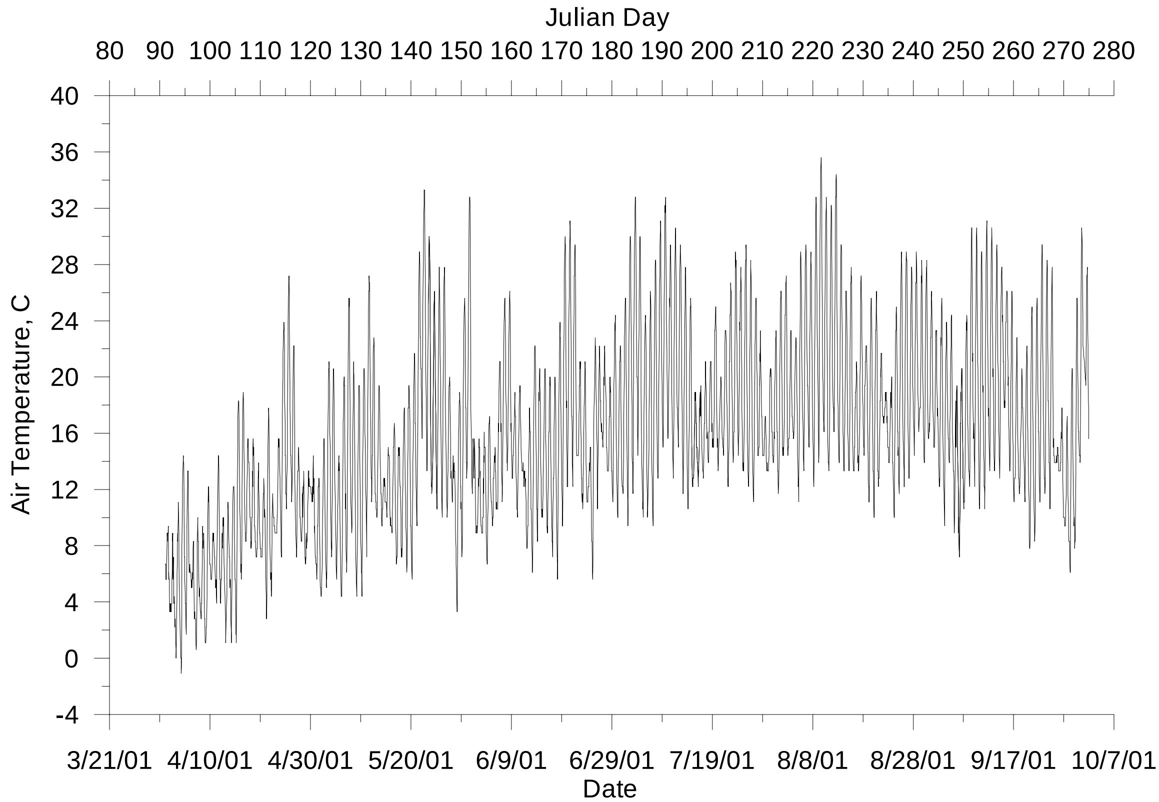

Figure 53. Air temperature at Aurora Municipal Airport, April to October 2001

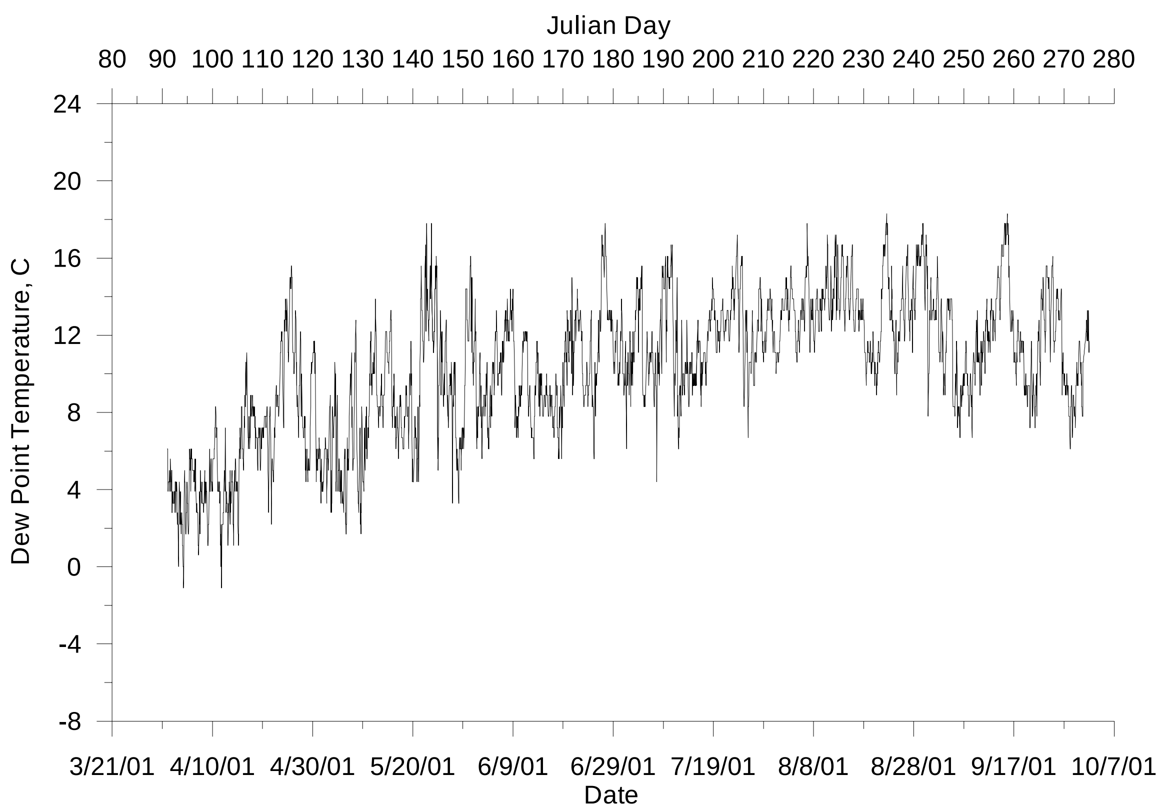

Figure 54. Dew point temperature at Aurora Municipal Airport, April to October 2001

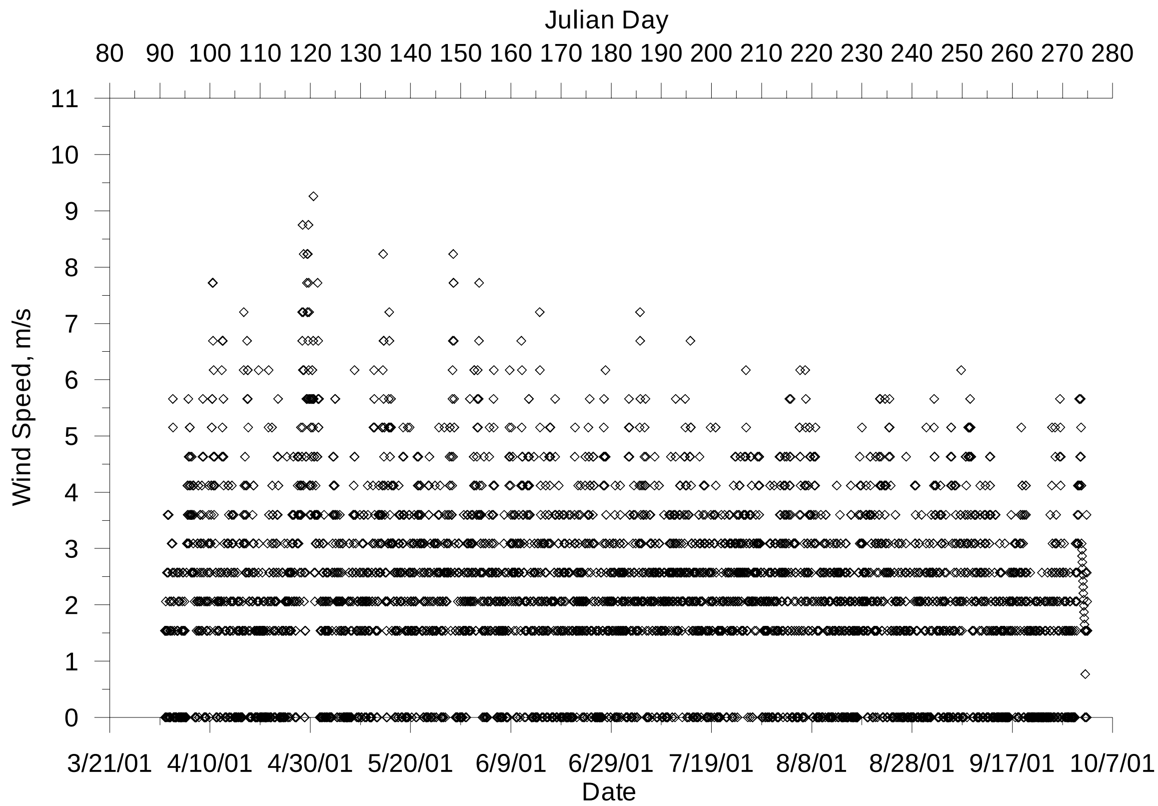

Figure 55. Wind speed at Aurora Municipal Airport, April to October 2001

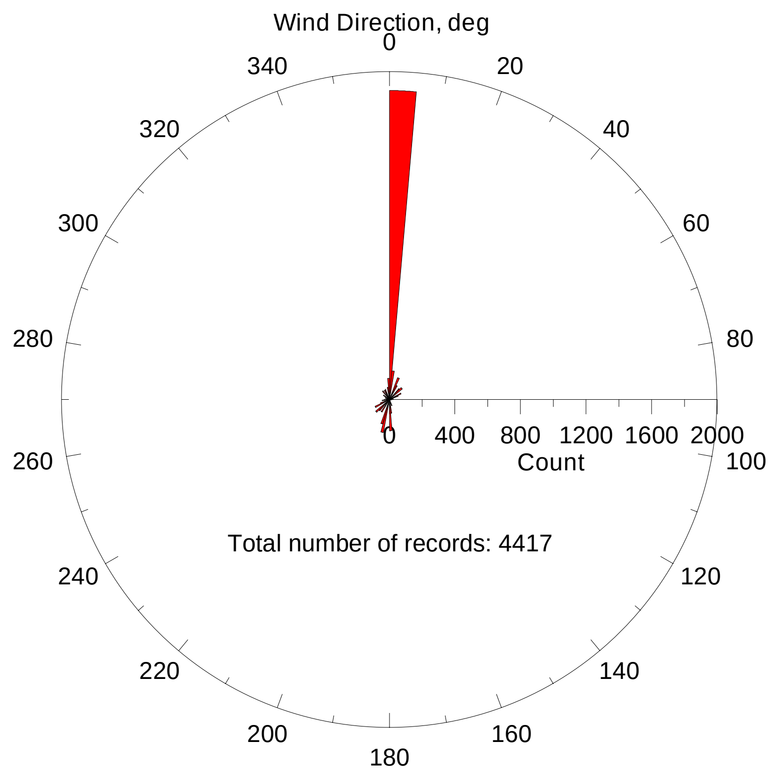

Figure 56. Wind direction at Aurora Municipal Airport, April to October 2001

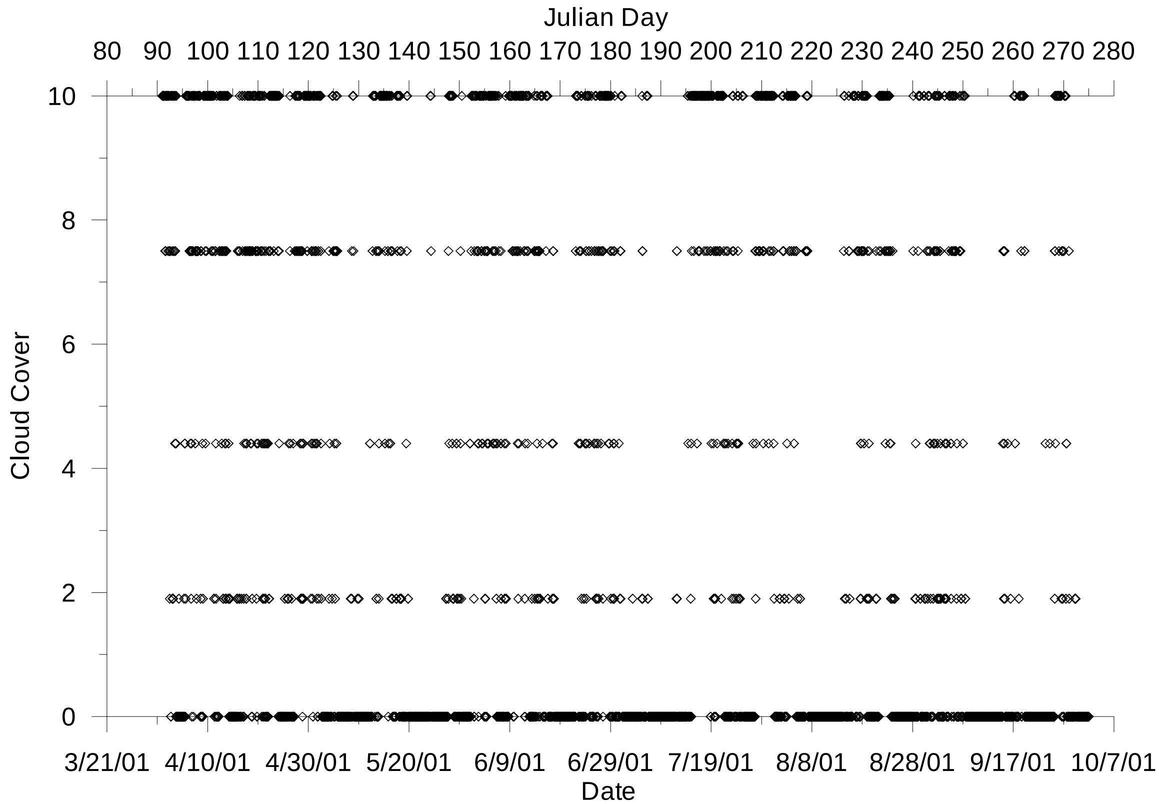

Figure 57. Cloud cover at Aurora Municipal Airport, April to October 2001

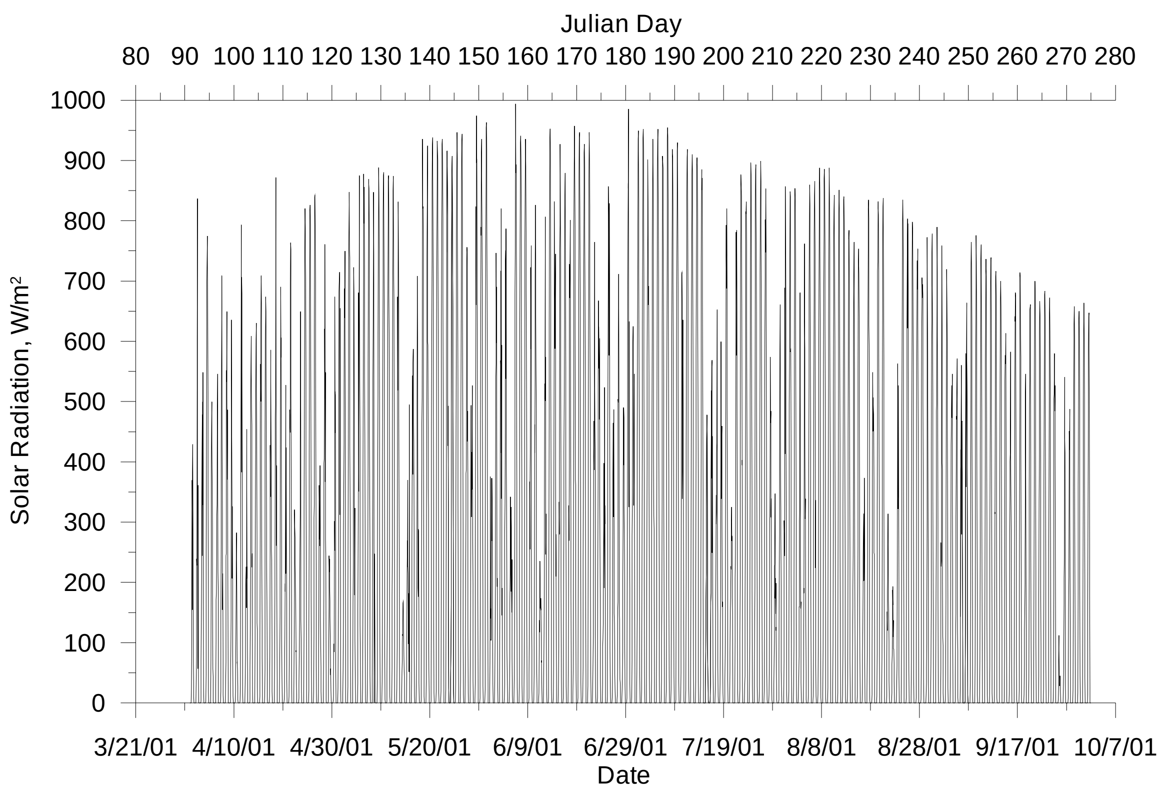

Figure 58. Solar radiation at Aurora Municipal Airport, April to October 2001

McMinnville Municipal Airport

The McMinnville municipal airport recoded similar meteorological data to the aurora airport with the exception of solar radiation data. Figure 59 and Figure 60 show the air and dew point temperature respectively, over the period of April to October 2001. Figure 61 and Figure 62 show the wind speed and direction, respectively. Figure 61 indicates the minimum wind speed-recording threshold is about 1.5 m/s. Winds were slightly higher than recorded at the Aurora airport. The rose diagram in Figure 62 indicates the predominantly wind direction is from the North but with some periodic winds coming from the Southwest. Figure 63 shows the coarseness of the cloud cover data recorded at the airport with only about 5 different cloud cover designations.

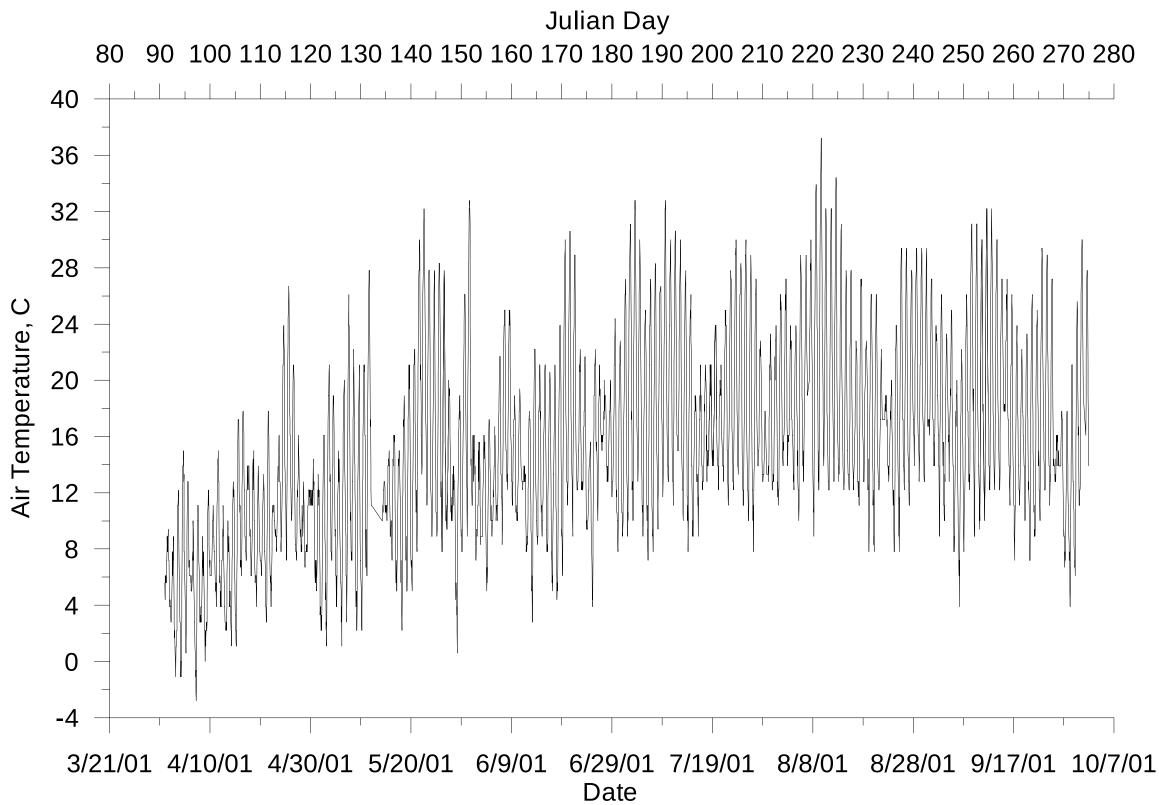

Figure 59. Air temperature at McMinnville Municipal Airport, April to October 2001

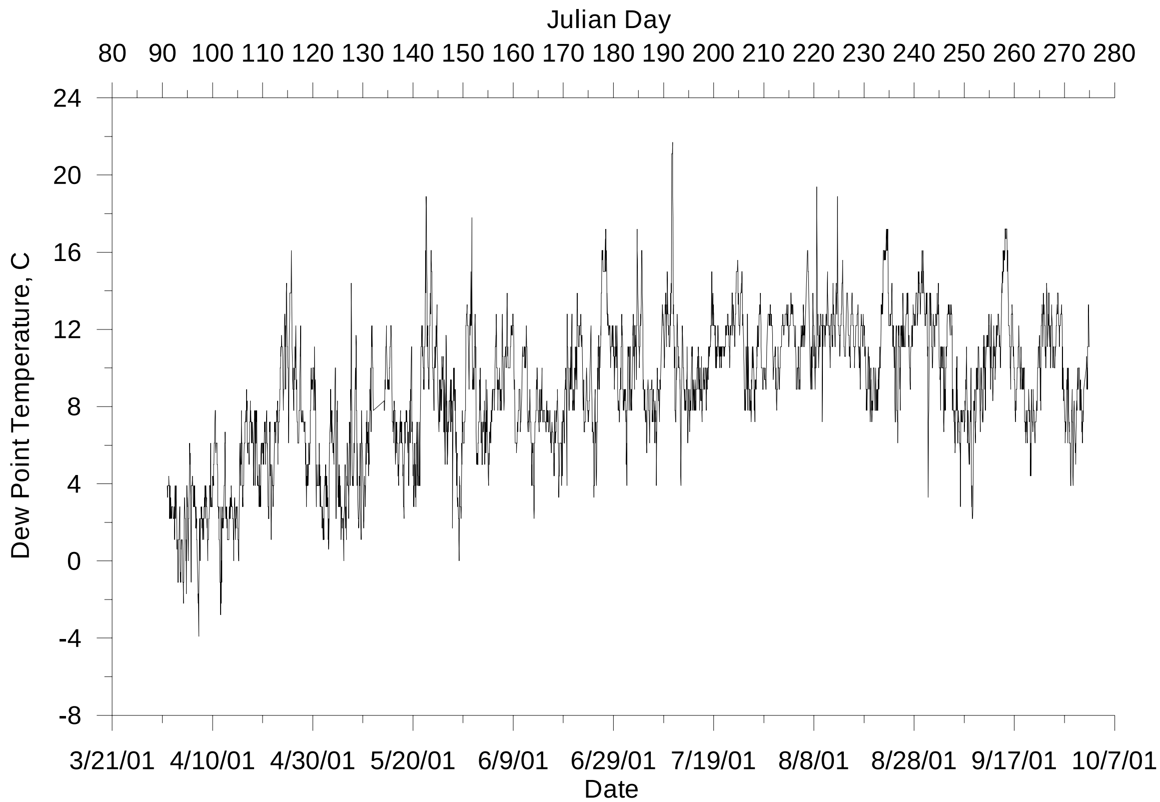

Figure 60. Dew point temperature at McMinnville Municipal Airport, April to October 2001

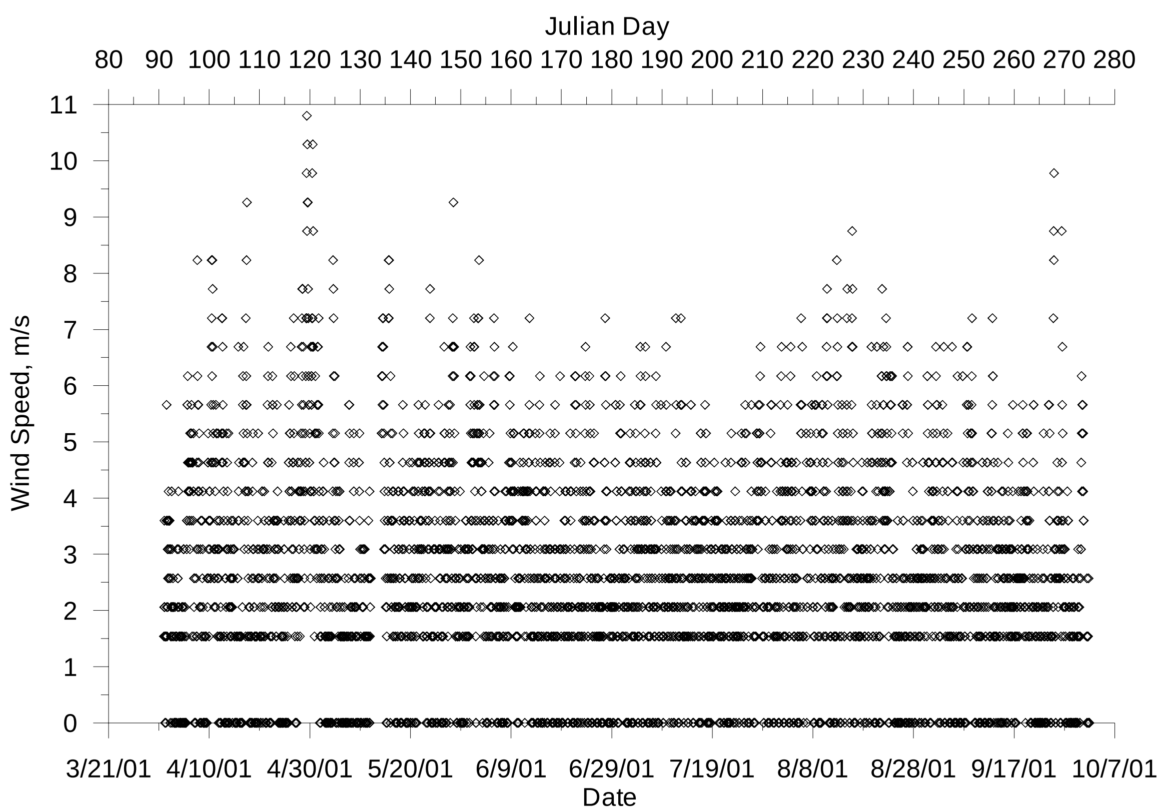

Figure 61. Wind speed at McMinnville Municipal Airport, April to October 2001

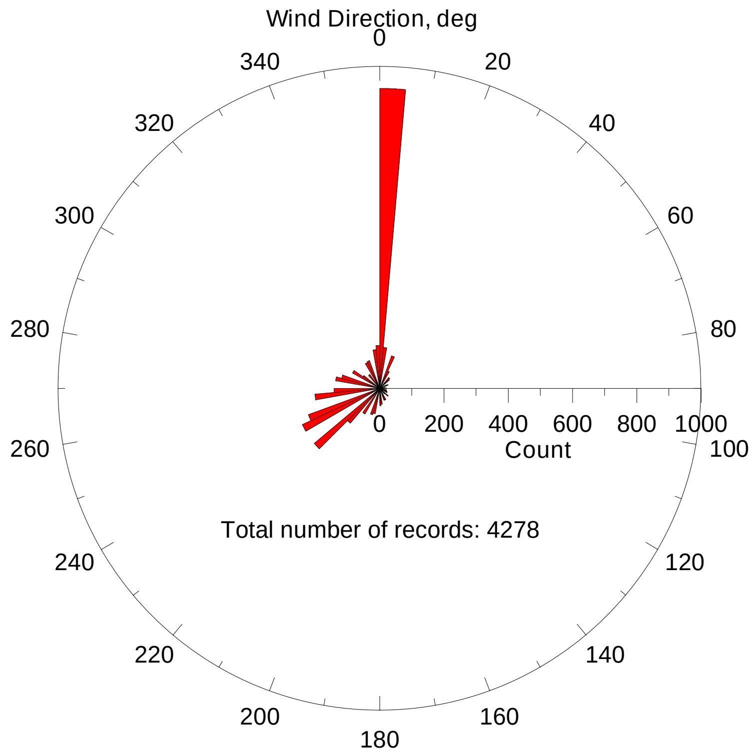

Figure 62. Wind direction at McMinnville Municipal Airport, April to October 2001

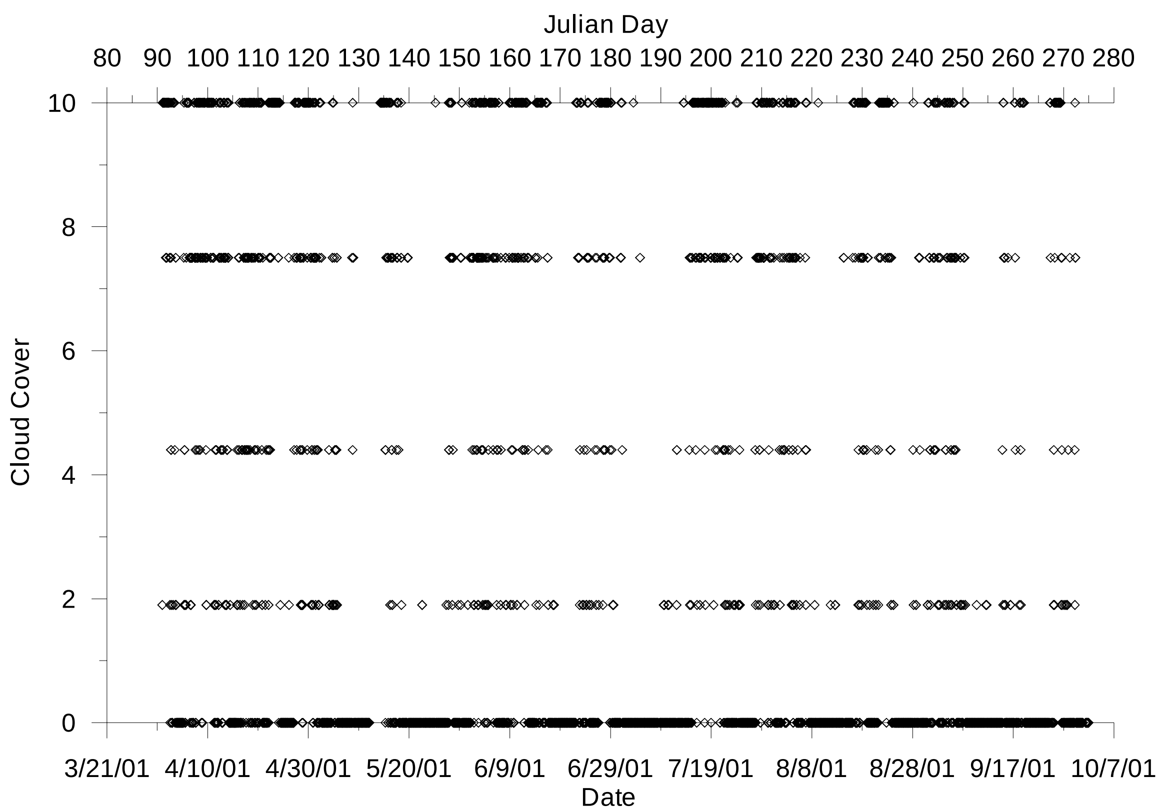

Figure 63. Cloud cover at McMinnville Municipal Airport, April to October 2001

Salem Municipal Airport

The Salem municipal airport records air and dew point temperature, wind speed and direction and could cover, but no solar radiation data. Figure 64 and Figure 65 show the air and dew point temperature respectively, over the period of April to October 2001. Figure 66 and Figure 67 show the wind speed and direction, respectively. Figure 66 indicates the minimum wind speed-recording threshold is about 1.5 m/s. The rose diagram in Figure 67 indicates the predominantly wind direction is from the North but with some periodic winds coming from the several other directions. Figure 68 shows the coarseness of the cloud cover data recorded at the airport with only about 5 different cloud cover designations.

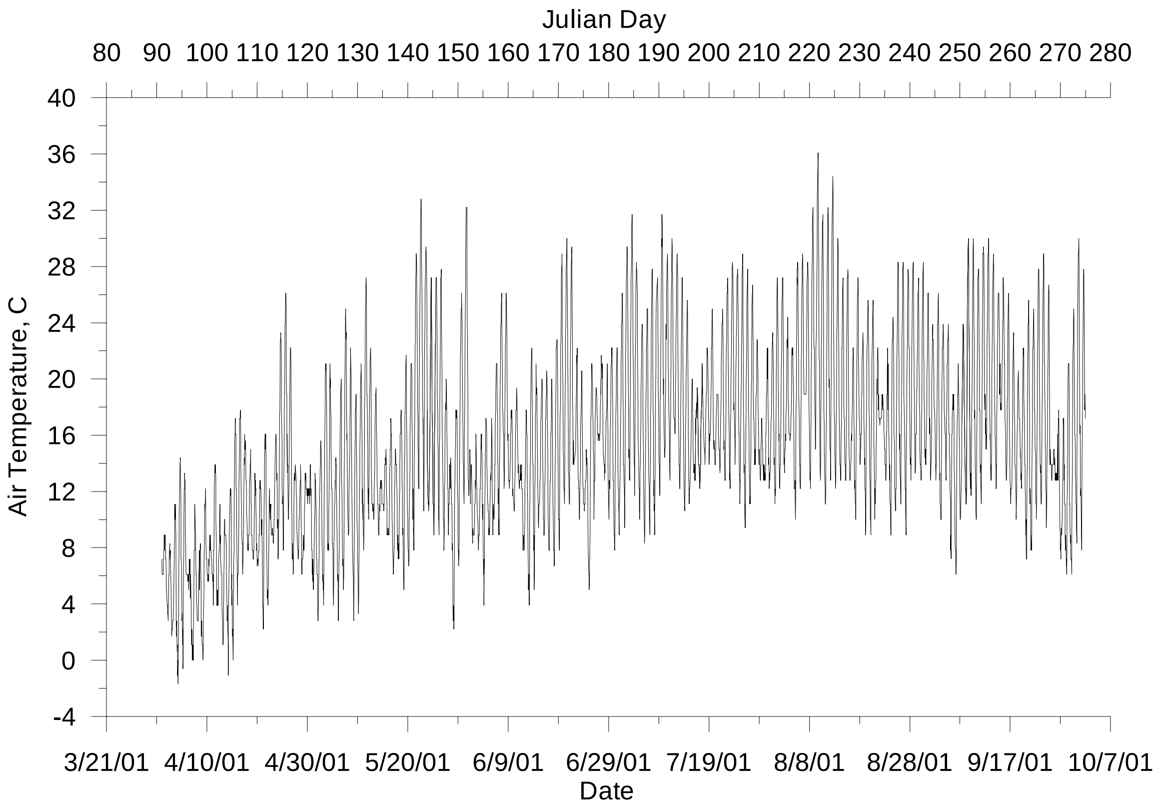

Figure 64. Air temperature at Salem Municipal Airport, April to October 2001

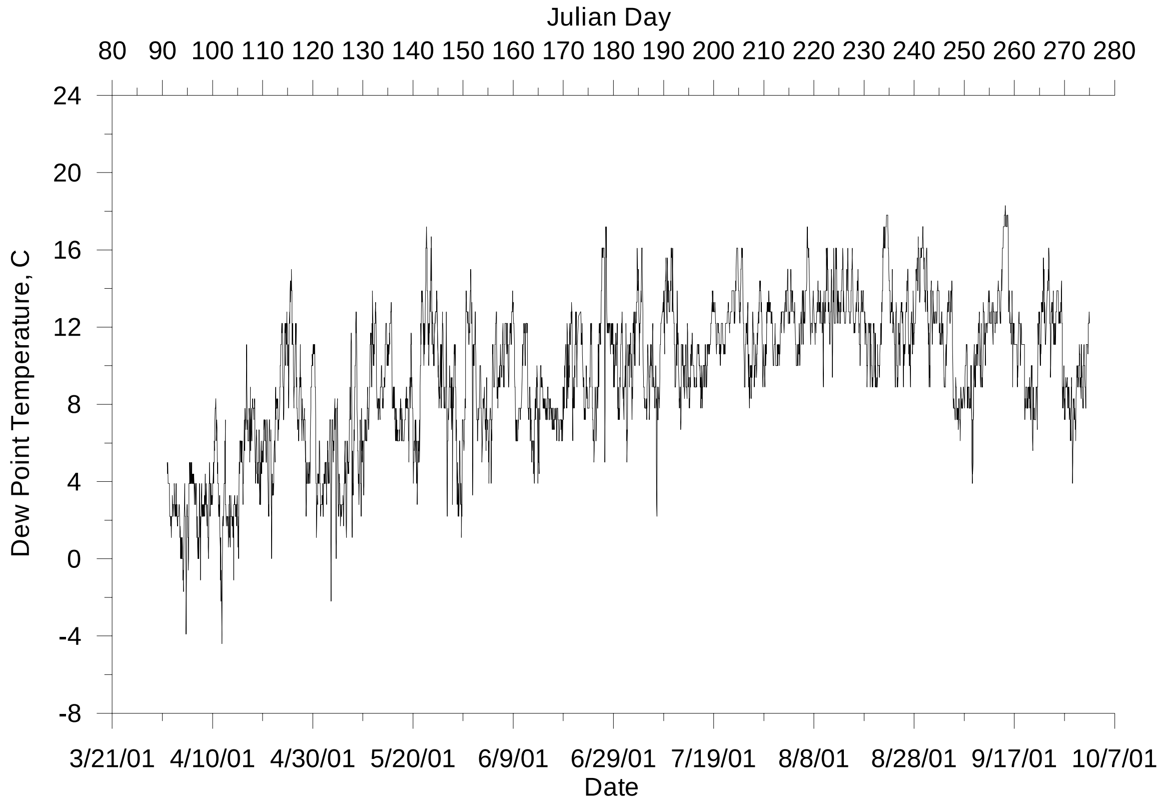

Figure 65. Dew point temperature at Salem Municipal Airport, April to October 2001

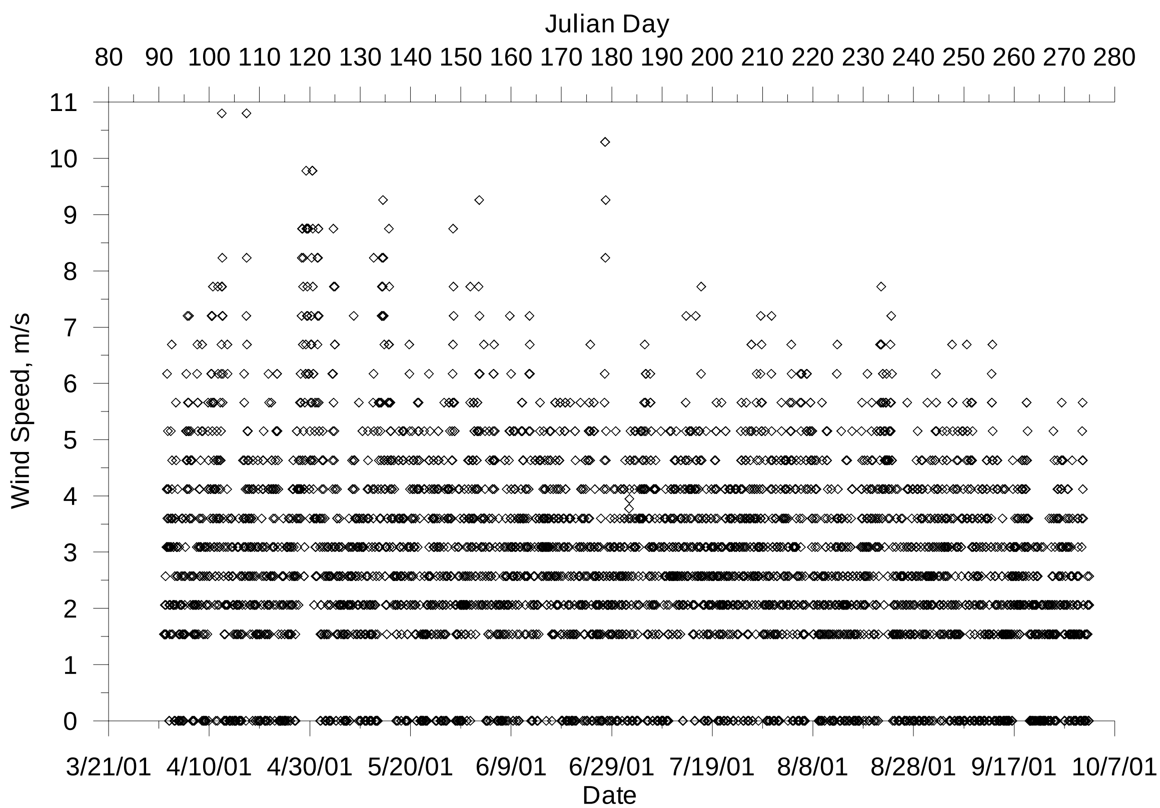

Figure 66. Wind speed at Salem Municipal Airport, April to October 2001

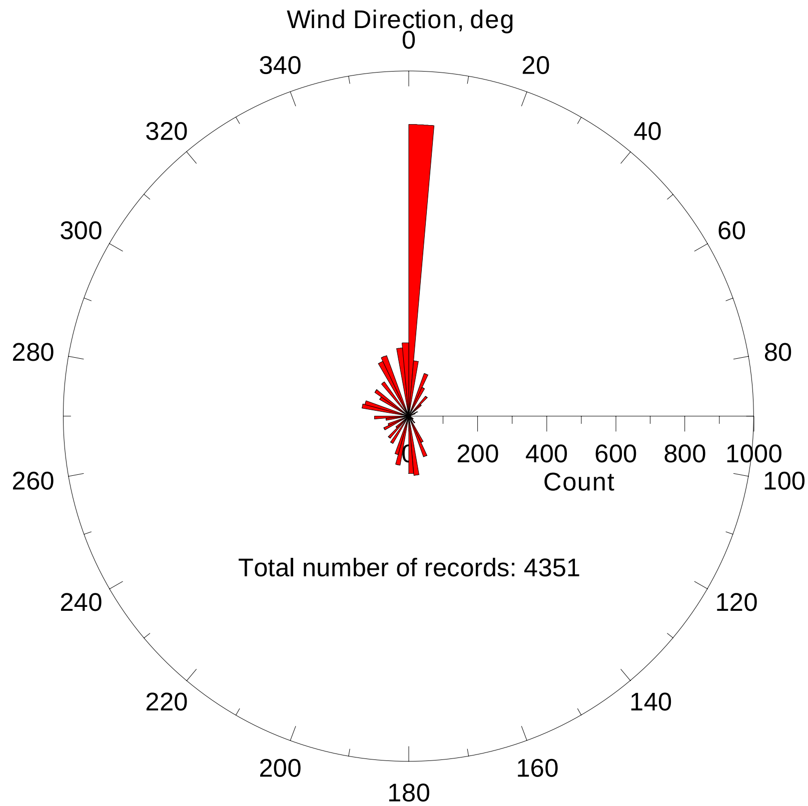

Figure 67. Wind direction at Salem Municipal Airport, April to October 2001

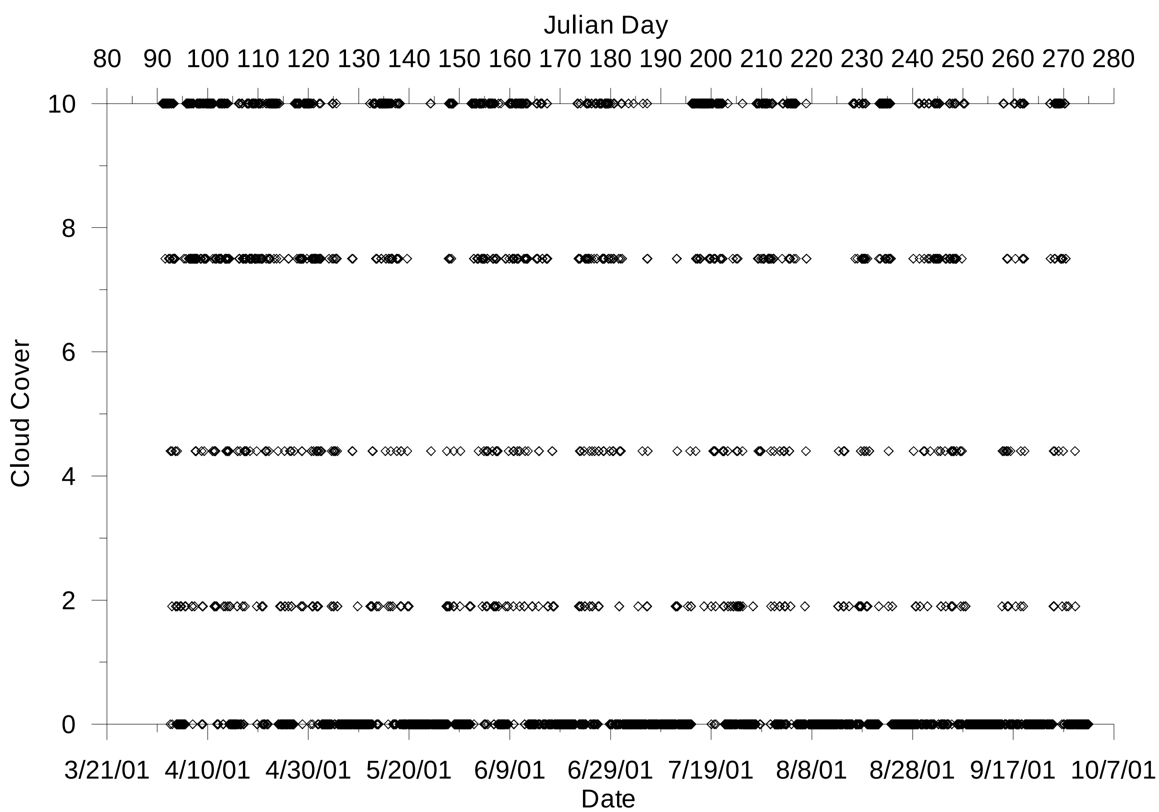

Figure 68. Cloud cover at Salem Municipal Airport, April to October 2001

Structures around Willamette Falls

The primary structures the Willamette Falls are the dam and flashboards operated to hold water for power generation. Figure 69 shows a plan view of the Willamette Falls and the dam sections. In order to accurately model water surface elevations at these facilities it was important to understand the size of the dam and the operations of the flashboards. Table 4 shows a list of the dam heights with and without flashboards. Flashboards put in place in the spring of each year and left in place until they washed out during the following winter. Figure 70 shows an aerial photograph of the Willamette Falls and the dam structures at the falls.

Since detailed bathymetric data was collected by PGE just upstream of the Willamette Falls this data was utilized to examine the size and length of the natural "dam" if the constructed dam an flashboards were removed. Figure 71 shows a contour plot of the river bathymetry upstream of the falls and Figure 72 shows a series of three-dimensional surface plots of the river bathymetry to illustrate flow paths through the Willamette Falls. An analysis of dam heights and lengths for the Willamette Falls without the constructed dam and flashboards is discussed in the report: "Mid-Willamette River: Management Scenarios."

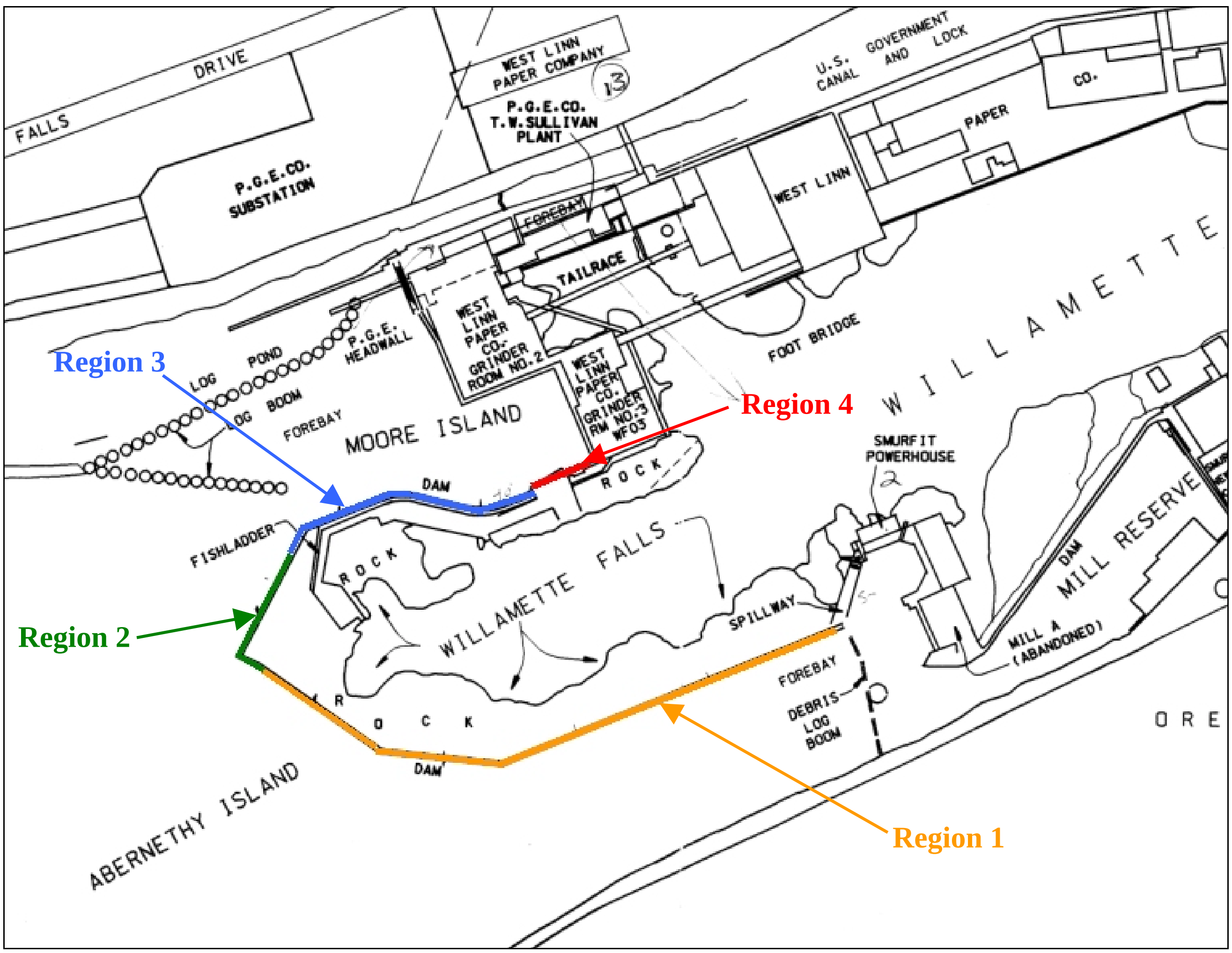

Figure 69. Plan view of the Willamette Falls

Table 4. Dam and flashboard specifications at the Willamette Falls

Region	Dam Section Length, ft	Dam Height, ft	Height with flashboards
1	1450	52.0	54.0
2	350	54.7	Not apply
3	375	52.5	55.5
4	175	56.9	Not apply

Figure 70. Aerial view of Willamette Falls and dam structures (compliments of PGE)

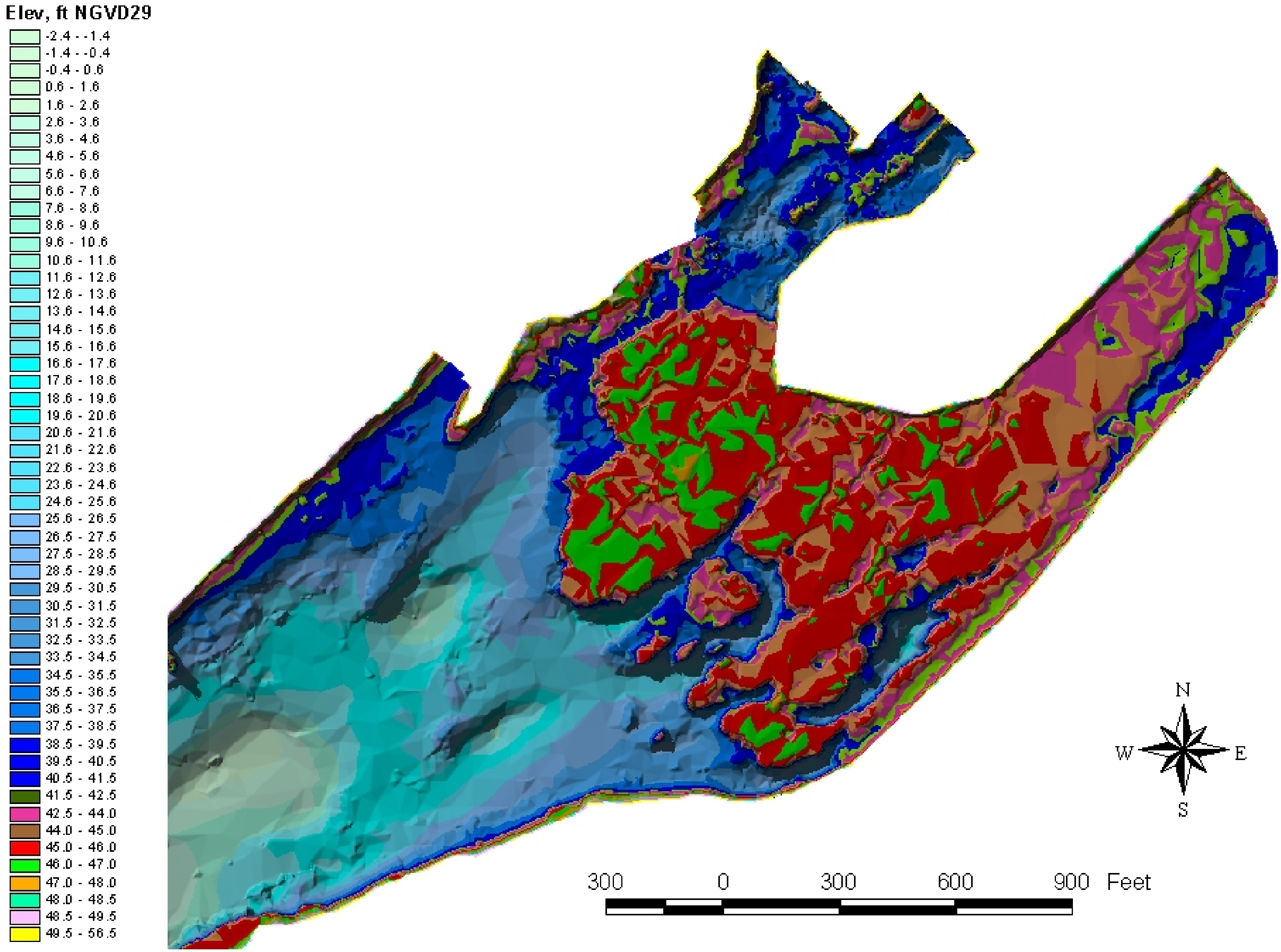

Figure 71. Channel bathymetry surface plot upstream of Willamette Falls

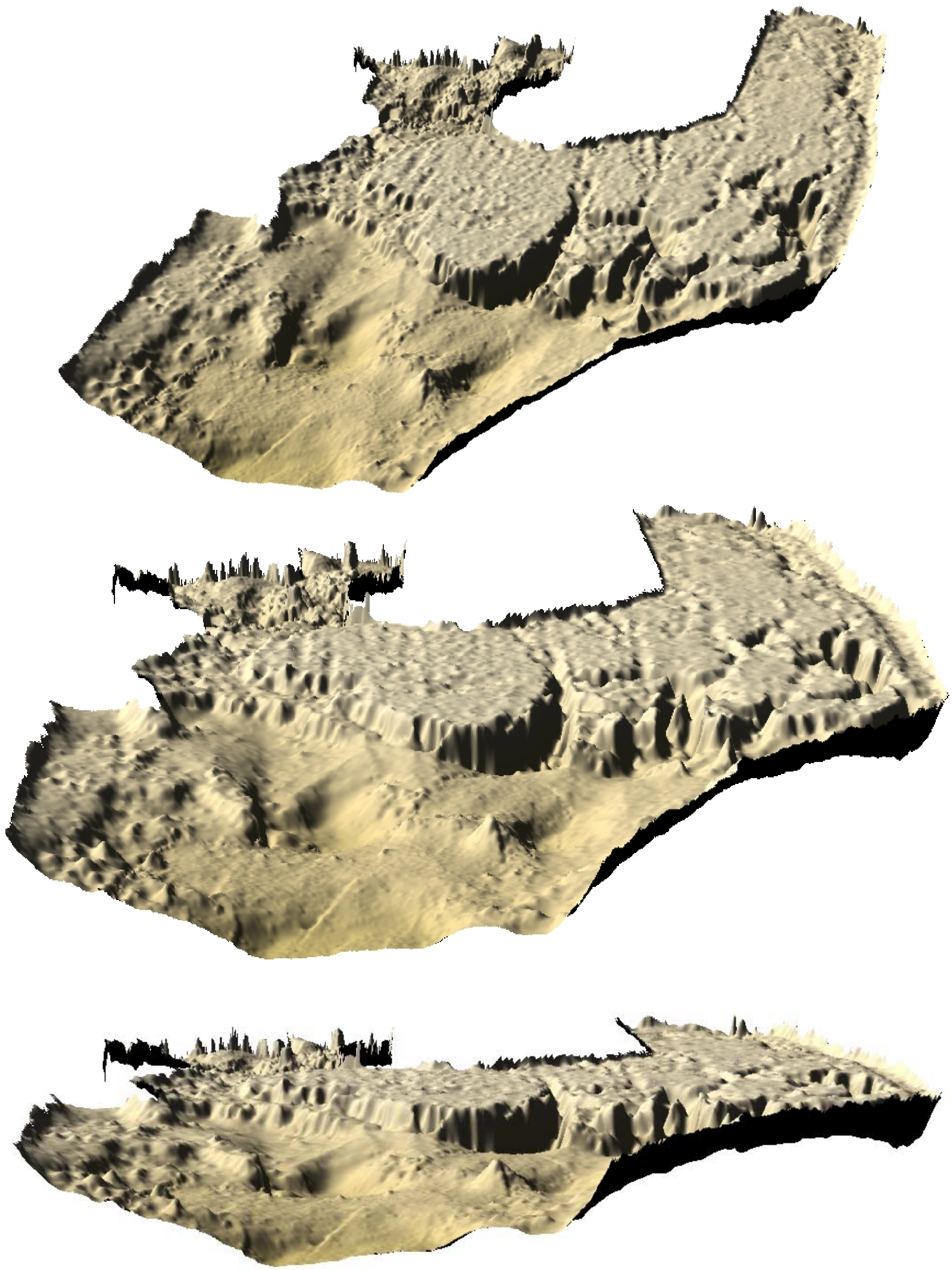

Figure 72. 3-D view of the Willamette River bathymetry upstream of the Willamette Falls

Middle Willamette River Model Shading Information

CE-QUAL-W2 incorporates both topographic and vegetative shade in the model. Topographic characteristics include the steepest inclination angle in 18 directions around a model segment. The vegetative characteristics consist of tree top elevation, distance between the river channel centerline and the controlling vegetation, and the vegetation density in summer and winter. The vegetation characteristics are provided for both banks of the river.

The vegetation and topographic characteristics for the mid-Willamette River model were developed using information supplied by the Oregon Department of Environmental Quality for use in their shade and Heat Source models. The information consists of points every 100 ft along the thalweg of the river and each point has channel width, elevation, 3 topographic inclination angles, and 9 vegetation compartments for each bank. Each vegetation compartment consists of vegetation height, distance and density characteristics.

The information supplied by the ODEQ was first used to calculate the variables used in the CE-QUAL-W2 model but at the resolution of every 100 ft along the channel. The 9 vegetation compartments were collapsed into one vegetation compartment representing the controlling vegetation for each bank. The 3 topographic inclination angles were expanded using interpolation to 18 inclination angles around each thalweg point. The output of this analysis was then used with the model grid to generate a shade input file for the model as shown in Appendix 4. Since the vegetation and topographic characteristics were at a higher resolution than the model grid the information from multiple thalweg points within a segment reach were averaged.

Summary

This report summarizes the background information for the development of the Willamette River model between the Willamette Falls (RM 26.8) and the City of Salem at RM 81.6. The information described in this report includes the following:

- Rational as to why CE-QUAL-W2 was chosen as a model framework
- Bathymetric data
- Meteorological data (short-wave solar radiation, air temperature, dew-point temperature, wind speed and direction, cloud cover)
- Temperature, water quality and flow data for all tributaries and point sources
- Temperature, water quality and flow data at the main stem Willamette River at Salem
- Information about the structures at the Willamette Falls
- Shading information from Oregon DEQ

Significant tributaries for this study included the Yamhill, the Molalla, Tualatin, and Mill Creek. Estimates were made of distributed sources between RM 81.6 and RM 26.8. Major point sources included the discharges from the City of Salem and the City of Wilsonville wastewater treatment plants.

Meteorological data varied in the basin and information was obtained at 3 locations in the area: Aurora Municipal Airport, McMinnville Municipal Airport, and Salem Municipal Airport. These were used for different sections of the CE-QUAL-W2 model grid.

Other related information includes reports prepared for the Clackamas County, Water Environment Services:

- Rodriguez, H. G., Annear, R. L., Wells, S. A., and Berger, C. (2001) – background information for setting up the Lower Willamette River model from the Willamette Falls (RM 26.8) to the Columbia River (RM 0), including the Columbia River from Bonneville Dam to the Beaver Army Terminal.
- Berger, C., Annear, R. L., and Wells, S. A. (2001) – model calibration for the Lower Willamette River model using CE-QUAL-W2

In addition there will be 2 additional companion reports to this one discussing

- Model Calibration and
- Model Management Alternatives.

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Appendix 1: Model Grid Development

The entire model grid as shown in Figure 73 was developed in smaller sections. For each section a detailed map of the system was made and a grid constructed. In the end, the grids were all merged together for the entire system model. This section shows the details of each piece of the bathymetric grid starting from the Falls to Salem.

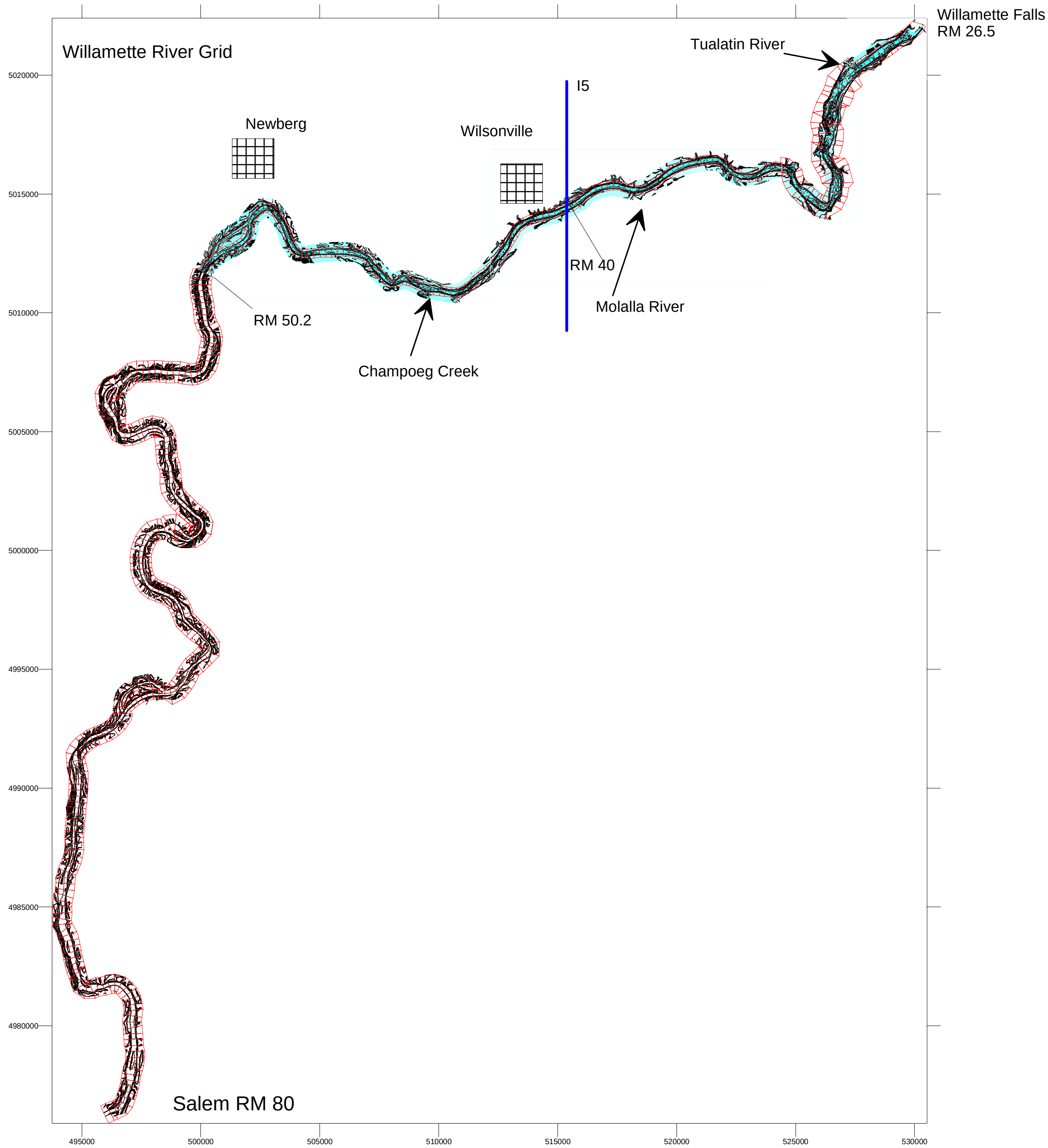

Figure 73. Willamette River grid from the Willamette Falls to Salem.

Grid Section 1

The first part of the grid was developed at the Falls using detailed x,y,z soundings from PGE in conjunction with detailed bathymetric maps from NOAA. These bathymetric contours were digitized and all the data were imported into SURFER for mapping and grid development. The first section is shown in Figure 74 with details of the grid itemized in Table 5.

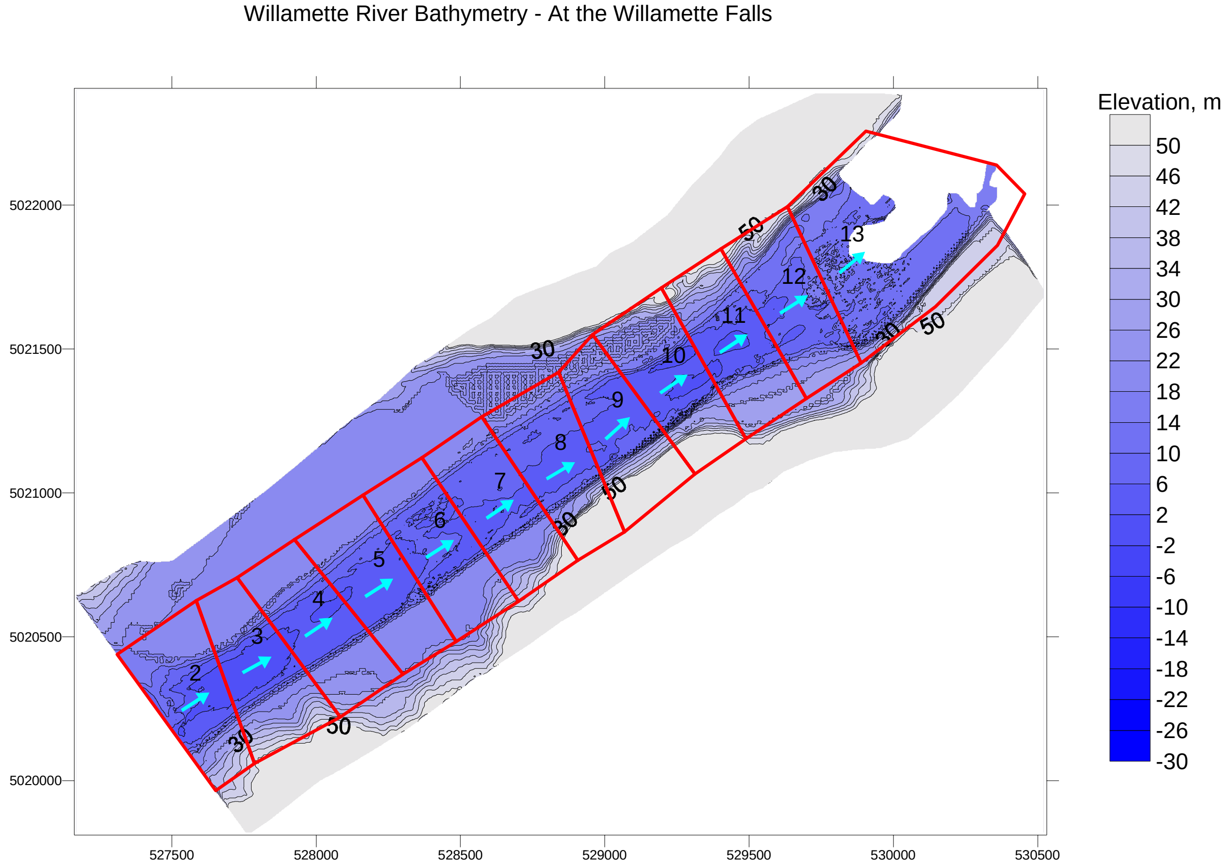

Figure 74. Grid section 1 near the Willamette Falls.

Table 5 Grid section 1 details.

Grid Parameter	Value
Number of model segments	12 segments
Segment spacing	250.76 m
IMP	14
Reach distance	3259.9 m
Reach slope	0.0000
KMP	45
Vertical spacing	1 m
ELBOT	-8.0 m

The channel bottom (the deepest point in the cross-section) along the thalweg is shown in Figure 75. This illustrates well the shallowing of the channel as the Falls are approached.

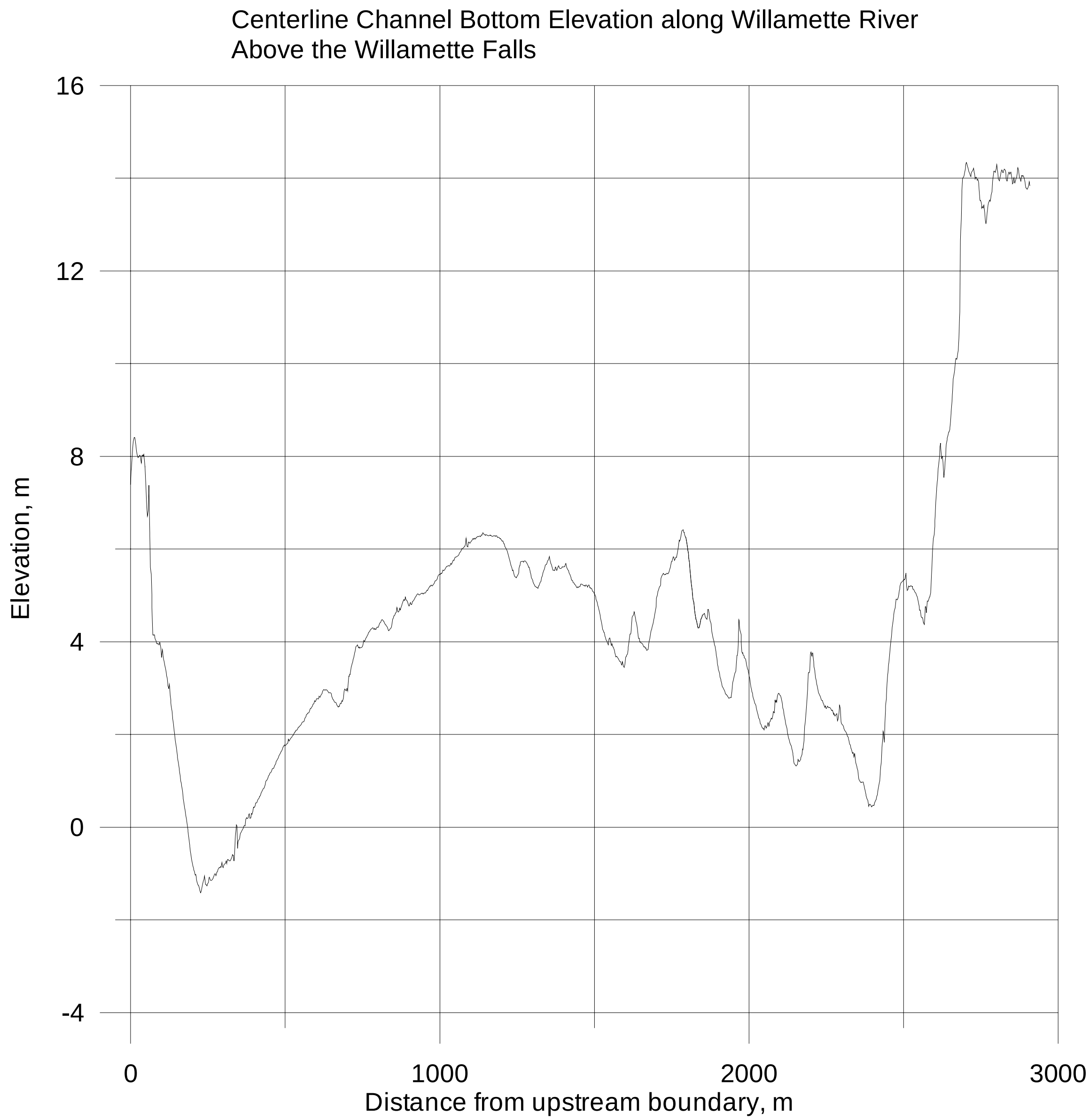

Figure 75. Elevation along channel in section above the Willamette Falls.

Grid Section 2

The layout of the second grid section (18528A) is shown in Figure 76. This section as with the other grid sections used NOAA bathymetric data and new, updated bathymetric data from USGS obtained in 2001 and 2002.

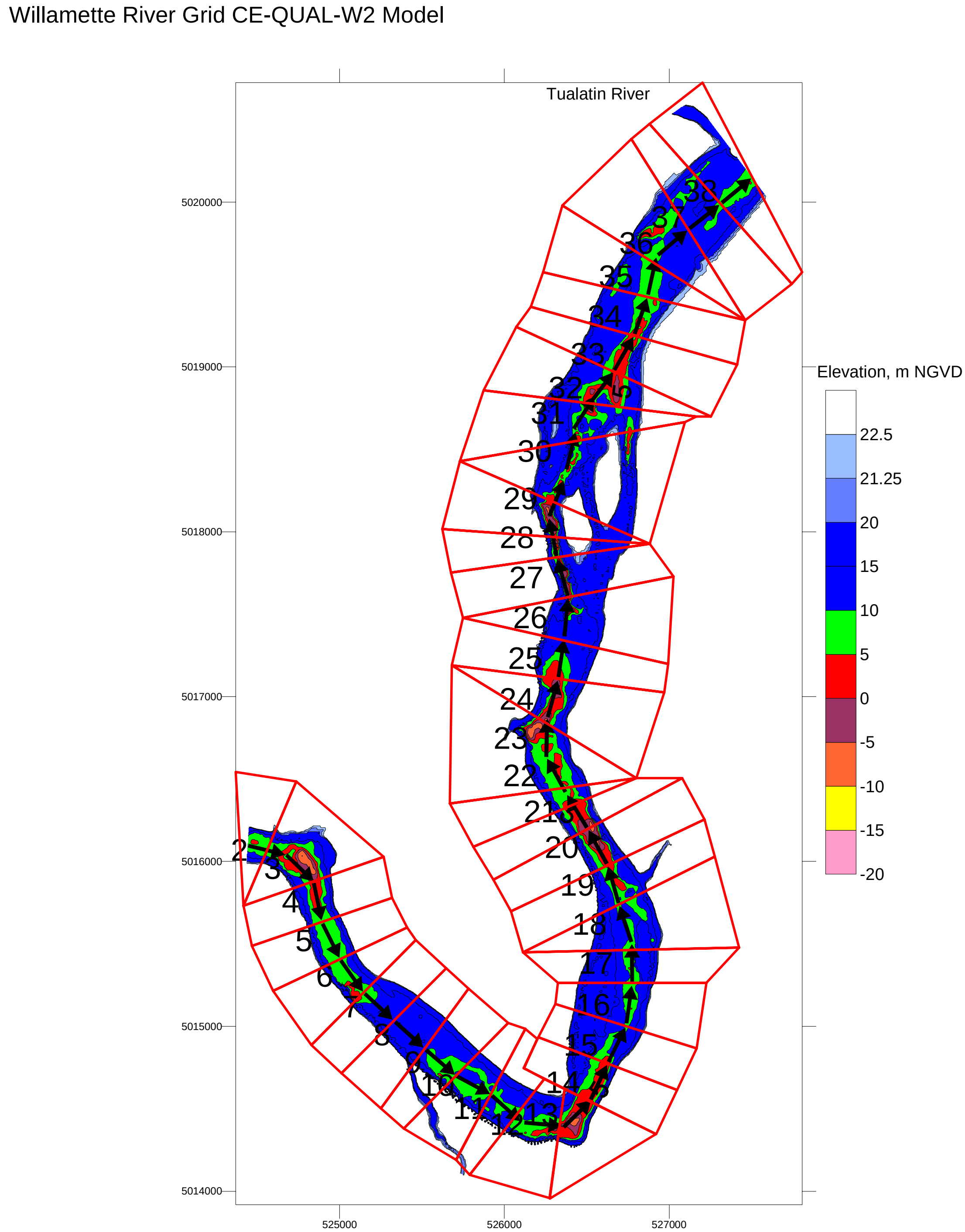

Figure 76. Grid section 2 highlighting the shallow and deeper channel areas and model segments.

Characteristics of the model grid are shown in Table 6. In all cases, comparisons were made between the W2 model grid and the SURFER area-volume-elevation curves. An example of these is shown in Figure 77 and Figure 78 for volume-elevation and surface area-elevation, respectively. These were used to make sure mistakes were not made in the grid construction. If errors were found the process was debugged to determine the errors. It should be noted though that the model grid was constructed to preserve volume rather than surface area (see Cole and Wells, 2002).

Table 6 Grid section 2 details.

Grid Parameter	Value
Number of model segments	37 segments
Segment spacing	253.22 m
IMP	39
Reach distance	9369.0 m
Reach slope	0.0000
KMP	45
Layer spacing	253.22 m
Vertical spacing	1 m
ELBOT	-8.0 m

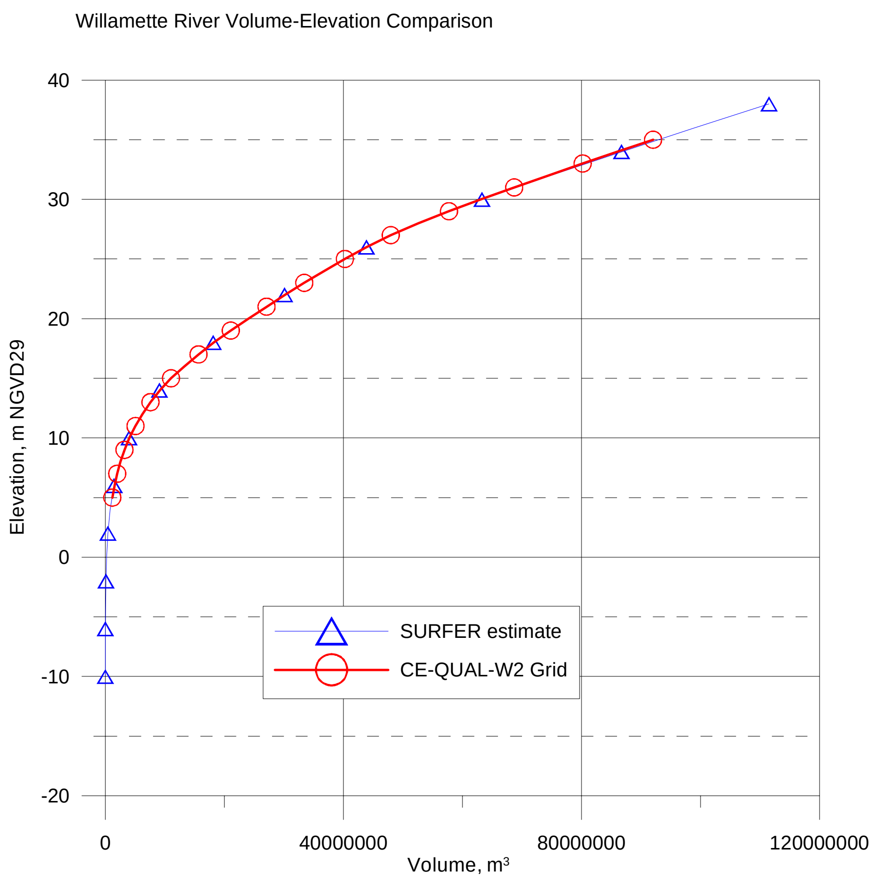

Figure 77. Comparison of SURFER and W2 model grid for elevation vs volume for grid section 2.

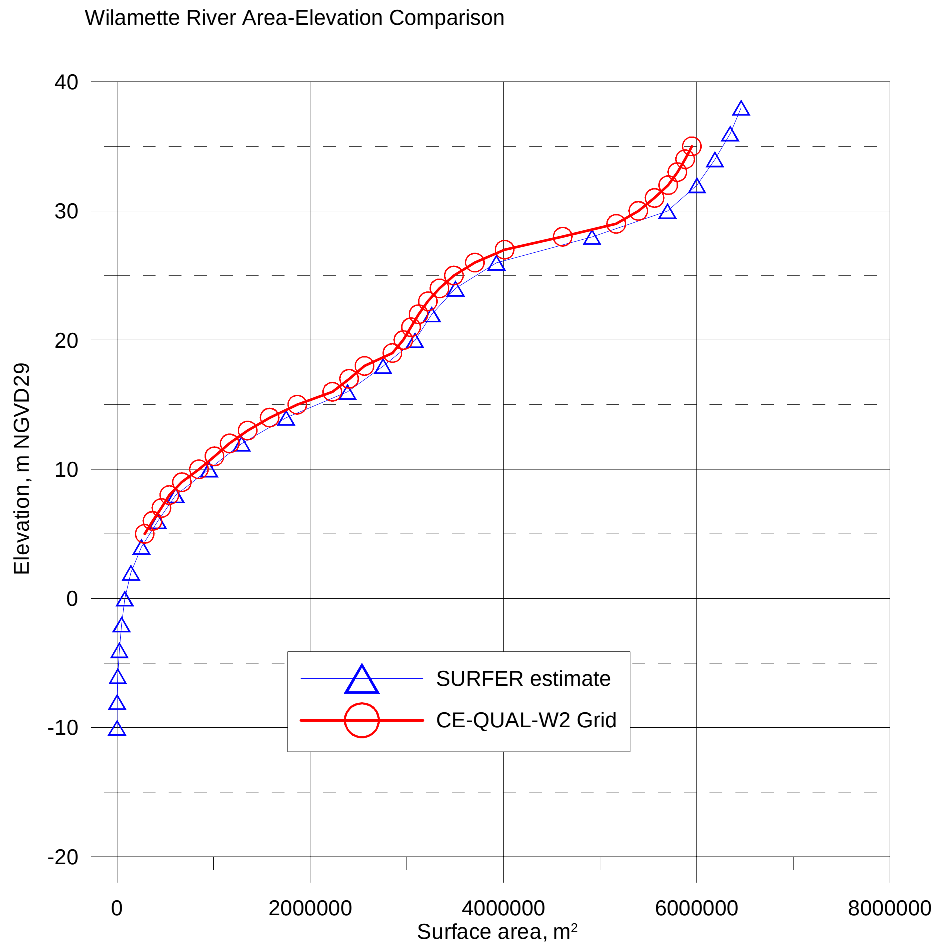

Figure 78. Comparison of SURFER and W2 model grids for surface area – elevation for grid section 2.

In order to illustrate how the grid is constructed, information from the CE-QUAL-W2 GUI interface was used to show the plan view of the grid using the surface widths (Figure 79), a representative width vs layer schematic for 2 model segments (Figure 80 for Segment 3 in Grid Section 2 and Figure 81 for Segment 30 in Grid Section 2), and the side view of the grid for Section 2 (Figure 82). The elevation of the deepest part of the channel along the thalweg is shown in Figure 83.

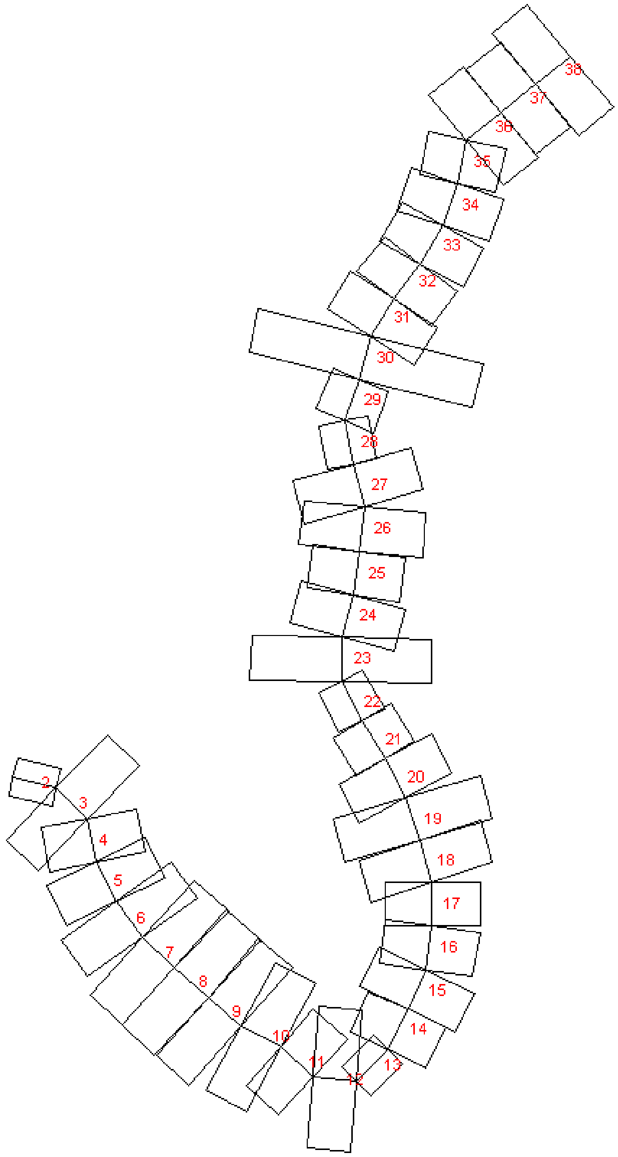

Figure 79. Plan view of model grid showing surface widths.

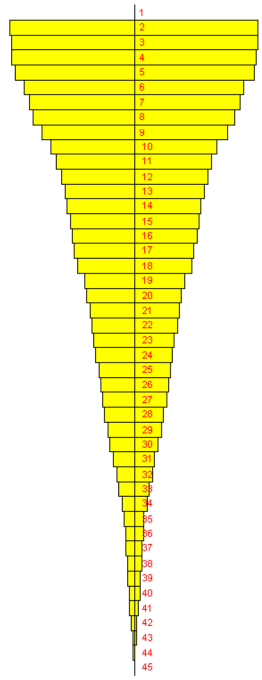

Figure 80. Grid section 2 Segment 3 layer widths.

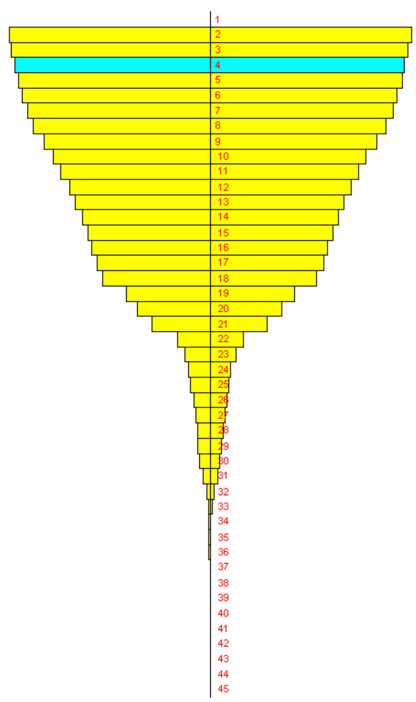

Figure 81. Grid section 2 Segment 30 layer widths.

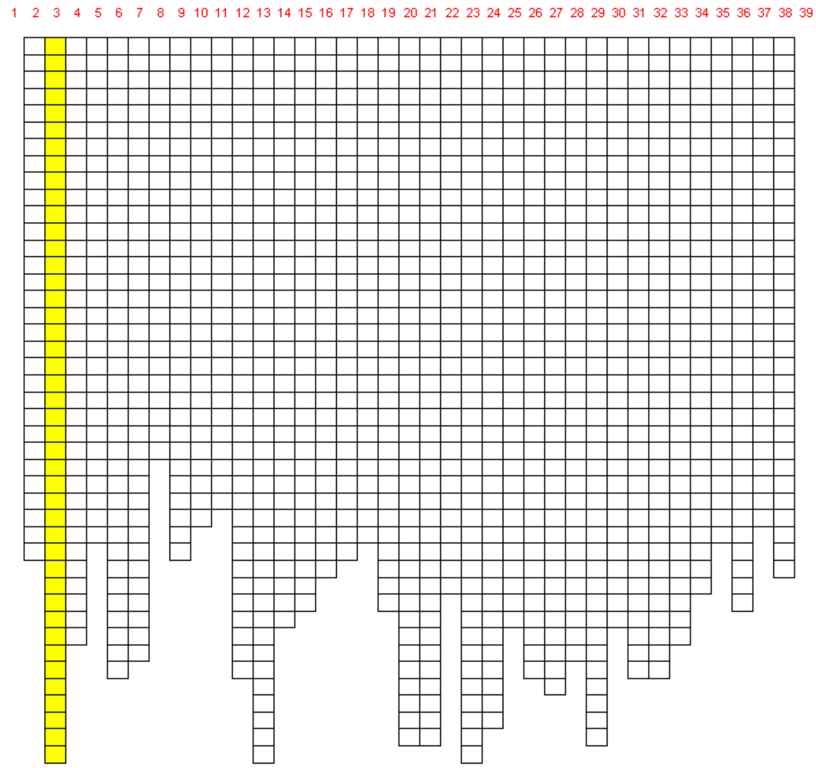

Figure 82. W2 Grid - side view of segments for Grid section 2.

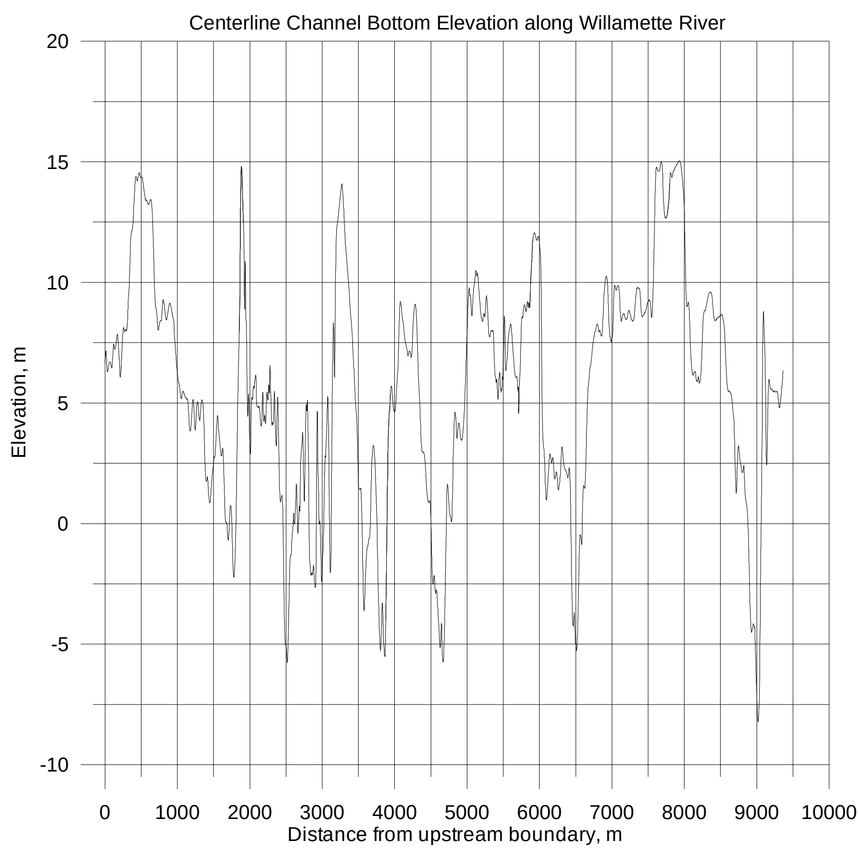

Figure 83. Channel bottom elevation of thalweg in Grid section 2.

Grid Section 3

The layout of the third grid section (18528B) is shown in Figure 84. This section as with the other grid sections used NOAA bathymetric data and new, updated bathymetric data from USGS obtained in 2001 and 2002. Details of the grid are shown in Table 7.

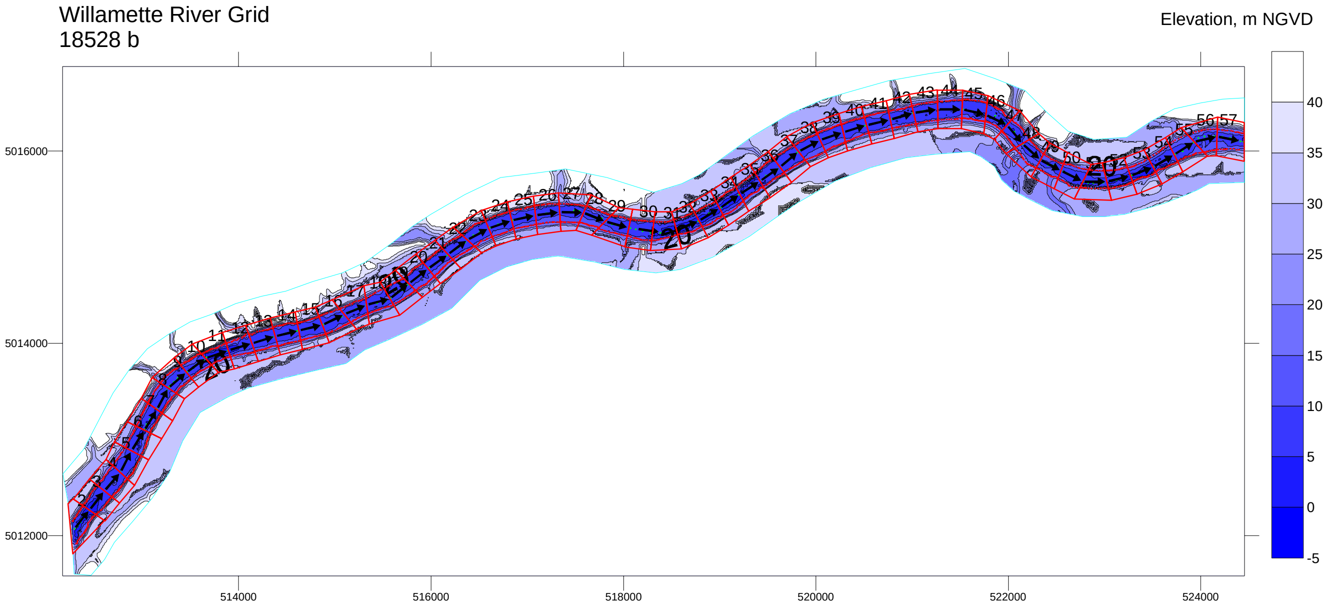

Figure 84. Model grid for grid section 3.

Table 7 Grid section 3 details.

Grid Parameter	Value
Number of model segments	56 segments
Segment spacing	253.65 m
IMP	58
Reach distance	14204.24 m
Reach slope	0.0000
KMP	45
Vertical spacing	1 m
ELBOT	-8.0 m

Figure 85 and Figure 86 show layer widths for segment 57 and segment 2 for grid section 3. Figure 87 shows the side view and Figure 88 shows the plan view for the section 3 grid. Figure 89 shows the channel bottom elevation along this grid section.

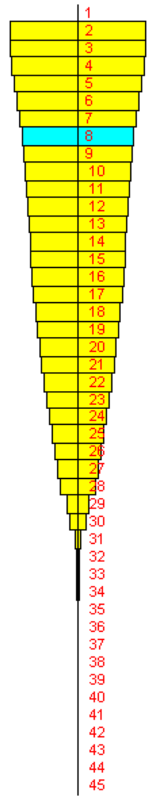

Figure 85. Segment 57 in Grid section 3 (18528b).

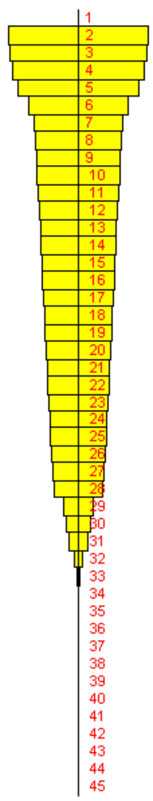

Figure 86. Segment 2 in grid section 3 (18528b).

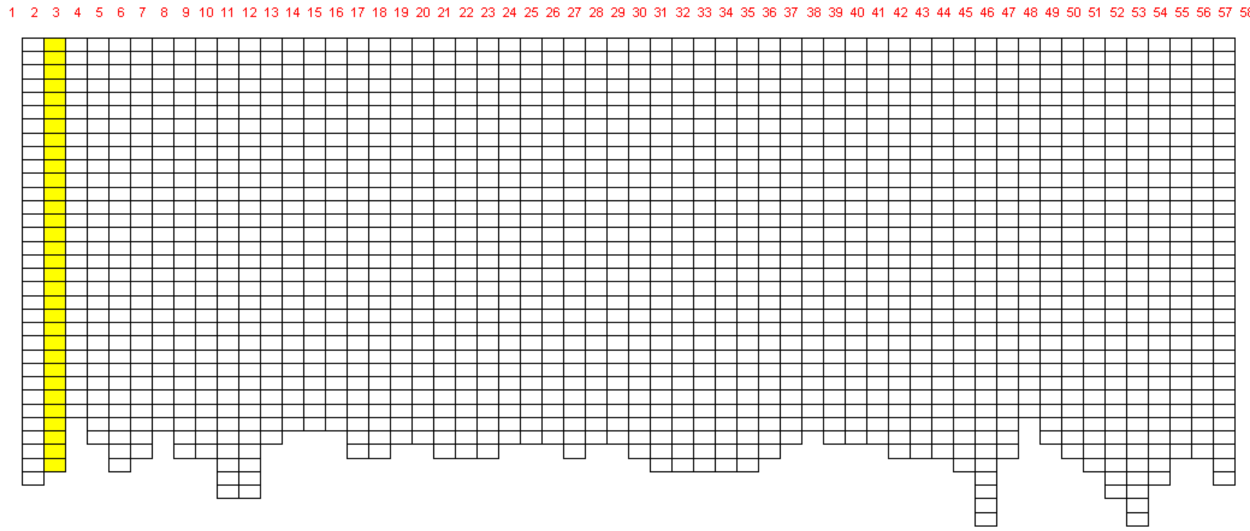

Figure 87. Side view of grid section 3 (18528b).

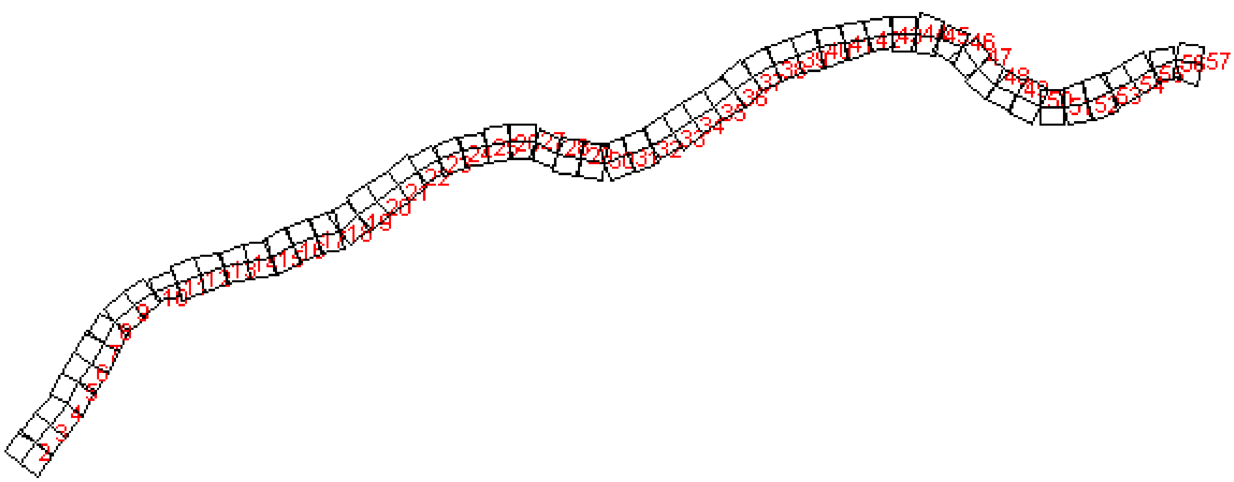

Figure 88. Plan view of grid for section 3 (18528b).

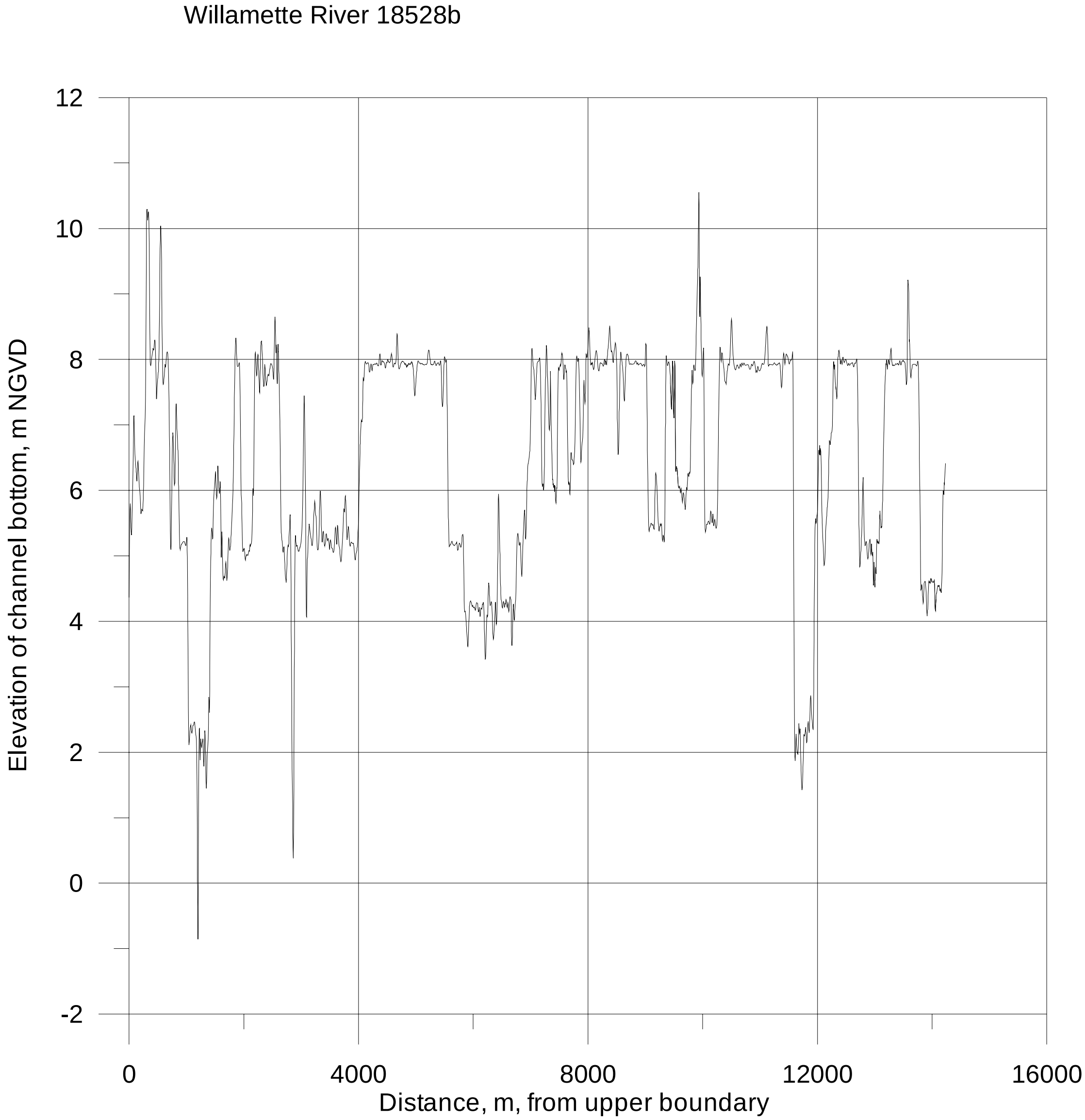

Figure 89. Bottom channel elevation along thalweg for grid section 3.

Grid Section 4

The layout of the fourth grid section (18528c) is shown in Figure 90. This section, as with the other grid sections, used NOAA bathymetric data and new, updated bathymetric data from USGS obtained in 2001 and 2002. Details of the grid are shown in Table 8.

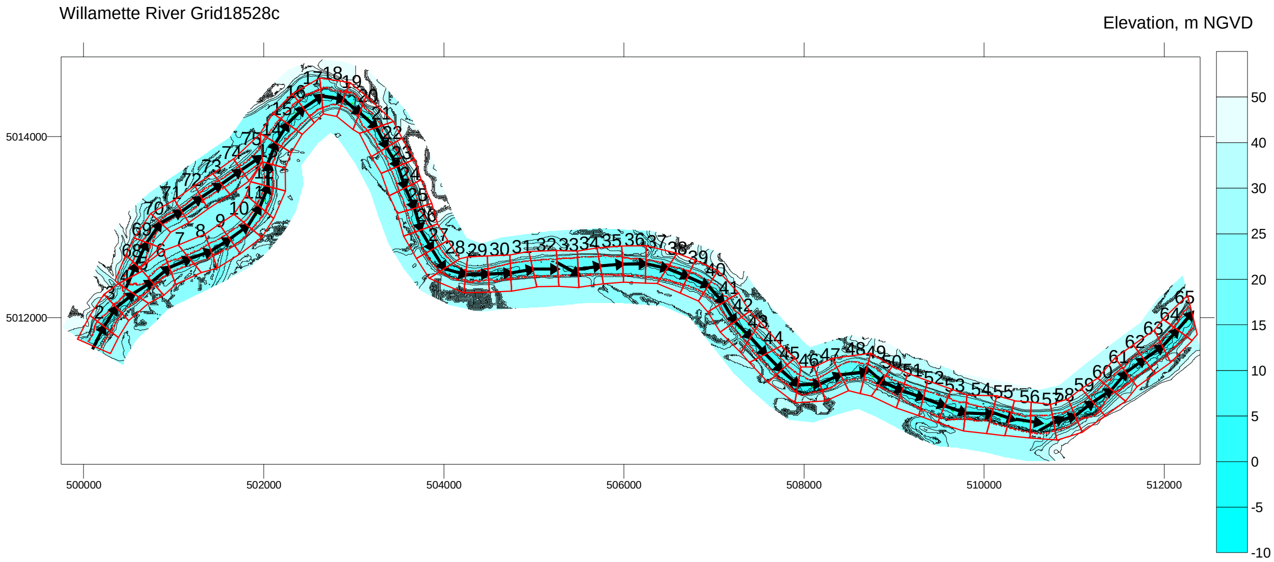

Figure 90. Grid Section 4 (18528c).

Table 8 Grid section 4 (18528c) details.

Grid Parameter	**Value**
Number of model segments	76 segments
Segment spacing BR1	250.48 m
Segment spacing BR2	268.20 m
IMP	76
Reach distance BR1	16030.6 m
Reach distance BR2	2145.6 m
Reach slope BR1 and BR2	0.0000
KMP	45
Vertical spacing	1 m
ELBOT	-8.0 m
Branches	2
Branch 1	Segments 2 to 65
Branch 2	Segments 68 to 75

Figure 91 shows the layer widths for segment 3 in section 4. Figure 91 shows the side view of the grid in section 4, and Figure 93 shows the plan view. Figure 94 shows the bottom channel elevation for this grid.

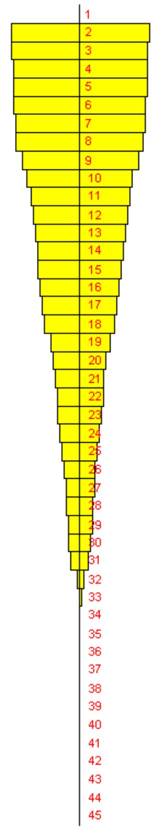

Figure 91. Segment 3 in grid section 18528c.

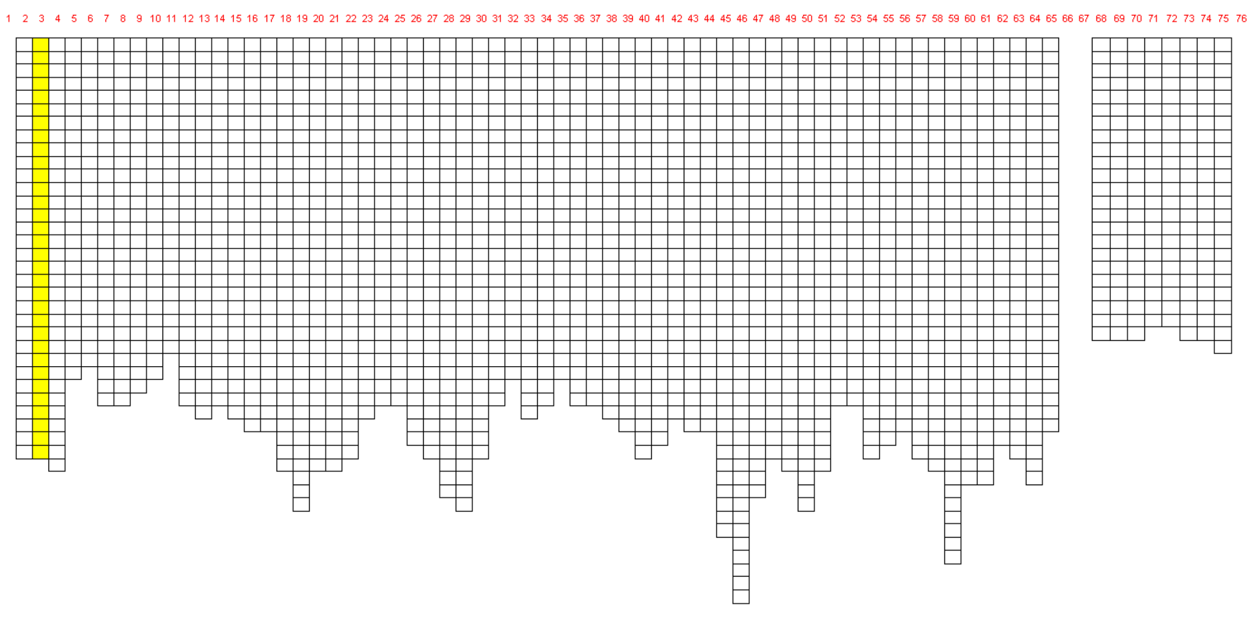

Figure 92. Side view of grid for section 4 18528c.

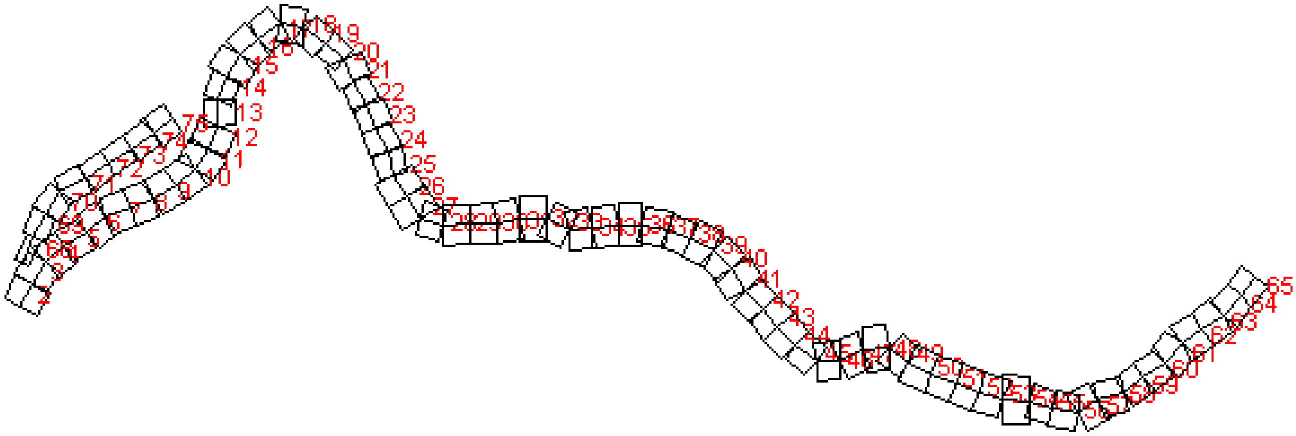

Figure 93 Plan view grid section 4 18528c.

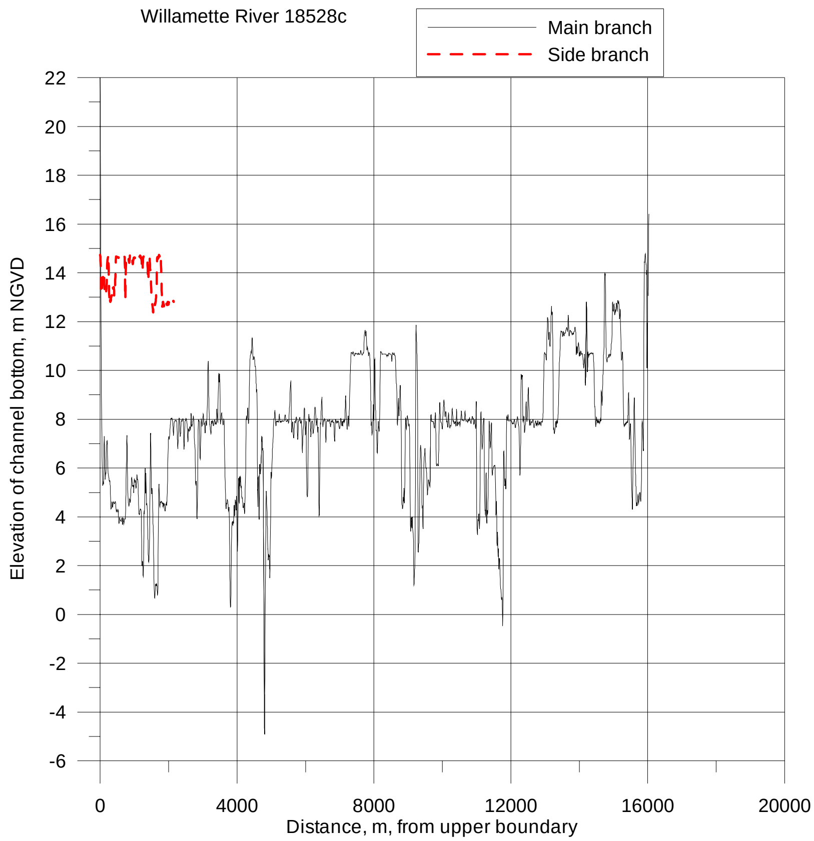

Figure 94. Bottom channel elevation along channel thalweg for grid section 4.

Grid section 5 (RM 50.2 to 72)

The layout of the fifth grid section is shown in Figure 95. This section did not use NOAA bathymetric data since it does not extend up this far into the Drainage basin. Any updated data from USGS were used as well as the Digital Elevation Maps to obtain the channel shape and elevation at the banks. Details of the grid are shown in Table 9. This is the first of the several grid sections that has a channel slope. The channel bottom elevations, shown in Figure 96, illustrate the various slopes for the 3 branches in this section of the grid (as can be seen from this graph, the location of actual data was extremely sparse).

Table 9 Grid section 5 details with KMP=45 and IMP=142 and ELBOT=-3.5 m.

Grid Parameter	**Branch 1**	**Branch 2**	**Branch 3**
Number of model segments	92	32	11
Segment spacing	250.2 m	254.1 m	257. 3 m
Slope	0.00089	0.00006	0.00133
Reach distance	23018.6 m	8131.1 m	2830.7 m
Vertical spacing	1 m	1 m	1 m
Branch segments	2 to 93	96 to 127	130 to 140

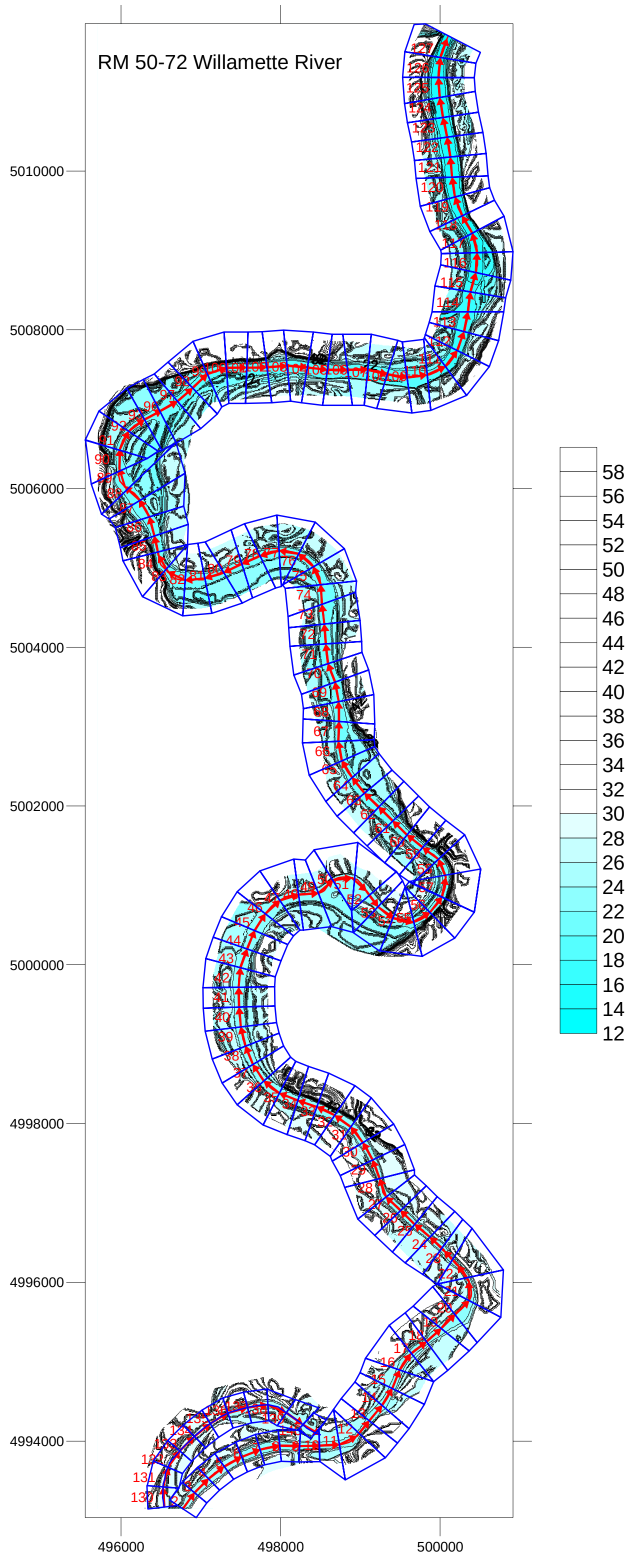

Figure 95. Grid section 5 (Rm 50 to 72).

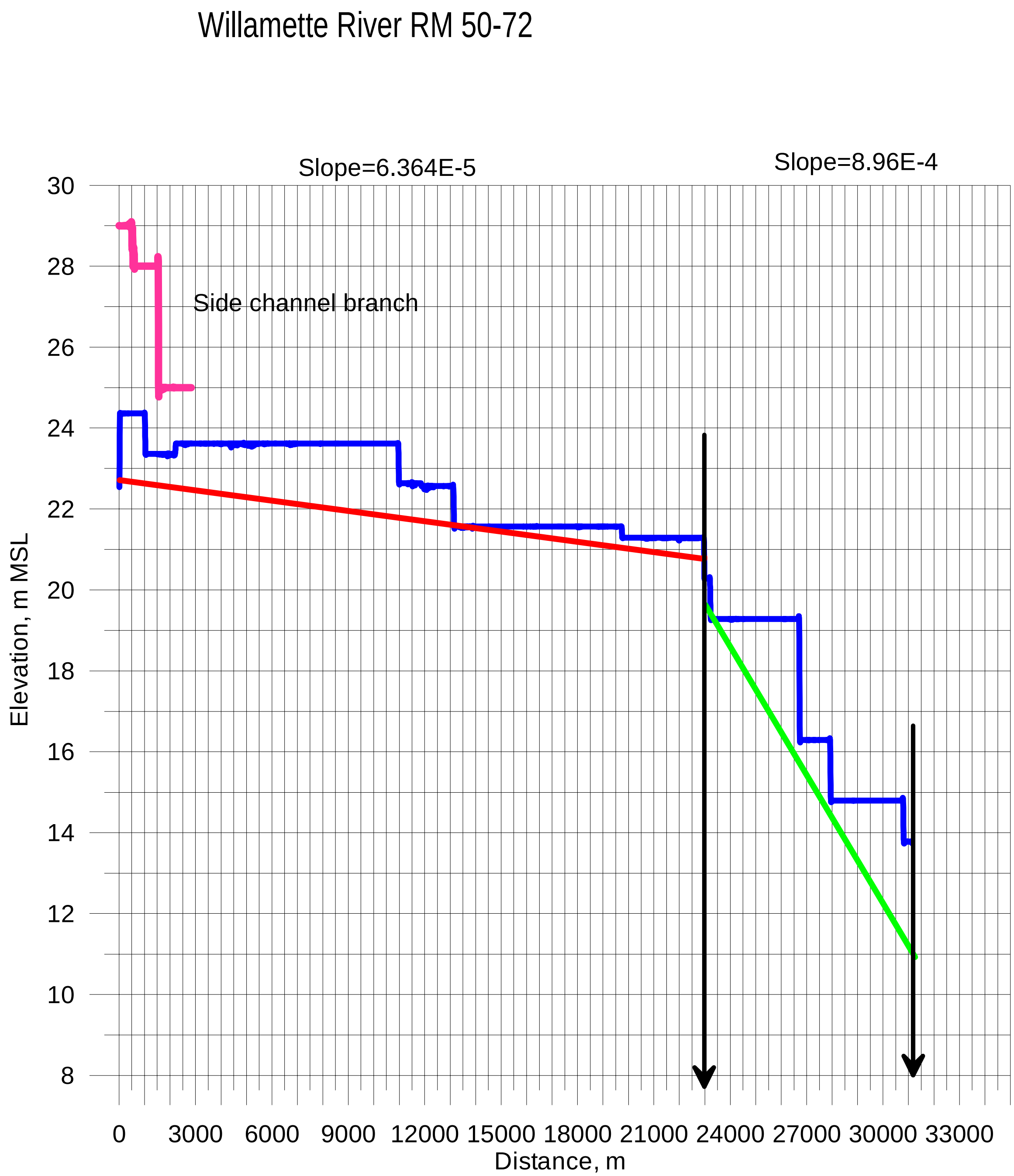

Figure 96. Bottom elevation for thalweg of the channel for grid section 5.

Grid section 6 (RM 72 to RM 81.6 Salem)

The layout of the 6th grid section is shown in Figure 98. This section did not use NOAA bathymetric data since it does not extend up this far into the Drainage basin. Any updated data from USGS were used as well as the Digital Elevation Maps to obtain the channel shape and elevation at the banks. Details of the grid are shown in Table 10. This is the first of the several grid sections that has a channel slope. The channel bottom elevations, shown in Figure 97, illustrate the various slopes for the 3 branches in this section of the grid (as can be seen from this graph, the location of actual data was extremely sparse).

Table 10 Grid section 6 details with KMP=45 and IMP=142 and ELBOT=-3.5 m.

Grid Parameter	Branch 1
Number of model segments	83
Segment spacing	250.2
Slope	0.00052
Reach distance	20766.3
Vertical spacing	1 m
Branch segments	2 to 84

Figure 97. Channel bottom elevation along channel thalweg for grid section 6 (Rm 72-81.6).

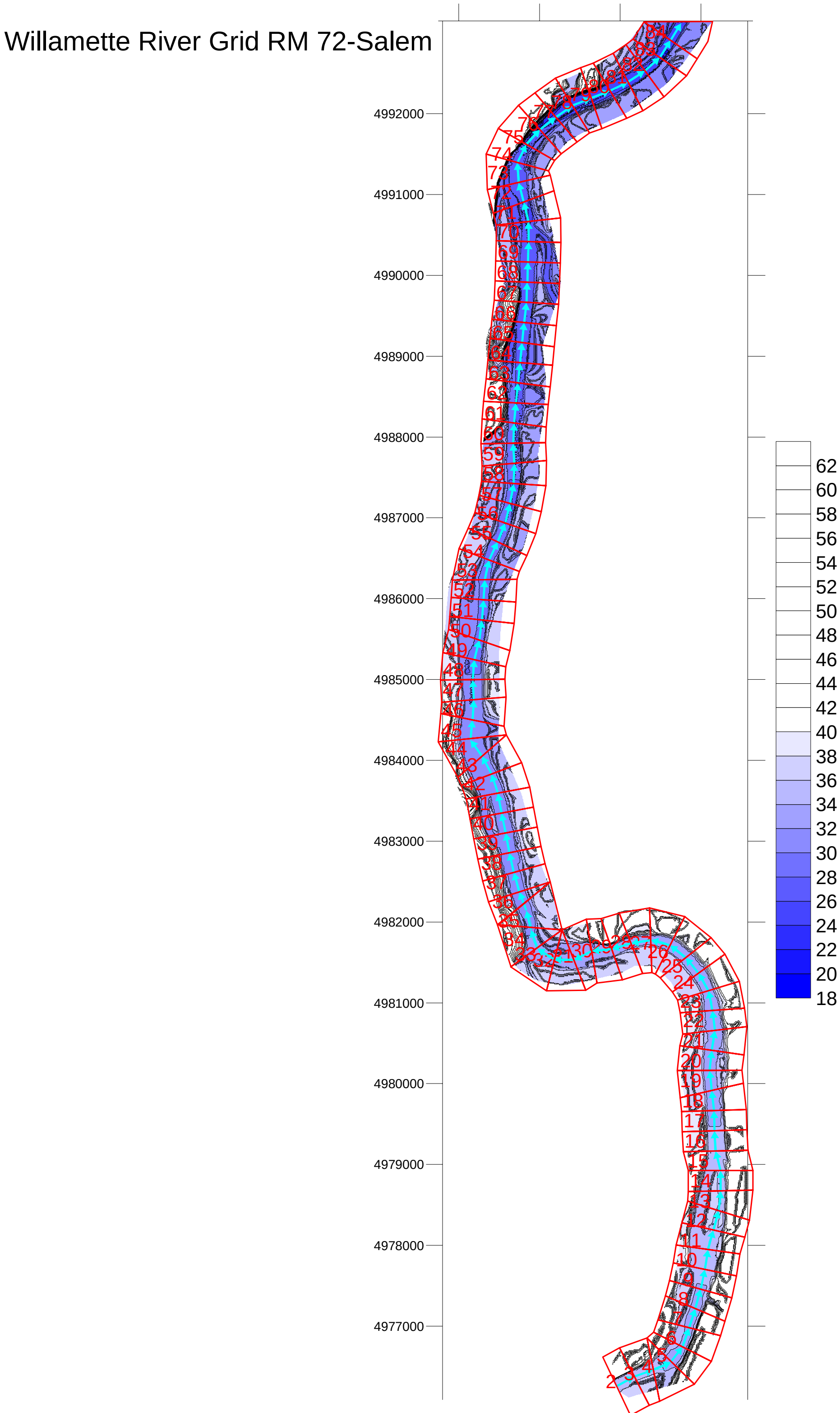

Figure 98. Grid section 6 from RM 72 to RM 81.6.

Model Grid Segments

Table 11 shows each model segment, the x-y coordinate for the segment center, and the orientation.

Table 11. Model segments, x-y coordinates of segment centers, RM and segment orientation for Willamette River model.

Segment # for grid	X Coordinate UTM	Y Coordinate UTM	RM from start	Angle-rad	Angle-Degrees	Seg # ORIG	Angle for GRAPHER	Notes
2	496065.6	4976317	0.23	4.21	241.3	2	-421.3	BR1
3	496292.7	4976419	0.39	4.37	250.2	3	-430.2	
4	496514.7	4976505	0.54	4.32	247.6	4	-427.6	
5	496695.2	4976646	0.7	3.8	217.7	5	-397.7	
6	496812.6	4976862	0.86	3.48	199.3	6	-379.3	
7	496891.9	4977099	1.01	3.45	197.7	7	-377.7	
8	496963.2	4977338	1.17	3.41	195.5	8	-375.5	
9	497022.8	4977581	1.32	3.35	192.1	9	-372.1	
10	497068.1	4977826	1.48	3.3	188.8	10	-368.8	
11	497120.5	4978069	1.63	3.41	195.6	11	-375.6	
12	497186.3	4978310	1.79	3.4	195.1	12	-375.1	
13	497231.3	4978553	1.94	3.24	185.8	13	-365.8	
14	497243.3	4978801	2.1	3.14	179.8	14	-359.8	
15	497211.9	4979047	2.25	2.89	165.6	15	-345.6	
16	497174.7	4979292	2.41	3.09	177.1	16	-357.1	
17	497164.4	4979542	2.57	3.11	178.1	17	-358.1	
18	497147.2	4979791	2.72	3.04	173.9	18	-353.9	
19	497120.6	4980039	2.88	3.03	173.8	19	-353.8	
20	497121.6	4980287	3.03	3.26	186.6	20	-366.6	
21	497153.7	4980534	3.19	3.28	188.2	21	-368.2	
22	497156.4	4980782	3.34	3.02	173.1	22	-353.1	
23	497117.3	4981028	3.5	2.95	168.8	23	-348.8	
24	497031.8	4981259	3.65	2.63	150.6	24	-330.6	
25	496890.7	4981463	3.81	2.45	140.1	25	-320.1	
26	496714	4981636	3.96	2.24	128.5	26	-308.5	
27	496498	4981744	4.12	1.83	104.7	27	-284.7	
28	496255.9	4981756	4.28	1.42	81.1	28	-261.1	
29	496013.6	4981700	4.43	1.27	72.9	29	-252.9	
30	495771.1	4981652	4.59	1.48	84.6	30	-264.6	
31	495537.4	4981584	4.74	1.1	63.2	31	-243.2	
32	495303.8	4981534	4.9	1.61	92.3	32	-272.3	
33	495078	4981604	5.05	2.14	122.5	33	-302.5	
34	494935.9	4981786	5.21	2.81	161.2	34	-341.2	
35	494867.9	4982020	5.36	2.91	166.5	35	-346.5	
36	494795.4	4982256	5.52	2.78	159.3	36	-339.3	
37	494717.1	4982493	5.67	2.86	164.1	37	-344.1	
38	494655.5	4982735	5.83	2.92	167.3	38	-347.3	
39	494604.2	4982980	5.99	2.95	168.9	39	-348.9	
40	494556.4	4983225	6.14	2.95	169	40	-349	
41	494509.2	4983471	6.3	2.95	169.3	41	-349.3	

Segment # for grid	X Coordinate UTM	Y Coordinate UTM	RM from start	Angle-rad	Angle-Degrees	Seg # ORIG	Angle for GRAPHER	Notes
42	494446.4	4983712	6.45	2.82	161.5	42	-341.5	
43	494348.9	4983941	6.61	2.66	152.2	43	-332.2	
44	494219.3	4984151	6.76	2.52	144.6	44	-324.6	
45	494159	4984376	6.92	3.23	185.2	45	-365.2	
46	494179.3	4984624	7.07	3.21	184.1	46	-364.1	
47	494181.2	4984873	7.23	3.09	176.7	47	-356.7	
48	494184.4	4985122	7.38	3.22	184.7	48	-364.7	
49	494224.9	4985367	7.54	3.39	194	49	-374	
50	494272.4	4985612	7.7	3.28	187.9	50	-367.9	
51	494298.9	4985861	7.85	3.22	184.3	51	-364.3	
52	494315.7	4986110	8.01	3.2	183.3	52	-363.3	
53	494350.1	4986356	8.16	3.36	192.6	53	-372.6	
54	494429.6	4986591	8.32	3.58	204.8	54	-384.8	
55	494529.9	4986820	8.47	3.53	202.5	55	-382.5	
56	494607.2	4987057	8.63	3.38	193.6	56	-373.6	
57	494658.8	4987301	8.78	3.32	190.2	57	-370.2	
58	494685.2	4987549	8.94	3.17	181.9	58	-361.9	
59	494682.5	4987799	9.09	3.09	176.8	59	-356.8	
60	494681.3	4988048	9.25	3.19	182.6	60	-362.6	
61	494698.2	4988297	9.41	3.23	185.1	61	-365.1	
62	494722.7	4988546	9.56	3.25	186.1	62	-366.1	
63	494749	4988795	9.72	3.25	186	63	-366	
64	494774.1	4989044	9.87	3.24	185.5	64	-365.5	
65	494798.7	4989293	10.03	3.24	185.8	65	-365.8	
66	494825.2	4989541	10.18	3.25	186.4	66	-366.4	
67	494844.4	4989791	10.34	3.18	182.4	67	-362.4	
68	494854.2	4990041	10.49	3.18	182	68	-362	
69	494862.6	4990291	10.65	3.17	181.8	69	-361.8	
70	494865.1	4990541	10.8	3.13	179.4	70	-359.4	
71	494834.3	4990786	10.96	2.9	166.3	71	-346.3	
72	494773.9	4991028	11.12	2.89	165.6	72	-345.6	
73	494735.3	4991273	11.27	3.08	176.5	73	-356.5	
74	494783.6	4991508	11.43	3.61	206.6	74	-386.6	
75	494922.8	4991712	11.58	3.88	222.2	75	-402.2	
76	495105.6	4991879	11.74	4.06	232.7	76	-412.7	
77	495306.6	4992028	11.89	4.09	234.5	77	-414.5	
78	495524.5	4992146	12.05	4.33	248.3	78	-428.3	
79	495757	4992238	12.2	4.34	248.7	79	-428.7	
80	495985.8	4992337	12.36	4.26	244.3	80	-424.3	
81	496202.1	4992461	12.51	4.12	236.1	81	-416.1	
82	496398.6	4992613	12.67	3.99	228.3	82	-408.3	
83	496557.8	4992802	12.83	3.7	212.1	83	-392.1	
84	496690.2	4993014	0	3.7	211.8	84	-391.8	
87	496846.8	4993247	0.23	3.76	215.6	2	-395.6	BR2
88	497007.9	4993436	0.39	3.93	224.9	3	-404.9	
89	497194.1	4993602	0.54	4.04	231.7	4	-411.7	
90	497401.4	4993740	0.7	4.21	241.3	5	-421.3	

Segment # for grid	X Coordinate UTM	Y Coordinate UTM	RM from start	Angle-rad	Angle-Degrees	Seg # ORIG	Angle for GRAPHER	Notes
91	497626.9	4993846	0.86	4.33	248.1	6	-428.1	
92	497865.3	4993917	1.01	4.51	258.6	7	-438.6	
93	498112.5	4993939	1.17	4.73	271.1	8	-451.1	
94	498362.3	4993939	1.32	4.69	268.9	9	-448.9	
95	498612	4993948	1.48	4.66	267	10	-447	
96	498845	4994009	1.63	4.25	243.5	11	-423.5	
97	499032.5	4994159	1.79	3.83	219.3	12	-399.3	
98	499191.1	4994353	1.94	3.83	219.4	13	-399.4	
99	499334.6	4994556	2.1	3.68	211	14	-391	
100	499444.8	4994778	2.25	3.52	201.7	15	-381.7	
101	499560.5	4994997	2.41	3.74	214.2	16	-394.2	
102	499728.9	4995175	2.57	4.06	232.5	17	-412.5	
103	499920.1	4995335	2.72	3.97	227.7	18	-407.7	
104	500098.8	4995507	2.88	3.92	224.5	19	-404.5	
105	500274.1	4995682	3.03	3.93	225.4	20	-405.4	
106	500362.5	4995890	3.19	3.14	179.8	21	-359.8	
107	500291.6	4996112	3.34	2.54	145.3	22	-325.3	
108	500136.6	4996305	3.5	2.39	137.2	23	-317.2	
109	499962.1	4996483	3.65	2.33	133.8	24	-313.8	
110	499776.9	4996649	3.81	2.27	130.2	25	-310.2	
111	499592.5	4996818	3.96	2.35	134.5	26	-314.5	
112	499412.5	4996990	4.12	2.32	133.1	27	-313.1	
113	499280.7	4997192	4.28	2.8	160.6	28	-340.6	
114	499196.2	4997425	4.43	2.78	159.5	29	-339.5	
115	499092.2	4997651	4.59	2.64	151	30	-331	
116	498956	4997858	4.74	2.48	142.2	31	-322.2	
117	498779.6	4998030	4.9	2.21	126.4	32	-306.4	
118	498566.6	4998157	5.05	2.01	115.2	33	-295.2	
119	498335.4	4998250	5.21	1.89	108.4	34	-288.4	
120	498100.8	4998336	5.36	1.95	111.8	35	-291.8	
121	497887.9	4998459	5.52	2.24	128.5	36	-308.5	
122	497721.8	4998640	5.67	2.55	146.3	37	-326.3	
123	497606.3	4998860	5.83	2.76	158.2	38	-338.2	
124	497530.7	4999097	5.99	2.9	166.4	39	-346.4	
125	497490.2	4999343	6.14	3.05	174.8	40	-354.8	
126	497476.4	4999592	6.3	3.12	178.9	41	-358.9	
127	497485.5	4999842	6.45	3.23	185.3	42	-365.3	
128	497538.8	5000083	6.61	3.48	199.6	43	-379.6	
129	497627.9	5000316	6.76	3.53	202.2	44	-382.2	
130	497742	5000538	6.92	3.71	212.3	45	-392.3	
131	497900	5000727	7.07	3.97	227.5	46	-407.5	
132	498108.4	5000848	7.23	4.4	252.4	47	-432.4	
133	498350.2	5000893	7.38	4.64	266.1	48	-446.1	
134	498564.3	5000984	7.54	3.97	227.5	49	-407.5	
135	498774.6	5001081	7.7	4.58	262.7	50	-442.7	
136	498984.2	5001015	7.85	5.46	312.5	51	-492.5	
137	499146.2	5000832	8.01	5.66	324.1	52	-504.1	
138	499320.1	5000659	8.16	5.34	305.7	53	-485.7	

Segment # for grid	X Coordinate UTM	Y Coordinate UTM	RM from start	Angle-rad	Angle-Degrees	Seg # ORIG	Angle for GRAPHER	Notes
139	499539.7	5000561	8.32	4.92	281.9	54	-461.9	
140	499765.1	5000598	8.47	4.19	240	55	-420	
141	499947.1	5000758	8.63	3.79	217.3	56	-397.3	
142	500047.1	5000978	8.78	3.34	191.4	57	-371.4	
143	500025.6	5001214	8.94	2.76	158.2	58	-338.2	
144	499880.1	5001404	9.09	2.22	126.9	59	-306.9	
145	499683.5	5001558	9.25	2.25	129	60	-309	
146	499496.5	5001724	9.41	2.34	134.1	61	-314.1	
147	499318.3	5001899	9.56	2.36	135.1	62	-315.1	
148	499141.2	5002076	9.72	2.35	134.6	63	-314.6	
149	498975.1	5002261	9.87	2.48	141.8	64	-321.8	
150	498833	5002466	10.03	2.59	148.5	65	-328.5	
151	498746.2	5002694	10.18	2.97	169.9	66	-349.9	
152	498728.4	5002942	10.34	3.17	181.9	67	-361.9	
153	498730.4	5003192	10.49	3.12	179	68	-359	
154	498705.6	5003439	10.65	2.96	169.5	69	-349.5	
155	498638.2	5003678	10.8	2.78	159	70	-339	
156	498580	5003919	10.96	3.03	173.7	71	-353.7	
157	498557.3	5004168	11.12	3.07	175.8	72	-355.8	
158	498533.1	5004417	11.27	3.02	173	73	-353	
159	498510.5	5004665	11.43	3.08	176.6	74	-356.6	
160	498457.3	5004903	11.58	2.76	158	75	-338	
161	498318.5	5005097	11.74	2.29	131	76	-311	
162	498103.2	5005198	11.89	1.73	99.3	77	-279.3	
163	497861.4	5005185	12.05	1.3	74.7	78	-254.7	
164	497627.9	5005102	12.2	1.15	65.9	79	-245.9	
165	497401.1	5004997	12.36	1.13	64.7	80	-244.7	
166	497169.6	5004907	12.52	1.27	72.7	81	-252.7	
167	496927.2	5004858	12.67	1.48	84.5	82	-264.5	
168	496696.2	5004898	12.83	2.02	116	83	-296	
169	496529.4	5005055	12.98	2.62	150.2	84	-330.2	
170	496443.9	5005281	13.14	2.93	168	85	-348	
171	496386.4	5005524	13.29	2.89	165.4	86	-345.4	
172	496292.2	5005753	13.45	2.61	149.8	87	-329.8	
173	496138.4	5005944	13.6	2.31	132.5	88	-312.5	
174	496013.4	5006139	13.76	2.85	163.1	89	-343.1	
175	495982.9	5006375	13.91	3.17	181.5	90	-361.5	
176	496040.5	5006611	14.07	3.6	206	91	-386	
177	496194	5006797	14.23	4.07	233	92	-413	
178	496403.6	5006930	0	4.22	242	93	-422	
181	496597.3	5007037	0.24	4.2	240.5	96	-420.5	BR3
182	496802.7	5007184	0.39	3.99	228.4	97	-408.4	
183	496989.8	5007356	0.55	3.95	226.4	98	-406.4	
184	497201.8	5007483	0.71	4.39	251.6	99	-431.6	
185	497448.6	5007523	0.87	4.71	269.8	100	-449.8	
186	497702.1	5007526	1.03	4.69	268.6	101	-448.6	
187	497955.5	5007539	1.18	4.64	265.7	102	-445.7	
188	498208.2	5007538	1.34	4.79	274.7	103	-454.7	

Segment # for grid	X Coordinate UTM	Y Coordinate UTM	RM from start	Angle-rad	Angle-Degrees	Seg # ORIG	Angle for GRAPHER	Notes
189	498460.5	5007513	1.5	4.83	276.7	104	-456.7	
190	498712.8	5007498	1.66	4.71	270	105	-450	
191	498965.4	5007498	1.82	4.71	270	106	-450	
192	499214.5	5007469	1.97	4.94	283.2	107	-463.2	
193	499461.6	5007420	2.13	4.87	279	108	-459	
194	499711.9	5007417	2.29	4.59	262.8	109	-442.8	
195	499952	5007485	2.45	4.28	245.3	110	-425.3	
196	500140.3	5007639	2.61	3.77	216.2	111	-396.2	
197	500256.4	5007859	2.76	3.48	199.4	112	-379.4	
198	500323.4	5008103	2.92	3.34	191.4	113	-371.4	
199	500363.7	5008353	3.08	3.26	187	114	-367	
200	500413.2	5008600	3.24	3.41	195.6	115	-375.6	
201	500455.1	5008848	3.39	3.2	183.6	116	-363.6	
202	500433.4	5009096	3.55	2.9	166.4	117	-346.4	
203	500339.7	5009328	3.71	2.61	149.6	118	-329.6	
204	500230.5	5009555	3.87	2.78	159.1	119	-339.1	
205	500167.4	5009799	4.03	3	171.8	120	-351.8	
206	500138.3	5010051	4.18	3.06	175	121	-355	
207	500107.9	5010303	4.34	2.99	171.1	122	-351.1	
208	500061.9	5010552	4.5	2.93	167.9	123	-347.9	
209	500015.7	5010801	4.66	2.99	171	124	-351	
210	499986.8	5011053	4.82	3.07	175.8	125	-355.8	
211	499990.2	5011306	4.97	3.24	185.7	126	-365.7	
212	500045.4	5011552	5.05	3.48	199.6	127	-379.6	
215	496533.9	4993295	0.24	3.08	176.7	130	-356.7	BR4
216	496557	4993547	0.4	3.38	193.8	131	-373.8	
217	496662	4993774	0.56	3.77	215.9	132	-395.9	
218	496827.6	4993968	0.72	3.93	225	133	-405	
219	497018.7	4994139	0.88	4.04	231.2	134	-411.2	
220	497228.5	4994286	1.04	4.17	238.8	135	-418.8	
221	497461.7	4994388	1.2	4.43	253.9	136	-433.9	
222	497712.6	4994440	1.36	4.58	262.5	137	-442.5	
223	497955.2	4994407	1.52	5.12	293.4	138	-473.4	
224	498175.1	4994282	1.68	5.33	305.5	139	-485.5	
225	498389.8	4994143	1.82	5.24	300.2	140	-480.2	
291	512228.9	5011958	0.23	3.85	220.7	65	-400.7	BR5
290	512065.4	5011773	0.39	3.88	222.4	64	-402.4	
289	511879.9	5011611	0.54	4.11	235.4	63	-415.4	
288	511676.6	5011467	0.7	4.09	234.1	62	-414.1	
287	511496	5011299	0.86	3.84	220	61	-400	
286	511313.2	5011134	1.01	4.12	236	60	-416	
285	511110.6	5010990	1.17	4.07	233.3	59	-413.3	
284	510891.8	5010879	1.32	4.41	252.5	58	-432.5	
283	510752.2	5010830	1.48	4.19	240.3	57	-420.3	
282	510507.6	5010854	1.63	4.87	278.8	56	-458.8	
281	510213.1	5010912	1.79	5.04	288.5	55	-468.5	
280	509967	5010940	1.95	4.74	271.8	54	-451.8	

Segment # for grid	X Coordinate UTM	Y Coordinate UTM	RM from start	Angle-rad	Angle-Degrees	Seg # ORIG	Angle for GRAPHER	Notes
279	509675.7	5010986	2.1	5.05	289.1	53	-469.1	
278	509442.6	5011068	2.26	5.06	289.9	52	-469.9	
277	509207.4	5011153	2.41	5.06	289.6	51	-469.6	
276	508976.6	5011245	2.57	5.13	294.1	50	-474.1	
275	508801.5	5011351	2.72	5.44	311.5	49	-491.5	
274	508572.1	5011388	2.88	4.61	263.8	48	-443.8	
273	508290.8	5011319	3.03	4.29	245.7	47	-425.7	
272	508054.6	5011262	3.19	4.67	267.4	46	-447.4	
271	507840	5011338	3.35	5.43	311.2	45	-491.2	
270	507659.9	5011508	3.5	5.5	315.2	44	-495.2	
269	507489.6	5011689	3.66	5.55	318.2	43	-498.2	
268	507320.4	5011868	3.81	5.5	315.1	42	-495.1	
267	507167.9	5012061	3.97	5.73	328.2	41	-508.2	
266	507019.1	5012259	4.12	5.55	318	40	-498	
265	506821.9	5012402	4.28	5.13	294	39	-474	
264	506593.6	5012498	4.44	5.09	291.7	38	-471.7	
263	506364.5	5012569	4.59	4.93	282.5	37	-462.5	
262	506117.8	5012593	4.75	4.7	269.1	36	-449.1	
261	505861.2	5012581	4.9	4.63	265.2	35	-445.2	
260	505612.8	5012552	5.06	4.56	261.5	34	-441.5	
259	505385.6	5012536	5.21	5.22	299.3	33	-479.3	
258	505135.7	5012536	5.37	4.71	269.7	32	-449.7	
257	504866.1	5012514	5.53	4.54	260.1	31	-440.1	
256	504617.7	5012487	5.68	4.66	267.2	30	-447.2	
255	504367.6	5012477	5.84	4.68	268.4	29	-448.4	
254	504124.1	5012507	5.99	4.99	285.8	28	-465.8	
253	503937.8	5012646	6.15	5.71	327.1	27	-507.1	
252	503806.5	5012859	6.3	5.75	329.5	26	-509.5	
251	503708.6	5013087	6.46	6.01	344	25	-524	
250	503622.6	5013320	6.61	5.86	335.5	24	-515.5	
249	503530	5013552	6.77	5.95	340.8	23	-520.8	
248	503426.5	5013775	6.93	5.74	329.1	22	-509.1	
247	503307.1	5013990	7.08	5.81	332.8	21	-512.8	
246	503157.1	5014182	7.24	5.42	310.8	20	-490.8	
245	502974.3	5014336	7.39	5.4	309.5	19	-489.5	
244	502762.9	5014429	7.55	4.87	279.1	18	-459.1	
243	502540.6	5014380	7.7	4.12	235.9	17	-415.9	
242	502351.8	5014227	7.86	3.95	226.1	16	-406.1	
241	502197.9	5014036	8.02	3.69	211.6	15	-391.6	
240	502087.8	5013813	8.17	3.51	201	14	-381	
239	502045.2	5013574	8.33	3.13	179.1	13	-359.1	
238	502001.6	5013336	8.48	3.52	201.8	12	-381.8	
237	501889.9	5013118	8.64	3.71	212.3	11	-392.3	
236	501723.5	5012942	8.79	4.09	234.1	10	-414.1	
235	501518.3	5012802	8.95	4.14	237.4	9	-417.4	
234	501296.6	5012692	9.1	4.36	250	8	-430	
233	501065.2	5012601	9.26	4.32	247.2	7	-427.2	
232	500854.1	5012475	9.42	4.03	231.1	6	-411.1	

Segment # for grid	X Coordinate UTM	Y Coordinate UTM	RM from start	Angle-rad	Angle-Degrees	Seg # ORIG	Angle for GRAPHER	Notes
231	500654.9	5012330	9.57	4.14	237	5	-417	
230	500456.4	5012188	9.73	4.04	231.4	4	-411.4	
229	500293.9	5012007	9.88	3.71	212.6	3	-392.6	
228	500170.2	5011792	0	3.62	207.3	2	-387.3	
347	524291	5016126	0.24	4.92	281.8	57	-461.8	
346	524050.8	5016124	0.39	4.48	256.9	56	-436.9	
345	523828.1	5016029	0.55	4.14	237.4	55	-417.4	
344	523613.8	5015898	0.71	4.18	239.7	54	-419.7	
343	523386.8	5015788	0.87	4.34	248.4	53	-428.4	
342	523146.3	5015712	1.02	4.48	256.7	52	-436.7	
341	522897.9	5015682	1.18	4.71	270	51	-450	
340	522659.7	5015740	1.34	5.18	296.8	50	-476.8	
339	522439.8	5015852	1.5	5.19	297.4	49	-477.4	
338	522239.6	5015993	1.65	5.45	312.3	48	-492.3	
337	522066.2	5016174	1.81	5.59	320.4	47	-500.4	
336	521875.9	5016325	1.97	5.16	295.9	46	-475.9	
335	521642.4	5016406	2.13	4.94	282.8	45	-462.8	
334	521392.2	5016434	2.29	4.72	270.2	44	-450.2	
333	521140.6	5016415	2.44	4.55	260.9	43	-440.9	
332	520894.4	5016361	2.6	4.44	254.1	42	-434.1	
331	520649.6	5016298	2.76	4.48	256.8	41	-436.8	
330	520404.9	5016232	2.92	4.42	253	40	-433	
329	520163.9	5016154	3.07	4.38	251.1	39	-431.1	
328	519932.1	5016054	3.23	4.23	242.2	38	-422.2	
327	519723.1	5015914	3.39	4.01	229.9	37	-409.9	
326	519523	5015760	3.55	4.1	234.7	36	-414.7	
325	519313.9	5015618	3.7	4.14	236.9	35	-416.9	
324	519104.2	5015477	3.86	4.1	235	34	-415	
323	518892.6	5015340	4.02	4.17	239.1	33	-419.1	
322	518668.6	5015225	4.18	4.31	246.7	32	-426.7	
321	518508.6	5015161	4.33	4.41	252.8	31	-432.8	
320	518259.6	5015174	4.49	4.84	277.3	30	-457.3	
319	517932.8	5015234	4.65	4.98	285.4	29	-465.4	
318	517698.2	5015314	4.81	5.1	292.1	28	-472.1	
317	517461	5015362	4.96	4.73	270.9	27	-450.9	
316	517211.3	5015348	5.12	4.58	262.5	26	-442.5	
315	516962.2	5015304	5.28	4.5	257.7	25	-437.7	
314	516718.6	5015237	5.44	4.39	251.3	24	-431.3	
313	516488.2	5015136	5.6	4.21	241.1	23	-421.1	
312	516277.5	5015000	5.75	4.07	233	22	-413	
311	516074.3	5014850	5.91	4.09	234.1	21	-414.1	
310	515871.1	5014699	6.07	4.06	232.5	20	-412.5	
309	515672.3	5014543	6.23	4.03	231	19	-411	
308	515452.8	5014432	6.38	4.45	255	18	-435	
307	515215.7	5014350	6.54	4.31	246.9	17	-426.9	
306	514985.8	5014246	6.7	4.27	244.6	16	-424.6	
305	514749.1	5014162	6.86	4.48	256.5	15	-436.5	

Segment # for grid	X Coordinate UTM	Y Coordinate UTM	RM from start	Angle-rad	Angle-Degrees	Seg # ORIG	Angle for GRAPHER	Notes
304	514503.3	5014102	7.01	4.47	256.3	14	-436.3	
303	514258.9	5014035	7.17	4.42	253	13	-433	
302	514016.5	5013962	7.33	4.42	253	12	-433	
301	513775.9	5013884	7.49	4.39	251.5	11	-431.5	
300	513558.4	5013771	7.64	4.07	233.1	10	-413.1	
299	513365	5013616	7.8	4	229.3	9	-409.3	
298	513210.7	5013423	7.96	3.63	207.9	8	-387.9	
297	513086.9	5013203	8.12	3.68	210.9	7	-390.9	
296	512954.9	5012988	8.27	3.7	212	6	-392	
295	512829.6	5012769	8.43	3.62	207.4	5	-387.4	
294	512689.1	5012560	8.59	3.85	220.6	4	-400.6	
293	512528	5012365	8.75	3.81	218.3	3	-398.3	
292	512372	5012168	0	3.81	218.4	2	-398.4	
384	527408.5	5020068	0.24	4.02	230.2	38	-410.2	
383	527214	5019910	0.39	4.04	231.6	37	-411.6	
382	527020.1	5019752	0.55	4.02	230.2	36	-410.2	
381	526896.6	5019550	0.71	3.36	192.7	35	-372.7	
380	526828.1	5019308	0.87	3.47	199	34	-379	
379	526724.8	5019080	1.02	3.66	209.6	33	-389.6	
378	526591	5018874	1.18	3.78	216.7	32	-396.7	
377	526482.4	5018721	1.34	3.71	212.7	31	-392.7	
376	526404	5018490	1.49	3.38	193.4	30	-373.4	
375	526316.4	5018202	1.65	3.53	202.1	29	-382.1	
374	526294.4	5017966	1.81	2.95	168.7	28	-348.7	
373	526353.2	5017723	1.97	2.86	164	27	-344	
372	526376	5017480	2.12	3.24	185.4	26	-365.4	
371	526345.1	5017232	2.28	3.29	188.7	25	-368.7	
370	526292.9	5016986	2.44	3.41	195.2	24	-375.2	
369	526257.1	5016749	2.6	3.16	181.2	23	-361.2	
368	526315.5	5016522	2.75	2.64	151.2	22	-331.2	
367	526441.2	5016304	2.91	2.6	148.8	21	-328.8	
366	526566.9	5016087	3.07	2.64	151.2	20	-331.2	
365	526661.6	5015858	3.23	2.86	164	19	-344	
364	526734.9	5015621	3.38	2.82	161.5	18	-341.5	
363	526775	5015383	3.54	3.14	179.7	17	-359.7	
362	526757	5015132	3.7	3.28	188	16	-368	
361	526682.8	5014888	3.85	3.6	206.1	15	-386.1	
360	526573.1	5014660	4.01	3.58	205.3	14	-385.3	
359	526442.6	5014470	4.17	3.93	225.2	13	-405.2	
358	526235.2	5014406	4.33	4.8	275	12	-455	
357	526010.7	5014503	4.48	5.45	312.2	11	-492.2	
356	525811.9	5014644	4.64	5.21	298.2	10	-478.2	
355	525611.8	5014782	4.8	5.43	311	9	-491	
354	525423.2	5014950	4.96	5.45	312	8	-492	
353	525237.8	5015120	5.11	5.46	312.9	7	-492.9	
352	525074.8	5015306	5.27	5.67	324.8	6	-504.8	
351	524948.2	5015520	5.43	5.83	333.9	5	-513.9	

Segment # for grid	X Coordinate UTM	Y Coordinate UTM	RM from start	Angle-rad	Angle-Degrees	Seg # ORIG	Angle for GRAPHER	Notes
350	524867.5	5015756	5.59	6.08	348.3	4	-528.3	
349	524759.5	5015960	5.74	5.48	314.2	3	-494.2	
348	524556.9	5016069	0	4.95	283.6	2	-463.6	
385	527581.8	5020275	0.23	4.13	236.7	2	-416.7	
386	527795.2	5020403	0.39	4.21	241.1	3	-421.1	
387	528008.8	5020534	0.55	4.12	236	4	-416	
388	528218.1	5020671	0.7	4.15	237.6	5	-417.6	
389	528428.7	5020806	0.86	4.14	237.3	6	-417.3	
390	528636.9	5020944	1.01	4.11	235.4	7	-415.4	
391	528847.1	5021078	1.17	4.18	239.5	8	-419.5	
392	529044.8	5021225	1.32	3.97	227.4	9	-407.4	
393	529238.9	5021379	1.48	4.11	235.7	10	-415.7	
394	529446.2	5021519	1.64	4.13	236.4	11	-416.4	
395	529655.2	5021655	1.79	4.14	237.3	12	-417.3	
396	529857.1	5021801	1.95	4.03	230.8	13	-410.8	
399	500532.1	5012472	0.25	3.55	203.4	68	-383.4	
400	500642.6	5012710	0.42	3.6	206.4	69	-386.4	
401	500778.4	5012938	0.58	3.76	215.1	70	-395.1	
402	500971.8	5013111	0.75	4.21	241.2	71	-421.2	
403	501197.6	5013252	0.92	4.1	234.8	72	-414.8	
404	501418.9	5013402	1.08	4.13	236.7	73	-416.7	
405	501640.2	5013553	1.25	4.1	234.8	74	-414.8	
406	501860.1	5013706	1.32	4.11	235.7	75	-415.7	

Appendix 2: Water Quality Constituent Procedure for Boundary Conditions

Algae:

$$\sum \Phi_{algae} = \Phi_{algae(total)} = \Phi_{Chl\_a(total)} \Big/ Chla\_to\_Algae\_ratio \quad (1)$$

Chla_to_Algae_Ratio = 35 and $\Phi_{Chl\_a(total)} = data$ if no data then $\Phi_{algae(total)} = 0.1$. In this case it is assumed there is only one algae species.

BOD ultimate

$$BOD_u = \frac{BOD_5}{(1-\exp(-5k))} \quad (2)$$

Where k=0.1, if BOD5=0 then BOD5 is set to 3

Total Organic Matter

$$\Phi_{TOM} \approx \frac{BOD_u}{\delta_O} \quad (3)$$

assuming that BOD is unfiltered and BOD represents all organic matter, or in terms of W2 variables:

$$\Phi_{TOM} = \Phi_{LPOM} + \Phi_{RPOM} + \sum \Phi_{algae} + \Phi_{LDOM} + \Phi_{RDOM}$$

$\delta_O = 1.4$

POM or Detritus:

$$\Phi_{POM} = fraction(\Phi_{TOM}) - \sum \Phi_{algae} \quad (4)$$

Where fraction = 0.45

$$f = \frac{\Phi_{POM} + \sum \Phi_{algae}}{\Phi_{TSS}} \quad (5)$$

$\Phi_{TSS} = data$. If no data exists for that time then $\Phi_{TSS} = \frac{\sum_{j=1}^{n} \Phi_{TSS-data}}{n}$ for the remaining n data points.

ISS:

$$\Phi_{ISS} = \left(\Phi_{TSS} - \sum \Phi_{algae} - \Phi_{POM}\right) \text{ or } \Phi_{ISS} = (1-f)(\Phi_{TSS}) \quad (6)$$

Dissolved Organic Matter (DOM)

$$\Phi_{DOM} = \Phi_{TOM} - \Phi_{POM} \quad (7)$$

Labile DOM

$$\Phi_{LDOM} = f_{LDOM} \Phi_{DOM} \quad (8)$$

$f_{LDOM} = 0.50$

Refractory DOM

$$\Phi_{RDOM} = (1 - f_{LDOM})\Phi_{DOM} \tag{9}$$

Labile POM

$$\Phi_{LPOM} = f_{LPOM}\Phi_{POM} \tag{10}$$

$f_{LPOM} = 0.5$

Refractory POM

$$\Phi_{RPOM} = (1 - f_{LPOM})\Phi_{POM} \tag{11}$$

Total Organic Phosphorus

$$\Phi_{PO4-P} = \Phi_{TOM}\delta_P + \Phi_{PO4} \tag{12}$$

If no data exists for that time then $\Phi_{PO4} = \frac{\sum_{j=1}^{n}\Phi_{PO4-data}}{n}$ for the remaining n data points.. $\delta_P = 0.011$

Nitrogen

$$\Phi_{TKN} = \Phi_{TOM}\delta_N + \Phi_{NH4} \tag{13}$$

If no data exists for that time then $\Phi_{NH4} = \frac{\sum_{j=1}^{n}\Phi_{NH4-data}}{n}$ for the remaining n data points.. $\delta_N = 0.08$

$\Phi_{TIC} = function(\Phi_{alk} + pH + Temp)$ as per Fortran code

$\Phi_{alk} = data$

$\Phi_{DO} = data$, if no data exists for that time then $\Phi_{DO} = \frac{\sum_{j=1}^{n}\Phi_{DO-data}}{n}$ for the remaining n data points.

$\Phi_{arbitray\_constituent} = Conductivity = data$

$Tracer = ArbitraryTracer = 30\, mg/L$

$\Phi_{TDS} = data$, if missing then $\Phi_{TDS} = \frac{\sum_{j=1}^{n}\Phi_{TDS-data}}{n}$ for the remaining n data points.

$\Phi_{NO3+NO2} = data$, if missing then $\Phi_{NO3+NO2} = \frac{\sum_{j=1}^{n}\Phi_{NO3+NO2-data}}{n}$ for the remaining n data points.

Willamette River at Salem: The procedure above was used.

Tualatin River: The procedure above was used with the exception that there was no TDS data so it was set to zero, the Chla_to_Algae_Ratio = 45, and the BODu was set to Total COD concentration values since no BOD5 or BODu data was available.

Molalla River: The procedure above was used with the exception that there was no TDS data so it was set to zero and the Chla_to_Algae_Ratio = 45

Yamhill River: The procedure above was used with the exception that there was no TDS data so it was set to zero and the Chla_to_Algae_Ratio = 45

City of Salem WWTP: The procedure above was used with several modifications due to a lack of data. Changes include:

$\sum \Phi_{a\lg ae} = 0$.

POM fraction for equation 4 was set 0.35 to ensure ISS stayed positive.

There was no TSS data so $\Phi_{TSS} = 0.72 * BOD5$.

Total Organic Phosphorus and Nitrogen were calculated with modified equations 12 and 13: $\Phi_{PO4-P} = \Phi_{TOM}\delta_P$ and $\Phi_{TKN} = \Phi_{TOM}\delta_N$ because there was no Ortho-Phosphorus or Ammonia concentration data.

There was no TDS data so it was set to zero

$\Phi_{arbitray\_constituent} = Conductivity = 0$ since there was no data.

$\Phi_{alk} = 10$ since there was no data.

$\Phi_{DO} = 6.4$ since there was no data.

City of Wilsonville: The procedure above was used with several modifications due to a lack of data. Changes include:

$\sum \Phi_{a\lg ae} = 0$.

POM fraction for equation 4 was set 0.25 to ensure ISS stayed positive.

Total Organic Phosphorus was calculated with a modified equation 12: $\Phi_{PO4-P} = \Phi_{TOM}\delta_P$ because there was no Ortho-Phosphorus concentration data.

There was no TDS data so it was set to zero

$\Phi_{arbitray\_constituent} = Conductivity = 0$ since there was no data.

$\Phi_{alk} = 10$ since there was no data.

$\Phi_{DO} = 6.4$ since there was no data.

Appendix 3: Tributaries in the Study Area

Table 12. Tributaries in the Willamette River above the Willamette Falls to Salem USGS gage.

X Coordinate UTM	Y Coordinate UTM	Id	RM	Tributary
528746.06250	5021090.00000	8414	27.5747	Unnamed Trib
527603.50000	5020279.00000	8368	28.4459	Tualatin River
526716.75000	5015837.50000	8201	31.6088	Beaver Creek
525501.31250	5014938.00000	8117	33.1997	Unnamed Trib
524617.43750	5016084.50000	8067	34.1467	Unnamed Trib
523734.31250	5015990.00000	8037	34.7148	Unnamed Trib
522419.84375	5015860.50000	7991	35.5861	Molalla River
522048.21875	5016211.50000	7974	35.9080	Newland Creek
520252.46875	5016192.50000	7912	37.0823	Unnamed Trib
519504.71875	5015785.50000	7884	37.6126	Boeckman Creek
517979.62500	5015229.00000	7828	38.6732	Coffee Lake Cree
517385.75000	5015349.50000	7808	39.0520	Unnamed Trib
516220.75000	5014968.50000	7767	39.8285	Corral Creek
515966.12500	5014751.00000	7756	40.0368	Unnamed Trib
513254.34375	5013523.00000	7657	41.9118	Unnamed Trib
512739.18750	5012629.00000	7623	42.5558	Jim Tapman Creek
512501.15625	5012313.50000	7610	42.8020	Unnamed Trib
510695.50000	5010850.00000	7532	44.2792	Ryan Creek
509381.40625	5011090.00000	7488	45.1126	Champoeg Creek
508395.09375	5011379.50000	7453	45.7755	Unnamed Trib
507585.56250	5011604.00000	7421	46.3815	Unnamed Trib
507383.03125	5011831.00000	7411	46.5709	Unnamed Trib
506282.25000	5012557.50000	7366	47.4232	Spring Brook Cre
503830.68750	5012829.00000	7280	49.0520	Unnamed Trib
502109.78125	5013908.50000	7185	50.8512	Chehalem Creek
500498.62500	5012228.00000	7102	52.4232	Unnamed Trib
500147.37500	5009967.00000	7022	53.9383	Unnamed Trib
500347.93750	5008282.00000	6964	55.0368	Yamhill River
499526.18750	5000546.50000	6488	64.0520	Unnamed Trib
497781.40625	4998544.50000	6345	66.7603	Unnamed Trib
500298.93750	4995700.50000	6210	69.3171	Patterson Creek
494745.93750	4991136.00000	5957	74.1088	Spring Valley Cr
494975.81250	4981668.50000	5637	80.1694	Glenn Creek
497156.21875	4980765.50000	5542	81.9686	Unnamed Trib
496984.28125	4977410.50000	5430	84.0898	Mill Creek

Appendix 4: Shade input file

Seg #	DynSh	TT Elev LB	TT Elev RB	CI Dist LB	CI Dist RB	SRF LB1	SRF LB2	SRF RB1	SRF RB2	TOPO 1	TOPO 2	TOPO 3	TOPO 4	TOPO 5	TOPO 6	TOPO 7	TOPO 8	TOPO 9	TOPO 10	TOPO 11	TOPO 12	TOPO 13	TOPO 14	TOPO 15	TOPO 16	TOPO 17	TOPO 18	SRFJD1	SRFJD2
1	1																												
2	-1	64.2	42.3	63.1	80.3	0.75	0.75	0.25	0.25	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.04	0.04	0.04	0.03	0.03	91	274
3	-1	54.0	42.2	79.8	79.1	0.47	0.47	0.36	0.36	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.04	0.04	0.04	0.03	0.03	91	274
4	-1	45.9	52.5	84.4	79.2	0.25	0.25	0.75	0.75	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.04	0.03	0.03	0.03	91	274
5	-1	45.9	41.6	87.6	77.5	0.25	0.25	0.17	0.17	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03	91	274
6	-1	38.2	45.0	157.7	74.5	0.12	0.12	0.31	0.31	0.03	0.03	0.03	0.04	0.04	0.04	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	91	274
7	-1	51.9	57.9	153.2	86.2	0.25	0.25	0.75	0.75	0.04	0.05	0.05	0.06	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.03	0.03	0.04	91	274
8	-1	63.2	57.9	150.0	62.5	0.25	0.25	0.75	0.75	0.06	0.07	0.08	0.09	0.10	0.09	0.08	0.07	0.06	0.05	0.04	0.04	0.03	0.03	0.03	0.04	0.05	0.05	91	274
9	-1	60.1	57.9	105.9	81.9	0.22	0.22	0.75	0.75	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.03	91	274
10	-1	63.2	57.9	92.1	85.5	0.25	0.25	0.75	0.75	0.03	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	91	274
11	-1	63.2	57.9	86.1	95.6	0.50	0.50	0.75	0.75	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	91	274
12	-1	63.2	57.9	85.4	100.1	0.75	0.75	0.75	0.75	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	91	274
13	-1	49.1	57.9	84.0	95.6	0.38	0.38	0.75	0.75	0.03	0.03	0.04	0.04	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	91	274
14	-1	48.7	39.7	49.2	43.8	0.19	0.19	0.14	0.14	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	91	274
15	-1	53.3	54.2	54.7	44.6	0.25	0.25	0.75	0.75	0.06	0.07	0.07	0.08	0.09	0.09	0.07	0.05	0.04	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.04	0.05	91	274
16	-1	55.0	57.9	51.6	53.9	0.22	0.22	0.75	0.75	0.05	0.06	0.06	0.07	0.07	0.07	0.06	0.04	0.03	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.04	0.04	91	274
17	-1	49.1	49.3	103.4	76.1	0.38	0.38	0.47	0.47	0.04	0.04	0.04	0.05	0.05	0.04	0.04	0.03	0.02	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.03	91	274
18	-1	63.2	57.9	90.4	104.6	0.75	0.75	0.75	0.75	0.02	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.01	0.00	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	91	274
19	-1	62.3	57.0	99.3	98.9	0.75	0.75	0.75	0.75	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	91	274
20	-1	62.2	56.9	101.3	101.9	0.75	0.75	0.75	0.75	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.02	0.01	0.00	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	91	274
21	-1	62.2	53.2	88.1	83.8	0.75	0.75	0.62	0.62	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.02	0.01	0.00	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.03	91	274
22	-1	62.2	56.9	96.8	78.8	0.75	0.75	0.75	0.75	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.02	0.01	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	91	274
23	-1	62.2	51.8	121.5	93.0	0.75	0.75	0.58	0.58	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.02	0.01	0.00	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.03	91	274
24	-1	62.2	56.9	103.2	107.3	0.75	0.75	0.75	0.75	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.02	0.01	0.00	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.03	91	274
25	-1	55.3	46.0	97.0	79.4	0.56	0.56	0.38	0.38	0.03	0.03	0.03	0.03	0.04	0.03	0.02	0.02	0.01	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	91	274
26	-1	62.2	42.4	101.	81.0	0.7	0.7	0.2	0.2	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	91	274

Seg #	DynSh	TT Elev LB	TT Elev RB	CI Dist LB	CI Dist RB	SRF LB1	SRF LB2	SRF RB1	SRF RB2	TOPO 1	TOPO 2	TOPO 3	TOPO 4	TOPO 5	TOPO 6	TOPO 7	TOPO 8	TOPO 9	TOPO 10	TOPO 11	TOPO 12	TOPO 13	TOPO 14	TOPO 15	TOPO 16	TOPO 17	TOPO 18	SRFJD1	SRFJD2
				7		5	5	5	5																				
27	-1	62.2	55.0	92.8	105.8	0.75	0.75	0.25	0.25	0.03	0.03	0.03	0.03	0.04	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	91	274
28	-1	62.2	47.8	82.0	87.8	0.75	0.75	0.25	0.25	0.02	0.03	0.03	0.03	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	91	274
29	-1	63.5	48.8	68.5	68.6	0.75	0.75	0.25	0.25	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	91	274
30	-1	66.0	42.4	55.9	56.4	0.75	0.75	0.25	0.25	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	91	274
31	-1	65.7	42.1	61.7	60.7	0.75	0.75	0.25	0.25	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	91	274
32	-1	65.0	55.9	79.8	73.5	0.75	0.75	0.75	0.75	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	91	274
33	-1	65.0	44.1	100.4	95.2	0.75	0.75	0.25	0.25	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	91	274
34	-1	65.0	40.3	62.9	74.9	0.75	0.75	0.22	0.22	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.02	91	274
35	-1	65.0	41.4	64.9	62.2	0.75	0.75	0.25	0.25	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.04	0.04	0.05	0.05	0.04	0.04	0.03	91	274
36	-1	64.8	40.1	65.5	57.9	0.75	0.75	0.22	0.22	0.05	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.03	0.05	0.06	0.08	0.08	0.07	0.07	0.06	91	274
37	-1	64.0	42.7	92.4	70.5	0.75	0.75	0.16	0.16	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.01	0.03	0.04	0.06	0.07	0.08	0.07	0.07	0.06	91	274
38	-1	64.0	64.0	99.4	109.4	0.75	0.75	0.75	0.75	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.05	0.06	0.07	0.06	0.06	0.05	91	274
39	-1	57.2	64.0	100.3	96.3	0.75	0.75	0.75	0.75	0.05	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.04	0.05	0.07	0.08	0.08	0.08	0.07	0.06	91	274
40	-1	54.2	48.6	100.1	93.1	0.44	0.44	0.44	0.44	0.06	0.05	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.04	0.05	0.07	0.08	0.09	0.08	0.07	0.07	91	274
41	-1	46.5	39.4	93.2	88.9	0.19	0.19	0.25	0.25	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.02	0.01	0.01	0.02	0.03	0.05	0.06	0.07	0.06	0.06	0.06	91	274
42	-1	53.9	39.4	81.7	84.7	0.25	0.25	0.25	0.25	0.04	0.04	0.04	0.04	0.03	0.03	0.02	0.02	0.01	0.00	0.01	0.02	0.03	0.04	0.05	0.05	0.04	0.04	91	274
43	-1	53.9	39.4	81.2	67.7	0.25	0.25	0.25	0.25	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.00	0.02	0.03	0.04	0.06	0.06	0.06	0.05	0.05	91	274
44	-1	47.4	50.4	56.9	76.9	0.25	0.25	0.25	0.25	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.02	0.01	0.00	0.01	0.02	0.03	0.04	0.05	0.05	0.05	0.04	91	274
45	-1	44.1	47.3	62.6	69.7	0.25	0.25	0.31	0.31	0.04	0.04	0.04	0.04	0.03	0.03	0.02	0.02	0.01	0.00	0.01	0.02	0.03	0.04	0.05	0.04	0.04	0.04	91	274
46	-1	41.1	63.0	64.9	129.4	0.22	0.22	0.75	0.75	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.00	0.01	0.02	0.03	0.04	0.05	0.04	0.04	0.04	91	274
47	-1	54.5	63.0	110.9	114.0	0.75	0.75	0.75	0.75	0.04	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.02	0.03	0.05	0.06	0.06	0.06	0.05	0.05	91	274
48	-1	53.9	54.1	120.8	108.0	0.75	0.75	0.56	0.56	0.04	0.04	0.04	0.03	0.03	0.03	0.02	0.01	0.01	0.00	0.01	0.03	0.04	0.05	0.05	0.05	0.05	0.04	91	274
49	-1	56.5	63.0	108.7	126.0	0.56	0.56	0.75	0.75	0.04	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.01	0.00	0.01	0.02	0.03	0.04	0.04	0.04	0.04	0.04	91	274
50	-1	59.2	63.0	107.3	133.4	0.69	0.69	0.75	0.75	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.01	0.00	0.01	0.02	0.03	0.03	0.04	0.04	0.03	0.03	91	274
51	-1	44.1	51.2	75.8	87.4	0.69	0.69	0.50	0.50	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.00	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.03	91	274
52	-1	40.9	63.0	57.6	71.3	0.56	0.56	0.75	0.75	0.03	0.04	0.04	0.04	0.05	0.05	0.03	0.02	0.01	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	91	274

Seg #	DynSh	TT Elev LB	TT Elev RB	CI Dist LB	CI Dist RB	SRF LB1	SRF LB2	SRF RB1	SRF RB2	TOPO 1	TOPO 2	TOPO 3	TOPO 4	TOPO 5	TOPO 6	TOPO 7	TOPO 8	TOPO 9	TOPO 10	TOPO 11	TOPO 12	TOPO 13	TOPO 14	TOPO 15	TOPO 16	TOPO 17	TOPO 18	SRFJD1	SRFJD2
53	-1	44.1	45.4	60.8	77.0	0.25	0.25	0.42	0.42	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	91	274
54	-1	44.1	36.6	66.4	66.6	0.50	0.50	0.25	0.25	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	91	274
55	-1	40.6	36.6	59.5	66.7	0.25	0.25	0.25	0.25	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.02	91	274
56	-1	53.6	36.6	83.7	65.1	0.58	0.58	0.25	0.25	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	91	274
57	-1	53.5	49.6	76.2	78.4	0.75	0.75	0.25	0.25	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	91	274
58	-1	59.2	53.9	78.2	76.9	0.75	0.75	0.25	0.25	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	91	274
59	-1	59.2	53.9	72.8	74.6	0.75	0.75	0.25	0.25	0.02	0.02	0.02	0.03	0.03	0.02	0.02	0.01	0.01	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	91	274
60	-1	59.2	53.9	87.2	83.2	0.75	0.75	0.25	0.25	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.01	0.01	0.00	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.03	91	274
61	-1	59.2	41.2	85.1	88.4	0.75	0.75	0.25	0.25	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.01	0.00	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.03	91	274
62	-1	59.1	40.9	74.8	75.7	0.75	0.75	0.25	0.25	0.04	0.04	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.00	0.02	0.03	0.04	0.05	0.06	0.05	0.05	0.04	91	274
63	-1	54.2	48.9	85.9	83.1	0.75	0.75	0.25	0.25	0.07	0.06	0.05	0.05	0.04	0.03	0.03	0.03	0.03	0.03	0.05	0.07	0.08	0.10	0.11	0.10	0.09	0.08	91	274
64	-1	54.2	48.9	80.3	84.1	0.75	0.75	0.25	0.25	0.07	0.07	0.06	0.05	0.04	0.04	0.03	0.03	0.02	0.01	0.04	0.06	0.08	0.10	0.11	0.10	0.09	0.08	91	274
65	-1	51.2	48.9	96.5	70.3	0.75	0.75	0.25	0.25	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.03	0.02	0.01	0.02	0.04	0.05	0.07	0.07	0.07	0.07	0.06	91	274
66	-1	53.4	48.1	73.9	72.4	0.75	0.75	0.25	0.25	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.02	0.02	0.01	0.03	0.04	0.06	0.07	0.08	0.07	0.07	0.06	91	274
67	-1	53.2	47.9	81.9	76.0	0.75	0.75	0.25	0.25	0.05	0.05	0.04	0.04	0.04	0.04	0.03	0.02	0.02	0.01	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.05	91	274
68	-1	53.2	47.9	83.8	79.1	0.75	0.75	0.25	0.25	0.07	0.08	0.08	0.08	0.08	0.08	0.06	0.04	0.03	0.01	0.02	0.04	0.05	0.06	0.07	0.07	0.07	0.07	91	274
69	-1	53.2	49.9	74.3	91.8	0.75	0.75	0.44	0.44	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.03	0.02	0.01	0.03	0.04	0.05	0.06	0.07	0.07	0.07	0.07	91	274
70	-1	53.2	53.2	82.3	113.2	0.75	0.75	0.75	0.75	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.03	0.02	0.01	0.02	0.03	0.04	0.04	0.05	0.05	0.05	0.05	91	274
71	-1	53.2	53.2	92.9	113.5	0.75	0.75	0.75	0.75	0.05	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.02	0.02	0.03	0.03	0.04	0.05	0.05	0.05	0.05	0.05	91	274
72	-1	53.2	39.7	84.3	80.8	0.75	0.75	0.56	0.56	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.03	0.04	0.04	0.05	0.06	0.05	0.05	0.05	91	274
73	-1	53.2	46.5	81.5	71.8	0.75	0.75	0.62	0.62	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.04	0.03	0.03	0.04	0.05	0.05	0.05	0.05	0.06	0.06	91	274
74	-1	53.2	57.0	91.5	86.2	0.69	0.69	0.75	0.75	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.03	0.03	0.02	0.03	0.04	0.04	0.05	0.05	0.05	0.05	0.05	91	274
75	-1	53.1	44.9	95.5	112.8	0.75	0.75	0.56	0.56	0.07	0.06	0.06	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.07	0.08	0.09	0.09	0.09	0.08	0.07	91	274
76	-1	52.9	47.9	73.4	93.7	0.62	0.62	0.75	0.75	0.08	0.07	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.04	0.06	0.08	0.10	0.11	0.10	0.09	0.09	91	274
77	-1	53.2	47.9	48.6	78.9	0.25	0.25	0.75	0.75	0.11	0.09	0.07	0.06	0.04	0.03	0.03	0.03	0.03	0.03	0.06	0.09	0.13	0.16	0.17	0.15	0.14	0.12	91	274
78	-1	51.9	45.0	76.0	85.8	0.38	0.38	0.66	0.66	0.07	0.07	0.06	0.05	0.04	0.03	0.04	0.04	0.04	0.04	0.05	0.07	0.09	0.10	0.11	0.10	0.09	0.08	91	274
79	-1	47.9	47.9	90.4	99.1	0.7	0.7	0.7	0.7	0.07	0.06	0.06	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.07	0.08	0.10	0.10	0.10	0.09	0.08	91	274

Seg #	DynSh	TT Elev LB	TT Elev RB	CI Dist LB	CI Dist RB	SRF LB1	SRF LB2	SRF RB1	SRF RB2	TOPO 1	TOPO 2	TOPO 3	TOPO 4	TOPO 5	TOPO 6	TOPO 7	TOPO 8	TOPO 9	TOPO 10	TOPO 11	TOPO 12	TOPO 13	TOPO 14	TOPO 15	TOPO 16	TOPO 17	TOPO 18	SRFJD1	SRFJD2
						5	5	5	5																				
80	-1	47.9	47.9	85.7	93.7	0.75	0.75	0.75	0.75	0.05	0.04	0.04	0.04	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	91	274
81	-1	47.9	47.9	78.0	91.2	0.75	0.75	0.75	0.75	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	91	274
82	-1	47.9	40.9	92.9	83.0	0.75	0.75	0.67	0.67	0.04	0.04	0.04	0.03	0.03	0.03	0.04	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	91	274
83	-1	47.9	52.1	95.6	77.1	0.75	0.75	0.75	0.75	0.04	0.03	0.03	0.03	0.03	0.03	0.04	0.05	0.06	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.04	91	274
84	-1	47.9	41.9	97.8	64.1	0.75	0.75	0.31	0.31	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.06	0.06	0.07	0.06	0.05	0.04	0.04	0.03	0.04	0.04	0.04	91	274
85	1																												
86	1																												
87	-1	47.9	53.2	106.0	68.3	0.75	0.75	0.31	0.31	0.04	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	91	274
88	-1	41.4	53.2	92.6	71.2	0.75	0.75	0.25	0.25	0.04	0.04	0.04	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	91	274
89	-1	39.5	53.2	65.5	61.2	0.41	0.41	0.25	0.25	0.04	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	91	274
90	-1	33.4	53.2	70.7	66.1	0.25	0.25	0.25	0.25	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.03	91	274
91	-1	46.0	53.2	79.8	85.6	0.25	0.25	0.25	0.25	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	91	274
92	-1	47.9	53.2	76.8	83.7	0.25	0.25	0.25	0.25	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	91	274
93	-1	47.1	52.4	78.7	73.6	0.25	0.25	0.25	0.25	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.05	0.06	0.05	0.05	0.04	0.03	0.03	0.03	0.02	0.02	91	274
94	-1	39.6	52.2	79.7	70.4	0.25	0.25	0.25	0.25	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.04	0.05	0.06	0.05	0.04	0.03	0.02	0.01	0.01	0.01	0.01	91	274
95	-1	32.4	52.2	57.5	72.5	0.25	0.25	0.25	0.25	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.05	0.07	0.05	0.04	0.02	0.01	0.00	0.00	0.00	0.00	91	274
96	-1	32.4	39.1	55.2	57.4	0.25	0.25	0.16	0.16	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.04	0.06	0.07	0.05	0.04	0.03	0.01	0.00	0.00	0.00	0.00	91	274
97	-1	34.5	32.4	63.4	55.6	0.25	0.25	0.25	0.25	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	91	274
98	-1	37.1	27.6	71.5	63.9	0.25	0.25	0.11	0.11	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.02	0.02	0.02	91	274
99	-1	35.1	24.0	57.3	42.1	0.22	0.22	0.00	0.00	0.05	0.06	0.06	0.07	0.08	0.08	0.08	0.07	0.07	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.03	0.04	91	274
100	-1	44.0	34.6	78.5	55.2	0.41	0.41	0.09	0.09	0.04	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.04	0.03	0.03	0.03	0.03	0.04	91	274
101	-1	46.9	42.3	64.2	67.5	0.31	0.31	0.25	0.25	0.04	0.04	0.04	0.04	0.05	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	91	274
102	-1	46.9	24.0	57.3	54.8	0.31	0.31	0.00	0.00	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	91	274
103	-1	46.9	24.0	60.1	56.7	0.75	0.75	0.00	0.00	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	91	274
104	-1	46.9	24.0	51.3	52.7	0.75	0.75	0.00	0.00	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.03	91	274
105	-1	46.9	35.4	63.0	68.4	0.69	0.69	0.12	0.12	0.03	0.03	0.03	0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	91	274
106	-1	38.3	24.0	49.2	138.3	0.75	0.75	0.00	0.00	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	91	274

Seg #	DynSh	TT Elev LB	TT Elev RB	CI Dist LB	CI Dist RB	SRF LB1	SRF LB2	SRF RB1	SRF RB2	TOPO 1	TOPO 2	TOPO 3	TOPO 4	TOPO 5	TOPO 6	TOPO 7	TOPO 8	TOPO 9	TOPO 10	TOPO 11	TOPO 12	TOPO 13	TOPO 14	TOPO 15	TOPO 16	TOPO 17	TOPO 18	SRFJD1	SRFJD2
107	-1	33.6	33.5	50.2	187.1	0.38	0.38	0.75	0.75	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	91	274
108	-1	36.6	33.9	78.2	68.8	0.69	0.69	0.75	0.75	0.06	0.06	0.06	0.07	0.07	0.07	0.06	0.05	0.04	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.05	91	274
109	-1	44.4	33.9	79.3	38.9	0.75	0.75	0.75	0.75	0.07	0.07	0.07	0.08	0.09	0.08	0.07	0.06	0.04	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.06	0.06	91	274
110	-1	46.9	33.9	55.6	40.5	0.75	0.75	0.75	0.75	0.06	0.06	0.07	0.07	0.08	0.08	0.07	0.06	0.05	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	91	274
111	-1	46.9	33.9	62.7	59.6	0.75	0.75	0.75	0.75	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.05	91	274
112	-1	46.9	33.9	64.8	59.6	0.75	0.75	0.75	0.75	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	91	274
113	-1	46.9	33.9	66.1	64.8	0.75	0.75	0.75	0.75	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	91	274
114	-1	46.9	33.9	72.0	70.7	0.75	0.75	0.75	0.75	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	91	274
115	-1	46.9	31.4	71.6	80.0	0.75	0.75	0.56	0.56	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.07	0.07	0.07	0.07	0.07	91	274
116	-1	46.9	31.4	54.7	78.3	0.75	0.75	0.56	0.56	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.06	0.06	0.07	0.07	0.07	0.07	0.07	91	274
117	-1	46.9	33.9	64.1	89.7	0.75	0.75	0.75	0.75	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	91	274
118	-1	46.9	42.6	78.3	88.9	0.75	0.75	0.75	0.75	0.07	0.07	0.08	0.08	0.09	0.09	0.08	0.07	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.05	0.06	0.06	91	274
119	-1	46.9	35.1	65.5	73.2	0.75	0.75	0.75	0.75	0.06	0.07	0.08	0.09	0.09	0.09	0.08	0.07	0.06	0.04	0.04	0.04	0.04	0.03	0.03	0.04	0.05	0.06	91	274
120	-1	46.9	33.3	79.7	50.7	0.75	0.75	0.75	0.75	0.06	0.07	0.08	0.09	0.10	0.10	0.08	0.06	0.05	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.04	0.05	91	274
121	-1	46.9	32.7	71.9	62.2	0.75	0.75	0.75	0.75	0.06	0.07	0.08	0.09	0.10	0.10	0.08	0.06	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.05	91	274
122	-1	46.9	40.2	63.6	82.5	0.75	0.75	0.50	0.50	0.06	0.07	0.08	0.09	0.10	0.09	0.07	0.06	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.05	91	274
123	-1	41.1	43.2	60.5	84.1	0.56	0.56	0.25	0.25	0.05	0.05	0.05	0.06	0.06	0.06	0.05	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	91	274
124	-1	34.4	30.3	56.5	61.8	0.44	0.44	0.19	0.19	0.04	0.04	0.05	0.05	0.05	0.05	0.04	0.04	0.03	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.04	91	274
125	-1	56.0	32.4	54.4	63.4	0.25	0.25	0.25	0.25	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	91	274
126	-1	40.2	33.6	60.9	65.6	0.25	0.25	0.25	0.25	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	91	274
127	-1	39.6	33.9	62.4	62.0	0.25	0.25	0.25	0.25	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	91	274
128	-1	37.3	33.9	70.1	59.7	0.38	0.38	0.25	0.25	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.02	0.02	0.03	0.02	0.02	0.02	91	274
129	-1	52.2	33.9	95.2	82.8	0.75	0.75	0.25	0.25	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.00	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	91	274
130	-1	52.2	33.9	111.8	83.7	0.75	0.75	0.25	0.25	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	91	274
131	-1	52.2	56.0	134.3	83.8	0.75	0.75	0.75	0.75	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	91	274
132	-1	52.2	42.9	88.1	104.8	0.75	0.75	0.47	0.47	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01	91	274
133	-1	40.6	30.3	94.0	120.	0.4	0.4	0.2	0.2	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	91	274

Seg #	DynSh	TT Elev LB	TT Elev RB	CI Dist LB	CI Dist RB	SRF LB1	SRF LB2	SRF RB1	SRF RB2	TOPO 1	TOPO 2	TOPO 3	TOPO 4	TOPO 5	TOPO 6	TOPO 7	TOPO 8	TOPO 9	TOPO 10	TOPO 11	TOPO 12	TOPO 13	TOPO 14	TOPO 15	TOPO 16	TOPO 17	TOPO 18	SRFJD1	SRFJD2
					1	7	7	2	2																				
134	-1	40.8	23.0	59.8	110.7	0.50	0.50	0.00	0.00	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.02	91	274
135	-1	35.8	23.9	58.5	95.8	0.61	0.61	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	91	274
136	-1	45.9	25.1	80.2	130.4	0.75	0.75	0.06	0.06	0.05	0.05	0.06	0.06	0.06	0.06	0.05	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.05	0.05	91	274
137	-1	31.6	23.0	44.7	290.7	0.28	0.28	0.00	0.00	0.08	0.08	0.08	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	91	274
138	-1	23.0	25.1	53.9	350.2	0.00	0.00	0.06	0.06	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	91	274
139	-1	23.0	23.0	83.3	244.3	0.00	0.00	0.00	0.00	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	91	274
140	-1	43.0	28.3	89.0	122.7	0.66	0.66	0.16	0.16	0.07	0.07	0.07	0.08	0.08	0.07	0.07	0.06	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.07	91	274
141	-1	45.5	25.5	76.2	107.6	0.75	0.75	0.08	0.08	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.07	0.05	0.04	0.03	0.03	0.03	0.04	0.04	91	274
142	-1	44.9	39.6	100.7	69.0	0.75	0.75	0.47	0.47	0.09	0.10	0.12	0.14	0.15	0.16	0.16	0.16	0.16	0.16	0.13	0.09	0.06	0.03	0.02	0.04	0.06	0.07	91	274
143	-1	44.9	50.2	98.1	56.7	0.75	0.75	0.75	0.75	0.15	0.17	0.20	0.23	0.25	0.27	0.28	0.29	0.30	0.31	0.25	0.19	0.13	0.06	0.04	0.07	0.10	0.12	91	274
144	-1	44.9	50.2	88.8	63.5	0.75	0.75	0.75	0.75	0.16	0.19	0.22	0.25	0.28	0.27	0.24	0.20	0.17	0.13	0.11	0.09	0.06	0.04	0.04	0.07	0.10	0.13	91	274
145	-1	31.7	50.2	58.0	72.6	0.39	0.39	0.75	0.75	0.10	0.12	0.14	0.15	0.17	0.16	0.13	0.10	0.07	0.04	0.04	0.03	0.03	0.03	0.03	0.05	0.07	0.09	91	274
146	-1	40.5	50.2	65.1	69.0	0.75	0.75	0.75	0.75	0.06	0.07	0.08	0.09	0.10	0.09	0.08	0.06	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.05	91	274
147	-1	44.9	50.2	63.5	54.9	0.75	0.75	0.75	0.75	0.05	0.06	0.07	0.08	0.09	0.08	0.07	0.05	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.05	91	274
148	-1	44.9	46.7	63.6	79.1	0.69	0.69	0.66	0.66	0.06	0.07	0.09	0.10	0.11	0.10	0.08	0.06	0.04	0.02	0.02	0.02	0.01	0.01	0.02	0.03	0.04	0.05	91	274
149	-1	44.9	42.0	77.8	74.8	0.31	0.31	0.47	0.47	0.06	0.07	0.08	0.09	0.10	0.09	0.07	0.05	0.03	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.05	91	274
150	-1	44.9	54.0	86.0	84.7	0.75	0.75	0.75	0.75	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	91	274
151	-1	45.5	54.0	71.7	83.5	0.75	0.75	0.75	0.75	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	91	274
152	-1	47.5	54.0	58.9	120.5	0.75	0.75	0.75	0.75	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.04	0.04	0.03	91	274
153	-1	44.9	30.8	60.5	129.0	0.75	0.75	0.62	0.62	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.04	0.04	91	274
154	-1	48.9	31.7	62.6	132.5	0.75	0.75	0.25	0.25	0.06	0.06	0.06	0.07	0.07	0.07	0.06	0.05	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	91	274
155	-1	44.9	49.6	90.3	122.1	0.64	0.64	0.75	0.75	0.08	0.09	0.10	0.11	0.11	0.11	0.08	0.06	0.04	0.01	0.02	0.02	0.03	0.03	0.04	0.05	0.06	0.07	91	274
156	-1	44.9	44.9	119.7	70.5	0.50	0.50	0.75	0.75	0.05	0.05	0.06	0.07	0.08	0.07	0.05	0.04	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.04	91	274
157	-1	44.9	42.0	100.5	81.8	0.75	0.75	0.66	0.66	0.03	0.03	0.04	0.04	0.04	0.04	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	91	274
158	-1	48.9	39.4	77.1	67.3	0.75	0.75	0.56	0.56	0.03	0.03	0.03	0.03	0.04	0.04	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	91	274
159	-1	44.9	25.7	76.6	69.7	0.75	0.75	0.11	0.11	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.01	0.00	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.03	91	274

Seg #	DynSh	TT Elev LB	TT Elev RB	CI Dist LB	CI Dist RB	SRF LB1	SRF LB2	SRF RB1	SRF RB2	TOPO 1	TOPO 2	TOPO 3	TOPO 4	TOPO 5	TOPO 6	TOPO 7	TOPO 8	TOPO 9	TOPO 10	TOPO 11	TOPO 12	TOPO 13	TOPO 14	TOPO 15	TOPO 16	TOPO 17	TOPO 18	SRFJD1	SRFJD2
160	-1	44.9	22.0	75.7	97.4	0.75	0.75	0.00	0.00	0.04	0.04	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.05	0.06	0.06	0.06	0.05	0.05	91	274
161	-1	34.0	50.5	62.1	171.4	0.50	0.50	0.67	0.67	0.03	0.03	0.03	0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.05	0.04	0.04	0.04	0.04	91	274
162	-1	32.8	54.0	125.4	110.3	0.62	0.62	0.75	0.75	0.02	0.02	0.02	0.02	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	91	274
163	-1	37.6	30.4	172.5	57.9	0.50	0.50	0.25	0.25	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	91	274
164	-1	44.9	30.4	157.1	42.2	0.25	0.25	0.25	0.25	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	91	274
165	-1	44.9	54.0	119.8	52.7	0.36	0.36	0.75	0.75	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	91	274
166	-1	44.9	44.1	79.4	65.9	0.75	0.75	0.56	0.56	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.01	91	274
167	-1	48.9	38.9	60.1	53.6	0.75	0.75	0.50	0.50	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	91	274
168	-1	50.2	50.2	55.8	59.6	0.75	0.75	0.75	0.75	0.02	0.02	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.02	91	274
169	-1	46.7	50.2	95.1	96.8	0.66	0.66	0.75	0.75	0.03	0.02	0.02	0.01	0.01	0.00	0.01	0.01	0.02	0.02	0.03	0.04	0.04	0.05	0.05	0.05	0.04	0.04	91	274
170	-1	50.2	50.2	97.6	117.3	0.42	0.42	0.75	0.75	0.06	0.04	0.03	0.02	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.09	0.10	0.10	0.09	0.08	0.07	91	274
171	-1	50.2	43.2	57.8	80.6	0.75	0.75	0.56	0.56	0.11	0.09	0.07	0.05	0.03	0.03	0.04	0.06	0.07	0.08	0.11	0.13	0.15	0.17	0.18	0.16	0.14	0.12	91	274
172	-1	50.2	50.2	52.4	71.6	0.75	0.75	0.75	0.75	0.13	0.11	0.09	0.06	0.04	0.03	0.04	0.05	0.06	0.07	0.11	0.15	0.18	0.22	0.23	0.20	0.18	0.16	91	274
173	-1	50.2	36.1	72.6	93.8	0.75	0.75	0.38	0.38	0.05	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.05	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.06	0.06	91	274
174	-1	50.2	43.6	169.2	62.1	0.75	0.75	0.75	0.75	0.04	0.03	0.03	0.02	0.02	0.02	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.06	0.06	0.05	0.05	0.04	91	274
175	-1	50.2	30.4	163.3	66.9	0.75	0.75	0.75	0.75	0.03	0.03	0.02	0.02	0.01	0.01	0.02	0.02	0.03	0.03	0.04	0.04	0.05	0.06	0.06	0.05	0.05	0.04	91	274
176	-1	50.2	32.9	94.8	158.7	0.75	0.75	0.75	0.75	0.06	0.05	0.04	0.03	0.02	0.01	0.02	0.02	0.02	0.03	0.04	0.06	0.08	0.09	0.10	0.09	0.08	0.07	91	274
177	-1	50.2	26.2	60.7	131.6	0.75	0.75	0.38	0.38	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.05	0.06	0.08	0.10	0.10	0.09	0.08	0.07	91	274
178	-1	50.2	22.0	57.0	106.8	0.75	0.75	0.00	0.00	0.06	0.05	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.06	0.07	0.08	0.09	0.08	0.07	0.07	91	274
179	1																												
180	1																												
181	-1	44.3	22.0	62.1	83.6	0.75	0.75	0.00	0.00	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	91	274
182	-1	23.8	24.1	59.4	79.8	0.75	0.75	0.19	0.19	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.02	91	274
183	-1	38.6	29.9	75.1	110.0	0.75	0.75	0.47	0.47	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	91	274
184	-1	42.9	42.9	100.9	69.9	0.69	0.69	0.75	0.75	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	91	274
185	-1	30.3	39.6	105.6	65.0	0.56	0.56	0.75	0.75	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.02	91	274
186	-1	42.9	29.9	74.3	73.5	0.75	0.75	0.75	0.75	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.02	0.02	0.02	91	274
187	-1	42.9	31.9	63.3	88.7	0.7	0.7	0.7	0.7	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	91	274

Seg #	DynSh	TT Elev LB	TT Elev RB	CI Dist LB	CI Dist RB	SRF LB1	SRF LB2	SRF RB1	SRF RB2	TOPO 1	TOPO 2	TOPO 3	TOPO 4	TOPO 5	TOPO 6	TOPO 7	TOPO 8	TOPO 9	TOPO 10	TOPO 11	TOPO 12	TOPO 13	TOPO 14	TOPO 15	TOPO 16	TOPO 17	TOPO 18	SRFJD1	SRFJD2
						5	5	5	5																				
188	-1	42.9	45.5	72.4	93.1	0.75	0.75	0.75	0.75	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	91	274
189	-1	42.9	42.9	87.7	82.7	0.75	0.75	0.75	0.75	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	91	274
190	-1	42.9	42.9	88.4	84.0	0.75	0.75	0.58	0.58	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	91	274
191	-1	42.9	42.9	93.4	90.7	0.75	0.75	0.75	0.75	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.01	0.01	91	274
192	-1	42.9	42.9	86.8	96.0	0.69	0.69	0.75	0.75	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	91	274
193	-1	42.9	42.9	77.7	104.2	0.75	0.75	0.75	0.75	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	91	274
194	-1	42.9	42.9	91.1	80.1	0.75	0.75	0.69	0.69	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	91	274
195	-1	42.9	42.9	139.2	53.0	0.75	0.75	0.75	0.75	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	91	274
196	-1	42.9	40.0	118.9	94.5	0.75	0.75	0.64	0.64	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	91	274
197	-1	42.1	34.0	71.8	77.6	0.75	0.75	0.25	0.25	0.04	0.04	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.03	0.02	0.01	0.02	0.03	0.03	91	274
198	-1	39.9	27.2	70.5	67.5	0.75	0.75	0.69	0.69	0.05	0.05	0.06	0.06	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.04	0.04	0.04	91	274
199	-1	39.9	25.6	70.7	64.3	0.75	0.75	0.69	0.69	0.06	0.06	0.07	0.07	0.08	0.07	0.07	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.04	0.04	0.05	0.05	91	274
200	-1	39.9	26.9	79.0	78.8	0.75	0.75	0.38	0.38	0.06	0.06	0.07	0.08	0.08	0.08	0.07	0.06	0.05	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.05	91	274
201	-1	34.8	18.1	89.9	89.0	0.58	0.58	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.03	91	274
202	-1	39.9	24.1	92.4	96.2	0.75	0.75	0.19	0.19	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	91	274
203	-1	39.9	30.6	102.0	99.5	0.75	0.75	0.50	0.50	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.04	91	274
204	-1	39.9	39.9	92.5	94.3	0.75	0.75	0.25	0.25	0.04	0.04	0.04	0.04	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.04	91	274
205	-1	39.9	39.9	76.6	74.0	0.69	0.69	0.53	0.53	0.04	0.05	0.05	0.05	0.06	0.05	0.05	0.04	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.04	91	274
206	-1	39.9	41.0	88.8	84.6	0.75	0.75	0.75	0.75	0.05	0.06	0.06	0.06	0.07	0.06	0.05	0.04	0.03	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.05	91	274
207	-1	37.0	42.2	89.0	103.4	0.66	0.66	0.75	0.75	0.05	0.06	0.06	0.06	0.07	0.06	0.05	0.04	0.02	0.01	0.02	0.02	0.03	0.03	0.04	0.04	0.04	0.05	91	274
208	-1	39.9	48.0	97.8	104.5	0.75	0.75	0.75	0.75	0.06	0.06	0.06	0.07	0.07	0.06	0.05	0.04	0.02	0.01	0.02	0.03	0.04	0.05	0.06	0.06	0.06	0.06	91	274
209	-1	39.9	49.0	100.4	104.2	0.75	0.75	0.75	0.75	0.06	0.05	0.05	0.05	0.05	0.05	0.04	0.03	0.02	0.01	0.02	0.03	0.04	0.06	0.06	0.06	0.06	0.06	91	274
210	-1	31.2	47.7	103.6	91.4	0.42	0.42	0.75	0.75	0.06	0.06	0.05	0.05	0.04	0.03	0.03	0.02	0.01	0.01	0.02	0.04	0.06	0.08	0.09	0.08	0.07	0.07	91	274
211	-1	40.6	45.2	108.9	95.6	0.25	0.25	0.75	0.75	0.08	0.07	0.06	0.05	0.04	0.04	0.03	0.03	0.02	0.01	0.03	0.06	0.08	0.10	0.11	0.10	0.09	0.08	91	274
212	-1	33.8	45.2	113.4	93.2	0.44	0.44	0.75	0.75	0.08	0.07	0.06	0.05	0.05	0.04	0.05	0.06	0.06	0.07	0.08	0.09	0.10	0.11	0.11	0.10	0.10	0.09	91	274
213	1																												
214	1																												

Seg #	DynSh	TT Elev LB	TT Elev RB	CI Dist LB	CI Dist RB	SRF LB1	SRF LB2	SRF RB1	SRF RB2	TOPO 1	TOPO 2	TOPO 3	TOPO 4	TOPO 5	TOPO 6	TOPO 7	TOPO 8	TOPO 9	TOPO 10	TOPO 11	TOPO 12	TOPO 13	TOPO 14	TOPO 15	TOPO 16	TOPO 17	TOPO 18	SRFJD1	SRFJD2
215	-1	40.5	39.4	19.7	14.0	0.69	0.69	0.56	0.56	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	91	274
216	-1	56.2	46.0	18.8	21.7	0.44	0.44	0.31	0.31	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.04	0.03	0.03	0.03	91	274
217	-1	50.9	46.0	15.5	27.2	0.75	0.75	0.31	0.31	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.02	0.03	0.04	0.06	0.06	0.06	0.05	0.04	91	274
218	-1	48.0	46.0	24.8	22.4	0.66	0.66	0.75	0.75	0.04	0.03	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.05	0.06	0.06	0.06	0.05	0.04	91	274
219	-1	39.6	41.8	19.6	35.6	0.31	0.31	0.44	0.44	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.02	91	274
220	-1	43.1	44.7	26.8	21.4	0.44	0.44	0.56	0.56	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	91	274
221	-1	50.6	47.9	25.7	20.9	0.68	0.68	0.75	0.75	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	91	274
222	-1	53.2	47.9	16.2	34.2	0.75	0.75	0.75	0.75	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	91	274
223	-1	53.2	47.9	16.9	18.8	0.75	0.75	0.75	0.75	0.03	0.04	0.04	0.05	0.05	0.05	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	91	274
224	-1	53.2	47.9	28.8	28.0	0.75	0.75	0.75	0.75	0.03	0.03	0.03	0.03	0.04	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.02	91	274
225	-1	45.0	38.8	27.7	47.4	0.62	0.62	0.44	0.44	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	91	274
226	1																												
227	1																												
228	-1	45.1	45.1	96.6	77.0	0.75	0.75	0.75	0.75	0.07	0.06	0.06	0.05	0.04	0.04	0.05	0.06	0.06	0.07	0.07	0.08	0.09	0.10	0.10	0.09	0.08	0.08	91	274
229	-1	44.2	48.0	74.0	70.2	0.75	0.75	0.75	0.75	0.06	0.06	0.06	0.06	0.05	0.05	0.04	0.03	0.03	0.02	0.03	0.05	0.06	0.07	0.08	0.07	0.07	0.07	91	274
230	-1	44.2	47.1	76.2	84.6	0.75	0.75	0.75	0.75	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.03	0.04	0.05	0.06	0.07	0.07	0.07	0.07	0.06	91	274
231	-1	44.2	48.0	87.7	88.4	0.75	0.75	0.75	0.75	0.08	0.07	0.06	0.06	0.05	0.04	0.04	0.04	0.04	0.04	0.06	0.07	0.09	0.10	0.11	0.10	0.09	0.09	91	274
232	-1	40.2	48.0	85.8	76.9	0.75	0.75	0.75	0.75	0.07	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.07	0.08	0.08	0.09	0.08	0.08	0.07	91	274
233	-1	22.9	48.0	81.1	80.2	0.22	0.22	0.75	0.75	0.06	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.06	0.06	0.07	0.07	0.07	0.06	0.06	91	274
234	-1	31.6	48.0	65.1	63.4	0.50	0.50	0.75	0.75	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	91	274
235	-1	38.9	48.0	72.2	87.1	0.69	0.69	0.75	0.75	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.02	91	274
236	-1	38.9	48.0	68.2	83.6	0.75	0.75	0.75	0.75	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.03	0.03	0.03	0.02	0.02	0.03	0.03	91	274
237	-1	38.9	48.0	61.3	76.8	0.75	0.75	0.75	0.75	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.02	0.03	0.03	0.03	91	274
238	-1	38.9	48.0	67.8	77.6	0.75	0.75	0.75	0.75	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.03	0.02	0.02	0.03	0.03	0.03	91	274
239	-1	38.9	48.0	68.1	72.4	0.75	0.75	0.75	0.75	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.03	0.03	0.04	91	274
240	-1	38.9	48.0	67.0	68.4	0.75	0.75	0.75	0.75	0.05	0.06	0.06	0.07	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.04	0.04	0.05	91	274
241	-1	38.9	39.2	72.3	66.8	0.75	0.75	0.44	0.44	0.09	0.10	0.11	0.12	0.13	0.13	0.10	0.08	0.05	0.02	0.03	0.03	0.03	0.04	0.04	0.05	0.06	0.08	91	274
242	-1	28.7	38.9	93.5	86.3	0.3	0.3	0.2	0.2	0.07	0.08	0.09	0.09	0.10	0.10	0.08	0.06	0.04	0.02	0.02	0.02	0.02	0.03	0.03	0.04	0.05	0.06	91	274

Seg #	DynSh	TT Elev LB	TT Elev RB	CI Dist LB	CI Dist RB	SRF LB1	SRF LB2	SRF RB1	SRF RB2	TOPO 1	TOPO 2	TOPO 3	TOPO 4	TOPO 5	TOPO 6	TOPO 7	TOPO 8	TOPO 9	TOPO 10	TOPO 11	TOPO 12	TOPO 13	TOPO 14	TOPO 15	TOPO 16	TOPO 17	TOPO 18	SRFJD1	SRFJD2
						1	1	5	5																				
243	-1	38.9	38.9	104.4	99.5	0.75	0.75	0.25	0.25	0.04	0.04	0.05	0.05	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.03	0.03	0.04	91	274
244	-1	38.9	38.9	105.9	114.6	0.53	0.53	0.36	0.36	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.04	0.03	0.03	0.02	0.03	0.03	0.03	91	274
245	-1	38.9	38.9	101.9	115.3	0.25	0.25	0.75	0.75	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.04	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	91	274
246	-1	19.7	38.9	82.9	94.3	0.22	0.22	0.69	0.69	0.03	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.03	0.03	91	274
247	-1	25.9	38.9	78.0	83.8	0.25	0.25	0.25	0.25	0.07	0.09	0.10	0.11	0.12	0.12	0.10	0.08	0.07	0.05	0.04	0.04	0.03	0.03	0.03	0.04	0.05	0.06	91	274
248	-1	25.9	38.9	75.7	90.5	0.31	0.31	0.25	0.25	0.06	0.06	0.06	0.07	0.07	0.07	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	91	274
249	-1	25.9	38.9	71.1	82.4	0.25	0.25	0.25	0.25	0.09	0.10	0.11	0.12	0.13	0.12	0.10	0.08	0.06	0.04	0.04	0.04	0.04	0.05	0.05	0.06	0.07	0.08	91	274
250	-1	25.9	38.9	79.3	86.9	0.38	0.38	0.25	0.25	0.09	0.10	0.12	0.13	0.14	0.13	0.10	0.08	0.05	0.02	0.03	0.03	0.04	0.04	0.05	0.06	0.07	0.08	91	274
251	-1	30.8	38.9	85.8	82.1	0.75	0.75	0.25	0.25	0.09	0.10	0.12	0.13	0.14	0.13	0.10	0.07	0.04	0.02	0.02	0.03	0.03	0.03	0.04	0.05	0.07	0.08	91	274
252	-1	38.9	38.9	80.2	81.9	0.75	0.75	0.25	0.25	0.10	0.11	0.12	0.13	0.14	0.13	0.10	0.07	0.04	0.01	0.02	0.03	0.04	0.04	0.05	0.06	0.07	0.08	91	274
253	-1	38.9	38.9	78.3	87.7	0.75	0.75	0.25	0.25	0.07	0.08	0.08	0.09	0.10	0.09	0.07	0.06	0.04	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.07	91	274
254	-1	38.9	38.9	85.5	89.2	0.75	0.75	0.25	0.25	0.05	0.05	0.05	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	91	274
255	-1	38.9	38.9	87.2	86.9	0.75	0.75	0.25	0.25	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	91	274
256	-1	38.9	40.7	75.6	63.2	0.75	0.75	0.64	0.64	0.03	0.03	0.03	0.02	0.02	0.03	0.05	0.07	0.08	0.10	0.09	0.08	0.07	0.05	0.05	0.04	0.04	0.04	91	274
257	-1	38.9	38.9	65.6	74.2	0.75	0.75	0.75	0.75	0.02	0.02	0.02	0.02	0.01	0.02	0.04	0.05	0.06	0.08	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.02	91	274
258	-1	38.9	38.9	75.0	85.6	0.75	0.75	0.75	0.75	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.05	0.04	0.03	0.02	0.01	0.01	0.01	0.01	91	274
259	-1	38.9	38.9	85.0	97.7	0.75	0.75	0.75	0.75	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.04	0.05	0.04	0.04	0.03	0.02	0.01	0.01	0.01	0.01	91	274
260	-1	38.9	38.9	91.9	100.8	0.75	0.75	0.75	0.75	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.04	0.05	0.04	0.04	0.03	0.02	0.01	0.01	0.01	0.01	91	274
261	-1	38.9	38.9	95.6	107.8	0.75	0.75	0.75	0.75	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.04	0.05	0.04	0.04	0.03	0.02	0.01	0.01	0.01	0.01	91	274
262	-1	38.9	38.9	100.4	103.3	0.75	0.75	0.75	0.75	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.04	0.05	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	91	274
263	-1	38.9	38.9	97.6	104.5	0.75	0.75	0.75	0.75	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.03	0.04	0.04	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	91	274
264	-1	38.9	38.9	87.0	107.1	0.75	0.75	0.75	0.75	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.04	0.05	0.04	0.03	0.03	0.02	0.01	0.01	0.01	0.01	91	274
265	-1	38.9	38.9	93.0	90.8	0.75	0.75	0.75	0.75	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.04	0.05	0.04	0.04	0.03	0.02	0.01	0.01	0.01	0.01	91	274
266	-1	38.9	38.9	87.5	96.3	0.75	0.75	0.75	0.75	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.03	91	274
267	-1	41.5	38.9	88.4	89.8	0.75	0.75	0.75	0.75	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.03	0.03	0.03	91	274
268	-1	48.0	38.9	90.5	72.6	0.75	0.75	0.75	0.75	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	91	274

Seg #	DynSh	TT Elev LB	TT Elev RB	CI Dist LB	CI Dist RB	SRF LB1	SRF LB2	SRF RB1	SRF RB2	TOPO 1	TOPO 2	TOPO 3	TOPO 4	TOPO 5	TOPO 6	TOPO 7	TOPO 8	TOPO 9	TOPO 10	TOPO 11	TOPO 12	TOPO 13	TOPO 14	TOPO 15	TOPO 16	TOPO 17	TOPO 18	SRFJD1	SRFJD2
269	-1	48.0	38.9	69.5	82.5	0.75	0.75	0.75	0.75	0.05	0.05	0.05	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	91	274
270	-1	48.0	38.9	78.6	91.2	0.75	0.75	0.75	0.75	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	91	274
271	-1	48.0	40.9	92.3	84.7	0.75	0.75	0.75	0.75	0.05	0.05	0.05	0.05	0.06	0.06	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	91	274
272	-1	48.0	43.5	93.4	110.3	0.75	0.75	0.75	0.75	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	91	274
273	-1	48.0	40.9	94.2	97.5	0.75	0.75	0.75	0.75	0.04	0.03	0.03	0.03	0.02	0.02	0.03	0.04	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.04	0.04	91	274
274	-1	48.0	48.0	94.6	71.5	0.75	0.75	0.75	0.75	0.03	0.02	0.02	0.02	0.02	0.03	0.04	0.05	0.07	0.08	0.07	0.06	0.05	0.04	0.03	0.03	0.03	0.03	91	274
275	-1	48.0	48.0	95.1	88.7	0.75	0.75	0.75	0.75	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.05	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.02	91	274
276	-1	48.0	48.0	107.8	90.6	0.75	0.75	0.75	0.75	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.04	0.05	0.05	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.02	91	274
277	-1	48.0	48.0	92.4	76.1	0.75	0.75	0.75	0.75	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.03	0.02	0.02	0.03	0.03	0.03	91	274
278	-1	48.0	48.0	88.5	81.6	0.75	0.75	0.75	0.75	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.05	0.05	0.05	0.04	0.04	0.03	0.03	0.03	0.03	0.03	91	274
279	-1	48.0	48.0	111.9	100.9	0.75	0.75	0.75	0.75	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.02	91	274
280	-1	48.0	48.0	125.6	109.1	0.75	0.75	0.75	0.75	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	91	274
281	-1	48.0	48.0	100.4	89.9	0.75	0.75	0.75	0.75	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.04	0.05	0.04	0.03	0.03	0.02	0.01	0.01	0.01	0.01	91	274
282	-1	48.0	48.0	90.2	77.1	0.75	0.75	0.75	0.75	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.05	0.04	0.03	0.02	0.01	0.01	0.01	0.01	91	274
283	-1	48.0	48.0	89.4	86.0	0.75	0.75	0.75	0.75	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.04	0.05	0.04	0.03	0.03	0.02	0.01	0.01	0.01	0.01	91	274
284	-1	48.7	47.8	90.0	96.5	0.75	0.75	0.75	0.75	0.04	0.04	0.05	0.05	0.06	0.06	0.06	0.06	0.05	0.05	0.04	0.04	0.03	0.02	0.02	0.03	0.03	0.04	91	274
285	-1	49.0	45.2	99.6	97.7	0.75	0.75	0.75	0.75	0.07	0.08	0.10	0.11	0.12	0.13	0.12	0.11	0.10	0.09	0.07	0.06	0.04	0.02	0.02	0.03	0.05	0.06	91	274
286	-1	49.0	45.2	82.6	85.5	0.75	0.75	0.75	0.75	0.06	0.08	0.09	0.10	0.11	0.12	0.13	0.13	0.14	0.14	0.11	0.08	0.05	0.02	0.01	0.03	0.04	0.05	91	274
287	-1	49.0	58.1	81.8	95.6	0.75	0.75	0.75	0.75	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.15	0.16	0.16	0.14	0.11	0.09	0.06	0.05	0.06	0.07	0.08	91	274
288	-1	48.0	65.8	81.7	104.8	0.69	0.69	0.75	0.75	0.08	0.08	0.08	0.08	0.09	0.10	0.11	0.13	0.15	0.17	0.14	0.12	0.10	0.08	0.07	0.07	0.07	0.08	91	274
289	-1	39.9	55.7	94.1	95.7	0.25	0.25	0.46	0.46	0.07	0.07	0.07	0.07	0.07	0.08	0.12	0.15	0.19	0.22	0.19	0.16	0.12	0.09	0.07	0.07	0.07	0.07	91	274
290	-1	39.9	48.1	101.8	91.8	0.31	0.31	0.25	0.25	0.07	0.07	0.07	0.06	0.06	0.08	0.11	0.15	0.18	0.21	0.18	0.15	0.12	0.09	0.07	0.07	0.07	0.07	91	274
291	-1	39.9	41.0	81.0	83.1	0.75	0.75	0.31	0.31	0.07	0.07	0.07	0.07	0.07	0.08	0.10	0.11	0.13	0.15	0.14	0.12	0.10	0.08	0.07	0.07	0.07	0.07	91	274
292	-1	39.9	39.9	77.0	91.0	0.75	0.75	0.25	0.25	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.09	0.10	0.11	0.10	0.10	0.09	0.08	0.07	0.07	0.07	0.07	91	274
293	-1	33.0	48.0	83.2	85.9	0.58	0.58	0.69	0.69	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.07	0.07	0.07	0.07	0.07	0.07	0.07	91	274
294	-1	34.1	49.0	99.9	70.0	0.75	0.75	0.75	0.75	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	91	274
295	-1	41.0	49.0	117.	93.6	0.5	0.5	0.7	0.7	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	91	274

Seg #	DynSh	TT Elev LB	TT Elev RB	CI Dist LB	CI Dist RB	SRF LB1	SRF LB2	SRF RB1	SRF RB2	TOPO 1	TOPO 2	TOPO 3	TOPO 4	TOPO 5	TOPO 6	TOPO 7	TOPO 8	TOPO 9	TOPO 10	TOPO 11	TOPO 12	TOPO 13	TOPO 14	TOPO 15	TOPO 16	TOPO 17	TOPO 18	SRFJD1	SRFJD2
				9		8	8	5	5																				
296	-1	39.2	49.0	113.0	106.2	0.75	0.75	0.75	0.75	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	91	274
297	-1	40.5	49.0	96.8	92.6	0.69	0.69	0.75	0.75	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	91	274
298	-1	40.9	49.0	87.4	78.9	0.62	0.62	0.75	0.75	0.08	0.08	0.07	0.07	0.06	0.06	0.06	0.06	0.06	0.05	0.07	0.08	0.09	0.10	0.10	0.10	0.09	0.09	91	274
299	-1	41.0	49.0	92.2	92.0	0.58	0.58	0.75	0.75	0.09	0.08	0.08	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.09	0.10	0.11	0.12	0.11	0.10	0.10	91	274
300	-1	41.0	44.4	102.4	100.0	0.75	0.75	0.62	0.62	0.09	0.08	0.08	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.09	0.10	0.11	0.12	0.11	0.10	0.10	91	274
301	-1	41.4	37.0	94.3	85.6	0.75	0.75	0.22	0.22	0.07	0.07	0.06	0.06	0.05	0.05	0.05	0.06	0.06	0.06	0.07	0.07	0.08	0.09	0.09	0.09	0.08	0.08	91	274
302	-1	35.9	37.3	78.0	78.0	0.58	0.58	0.22	0.22	0.05	0.05	0.04	0.03	0.03	0.03	0.04	0.04	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.07	0.06	0.06	91	274
303	-1	33.5	39.9	84.0	78.1	0.62	0.62	0.38	0.38	0.04	0.03	0.03	0.02	0.02	0.02	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.04	91	274
304	-1	32.7	39.9	95.5	91.4	0.69	0.69	0.25	0.25	0.04	0.03	0.03	0.02	0.02	0.02	0.03	0.04	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.04	91	274
305	-1	43.7	39.9	106.9	92.7	0.75	0.75	0.47	0.47	0.04	0.03	0.03	0.03	0.02	0.03	0.03	0.04	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.04	0.04	91	274
306	-1	42.7	46.7	94.8	98.4	0.75	0.75	0.75	0.75	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.03	0.03	91	274
307	-1	41.8	47.5	89.0	116.0	0.75	0.75	0.75	0.75	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	91	274
308	-1	43.6	45.6	83.8	102.0	0.75	0.75	0.75	0.75	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	91	274
309	-1	42.9	47.0	89.4	92.9	0.75	0.75	0.75	0.75	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.04	0.04	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.03	91	274
310	-1	35.1	52.1	105.2	95.5	0.44	0.44	0.75	0.75	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.04	0.04	0.04	91	274
311	-1	32.9	48.4	98.3	94.9	0.25	0.25	0.75	0.75	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	91	274
312	-1	40.1	40.1	98.3	97.1	0.75	0.75	0.84	0.84	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	0.06	0.06	91	274
313	-1	37.7	47.9	84.3	95.2	0.69	0.69	0.75	0.75	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.05	0.05	0.05	91	274
314	-1	40.6	45.0	93.1	98.3	0.64	0.64	0.75	0.75	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.04	91	274
315	-1	42.7	48.1	93.3	108.2	0.69	0.69	0.75	0.75	0.03	0.03	0.02	0.02	0.01	0.02	0.02	0.03	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.04	0.04	0.03	91	274
316	-1	42.7	49.0	101.6	94.0	0.62	0.62	0.75	0.75	0.03	0.03	0.02	0.02	0.01	0.02	0.02	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.04	0.04	0.04	0.03	91	274
317	-1	32.2	39.9	99.6	95.8	0.56	0.56	0.25	0.25	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	91	274
318	-1	42.1	43.9	104.6	91.4	0.64	0.64	0.47	0.47	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	91	274
319	-1	44.4	39.9	90.6	98.4	0.75	0.75	0.25	0.25	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.03	91	274
320	-1	48.3	39.9	80.6	91.8	0.69	0.69	0.25	0.25	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.04	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02	91	274
321	-1	36.7	40.5	86.5	104.4	0.75	0.75	0.56	0.56	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.05	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.02	0.02	91	274

Seg #	DynSh	TT Elev LB	TT Elev RB	CI Dist LB	CI Dist RB	SRF LB1	SRF LB2	SRF RB1	SRF RB2	TOPO 1	TOPO 2	TOPO 3	TOPO 4	TOPO 5	TOPO 6	TOPO 7	TOPO 8	TOPO 9	TOPO 10	TOPO 11	TOPO 12	TOPO 13	TOPO 14	TOPO 15	TOPO 16	TOPO 17	TOPO 18	SRFJD1	SRFJD2
322	-1	34.1	49.0	88.4	93.1	0.75	0.75	0.75	0.75	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.05	0.06	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.02	0.02	91	274
323	-1	40.6	48.1	90.4	87.6	0.44	0.44	0.75	0.75	0.02	0.03	0.03	0.03	0.04	0.04	0.05	0.06	0.07	0.08	0.06	0.05	0.03	0.02	0.01	0.01	0.02	0.02	91	274
324	-1	43.0	49.0	90.8	85.7	0.75	0.75	0.75	0.75	0.04	0.04	0.04	0.05	0.05	0.05	0.06	0.07	0.08	0.08	0.07	0.06	0.05	0.03	0.03	0.03	0.03	0.04	91	274
325	-1	63.6	49.0	108.1	90.2	0.75	0.75	0.75	0.75	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.07	0.06	0.05	0.05	0.04	0.05	0.05	0.05	91	274
326	-1	41.1	47.6	81.1	94.1	0.69	0.69	0.75	0.75	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.05	0.05	0.05	0.05	0.05	0.05	91	274
327	-1	39.8	45.2	77.2	105.5	0.58	0.58	0.75	0.75	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.08	0.07	0.07	0.06	0.05	0.05	0.05	0.05	0.05	91	274
328	-1	43.4	44.2	83.9	106.1	0.31	0.31	0.75	0.75	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.06	0.07	0.08	0.07	0.07	0.06	0.05	0.05	0.05	0.05	0.05	91	274
329	-1	43.4	44.2	101.8	98.9	0.44	0.44	0.75	0.75	0.04	0.04	0.04	0.04	0.03	0.04	0.05	0.05	0.06	0.07	0.07	0.06	0.06	0.06	0.05	0.05	0.05	0.05	91	274
330	-1	43.4	44.6	111.2	116.1	0.31	0.31	0.53	0.53	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.05	0.06	0.07	0.06	0.05	0.05	0.04	0.04	0.03	0.03	0.03	91	274
331	-1	43.4	47.1	99.6	117.7	0.75	0.75	0.25	0.25	0.03	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.06	0.07	0.06	0.05	0.05	0.04	0.03	0.03	0.03	0.03	91	274
332	-1	41.7	47.1	97.6	103.3	0.75	0.75	0.25	0.25	0.02	0.02	0.02	0.01	0.01	0.02	0.03	0.04	0.06	0.07	0.06	0.05	0.04	0.03	0.03	0.03	0.02	0.02	91	274
333	-1	43.4	47.8	94.1	99.8	0.75	0.75	0.62	0.62	0.02	0.03	0.03	0.03	0.03	0.03	0.04	0.05	0.06	0.07	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.02	91	274
334	-1	43.4	48.0	100.9	95.7	0.75	0.75	0.75	0.75	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.05	0.06	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.02	0.02	91	274
335	-1	44.9	48.0	97.0	104.4	0.75	0.75	0.75	0.75	0.03	0.03	0.04	0.04	0.05	0.05	0.05	0.06	0.06	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.02	0.03	91	274
336	-1	43.4	48.0	104.9	101.7	0.58	0.58	0.75	0.75	0.04	0.04	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.05	0.04	0.03	0.02	0.01	0.02	0.03	0.03	91	274
337	-1	47.2	37.3	109.5	77.2	0.75	0.75	0.75	0.75	0.05	0.06	0.07	0.07	0.08	0.08	0.07	0.06	0.05	0.04	0.04	0.03	0.02	0.02	0.02	0.03	0.03	0.04	91	274
338	-1	45.9	26.6	87.9	91.3	0.75	0.75	0.28	0.28	0.07	0.08	0.08	0.09	0.09	0.09	0.07	0.06	0.04	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.06	0.07	91	274
339	-1	43.4	23.5	77.0	78.0	0.75	0.75	0.22	0.22	0.05	0.05	0.06	0.06	0.06	0.06	0.05	0.05	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	91	274
340	-1	43.4	37.0	83.4	87.6	0.75	0.75	0.62	0.62	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	91	274
341	-1	40.8	36.6	101.6	98.4	0.75	0.75	0.62	0.62	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.04	0.05	0.05	0.04	0.04	0.03	0.03	0.03	0.03	0.02	91	274
342	-1	40.0	42.5	104.2	94.3	0.31	0.31	0.62	0.62	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.04	0.05	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.02	0.02	91	274
343	-1	44.5	43.1	93.0	87.2	0.53	0.53	0.64	0.64	0.02	0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.05	0.05	0.04	0.03	0.03	0.02	0.01	0.01	0.02	0.02	91	274
344	-1	43.4	48.0	77.2	78.9	0.75	0.75	0.75	0.75	0.03	0.03	0.03	0.04	0.04	0.04	0.05	0.05	0.06	0.06	0.05	0.04	0.03	0.02	0.01	0.02	0.02	0.02	91	274
345	-1	42.2	45.6	97.1	85.7	0.69	0.69	0.69	0.69	0.04	0.03	0.03	0.03	0.03	0.03	0.04	0.05	0.05	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	91	274
346	-1	42.6	40.0	110.5	110.5	0.75	0.75	0.38	0.38	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.04	91	274
347	-1	40.6	46.6	116.0	118.6	0.69	0.69	0.50	0.50	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.05	0.06	0.07	0.06	0.05	0.04	0.03	0.03	0.03	0.03	0.03	91	274
348	-1	42.7	48.0	106.	92.3	0.7	0.7	0.7	0.7	0.03	0.04	0.04	0.04	0.05	0.05	0.05	0.06	0.06	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.03	0.03	91	274

Seg #	DynSh	TT Elev LB	TT Elev RB	CI Dist LB	CI Dist RB	SRF LB1	SRF LB2	SRF RB1	SRF RB2	TOPO 1	TOPO 2	TOPO 3	TOPO 4	TOPO 5	TOPO 6	TOPO 7	TOPO 8	TOPO 9	TOPO 10	TOPO 11	TOPO 12	TOPO 13	TOPO 14	TOPO 15	TOPO 16	TOPO 17	TOPO 18	SRFJD1	SRFJD2
				7		5	5	5	5																				
349	-1	44.7	48.0	82.6	97.1	0.75	0.75	0.75	0.75	0.04	0.05	0.05	0.06	0.06	0.07	0.06	0.06	0.06	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.03	0.03	91	274
350	-1	41.5	48.0	129.1	123.0	0.50	0.50	0.75	0.75	0.08	0.10	0.11	0.12	0.13	0.12	0.10	0.07	0.05	0.03	0.03	0.03	0.03	0.03	0.04	0.05	0.06	0.07	91	274
351	-1	63.6	48.0	91.9	93.4	0.75	0.75	0.44	0.44	0.10	0.11	0.13	0.14	0.15	0.14	0.11	0.08	0.05	0.02	0.03	0.04	0.05	0.05	0.06	0.07	0.08	0.09	91	274
352	-1	51.8	42.9	96.8	99.6	0.69	0.69	0.36	0.36	0.08	0.09	0.10	0.11	0.12	0.11	0.09	0.08	0.06	0.04	0.04	0.04	0.04	0.04	0.05	0.06	0.07	0.08	91	274
353	-1	43.4	48.0	94.2	90.5	0.75	0.75	0.75	0.75	0.05	0.05	0.05	0.06	0.06	0.06	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	91	274
354	-1	43.4	48.0	132.6	111.8	0.75	0.75	0.75	0.75	0.04	0.04	0.04	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.05	0.04	0.04	91	274
355	-1	42.3	48.0	149.0	150.4	0.75	0.75	0.75	0.75	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	91	274
356	-1	43.4	48.0	138.6	133.7	0.75	0.75	0.75	0.75	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	91	274
357	-1	38.3	48.0	141.2	118.7	0.50	0.50	0.75	0.75	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	91	274
358	-1	42.1	48.0	141.0	116.0	0.69	0.69	0.75	0.75	0.05	0.05	0.05	0.05	0.06	0.06	0.05	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	91	274
359	-1	33.1	45.6	131.3	119.4	0.36	0.36	0.69	0.69	0.07	0.08	0.08	0.09	0.10	0.11	0.10	0.09	0.09	0.08	0.07	0.06	0.04	0.03	0.03	0.04	0.05	0.06	91	274
360	-1	30.9	38.9	104.6	84.9	0.53	0.53	0.69	0.69	0.09	0.10	0.11	0.13	0.14	0.14	0.14	0.13	0.12	0.11	0.09	0.07	0.05	0.03	0.03	0.04	0.06	0.07	91	274
361	-1	25.9	47.5	113.3	92.2	0.62	0.62	0.75	0.75	0.08	0.09	0.09	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.09	0.08	0.07	0.05	0.05	0.06	0.06	0.07	91	274
362	-1	25.9	48.0	139.9	145.1	0.75	0.75	0.75	0.75	0.07	0.08	0.09	0.09	0.10	0.10	0.10	0.09	0.09	0.08	0.07	0.06	0.05	0.04	0.04	0.05	0.06	0.06	91	274
363	-1	25.9	48.0	146.9	169.7	0.75	0.75	0.75	0.75	0.08	0.09	0.10	0.11	0.12	0.12	0.10	0.09	0.07	0.06	0.05	0.05	0.04	0.03	0.04	0.05	0.06	0.07	91	274
364	-1	42.6	44.2	160.2	187.6	0.61	0.61	0.75	0.75	0.07	0.08	0.08	0.09	0.09	0.09	0.08	0.07	0.06	0.05	0.04	0.04	0.04	0.04	0.05	0.05	0.06	0.06	91	274
365	-1	41.2	44.2	160.4	136.3	0.68	0.68	0.75	0.75	0.09	0.10	0.11	0.11	0.12	0.12	0.10	0.08	0.06	0.04	0.04	0.04	0.04	0.05	0.05	0.06	0.07	0.08	91	274
366	-1	49.6	44.2	114.7	91.3	0.69	0.69	0.75	0.75	0.07	0.07	0.08	0.08	0.08	0.08	0.07	0.05	0.04	0.03	0.03	0.04	0.04	0.05	0.05	0.06	0.06	0.06	91	274
367	-1	55.4	44.2	98.4	79.6	0.75	0.75	0.75	0.75	0.11	0.12	0.13	0.15	0.16	0.15	0.12	0.09	0.06	0.04	0.04	0.05	0.05	0.06	0.07	0.08	0.09	0.10	91	274
368	-1	46.5	44.2	124.3	102.3	0.62	0.62	0.75	0.75	0.13	0.14	0.15	0.17	0.18	0.17	0.13	0.10	0.07	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.12	91	274
369	-1	62.8	33.6	126.1	129.2	0.58	0.58	0.47	0.47	0.12	0.14	0.15	0.16	0.17	0.16	0.12	0.09	0.06	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	91	274
370	-1	45.9	33.0	94.5	103.0	0.56	0.56	0.44	0.44	0.14	0.15	0.16	0.16	0.17	0.16	0.12	0.09	0.05	0.02	0.04	0.06	0.08	0.10	0.11	0.12	0.13	0.13	91	274
371	-1	50.1	44.7	152.3	133.2	0.67	0.67	0.75	0.75	0.15	0.16	0.16	0.17	0.18	0.16	0.12	0.09	0.05	0.01	0.04	0.06	0.08	0.11	0.12	0.13	0.14	0.14	91	274
372	-1	58.2	38.3	164.7	165.0	0.75	0.75	0.75	0.75	0.16	0.17	0.18	0.18	0.19	0.18	0.14	0.10	0.06	0.02	0.05	0.07	0.09	0.12	0.13	0.14	0.15	0.15	91	274
373	-1	50.3	26.6	89.0	96.4	0.75	0.75	0.44	0.44	0.16	0.17	0.17	0.18	0.19	0.17	0.13	0.09	0.06	0.02	0.04	0.07	0.09	0.12	0.13	0.14	0.15	0.15	91	274
374	-1	53.5	30.8	49.1	58.7	0.50	0.50	0.38	0.38	0.12	0.12	0.12	0.11	0.11	0.10	0.08	0.06	0.04	0.01	0.04	0.06	0.09	0.11	0.12	0.12	0.12	0.12	91	274

Seg #	DynSh	TT Elev LB	TT Elev RB	CI Dist LB	CI Dist RB	SRF LB1	SRF LB2	SRF RB1	SRF RB2	TOPO 1	TOPO 2	TOPO 3	TOPO 4	TOPO 5	TOPO 6	TOPO 7	TOPO 8	TOPO 9	TOPO 10	TOPO 11	TOPO 12	TOPO 13	TOPO 14	TOPO 15	TOPO 16	TOPO 17	TOPO 18	SRFJD1	SRFJD2
375	-1	56.8	43.7	66.6	62.1	0.64	0.64	0.64	0.64	0.18	0.17	0.15	0.14	0.13	0.11	0.09	0.06	0.04	0.02	0.07	0.11	0.16	0.21	0.23	0.22	0.20	0.19	91	274
376	-1	38.8	34.2	79.8	73.7	0.41	0.41	0.44	0.44	0.18	0.16	0.15	0.13	0.12	0.10	0.09	0.07	0.06	0.04	0.09	0.13	0.18	0.22	0.24	0.22	0.21	0.19	91	274
377	-1	47.4	43.4	115.0	111.3	0.56	0.56	0.69	0.69	0.21	0.20	0.19	0.17	0.16	0.14	0.11	0.09	0.06	0.03	0.08	0.13	0.18	0.23	0.25	0.24	0.23	0.22	91	274
378	-1	43.9	35.4	202.4	165.0	0.58	0.58	0.50	0.50	0.23	0.23	0.23	0.22	0.22	0.20	0.16	0.11	0.07	0.03	0.07	0.12	0.17	0.21	0.23	0.23	0.23	0.23	91	274
379	-1	55.2	40.8	194.8	157.4	0.75	0.75	0.75	0.75	0.23	0.23	0.23	0.23	0.23	0.20	0.16	0.11	0.06	0.02	0.07	0.12	0.16	0.21	0.24	0.24	0.23	0.23	91	274
380	-1	53.7	40.8	186.7	160.2	0.75	0.75	0.75	0.75	0.23	0.23	0.22	0.21	0.21	0.19	0.15	0.11	0.07	0.04	0.09	0.14	0.19	0.24	0.26	0.25	0.25	0.24	91	274
381	-1	50.3	29.0	196.5	181.9	0.75	0.75	0.53	0.53	0.22	0.21	0.20	0.20	0.19	0.17	0.14	0.11	0.08	0.05	0.10	0.14	0.18	0.23	0.25	0.24	0.23	0.22	91	274
382	-1	46.9	24.6	202.4	208.3	0.75	0.75	0.75	0.75	0.21	0.20	0.19	0.18	0.17	0.15	0.14	0.12	0.10	0.08	0.13	0.17	0.21	0.25	0.26	0.25	0.24	0.23	91	274
383	-1	49.7	37.3	203.0	223.0	0.69	0.69	0.78	0.78	0.18	0.16	0.14	0.13	0.11	0.10	0.11	0.12	0.12	0.13	0.15	0.18	0.21	0.24	0.24	0.22	0.21	0.19	91	274
384	-1	31.7	33.1	210.0	199.5	0.56	0.56	0.56	0.56	0.14	0.12	0.11	0.10	0.08	0.08	0.10	0.12	0.13	0.15	0.16	0.17	0.18	0.20	0.20	0.18	0.17	0.15	91	274
385	-1	29.2	27.0	179.3	139.4	0.31	0.31	0.39	0.39	0.11	0.10	0.09	0.08	0.07	0.08	0.10	0.12	0.15	0.17	0.17	0.16	0.16	0.16	0.15	0.14	0.13	0.12	91	274
386	-1	30.5	26.1	114.9	117.8	0.56	0.56	0.31	0.31	0.07	0.06	0.05	0.05	0.04	0.05	0.08	0.10	0.13	0.16	0.15	0.13	0.12	0.11	0.10	0.09	0.08	0.08	91	274
387	-1	36.4	25.9	115.3	126.5	0.75	0.75	0.25	0.25	0.03	0.04	0.04	0.04	0.04	0.05	0.07	0.10	0.12	0.14	0.11	0.09	0.06	0.04	0.03	0.03	0.03	0.03	91	274
388	-1	33.8	26.0	133.9	146.1	0.75	0.75	0.33	0.33	0.06	0.07	0.07	0.08	0.09	0.10	0.10	0.11	0.11	0.12	0.10	0.08	0.05	0.03	0.03	0.03	0.04	0.05	91	274
389	-1	36.4	28.5	136.7	155.1	0.75	0.75	0.78	0.78	0.06	0.07	0.08	0.09	0.09	0.10	0.11	0.12	0.12	0.13	0.11	0.08	0.06	0.03	0.02	0.03	0.04	0.05	91	274
390	-1	36.4	42.1	145.8	158.5	0.75	0.75	0.75	0.75	0.06	0.07	0.08	0.09	0.10	0.10	0.10	0.11	0.11	0.11	0.09	0.07	0.06	0.04	0.03	0.04	0.05	0.06	91	274
391	-1	33.8	27.0	159.1	156.2	0.69	0.69	0.81	0.81	0.06	0.07	0.07	0.08	0.09	0.10	0.10	0.11	0.12	0.12	0.10	0.08	0.06	0.03	0.03	0.03	0.04	0.05	91	274
392	-1	34.9	25.4	151.0	150.9	0.75	0.75	0.88	0.88	0.05	0.06	0.07	0.07	0.08	0.09	0.11	0.12	0.14	0.15	0.12	0.09	0.06	0.03	0.01	0.02	0.03	0.04	91	274
393	-1	34.9	24.7	122.1	121.5	0.75	0.75	0.91	0.91	0.04	0.05	0.05	0.06	0.07	0.08	0.11	0.13	0.16	0.18	0.14	0.11	0.07	0.03	0.02	0.02	0.03	0.03	91	274
394	-1	24.0	24.1	134.1	115.7	0.58	0.58	0.44	0.44	0.06	0.07	0.08	0.08	0.09	0.10	0.12	0.13	0.15	0.16	0.13	0.10	0.07	0.04	0.03	0.03	0.04	0.05	91	274
395	-1	32.2	22.9	172.0	165.8	0.75	0.75	0.31	0.31	0.08	0.09	0.09	0.09	0.10	0.11	0.12	0.13	0.14	0.16	0.14	0.11	0.09	0.07	0.06	0.07	0.07	0.08	91	274
396	-1	30.2	16.9	229.2	230.8	0.75	0.75	0.12	0.12	0.09	0.09	0.09	0.09	0.09	0.09	0.11	0.13	0.15	0.16	0.15	0.13	0.11	0.09	0.09	0.09	0.09	0.09	91	274
397	1																												
398	1																												
399	-1	39.9	31.8	40.2	55.4	0.75	0.75	0.47	0.47	0.07	0.05	0.04	0.03	0.02	0.01	0.01	0.01	0.02	0.02	0.04	0.06	0.09	0.11	0.12	0.10	0.09	0.08	91	274
400	-1	39.9	39.9	47.1	61.1	0.75	0.75	0.69	0.69	0.07	0.06	0.05	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.04	0.06	0.09	0.11	0.11	0.10	0.09	0.08	91	274
401	-1	39.9	39.9	32.3	49.5	0.75	0.75	0.75	0.75	0.07	0.06	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.04	0.06	0.08	0.10	0.11	0.10	0.09	0.08	91	274
402	-1	39.9	39.9	33.5	37.7	0.7	0.7	0.7	0.7	0.05	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.04	0.05	0.07	0.08	0.08	0.07	0.07	0.06	91	274

Seg #	DynSh	TT Elev LB	TT Elev RB	CI Dist LB	CI Dist RB	SRF LB1	SRF LB2	SRF RB1	SRF RB2	TOPO 1	TOPO 2	TOPO 3	TOPO 4	TOPO 5	TOPO 6	TOPO 7	TOPO 8	TOPO 9	TOPO 10	TOPO 11	TOPO 12	TOPO 13	TOPO 14	TOPO 15	TOPO 16	TOPO 17	TOPO 18	SRFJD1	SRFJD2
						5	5	5	5																				
403	-1	39.9	39.9	51.3	40.7	0.75	0.75	0.75	0.75	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.03	91	274
404	-1	39.9	39.9	54.7	42.9	0.75	0.75	0.75	0.75	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	91	274
405	-1	39.9	39.9	51.6	55.8	0.75	0.75	0.75	0.75	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	91	274
406	-1	39.9	34.8	60.1	64.1	0.36	0.36	0.58	0.58	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	91	274
407	1																												