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Prepared in cooperation with the Vancouver Lake Watershed Partnership

Discharge, Water Temperature, and Selected Meteorological Data for Vancouver Lake, Vancouver, Washington, Water Years 2011–13

Data Series 849

U.S. Department of the Interior
U.S. Geological Survey

Cover: Photograph showing temporary weather station at Vancouver Lake site 2 near Vancouver Lake, Washington. (Photograph taken by Rich Sheibley, U.S. Geological Survey.)

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Conversion Factors

Inch/Pound to SI

Multiply	By	To obtain
	Length	
inch (in.)	2.54	centimeter (cm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Area	
square foot (ft^2)	0.09290	square meter (m^2)
	Flow rate	
foot per second (ft/s)	0.3048	meter per second (m/s)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)

SI to Inch/Pound

Multiply	By	To obtain
	Flow rate	
meter per second (m/s)	3.281	foot per second (ft/s)
millimeter (mm)	0.03937	inch (in.)

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

$$°F = (1.8 \times °C) + 32.$$

Datums

Vertical coordinate information is referenced to National Geodetic Vertical Datum of 1929 (NGVD 29).

Horizontal coordinate information is referenced to North American Datum of 1983 (NAD 83).

Abbreviations and Acronyms

ADAPS	USGS Automated Data Processing System
ADCP	Acoustic Doppler Current Profilers
ADVM	Acoustic Doppler Velocity Meter
DCP	data collection platform
GOES	Geostationary Operational Environmental Satellite
HDR	high data rate
N	nitrogen
P	phosphorus
Partnership	Vancouver Lake Watershed Partnership
PSI	peak stage indicator
RH	relative humidity
USGS	U.S. Geological Survey

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Abstract

The U.S. Geological Survey partnered with the Vancouver Lake Watershed Partnership in a 2-year intensive study to quantify the movement of water and nutrients through Vancouver Lake in Vancouver, Washington. This report is intended to assist the Vancouver Lake Watershed Partnership in evaluating potential courses of action to mitigate seasonally driven blooms of harmful cyanobacteria and to improve overall water quality of the lake. This report contains stream discharge, lake water temperature, and selected meteorological data for water years 2011, 2012, and 2013 that were used to develop the water and nutrient budgets for the lake.

Introduction

Vancouver Lake is located on a historical flood plain on the eastern bank of the Columbia River, near Vancouver, Washington (fig. 1). A water-quality survey done by the University of Washington in 1968 showed that excess concentrations of natural and anthropogenic nitrogen (N) and phosphorus (P) have degraded overall water quality and precipitated the formation of harmful algal blooms (Bhagat and Funk, 1968). As recently as September 4, 2013, Vancouver Lake was closed to recreational activity because of a rapid increase in cyanobacteria (*Anabaena* and *Aphanizomenon* spp.) (Washington State Department of Health, 2013). These genera have been identified by the Washington State Department of Health as potentially dangerous to humans (Bollens and Bollens, 2009).

Degradation of water quality and the presence of algal blooms began shortly after the construction of a flood control structure that isolated Vancouver Lake from its major source of fresh water, the Columbia River. Scientific evidence of degraded water quality from the 1950s and 1960s resulted in an evaluation of Vancouver Lake by Washington State University, with the goal of providing the Port of Vancouver with a lake management strategy to improve the overall "health" of the lake (Bhagat and others, 1968). A follow-up feasibility study (Stevens, Thompson, and Runyan, Inc., 1973) resulted in the construction of a flushing channel and the dredging of the lake, both of which were completed in 1983. The Flushing Channel reconnected the lake with the Columbia River, and the dredging deepened the lake to reduce fish mortality during hot summer months, improved tidal flow, and removed sediments suspected of providing the nutrient base for cyanobacteria (Knutsen and Cardwell, 1984). These actions provided only a short-term solution to the water quality issues. A lake survey by the Washington Department of Ecology in 1990 reported a trophic index of 65 (eutrophic) in relation to total P concentration, and the lowest seasonal (summer) mean water clarity of the 70 lakes included in the study (Rector and Hallock, 1993).

In 2004, the Vancouver Lake Watershed Partnership (Partnership), a multi-agency public/private consortium, was created to provide clear environmental management objectives for the lake and surrounding wetlands. Low daily water turnover rates and long water residency times (U.S. Army Corps of Engineers, 1990), coupled with data indicating the likelihood of continued cyanobacteria blooms (Bollens and Bollens, 2009), led the Partnership to commission a scientific study of the water and nutrient sources to Vancouver Lake. As a result, the U.S. Geological Survey (USGS) did a 2-year comprehensive study to define the water and nutrient budget for the lake.

Purpose and Scope

This report presents discharge, water temperature, and meteorological data from six sites within the Vancouver Lake watershed. Site locations, methods, and assessments of data quality also are included in this report. This information was collected in support of the development of a water and nutrient budget for the lake for water years 2011 to 2013.

Base from U.S. Geological Survey digital data, 1:50,000, and World Imagery from ArcGIS.com. Map projection: State Plane Washington South, FIPS 4602; horizontal datum is North American Datum of 1983

Figure 1. Vancouver Lake study area, Vancouver, Washington.

Methods and Site Descriptions

Three types of data were collected for this study: (1) stream discharge data, (2) lake water temperature data, and (3) selected meteorological data (table 1).

Discharge

Data were obtained from streamgages (fig. 2) operated for the study period. Discharge measurements were made by USGS personnel using Price AA, FlowTracker Handheld ADV® current velocity meters and Teledyne RD Instruments Acoustic Doppler Current Profilers (ADCP), according to standard USGS techniques (Rantz, 1982a; Mueller and Wagner, 2009). These measurements, in combination with continuous stage data collected at streamflow-gaging stations, were used to develop discharge ratings to calculate discharge based on stage-discharge or index-velocity relations. Using the ratings, corrections to gage heights (or "stage") based on reference streamgage comparisons, and scour and fill shifts to the ratings, final records of daily mean streamflow were produced according to USGS standards (Rantz, 1982b; Levesque and Oberg, 2012).

Flushing Channel Streamgage

Located on the southwest shore of Vancouver Lake, roughly 0.8 mi from the Columbia River (fig. 2, table 1), the streamgage at Flushing Channel at Vancouver Lake, at Vancouver, Wash. (USGS site No. 14144805) consisted of a high data rate (HDR) Geostationary Operational Environmental Satellite (GOES) satellite-telemetered data-collection platform (DCP) combined with a transducer to provide continuous (every 15 minutes) gage height and an acoustic Doppler velocity meter (ADVM) "up-looker" to provide mean channel velocity. Velocity data were averaged over 1 minute and recorded at 15 minute intervals. The transducer and ADVM were installed inside one of two 84-in.-diameter inlet pipes, about 15 ft from the mouth that empties into Vancouver Lake. Inflow was regulated by tides and releases from dams upstream on the Columbia River. No diversions were present along the channel. Flow into Vancouver Lake was controlled by tide flap gates approximately 90 ft upstream of the velocity meter. As lake levels recede below the level of the Columbia River, the head differential opens the gate and the lake is filled. When the head difference is greater on the lake side, the gate is closed and flow is stopped. Both pipes are at the same elevation and were assumed to maintain the same flow characteristics. Observations by divers at various stages indicated that the pipes remained full at all times during the study period and gage height was not used in the computation of the record.

Measurements were made at the inlet and the outlet of the pipes using both acoustic Doppler current profiler ADCP and conventional current meter techniques at various times throughout the study period.

Discharge was calculated using measured velocity multiplied by the area of the pipe. The area of the two pipes was determined to be 76.97 ft^2, based on the standard equation for the area of a circular pipe, and doubled to represent flow from two pipes. Daily mean discharge was then calculated as an average of the total daily discharges for the entire study period.

Table 1. Study sites at Vancouver and Ridgefield, Washington, 2010–13.

[Site locations are shown in figure 2. **Latitude and longitude**: In degrees, minutes, and seconds; referenced to National Geodetic Vertical Datum of 1929. USGS, U.S. Geological Survey]

USGS site name	USGS site No.	Latitude	Longitude	Site type
Flushing Channel near Vancouver Lake, at Vancouver, Washington	14144805	45°40'08"	122°44'37"	Discharge
Burnt Bridge Creek near mouth, at Vancouver, Washington	14211902	45°40'31"	122°41'33"	Discharge
Vancouver Lake site 2 near Vancouver, Washington	14211925	45°40'27"	122°45'51"	Weather station
Vancouver Lake site 3 near Vancouver, Washington	14211929	45°40'22"	122°44'24"	Temperature buoy
Vancouver Lake site 1 near Vancouver, Washington	14211940	45°41'18"	122°42'18"	Temperature buoy
Lake River at Ridgefield, Washington	14213090	45°42'12"	122°43'10"	Discharge

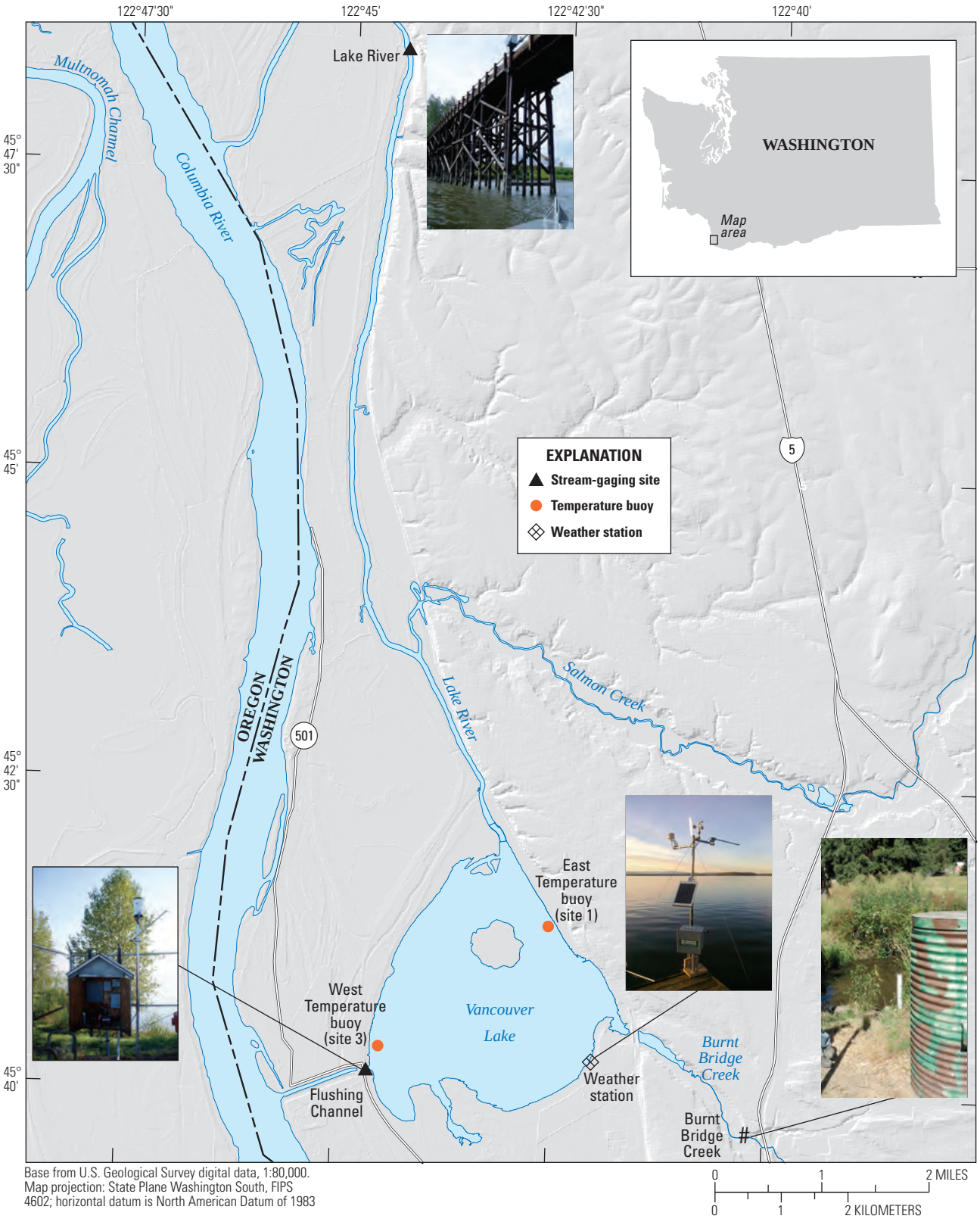

Figure 2. Streamgaging stations, water-temperature measurement sites, and temporary weather station at and near Vancouver Lake, Washington.

Burnt Bridge Creek Streamgage

Located about 1.5 mi upstream from its inlet into Vancouver Lake (fig. 2, table 1), the streamgage at Burnt Bridge Creek near mouth, at Vancouver, Wash. (14211902) consisted of an HDR GOES satellite telemetered DCP combined with a shaft encoder to provide continuous (15 minute) gage-height data. The streamgage was housed in a 3-ft-diameter corrugated metal well with an intake to maintain communication with the creek. A staff gage at the intake served as base reference for gage height or "stage." Maximum and minimum peak stage indicators (PSI clips) were installed for high and low stage verification.

Flow at the streamgage at low to medium-flow conditions was controlled by a broad, large riffle about 10 ft downstream of the streamgage. At higher flows, steep channel banks with scattered trees and brush and bridge abutments controlled gage heights. Both controls were stable, although the riffle control is subject to sediment and debris changes. There was no regulation or diversions upstream of the streamgage. A large wetland was located between the streamgage and the final inflow to the lake. Measurements were made in the immediate vicinity of the streamgage. Both ADCP and conventional measurement techniques with a Price AA velocity meter were used at various times throughout the study period.

Differences between recorded gage heights and reference sensors resulted in the application of gage-height corrections, as necessary, to adjust the record to agree with the base reference streamgage. A stage-discharge rating was developed based on the gage height at the time discharge measurements were made. Stage-shift changes to ratings, applied per USGS standards (Rantz, 1982b), were made periodically to account for minor changes in the stage-discharge rating. Daily mean discharge was calculated from recorded gage heights (15 minute intervals), the stage-discharge rating, and, if necessary, with applied gage-height corrections and applicable stage-shifts for the entire study period.

Lake River Streamgage

Located 7.8 mi north of the outlet to Vancouver Lake and 2.0 mi southeast of the Columbia River (fig. 2, table 1), the streamgage at Lake River at Ridgefield, Wash. (14213090) consisted of an HDR GOES satellite telemetered DCP combined with a radar stage sensor that provided gage-height data and a side-looking ADVM that provided continuous (15 minute) velocity data. Velocity data were averaged over 1 minute and also recorded at 15 minute intervals. The DCP was housed in a gage house clamped onto the southern bridge rail, referred to as the upstream side of the bridge, along with the radar unit and wire-weight gage, serving as base gage-height reference. The ADVM was attached to a sliding mount on a bridge pier directly downstream of the gage house and monitored mid-channel velocity in a 30 ft span between bridge piers.

Flow at the Lake River streamgage was bidirectional, and streamflow was controlled by tide level in conjunction with regulated releases from the Bonneville Dam that affect the Columbia River stage near the study area. This flow regime determined the level of Vancouver Lake and subsequent outflow through Lake River. Positive measured velocities refer to flow out of Vancouver Lake from south to north and toward the Columbia River. Negative velocities correspond to flow into Vancouver Lake from north to south and are affected by tides. Positive flow is referenced as downstream and negative flow as upstream.

The Lake River channel acted as the control for all stages and in both directions of flow. Both banks were covered with brush and trees and the left (west) bank was subject to overflow at higher gage heights. The bridge piers were susceptible to catching logs and other debris, and these conditions were reflected in the quality of the discharge measurement ratings. Because the river was continuously in flux, gage height and velocity recording intervals were increased during measurement periods to provide more detailed information. Measurements were made with an ADCP from the upstream and downstream sides of the bridge, depending on flow characteristics.

This streamgage was operated as an index-velocity station according to USGS standards (Levesque and Oberg, 2012), whereby gage height is converted to channel cross-sectional area by use of a stage-area rating based on a surveyed cross-section. The recorded (index) velocity was adjusted to reflect the mean velocity of the channel based on ADCP measured velocities to create an index-velocity rating. Based on surveyed cross-sectional area, an equation was used to define the stage-area relation.

$$\text{Area} = 6.3397 \times \left(6.6949 + \text{gage height}\right)^2 + 85.956. \quad (1)$$

The index-velocity rating was developed based on the comparison of mean channel velocity (measured discharge divided by the rated area) to the index velocity as measured by the ADVM. A compound linear rating was used to describe the relation between the two. Two straight lines were used to define the negative and positive flows. Negative and positive velocities as much as 1.14 ft/s were defined using the equation:

$$\text{velocity} = 0.9045 \times \text{measured} - \text{velocity}; R^2 = 0.99. \quad (2)$$

Velocities from 1.14 to 2.70 ft/s were defined by a different straight line equation:

$$\text{vel} = 0.3408 \times \text{measured} - \text{velocity} + 0.6889; R^2 = 0.15. \quad (3)$$

Daily mean discharge then was calculated using rated area and velocity information for the study period.

Water Temperature

Water temperature of the lake was measured at two temperature buoys (Vancouver Lake site 1 and near Flushing Channel at site 3) and at the weather station at Vancouver Lake site 2 (fig. 2, table 1). These sites were selected to best represent the thermal and spatial variations in Vancouver Lake. Six Hobo Tibitemp© sensors were fixed to a weighted line at 1 ft intervals, measured from the water surface, and suspended beneath a polystyrene float. The sensors were programmed to collect temperature data at 5 minute intervals. Data were uploaded into the USGS Automated Data Processing System (ADAPS) database. These measured values were then used to calculate a lake-wide average daily value for temperature at each depth interval during the course of the study.

Meteorological Data

Precipitation

Located at the Flushing Channel streamgaging station, a tipping bucket-type precipitation sensor was mounted on a 15-ft-tall pedestal with no overhead obstructions within a 100 ft radius. The precipitation gage interfaced with the HDR DCP to provide precipitation data in inches of rain. Daily precipitation totals were calculated to 0.01 in. Inspections of the precipitation gauge were made on every site visit and the instrument was cleaned and oiled when necessary. Precipitation data were downloaded from the DCP and the precipitation gage tested and calibrated yearly according to USGS requirements (U.S. Geological Survey, 2005).

Air Temperature

Air temperature was measured using a combination temperature and relative humidity probe mounted in a 6-in. radiation shield provided by the manufacturer. Air temperature was one of five parameters monitored by the temporary weather station installed at site 2 (fig. 2). Data were collected at 5 minute intervals and stored on a DCP. The logger was downloaded monthly and the data were uploaded into ADAPS. These measured values were then used to calculate an average daily value for temperature at this site during the period of study.

Relative Humidity

Relative humidity (RH) was measured as part of the combination temperature and relative humidity probe. RH was calculated using the relation between measured vapor pressure and the saturation vapor pressure, expressed as a percentage. Data were collected at 5 minute intervals and stored on the weather station's DCP. Measured values were uploaded into ADAPS from the weather station logger and average daily unit values were calculated for the period of study.

Wind Speed and Direction

Wind speed and direction were measured using the Campbell Scientific© Met One 034B Windset directional anemometer. Directional measurements were referenced to true north and indicate the azimuth along which the wind is moving. Data were collected at 5 minute intervals and stored on the weather station's DCP, with measured wind speeds less than 0.9 m/s being recorded as 0. Measured values were uploaded into ADAPS from the weather station logger and average daily values were calculated for the period of study.

Net Solar Radiation

Solar and far infrared radiation data were collected using a Campbell Scientific© NR-LITE Net Radiometer attached to the weather station by a leveling bracket and a 4 ft extension arm. This arrangement allowed the downward-facing radiometer to be positioned directly over the water to better capture the return radiation from the lake. Net solar radiation is defined as the difference between the energy received from the hemisphere (upward-looking sensor) and the energy released by the water surface. Net measurements were collected at 5 minute intervals and stored on the weather station's DCP. Measured values were adjusted to accommodate wind speeds greater than 5 m/s with the following formula:

$$Rn,cor = Rn,obs \times \left(1.0 + A \times \left(U - 5.0 \quad \right)\right) \tag{4}$$

where

Rn,cor is net radiation corrected for wind speed,
Rn,obs is net radiation not corrected for wind speed,
U is horizontal wind speed in meters per second, and
A is empirical constant derived from data = 0.021286.

Net solar radiation measured during wind speeds of less than 5 m/s did not require the application of a correction. Values were uploaded into ADAPS from the weather station logger and average daily values were calculated for the period of the study.

Discharge Data

A station analysis of the discharge computation data for each individual streamgage is provided and quality of the discharge measurements and the computed daily discharge are rated. The USGS assigns accuracy to streamflow measurements based on the equipment, character of the measurement section, number of observations, stability of stage, wind conditions, and the accuracy of depth and velocity

measurements (Rantz, 1982a, p. 179). Accuracy ratings of "good" indicate that the measurements are judged to be within 5 percent of true values. Ratings of "fair" indicate that the measurements are judged to be within 8 percent of true values. Ratings of "poor" indicate that the measurements are judged not to be within 8 percent of true values. Streamflow measurements combined with continuous gage height and velocity data produced the daily mean discharge record for each streamgage for the study period. The USGS also assigns similar accuracy (good, fair, or poor) to discharge records depending on the overall condition of the record. Tables of daily mean discharge at all streamgages are provided in table 2 (at back of report).

Flushing Channel

The DCP and ADVM provided a complete velocity record (15 minute data) for the study period, except from November 30 to December 1, 2010, December 26 to 28, 2010, January 26 to 31, 2011, and January 12 to 17 and 26 to 30, 2012, when the streamgage was not operating and no data were recorded.

Discharge measurements at the site were difficult to obtain. Deep, boiling, turbulent, uneven flow was present at the outlet of the pipes and visibly stagnant, low subsurface velocity, debris-laden flow was present at the inlet. Several measurements were made in at these locations, none of which matched well with the mathematically calculated discharge.

A boat measurement with a rigid-mounted ADCP was made on the lake, downstream of the flushing channel outlet pipes, with some difficulty. This measurement was rated poor and verified calculated discharge within 13 percent. A measurement also was made on the upstream side of the pipe, about 75 ft upstream of the flushing channel inlet, using a tethered ADCP. This measurement was rated poor due to the low velocity of the water and large volume of woody debris at the inlet. However, measured discharge was 5 percent higher than calculated discharge based on recorded velocity. When lake levels were low enough, a Price AA velocity meter was used at the outlet of Flushing Channel, at the immediate interface of the pipe and the lake. Multiple point velocities were recorded and averaged across the transect to obtain a mean velocity. An attempt was made during later visits to establish the area of the outlet of the pipe using several different methods. The area measured using a long wading rod (13.95 ft^2) correlated well with measurements obtained by divers (13.27 ft^2). Using these area measurements and previous transect mean velocity, the measured discharge was between 3 and 8 percent greater than the recorded, calculated discharge. It was discovered during the dive that the outlet of the pipe was constricted by concrete and the area was not representative of the area inside the pipe where the ADVM was located.

Most visits during the study period did not allow for communication with the ADVM and routine beam checks or other diagnostics to be run. However, one beam check was run, and signal-to-noise ratio values and other beam data showed good correlation between beams throughout the study period. This correlation was assumed for the entire study period.

Based on the correlation of the measurements to the calculated values, the computed discharge was considered reasonable and was used directly as calculated from the velocity readings for the entire study period. Estimates of streamflow during periods of missing gage height record were based on trend of flow and comparison with nearby streamgaging stations where applicable.

Measured discharges for the study period ranged from 77.1 to 137 ft^3/s and were within 13 percent of calculated discharge from the ADVM. Computed instantaneous discharge ranged from 0.00 to 204 ft^3/s for water year 2011 and from 0.00 to 231 ft^3/s for water year 2012. Daily mean discharge (table 2) was obtained using the methods above, and the overall record quality was rated fair.

Burnt Bridge Creek

The DCP provided a complete gage height record for the study period. At several times during the period, the stilling well communicated poorly with the river. Based on inspections and flushing of well intakes, corrections (from -0.05 to +0.30 ft) were used to bring recorded gage heights into agreement with base streamgage readings. The maximum recorded stage (6.59 ft) was reasonably verified by a PSI clip reading (6.54 ft). The minimum recorded stage (4.81 ft) was verified by a PSI clip reading (4.78 ft).

Nineteen discharge measurements were made during the study period, and measurement ratings ranged from poor to good. The stage-discharge relation was developed based on all measurements, and shifts were applied appropriately based on the shift required by a discharge measurement to be in agreement with the rating. When a discharge measurement indicated that scour had occurred on the control, positive shifts were prorated on the rise of large peaks that occurred prior to that discharge measurement. When a discharge measurement indicated that fill had occurred on the control, negative shifts were prorated on the recession of peaks that occurred prior to that discharge measurement.

Measured discharges for the study period ranged from 6.65 to 124 ft^3/s and verified the rating, either direct or with shifts applied, to within 6.5 percent. Computed discharge ranged from 6.3 to 211 ft^3/s over the study period. A fair hydrographic comparison was made with the USGS streamgage at Canyon Creek near Heisson, Wash. (14219000) (data not shown). Daily mean discharge (table 2) was obtained using the methods above, and the overall record quality was considered fair with no estimated daily discharges.

Lake River

The DCP and ADVM provided a complete velocity record for the study period except from February 25 to April 27, 2011, when the ADVM mount was damaged and no velocity data were obtained. The gage-height record was complete for the entire study period. Gage height corrections of as much as +0.10 ft were applied during the study period to bring recorded values into agreement with base gage height reference. There was good correlation between the wire-weight gage, base reference, and radar at most visits during the study period. The maximum (20.43 ft) and minimum (5.72 ft) recorded gage height for the study period were reasonably verified based on comparisons made between the radar and the ADVM records.

Diagnostics of the ADVM gathered during site visits showed good beam correlation across the 30 ft cell range, and anomalies noticed in the beams likely represented trees and other obstructions moving through the channel for short periods of time. Analysis of the blanking distance, the first few cells from the face of the ADVM of multi-cell data, indicated that the blanking distance was not set based on measured flow disturbance apparent in cells close to the ADVM. Although no correction to the data was applied per Levesque and Oberg (2012), this disturbed area represented a small percentage of the overall measured velocity. Because only single cell data were collected for half of the study period and no blanking distance correction was applied, range-averaged velocity was used instead of multi- or single-cell velocity.

Analysis of the beam data also showed the potential for alignment, beam, and orientation issues of the ADVM or possible subsurface currents at angles not perpendicular to the ADVM. These factors can have an adverse effect on the overall velocity rating, especially during flow reversals, and were reflected in the rating of the record quality.

The maximum (1.59 ft/s) and minimum velocity (-2.27 ft/s) recorded for the period was not verified, but was assumed reasonable.

A total of 58 discharge measurements were made during the study period. Measurement conditions were good, with steady, even flow across the channel. Floating debris was noted at times during the study period, as well as occasional debris lodged on the bridge piers toward the left (west) and right (east) sides of the bridge. Measurements were downgraded appropriately based on these conditions. No wading measurements could be made. Boat ADCP measurements were made periodically, although generally, tethered ADCP boat measurements were made on upstream and downstream sides of the bridge.

The discharge rating was separated into two ratings, stage-area and index-velocity. Based on the surveyed cross-section, the stage-area rating was considered good and no shifts or corrections were made for the entire study period.

The compound velocity rating indicated good correlation from -2.50 to 1.14 ft/s ($R^2 = 0.99$). However, the upper end, from 1.14 to 2.70 ft/s, defined with a separate linear rating indicated poor correlation ($R^2 = 0.15$), likely due to noise introduced to the rating as the velocity changed direction. Velocities in this upper range represented only 14.8 percent of the total record. The lower end of the rating does not show the same “rating noise” and indicated that differing channel dynamics were the major influence for this noticeable difference.

Based on the measurement ratings and channel conditions, no shifts were applied to the velocity rating and both ratings were used directly as calculated for the entire period.

No velocity estimates were made to the data for February 25 through April 27, 2011, when the ADVM was damaged, as analysis of downstream streamgages showed no correlation between the USGS streamgage and comparison streamgages. Based on this, these data are considered missing and were not estimated.

Measured discharges for the study period ranged from -2,770 to 2,890 ft^3/s and 66 percent of the measurements verified the rating within 10 percent. Computed discharge was from -7,460 to 4,410 ft^3/s for 2011 and from -6,820 to 4,540 ft^3/s for 2012. A fair hydrographic comparison (high and low stage) was made with the National Oceanic and Atmospheric Administration (NOAA) Tide Data at Saint Helens, Wash. (9439201) (data not shown). No reliable velocity comparison were possible, nor did velocity correlate well with nearby streamgages. Daily mean discharge (table 2) was obtained using the methods described above, and overall record quality was considered fair with no estimated daily discharges except velocities greater than 1.14 ft/s, which are considered poor.

Water Temperature

The thermistors installed at the East (site 1) and West (site 3) temperature buoys and at the weather station (fig. 2) provided a complete record for the study period from the surface to -3 ft below the surface, except for December 19, 2011, to January 24, 2012, at -1, -2, and -3 ft below the surface depths. These data were overwritten by the thermistor after its internal memory capacity was exceeded and subsequently not included in the record. Records from the lake surface to -3 ft below the surface in depth for water years 2011, 2012, and 2013 are considered excellent.

Lake temperature measurements were obtained at the weather station, and sites 1 and 3, at -4 and -5 ft below the surface depths, but do not provide a complete record for the study period. Numerous problems at these depths included instrument failure, loss, and movement. Foremost among these problems were the vertical movement of the dock where the weather station thermistors were attached, and the burying of the thermistor chain attached to the floats at sites 1 and 3, both caused by the large changes in lake stage throughout the study period. At low stage, thermistors at -4 and -5 ft below the surface depths often were buried in lake sediment,

insulating them from the surrounding waters. Recovery of these buried instruments was sometimes impossible and data were lost. Sample values that were recorded at these depths were evaluated and those determined to be unreasonable or erroneous were not included in the record. Because of the numerous periods of missing data, the quality of this record for water years 2011 and 2012 is considered poor at best. No data was collected at these depths for water year 2013.

Lake temperatures were averaged across the three temperature sites for each depth, and tables of average daily temperatures at each depth are provided in table 3 (at back of report). Temperature data indicated a homogenous body of water with little evidence of stratification.

Meteorological Data

Precipitation

The DCP provided a complete precipitation record for the study period, except from November 30 to December 1, 2010, December 26 to 29, 2010, January 25 to 31, 2011, January 11 to 18 and 25 to 31, 2012, when no data were collected. The maximum recorded daily precipitation of 1.36 in. on February 28, 2011, 2.21 in. on November 22, 2011, and 0.82 in. on October 12, 2012, seem to be reasonable when compared to the nearby (4.5 mi) NOAA precipitation station in Vancouver, Wash. (Vancouver 4 NNE, Index Number 8773). The precipitation gage operated well for the entire study period and all calibrations tests were within acceptable tolerance and considered good. Overall record quality was considered good except for October 1–11, 2011, which is fair due to a plugged cone. Daily precipitation totals for the entire study period are provided in table 4 (at back of report).

Air Temperature

The DCP provided a complete record of air temperature for the period of the study, except for February 25–May 17, 2012, when the datalogger was not functioning correctly, and from September 20, 2012 to end of study, after the weather station was decommissioned. Daily mean temperatures for the study period coincide well with the NOAA weather station in Vancouver, Wash. (Vancouver 4 NNE, Index Number 8773), and ranged from -4.0 °C on November 24, 2010, to 25.3 °C on August 16, 2012, during the study period (table 4). The thermistor responded well to the daily fluctuations of temperature throughout the study period and recorded values correlate well with check measurements made during site visits (data not shown). Overall, the recorded data quality for water years 2011 and 2012 are considered good. No data were collected in 2013.

Relative Humidity

The CR800 datalogger provided a complete record of RH for the study period except for February 23–May 16, 2012, when the datalogger was not functioning correctly, and from September 20, 2012, to end of study, after the weather station was decommissioned (table 4). Additional, intermittent losses of RH data occurred in the winter months when average temperature values were equal to or less than 4 °C and the calculated RH value exceeded 100 percent. RH values measured at the NOAA weather station in Vancouver, Wash. (Vancouver 4 NNE, Index Number 8773) are comparable with RH at the weather station (data not shown). Overall, the recorded data quality for water years 2011 and 2012 is considered excellent. No data were collected during water year 2013.

Wind Speed and Direction

The directional anemometer installed on the weather station provided a complete record for the duration of the study, except for February 23–May 16, 2012, when the datalogger was not functioning. Directional data were also lost from November 23 to December 21, 2010, due to a damaged wind vane. Daily mean wind speeds ranged from 1.1 m/s on January 6, 2011, to 11.0 m/s on July 6, 7, and 28, 2011 (table 4), and compared well with data collected at the NOAA weather station in Vancouver, Wash. (Vancouver 4 NNE, Index Number 8773) (data not shown). Winds measured at the weather station primarily were from the west, between 2 and 4 m/s. Data contained in this record for water years 2011 and 2012 are considered to be of excellent quality. No data was collected in water year 2013.

Net Solar Radiation

The CR800 series datalogger recorded a complete record of net solar radiation for the duration of the study, with the exception of February 23–May 16, 2012, when the datalogger was not functioning correctly. Additional periods of missing record on October 4 and November 23, 2011, and again on January 18, 2012, are attributed to debris blocking the sensor's view of the water surface. The seasonal trend of increasing net values throughout the water year, with a sustained peak from June through August, is mirrored in hourly cloud cover data collected at the NOAA weather station in Vancouver, Wash. (Vancouver 4 NNE, Index Number 8773) (data not shown). Overall, the quality of this record is considered excellent for water years 2011 and 2012. No data was collected in water year 2013. Daily mean net solar radiation values are given in table 4.

Conclusions

This report provides a summary of the discharge, water temperature, and selected meteorological data collected as part of the Vancouver Lake Nutrient Budget Project. Discharge data for the three streamgages showed varying flow regimes. Flushing Channel near Vancouver Lake, at Vancouver, Wash. (14144805) was a semi-regulated, tidally influenced pair of constricted pipes; Burnt Bridge Creek near mouth, at Vancouver, Wash. (14211902) was an unregulated stream channel; and Lake River at Ridgefield, Wash. (14213090) exhibited tidally influenced bi-directional flow. Temperatures measured at varying depths indicate that Vancouver Lake is a homogenous body of water, and exhibits little evidence of stratification. Winds measured at the weather station primarily were from the west, between 2 and 4 meters per second. Discharge data included in this report will be used to calculate nutrient loads into and out of Vancouver Lake. The same discharge record will be combined with lake temperature and meteorological measurements to determine an overall water budget for the lake.

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Data Tables

Table 2. Daily Mean Discharge for Flushing Channel, Burnt Bridge Creek, and Lake River, at and near Vancouver, Washington, Water Years 2011–13

Daily mean discharge at Flushing Channel near Vancouver Lake, Washington (14144805), water year 2011.

DISCHARGE, IN CUBIC FEET PER SECOND, MEAN VALUES

[e, estimated; ac-ft, acre-foot]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	43	50	e42	75	84	98	112	87	148	158	95	48
2	42	47	49	36	46	91	124	101	148	158	80	30
3	44	38	53	68	42	67	127	71	146	141	50	31
4	43	41	43	63	44	50	121	83	147	141	57	32
5	56	42	48	31	39	51	127	85	145	114	55	40
6	66	41	39	16	28	61	116	63	144	117	40	43
7	73	51	38	25	34	62	104	74	135	119	44	53
8	60	40	41	21	63	81	84	65	145	131	81	59
9	60	34	42	36	87	92	91	90	141	127	65	67
10	49	25	49	37	69	128	113	97	135	120	55	58
11	25	14	43	35	51	112	101	93	136	106	76	56
12	31	14	77	88	81	117	95	78	137	97	87	57
13	33	19	74	88	55	83	93	106	142	86	64	57
14	39	26	101	77	64	88	86	122	137	89	39	49
15	27	27	104	92	105	95	81	117	141	110	56	42
16	25	40	75	123	88	111	85	135	137	82	73	43
17	28	43	5.9	146	61	115	78	137	139	61	63	34
18	34	52	36	121	55	119	105	130	134	76	55	40
19	47	51	73	117	44	94	101	130	127	82	66	36
20	52	57	79	109	39	57	98	131	123	80	41	35
21	50	33	61	78	39	52	80	141	129	77	42	38
22	50	34	66	76	46	30	96	136	148	81	37	45
23	46	34	62	106	53	67	77	143	151	70	52	50
24	52	27	57	100	48	69	79	148	160	78	77	68
25	44	31	56	99	16	57	89	156	168	82	87	74
26	36	38	e58	e99	32	61	88	146	148	80	61	72
27	29	31	e63	e108	60	62	95	148	152	76	62	75
28	32	23	e72	e120	85	65	92	140	151	73	67	63
29	26	29	81	e131	---	55	81	146	148	61	51	56
30	28	e35	69	e116	---	99	65	149	145	73	65	59
31	30	---	103	e99	---	112	---	156	---	64	66	---
Total	1300	1067	1859.9	2536	1558	2501	2884	3604	4287	3010	1909	1510
Mean	41.9	35.6	60	81.8	55.6	80.7	96.1	116	143	97.1	61.6	50.3
Max	73	57	104	146	105	128	127	156	168	158	95	75
Min	25	14	5.9	16	16	30	65	63	123	61	37	30
Ac-ft	2580	2120	3690	5030	3090	4960	5720	7150	8500	5970	3790	3000

SUMMARY STATISTICS

	Water Year 2011	
Annual total	28,025.9	
Annual mean	76.8	
Highest daily mean	168	Jun 25
Lowest daily mean	5.9	Dec 17
Annual runoff (ac-ft)	55,590	

Daily mean discharge at Flushing Channel near Vancouver Lake, Washington (14144805), water year 2012.

DISCHARGE, IN CUBIC FEET PER SECOND, MEAN VALUES

[e, estimated; ac-ft, acre-foot]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	39	31	7.8	77	65	26	140	133	89	141	104	44
2	32	44	14	29	36	37	143	151	88	134	78	32
3	46	46	21	31	41	64	151	140	93	120	74	28
4	40	39	31	72	50	49	140	150	110	101	70	35
5	53	42	42	64	53	72	104	132	109	123	69	44
6	38	47	54	43	51	51	101	135	116	129	54	54
7	35	44	51	38	61	65	132	124	140	112	56	36
8	38	45	57	39	50	51	114	119	120	92	37	36
9	54	55	49	56	42	61	79	114	125	96	48	26
10	74	49	52	53	50	49	52	119	114	109	38	27
11	78	58	44	74	48	60	80	117	115	130	38	44
12	49	46	35	e67	41	72	105	129	124	134	82	59
13	46	51	36	e64	41	88	87	125	122	126	95	61
14	61	38	33	e64	53	77	102	101	124	142	61	71
15	57	29	36	e65	33	92	96	111	129	129	48	79
16	42	45	22	e64	49	116	102	112	133	138	78	68
17	30	66	27	e68	50	114	115	104	117	145	63	60
18	39	40	33	80	64	99	122	130	129	116	68	66
19	36	28	36	159	46	86	127	134	135	107	53	62
20	30	42	44	159	68	82	124	113	152	110	56	56
21	40	65	50	145	64	71	123	113	137	140	57	41
22	66	95	56	119	90	114	119	97	123	148	46	31
23	63	106	63	86	90	95	139	120	140	122	52	36
24	53	49	67	93	59	105	149	114	131	121	36	40
25	64	37	74	87	33	111	143	107	155	91	50	47
26	72	27	57	e80	28	94	176	111	156	93	44	42
27	50	40	64	e77	47	91	156	83	156	115	57	56
28	61	37	75	e75	64	119	160	86	153	77	63	67
29	53	20	73	e71	53	129	143	78	132	82	53	68
30	33	15	110	e78	---	155	137	94	138	93	59	43
31	26	---	64	73	---	165	---	86	---	102	56	---
Total	1498	1376	1477.8	2350	1520	2660	3661	3582	3805	3618	1843	1459
Mean	48.3	45.9	47.7	75.8	52.4	85.8	122	116	127	117	59.5	48.6
Max	78	106	110	159	90	165	176	151	156	148	104	79
Min	26	15	7.8	29	28	26	52	78	88	77	36	26
Ac-ft	2970	2730	2930	4660	3010	5280	7260	7100	7550	7180	3660	2890

SUMMARY STATISTICS

	Water Year 2012	
Annual total	28,849.8	
Annual mean	78.8	
Highest daily mean	176	Apr 26
Lowest daily mean	7.8	Dec 1
Annual runoff (ac-ft)	57,220	

Daily mean discharge at Flushing Channel near Vancouver Lake, Washington (14144805), partial water year 2013.

DISCHARGE, IN CUBIC FEET PER SECOND, MEAN VALUES

[ac-ft, acre-foot]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	38	31	---	---	---	---	---	---	---	---	---	---
2	37	27	---	---	---	---	---	---	---	---	---	---
3	45	26	---	---	---	---	---	---	---	---	---	---
4	46	20	---	---	---	---	---	---	---	---	---	---
5	38	17	---	---	---	---	---	---	---	---	---	---
6	29	21	---	---	---	---	---	---	---	---	---	---
7	33	26	---	---	---	---	---	---	---	---	---	---
8	41	55	---	---	---	---	---	---	---	---	---	---
9	47	54	---	---	---	---	---	---	---	---	---	---
10	45	46	---	---	---	---	---	---	---	---	---	---
11	49	51	---	---	---	---	---	---	---	---	---	---
12	49	76	---	---	---	---	---	---	---	---	---	---
13	46	66	---	---	---	---	---	---	---	---	---	---
14	54	---	---	---	---	---	---	---	---	---	---	---
15	69	---	---	---	---	---	---	---	---	---	---	---
16	71	---	---	---	---	---	---	---	---	---	---	---
17	44	---	---	---	---	---	---	---	---	---	---	---
18	43	---	---	---	---	---	---	---	---	---	---	---
19	42	---	---	---	---	---	---	---	---	---	---	---
20	30	---	---	---	---	---	---	---	---	---	---	---
21	32	---	---	---	---	---	---	---	---	---	---	---
22	38	---	---	---	---	---	---	---	---	---	---	---
23	38	---	---	---	---	---	---	---	---	---	---	---
24	40	---	---	---	---	---	---	---	---	---	---	---
25	43	---	---	---	---	---	---	---	---	---	---	---
26	55	---	---	---	---	---	---	---	---	---	---	---
27	58	---	---	---	---	---	---	---	---	---	---	---
28	44	---	---	---	---	---	---	---	---	---	---	---
29	70	---	---	---	---	---	---	---	---	---	---	---
30	54	---	---	---	---	---	---	---	---	---	---	---
31	40	---	---	---	---	---	---	---	---	---	---	---
Total	1408	---	---	---	---	---	---	---	---	---	---	---
Mean	45.4	---	---	---	---	---	---	---	---	---	---	---
Max	71	---	---	---	---	---	---	---	---	---	---	---
Min	29	---	---	---	---	---	---	---	---	---	---	---
Ac-ft	2790	---	---	---	---	---	---	---	---	---	---	---

Daily mean discharge at Burnt Bridge Creek near Mouth at Vancouver, Washington (14211902), water year 2011.

DISCHARGE, IN CUBIC FEET PER SECOND, MEAN VALUES

[ac-ft, acre-foot; Cfsm, cubic feet per second per square mile; in., inch]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	9.4	44	49	46	26	66	38	30	22	15	12	9.1
2	9.2	42	39	39	25	63	42	29	23	15	12	8.9
3	9.1	30	31	34	25	55	37	28	23	14	12	8.7
4	8.9	22	26	31	24	53	40	27	22	14	11	8.7
5	8.7	19	24	33	23	55	54	26	21	14	11	8.7
6	8.7	22	23	36	24	52	51	27	20	13	11	8.6
7	8.7	39	25	33	26	45	46	32	20	13	11	8.4
8	8.4	28	52	31	26	40	43	50	19	13	11	8.4
9	19	31	82	30	24	39	37	42	18	13	11	8.4
10	36	36	94	28	23	52	35	35	18	13	11	8.4
11	26	27	123	26	22	54	37	32	18	13	11	8.4
12	17	24	104	34	25	53	36	36	18	13	11	8.4
13	13	23	75	54	35	52	32	30	18	14	10	8.4
14	12	40	89	54	36	53	40	27	17	14	10	8.4
15	11	33	77	52	49	53	71	43	17	13	10	8.4
16	10	27	60	72	52	55	83	50	16	14	10	8.7
17	9.7	42	50	62	47	55	84	39	16	25	9.7	8.8
18	9.7	79	47	55	36	55	73	32	16	25	9.7	9.5
19	11	61	46	55	33	54	61	28	18	17	9.7	9.8
20	10	52	56	52	30	51	50	26	17	15	9.7	9.3
21	10	43	50	56	27	46	42	24	16	14	9.4	9
22	10	41	42	56	25	43	36	24	16	14	9.4	8.7
23	12	38	37	51	25	38	30	23	15	13	9.4	8.7
24	52	32	33	44	27	44	28	23	15	13	9.4	8.4
25	58	27	31	39	28	46	33	24	15	13	9.3	8.4
26	44	26	34	36	26	48	39	28	15	13	9.1	9.1
27	30	28	38	33	24	50	39	27	15	13	9	11
28	26	27	68	31	32	43	40	29	15	13	8.4	12
29	28	24	92	30	---	44	41	26	15	12	8.6	11
30	23	50	64	28	---	55	35	23	15	12	9.3	9.6
31	31	---	53	27	---	46	---	23	---	12	9.1	---
Total	579.5	1057	1714	1288	825	1558	1353	943	529	442	314.2	270.3
Mean	18.7	35.2	55.3	41.5	29.5	50.3	45.1	30.4	17.6	14.3	10.1	9.01
Max	58	79	123	72	52	66	84	50	23	25	12	12
Min	8.4	19	23	26	22	38	28	23	15	12	8.4	8.4
Ac-ft	1150	2100	3400	2550	1640	3090	2680	1870	1050	877	623	536
Cfsm	0.68	1.28	2	1.51	1.07	1.82	1.63	1.1	0.64	0.52	0.37	0.33
In.	0.78	1.42	2.31	1.74	1.11	2.1	1.82	1.27	0.71	0.6	0.42	0.36

SUMMARY STATISTICS

	Water Year 2011	
Annual total	10,873	
Annual mean	29.8	
Highest daily mean	123	Dec 25
Lowest daily mean	8.4	Oct 8
Annual runoff (ac-ft)	21,570	
Annual runoff (cfsm)	1.08	
Annual runoff (in.)	14.65	

Daily mean discharge at Burnt Bridge Creek near Mouth at Vancouver, Washington (14211902), water year 2012.

DISCHARGE, IN CUBIC FEET PER SECOND, MEAN VALUES

[ac-ft, acre-foot; Cfsm, cubic feet per second per square mile; in., inch]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	9.1	14	22	38	34	40	77	26	16	16	9.7	7.5
2	9.1	13	20	29	31	38	59	25	17	15	9.7	7.5
3	9.7	19	19	24	28	31	49	46	16	14	9.7	7.5
4	11	19	18	23	27	27	47	48	19	14	9.3	7.4
5	13	16	18	24	25	30	54	38	43	14	9.1	7.2
6	15	15	17	22	25	31	53	30	25	13	9.1	7.2
7	13	13	17	23	24	25	42	26	34	13	8.7	7.2
8	12	12	16	21	24	23	36	24	34	12	8.9	6.9
9	11	11	16	20	28	22	32	23	32	12	8.9	6.9
10	14	11	16	28	28	21	30	21	22	12	8.7	7.1
11	18	13	15	23	29	29	32	21	19	12	8.7	7.2
12	18	16	15	20	25	37	41	20	18	12	8.7	6.9
13	16	15	15	19	25	80	32	19	17	12	8.7	6.9
14	15	15	14	19	25	64	28	19	16	11	8.4	6.9
15	14	14	15	20	24	101	26	18	15	11	8.4	6.9
16	14	23	15	18	23	73	40	18	15	11	8.4	6.9
17	13	30	14	23	27	63	38	17	15	11	8.2	6.9
18	12	28	14	67	35	51	34	17	15	11	8	6.9
19	12	22	14	132	31	42	37	17	15	11	8.5	6.9
20	12	17	14	128	28	46	44	17	14	11	8.6	6.9
21	12	19	14	102	35	70	34	24	14	11	8.3	6.9
22	12	111	14	73	39	76	29	25	15	11	8.1	6.9
23	12	100	13	62	35	61	26	21	29	11	8	6.9
24	12	70	13	70	29	46	25	27	26	11	7.8	6.9
25	12	53	13	67	34	38	24	29	17	10	7.8	6.9
26	12	38	13	58	33	33	30	38	21	10	7.8	6.9
27	11	35	16	47	29	31	32	35	21	10	7.7	6.7
28	11	40	42	39	28	31	27	23	16	10	7.5	6.6
29	12	30	45	36	40	47	24	18	15	10	7.5	6.6
30	13	25	65	45	---	103	27	17	15	10	7.5	6.6
31	15	---	54	40	---	91	---	16	---	10	7.5	---
Total	394.9	857	626	1360	848	1501	1109	763	606	362	261.9	209.6
Mean	12.7	28.6	20.2	43.9	29.2	48.4	37	24.6	20.2	11.7	8.45	6.99
Max	18	111	65	132	40	103	77	48	43	16	9.7	7.5
Min	9.1	11	13	18	23	21	24	16	14	10	7.5	6.6
Ac-ft	783	1700	1240	2700	1680	2980	2200	1510	1200	718	519	416
Cfsm	0.46	1.04	0.73	1.59	1.06	1.75	1.34	0.89	0.73	0.42	0.31	0.25
In.	0.53	1.16	0.84	1.83	1.14	2.02	1.49	1.03	0.82	0.49	0.35	0.28

SUMMARY STATISTICS

	Calendar Year 2011		Water Year 2012	
Annual total	9,400.4		8,898.4	
Annual mean	25.8		24.3	
Highest annual mean				
Lowest annual mean				
Highest daily mean	111	Nov 22	132	Jan 19
Lowest daily mean	8.4	Aug 28	6.6	Sep 29
Annual runoff (ac-ft)	18,650		17,650	
Annual runoff (cfsm)	0.93		0.88	
Annual runoff (in.)	12.67		11.99	

Daily mean discharge at Burnt Bridge Creek near Mouth at Vancouver, Washington (14211902), water year 2013.

DISCHARGE, IN CUBIC FEET PER SECOND, MEAN VALUES

[ac-ft, acre-foot; Cfsm, cubic feet per second per square mile; in., inch]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	6.6	35	---	---	---	---	---	---	---	---	---	---
2	6.6	31	---	---	---	---	---	---	---	---	---	---
3	6.6	30	---	---	---	---	---	---	---	---	---	---
4	6.6	23	---	---	---	---	---	---	---	---	---	---
5	6.5	19	---	---	---	---	---	---	---	---	---	---
6	6.6	17	---	---	---	---	---	---	---	---	---	---
7	6.6	18	---	---	---	---	---	---	---	---	---	---
8	6.6	17	---	---	---	---	---	---	---	---	---	---
9	6.6	16	---	---	---	---	---	---	---	---	---	---
10	6.6	15	---	---	---	---	---	---	---	---	---	---
11	6.6	16	---	---	---	---	---	---	---	---	---	---
12	9.2	40	---	---	---	---	---	---	---	---	---	---
13	21	---	---	---	---	---	---	---	---	---	---	---
14	14	---	---	---	---	---	---	---	---	---	---	---
15	17	---	---	---	---	---	---	---	---	---	---	---
16	21	---	---	---	---	---	---	---	---	---	---	---
17	16	---	---	---	---	---	---	---	---	---	---	---
18	11	---	---	---	---	---	---	---	---	---	---	---
19	15	---	---	---	---	---	---	---	---	---	---	---
20	23	---	---	---	---	---	---	---	---	---	---	---
21	23	---	---	---	---	---	---	---	---	---	---	---
22	21	---	---	---	---	---	---	---	---	---	---	---
23	18	---	---	---	---	---	---	---	---	---	---	---
24	18	---	---	---	---	---	---	---	---	---	---	---
25	15	---	---	---	---	---	---	---	---	---	---	---
26	12	---	---	---	---	---	---	---	---	---	---	---
27	21	---	---	---	---	---	---	---	---	---	---	---
28	36	---	---	---	---	---	---	---	---	---	---	---
29	47	---	---	---	---	---	---	---	---	---	---	---
30	46	---	---	---	---	---	---	---	---	---	---	---
31	37	---	---	---	---	---	---	---	---	---	---	---
Total	513.7	---	---	---	---	---	---	---	---	---	---	---
Mean	16.6	---	---	---	---	---	---	---	---	---	---	---
Max	47	---	---	---	---	---	---	---	---	---	---	---
Min	6.5	---	---	---	---	---	---	---	---	---	---	---
Ac-ft	1020	---	---	---	---	---	---	---	---	---	---	---
Cfsm	0.6	---	---	---	---	---	---	---	---	---	---	---
In.	0.69	---	---	---	---	---	---	---	---	---	---	---

Daily mean discharge at Lake River at Ridgefield, Washington (14213090), water year 2011.

DISCHARGE, IN CUBIC FEET PER SECOND, MEAN VALUES

[Negative discharge values indicate net flow into Vancouver Lake, from north to south; ac-ft, acre-foot]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	106	-97	-588	1340	719	---	---	488	-54	-612	-674	149
2	207	-185	-79	1510	1060	---	---	-471	331	-1560	-235	807
3	112	33	-13	245	731	---	---	924	727	234	582	761
4	249	-220	447	154	431	---	---	94	-76	46	330	560
5	-243	-207	450	1130	654	---	---	30	180	2360	684	346
6	-563	-145	612	1460	1000	---	---	874	166	1510	833	315
7	-781	-150	204	803	744	---	---	280	770	310	636	130
8	-421	293	-33	1080	68	---	---	709	772	559	136	-56
9	-608	319	302	692	111	---	---	-120	761	473	128	-291
10	-178	675	594	851	578	---	---	-115	578	683	271	-141
11	860	1140	1390	852	543	---	---	25	298	792	-294	-151
12	627	1300	653	-546	-257	---	---	1250	543	844	-535	-116
13	625	984	754	-652	320	---	---	-1720	-150	1310	-28	-39
14	377	583	-469	450	185	---	---	-2440	-9.7	441	410	154
15	634	443	101	-43	-1210	---	---	-1680	-83	-926	56	122
16	460	67	2250	-2690	-1550	---	---	-3270	172	556	-212	126
17	373	40	2920	-4480	149	---	---	-2620	149	1300	23	474
18	182	-81	1160	-495	211	---	---	-1040	1160	604	349	462
19	-197	494	187	549	643	---	---	-22	2040	241	119	434
20	-297	163	84	2410	966	---	---	537	2130	950	653	361
21	-317	564	484	2800	866	---	---	398	1410	918	671	218
22	-293	338	183	2650	843	---	---	875	467	940	656	66
23	-246	901	492	737	564	---	---	219	432	971	397	34
24	-800	1090	635	979	528	---	---	-72	-800	716	-196	-274
25	-559	825	546	1350	---	---	---	63	-1150	455	-570	-525
26	236	160	980	2640	---	---	---	270	2180	409	-134	-597
27	676	552	1110	1010	---	---	---	-803	2080	285	-215	-593
28	547	878	-388	632	---	---	-145	-441	733	27	-436	-144
29	650	874	-536	994	---	---	783	-641	636	267	-78	-36
30	501	60	1020	1710	---	---	1720	-494	803	-363	-264	-19
31	426	---	917	775	---	---	---	-157	---	-50	-154	---
Total	2345	11691	16369	20897	---	---	---	-9070	17195	14690	2909	2537
Mean	75.6	390	528	674	---	---	---	-293	573	474	93.8	84.6
Max	860	1300	2920	2800	---	---	---	1250	2180	2360	833	807
Min	-800	-220	-588	-4480	---	---	---	-3270	-1150	-1560	-674	-597
Ac-ft	4650	23190	32470	41450	---	---	---	-17990	34110	29140	5770	5030

Daily mean discharge at Lake River at Ridgefield, Washington (14213090), water year 2012.

DISCHARGE, IN CUBIC FEET PER SECOND, MEAN VALUES

[Negative discharge values indicate net flow into Vancouver Lake, from north to south; ac-ft, acre-foot]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	336	730	1180	1140	1020	1350	282	1270	175	-440	-326	114
2	609	293	839	1780	1760	1180	851	-350	13	103	300	419
3	122	176	797	1250	1050	367	641	30	156	932	77	540
4	301	291	547	176	560	444	1930	-1340	-847	1570	81	379
5	-18	204	256	164	357	-300	3600	1290	-518	95	25	78
6	387	-20	-52	700	161	246	2770	896	-342	1.2	394	-77
7	389	121	-23	658	-165	54	102	1820	-1610	1080	565	440
8	293	94	-187	540	-184	285	1010	2180	-65	1600	975	551
9	-100	-73	17	32	148	-153	2030	2220	-194	908	779	623
10	-433	-89	-186	215	8.3	124	2510	1380	1110	673	763	402
11	-648	-357	-166	130	85	-123	1130	1510	1520	-85	761	267
12	128	15	114	355	538	-208	246	1130	985	422	-228	45
13	350	-116	125	332	631	-340	1140	971	512	680	-352	-98
14	-96	194	226	222	419	808	480	1780	741	-280	75	-303
15	18	460	224	493	817	355	1730	348	520	464	261	-539
16	335	323	564	484	488	-983	500	-639	330	-483	-570	-303
17	692	-317	428	22	348	-180	28	67	817	-567	-237	-152
18	525	226	317	-208	-92	1040	-682	-1030	-41	976	-483	-305
19	342	510	364	-2630	521	1790	-715	-1260	-340	722	87	-218
20	426	381	206	-2850	16	903	-345	482	-1360	359	-28	194
21	229	-72	-30	-1720	-42	853	-57	-142	-292	-958	-32	544
22	-116	-787	47	1250	-836	-368	158	693	556	-971	402	603
23	-67	-1560	-215	2480	-296	1070	-907	-731	-165	746	264	502
24	19	576	-301	1850	786	351	-164	-269	518	456	617	362
25	-228	1120	-588	1340	1110	258	-61	422	-906	1640	388	148
26	-635	1440	84	1440	1540	1540	-3770	551	-431	975	468	80
27	-128	784	-172	1620	933	1460	311	2230	-388	218	28	-161
28	-400	933	-719	1720	761	157	340	1850	-297	982	-221	-293
29	-285	973	-329	1600	546	-750	771	1710	1270	643	-31	-372
30	335	1100	-1630	1430	---	-3460	1120	806	94	192	-343	275
31	750	---	1370	1040	---	-4410	---	641	---	-312	-205	---
Total	3432	7553	3107	17055	12988.3	3360	16979	20516	1521	12341.2	4254	3745
Mean	111	252	100	550	448	108	566	662	50.7	398	137	125
Max	750	1440	1370	2480	1760	1790	3600	2230	1520	1640	975	623
Min	-648	-1560	-1630	-2850	-836	-4410	-3770	-1340	-1610	-971	-570	-539
Ac-ft	6810	14980	6160	33830	25760	6660	33680	40690	3020	24480	8440	7430

SUMMARY STATISTICS

	Water Year 2012	
Annual total	106,851.5	
Annual mean	292	
Highest daily mean	3600	Apr 5
Lowest daily mean	-4410	Mar 31
Annual runoff (ac-ft)	211,900	

Daily mean discharge at Lake River at Ridgefield, Washington (14213090), partial water year 2013.

DISCHARGE, IN CUBIC FEET PER SECOND, MEAN VALUES

[Negative discharge values indicate net flow into Vancouver Lake, from north to south; ac-ft, acre-foot]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	287	470	---	---	---	---	---	---	---	---	---	---
2	182	1010	---	---	---	---	---	---	---	---	---	---
3	194	800	---	---	---	---	---	---	---	---	---	---
4	199	885	---	---	---	---	---	---	---	---	---	---
5	446	827	---	---	---	---	---	---	---	---	---	---
6	459	665	---	---	---	---	---	---	---	---	---	---
7	331	570	---	---	---	---	---	---	---	---	---	---
8	79	139	---	---	---	---	---	---	---	---	---	---
9	12	111	---	---	---	---	---	---	---	---	---	---
10	71	91	---	---	---	---	---	---	---	---	---	---
11	11	-86	---	---	---	---	---	---	---	---	---	---
12	-57	-649	---	---	---	---	---	---	---	---	---	---
13	52	---	---	---	---	---	---	---	---	---	---	---
14	-172	---	---	---	---	---	---	---	---	---	---	---
15	-479	---	---	---	---	---	---	---	---	---	---	---
16	-629	---	---	---	---	---	---	---	---	---	---	---
17	120	---	---	---	---	---	---	---	---	---	---	---
18	193	---	---	---	---	---	---	---	---	---	---	---
19	185	---	---	---	---	---	---	---	---	---	---	---
20	344	---	---	---	---	---	---	---	---	---	---	---
21	322	---	---	---	---	---	---	---	---	---	---	---
22	193	---	---	---	---	---	---	---	---	---	---	---
23	283	---	---	---	---	---	---	---	---	---	---	---
24	313	---	---	---	---	---	---	---	---	---	---	---
25	265	---	---	---	---	---	---	---	---	---	---	---
26	-142	---	---	---	---	---	---	---	---	---	---	---
27	-351	---	---	---	---	---	---	---	---	---	---	---
28	-120	---	---	---	---	---	---	---	---	---	---	---
29	-758	---	---	---	---	---	---	---	---	---	---	---
30	-77	---	---	---	---	---	---	---	---	---	---	---
31	158	---	---	---	---	---	---	---	---	---	---	---
Total	1914	---	---	---	---	---	---	---	---	---	---	---
Mean	61.7	---	---	---	---	---	---	---	---	---	---	---
Max	459	---	---	---	---	---	---	---	---	---	---	---
Min	-758	---	---	---	---	---	---	---	---	---	---	---
Ac-ft	3800	---	---	---	---	---	---	---	---	---	---	---

Table 3. Daily Mean Water Temperatures for Vancouver Lake, Vancouver, Washington, Water Years 2011–12

Daily mean surface-water temperature at Vancouver Lake at Vancouver, Washington, water year 2011.

TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	---	12.3	5.9	3.8	7.1	4.3	11.4	15.3	16.4	19.9	23.4	21.0
2	---	13.3	6.2	3.6	6.6	4.7	10.9	14.6	16.3	21.2	24.1	21.0
3	---	13.4	6.6	3.5	6.6	5.2	11.1	15.2	16.9	21.2	24.4	20.7
4	---	14.1	6.7	3.2	6.7	5.4	10.5	16.1	17.8	20.9	24.1	22.3
5	---	13.6	6.5	3.1	7.2	6.7	10.5	16.0	18.9	21.0	23.9	23.1
6	---	13.5	6.2	3.5	7.8	6.8	10.5	15.2	19.0	21.5	22.8	23.2
7	---	12.8	6.4	4.1	7.7	7.2	10.5	14.7	18.4	21.2	22.7	23.8
8	---	10.6	6.5	3.7	7.8	8.1	11.4	15.2	18.0	21.0	22.3	24.2
9	---	9.6	7.1	4.1	7.5	8.1	11.7	15.4	18.4	21.1	21.5	23.3
10	---	10.3	7.2	4.4	7.0	8.8	11.2	15.9	18.3	21.8	22.4	23.8
11	---	9.1	7.0	3.4	6.8	9.1	11.2	15.4	18.5	22.0	22.6	24.8
12	---	9.1	8.0	3.8	6.8	8.9	11.8	15.7	19.0	21.4	22.4	24.3
13	---	8.7	8.4	5.5	7.5	8.8	11.3	15.8	18.4	21.1	22.1	22.2
14	---	10.1	8.8	6.6	7.4	8.8	10.7	16.5	18.4	20.8	21.9	20.5
15	---	11.2	8.5	7.4	7.2	8.9	10.6	15.6	18.3	21.8	22.4	19.9
16	---	11.0	8.2	8.5	6.7	8.7	10.8	15.3	19.1	21.6	22.5	20.0
17	---	10.1	7.6	8.7	6.5	8.5	11.5	15.4	19.1	21.0	22.5	18.8
18	---	9.2	6.7	7.8	6.2	8.3	12.1	16.3	18.6	20.9	21.9	18.1
19	---	8.5	6.2	7.6	5.9	8.7	12.6	16.8	18.7	20.8	21.6	19.3
20	---	8.0	5.9	7.3	6.0	8.3	12.6	17.3	19.6	21.8	22.2	20.5
21	---	7.0	5.7	7.2	6.4	8.5	12.1	16.7	20.4	21.3	24.6	21.2
22	---	6.4	5.7	7.4	6.3	8.7	12.7	16.3	20.0	21.4	24.0	21.7
23	---	4.3	5.8	7.3	6.1	8.7	14.3	16.5	19.8	22.0	25.0	22.4
24	---	3.4	5.8	7.4	5.7	8.7	13.5	17.2	19.6	23.3	25.4	23.3
25	---	3.6	5.9	7.4	5.4	8.9	13.2	16.7	19.3	22.7	25.0	20.5
26	---	4.1	5.8	7.5	4.7	9.2	13.2	15.8	20.6	21.9	24.8	18.8
27	---	5.0	5.9	7.6	4.2	9.1	13.0	15.7	21.0	22.0	24.5	18.3
28	---	5.2	6.2	7.2	4.4	9.1	12.6	16.2	20.9	21.7	24.6	18.0
29	---	5.5	5.6	7.7	---	9.3	13.4	15.9	20.1	22.0	23.6	18.8
30	12.0	5.5	5.0	7.7	---	9.7	13.7	16.5	19.9	22.6	22.1	18.2
31	12.0	---	4.2	7.8	---	10.6	---	16.4	---	23.1	21.2	---
Mean	---	8.8	6.5	6.0	6.4	8.2	11.9	15.9	18.9	21.6	23.2	21.2
Max	---	14.2	8.8	8.7	7.8	10.6	14.3	17.4	21.0	23.3	25.5	24.8
Min	---	3.4	4.2	3.1	4.1	4.3	10.3	14.5	16.3	19.9	21.2	18.0

Daily mean surface-water temperature at Vancouver Lake at Vancouver, Washington, water year 2012.

TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	18.2	11.6	7.3	6.6	6.3	6.0	9.6	14.7	18.1	19.7	21.8	20.0
2	17.8	10.8	7.2	6.3	6.7	6.2	9.5	14.9	18.7	19.9	21.8	19.8
3	17.1	10.7	6.2	6.7	6.3	7.3	9.5	14.2	18.4	19.9	22.3	20.5
4	16.3	10.3	5.9	6.6	6.4	8.7	9.4	14.7	18.2	19.5	23.5	20.0
5	15.3	9.7	5.2	6.9	7.0	8.1	9.7	14.7	17.6	19.7	25.5	20.3
6	14.7	9.7	4.9	6.4	6.4	8.1	9.7	15.2	17.4	20.2	25.5	21.1
7	14.5	9.5	4.8	6.3	6.0	8.6	10.3	16.9	17.4	20.6	25.5	21.6
8	15.7	9.9	4.9	6.1	6.0	8.6	10.8	17.0	17.4	21.7	24.5	22.2
9	15.8	10.3	4.4	5.9	6.5	9.3	12.0	16.6	17.0	22.4	23.7	21.7
10	15.2	10.3	3.7	5.9	6.8	9.1	12.6	15.8	16.8	22.3	22.7	20.8
11	14.9	9.4	3.7	5.4	7.3	8.7	12.3	15.9	16.6	22.2	22.9	18.9
12	15.6	8.9	3.2	4.7	7.4	8.0	12.3	17.8	16.6	22.7	23.2	17.3
13	15.2	8.9	3.1	4.5	7.4	7.7	13.6	19.2	17.2	22.6	23.7	17.5
14	14.7	9.0	3.2	4.3	7.2	7.3	13.8	19.9	17.3	22.4	24.3	18.0
15	14.5	8.6	3.6	3.9	7.3	7.8	14.8	20.5	17.3	22.3	24.7	19.4
16	14.6	8.2	4.0	3.4	6.9	8.0	13.9	---	17.6	---	25.3	19.6
17	14.8	8.3	4.6	3.3	7.1	8.1	13.5	18.2	17.9	---	25.7	19.9
18	14.5	7.8	4.5	3.3	7.1	8.3	13.4	17.9	18.9	23.3	24.9	19.7
19	14.1	7.3	4.9	4.3	7.3	8.0	12.7	17.7	18.8	23.2	23.6	19.9
20	14.3	6.7	5.0	4.6	7.3	7.9	12.9	16.8	---	22.9	23.3	19.6
21	14.2	6.5	4.9	5.0	7.7	7.6	15.1	17.2	20.7	22.9	---	18.8
22	14.7	7.6	4.6	5.0	8.6	7.8	16.5	16.8	19.1	22.6	---	17.7
23	15.4	8.9	4.2	5.0	8.5	8.1	17.1	16.2	19.2	21.9	21.3	18.1
24	15.1	8.7	4.6	5.1	8.3	8.1	15.7	16.2	19.5	21.5	20.8	18.2
25	14.2	8.5	4.8	5.3	8.2	8.8	15.6	16.1	19.8	22.1	19.8	18.8
26	13.0	8.5	4.8	5.5	7.9	9.3	15.7	16.4	19.7	22.7	20.1	18.6
27	12.5	8.2	5.2	5.3	7.4	10.0	14.9	16.4	19.6	22.7	20.2	19.1
28	12.1	8.2	6.4	5.3	6.8	9.7	16.1	16.7	19.2	22.4	20.3	20.8
29	12.4	7.8	7.0	5.3	5.9	9.6	16.6	16.6	19.2	22.7	20.9	20.2
30	12.8	7.8	7.2	5.7	---	9.9	15.3	17.2	19.1	22.6	21.0	18.8
31	12.6	---	6.7	6.1	---	9.8	---	17.4	---	22.1	20.4	---
Mean	14.7	8.9	5.0	5.3	6.9	8.3	13.2	---	---	---	---	19.6
Max	18.2	11.6	7.3	6.9	8.5	10.0	17.1	---	---	---	---	22.2
Min	12.0	6.5	3.0	3.2	5.5	6.0	9.4	---	---	---	---	17.3

Daily mean surface-water temperature at Vancouver Lake at Vancouver, Washington, partial water year 2013.

TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	17.7	---	---	---	---	---	---	---	---	---	---	---
2	17.7	---	---	---	---	---	---	---	---	---	---	---
3	16.6	---	---	---	---	---	---	---	---	---	---	---
4	15.5	---	---	---	---	---	---	---	---	---	---	---
5	14.9	---	---	---	---	---	---	---	---	---	---	---
6	14.4	---	---	---	---	---	---	---	---	---	---	---
7	15.9	---	---	---	---	---	---	---	---	---	---	---
8	15.8	---	---	---	---	---	---	---	---	---	---	---
9	15.5	---	---	---	---	---	---	---	---	---	---	---
10	15.2	---	---	---	---	---	---	---	---	---	---	---
11	15.3	---	---	---	---	---	---	---	---	---	---	---
12	13.9	---	---	---	---	---	---	---	---	---	---	---
13	13.8	---	---	---	---	---	---	---	---	---	---	---
14	14.1	---	---	---	---	---	---	---	---	---	---	---
15	14.8	---	---	---	---	---	---	---	---	---	---	---
16	15.1	---	---	---	---	---	---	---	---	---	---	---
17	15.0	---	---	---	---	---	---	---	---	---	---	---
18	15.4	---	---	---	---	---	---	---	---	---	---	---
19	14.7	---	---	---	---	---	---	---	---	---	---	---
20	14.0	---	---	---	---	---	---	---	---	---	---	---
21	13.3	---	---	---	---	---	---	---	---	---	---	---
22	12.4	---	---	---	---	---	---	---	---	---	---	---
23	11.3	---	---	---	---	---	---	---	---	---	---	---
24	10.7	---	---	---	---	---	---	---	---	---	---	---
25	---	---	---	---	---	---	---	---	---	---	---	---
26	---	---	---	---	---	---	---	---	---	---	---	---
27	---	---	---	---	---	---	---	---	---	---	---	---
28	---	---	---	---	---	---	---	---	---	---	---	---
29	---	---	---	---	---	---	---	---	---	---	---	---
30	---	---	---	---	---	---	---	---	---	---	---	---
31	---	---	---	---	---	---	---	---	---	---	---	---

Daily mean surface-water temperature at 1 foot deep, Vancouver Lake at Vancouver, Washington, water year 2011.

TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	---	---	---	---	7.1	4.4	11.1	14.8	16.4	19.8	23.3	21.0
2	---	---	---	---	6.6	4.6	10.9	14.6	16.3	20.9	23.7	21.0
3	---	---	---	---	6.3	5.1	11.0	15.0	16.8	21.2	24.1	20.5
4	---	---	---	---	6.3	5.4	10.4	15.9	17.6	20.9	24.1	21.0
5	---	---	---	---	6.8	6.3	10.4	16.0	18.7	21.0	23.8	22.4
6	---	---	---	---	7.3	6.6	10.5	15.2	18.9	21.5	22.8	22.9
7	---	---	---	---	7.6	6.9	10.4	14.7	18.4	21.2	22.7	23.2
8	---	---	---	---	7.6	7.3	11.0	15.0	18.0	21.0	22.2	23.8
9	---	---	---	---	7.5	7.9	11.3	15.3	18.3	21.1	21.5	23.2
10	---	---	---	---	6.8	8.8	10.9	15.6	18.3	21.7	22.1	23.5
11	---	---	---	---	6.5	9.1	11.2	15.4	18.4	21.8	22.5	24.1
12	---	---	---	---	6.6	8.9	11.6	15.4	18.8	21.3	22.3	24.0
13	---	---	---	---	7.1	8.7	11.2	15.8	18.3	21.1	21.9	22.2
14	---	---	---	---	7.1	8.7	10.7	16.3	18.4	20.8	21.7	20.4
15	---	---	---	---	7.1	8.9	10.6	15.6	18.2	21.6	22.3	19.7
16	---	---	---	---	6.6	8.7	10.8	15.3	18.9	21.5	22.4	19.8
17	---	---	---	---	6.2	8.5	11.3	15.4	18.9	21.1	22.5	18.7
18	---	---	---	---	6.3	8.3	11.8	16.1	18.5	20.8	21.9	18.0
19	---	---	---	---	5.9	8.6	12.4	16.7	18.6	20.8	21.6	19.0
20	---	---	---	7.3	6.1	8.3	12.5	17.1	19.3	21.5	22.1	19.6
21	---	---	---	7.1	6.3	8.5	12.1	16.6	20.2	21.3	24.1	20.5
22	---	---	---	7.3	6.2	8.6	12.6	16.3	19.9	21.3	23.9	21.0
23	---	---	---	7.2	6.1	8.6	13.9	16.4	19.7	21.9	24.3	21.6
24	---	---	---	7.3	5.7	8.7	13.4	17.0	19.6	22.7	25.2	22.6
25	---	---	---	7.3	5.4	8.7	13.2	16.7	19.2	22.6	24.9	20.5
26	---	---	---	7.3	4.7	9.0	13.1	15.8	20.3	21.8	24.7	18.8
27	---	---	---	7.3	4.1	9.0	13.0	15.7	20.8	21.9	24.5	18.2
28	---	---	---	7.2	4.5	9.1	12.6	16.1	20.8	21.7	24.3	17.9
29	---	---	---	7.6	---	9.2	13.1	15.9	20.0	22.0	23.4	18.0
30	---	---	---	7.7	---	9.7	13.6	16.3	19.8	22.6	22.1	18.1
31	---	---	---	7.5	---	10.2	---	16.3	---	23.0	21.1	---
Mean	---	---	---	---	6.3	8.0	11.7	15.8	18.8	21.5	23.0	20.8
Max	---	---	---	---	7.6	10.2	13.9	17.1	20.8	23.0	25.2	24.1
Min	---	---	---	---	4.1	4.4	10.4	14.6	16.3	19.8	21.1	17.9

Daily mean surface-water temperature at 1 foot deep, Vancouver Lake at Vancouver, Washington, water year 2012.

TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	18.1	11.6	7.3	---	6.2	6.1	9.1	14.9	19.9	21.0	22.1	21.3
2	17.7	10.8	7.1	---	6.5	6.3	9.3	15.0	19.2	21.0	22.0	20.8
3	17.0	10.6	6.5	---	6.4	7.1	9.5	14.4	19.0	20.4	22.4	20.9
4	16.3	10.2	6.1	---	6.3	8.3	9.4	14.6	18.5	20.5	23.9	20.6
5	15.3	9.7	5.5	---	6.7	8.3	9.8	14.7	17.7	22.1	26.1	21.5
6	14.7	9.4	5.3	---	6.3	8.3	10.1	15.4	18.2	22.8	26.3	22.3
7	14.5	9.6	4.9	---	6.0	8.4	10.4	17.0	17.9	22.8	25.8	24.2
8	15.2	9.9	5.2	---	5.9	8.7	10.8	17.7	17.6	23.3	24.6	24.3
9	15.6	10.6	4.9	---	6.4	9.2	11.9	17.3	17.4	24.0	23.8	22.1
10	15.2	10.5	3.8	---	6.9	9.4	12.7	16.0	18.3	23.7	22.9	21.0
11	14.9	10.0	3.8	---	7.2	8.8	12.7	15.9	20.0	23.6	23.0	18.9
12	15.3	9.5	3.5	---	7.3	8.1	12.5	17.8	20.3	24.5	23.4	17.9
13	15.1	9.0	3.5	---	7.4	7.7	13.7	19.5	19.0	24.4	23.8	20.0
14	14.6	9.2	3.3	---	7.2	7.3	13.7	20.3	19.2	25.7	24.3	21.8
15	14.5	9.0	4.0	---	7.3	7.8	14.6	20.9	21.0	24.8	24.8	21.4
16	14.5	8.5	4.0	---	6.9	8.1	14.1	21.3	22.5	23.4	26.2	20.7
17	14.7	8.3	4.6	---	7.2	8.3	13.7	20.0	22.0	24.7	27.5	21.4
18	14.3	7.8	4.3	---	7.1	8.4	13.6	19.1	20.4	23.5	25.4	22.2
19	14.1	7.5	---	---	7.2	8.2	13.2	19.6	19.6	23.6	24.5	21.4
20	14.2	6.9	---	---	7.3	8.0	13.2	19.6	20.8	23.2	23.8	19.9
21	14.2	6.4	---	---	7.8	7.7	14.7	18.1	22.2	23.7	23.1	18.8
22	14.7	7.7	---	---	8.7	7.7	16.4	16.9	21.8	22.9	22.5	19.5
23	15.3	8.7	---	---	8.7	8.1	17.7	16.4	20.5	22.1	21.7	19.3
24	14.8	8.4	---	---	8.6	8.7	16.8	16.5	20.9	21.6	20.9	19.5
25	14.1	8.5	---	5.4	8.2	9.0	15.9	16.7	20.8	22.8	20.9	19.0
26	12.9	8.4	---	5.5	7.9	9.5	15.7	17.8	20.3	23.8	21.2	18.5
27	12.4	8.3	---	5.3	7.5	9.9	15.3	17.4	21.1	23.2	21.5	18.9
28	12.1	8.3	---	5.2	6.9	9.8	16.2	17.5	21.7	22.8	22.1	20.4
29	12.2	7.8	---	5.3	6.0	9.8	16.9	18.2	22.0	23.1	22.5	20.1
30	12.6	7.8	---	5.7	---	10.0	15.7	19.2	22.1	22.7	21.9	18.7
31	12.5	---	---	6.0	---	9.5	---	20.3	---	22.3	21.1	---
Mean	14.6	9.0	---	---	7.1	8.4	13.3	17.6	20.1	23.0	23.4	20.6
Max	18.1	11.6	---	---	8.7	10.0	17.7	21.3	22.5	25.7	27.5	24.3
Min	12.1	6.4	---	---	5.9	6.1	9.1	14.4	17.4	20.4	20.9	17.9

Daily mean surface-water temperature at 1 foot deep, Vancouver Lake at Vancouver, Washington, partial water year 2013.

TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	17.6	---	---	---	---	---	---	---	---	---	---	---
2	17.6	---	---	---	---	---	---	---	---	---	---	---
3	16.3	---	---	---	---	---	---	---	---	---	---	---
4	15.4	---	---	---	---	---	---	---	---	---	---	---
5	14.8	---	---	---	---	---	---	---	---	---	---	---
6	14.4	---	---	---	---	---	---	---	---	---	---	---
7	14.7	---	---	---	---	---	---	---	---	---	---	---
8	14.8	---	---	---	---	---	---	---	---	---	---	---
9	15.1	---	---	---	---	---	---	---	---	---	---	---
10	15.1	---	---	---	---	---	---	---	---	---	---	---
11	15.0	---	---	---	---	---	---	---	---	---	---	---
12	13.9	---	---	---	---	---	---	---	---	---	---	---
13	13.7	---	---	---	---	---	---	---	---	---	---	---
14	14.0	---	---	---	---	---	---	---	---	---	---	---
15	14.7	---	---	---	---	---	---	---	---	---	---	---
16	15.0	---	---	---	---	---	---	---	---	---	---	---
17	14.9	---	---	---	---	---	---	---	---	---	---	---
18	14.9	---	---	---	---	---	---	---	---	---	---	---
19	14.6	---	---	---	---	---	---	---	---	---	---	---
20	13.9	---	---	---	---	---	---	---	---	---	---	---
21	13.2	---	---	---	---	---	---	---	---	---	---	---
22	12.3	---	---	---	---	---	---	---	---	---	---	---
23	11.2	---	---	---	---	---	---	---	---	---	---	---
24	10.6	---	---	---	---	---	---	---	---	---	---	---
25	---	---	---	---	---	---	---	---	---	---	---	---
26	---	---	---	---	---	---	---	---	---	---	---	---
27	---	---	---	---	---	---	---	---	---	---	---	---
28	---	---	---	---	---	---	---	---	---	---	---	---
29	---	---	---	---	---	---	---	---	---	---	---	---
30	---	---	---	---	---	---	---	---	---	---	---	---
31	---	---	---	---	---	---	---	---	---	---	---	---

Daily mean surface-water temperature at 2 feet deep, Vancouver Lake at Vancouver, Washington, water year 2011.

TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	---	12.2	5.9	3.9	7.1	4.4	10.9	14.4	16.1	19.6	23.2	20.9
2	---	13.0	6.2	3.7	6.5	4.6	10.8	14.4	16.1	20.5	23.5	20.9
3	---	13.2	6.6	3.6	6.4	5.1	10.9	14.9	16.6	20.7	23.8	20.4
4	---	13.0	6.7	3.3	6.5	5.3	10.4	15.7	17.5	20.6	24.0	20.3
5	---	13.5	6.6	3.3	6.7	6.1	10.4	15.8	18.2	20.8	23.6	21.9
6	---	13.4	6.3	3.5	7.3	6.5	10.4	15.2	18.5	21.3	22.7	22.6
7	---	12.9	6.4	4.2	7.6	6.9	10.4	14.7	18.4	21.2	22.6	22.8
8	---	12.3	6.5	3.8	7.6	7.0	10.9	15.0	17.9	21.0	22.1	23.6
9	---	11.3	7.1	4.2	7.4	7.9	11.1	15.2	18.2	20.9	21.4	23.0
10	---	11.0	7.2	4.6	6.9	8.7	11.0	15.4	18.0	21.3	21.8	23.4
11	---	10.5	7.1	3.5	6.6	9.0	11.1	15.3	18.2	21.4	22.3	23.6
12	---	10.2	7.9	3.8	6.6	8.8	11.4	15.3	18.5	21.2	22.3	23.7
13	---	10.2	8.3	5.4	7.1	8.6	11.1	15.7	18.1	20.9	21.8	22.1
14	---	10.1	8.8	6.5	7.3	8.7	10.6	16.2	18.3	20.8	21.6	20.4
15	---	10.6	8.5	7.1	7.1	8.9	10.6	15.5	18.0	21.4	22.1	19.7
16	---	10.9	8.3	8.5	6.6	8.7	10.7	15.2	18.4	21.5	22.3	19.6
17	---	10.1	7.7	8.6	6.4	8.5	11.2	15.3	18.6	21.0	22.3	18.7
18	---	9.3	6.7	7.8	6.2	8.3	11.6	15.6	18.4	20.8	21.8	18.0
19	---	8.5	6.3	7.6	5.9	8.5	12.1	16.1	18.4	20.7	21.5	18.8
20	---	8.0	5.9	7.3	6.0	8.3	12.4	16.4	18.8	21.1	22.0	19.2
21	---	7.1	5.7	7.2	6.2	8.4	12.0	16.2	19.4	21.2	23.6	19.9
22	---	6.5	5.7	7.3	6.3	8.6	12.4	16.0	19.4	21.2	23.7	20.5
23	---	4.4	5.8	7.2	6.0	8.5	13.6	16.1	19.3	21.8	23.6	20.8
24	---	3.5	5.9	7.3	5.7	8.7	13.4	16.6	19.2	22.5	24.9	22.0
25	---	3.6	5.9	7.3	5.3	8.7	13.1	16.4	19.0	22.3	24.7	20.4
26	---	4.1	5.9	7.3	4.7	9.0	13.0	15.7	19.7	21.8	24.6	18.8
27	---	5.1	5.9	7.2	4.1	8.9	13.0	15.6	20.2	21.8	24.4	18.2
28	---	5.2	6.2	7.2	4.5	9.0	12.5	15.8	20.5	21.6	24.2	17.9
29	---	5.5	5.6	7.5	---	9.2	12.8	15.7	19.8	21.9	23.2	17.5
30	12.1	5.5	5.1	7.6	---	9.7	13.4	16.0	19.7	22.4	22.1	18.0
31	11.8	---	4.3	7.6	---	10.1	---	16.0	---	23.0	21.0	---
Mean	---	9.2	6.5	6.0	6.4	8.0	11.6	15.6	18.5	21.3	22.9	20.6
Max	---	13.5	8.8	8.6	7.6	10.1	13.6	16.6	20.5	23.0	24.9	23.7
Min	---	3.5	4.3	3.3	4.1	4.4	10.4	14.4	16.1	19.6	21.0	17.5

Daily mean surface-water temperature at 2 feet deep, Vancouver Lake at Vancouver, Washington, water year 2012.

TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	18.0	11.6	7.1	---	6.2	6.0	9.1	14.9	19.8	21.0	22.1	20.6
2	17.7	10.7	7.0	---	6.4	6.3	9.3	14.9	19.2	20.7	22.0	20.8
3	17.0	10.6	6.4	---	6.4	6.9	9.5	14.4	19.0	20.4	22.4	20.8
4	16.3	10.2	6.0	---	6.3	8.0	9.4	14.5	18.5	20.4	23.7	20.5
5	15.3	9.7	5.5	---	6.4	8.3	9.7	14.6	17.8	22.0	25.2	21.3
6	14.7	9.3	5.2	---	6.3	8.1	10.0	15.3	18.1	22.8	25.8	22.2
7	14.5	9.5	4.9	---	6.0	8.3	10.2	16.6	17.9	22.8	25.6	23.4
8	14.8	9.8	5.1	---	5.9	8.6	10.7	17.6	17.6	23.3	24.6	24.0
9	15.5	10.5	4.8	---	6.4	9.1	11.6	17.1	17.4	24.0	23.8	22.1
10	15.2	10.4	3.9	---	6.9	9.4	12.5	15.9	18.0	23.6	22.8	21.0
11	14.9	10.0	3.9	---	7.1	8.8	12.6	15.9	19.7	23.6	23.0	19.0
12	15.1	9.4	3.5	---	7.3	8.1	12.5	17.5	20.2	24.4	23.3	17.8
13	15.1	8.9	3.5	---	7.3	7.7	13.4	19.3	19.0	24.4	23.8	19.1
14	14.5	9.1	3.4	---	7.2	7.4	13.4	20.1	19.1	25.4	24.3	20.8
15	14.4	8.9	4.0	---	7.2	7.7	14.3	20.7	20.8	24.6	24.8	21.1
16	14.4	8.5	4.1	---	7.0	8.1	14.1	21.3	22.3	23.4	25.1	20.6
17	14.5	8.3	4.6	---	7.1	8.3	13.6	19.8	21.9	24.5	26.8	20.7
18	14.2	7.8	4.2	---	7.1	8.4	13.5	19.0	20.4	23.5	25.4	21.8
19	14.0	7.4	---	---	7.1	8.1	13.1	19.5	19.6	23.3	24.3	21.2
20	14.1	6.8	---	---	7.3	8.0	13.1	19.6	20.5	23.3	23.7	19.9
21	14.2	6.4	---	---	7.7	7.7	13.7	18.2	22.2	23.5	23.1	18.8
22	14.7	7.6	---	---	8.6	7.6	15.7	16.9	21.8	22.9	22.5	18.9
23	15.2	8.7	---	---	8.6	8.0	17.5	16.5	20.4	22.1	21.7	19.2
24	14.7	8.3	---	---	8.6	8.6	16.7	16.5	20.9	21.6	20.9	19.3
25	14.0	8.4	---	5.3	8.1	9.0	15.8	16.7	20.8	22.5	20.5	19.0
26	12.8	8.4	---	5.5	7.8	9.4	15.7	17.4	20.3	23.7	21.2	18.5
27	12.4	8.3	---	5.3	7.5	9.8	15.2	17.4	21.0	23.0	21.1	18.7
28	12.0	8.2	---	5.2	6.9	9.8	16.0	17.4	21.7	22.8	21.8	19.7
29	12.1	7.8	---	5.3	6.0	9.7	16.7	17.6	21.8	23.0	22.1	20.1
30	12.5	7.7	---	5.7	---	10.0	15.6	18.8	22.0	22.7	21.9	18.8
31	12.5	---	---	6.0	---	9.4	---	20.2	---	22.3	20.9	---
Mean	14.6	8.9	---	---	7.0	8.3	13.1	17.5	20.0	22.9	23.2	20.3
Max	18.0	11.6	---	---	8.6	10.0	17.5	21.3	22.3	25.4	26.8	24.0
Min	12.0	6.4	---	---	5.9	6.0	9.1	14.4	17.4	20.4	20.5	17.8

Daily mean surface-water temperature at 2 feet deep, Vancouver Lake at Vancouver, Washington, partial water year 2013.

TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	17.7	---	---	---	---	---	---	---	---	---	---	---
2	17.6	---	---	---	---	---	---	---	---	---	---	---
3	16.2	---	---	---	---	---	---	---	---	---	---	---
4	15.4	---	---	---	---	---	---	---	---	---	---	---
5	14.8	---	---	---	---	---	---	---	---	---	---	---
6	14.4	---	---	---	---	---	---	---	---	---	---	---
7	13.9	---	---	---	---	---	---	---	---	---	---	---
8	14.2	---	---	---	---	---	---	---	---	---	---	---
9	14.6	---	---	---	---	---	---	---	---	---	---	---
10	15.1	---	---	---	---	---	---	---	---	---	---	---
11	14.9	---	---	---	---	---	---	---	---	---	---	---
12	13.9	---	---	---	---	---	---	---	---	---	---	---
13	13.8	---	---	---	---	---	---	---	---	---	---	---
14	14.1	---	---	---	---	---	---	---	---	---	---	---
15	14.8	---	---	---	---	---	---	---	---	---	---	---
16	15.1	---	---	---	---	---	---	---	---	---	---	---
17	15.0	---	---	---	---	---	---	---	---	---	---	---
18	14.7	---	---	---	---	---	---	---	---	---	---	---
19	14.7	---	---	---	---	---	---	---	---	---	---	---
20	14.0	---	---	---	---	---	---	---	---	---	---	---
21	13.3	---	---	---	---	---	---	---	---	---	---	---
22	12.4	---	---	---	---	---	---	---	---	---	---	---
23	11.3	---	---	---	---	---	---	---	---	---	---	---
24	10.7	---	---	---	---	---	---	---	---	---	---	---
25	---	---	---	---	---	---	---	---	---	---	---	---
26	---	---	---	---	---	---	---	---	---	---	---	---
27	---	---	---	---	---	---	---	---	---	---	---	---
28	---	---	---	---	---	---	---	---	---	---	---	---
29	---	---	---	---	---	---	---	---	---	---	---	---
30	---	---	---	---	---	---	---	---	---	---	---	---
31	---	---	---	---	---	---	---	---	---	---	---	---

Daily mean surface-water temperature at 3 feet deep, Vancouver Lake at Vancouver, Washington, water year 2011.

TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	---	---	---	---	6.8	4.3	10.3	14.2	15.6	19.6	23.0	20.9
2	---	---	---	---	6.3	4.5	10.1	14.3	15.5	20.3	23.2	20.9
3	---	---	---	---	6.1	5.0	10.3	15.1	16.5	20.5	23.4	20.3
4	---	---	---	---	6.2	5.2	10.1	15.8	17.6	20.5	23.8	20.1
5	---	---	---	---	6.6	6.1	10.5	15.9	18.3	20.7	23.4	22.1
6	---	---	---	---	7.1	6.5	10.4	15.1	18.6	21.2	22.5	22.5
7	---	---	---	---	7.2	6.7	10.4	14.7	18.3	21.1	22.4	22.3
8	---	---	---	---	7.3	6.9	10.5	14.9	17.9	20.9	21.9	23.5
9	---	---	---	---	7.0	7.7	10.5	15.3	18.1	20.9	21.3	23.1
10	---	---	---	---	6.2	8.5	10.6	15.5	18.0	21.1	21.4	23.4
11	---	---	---	---	5.9	8.9	10.9	15.6	18.1	21.3	22.0	23.5
12	---	---	---	---	6.0	8.7	11.4	15.2	18.4	21.1	22.1	23.7
13	---	---	---	---	7.0	8.3	11.0	15.5	18.0	20.8	21.7	21.7
14	---	---	---	---	7.0	8.6	10.6	16.3	18.2	20.7	21.4	20.2
15	---	---	---	---	7.1	8.8	10.5	15.8	17.9	21.2	21.8	19.7
16	---	---	---	---	6.7	8.6	10.6	15.3	18.2	21.4	22.3	19.7
17	---	---	---	---	6.3	8.4	11.3	15.3	18.4	21.0	22.4	18.8
18	---	---	---	---	6.3	8.2	11.5	15.3	18.3	20.8	21.7	18.0
19	---	---	---	---	5.8	8.3	11.7	15.7	18.3	20.6	21.5	18.8
20	---	---	---	7.3	5.9	8.0	12.4	16.1	18.6	20.8	22.0	19.0
21	---	---	---	7.1	6.2	8.3	12.0	16.2	19.3	21.1	23.5	19.9
22	---	---	---	7.1	6.1	8.5	12.4	16.1	19.3	21.1	23.6	20.6
23	---	---	---	7.1	6.0	8.3	13.5	16.0	19.2	21.7	23.3	20.7
24	---	---	---	7.1	5.6	8.6	13.6	16.2	19.1	22.1	25.0	22.3
25	---	---	---	7.2	5.1	8.6	13.2	16.3	18.9	22.2	24.7	20.5
26	---	---	---	7.2	4.5	9.0	13.0	15.5	19.4	21.7	24.7	18.7
27	---	---	---	7.0	4.1	8.8	13.0	15.5	19.8	21.6	24.4	18.1
28	---	---	---	7.0	4.5	8.9	12.5	15.8	20.2	21.6	24.2	18.0
29	---	---	---	7.4	---	9.1	12.6	15.7	19.7	21.8	23.1	17.4
30	---	---	---	7.5	---	9.7	13.3	15.6	19.6	22.3	21.9	17.9
31	---	---	---	7.3	---	10.0	---	15.5	---	22.8	20.9	---
Mean	---	---	---	---	6.2	7.9	11.5	15.5	18.4	21.2	22.7	20.5
Max	---	---	---	---	7.3	10.0	13.6	16.3	20.2	22.8	25.0	23.7
Min	---	---	---	---	4.1	4.3	10.1	14.2	15.5	19.6	20.9	17.4

Daily mean surface-water temperature at 3 feet deep, Vancouver Lake at Vancouver, Washington, water year 2012.

TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	18.1	11.5	7.1	---	6.2	5.9	9.1	14.9	19.7	21.0	21.9	20.4
2	17.7	10.7	7.0	---	6.3	6.3	9.3	14.9	19.2	20.6	21.8	20.5
3	17.0	10.5	6.4	---	6.4	6.8	9.5	14.4	18.9	20.4	22.3	20.6
4	16.3	10.1	6.0	---	6.3	7.8	9.4	14.5	18.5	20.3	23.2	20.4
5	15.3	9.6	5.5	---	6.3	8.2	9.6	14.5	17.8	21.7	24.5	21.0
6	14.7	9.2	5.1	---	6.3	8.1	9.9	15.3	18.0	22.8	25.2	21.9
7	14.5	9.5	4.9	---	6.0	8.2	10.2	16.0	17.9	22.8	25.3	22.8
8	14.7	9.7	5.1	---	6.0	8.5	10.7	17.5	17.7	23.3	24.4	23.5
9	15.9	10.3	4.7	---	6.4	9.1	11.4	17.0	17.4	23.9	23.6	22.0
10	15.4	10.4	3.9	---	6.8	9.4	12.3	15.9	17.7	23.5	22.6	20.8
11	15.0	10.0	4.0	---	7.1	8.9	12.6	15.9	19.0	23.5	22.9	18.8
12	15.0	9.4	3.5	---	7.2	8.1	12.5	17.0	19.9	24.3	23.2	17.5
13	15.2	8.9	3.7	---	7.3	7.7	13.3	19.0	19.0	24.3	23.7	17.7
14	14.4	9.1	3.6	---	7.2	7.4	13.4	20.0	18.9	24.8	24.0	20.0
15	14.4	9.0	4.0	---	7.2	7.8	14.1	20.5	20.5	24.3	24.6	20.6
16	14.3	8.5	4.2	---	7.0	8.1	14.1	21.2	22.0	23.3	24.6	20.3
17	14.3	8.3	4.6	---	7.2	8.3	13.7	19.7	21.8	24.1	26.1	20.3
18	14.0	7.8	4.3	---	7.1	8.4	13.6	18.6	20.4	23.3	25.2	21.0
19	14.0	7.4	---	---	7.1	8.2	13.2	19.2	19.6	22.9	23.8	20.7
20	14.0	6.7	---	---	7.2	8.0	13.2	19.5	20.0	23.1	23.5	19.8
21	14.2	6.4	---	---	7.7	7.7	13.4	18.1	22.0	23.0	22.9	18.7
22	14.7	7.6	---	---	8.6	7.4	15.2	16.9	21.7	22.8	22.4	17.9
23	15.1	8.7	---	---	8.6	8.0	17.4	16.4	20.3	21.9	21.5	18.8
24	14.5	8.3	---	---	8.6	8.6	16.6	16.5	20.9	21.5	20.8	18.8
25	13.9	8.4	---	5.3	8.2	8.9	15.9	16.6	20.8	22.0	20.2	18.8
26	12.8	8.4	---	5.5	7.9	9.4	15.7	17.1	20.3	23.1	21.0	18.3
27	12.3	8.3	---	5.3	7.5	9.9	15.2	17.3	20.9	22.5	20.8	18.1
28	12.0	8.2	---	5.2	6.9	9.8	15.7	17.3	21.6	22.6	21.5	19.0
29	12.0	7.8	---	5.3	6.0	9.8	16.5	17.3	21.2	22.6	21.8	19.9
30	12.4	7.7	---	5.7	---	10.0	15.6	18.5	21.8	22.6	21.7	18.6
31	12.5	---	---	6.0	---	9.4	---	19.9	---	22.1	20.7	---
Mean	14.5	8.9	---	---	7.0	8.3	13.0	17.3	19.8	22.7	22.9	19.9
Max	18.1	11.5	---	---	8.6	10.0	17.4	21.2	22.0	24.8	26.1	23.5
Min	12.0	6.4	---	---	6.0	5.9	9.1	14.4	17.4	20.3	20.2	17.5

Daily mean surface-water temperature at 3 feet deep, Vancouver Lake at Vancouver, Washington, partial water year 2013.

TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	17.5	---	---	---	---	---	---	---	---	---	---	---
2	17.4	---	---	---	---	---	---	---	---	---	---	---
3	16.0	---	---	---	---	---	---	---	---	---	---	---
4	15.2	---	---	---	---	---	---	---	---	---	---	---
5	14.7	---	---	---	---	---	---	---	---	---	---	---
6	14.3	---	---	---	---	---	---	---	---	---	---	---
7	13.5	---	---	---	---	---	---	---	---	---	---	---
8	13.7	---	---	---	---	---	---	---	---	---	---	---
9	14.2	---	---	---	---	---	---	---	---	---	---	---
10	14.8	---	---	---	---	---	---	---	---	---	---	---
11	14.6	---	---	---	---	---	---	---	---	---	---	---
12	13.8	---	---	---	---	---	---	---	---	---	---	---
13	13.7	---	---	---	---	---	---	---	---	---	---	---
14	13.9	---	---	---	---	---	---	---	---	---	---	---
15	14.6	---	---	---	---	---	---	---	---	---	---	---
16	14.9	---	---	---	---	---	---	---	---	---	---	---
17	14.8	---	---	---	---	---	---	---	---	---	---	---
18	14.4	---	---	---	---	---	---	---	---	---	---	---
19	14.5	---	---	---	---	---	---	---	---	---	---	---
20	13.8	---	---	---	---	---	---	---	---	---	---	---
21	13.1	---	---	---	---	---	---	---	---	---	---	---
22	12.3	---	---	---	---	---	---	---	---	---	---	---
23	11.1	---	---	---	---	---	---	---	---	---	---	---
24	10.6	---	---	---	---	---	---	---	---	---	---	---
25	---	---	---	---	---	---	---	---	---	---	---	---
26	---	---	---	---	---	---	---	---	---	---	---	---
27	---	---	---	---	---	---	---	---	---	---	---	---
28	---	---	---	---	---	---	---	---	---	---	---	---
29	---	---	---	---	---	---	---	---	---	---	---	---
30	---	---	---	---	---	---	---	---	---	---	---	---
31	---	---	---	---	---	---	---	---	---	---	---	---

Daily mean surface-water temperature at 4 feet deep, Vancouver Lake at Vancouver, Washington, water year 2011.

TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	---	---	---	---	7.0	4.4	10.7	13.8	16.3	19.8	22.6	20.6
2	---	---	---	---	6.5	4.6	10.7	14.0	16.2	20.3	22.7	20.7
3	---	---	---	---	6.1	5.1	10.7	14.6	16.6	20.7	22.8	20.3
4	---	---	---	---	6.2	5.3	10.4	15.3	17.4	20.7	23.2	20.0
5	---	---	---	---	6.4	5.9	10.4	15.5	18.3	20.9	23.0	20.8
6	---	---	---	---	6.8	6.4	10.4	15.1	18.5	21.4	22.5	21.4
7	---	---	---	---	7.4	6.7	10.4	14.7	18.3	21.2	22.3	21.8
8	---	---	---	---	7.5	6.9	10.8	14.8	17.9	20.9	21.8	22.4
9	---	---	---	---	7.3	7.9	11.0	15.1	18.1	20.8	21.3	22.6
10	---	---	---	---	6.7	8.7	10.9	15.1	18.2	21.2	21.2	22.9
11	---	---	---	---	6.3	9.0	11.0	15.2	18.3	21.4	21.7	22.9
12	---	---	---	---	6.4	8.9	11.1	15.0	18.6	21.1	21.9	22.8
13	---	---	---	---	6.9	8.7	11.0	15.7	18.3	20.9	21.5	22.0
14	---	---	---	---	7.1	8.7	10.7	15.8	18.3	20.6	21.3	20.6
15	---	---	---	---	7.1	8.9	10.6	15.5	18.1	21.0	21.3	19.8
16	---	---	---	---	6.6	8.7	10.7	15.1	18.3	21.2	21.9	19.5
17	---	---	---	---	6.2	8.5	11.1	15.2	18.4	20.9	21.9	18.8
18	---	---	---	---	6.2	8.3	11.3	15.7	18.5	20.7	21.5	18.0
19	---	---	---	---	5.9	8.4	11.7	16.1	18.4	20.6	21.5	18.5
20	---	---	---	7.3	5.9	8.3	12.2	16.6	18.8	20.2	21.7	18.6
21	---	---	---	7.1	6.1	8.4	11.9	16.4	19.6	20.7	22.6	18.6
22	---	---	---	7.2	6.1	8.5	12.2	16.2	19.8	20.7	22.8	19.2
23	---	---	---	7.2	6.1	8.5	12.9	16.3	19.5	21.1	22.9	19.5
24	---	---	---	7.2	5.7	8.7	13.3	16.6	19.4	21.7	23.8	20.5
25	---	---	---	7.2	5.3	8.7	13.1	16.6	19.1	21.7	24.4	20.5
26	---	---	---	7.1	4.7	9.0	13.0	15.8	19.5	21.6	24.3	18.8
27	---	---	---	7.1	4.1	9.0	13.0	15.6	20.0	21.5	24.2	18.0
28	---	---	---	7.1	4.5	9.0	12.5	15.9	20.4	21.5	23.6	17.9
29	---	---	---	7.4	---	9.2	12.3	15.9	19.9	21.8	22.8	17.5
30	---	---	---	7.5	---	9.7	13.3	16.0	19.7	22.1	22.0	17.7
31	---	---	---	7.5	---	10.1	---	16.2	---	22.5	20.9	---
Mean	---	---	---	---	6.2	7.9	11.5	15.5	18.6	21.1	22.4	20.1
Max	---	---	---	---	7.5	10.1	13.3	16.6	20.4	22.5	24.4	22.9
Min	---	---	---	---	4.1	4.4	10.4	13.8	16.2	19.8	20.9	17.5

Daily mean surface-water temperature at 4 feet deep, Vancouver Lake at Vancouver, Washington, water year 2012.

TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	18.0	11.7	---	---	---	5.8	9.6	14.7	---	---	21.5	20.1
2	17.8	11.0	---	---	---	6.2	9.5	14.6	---	---	21.5	20.0
3	17.1	10.6	---	---	---	6.9	9.5	14.3	---	---	22.0	20.5
4	16.3	10.3	---	---	---	7.2	9.4	14.3	---	---	22.4	20.0
5	15.3	9.8	---	---	---	7.8	9.4	14.1	---	---	23.4	20.3
6	14.8	9.3	---	---	---	7.9	9.3	14.9	---	---	24.0	21.1
7	14.6	9.4	---	---	---	7.8	9.9	15.1	---	---	24.4	21.6
8	14.6	9.6	---	---	---	8.2	10.6	16.6	---	---	24.0	22.2
9	14.9	---	---	---	---	8.7	11.1	16.0	---	---	23.6	21.7
10	15.0	---	---	---	---	9.2	11.7	15.7	---	---	22.7	20.7
11	15.0	---	---	---	---	8.7	12.1	15.8	---	---	22.6	19.0
12	15.0	---	---	---	---	8.1	12.2	16.3	---	---	23.1	17.3
13	15.0	---	---	---	---	7.7	12.7	17.6	---	---	23.4	17.5
14	14.3	---	---	---	---	7.4	13.3	19.0	---	---	23.5	17.9
15	14.3	---	---	---	---	7.8	13.3	19.2	---	---	24.2	19.4
16	14.1	---	---	---	---	8.0	13.6	---	---	---	24.5	19.7
17	14.0	---	---	---	---	8.0	13.5	---	---	---	24.6	20.0
18	14.0	---	---	---	---	8.3	13.1	---	---	23.0	24.6	19.8
19	14.1	---	---	---	---	8.0	12.7	---	---	22.6	23.8	20.2
20	14.0	---	---	---	---	7.9	12.9	---	---	22.4	23.0	19.8
21	14.2	---	---	---	---	7.6	13.1	---	---	22.2	22.4	18.8
22	14.6	---	---	---	---	7.3	14.0	---	---	22.0	22.2	17.7
23	15.2	---	---	---	---	7.4	16.2	---	---	21.6	21.5	18.1
24	14.5	---	---	---	8.3	8.1	15.4	---	---	21.3	20.9	18.2
25	13.9	---	---	---	8.2	8.7	15.6	---	---	21.3	19.9	18.7
26	13.0	---	---	---	7.8	9.2	15.5	---	---	21.6	20.2	18.3
27	12.4	---	---	---	7.4	9.8	14.9	---	---	21.9	20.3	18.1
28	12.2	---	---	---	6.8	9.7	14.9	---	---	21.9	20.6	18.6
29	12.0	---	---	---	6.0	9.7	15.9	---	---	22.0	21.0	19.7
30	12.3	---	---	---	---	10.0	15.2	---	---	21.9	21.2	18.7
31	12.5	---	---	---	---	9.8	---	---	---	21.8	20.5	---
Mean	14.5	---	---	---	---	8.2	12.7	---	---	---	22.5	19.5
Max	18.0	---	---	---	---	10.0	16.2	---	---	---	24.6	22.2
Min	12.0	---	---	---	---	5.8	9.3	---	---	---	19.9	17.3

Daily mean surface-water temperature at 4 feet deep, Vancouver Lake at Vancouver, Washington, partial water year 2013.

TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	17.5	---	---	---	---	---	---	---	---	---	---	---
2	17.4	---	---	---	---	---	---	---	---	---	---	---
3	16.0	---	---	---	---	---	---	---	---	---	---	---
4	15.2	---	---	---	---	---	---	---	---	---	---	---
5	14.7	---	---	---	---	---	---	---	---	---	---	---
6	14.3	---	---	---	---	---	---	---	---	---	---	---
7	13.5	---	---	---	---	---	---	---	---	---	---	---
8	13.7	---	---	---	---	---	---	---	---	---	---	---
9	14.1	---	---	---	---	---	---	---	---	---	---	---
10	14.7	---	---	---	---	---	---	---	---	---	---	---
11	14.6	---	---	---	---	---	---	---	---	---	---	---
12	13.9	---	---	---	---	---	---	---	---	---	---	---
13	13.7	---	---	---	---	---	---	---	---	---	---	---
14	14.0	---	---	---	---	---	---	---	---	---	---	---
15	14.7	---	---	---	---	---	---	---	---	---	---	---
16	15.0	---	---	---	---	---	---	---	---	---	---	---
17	14.8	---	---	---	---	---	---	---	---	---	---	---
18	14.5	---	---	---	---	---	---	---	---	---	---	---
19	14.6	---	---	---	---	---	---	---	---	---	---	---
20	13.9	---	---	---	---	---	---	---	---	---	---	---
21	13.1	---	---	---	---	---	---	---	---	---	---	---
22	12.3	---	---	---	---	---	---	---	---	---	---	---
23	11.2	---	---	---	---	---	---	---	---	---	---	---
24	10.6	---	---	---	---	---	---	---	---	---	---	---
25	---	---	---	---	---	---	---	---	---	---	---	---
26	---	---	---	---	---	---	---	---	---	---	---	---
27	---	---	---	---	---	---	---	---	---	---	---	---
28	---	---	---	---	---	---	---	---	---	---	---	---
29	---	---	---	---	---	---	---	---	---	---	---	---
30	---	---	---	---	---	---	---	---	---	---	---	---
31	---	---	---	---	---	---	---	---	---	---	---	---

Daily mean surface-water temperature at 5 feet deep, Vancouver Lake at Vancouver, Washington, water year 2011.

TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	---	---	---	---	7.1	4.4	10.8	13.4	16.4	19.4	---	---
2	---	---	---	---	6.7	4.6	11.4	13.7	16.5	19.6	---	---
3	---	---	---	---	6.1	5.1	11.1	14.1	16.5	19.9	---	---
4	---	---	---	---	6.2	5.4	10.5	14.4	16.9	19.9	---	---
5	---	---	---	---	6.4	5.6	10.3	14.6	17.6	20.3	---	---
6	---	---	---	---	6.9	6.2	10.4	15.0	17.7	21.1	---	---
7	---	---	---	---	7.7	6.6	10.3	14.6	18.5	20.9	---	---
8	---	---	---	---	7.7	6.8	10.9	14.7	17.9	20.9	---	---
9	---	---	---	---	7.4	7.9	11.3	15.0	17.6	20.5	---	---
10	---	---	---	---	7.1	8.9	11.2	14.7	17.6	20.4	---	---
11	---	---	---	---	6.7	9.1	11.1	14.6	17.7	20.6	---	---
12	---	---	---	---	6.8	8.9	11.0	14.7	18.0	20.7	---	---
13	---	---	---	---	6.9	8.9	11.0	16.1	18.3	---	---	---
14	---	---	---	---	7.2	8.7	10.7	14.9	18.2	---	---	---
15	---	---	---	---	7.1	8.9	10.5	14.7	18.0	---	---	---
16	---	---	---	---	6.3	8.8	10.7	14.6	18.0	---	---	---
17	---	---	---	---	5.8	8.5	10.6	14.6	17.9	---	---	---
18	---	---	---	---	6.1	8.3	11.2	15.2	18.1	---	---	---
19	---	---	---	---	5.9	8.4	11.7	15.3	18.0	---	---	---
20	---	---	---	7.3	5.9	8.4	11.9	15.7	18.3	---	---	---
21	---	---	---	7.1	5.9	8.5	11.9	15.8	18.4	---	---	---
22	---	---	---	7.2	6.1	8.5	11.9	15.7	18.4	---	---	---
23	---	---	---	7.1	6.0	8.6	12.5	15.9	19.0	---	---	---
24	---	---	---	7.2	5.6	8.8	12.7	16.3	18.8	---	---	---
25	---	---	---	7.2	5.4	8.7	12.9	16.3	18.4	---	---	---
26	---	---	---	7.1	4.7	8.9	13.1	15.7	19.1	---	---	---
27	---	---	---	7.1	4.1	9.0	13.0	15.6	19.3	---	---	---
28	---	---	---	7.1	4.4	9.0	12.6	15.7	19.8	---	---	---
29	---	---	---	7.3	---	9.2	12.3	15.6	19.8	---	---	---
30	---	---	---	7.6	---	9.6	13.1	15.6	19.5	---	---	---
31	---	---	---	7.5	---	10.1	---	16.2	---	---	---	---
Mean	---	---	---	---	6.3	8.0	11.5	15.1	18.1	---	---	---
Max	---	---	---	---	7.7	10.1	13.1	16.3	19.8	---	---	---
Min	---	---	---	---	4.1	4.4	10.3	13.4	16.4	---	---	---

Daily mean surface-water temperature at 5 feet deep, Vancouver Lake at Vancouver, Washington, water year 2012.

TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	---	---	---	---	---	---	---	---	---	---	21.4	20.1
2	---	---	---	---	---	---	---	---	---	---	21.4	19.9
3	---	---	---	---	---	---	---	---	---	---	22.0	20.5
4	---	---	---	---	---	---	---	---	---	---	22.3	20.0
5	---	---	---	---	---	---	---	---	---	---	22.9	20.3
6	---	---	---	---	---	---	---	---	---	---	23.6	21.1
7	---	---	---	---	---	---	---	---	---	---	24.0	21.5
8	---	---	---	---	---	---	---	---	---	---	23.8	22.1
9	---	---	---	---	---	---	---	---	---	---	23.6	21.6
10	---	---	---	---	---	---	---	---	---	---	22.6	20.8
11	---	---	---	---	---	---	---	---	---	---	22.5	19.4
12	---	---	---	---	---	---	---	---	---	---	23.0	17.9
13	---	---	---	---	---	---	---	---	---	---	23.3	18.0
14	---	---	---	---	---	---	---	---	---	---	23.3	18.1
15	---	---	---	---	---	---	---	---	---	---	24.0	19.3
16	---	---	---	---	---	---	---	---	---	---	24.4	19.5
17	---	---	---	---	---	---	---	---	---	---	24.4	19.9
18	---	---	---	---	---	---	---	---	---	22.8	24.4	19.7
19	---	---	---	---	---	---	---	---	---	22.5	23.7	20.0
20	---	---	---	---	---	---	---	---	---	22.4	22.9	19.6
21	---	---	---	---	---	---	---	---	---	22.1	22.3	18.8
22	---	---	---	---	---	---	---	---	---	21.9	22.2	17.7
23	---	---	---	---	---	---	---	---	---	21.6	21.4	18.1
24	---	---	---	---	---	---	---	---	---	21.3	20.8	18.2
25	---	---	---	---	---	---	---	---	---	21.2	19.9	18.8
26	---	---	---	---	---	---	---	---	---	21.4	20.2	18.6
27	---	---	---	---	---	---	---	---	---	21.6	20.3	19.1
28	---	---	---	---	---	---	---	---	---	21.8	20.4	20.8
29	---	---	---	---	---	---	---	---	---	21.9	20.9	20.2
30	---	---	---	---	---	---	---	---	---	21.8	21.1	18.8
31	---	---	---	---	---	---	---	---	---	21.7	20.5	---
Mean	---	---	---	---	---	---	---	---	---	---	22.4	19.6
Max	---	---	---	---	---	---	---	---	---	---	24.4	22.1
Min	---	---	---	---	---	---	---	---	---	---	19.9	17.7

Table 4. Daily Precipitation Values Measured at Flushing Channel and Daily Mean Air Temperature, Relative Humidity, Wind Speed and Direction, and Net Solar Radiation Measured at Vancouver Lake, Vancouver, Washington, Water Years 2011–12

Total precipitation, Vancouver Lake at Vancouver, Washington, water year 2011.

PRECIPITATION, IN INCHES, SUM VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.00	0.94	---	0.00	0.00	0.61	0.03	0.00	0.13	0.00	0.00	0.00
2	0.00	0.00	0.01	0.00	0.00	0.14	0.00	0.00	0.16	0.00	0.00	0.00
3	0.00	0.01	0.00	0.00	0.00	0.12	0.00	0.04	0.01	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.34	0.41	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.35	0.08	0.06	0.09	0.06	0.00	0.00	0.00	0.00
6	0.00	0.94	0.04	0.03	0.07	0.00	0.08	0.27	0.00	0.00	0.00	0.00
7	0.00	0.07	0.28	0.05	0.10	0.00	0.00	0.05	0.00	0.00	0.00	0.00
8	0.01	0.00	0.79	0.02	0.01	0.17	0.00	0.19	0.00	0.00	0.00	0.00
9	0.68	0.71	1.03	0.05	0.00	0.49	0.00	0.00	0.00	0.00	0.00	0.00
10	0.56	0.07	0.21	0.01	0.00	0.56	0.13	0.00	0.00	0.00	0.00	0.00
11	0.00	0.07	1.22	0.03	0.00	0.00	0.04	0.25	0.00	0.00	0.00	0.00
12	0.00	0.01	0.24	0.59	0.58	0.31	0.00	0.00	0.04	0.14	0.00	0.00
13	0.01	0.18	0.53	0.61	0.14	0.57	0.10	0.00	0.00	0.01	0.00	0.00
14	0.02	0.22	0.58	0.00	0.49	0.32	0.57	0.00	0.00	0.02	0.00	0.00
15	0.00	0.02	0.05	0.77	0.45	0.42	0.67	0.58	0.11	0.00	0.00	0.02
16	0.00	0.00	0.00	0.46	0.34	0.28	0.00	0.02	0.00	0.14	0.00	0.00
17	0.00	1.35	0.00	0.06	0.00	0.14	0.00	0.00	0.00	0.73	0.00	0.06
18	0.00	0.49	0.27	0.42	0.27	0.15	0.01	0.00	0.15	0.00	0.00	0.13
19	0.00	0.03	0.11	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.26	0.47	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00
21	0.00	0.18	0.01	0.68	0.03	0.12	0.11	0.03	0.00	0.03	0.00	0.00
22	0.02	0.15	0.02	0.00	0.06	0.00	0.00	0.04	0.00	0.00	0.00	0.00
23	0.49	0.00	0.01	0.03	0.10	0.15	0.00	0.12	0.00	0.00	0.00	0.00
24	1.08	0.00	0.09	0.01	0.13	0.27	0.15	0.00	0.00	0.00	0.00	0.00
25	0.37	0.00	0.08	0.01	0.00	0.02	0.66	0.16	0.00	0.03	0.00	0.09
26	0.09	0.19	---	---	0.00	0.36	0.12	0.06	0.00	0.00	0.00	0.07
27	0.00	0.11	---	---	0.30	0.08	0.09	0.05	0.01	0.00	0.00	0.13
28	0.34	0.05	---	---	1.36	0.12	0.20	0.02	0.13	0.00	0.00	0.00
29	0.04	0.13	0.19	---	---	0.26	0.00	0.00	0.08	0.00	0.00	0.00
30	0.30	---	0.00	---	---	0.01	0.00	0.03	0.00	0.00	0.00	0.00
31	0.04	---	0.00	---	---	0.00	---	0.23	---	0.00	0.00	---
Total	4.05	---	---	---	4.51	6.16	3.47	2.20	0.82	1.10	0.00	0.50

Total precipitation, Vancouver Lake at Vancouver, Washington, water year 2012.

PRECIPITATION, IN INCHES, SUM VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.03	0.00	0.00	0.00	0.02	0.19	0.05	0.19	0.05	0.00	0.00	0.00
2	0.05	0.00	0.00	0.08	0.00	0.00	0.00	0.06	0.01	0.01	0.00	0.00
3	0.10	0.00	0.00	0.00	0.01	0.00	0.24	0.79	0.00	0.01	0.00	0.00
4	0.02	0.00	0.00	0.17	0.00	0.00	0.09	0.19	0.41	0.00	0.00	0.00
5	0.16	0.00	0.01	0.07	0.00	0.24	0.18	0.00	0.42	0.00	0.00	0.00
6	0.12	0.00	0.00	0.13	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00
7	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.00	0.00	0.00
8	0.04	0.00	0.00	0.01	0.12	0.00	0.00	0.00	0.08	0.00	0.00	0.04
9	0.05	0.00	0.00	0.27	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.05	0.00	0.01	0.00	0.18	0.11	0.01	0.00	0.00	0.00	0.00	0.01
11	0.18	0.14	0.00	0.00	0.01	0.17	0.49	0.00	0.00	0.00	0.00	0.00
12	0.00	0.10	0.00	---	0.11	1.01	0.03	0.00	0.10	0.00	0.00	0.00
13	0.00	0.02	0.00	---	0.06	0.19	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.06	0.09	---	0.05	0.63	0.00	0.00	0.00	0.00	0.00	0.01
15	0.00	0.01	0.03	---	0.00	0.75	0.04	0.00	0.00	0.00	0.00	0.00
16	0.00	0.70	0.00	---	0.10	0.14	0.36	0.00	0.00	0.00	0.00	0.00
17	0.00	0.23	0.01	---	0.27	0.15	0.06	0.00	0.00	0.00	0.00	0.00
18	0.00	0.18	0.02	1.00	0.18	0.07	0.02	0.00	0.04	0.00	0.00	0.00
19	0.00	0.00	0.00	1.51	0.01	0.05	0.40	0.00	0.04	0.00	0.00	0.00
20	0.00	0.00	0.02	0.67	0.16	0.23	0.00	0.06	0.00	0.03	0.00	0.00
21	0.00	0.54	0.00	0.02	0.04	0.51	0.00	0.42	0.00	0.00	0.00	0.00
22	0.00	2.21	0.01	0.40	0.20	0.32	0.00	0.17	0.07	0.00	0.00	0.00
23	0.00	0.64	0.00	0.01	0.00	0.00	0.00	0.01	0.39	0.00	0.00	0.00
24	0.00	0.34	0.00	0.84	0.16	0.00	0.00	0.34	0.11	0.00	0.00	0.00
25	0.00	0.04	0.11	0.00	0.21	0.01	0.05	0.10	0.00	0.00	0.00	0.00
26	0.00	0.00	0.07	---	0.03	0.00	0.24	0.03	0.05	0.00	0.00	0.00
27	0.00	0.41	0.58	---	0.00	0.18	0.03	0.01	0.00	0.00	0.00	0.00
28	0.00	0.00	0.64	---	0.24	0.12	0.01	0.00	0.00	0.00	0.00	0.00
29	0.00	0.01	0.60	---	0.26	1.22	0.04	0.00	0.00	0.00	0.00	0.00
30	0.00	0.02	0.31	---	---	0.28	0.12	0.00	0.12	0.00	0.00	0.00
31	0.00	---	0.00	0.00	---	0.51	---	0.03	---	0.00	0.03	---
Total	0.86	5.65	2.51	---	2.59	7.08	2.50	2.40	2.35	0.05	0.03	0.06

Total precipitation, Vancouver Lake at Vancouver, Washington, partial water year 2013.

PRECIPITATION, IN INCHES, SUM VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	0.00	0.11	---	---	---	---	---	---	---	---	---	---
2	0.00	0.08	---	---	---	---	---	---	---	---	---	---
3	0.00	0.20	---	---	---	---	---	---	---	---	---	---
4	0.00	0.00	---	---	---	---	---	---	---	---	---	---
5	0.00	0.00	---	---	---	---	---	---	---	---	---	---
6	0.00	0.06	---	---	---	---	---	---	---	---	---	---
7	0.00	0.02	---	---	---	---	---	---	---	---	---	---
8	0.00	0.00	---	---	---	---	---	---	---	---	---	---
9	0.00	0.00	---	---	---	---	---	---	---	---	---	---
10	0.00	0.00	---	---	---	---	---	---	---	---	---	---
11	0.00	0.52	---	---	---	---	---	---	---	---	---	---
12	0.82	0.45	---	---	---	---	---	---	---	---	---	---
13	0.00	0.00	---	---	---	---	---	---	---	---	---	---
14	0.33	---	---	---	---	---	---	---	---	---	---	---
15	0.20	---	---	---	---	---	---	---	---	---	---	---
16	0.04	---	---	---	---	---	---	---	---	---	---	---
17	0.00	---	---	---	---	---	---	---	---	---	---	---
18	0.05	---	---	---	---	---	---	---	---	---	---	---
19	0.24	---	---	---	---	---	---	---	---	---	---	---
20	0.16	---	---	---	---	---	---	---	---	---	---	---
21	0.09	---	---	---	---	---	---	---	---	---	---	---
22	0.33	---	---	---	---	---	---	---	---	---	---	---
23	0.14	---	---	---	---	---	---	---	---	---	---	---
24	0.06	---	---	---	---	---	---	---	---	---	---	---
25	0.01	---	---	---	---	---	---	---	---	---	---	---
26	0.04	---	---	---	---	---	---	---	---	---	---	---
27	0.46	---	---	---	---	---	---	---	---	---	---	---
28	0.47	---	---	---	---	---	---	---	---	---	---	---
29	0.47	---	---	---	---	---	---	---	---	---	---	---
30	0.53	---	---	---	---	---	---	---	---	---	---	---
31	0.25	---	---	---	---	---	---	---	---	---	---	---
Total	4.69	---	---	---	---	---	---	---	---	---	---	---

Daily mean air temperature, Vancouver Lake at Vancouver, Washington, water year 2011.

AIR TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	---	14.8	6.9	-1.5	2.3	2.3	11.3	10.5	12.4	16.8	19.3	16.8
2	---	12.9	5.8	-1.7	1.2	7	7.6	11.2	12	19	19.1	17.5
3	---	14.9	6.1	-1.9	4.4	6	7.7	10.3	15.6	17.3	20.2	20.5
4	---	12.1	4.7	-1.3	6.7	5.4	8.6	11.7	19.6	18.3	20.2	20.5
5	---	12.1	5.6	1.7	7.9	7.3	8.1	11.5	18.9	20	18.6	20
6	---	12.7	5.5	4	9.3	4.4	6.2	10.6	16.2	21.1	18.1	20.4
7	---	11.2	5.2	5.6	7.5	4.6	5.9	10.6	14.2	16.3	18.1	23
8	---	7.9	8.5	1.7	5.9	8.5	7.4	10	14	15.9	16.9	22.4
9	---	7.2	9.6	2.7	2.3	11.2	9.6	11.9	15.4	17.1	16.3	22.4
10	---	7.2	6.8	2.2	1.5	8.6	9.8	12.2	14.2	18	17.7	23
11	---	6.2	6.4	0.1	4.6	8.8	8.3	10.9	14.9	17.2	18.2	22.3
12	---	6.2	14	7.1	8.2	8	6.7	10	14.4	16.4	18.3	17.9
13	---	7.2	12.6	11.9	6.2	8.5	8	13.2	15.6	16.2	16.9	17.1
14	---	10	7.3	12.7	7.9	9.7	7.4	13.4	14.1	16.7	17.6	17
15	---	12.5	6.5	12.4	5.6	8.8	7.6	11.5	13.3	18.1	18.8	16
16	---	10.5	5.4	13.4	3.5	6	10.4	11.5	13.9	17.8	19.1	15.6
17	---	8.6	4	9.6	4.7	6.2	6.7	11.2	15.2	16.2	19	13.3
18	---	5.4	5	6	3.5	6.4	7.1	14	14.4	17.5	17.9	16.7
19	---	6.1	3.7	3.7	4.3	6.5	7.3	14.2	15.2	17.3	18.9	16.9
20	---	5.3	3.9	3.7	2.9	7.5	8.5	14	17	17.6	22.7	16.4
21	---	2.5	4.4	6.3	5.1	8	7.3	12.5	18.7	16.8	21.8	18.7
22	---	2.9	5.3	6.1	3.9	6.8	8.3	11.8	16.7	16.1	20.1	19.3
23	---	-3.2	6.1	5	2.8	7.1	10.9	11.9	14.9	19.2	21.9	20
24	---	-4	6	6.9	1	6.9	10.2	12.7	15.1	21.2	23	20.6
25	---	1.3	6	7	-1.8	6.2	9.7	12.2	15.2	18.1	22.7	17.1
26	---	5.4	5.8	4.7	-2.5	7.5	9.7	10.2	16.6	17.8	21.6	16.1
27	---	4.2	6.8	5.1	4.8	7.8	8.9	11.3	18.7	17.3	21.4	15.5
28	---	3.8	6.9	8.1	4.2	8.1	6.6	10.9	17.9	19	19.2	14.2
29	---	4.6	3.4	9.3	---	9.5	8.5	11.6	16.7	19.4	17.6	16.2
30	9.4	6	-0.7	5.6	---	12.5	9.7	13	15.1	19.6	17.3	15
31	11.2	---	-1.5	5.1	---	12.6	---	12.3	---	18.7	16	---
Mean	---	7.2	5.9	5.2	4.2	7.6	8.3	11.8	15.5	17.9	19.2	18.3
Max	---	14.9	14	13.4	9.3	12.6	11.3	14.2	19.6	21.2	23	23
Min	---	-4	-1.5	-1.9	-2.5	2.3	5.9	10	12	15.9	16	13.3

Daily mean air temperature, Vancouver Lake at Vancouver, Washington, water year 2012.

AIR TEMPERATURE, IN DEGREES CELSIUS, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	14.5	4.4	3.1	5.1	7.1	---	---	---	18.4	16.5	17.6	16.2
2	14.6	6.7	5.5	6.5	6.3	---	---	---	15	16.3	17.1	16.6
3	14.1	7.2	1.6	9	8.9	---	---	---	13.1	15.2	20.9	17.9
4	13.2	5.7	3.3	7.9	5.6	---	---	---	12.3	15.7	25.2	19.5
5	11.2	6.2	0.6	7.1	4.4	---	---	---	11.9	18.3	24.3	20.5
6	11.3	5.2	1	2.2	6.4	---	---	---	12.7	18.8	22.7	20.2
7	12.8	8.4	2.8	4.8	7.8	---	---	---	13.8	20.1	18.9	21.4
8	14.7	8.4	2.4	1.8	5.9	---	---	---	11.3	21.3	18.6	18.7
9	13.5	9.2	1.9	3.5	7	---	---	---	12.5	18.5	19	16.2
10	14.3	6.4	-0.4	4	7.5	---	---	---	14.1	18.2	19	16.3
11	14.1	5.1	1.9	2	6.8	---	---	---	16.4	20.7	20.2	14.4
12	13.4	7.6	1.5	0.6	5.5	---	---	---	15.4	19.2	24	17.7
13	11.6	9.5	0.1	1.3	5.5	---	---	---	14.1	18.1	22.2	18.9
14	12.2	8.1	1.2	3.1	5.5	---	---	---	13.1	19.7	21	18.7
15	12	3.7	3.4	1.5	4.5	---	---	---	16.6	17.8	22.7	18.2
16	11.6	7.2	3.9	0.9	5	---	---	---	20	18.7	25.3	17.4
17	10.6	7	3.5	2.4	7.8	---	---	12	18	20.5	23.6	19.8
18	14.4	4.7	4.1	6.4	6.1	---	---	11.8	14.2	18.6	18.6	18.5
19	12	3.7	5.1	6	4.9	---	---	13.9	13.8	19.7	19	15.6
20	12.6	2.2	4.7	4.7	6.8	---	---	15.4	16.5	19.2	18.8	14.5
21	14.3	7.9	2.5	7.1	10.9	---	---	14.5	18.3	20.1	18.8	15.5
22	16.2	12.3	1.1	5.8	9	---	---	11.9	15.6	16.8	17.3	15.9
23	13.8	9.4	3.4	3	---	---	---	12.2	13.9	15.7	16.4	15
24	9.5	7	5.3	6.9	---	---	---	11.2	14.9	18.4	16.2	15.4
25	8.1	7	6.1	9.5	---	---	---	13.6	15.3	20.4	19	---
26	6.8	8	3.5	6.1	---	---	---	14	14.9	18.5	17.2	---
27	7.2	8.9	8.8	0	---	---	---	13.7	16.4	17.4	18.2	---
28	9.9	5.5	12.1	3	---	---	---	13.4	17.6	18.6	18.3	---
29	10.3	4.9	9.5	6.5	---	---	---	13.1	19.3	18.7	17.6	---
30	12.5	7	7.9	7.8	---	---	---	15.7	18.7	17.2	17.6	---
31	9.3	---	3.1	7.5	---	---	---	17.1	---	18	16.8	---
Mean	12.1	6.8	3.7	4.6	---	---	---	---	15.3	18.4	19.7	---
Max	16.2	12.3	12.1	9.5	---	---	---	---	20	21.3	25.3	---
Min	6.8	2.2	-0.4	0	---	---	---	---	11.3	15.2	16.2	---

Daily mean relative humidity, Vancouver Lake at Vancouver, Washington, water year 2011.

RELATIVE HUMIDITY, IN PERCENT, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	---	82	95.5	---	---	98.2	79.3	66.5	78.2	65.3	63.7	67.9
2	---	91.9	95.6	---	---	76.2	70.5	67.5	76.1	61.5	66.6	67.1
3	---	59.4	86.5	---	71.6	82.6	67.8	68.1	66.9	68.9	65.5	49.5
4	---	79.2	76.7	---	86	91.6	86.1	66.4	55.1	61.3	70.5	58.4
5	---	88.6	71.9	---	94.4	84.8	75.5	74	63.3	56.7	72	63.2
6	---	88.8	77.3	99.2	88.7	91.9	80.4	80	68	61.1	72.2	64.8
7	---	81.2	84.1	93.8	79.4	---	76.4	76.8	66	71.9	72.4	57.8
8	---	86.2	88.9	---	80.9	82.2	69.7	75.2	69.5	62.5	71.6	57.6
9	---	88.9	90.7	95.1	---	82.1	65	70.8	71.7	60.9	68.3	59.2
10	---	90.5	92.7	---	---	79.6	75.5	70.5	73.1	60.4	66	58.6
11	---	92.2	97	---	91	65.7	71.3	80	66.4	65.4	67.8	63.7
12	---	96.6	81.6	---	80.2	80.4	74.2	70.1	72.2	80.9	72.8	74.3
13	---	96.2	90.1	86.7	94.7	85.4	71.2	65.4	74.3	78.6	72	78.4
14	---	96.6	85.7	83.5	85.9	70.7	84.9	70.3	68.6	74.5	65.5	72.2
15	---	89	82.9	89.9	86.6	85.2	94.5	80.7	68.9	72.1	63.1	76
16	---	76.1	85	84.2	90.7	86.5	78.5	65.3	67.3	79.3	60.8	68.7
17	---	86.3	---	80.7	80.7	86	67.2	67.4	63.5	85.8	57.1	81.8
18	---	92	79.5	93.1	89.1	87	66.9	58.8	80	77.3	70.8	83
19	---	83.8	84.3	88.3	76.1	78.1	68.7	54.4	73.6	71.7	65.9	72.3
20	---	89.4	91.1	90.9	---	77.7	66.5	56.5	71.9	70.5	56.1	75.8
21	---	92.5	86.3	95.6	81.9	78	70.3	68.7	72.9	77.7	63.5	75.2
22	---	89.9	87.8	89.8	82.7	76.2	67.6	71.9	72	69.8	72.3	74.9
23	---	---	74.7	96.2	---	77.7	62.8	72.7	63.9	65.4	73.1	76.7
24	---	---	79.7	93.7	---	86.9	79	70.5	65.8	59.2	69.6	69
25	---	---	87.5	95.9	---	85.6	77	74.6	63.3	72.2	65.8	68.2
26	---	87.8	84	96	---	82.2	74.5	78.4	64.5	70.9	70.4	71.8
27	---	95.9	89.3	95	---	77.8	72.3	73.7	69.2	67	65.2	77.9
28	---	95.3	93.5	85.1	91.8	77.4	81.1	71.1	84.1	65.9	71.4	70.6
29	---	89.6	84.7	83.9	---	86.1	72.4	77.7	75.5	72.8	75.7	65.6
30	94	93.9	---	95.1	---	78.4	63.9	70.4	69.6	66.8	65.3	75.9
31	82.3	---	---	73.1	---	77.3	---	79.8	---	72.2	67.7	---
Mean	---	---	---	---	---	---	73.7	70.8	69.8	69.2	67.8	69.2
Max	---	---	---	---	---	---	94.5	80.7	84.1	85.8	75.7	83
Min	---	---	---	---	---	---	62.8	54.4	55.1	56.7	56.1	49.5

Daily mean relative humidity, Vancouver Lake at Vancouver, Washington, water year 2012.

RELATIVE HUMIDITY, IN PERCENT, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	79.4	94.6	---	82	82.9	---	---	---	78.7	72.3	73.3	67
2	86.2	---	83.4	81.6	72.2	---	---	---	76.3	69.1	74.2	67.3
3	82.9	87.7	---	85.3	44.1	---	---	---	62.1	70.5	69.2	68.8
4	77.7	86.5	87.4	90.6	69.7	---	---	---	84.2	64	57.8	62.8
5	83.4	90.7	---	82.8	---	---	---	---	71.2	63.1	60.8	61.5
6	89.2	90.9	98.1	98.3	---	---	---	---	63.9	66.9	66.6	68.3
7	88.7	87.4	94.7	94.3	58.1	---	---	---	71.6	65.8	78.3	65.5
8	82.9	85.4	---	99.4	87	---	---	---	77.6	65	68.8	71.7
9	89.6	87.2	---	97.4	87.2	---	---	---	68.2	71.3	73.6	68.3
10	84.3	86.1	---	87.8	88.6	---	---	---	64.3	69.9	72.1	64.8
11	79.8	90.4	93.8	---	85.6	---	---	---	64.7	69.7	68.2	63.5
12	79.4	87.2	---	---	88.4	---	---	---	81.3	69.7	57.1	52.4
13	84.5	85.3	---	---	87.3	---	---	---	69.9	74.1	60.7	57.8
14	84.6	88.5	---	82.4	84.3	---	---	---	66.8	73.5	66.3	67.2
15	84.5	98.1	96	---	82.2	---	---	---	66.7	72.6	69.2	63.4
16	80	92.9	98.9	---	91.1	---	---	---	70	69.7	60	63.6
17	82.2	83.4	95.9	93.2	91	---	---	63.4	70.9	73.1	64	64.2
18	67.1	86.7	96.5	91.1	79.5	---	---	57.7	69.2	76.2	80.8	68.1
19	85.8	88.8	91.7	94.6	80	---	---	56.6	73.8	73.9	71.4	81
20	85.5	---	93.8	95.5	92.3	---	---	70.9	71.5	72.8	73.1	84.5
21	78.4	84.4	97	78.3	80.7	---	---	84	66	66	66.6	78.9
22	78.4	85	---	85.1	77	---	---	77.5	73.4	69.7	71.8	67.9
23	78.8	87.8	78.6	97.8	---	---	---	70.2	80.1	71.7	67	74.8
24	80.5	86.5	76.2	90.6	---	---	---	81.3	72.6	70	65.8	78.3
25	83.1	82.4	77.4	78.4	---	---	---	74.4	70.3	68.1	57	---
26	84	80.8	93.1	79.7	---	---	---	77.9	76.3	78.7	66.2	---
27	85.6	85	81.7	---	---	---	---	72.1	66.4	74.3	68.1	---
28	82.1	93.4	87.1	---	---	---	---	71.1	66.1	71.7	63.9	---
29	92.2	91.2	86.2	85.9	---	---	---	64.4	68.3	70	70.2	---
30	92.1	86.2	82.3	83.9	---	---	---	62.8	81.7	72.8	69.8	---
31	79.9	---	93.8	83.4	---	---	---	78.9	---	67.6	64.3	---
Mean	83	---	---	---	---	---	---	---	71.5	70.4	67.6	---
Max	92.2	---	---	---	---	---	---	---	84.2	78.7	80.8	---
Min	67.1	---	---	---	---	---	---	---	62.1	63.1	57	---

Daily mean wind vectors, Vancouver Lake at Vancouver, Washington, water year 2011.

WIND VECTORS, IN METERS PER SECOND/DEGREES CLOCKWISE FROM TRUE NORTH, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	---	4.6 / 141	2.1 / ---	2.5 / 101	3.6 / 147	2.7 / 225	4.7 / 190	3.5 / 199	4.4 / 180	7.7 / 285	6.1 / 252	6.9 / 254
2	---	2.4 / 216	1.5 / ---	2.3 / 103	2.8 / 106	5.6 / 160	10 / 248	7.2 / 188	4.5 / 121	6.4 / 243	5.8 / 272	7.7 / 256
3	---	3.2 / 120	1.6 / ---	2.7 / 101	2.1 / 153	4.4 / 123	3 / 156	5.8 / 248	4.8 / 209	5.7 / 209	5.4 / 255	5.2 / 197
4	---	2.2 / 139	2.8 / ---	2.1 / 102	1.8 / 147	2.8 / 161	4.5 / 122	4.9 / 237	6 / 240	8.8 / 275	9 / 277	2.3 / 153
5	---	1.7 / 143	3.1 / ---	1.5 / 163	1.4 / 205	3 / 232	7.8 / 171	4.1 / 179	4.1 / 228	10 / 280	7.5 / 273	4.7 / 184
6	---	2.4 / 134	2.8 / ---	1.1 / 183	2.5 / 168	3.1 / 191	5.7 / 153	4.1 / 166	6.7 / 261	11 / 289	8.2 / 272	4.4 / 200
7	---	3.3 / 181	2.5 / ---	2.6 / 123	8 / 237	3.2 / 128	7.7 / 239	5.8 / 168	7 / 194	11 / 282	6.4 / 277	4.8 / 214
8	---	2.9 / 161	3.6 / ---	1.8 / 136	4 / 187	3 / 135	5.9 / 199	5.8 / 221	4.5 / 225	8 / 254	8.5 / 264	5.7 / 227
9	---	3 / 148	4.1 / ---	1.9 / 154	2.5 / 122	7.1 / 112	4.4 / 182	6.9 / 286	7.3 / 267	8.3 / 267	7.7 / 294	6.7 / 267
10	---	1.9 / 150	2.1 / ---	2.6 / 103	2.1 / 131	8.2 / 157	5.7 / 129	4.7 / 248	7.4 / 272	5.7 / 251	5.2 / 250	4.3 / 195
11	---	2.6 / 154	2.8 / ---	3.6 / 210	2 / 159	3.9 / 104	7 / 210	4.2 / 161	7.8 / 268	5 / 211	7.8 / 270	2.9 / 158
12	---	2.5 / 161	6.4 / ---	3.9 / 124	4.9 / 128	3.8 / 116	3 / 176	3.8 / 161	4.4 / 198	3.8 / 146	7.5 / 260	4 / 206
13	---	1.5 / 113	2.8 / ---	5.8 / 136	2.1 / 152	5.5 / 145	6.1 / 162	8.7 / 270	7.3 / 175	4.1 / 169	6.6 / 270	7.1 / 264
14	---	1.6 / 234	6.6 / ---	6.2 / 134	5.3 / 139	6.7 / 129	5.8 / 152	3.9 / 183	7.5 / 282	4.4 / 186	6.5 / 259	5.8 / 263
15	---	4.1 / 138	5.1 / ---	3.7 / 114	4.9 / 122	6.6 / 118	2.3 / 159	5.9 / 205	7.7 / 243	4.8 / 213	6.1 / 268	2.7 / 126
16	---	7.4 / 177	2 / ---	7.4 / 142	3.1 / 113	4.7 / 115	6.6 / 261	5.8 / 207	4.8 / 209	4.9 / 162	6.9 / 232	4.7 / 229
17	---	6.1 / 227	3.6 / ---	6.3 / 214	3.2 / 124	3.3 / 114	5.6 / 232	4.8 / 227	6.7 / 253	3.4 / 174	7.5 / 245	2.2 / 144
18	---	3.9 / 311	5.7 / ---	3.7 / 283	3.4 / 140	3.3 / 112	4.1 / 228	6 / 243	4.9 / 167	5.7 / 277	8.2 / 280	2.8 / 102
19	---	5.7 / 313	3.4 / ---	3.3 / 169	8.6 / 296	3.3 / 146	4.9 / 199	6 / 237	5.1 / 225	5.4 / 255	9.8 / 285	5.7 / 267
20	---	3.5 / 307	4 / ---	2.4 / 116	3.3 / 125	4.3 / 215	7.5 / 290	5.7 / 229	4.4 / 269	4.4 / 254	8.1 / 267	2.1 / 133
21	---	3.5 / 310	2.8 / ---	1.7 / 155	2.7 / 182	5 / 176	7.7 / 226	6.1 / 282	4.4 / 216	5.6 / 205	5.1 / 200	2.5 / 196
22	---	7.2 / 292	2.6 / 180	2.8 / 148	7 / 176	4.7 / 185	3.9 / 189	4.8 / 258	9.2 / 285	5.5 / 198	4.3 / 119	2.5 / 98
23	---	8.5 / ---	3.7 / 152	1.9 / 140	5.6 / 165	4 / 124	4 / 208	5.2 / 285	6.4 / 265	7.7 / 267	3.4 / 193	2.7 / 164
24	---	2.5 / ---	3.2 / 170	1.8 / 114	2.1 / 113	3.5 / 185	4.3 / 155	3.9 / 197	7 / 279	4 / 216	6.3 / 241	3.7 / 182
25	---	1.9 / ---	2.4 / 151	2.3 / 172	2.4 / 110	3.4 / 146	8.6 / 157	5.9 / 178	8.2 / 259	4.5 / 199	8.6 / 288	5.8 / 123
26	---	3 / ---	6.9 / 128	1.5 / 176	2.7 / 81	4.6 / 120	6.9 / 158	5.5 / 125	3.3 / 168	8.6 / 281	7.9 / 264	4.5 / 96
27	---	2.2 / ---	5.5 / 127	1.7 / 101	8.1 / 154	5.9 / 138	6.3 / 147	6.7 / 159	3.6 / 198	8.2 / 271	8.5 / 246	4.1 / 150
28	---	1.7 / ---	7.6 / 255	4.7 / 141	5.7 / 152	4.7 / 141	4.7 / 179	5.4 / 199	3.8 / 183	11 / 286	6.5 / 283	4 / 149
29	---	2.5 / ---	7.1 / 191	3.3 / 158	---	5.9 / 135	4.4 / 197	3.9 / 147	6.5 / 200	9.6 / 284	5.9 / 264	2.3 / 139
30	2.1 / 121	3.5 / ---	2.5 / 135	2.5 / 185	---	7.9 / 155	5.9 / 258	4 / 162	4.8 / 255	7.4 / 292	9 / 264	4.4 / 182
31	2.5 / 145	---	2.3 / 95	2.9 / 145	---	6.2 / 191	---	4.6 / 200	---	8.8 / 267	4.6 / 201	---
Mean	---	3.4 / ---	3.7 / ---	3 / 147	3.9 / 151	4.7 / 149	5.6 / 191	5.3 / 208	5.8 / 226	6.8 / 240	6.9 / 254	4.3 / 184
Max	---	8.5 / ---	7.6 / ---	7.4 / 283	8.6 / 296	8.2 / 232	10 / 290	8.7 / 286	9.2 / 285	11 / 292	9.8 / 294	7.7 / 267
Min	---	1.5 / ---	1.5 / ---	1.1 / 101	1.4 / 81	2.7 / 104	2.3 / 122	3.5 / 125	3.3 / 121	3.4 / 146	3.4 / 119	2.1 / 96

Daily mean wind vectors, Vancouver Lake at Vancouver, Washington, water year 2012.

WIND VECTORS, IN METERS PER SECOND/DEGREES CLOCKWISE FROM TRUE NORTH, MEAN VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	2.3 / 122	2.4 / 125	2 / 119	1.9 / 158	4.1 / 126	---	---	---	5.1 / 191	7.1 / 273	8.3 / 283	5.6 / 245
2	2.6 / 81	3.7 / 97	3.1 / 165	4.1 / 85	2.8 / 142	---	---	---	6.6 / 262	5.7 / 272	8.5 / 281	5.9 / 244
3	3.3 / 114	2.7 / 134	2.2 / 142	2.2 / 147	5.5 / 111	---	---	---	4.6 / 257	7.8 / 233	9 / 279	9.4 / 281
4	3.9 / 90	2.1 / 156	3.5 / 180	3 / 132	3 / 77	---	---	---	6.7 / 270	6.2 / 246	3.9 / 191	8.1 / 270
5	4.2 / 121	2.1 / 120	2.1 / 183	3.2 / 173	2.1 / 110	---	---	---	7 / 175	5 / 218	2.6 / 170	6.5 / 273
6	2.2 / 80	2 / 104	2.7 / 214	2.3 / 151	4.6 / 78	---	---	---	3 / 111	7.3 / 248	5.3 / 276	4 / 202
7	2.8 / 85	2 / 112	1.7 / 131	1.6 / 97	4 / 143	---	---	---	6.2 / 133	8.3 / 283	7.2 / 282	0 / 127
8	2.1 / 183	1.9 / 107	3.5 / 160	1.9 / 126	2.1 / 130	---	---	---	4.8 / 132	7.4 / 261	5.6 / 232	1.7 / 233
9	2 / 134	1.2 / 107	2.1 / 123	1.7 / 150	2.2 / 170	---	---	---	6.3 / 182	8.9 / 275	7.3 / 237	4 / 142
10	4.3 / 116	2 / 97	2 / 117	2.5 / 135	3.2 / 128	---	---	---	4.6 / 208	9.1 / 270	8.9 / 282	8.2 / 243
11	7.2 / 121	4.5 / 171	2.4 / 208	2.5 / 112	1.8 / 128	---	---	---	3.5 / 236	7.9 / 292	7.3 / 273	9 / 275
12	2.8 / 158	5.1 / 121	2.8 / 137	2.4 / 89	2.6 / 184	---	---	---	4.1 / 245	7.1 / 283	10 / 285	6.7 / 215
13	4.3 / 236	3 / 104	2.2 / 116	2 / 112	2.8 / 188	---	---	---	9.5 / 290	7 / 276	8.4 / 266	1.3 / 94
14	2.2 / 173	3 / 183	2.2 / 141	4.7 / 192	4.3 / 153	---	---	---	6.9 / 284	4.7 / 266	6.8 / 240	3.1 / 164
15	5.5 / 287	2.2 / 184	1.5 / 210	3.9 / 93	2.1 / 99	---	---	---	5 / 243	6.1 / 251	7.2 / 279	6.4 / 239
16	3.7 / 236	4.8 / 155	1.6 / 177	4.6 / 117	2 / 126	---	---	---	5.4 / 277	5.6 / 220	2.3 / 180	4.7 / 242
17	3.8 / 219	5.3 / 167	2.3 / 133	4.9 / 144	3.4 / 104	---	---	6.5 / 214	6.9 / 269	4.1 / 227	5 / 245	1.6 / 104
18	3.3 / 155	3.6 / 124	1.5 / 156	4.6 / 97	7.2 / 135	---	---	5.1 / 231	8.6 / 239	3.8 / 247	6 / 265	1.8 / 148
19	2.2 / 132	3.1 / 177	1.6 / 164	3.5 / 187	2.5 / 90	---	---	3.5 / 212	4.9 / 167	4.7 / 269	6.4 / 263	4.3 / 261
20	2.4 / 175	2.2 / 122	1.3 / 118	3.6 / 131	2.4 / 121	---	---	3.4 / 181	4.7 / 248	4.4 / 184	5.4 / 237	3.9 / 244
21	3.2 / 102	5.5 / 86	2.7 / 184	7.1 / 142	7.1 / 127	---	---	5.7 / 119	6.7 / 281	5.5 / 273	6.9 / 271	4.9 / 264
22	3.7 / 106	8.9 / 115	1.5 / 159	4.3 / 78	10 / 195	---	---	8.3 / 127	3.4 / 188	7.2 / 230	6.9 / 239	3 / 190
23	5.2 / 255	4.3 / 174	2 / 178	3 / 172	---	---	---	7.7 / 166	4.8 / 182	7 / 190	7 / 240	3.1 / 155
24	3.6 / 147	4.7 / 93	1.8 / 142	5 / 83	---	---	---	4.3 / 180	5.9 / 226	9.5 / 284	8 / 228	3.2 / 155
25	3.8 / 168	3.6 / 156	4.4 / 105	4.6 / 118	---	---	---	7.3 / 214	6.2 / 261	4.9 / 248	3.8 / 220	---
26	2.2 / 161	1.7 / 126	2.4 / 128	5.3 / 169	---	---	---	2.9 / 189	5.1 / 186	6.3 / 276	4.9 / 127	---
27	2.5 / 161	2.9 / 106	7.6 / 113	2.4 / 170	---	---	---	3.7 / 185	2.9 / 185	4.8 / 264	3.8 / 220	---
28	3.6 / 109	2.7 / 182	7 / 110	1.4 / 127	---	---	---	5.6 / 219	3.7 / 120	8.3 / 281	4.3 / 213	---
29	1.7 / 180	3.5 / 178	3.4 / 89	4.9 / 164	---	---	---	5.4 / 234	3.3 / 207	6.7 / 275	4.2 / 205	---
30	2.6 / 192	4.1 / 190	5.6 / 175	2.9 / 134	---	---	---	3.3 / 218	3.6 / 240	8.1 / 284	8.2 / 278	---
31	4.1 / 185	---	2.5 / 184	1.9 / 130	---	---	---	3.2 / 158	---	8.6 / 280	8.9 / 277	---
Mean	3.3 / 154	3.4 / 136	2.7 / 150	3.4 / 133	---	---	---	---	5.3 / 216	6.6 / 257	6.4 / 244	---
Max	7.2 / 287	8.9 / 190	7.6 / 214	7.1 / 192	---	---	---	---	9.5 / 290	9.5 / 292	10 / 285	---
Min	1.7 / 80	1.2 / 86	1.3 / 89	1.4 / 78	---	---	---	---	2.9 / 111	3.8 / 184	2.3 / 127	---

Net solar radiation, Vancouver Lake at Vancouver, Washington, water year 2011.

SOLAR RADIATION, WATTS PER SQUARE METER, NET VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	---	-2	2	-3	-2	2	17	23	20	32	22	17
2	---	3	0	-4	0	4	12	15	12	32	22	14
3	---	4	0	-5	5	3	10	24	33	24	23	13
4	---	4	-1	-2	1	3	-3	26	34	32	27	13
5	---	2	-2	0	3	11	6	13	21	32	19	15
6	---	-1	-1	3	0	5	7	4	29	31	16	15
7	---	0	-2	-2	0	9	16	12	11	16	22	15
8	---	-4	1	0	4	9	18	23	12	28	22	12
9	---	-5	-3	0	0	6	13	13	32	26	21	15
10	---	0	-2	-1	0	8	0	23	12	26	27	14
11	---	-1	-1	0	2	12	18	1	28	15	26	12
12	---	0	-2	0	1	0	14	29	11	7	27	10
13	---	-1	3	0	2	-3	2	30	25	12	15	5
14	---	0	-7	2	-2	5	-2	15	17	12	18	6
15	---	3	-3	1	-3	-4	3	1	26	27	25	4
16	---	0	-5	-2	-4	0	6	14	28	12	22	11
17	---	-4	-5	-2	3	4	16	21	33	0	22	-3
18	---	-4	-4	-3	-4	-2	14	30	0	15	20	4
19	---	-6	-3	0	5	14	21	30	19	6	24	13
20	---	-3	-4	0	3	1	14	27	22	29	24	10
21	---	-5	-3	0	3	8	6	13	26	4	21	9
22	---	-7	0	-2	3	6	20	8	14	28	14	9
23	---	-8	0	0	0	11	22	19	20	25	16	13
24	---	-2	-2	0	5	0	8	33	27	24	15	10
25	---	0	-2	0	4	5	11	0	29	10	21	6
26	---	0	-3	0	0	5	13	5	20	24	18	-2
27	---	0	-3	0	0	2	9	16	19	22	19	9
28	---	0	-2	2	-2	8	0	27	5	26	13	10
29	---	0	-5	2	---	0	21	2	11	25	8	10
30	-3	0	-5	2	---	7	19	22	19	25	10	7
31	4	---	-8	2	---	11	---	12	---	24	13	---
Mean	---	-1	-2	0	0	5	11	17	20	21	20	10
Max	---	4	3	3	5	14	22	33	34	32	27	17
Min	---	-8	-8	-5	-4	-4	-3	0	0	0	8	-3

Solar radiation corrected for wind speed when wind speed greater than 5m/s based on the equation: CNR=DNR*

(1.0+0.021286*(windspeed-5.0)), where CNR is the corrected net radiation and DNR is uncorrected net radiation.

Net solar radiation, Vancouver Lake at Vancouver, Washington, water year 2012.

SOLAR RADIATION, WATTS PER SQUARE METER, NET VALUES

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	3	-3	-5	-2	0	---	---	---	14	17	22	12
2	0	1	-4	-3	0	---	---	---	15	22	22	13
3	0	0	-3	0	-2	---	---	---	17	15	28	15
4	---	2	-3	-2	0	---	---	---	2	29	26	15
5	0	-2	-3	-4	0	---	---	---	17	29	24	14
6	1	0	0	-1	-1	---	---	---	23	30	25	13
7	0	2	0	-1	-1	---	---	---	17	32	15	11
8	10	0	-7	0	0	---	---	---	8	33	21	8
9	2	1	-6	1	4	---	---	---	16	30	19	7
10	2	-3	-4	-4	0	---	---	---	25	28	20	13
11	3	-2	-3	-6	3	---	---	---	25	29	22	10
12	7	-1	-7	-4	4	---	---	---	6	29	21	11
13	0	0	-4	-2	0	---	---	---	20	27	22	9
14	2	-3	0	-4	0	---	---	---	29	25	21	9
15	3	0	2	-3	2	---	---	---	30	12	22	9
16	3	-3	1	-2	0	---	---	---	28	28	18	9
17	4	-3	0	-2	0	---	---	23	19	18	18	8
18	5	-2	0	---	0	---	---	20	14	11	4	8
19	-1	-4	0	1	3	---	---	18	15	24	14	4
20	2	-4	0	1	0	---	---	3	29	8	14	2
21	4	-3	-2	1	4	---	---	-2	32	28	16	3
22	6	-4	-5	-4	4	---	---	3	7	9	15	8
23	0	---	0	2	---	---	---	17	16	22	10	5
24	0	-4	0	0	---	---	---	10	24	26	17	6
25	0	-3	-3	0	---	---	---	26	14	26	14	---
26	0	2	0	-2	---	---	---	21	15	22	11	---
27	0	-2	-3	-2	---	---	---	16	28	14	14	---
28	-2	-4	-2	1	---	---	---	15	14	28	13	---
29	2	-2	-2	-2	---	---	---	28	18	28	13	---
30	0	-4	-5	3	---	---	---	25	10	24	16	---
31	-4	---	-3	3	---	---	---	11	---	25	15	---
Mean	---	---	-2	---	---	---	---	---	18	23	18	---
Max	---	---	2	---	---	---	---	---	32	33	28	---
Min	---	---	-7	---	---	---	---	---	2	8	4	---

Solar radiation corrected for wind speed when wind speed greater than 5m/s based on the equation: CNR=DNR*

(1.0+0.021286*(windspeed-5.0)) where CNR is the corrected net radiation and DNR is uncorrected net radiation.

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