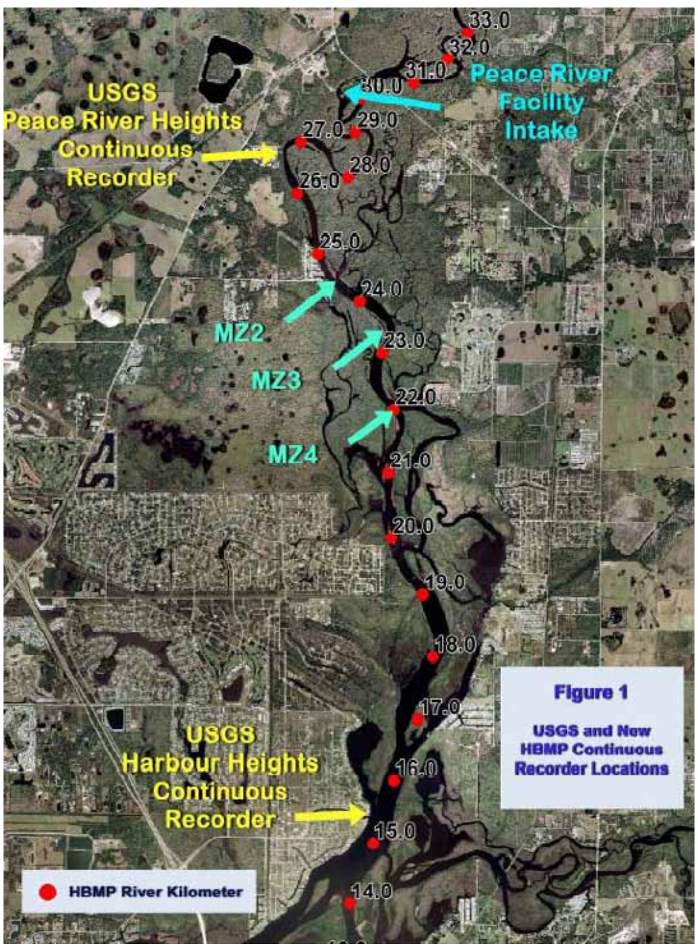
Summary of Low Flow "Pump Test" Results from Continuous Recorder Data

1.0 Overview

The primary, long-term goal of the combined Hydrobiological Monitoring Program (HBMP) study elements has been to provide the Southwest Florida Water Management District (District) with sufficient information to determine whether the water quality characteristics and biological communities of the lower Peace River/upper Charlotte Harbor estuarine system have been, are being, or may be significantly adversely impacted by permitted withdrawals by the Peace River Regional Water Supply Facility (Facility). The dry-season threshold for freshwater withdrawals based on the preceding day's Peace River at Arcadia flow was increased from 100 to 130 cfs year round as part of the Facility's 1996 permit renewal.



Over the past decade, the HBMP study design has included continuous (fifteen-minute interval) measurements of subsurface and near bottom water column conductivity (salinity) at two fixed USGS monitoring gages located at river kilometers (RK) 15.5 and 26.7 (Figure 1). Based on the recommendations of both the *2002 HBMP Comprehensive Report* and the HBMP Scientific Review Panel, supplementary continuous conductivity gages have also been established by the Peace River Manasota Regional Water Supply Authority (Authority) downstream of the existing upstream USGS Peace River Heights monitoring location. The primary objective of these additional HBMP continuous conductivity recording gages (MZ2 through MZ4, Figure 1), when combined with the information from the two existing USGS sites, was to obtain greater resolution of the direct relationships among freshwater flow, stage height and conductivity downstream of the Facility. Specifically, the purpose of this array of gages was to be able to determine the potential magnitude of Facility withdrawal salinity impacts within the reach of the river characterized by the movement of the freshwater/saltwater interface at flows near the 130 cfs withdrawal threshold.

2.0 Special 2006/2007 Pump Test

The Authority and District (with the aid of the HBMP Scientific Review Panel) have discussed the need to conduct a series of controlled "Pump Tests" using the detailed information gathered from the continuous recorders. These "pump tests" would actually measure the magnitude of salinity changes downstream of the Facility resulting from freshwater withdrawals. The primary objective of these tests would be to provide additional lines of evidence and field test the reliability of the overall conclusions reached by previous HBMP statistical models. These models have also uniformly suggested that the predicted potential salinity changes due to the permitted freshwater withdrawal schedule are expected to range from 0.1 to 0.5 psu. Such predicted changes are quite small given the normal ranges of salinity due to variations in both daily tides and seasonal freshwater inflows. Quantifying the magnitude as well as both the spatial and temporal extent of possible salinity changes are important criteria in understanding potential estuarine impacts due to current and projected future Facility water withdrawals.

Due to the severity of the unusually dry conditions that characterized much of 2006 and the unusual periods of low flow during much of the normal summer wet-season, the Authority had to rely on, and was unable to fully recharge, its off-stream reservoir and groundwater storage system during the usually high flow summer months. In response to the very low flows during the late fall of 2006 and in anticipation of predicted unusually dry conditions expected during early 2007, the Authority received authorization from the District (starting in December 2006) to temporally reduce the low flow cut off withdrawal threshold from 130 to 90 cfs, until after the anticipated beginning of the 2007 summer wet-season. This reduction in the low flow threshold allowed the Authority the opportunity to access more water from the river and reduce the demand on stored supplies. The temporary change also provided the Authority with the opportunity to run a series of "pump tests" both above and below the 1996 Permit's 130 cfs limit (Figure 2). Although not originally envisioned under these conditions, both the Scientific Review Panel and the District had previously suggested that it would be beneficial to collect such "pump test" data both at flows above and below the 130 cfs threshold.

3.0 Analyses of Data from Special Low Flow Pump Test and Comparisons with Model Predictions

Table 1 statistically summarizes salinities during 2006 at each of the two USGS and three HBMP continuous recorders, and indicates the observed magnitudes of seasonal and daily salinity ranges at each gaging location. As these summary statistics indicate, under the relatively dry conditions such as those that characterized much of 2006, salinity (conductivity) in the reach of the river downstream of the Facility naturally varies over a fairly broad range. The statistics on Table 1 also show that as long as the Facility's withdrawal schedule limits the potential changes in salinity (due to withdrawals) to the estimated (modeled) 0.1-0.5 psu, the Facility's impacts on salinity are expected to be small and may actually be difficult to directly measure.

Table 1
Seasonal and Daily Ranges of Salinity at the Two USGS and Three HBMP Continuous Recorders during 2006

Location	Annual Salinity Statistics				Daily Variability (Δ) of Salinity Statistics			
	Mean Salinity (psu)	Median Salinity (psu)	Minimum Salinity (psu)	Maximum Salinity (psu)	Mean Salinity Change (psu)	Median Salinity Change (psu)	Minimum Salinity Change (psu)	Maximum Salinity Change (psu)
Harbour Heights (RK 15.5)	8.1	7.6	0.1	24.7	6.0	6.0	0	14.3
MZ4 (RK 21.9)	2.7	0.9	0.1	18.6	3.4	3.1	0	13.7
MZ3 (RK 23.4)	2.0	0.5	0.1	18.3	3.1	2.3	0	14.1
MZ2 (RK 24.5)	1.6	0.4	0.1	16.5	2.8	1.9	0	13.3
Peace River Heights (RK 26.7)	1.1	0.3	0.1	14.1	1.6	1.0	0	10.4

Figure 2 depicts daily Peace River flow at the USGS Arcadia gage during the period of the "pump test" events conducted between December 2006 and May 2007. This figure indicates the relative timing of the events in relation to both the permit's 130 cfs threshold (dashed yellow line) and the District's temporary approved reduction to a 90 cfs cutoff (solid red line). River flow over this five month interval was actually above the 130 cfs threshold approximately 52 percent of the time, and below the temporary 90 cfs cutoff roughly 25 percent of the time. During the five month period, the Authority conducted a series of sixteen "pump test" events (depicted by red arrows) during which all withdrawals from the river ceased for 24 hours. The specific timing of each of these "pump test" events was based on a series of predetermined criteria.

- The predicted daily tide tables were reviewed to establish a potential series of consecutive days each month, when comparable tides were expected and were approximately similar in both timing and magnitude.

- Days were chosen to eliminate predicted sustained winds greater than 10 mph from either the north or south over the "pump test" period if at all possible. (Unless extremely strong and/or predicted to shift, winds from the east or west were considered to be of less consequence.)

- Whenever real-time provisional river flows for the USGS Peace River gage at Arcadia were within the selected target range (90 to 250 cfs), Facility staff checked both the predicted tides and expected weather (rainfall and wind) to determine if a "pump test" event could effectively be conducted.

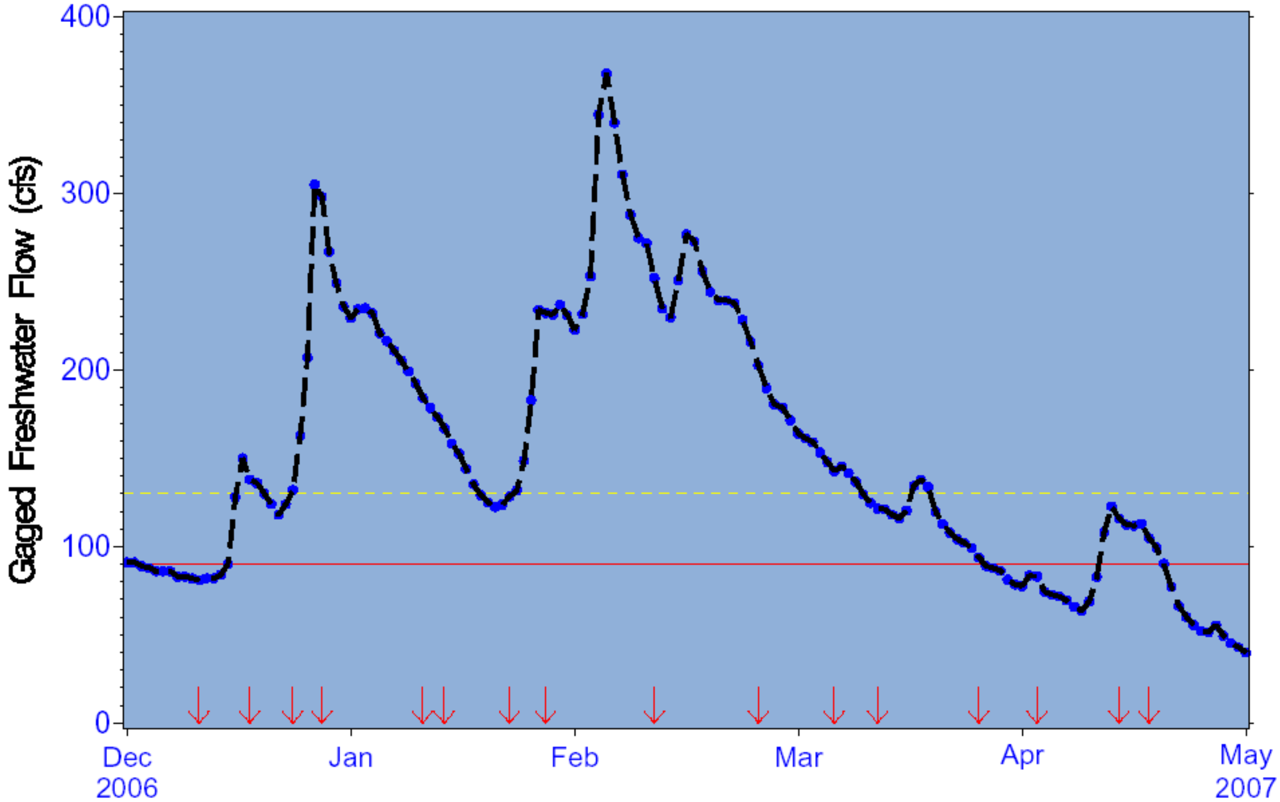


Figure 2 Daily gaged Peace River flow (cfs) at Arcadia during pump test period (Dec 2006 - April 2007). Upper yellow line denotes permit 130 cfs threshold, while lower red line indicates temporary 90 cfs cutoff. Red arrows indicate timing of 16 pump test events.

The majority of the individual "pump tests" during this initial series of sixteen events, as indicated, actually took place when river flows at the Arcadia gage were above 130 cfs.

- **Events when Arcadia flows were 130 cfs or greater**
  1. December 18th through 20th
  2. December 24th through 26th
  3. December 28th through 30th
  4. January 11th through 13th
  5. January 14th through 16th
  6. January 23rd through 25th
  7. January 28th through 30th
  8. February 11th through 13th
  9. February 24th through 26th
  10. March 6th through 8th

- **Events when Arcadia flows were between 130 and 90 cfs**
  1. March 12th through 14th
  2. April 14th through 16th
  3. April 18th through 20th

- **Events when Arcadia flows were less than 90 cfs**
  1. December 11th through 13th
  2. March 26th through 28th
  3. April 3rd and 4th * (no withdrawals were taken on the third day due to low provisional flows)

Figure 3 graphically shows the results of one of these sixteen "pump test" events conducted over a three day period between March 26th and March 28th, 2007. These results are highlighted here since conditions during this period were near ideal for assessing potential salinity impacts of Facility withdrawals very near the temporary 90 cfs cutoff. During the 1st day, the finalized USGS approved Peace River at Arcadia flow was 94 cfs and the Facility withdrew 11.1 cfs (based on the real-time provisional flow estimate of 111 cfs). During the second day, flow declined 5 cfs to 89 cfs, and there was no Facility withdrawal. The third day river flow declined another 1 cfs to 88 cfs and daily Facility withdrawal averaged 10.2 (again withdrawals were based on real-time provisional USGS estimated flow from the Arcadia gage, which were revised several months later downward based on adjusted field cross-section and calibration information).

- Day 1 (blue lines) – with withdrawals
- Day 2 (red lines) – without withdrawals
- Day 3 (black lines) – with withdrawals

Measured (USGS) and estimated (MZ2 and MZ4) gage heights for four of the monitoring locations along the HBMP transect (see Figure 1) are depicted in Figures 3a through 3d. The gage heights (water level) indicated for each of the three "pump test" days primarily reflect the integrated influences of tide and wind, which are the dominate factors affecting water levels in the lower river during periods of low freshwater inflow, such as characterized the December 2006 - May 2007 time period. As these graphics indicate, the daily patterns of changes in observed gage heights were very similar over the three day March 26th to 28th "pump test" period. Such relatively comparable gage height patterns allow any observed changes in conductivity (salinity) to be attributed to other factors, such as potential differences (increases) due to Facility freshwater withdrawals.

As the series of figures (3.a through 3.d) indicate, daily patterns of changes in conductivities (represented by the dashed lines) at each of the four monitoring locations along the HBMP monitoring transect directly reflect analogous patterns in water level or gage height due to the interactions of tide and wind. If withdrawals were having a measurable influence on conductivity/salinity, then the red dashed line (no withdrawals) should be appreciably lower than either the blue (preceding day) or black (following day) dashed lines representing conditions when the Facility was withdrawing water. Since such a pattern was not apparent in either this or any of the other fifteen "pump test" events, it is clear that (as predicted by previous models) the influences of withdrawals on salinity along the lower river are quite small using either the 130 cfs threshold or the temporary 90 cfs cutoff. The presented graphical analyses do suggest that at the highest tides, salinities during days with no withdrawals were occasionally briefly lower than at comparable stage levels when the Facility was withdrawing water. This pattern of small differences during flood and not during ebb tides suggests that the influences of withdrawals during low flows may exhibit subtle differences that may be lost to even statistical models. However, while such slight differences due to withdrawals may be observable, the graphical analyses again indicate that any such changes are extremely small and of short duration when compared to the normal range of salinity changes due to normal daily tidal variation, and longer term changes in flows.

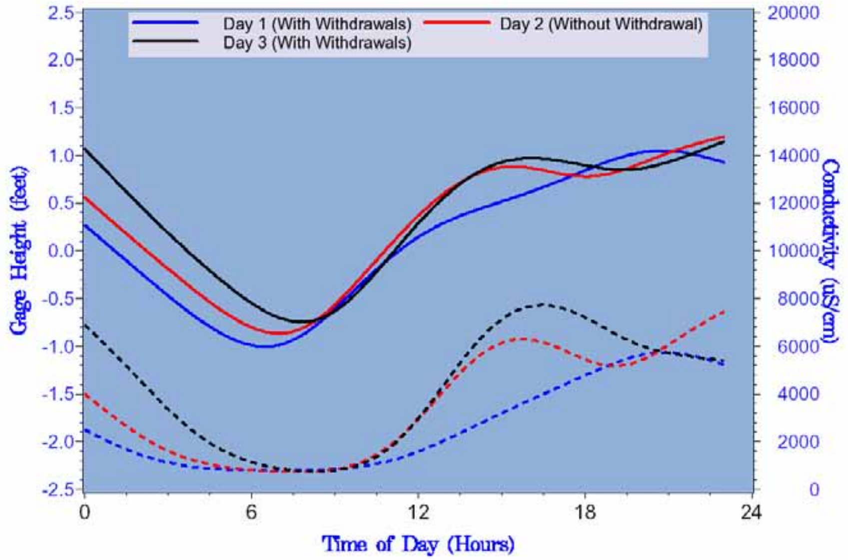


Figure 3.a Gage height (solid lines) and surface conductivity (dashed lines) at USGS Peace River Height Gage (RK 26.7)
March 26th through 28th, flows = 94, 89 & 88 cfs, withdrawals = 11.1, 0.0 & 10.2 cfs

HBMP Pump Test Report

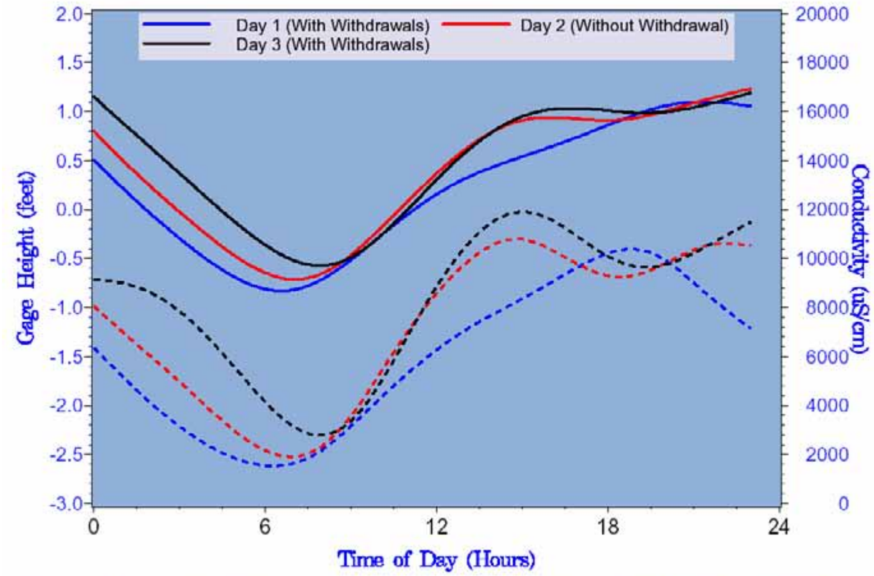


Figure 3.b Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ2 Gage (RK 24.5)
March 26th through 28th, flows = 94, 89 & 88 cfs, withdrawals = 11.1, 0.0 & 10.2 cfs

HBMP Pump Test Report

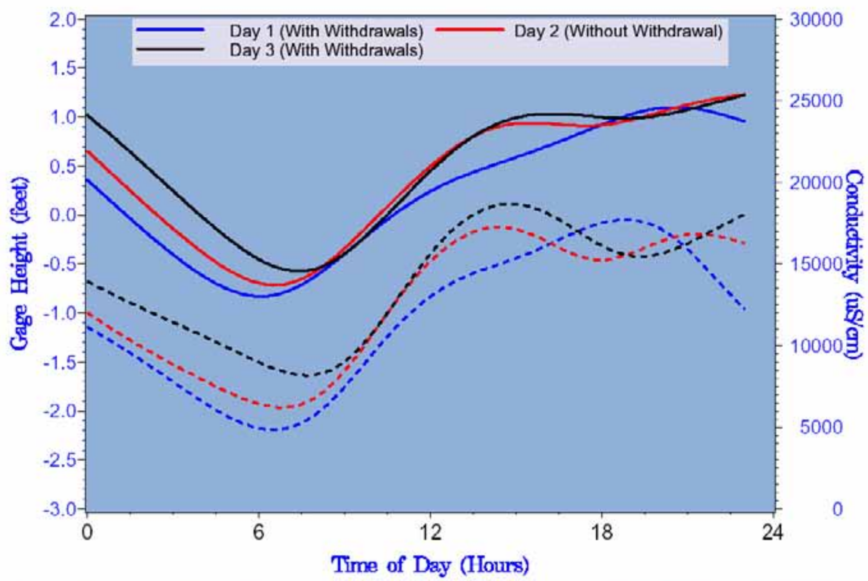


Figure 3.c Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ4 Gage (RK 21.9)
March 26th through 28th, flows = 94, 89 & 88 cfs, withdrawals = 11.1, 0.0 & 10.2 cfs

HBMP Pump Test Report

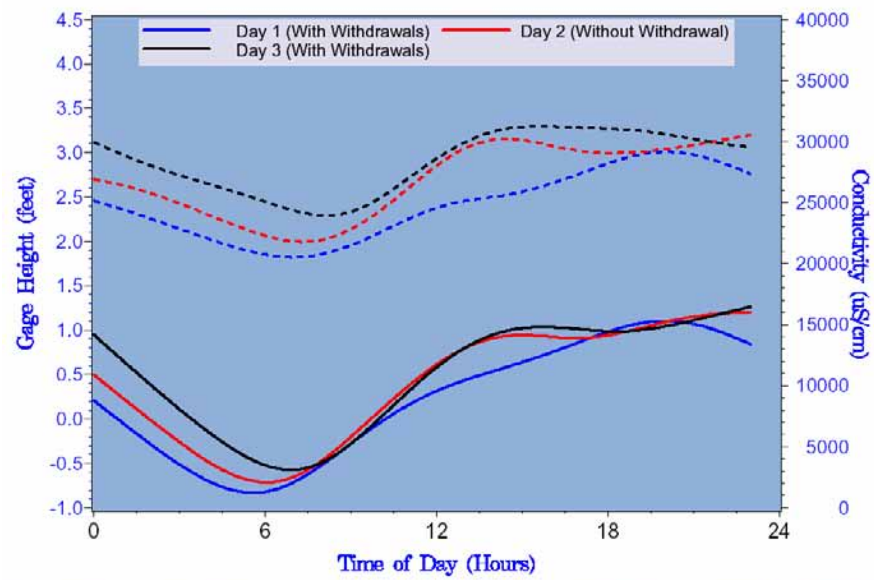


Figure 3.d Gage height (solid lines) and surface conductivity (dashed lines) at USGS Harbour Height Gage (RK 15.5)
March 26th through 28th, flows = 94, 89 & 88 cfs, withdrawals = 11.1, 0.0 & 10.2 cfs

HBMP Pump Test Report

The series of graphical analyses for each of the sixteen “pump test” events were evaluated in relation to the flow and withdrawal in order to determine the potential magnitude and duration of salinity changes during each event that might be attributable to Facility withdrawals. Analyses of the relationships between average hourly gage heights and conductivities showed that under ideal conditions of similar flows and tides, differences attributable to withdrawals were, as expected, relatively small given the normal daily range of variation. Analyses of the data found that salinity changes due to withdrawals were primarily confined to the peaks of incoming tides when differences in flows might be expected to have the greatest influences. The results of these graphical analyses are summarized in Table 2.

Table 2

Summary of Graphical Analyses
Maximum Salinity Changes Attributable to Facility Withdrawals

“Pump Test” Event	Daily Conditions		Estimated Changes in Salinity				
	“Revised” Arcadia Gaged Flows (cfs)	Facility Withdrawals (cfs)	USGS RK 15.5	MZ4 RK 21.9	MZ3 RK 23.4	MZ2 RK 24.5	USGS RK 26.7
Flows Above 130 cfs Threshold							
December 28th through 30th	271	26.8	NA	NA	NA	NA	NA
January 28th through 30th	239	21.0	< 0.1	< 0.1	< 0.1	-----	-----
February 11th through 13th	238	21.9	< 0.1	< 0.1	< 0.1	-----	-----
February 24th through 26th	181	20.9	< 0.1	< 0.3	< 0.1	< 0.2	-----
January 11th through 13th	178	17.4	< 0.1	< 0.4	< 0.2	< 0.2	-----
January 14th through 16th	159	15.5	NA	NA	NA	NA	NA
December 24th through 26th	158	13.2	NA	NA	NA	NA	NA
March 6th through 8th	143	15.6	< 0.2	< 0.4	< 0.2	< 0.1	< 0.1
January 23rd through 25th	136	11.7	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
December 18th through 20th	134	15.0	< 0.1	< 0.2	< 0.4	< 0.1	< 0.4
Flows Between 130 cfs Threshold and Temporary 90 cfs Cutoff							
March 12th through 14th	120	13.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
April 14th through 16th	113	13.6	NA	NA	NA	NA	NA
April 18th through 20th	98	12.6	< 0.5	< 0.5	< 0.8	< 0.5	< 0.5
Flows Below 90 cfs Cutoff							
March 26th through 28th	90	10.7	< 0.4	< 0.2	< 0.4	< 0.4	< 0.4
December 11th through 13th	82	9.6	< 0.3	< 0.2	< 0.2	< 0.3	< 0.3
April 3rd and 4th	79	7.0	< 0.2	< 0.2	< 0.2	< 0.1	< 0.1

* NA – analyses indicate either flow or tidal variability too great to accurately estimate salinity changes due to Facility withdrawals

----- dashed line indicates that under flow conditions, the recorder location is predominately fresh and there are no effects of withdrawals on salinity

Summary of Graphical Analyses Results

The following summarizes the primary findings and results of the graphical data analyses for the series of low flow "pump test" events conducted between December 1, 2006 and May 1, 2007.

- The summary results show expected declines in the influences of tidal patterns on salinity moving downstream with increasing flows. Potential changes in salinity resulting from Facility withdrawals are increasingly limited to the downstream reaches of the lower river as flows increase.

- The largest observed changes in salinity that could be directly related to withdrawals occurred during flows below the original 130 cfs threshold. The magnitude of salinity changes due to withdrawals was generally similar over a wide reach of the lower river.

- However, even when withdrawals occurred below the 90 cfs cutoff, the maximum observed differences were found to primarily occur at the top end of incoming tides.

- The observed maximum differences were well within the limits predicted by previous statistical models. In fact, when averaged over the entire range of the daily tidal cycles, directly observed daily changes were far less than those previously estimated by the statistical models.

4.0 Statistical Comparisons

A number of additional graphical and statistical procedures were further used to evaluate and confirm the magnitude of differences in surface salinities at each of the five continuous recorder locations under conditions with and without Facility withdrawals.

- Box & whisker plot comparisons were used to graphically depict average hourly surface salinities at the five continuous recorder locations along the HBMP monitoring transect during the three individual days of each "pump test" event.

- Statistical tests were used to determine if there were significant differences in salinity among days at individual locations during each of the "pump test" events.

- The available historical data for each of the five recorders were also assessed to determine the natural variability of surface salinities at each of the five recorder locations under conditions of Peace River at Arcadia flows of 50-70, 70-90, 90-110, 110-130, 130-150, and 150-170 cfs. Analyses were conducted to determine if such historical data collected using the 130 cfs threshold could be used to provide accurate comparisons with salinity data collected between December 1, 2006 and May 1, 2007 under the temporary 90 cfs cutoff.

Box & Whisker Plot Comparisons

Box & whisker plots were used to graphically depict average hour surface salinities at the five continuous recorder locations along the HBMP monitoring transect during each of the three individual days of each "pump test" event. Figure 4 provides an overview of the overall format of the statistical information provided in the graphical box & whisker depictions. Figure 5 shows the relative differences in salinity using box & whisker plots for the same March 26th through March 28th "pump test" sampling event shown in Figure 3 above.

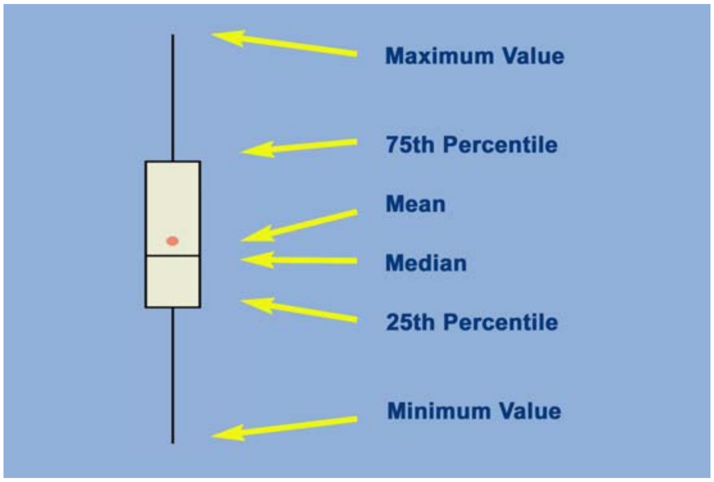


Figure 4. Diagram of box & whisker format

- **Top whisker extends to the maximum value**
- **Top of the box equals the 75th percentile**
- **Rose dot equals the mean**
- **Black line equals the median**
- **Bottom of the box equals the 25th percentile**
- **Bottom whisker extends to the minimum value**

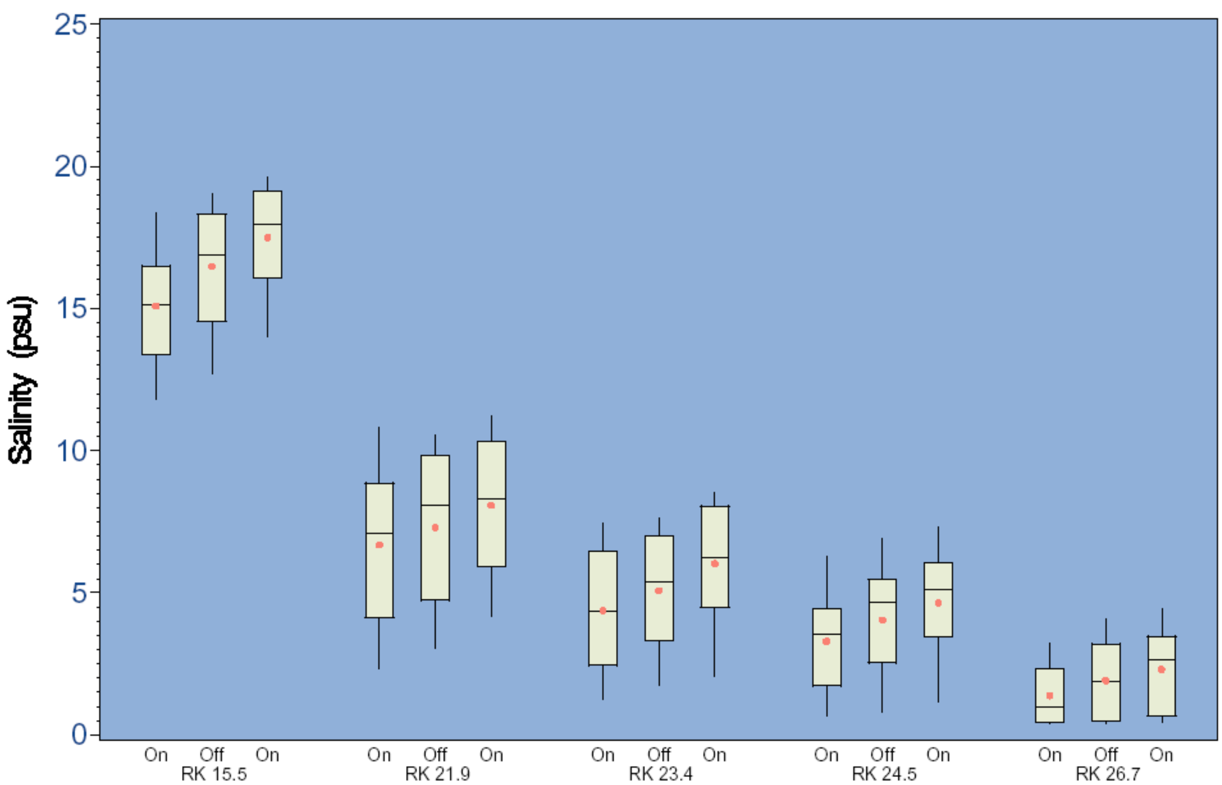


Figure 5 Boxplots of average hour salinities by location (RK) and by date (On=days with withdrawals, Off=days with no withdrawals)
March 26th through 28th, flows = 94, 89 & 88 cfs, withdrawals = 11.1, 0.0 & 10.2 cfs

- Attempts were taken in advance to limit the "pump tests" to those conditions characterized by very similar predicted tides and the events were conducted over short durations to limit fluctuations in flows. However, the actual field data show how variable daily surface salinities along the lower river can be under even relatively small variations in tide stage and flow.

- When all the box & whisker "pump tests" are compared from conditions of higher to lower flows, the sequence of figures visibly points out the overall pattern of increasing salinity and variability upstream as river flows decline.

- The results clearly show the relatively large influences that short term differences in tide stages can have on salinities even under relatively similar flow conditions along the entire lower river.

- Box & whisker plots even under relatively similar daily tidal patterns and flows do not clearly show any consistent daily differences in mean, median or range of variation of salinities at the monitoring locations among the two days with and the one day without Facility withdrawals.

Development of Statistical Models

Statistical models were developed using averaged hourly data gathered during the first four months of 2007 at the five continuous recording sites. The data were used to develop statistical models of salinity versus flow relationships using measured sub-surface salinities as the dependent variables, and expressions of gaged freshwater inflows minus withdrawals as well as measured stage (water level) as independent variables. The following assumptions and criteria were applied during the development of these models.

- The modeled flow terms were limited to total daily gaged freshwater inflows measured at the Peace River at Arcadia USGS gage. Some enhancement of the models would potentially have resulted from also including corresponding gaged flows from both Horse and Joshua Creeks (and for the Harbor Heights recorder location also using Shell Creek). However, these additional inputs were not included since a primary objective of the study was to determine specific relationships relative to the low flow threshold based on gaged river flows at the Arcadia gage.

- Actual daily withdrawals by the Facility were subtracted from the daily average Peace River at Arcadia flow for each observation in order to determine the final resultant flow terms.

- A second lagged, long-term cumulative flow term was applied in each of the statistical models to establish some indication of background conditions and the "resident memory" associated with the characteristic of the longer-term salinity gradient within the upper estuary.

- All gaged continuous recorder data were averaged over one-hour intervals. Stage heights corresponding with the same interval of the measured salinity were added to the models to account for the daily variability in the influences of tides/wind on salinity (see previous discussions).

- A final term was tested for each model to account for the interactions of flow with stage and tidal influences. When freshwater inflows are low (such as the spring dry-season), there are very close correlations between tidal stage and the observed daily variability in measured conductivities (salinity). However, as flow increases and overall conductivities decline, the influences of daily tidal variability on observed salinity patterns decline.

- As an initial step in the development of each statistical model, the SAS Stepwise General Linear Model and RSREG procedures were used to screen the potential significance of a number of possible applied linear, non-linear, and interactive terms. Logs of the flow term were tested to account for the often-observed curvilinear response of salinity to increasing freshwater flow. Conversely, non-transformed variables were used within the models for those independent terms found to have more linear interactions. (All model parameters were tested and met the statistical requirements for normal distributions due to the very large number of observations.)

- Using an iterative process, surface salinity models were developed for each of the continuous recorder sites using the fewest number of independent variables that were both significant at the 0.01 level and added appreciably (at least one percent) to the overall explained error of the model. In developing the statistical models, enhancement of the explained error (R-square) was considered secondary to increasing the establishment of enhancement of the relationships between predicted and observed salinities (model fit).

The initial surface salinity model for testing the reliability of the actual field data collected at each of the continuous recorder locations utilized the general following form. These models were then modified to include only those significant terms that directly increase the fit. (Tide stages for the three HBMP recorders were interpolated from the corresponding gage height measurements from the downstream and upstream USGS gages.)

$$Salinity = \beta_\alpha + (\beta_1 x\ Flow1) + (\beta_2 \times Flow2) + (\beta_3 xStage) + (\beta_4 x(Stage / Flow))$$

where:

β_α = specific intercept

β_1 = "short-terms" flow slopes (linear and/or non-linear)

β_2 = "long-terms" flow slopes (linear and/or non-linear)

β_3 = gage height specific slope

β_4 = gage height/flow interaction specific slope

The developed statistical models for each continuous recorder location were then used to estimate surface salinities both with and without withdrawals on an hourly basis during the ten day interval in 2007 between April 12th and April 21st. Finalized USGS gaged flow estimates for the Peace

River at Arcadia ranged from 122 to 77 cfs over this ten day interval. However, based on available provisional USGS flow information, the Facility was withdrawing water (except for two "pump test" days) over the entire period. Table 3 provides estimates of differences in selected metrics of modeled surface salinities at each of the continuous recorder monitoring locations during this ten day period under conditions with and without withdrawals.

Table 3

Comparisons of Predicted Salinities from the Statistical Models With and Without Withdrawals for the Ten-Day Period between April 12th - 21st

Continuous Recorder Location	Mean Salinity		Median Salinity		Minimum Salinity		Maximum Salinity	
	With Withdrawals	Without Withdrawals	With Withdrawals	Without Withdrawals	With Withdrawals	Without Withdrawals	With Withdrawals	Without Withdrawals
Harbour Heights (RK 15.5)	15.8	15.6	15.7	15.5	10.9	10.4	21.2	21.0
MZ4 (RK 21.9)	6.9	6.5	6.9	6.5	1.9	1.3	11.8	11.5
MZ3 (RK 23.4)	4.8	4.5	4.7	4.5	0.5	0.0	9.0	8.7
MZ2 (RK 24.5)	3.7	3.5	3.7	3.5	0.0	0.0	7.2	7.0
Peace River Heights (RK 26.7)	1.9	1.4	1.8	1.4	0.0	0.0	3.9	3.8

The results of these analyses were similar to those of previous statistical models that have indicated that the magnitude of salinity differences due to Facility withdrawals were probably between 0.1 and 0.5 psu, and are relatively small even at flows below the 130 cfs threshold when compared to the normal range of salinity variation observed due to tides and wind.

5.0 Summary of Key Report Findings

The following series of bullets provide brief summaries of some of the key findings presented in this report.

- During the period of study between December 1, 2006 and May 1, 2007, Peace River at Arcadia gaged flows were between the previous 130 cfs threshold and the temporary 90 cfs cutoff only approximately twenty-four percent of the time. This and the timing of such occurrences suggest that any salinity changes downstream of the Facility due to the temporary reduction of the low flow cutoff from 130 cfs to 90 cfs would have been limited in both frequency and duration.

- Graphical analyses of the relationships between average hourly gage heights and conductivities showed that under ideal conditions of similar flows and tides, differences attributable to withdrawals were, as expected, relatively small given the normal daily range of variation.

- These graphical analyses of continuous recorder data found that salinity changes due to withdrawals were primarily confined to the peaks of incoming tides when differences in flows might be expected to have the greatest influences.

- The results showed declines in the influences of tidal patterns on salinity moving downstream with increasing flows. Potential changes in salinity resulting from Facility withdrawals were also found to increasingly move further downstream as river flows increased.

- The largest directly observed changes in salinity apparently related to withdrawals occurred during flows below the original 130 cfs threshold. The magnitude of such changes was found to be generally similar over a relatively wide reach of the lower river.

- However, even when withdrawals occurred below the 90 cfs cutoff, the maximum observed differences were found to predominantly occur at the top end of incoming tides.

- The maximum salinity differences observed from the graphical analyses of the continuous recorder data were well within those limits predicted by previous statistical models. In fact, when averaged over the entire range of the daily tidal cycles, these directly observed daily changes were far less than those estimated from such statistical models.

- The graphical analyses visibly point out patterns of increasing salinity and variability upstream as river flows decline, and the relatively large influences that short-term differences in tide stages can have on salinities even under relatively similar flow conditions along the entire lower river.

- Graphical box and whisker plot comparisons did not clearly show any consistent daily differences in mean, median or range of variation of salinities at any of the monitoring locations among the two days with and the one day without Facility withdrawals.

- Further statistical comparisons of mean daily salinities further supported these findings.

- Additional analyses were conducted to determine whether previous historical continuous recorder data collected when the 130 cfs threshold was being applied could be used to provide accurate comparisons with surface salinity data collected during the five month reporting period between December 1, 2006 and May 1, 2007 when the temporary 90 cfs cutoff was in effect. The results indicated that, even categorizing for differences in flows, it was extremely difficult to make comparisons using such data. Salinity differences caused by more dominate factors such as the preceding flow conditions, and/or variability in the magnitude and duration of tidal cycles obscured any differences due to changes in the low flow threshold from 130 to 90 cfs.

- Low flow statistical models were developed using averaged hourly data gathered during the first four months of 2007 at the five continuous recording sites. The resulting statistical models were found to be relatively accurate (having R-square values between 0.70 and 0.87) in predicting the frequency, duration and magnitude of the observed daily variation in salinity along the HBMP monitoring transect.

- The results of analyses using these specifically developed low flow models were similar to those of previous statistical models, which indicated that the magnitude of salinity differences due to Facility withdrawals were probably between 0.1 and 0.5 psu. The model results indicated that such salinity changes due to Facility withdrawals were relatively small even at flows below the 130 cfs threshold when compared to the normal range of salinity variation observed due to tides and wind.

The temporary reduction in the low flow threshold from 130 to 90 cfs increased the number of days of actual river pumping and the ability to store additional water by less than 25 percent of the time between December 2006 and May 2007. Based on preliminary analyses of the "pump test" results, it is apparent that any changes in salinity due to this change in the threshold were relatively small and temporary, and not expected to have resulted in widespread or sustained responses by the biological communities along the lower river.

6.0 Responses to Questions Raised by HBMP Scientific Review Panel

A presentation of the initial draft findings of the "pump test" results was made to the HBMP Scientific Review Panel in December 2007 in conjunction with the District's presentation of the proposed methodologies for the draft minimum flows and levels (MFLs) for both the lower Peace River and Shell Creek. The following provides summary information in response to the two questions raised by panel members in response to the initial "pump test" findings.

Use of Predictive Models to Assess Spatial and Temporal Salinity Changes

Several panel members requested that similar statistical models based on the continuous recorder data could be used to address the question of, "How much of a difference in salinity is predicted to occur over what stretch of the river, over what period of time, under the existing diversion schedule?"

In order to provide answers to this question, new empirical statistical surface salinity models were developed using data available through the end of 2007 for each of the five continuous recorder monitoring locations (Figure 1). The series of site specific statistical models were constructed using averaged hourly data gathered during the periods-of-record for each recorder location. These statistical models were then used to produce the graphical depictions indicating predicted surface salinity increases above the "baseline," no-withdrawal scenario under both actual and theoretical maximum Facility withdrawals during each of the past four years.

The following briefly summaries the results of the analyses for each of the five continuous recorder sites. Generally the predicted salinity increases were larger (around 0.5 psu) and more frequent downstream. However, during the very low flows that characterized 2007, and under the District's revised emergency withdrawal schedule, the developed statistical models predicted instances of higher salinity at the more upstream recorder sites.

- **RK 15.5** (USGS Harbour Heights Gage) – Under conditions when combined upstream USGS gaged freshwater inflows (lower Peace River and Shell Creek) are above approximately 1500 cfs, the constructed statistical model predicts that neither actual nor maximum permitted Facility withdrawals result in increases in salinities at this location. Seasonally, average daily predicted salinity increases resulting from maximum permitted withdrawals are shown to be around 0.5 psu.

- **RK 21.9** (HBMP MZ4 Gage) **–** During both the relatively wet years of 2004 and 2005, the constructed statistical model indicates that surface salinities at this location in the lower river were only briefly influenced by withdrawals. However, during the much drier conditions that characterized much of 2006 and 2007, Facility withdrawals are predicted to have resulted in salinity increases typically in the range between 0.3 and 0.5 psu. The model further indicates notable differences in the predicted salinity under similar flow conditions between the first part and the end of 2007. This expected result reflects the cumulative impact of the recent extreme drought conditions and the influences of seasonally increasing salinity levels that developed in regions of upper Charlotte Harbor and the lower Peace River.

- **RK 23.4** (HBMP MZ3 Gage) **–**Both the frequency and magnitude of the salinity increase due to withdrawals during the wetter years (2004 and 2005) at this recorder location are less that those predicted at the more downstream sites. However, during the drier periods of 2006 and 2007, some of the USGS's downward revisions of provisional flows and the District's emergency changes to the withdrawal schedule in December 2006 resulted in periods when salinity increases due to actual withdrawals exceeded those estimated by applying the maximum 1996 permitted amounts. In addition, the unusually high salinities in this reach of the lower river resulting from the extended 2007 drought conditions briefly resulted in predicted salinity increases above those typically seen downstream (0.5 – 1.0 psu).

- **RK 24.5** (HBMP MZ2 Gage) – The predicted salinity increases were predicted to be less than corresponding changes downstream during the wetter years of 2004 and 2005, exhibit very similar seasonal patterns to those predicted immediately downstream at RK 23.4 during the much drier conditions that characterized much of both 2006 and 2007.

- **RK 26.7 (**USGS Peace River Heights Gage) **–** The increases in surface salinities predicted at this upstream location (Figure 1) are reduced in comparison with the more downstream sites during both wetter and drier time intervals. Even following two years of drought, the predicted salinity increases due to Facility withdrawals at the end of 2007 were always below 0.4 psu.

The developed statistical models were used to further indicate relative predicted averaged increases in surface salinities along the lower Peace River HBMP monitoring transect resulting from Facility withdrawals, seasonally during each of the past four years and then overall combining the predicted increases during the wet and dry years between 2004 and 2007. The following conclusions summarize the findings presented in Table 6.3.

- 2004 was characterized by a relatively typical annual seasonal pattern, with a much wetter than usual end of the summer wet season. Spatially, under such flows, the greatest increases in salinity resulting from Facility withdrawals were predicted downstream at the Harbour Heights recorder, and then progressively decreasing moving upstream. Seasonally, as expected, the largest increases were predicted to have occurred during the period of low flows during the spring dry-season.

- Seasonally, the spatial distributions of predicted salinity increases due to withdrawals during 2005 clearly reflect the much wetter than usual conditions that characterized much of the year. This is most clearly shown by the very low predicted salinity increase at the more upstream recorder locations.

- Conversely, the influences of the increasing drought conditions that characterized the 2006-2007 interval are shown by higher salinity changes comparatively occurring much further up stream. In fact, the models suggest that the largest average changes in salinities (still below 0.5 psu) during the typically wet months of 2007 occurred upstream below RK 23.4 (Navigator Marina) rather than at the downstream recorder near Harbour Heights (RK 15.5).

- Overall, the spatial gradient of predicted salinity increases shows a strong declining pattern moving upstream. Seasonally, the period of the greatest potential changes occurs during the typical spring dry-season, and the smallest changes are predicted during the normal summer wet-season.

Comparisons with Previous Empirical Model Results

Panel members also suggested that these salinity results should be compared to predicted values from previous existing empirical modeling tools developed to assess the potential impacts of Facility withdrawals on the salinity structure of the lower Peace River/upper Charlotte Harbor estuarine system.

The preceding statistical models were specifically developed from hourly averaged data gathered over the period-of-record at each of the current five continuous recorder locations along the lower Peace River monitoring transect. These statistically based models were applied to predict salinity changes due to Facility withdrawals using measured hourly variations in gage height with daily averaged rates of freshwater inflows and withdrawals. Historically, there have been a number of previous modeling efforts that have similarly attempted to quantify the potential impacts of Peace River Facility withdrawals on both the salinity structure of the lower river as well as the movement of specific isohalines. These previous analyses have generally relied on monthly or daily averaged values, and typically did not account for estimated tidal influences (gage height). Overall, the results of these previous efforts have suggested the predicted effects of freshwater withdrawals on salinity to typically be between 0.1-0.5 psu, and probably could not easily be detected given the normal distributions or daily tidal ranges of salinity along the lower Peace River/upper Charlotte Harbor HBMP monitoring transect. Table 4 briefly summarizes the significant conclusions of both the current "pump test" results and previous historic modeling efforts used to predict the relative impacts of Facility withdrawals on lower Peace River salinity/isohaline changes.

Table 4
Summary of Previous Lower Peace River Estuary Salinity / Isohaline Models

Study	Year	Descriptions	Summary of Potential Impacts of Withdrawals
University of Miami	1975	Statistical models were developed from monthly salinity data collected between 1973-1974 at fixed sampling locations along the lower Peace River, and Arcadia gaged flows.	Potential increase of 1.3 to 3.2 psu with 30 mgd withdrawals during flows of 100 cfs
Environmental Quality Laboratory	1982, 1984, 1989, 1996	Statistical models were developed of surface and bottom salinities at HBMP long-term fixed monitoring sites in the lower river and upper Charlotte Harbor based on monthly data and daily gaged freshwater inflows and withdrawals. Additional models were used to indicate the spatial variability of both freshwater interface and isohalines in relation to inflows and withdrawals.	Less than 0.5 psu change under 1988 revised withdrawal schedule, and isohaline movement less than 0.4 kilometers
2000 HBMP Midterm Interpretive Report	2002	Long-term monthly HBMP fixed station and moving isohaline data were combined to develop statistical models of the spatial salinity relationships in the lower Peace River with daily gaged inflows and withdrawals.	Less than 0.5 psu change under the 1996 revised permit withdrawals schedule
Janicki Environmental	2002	Updated long-term monthly HBMP fixed station and moving isohaline data were used to develop predictive models of salinity water column profile and relative isohaline relationships in the lower Peace River with daily gaged inflows and withdrawals.	Average potential increases of 0.1 to 0.3 psu in salinity and upstream movement of 0.1 to 0.3 kilometers of the isohalines under 1996 withdrawal schedule
2002 HBMP Comprehensive Summary Report	2004	Statistical models were developed using hourly averaged subsurface and near bottom salinities collected at 15-minute intervals between 1997 and 2002 at river kilometers 15.5 and 26.7 with corresponding stage level and daily gaged inflows and Facility withdrawals	Increases in salinities at each site under 1996 permit conditions predicted to be less than 0.4 psu (actual predicted increases have exceeded this approximately ten percent of the time).
Evaluation of Low Flow "Pump Test" Findings using Observed Data and Modeled Results from the Lower Peace River USGS and HBMP Continuous Recorders	2008	The primary object of this report was to graphically and statistically summarize and present conclusions from a series of sixteen "pump test" events conducted during the period between December 2006 and May 2007. Statistical models were developed using hourly averaged salinities collected at 15-minute intervals at river kilometers 15.5, 21.9, 23.4, 24.5 and 26.7 with corresponding stage level and daily gaged inflows and Facility withdrawals.	The results of specifically developed low flow models indicated that the magnitude of daily salinity differences due to withdrawals were typically between 0.1 and 0.5 psu, and somewhat higher during the recent drought. The largest differences were observed were generally were confined to the top end of incoming tides.

Contents

Executive Summary

Evaluation of Low Flow "Pump Test" Findings Using Observed Data and Modeled Results from the Lower Peace River USGS and HBMP Continuous Recorders

1.0 Introduction and Overview

The primary objective of this report is to graphically and statistically present the results and conclusions from a series of sixteen "pump test" events conducted by the Peace River Manasota Regional Water Supply Authority (Authority) during the period between December 2006 and May 2007. In response to the historically very low summer flows that occurred during the 2006 summer wet-season, combined with projected dry conditions during the spring of 2007, the Authority received permission from the Southwest Florida Water Management District (District) in late November 2006 to temporarily reduce the low flow threshold specified in the 1996 water use permit (WUP) from 130 cfs to 90 cfs measured at the Peace River at Arcadia USGS gage. The following series of topics are presented and discussed in this report.

- A brief generalized overview of the continuous recorder monitoring elements associated with the lower Peace River Hydrobiological Monitoring Program (HBMP).

- A summary of the results of previous modeling efforts designed to quantify the magnitude, and temporal and spatial distribution of salinity changes resulting from freshwater withdrawals.

- A review of the established criteria used in designing and implementing the controlled river "pump test" monitoring events.

- The results and conclusions of the measured and modeled salinity changes resulting from temporary withdrawals below the 130 cfs threshold, based on graphical and statistical analyses conducted using the information from the five continuous (15-minute interval) conductivity recorders located downstream of the Peace River Water Treatment Facility Facility).

The primary, long-term goal of the combined HBMP study elements has been to provide the Southwest Florida Water Management District (District) with sufficient information to determine whether the water quality characteristics and biological communities of the lower Peace River/upper Charlotte Harbor estuarine system have been, are being, or may be significantly adversely impacted by permitted withdrawals of the Peace River Regional Water Supply Facility (Facility). A further objective of the ongoing base of ecological information developed in conjunction with the HBMP has been to provide the District with critical information related to the estuarine system's overall status and relative "health," by evaluating the status and trends of selected water quality and biological characteristics. Over a period of nearly a decade, the HBMP monitoring study design has included continuous (fifteen-minute interval) measurements of subsurface and near bottom water column conductivities at two fixed USGS monitoring gages located at River Kilometers (RK) 15.5 and 26.7 (**Figure 1.1**). The particular locations of these two gages on existing docks at Harbour Heights and Peace River Heights were established in part due to the need of USGS staff to be able to have land based access to facilitate the ease of routine maintenance and downloading of data. When compared to corresponding flows at the Peace River at Arcadia gage, the influences of tide, wind and antecedent flow conditions can, both individually and combined under low and moderate flows, result in a wide range of variation in daily averaged conductivity measurements at the more downstream Harbour Heights gage (located at RK 15.5). In comparison, the influences of these confounding affects is often somewhat less at the more upstream USGS Peace River Heights gaging site (located at RK 26.7).

The dry-season threshold for freshwater withdrawals based on the preceding day's Peace River at Arcadia flow was increased from 100 to 130 cfs year round as part of the Facility's 1996 permit renewal. The upstream reach of the river where the USGS Peace River Heights recorder is located (River Kilometer 26.7) is normally characterized by freshwater conditions when river flow at the USGS Peace River at Arcadia gage reaches 130 cfs. As a result of this freshwater condition, the location of the more upstream USGS continuous recording gage is appropriate in assessing seasonal and potential long-term systematic shifts in the freshwater/saltwater interface during low levels of freshwater inflow. It is however extremely doubtful if the direct influences of Facility withdrawals can normally be measured at this location, due to the 130 cfs withdrawal threshold.

The *2002 HBMP Comprehensive Summary Report* (finalized in September 2004) and the HBMP Scientific Review Panel therefore recommended that a series of additional continuous conductivity gages be established by the Authority downstream of the existing upstream USGS Peace River Heights monitoring location. The primary objective of these additional HBMP continuous conductivity recording gages, when combined with the two existing USGS sites, was to obtain greater resolution of the direct relationships among freshwater flow, stage height and conductivity downstream of the Facility during periods of withdrawals. The prime purpose of these additional gages was to be able to specifically determine the potential magnitude of Facility withdrawal salinity impacts within the reach of the river characterized by the movement of the freshwater/saltwater interface at flows immediately above the 130 cfs threshold. As such, these new HBMP gages provide additional direct measures of potential salinity changes do to Facility withdrawals under lower flow conditions.

The initial first step to deploying the additional HBMP continuous recorders was to determine the required spatial distribution of potential monitoring sites necessary to maximize their ability to detect salinity changes (impacts) that could be directly attributed to Facility freshwater withdrawals. In January 2004, intense field sampling was conducted to assess the sources and short-term tidal differences in ion balances near the freshwater/saltwater interface. In combination with that effort, the hourly spatial movement of the interface was determined under typical tidal conditions and a gaged Peace River at Arcadia flow of 285 cfs (Section 7, *2002 HBMP Comprehensive Summary Report*). *In situ* water column profiles taken during the monitoring event indicated that the water columns both above and below the designated 500 us/cm interface were well mixed. Upstream of the interface river conductivities generally ranged from 460 to 490 us/cm, while immediately downstream of the interface conductivities were in the range of 700 to 800 us/cm. Table 1.1 indicates that, during the first three hours immediately following high slack tide (at 7:47 am), the freshwater/saltwater interface rapidly moved downstream and was clearly distinct (confined to a narrow band of less than 0.01 kilometer).

However, when the interface reached the area of the river near River Kilometer 23.2 its further downstream movement rapidly declined, even though the tide continued to go out. During this period the exact location of the interface also became far less distinct, often covering as much as 0.1 kilometer.

Table 1.1

Relative Spatial Movement of the Freshwater/Saltwater Interface Over the Tidal Cycle

Time	7:47 am	8:59 am	10:00 am	11:06 am	11:59 am	1:04 pm	1:58 pm	2:55 pm	4:05 pm
River Kilometer	25.9	25.0	23.5	23.2	23.1	23.0	22.9	23.0	23.1

Over this typical tidal event, the downstream distance over which the freshwater/saltwater interface was observed to have moved was approximately three kilometers between high and low slack tides. These results provided an indication of the spatial extent (see **Figure 1.1**) along the lower river over which the interface could be expected to fluctuate when Facility withdrawals might be expected to exhibit the greatest influences on upper river salinity patterns. It should also be noted that the observed tidal movement of the interface was approximately an order of magnitude greater than the potential isohaline movements previously predicted (see below) by the various statistical salinity models developed for the lower Peace River estuarine system.

These existing statistical models and graphical analyses of salinity/flow relationships were reviewed from the long-term HBMP fixed stations and USGS continuous recorders in this reach of the lower river. These results were then evaluated in relationship to potential existing physical structures (docks, pilings, etc.) to which additional continuous recorders might be attached. Three Manatee Speed Zone markers were chosen for the initial deployment of three new HBMP continuous recorders in December 2005, the locations of which are indicated in **Figure 1.1**. Near surface conductivity and temperature are measured at 15-minute intervals at each of these sites.

- **MZ4 –**The Manatee Speed Zone Sign located on the Peace River near the Liverpool side channel (River Kilometer 21.9).

- **MZ3** – The Manatee Speed Zone Sign located on the Peace River at River Kilometer 23.4.

- **MZ2 –** The Manatee Speed Zone Sign located on the Peace River just downstream of the Navigator Marina (River Kilometer 24.5).

2.0 Results of Previous Modeling Efforts

A number of previous modeling efforts have historically been conducted in different attempts to quantify the potential impacts of Peace River Facility withdrawals on both the salinity structure of the lower river and the movement of the freshwater/saltwater interface (as well as isohalines). A series of statistical models of salinity versus flow and withdrawal relationships at "fixed" lower Peace River monitoring sites were developed as part of previous HBMP Summary Reports in the late 1980s, 1990s and early 2000s. The Southwest Florida Water Management District (Janicki Environmental 2002) has also developed statistical salinity/flow withdrawal models at selected fixed long-term sampling sites along the HBMP monitoring transect. These modeling efforts have been utilized to formulate predictions of daily salinity differences of both actual and maximum permitted withdrawals relative to no withdrawal scenarios. The conclusions of these modeling efforts similarly suggested that the predicted effects of freshwater withdrawals on salinity would typically be between 0.1-0.5 psu and probably could not easily be detected given the normal distributions or daily tidal ranges of salinity along the lower Peace River/upper Charlotte Harbor HBMP monitoring transect.

The following briefly summarizes the objectives and significant conclusions of each of the historic lower Peace River salinity/isohaline modeling efforts (see **Table 2.1**).

2.1 University of Miami

The Rosenstiel School of Marine and Atmospheric Science (University of Miami) (Michel *et al.* 1975) evaluated potential environmental impacts in conjunction with General Development Corporation's initial assessment of the feasibility of locating a regional water supply system on the Peace River in Desoto County near State Road No. 761. The university research team developed a series of statistical relationships for selected areas of the lower river downstream of the proposed Peace River Facility location using freshwater flow, tide and salinity based on data collected between 1973 and 1974. These data were subsequently used to calibrate the first initial numerical models utilized to characterize the salinity distributions with and without Facility withdrawals under the normal range of variation in flows during both extended wet and dry periods.

Worst-case conditions were modeled assuming freshwater withdrawals during naturally occurring periods of low river flow (50 cfs) well below the current permitted Peace River at Arcadia gage 130 cfs cutoff. The developed models suggested that increased salinities in the range of 1.3 to 3.2 psu would be observed under withdrawals of 30 mgd (46 cfs) during periods when Arcadia gaged Peace River flow was only 100 cfs. The report (Michel *et al.* 1975) concluded that "under these conditions of flow and withdrawal, biological data indicated that such slight salinity increases, above the naturally occurring values of low flow periods, should add little additional stress on the plants and animals of the study area." This conclusion was based on what was found to be the highly dynamic natural seasonal changes in salinity within portions of the lower Peace River due to difference in flows during wet and dry periods.

2.2 Environmental Quality Laboratory

A series of statistical models were developed based on the long-term accumulation of HBMP fixed station salinity and isohaline information. Statistical models of sub-surface and near-bottom salinity, and/or the relative locations of isohalines, were used to assess the spatial magnitude of seasonal salinity variations in response to annual and long-term patterns in gaged freshwater inflows, as well as projected changes resulting from Facility withdrawals. The results of these ongoing modeling efforts were historically presented in conjunction with previous HBMP summary reports (EQL 1982, 1984, 1989, 1996). Overall, the results of these long-term HBMP modeling efforts suggested that the predicted increases in salinity would be less than 0.5 psu, and that the potential movement of isohaline locations would be less than 0.4 kilometer. Previous HBMP Summary Reports have concluded that such predicted changes are far less than the observed typical natural daily tidal variations, and that any impacts due to Facility withdrawals should be buried within the order of magnitude greater natural “noise” of daily and seasonal variability.

2.3 2000 Midterm Interpretive Report

As part of the *2000 Midterm Interpretive Report* analyses, statistical models were developed with the objective of establishing “predictive” relationships between gaged inflows and the spatial salinity structure of the lower Peace River. These models were then applied in order to discern the incremental effects of permitted withdrawals on the salinity structure of the estuary downstream of the Facility.

Model results indicated that, on average, the influences of past withdrawals on the spatial distribution of salinity patterns in the lower Peace River have historically resulted in maximum changes of less than 0.3 psu. These model results also indicated that the largest changes resulting from past withdrawals have occurred between River Kilometers 14 and 18 in the lower Peace River. Statistical models were then used to predict the potential magnitude of salinity changes expected under maximum future permitted daily withdrawals under conditions of Peace River at Arcadia flows between 200 and 1,000 cfs. The modeled results predicted maximum salinity increases < 0.5 psu occurring between River Kilometers 14 and 18 when Arcadia flows range between 400 and 1000 cfs. Under conditions of flows of 200 cfs at Arcadia, the models predicted similar maximum increases in salinity (< 0.5 psu) occurring further upstream.

2.4 Janicki Environmental (2002)

The Southwest Florida Water Management District (Janicki Environmental 2002) re-evaluated the regression analyses of salinity/streamflow interactions in the lower Peace River estuarine system in order to further quantify salinity and isohaline location relationships with inflows using updated HBMP data through 1999. The study’s primary objective was to assist review of the HBMP in evaluating the salinity regime of the lower Peace River/upper Charlotte Harbor system, by determining the relative potential magnitude of salinity changes directly associated with Peace River Facility freshwater withdrawals.

Updated salinity models were developed for a series of seven "fixed" sites located along the lower Peace River transect from just downstream of the river's mouth (RK –2.4) upstream to a point (RK 25.9) below the Facility. Best-fit regression models were used to predict salinities at each location, at the four water column profile depths, for incremental percentiles of flow under three differing withdrawal scenarios.

- "No Withdrawals"
- "Actual Historical Withdrawals"
- "Maximum Theoretical Withdrawals" as per the 1996 permit schedule

A corollary task was to develop updated regression models of the predicted spatial locations of the four monitored "moving" isohaline locations (0, 6, 12 and 20 psu) in relation to variations in freshwater inflows under the same three withdrawal scenarios.

The key findings of this study indicated that:

- A considerable amount of natural variation in salinity occurs independent of flow over a wide range of freshwater inflows.

- The modeled salinity increases predicted at the "fixed" sampling sites along the lower Peace River ranged from between 0.1 and 0.3 psu as a direct result of Facility withdrawals under the maximum permitted conditions.

- The predicted differences in relative spatial locations of the four surface isohalines due to withdrawals were found to be small, projected as being only 0.1 to 0.3 kilometers under maximum permitted withdrawals.

2.5 2002 HBMP Comprehensive Summary Report (2004)

Statistical models were developed as part of this report using the 15-minute conductivity and stage height data from the two lower Peace River USGS continuous recorders (RK 26.7 and 15.5). These models were then used to answer these questions:

1. What would have been the average differences in salinities at each of these sites if freshwater withdrawals had not taken place?

2. What would the predicted changes in salinities have been at these two locations downstream of the Peace River Facility under the maximum withdrawals allowed under the current permit?

The following conclusions and inferences were drawn from the summary results.

- Facility withdrawals were found to have no effect on salinity approximately thirty to forty percent of the time, due to the combined influences of the 130 cfs permit cutoff criteria, and the fact that Facility withdrawals cannot change salinity when flows are high enough that salinities are zero at the gaging site over the entire range of the daily tidal cycle.

- Overall, the models indicated that the influences of Facility withdrawals are predicted to be small, being less than 0.2 psu more than seventy percent of the time, which is far less than the daily range of variation resulting from the daily tidal cycle.

- Under conditions of maximum permitted withdrawals the models suggest that the greatest differences in salinities at each of the sites would be approximately 0.4 psu. The models indicated that the predicted increases in salinity due to actual withdrawals have exceeded this approximately ten percent of the time.

- The differences in salinity due to withdrawals were predicted to be slightly greater at the downstream gaging site, since salinities are very low (or zero) throughout much of the year at the more upstream gaging site.

- The conclusions of the modeling of continuous recorder data were found to be very similar to those reached by previous modeling efforts using the monthly fixed station HBMP data. If anything, the statistical models based on continuous recorder data predict slightly lower potential salinity increases due to permitted Facility withdrawals than the results of previous statistical models developed using monthly fixed station data.

3.0 Control River "Pump Test" Design

The Authority and District (with suggestions from the HBMP Scientific Review Panel) have for a number of years discussed the need to conduct a series of controlled "Pump Tests" to actually measure the magnitude of salinity changes downstream of the Facility resulting from maximum permitted freshwater withdrawals. The goal of such tests would be to provide additional lines of evidence and field test the reliability of the overall conclusions reached by previous statistical models. Quantifying the spatial and temporal extent of salinity changes is an important criteria in understanding the potential magnitude of salinity changes resulting from both current and possible future increases in Facility freshwater withdrawals. All evidence suggests that salinity changes are, however, currently far below both the typical daily tidal and seasonal salinity variations that naturally occur along the lower river (see Table 4.1 below), and probably could not be easily detected using fixed, moving, or randomized monitoring designs. It has therefore been suggested that it would be possible to provide additional conclusive experimental lines of evidence needed to defend the conclusions reached by the existing statistical lower river salinity models by conducting actual temporally intense field measurements during comparable flow conditions during which the Facility would either withdraw controlled volumes of water or not withdraw any water.

When combined with the two existing USGS continuous recorders, the three new HBMP recorders (**Figure 1.1**) provide the spatial and temporal intensive conductivity data needed for the Authority to begin conducting actual direct measurements of salinity changes downstream of the Facility specifically attributable to withdrawals. The following discussion summarizes and presents the potential timing options, design criteria, and/or alternatives the Authority has implemented in conducting such experimental field "pump tests". Again, the primary objective of conducting an extended series of "pump tests" over the next few years will be to quantify actual salinity changes resulting from Peace River Facility withdrawals under variable flow conditions. The results of these investigations will then be utilized to check the real world accuracy of the statistical and hydrodynamic salinity models that have historically been used to access potential salinity changes due to Facility withdrawals.

3.1 Location/Timing

The initial question that must be addressed regarding the design of Facility "pump tests" pertains to whether there are specific ranges of flows and/or seasons when potential Facility salinity impacts would be expected to be more easily detected. Results of analyses conducted in conjunction with the *2002 HBMP Comprehensive Summary Report* indicated that the greatest probability of actually being able to detect salinity changes due to the Facility's withdrawals increases both closer to the point of withdrawal and under low river flow conditions. The higher ambient salinity levels that naturally occur further downstream, when taken in conjunction with the confounding influences of both the increasing volumes of tidal exchange and daily variations in wind patterns, make detecting the small salinity differences caused by the Facility withdrawals increasingly difficult further downstream away from the point of withdrawal.

Probably the most opportune time to potentially detect changes in salinities due to Facility withdrawals would coincide with periods when river flows are both above the low flow Peace

River at Arcadia threshold flow of 130 cfs but not high enough to have moved the freshwater/saltwater interface too far downstream from the Facility. Seasonally, extended periods meeting these flow criteria typically occur during both the late fall/winter low flow interval and the spring dry-season. Brief periods of rain associated with the passage of cold fronts during the fall and winter often result in marked spikes in flow. Conversely, while river flows are typically more stable during the spring dry-season, they are often too low for the Facility to be consistently taking a full permitted ten percent of flow for any consistent period of time.

Therefore, while the historic flow data suggest that ideal conditions for implementing actual field testing of salinity changes due to Facility withdrawals commonly occur, the specific timing will be difficult to predict very far in advance, and conditions can be expected to change rapidly. This is especially true regarding both southerly or northerly winds preceding and following fall/winter cold fronts, which can be sustained over several days and then rapidly reverse. During periods of low to moderate rates of river inflow, wind shifts can be as or more important than tides in determining the short-term variability of the salinity structure within the lower river estuarine system.

3.2 Initial Pump Test Design Criteria

The primary objective of the Authority's "pump tests" is to investigate the overall conclusions previously reached by the preceding statistical models regarding withdrawal impacts on salinity changes in the lower Peace River. The purpose of such "Pump Tests" is to physically measure the magnitude, as well as temporal and spatial extent of directly measured salinity changes that can be separated and attributed solely to Facility withdrawals. Working together, the Authority and District have developed a series of criteria to be applied in conducting an extended series of Facility "Pump Tests" over the next few years.

- Future predicted daily tide tables have been reviewed to establish potential pairs of days with expected comparable tides that are both approximately similar in timing and magnitude (see **Figure 3.1**).

- Whenever real-time provisional river flows for the USGS Peace River gage at Arcadia are within the selected target range (approximately 150 to 250 cfs), the Peace River Facility staff will check both the predicted tides and expected weather (rainfall and wind) to determine if a "Pump Test" event could be effectively conducted. Assuming that both Facility demands and storage criteria can be met.

- Predicted sustained winds from either the north or south should be less than 10 mph over the two day "Pump Test" period if at all possible. Unless extremely strong and/or predicted to shift, winds from the east or west are of less consequence.

- If conditions meet the established criteria, and the Facility is able, withdraw water on one of the two days of the pair and not the other. Withdrawals should be sustained over the test period at the maximum permitted amount (10% of Arcadia flow) to maximize the potential for detecting potential impacts.

- This procedure should be repeated as frequently as practical over a period of several years.
- Based on finalized USGS gage data, the resulting "Pump Tests" will be grouped into differing classes for analyses of salinity impacts based on both flows and tides.
- Potential temporal and spatial modifications to the initial "Pump Test" design may be made based on initial summary results or coincide with potential future Facility or withdrawal schedule modifications.

3.3 Special 2006/2007 Pump Test Design Criteria

Due to the severity of the unusually dry conditions that characterized much of 2006 and the unusual periods of low flow during much of the normally summer wet-season, the Authority had to rely on, and was unable to fully recharge, its off-stream reservoir and groundwater storage during the normally high flow summer months. As a result of the very low flows during the late fall of 2006, and in anticipation of predicted unusually dry conditions expected during early 2007, the Authority staff asked and received authorization from the Southwest Florida Water Management District, starting in December 2006, to temporarily reduce the low flow cut off withdrawal threshold from 130 to 90 cfs, until after the anticipated beginning of the 2007 summer wet-season.

This reduction in the low flow threshold provided the Authority with the opportunity to run a series of additional "pump tests," using the same criteria above, below the 1996 Permit's 130 cfs limit. Although not originally envisioned under these conditions, both the Scientific Review Panel and the District had previously suggested that it might be beneficial to collect such "pump test" data both at flows above and below the 130 cfs threshold.

4.0 Analyses of Data from Low Flow “Pump Test” and Comparisons with Model Predictions

The following discussions and analyses present supplementary background information, combined with the results of graphical and statistical analyses used to determine the relative magnitude of measured and modeled salinity changes resulting from Facility withdrawals. The report specifically emphasizes the results of expected salinity changes due to withdrawals between the 1996 permit 130 cfs Peace River at Arcadia threshold and the temporary reduction to 90 cfs. The following information and analyses are presented.

- An overview and summary of both annual and daily salinity ranges measured at each of the five continuous recorder locations along the HBMP lower Peace River monitoring transect.

- Graphics slowing flows both at the USGS Peace River at Arcadia gage, and combined gaged flows upstream of the Facility (adding Horse and Joshua Creek flows) during the study period between December 2006 and May 2007. These graphics specifically also indicate the actual timing of each of the initial sixteen “pump test” events relative to Peace River at Arcadia gaged flows.

- Graphical analyses are presented showing average hourly conductivities over three day intervals.

  1. The day before each “pump test” event (when withdrawals were occurring).
  2. The day of the “pump test” when the Facility wasn’t taking water.
  3. The day after, when the Facility again was withdrawing water.

  Changes in conductivities are compared in these graphics with average hourly changes in water levels (reflecting both tide stage and the influences of wind, which can account for significant changes depending on direction and duration).

- The results of these statistical procedures provide further comparisons of changes in surface conductivity/salinity at each of the five gaging locations on days with and without Facility withdrawals during each of the sixteen series of low flow “pump test” events.

  1. Statistical comparisons are provided for each of the three days (two with and one without withdrawals) during each pump test event indicating median, mean, minimum and maximum average hourly conductivities/salinities from the 15-minute interval data for each of the five continuous recorders.

  2. Available historical data for each of the recorders were also evaluated in order to determine if surface conductivity/salinity differences at each of the five recorder locations under conditions of Peace River at Arcadia flows of 50-70, 70-90, 90-110, 110-130, 130-150, and 150-170 cfs could be used to assess differences under conditions with and without Facility water withdraws.

- Predictive statistical models similar to those previously developed in conjunction with the *2002 HBMP Comprehensive Summary Report* for the two USGS continuous recorders were created for each of the five recorder locations. Unlike previous statistical modeling efforts, those present in this report were developed to be predictive of salinities over a fairly narrow flow range of 50-250 cfs at Arcadia gage. The objective in limiting the range was to increase the resulting fit over the set of conditions that occurred during the series of sixteen Facility "pump tests" events.

4.1 Typical Annual and Daily Spatial Variability in Salinity along the Lower Peace River

The purpose of the presented information is to provide an overview of relative magnitude of both seasonal and daily variability that occurs along the lower Peace River. Table 4.1 provides statistical summaries of surface salinities during 2006 at the two USGS and three HBMP continuous recorders (see **Figure 1.1**). Although 2006 was generally drier than average (**Figure 4.1**), it was used since it represents the first year where comparable continuous recorder data were available from both the upstream and downstream USGS sites, as well as the three added HBMP locations. The summarized results shown in Table 4.1 indicate the mean, median, minimum and maximum salinities during 2006 at each of the five continuous recorder locations. The data show that while the area of the river downstream of the Facility is typically characterized by freshwater conditions, relatively high salinities (14 psu) do seasonally extend well upstream during periods of low flow and high spring tides.

Table 4.1
Seasonal and Daily Ranges of Salinity at the Two USGS and Three HBMP Continuous Recorders during 2006

Location	Annual Salinity Statistics				Daily Variability (Δ) of Salinity Statistics			
	Mean Salinity (psu)	Median Salinity (psu)	Minimum Salinity (psu)	Maximum Salinity (psu)	Mean Salinity Change (psu)	Median Salinity Change (psu)	Minimum Salinity Change (psu)	Maximum Salinity Change (psu)
Harbour Heights (RK 15.5)	8.1	7.6	0.1	24.7	6.0	6.0	0	14.3
MZ4 (RK 21.9)	2.7	0.9	0.1	18.6	3.4	3.1	0	13.7
MZ3 (RK 23.4)	2.0	0.5	0.1	18.3	3.1	2.3	0	14.1
MZ2 (RK 24.5)	1.6	0.4	0.1	16.5	2.8	1.9	0	13.3
Peace River Heights (RK 26.7)	1.1	0.3	0.1	14.1	1.6	1.0	0	10.4

Table 4.1 also shows mean, median, minimum and maximum daily ranges of observed salinity changes at each of the continuous recorder locations. As expected, daily average salinity ranges show progressive declines moving upstream. Somewhat surprising are the fairly large daily

changes in surface salinity that occur even well upstream given the right combinations of river flow, tides and wind.

4.2 River Flows and Timing of “Pump Test” Events

USGS gaged Peace River at Arcadia flows between December 1, 2006 and May 1, 2007 and the timing of each of the sixteen “pump test” events relative to gaged flows are graphically depicted in **Figure 4.2a (**A comparison of total gaged flows during this period for all three USGS gages upstream of the Facility (Peace River at Arcadia, plus Horse and Joshua Creeks) are provided in **Figure 4.2b**.) As Figure 4.2a shows, relatively wet winter rainfall events associated with cold fronts in both late December and then again in early February actually keep flows at the Peace River at Arcadia gage above the 130 cfs threshold during much of the five month period. However, by early March, increasing temperatures and the beginning of typical dry-season rainfall conditions had resulted in flows below 130 cfs, and by the later part of April gage flows at the Peace River at Arcadia gage had declined below the temporary 90 cfs cutoff. Table 4.2 provides further statistical summarizes of gaged flows during this initial “pump test” period.

Table 4.2
Statistical Summaries of Gaged Flows between
December 1, 2006 and May 1, 2007

USGS Gaged Flows	Mean	Median	Minimum	Maximum
Peace River at Arcadia	152.6	132.0	42.8	367.6
Arcadia, plus Joshua and Horse Creek Gages	193.0	164.8	54.4	482.3

Overall during the five month period covered by this initial series of “pump tests,” river flows at the Arcadia gage were actually above the 1996 permitted threshold of 130 cfs approximately fifty-one percent of the time. Flows by comparison were below the temporary cutoff of 90 cfs twenty-five percent of the time, and between the 130 cfs threshold and the temporary 90 cfs cutoff only twenty-four percent of the time. This and the timing of such events (**Figure 4.2a**) suggests that any salinity changes downstream of the Facility due to the temporary reduction of the low flow cutoff from 130 cfs to 90 cfs would have been limited in both frequency and duration.

4.3 Graphical Analyses of “Pump Test” Information

A preliminary investigation was conducted of differences in conductivities recorded by the two USGS continuous recorders between paired days with and without withdrawals under similar tidal conditions as part of the *2002 HBMP Comprehensive Summary Report*. Since such occurrences resulted from Facility operational conditions and were not part of any designed plan, the historical (1996-2002) continuous recorder data were “mined” for instances when such conditions had occurred under flow conditions of less than 200 cfs. The results of these initial analyses showed that, during flows well below the 130 cfs Peace River at Arcadia threshold and at withdrawals exceeding ten percent, actual measured salinity differences at the upstream (RK 26.7) USGS recorder increased between 0.6 and 1.0 psu over a small portion of the tidal cycle.

Based on these preliminary results, similar graphical procedures were used to make direct comparisons of surface conductivities/salinities between the sixteen pairs of "pump tests" collected from December 1, 2006 until the end of April 2007 at each of the five continuous recorders located downstream of the Facility along the HBMP monitoring transect (**Figure 1.1**). These graphical comparisons were then evaluated to determine potential measurable differences at each of the five continuous recording gage locations during each "pump test" event. In each instance, comparisons of daily changes in the relationship between conductivities and stage heights are shown for the days (with withdrawals) before and after each "pump test" event (no withdrawals). **Table 4.3** provides overall comparisons of both gaged Peace River at Arcadia flows and Facility withdrawals during each of the sixteen "pump test" events.

The majority of the individual "pump tests" during this initial series of sixteen events, as the information in **Figure 4.2a** and **Table 4.3** indicate, actually took place when river flows at the Arcadia gage were above 130 cfs.

- Events when Arcadia flows were 130 cfs or greater
    1. December 18th through 20th
    2. December 24th through 26th
    3. December 28th through 30th
    4. January 11th through 13th
    5. January 14th through 16th
    6. January 23rd through 25th
    7. January 28th through 30th
    8. February 11th through 13th
    9. February 24th through 26th
    10. March 6th through 8th

- Events when Arcadia flows were between 130 and 90 cfs
    1. March 12th through 14th
    2. April 14th through 16th
    3. April 18th through 20th

- Events when Arcadia flows were less than 90 cfs
    1. December 11th through 13th
    2. March 26th through 28th
    3. April 3rd and 4th *

       (* no withdrawals were taken on the third day due to the measured low flows)

The information indicates that not only were several of the "pump tests" actually conducted below the temporary 90 cfs cutoff, but that in a number of instances actual withdrawals exceeded the Facility's 1996 permitted limit of ten percent. The Facility bases each day's withdrawals on "provisional" preceding day flow data determined from the water level recorder at the USGS Peace River at Arcadia gaging station. Such "provisional" real-time data are obtained by the Authority directly from the USGS Tampa office's Web Site a number of times each day. This is accomplished in order to determine an accurate working estimate of the preceding daily Arcadia flow on which to establish the current day's withdrawal schedule. However, after the fact, the

USGS checks and evaluates the data from both the Arcadia gage stage recorder and periodic river cross section measurements collected a number of times each year. Based on such quality assurance checks the USGS makes various revisions to the recent, real-time information before establishing finalized daily flow estimates for the preceding USGS water year. Thus, the daily values used by the Facility are only “provisional” and can and are often changed as a result of ongoing USGS data quality assurance procedures weeks or even months later. It is therefore not uncommon for subsequent determinations of percent withdrawals, based on the finalized, revised USGS calculations of the initial “provisional” daily flows, to occasionally indicate that daily withdrawals, based on initial real-time flow information, exceeded the District’s permitted maximum ten percent withdrawal criteria. Likewise there are also analogous instances where additional water could have been taken due to differences between the initial real time provisional data and finalized USGS flow estimates.

4.3.1 Results of Graphical “Pump Test” Analyses

Individual graphical analyses of each of the “pump test” events at each of the five continuous recorders along the HBMP monitoring transect are indicated in Table 4.4. These figures depict both average hourly gage heights (solid lines) and surface conductivities (dashed lines) separately for each of the three days used in the data analyses for each of the “pump tests.”

- Day 1 (blue lines) – with withdrawals
- Day 2 (red lines) – without withdrawals
- Day 3 (black lines) – with withdrawals

The overall design of this initial series of tests was to attempt to determine if relatively small salinity differences were apparent between conditions when the Facility was and was not withdrawing water given the known magnitude of daily salinity variability due to tidal patterns and differences in flows (Table 4.1). Under conditions of relatively similar tidal patterns and flows, turning the Facility’s pumps off should have resulted in increased flows and lower observed salinities during the second day (dashed red lines) of each of the “pump test” periods. **Table 4.3** summaries the flow and withdrawal data during each of the test intervals. In a number of instances, differences in gaged flows among the days were as large as or greater than occurred due to Facility withdrawals. These marked short-term variations in flows thus make any interpretations of the data relative to the influences of the Facility on salinity changes difficult for the following test intervals.

- December 24th through 26th
- December 28th through 30th

In a number of other instances, while smaller, differences in flows over the three-day intervals need to be taken into account in interpreting specific test results.

As these figures and the subsequent statistical models presented below in Section 4.5 show, daily patterns of variation in stage height (caused by the combined influences of tides and wind) are a dominant factor in determining observed short-term salinity patterns under similar low flow conditions. Predicted daily tide tables were therefore used beforehand to establish potential sequences of days to run "pump test" events based on sequences of days with tides that were expected to be approximately comparable both in timing and magnitude. The results in Table 4.4 show that this procedure was generally successful in obtaining series of days with similar tidal patterns (see **Figures 4.8** and **4.78**). However, as expected, during some of the three day intervals variability in wind patterns resulted in stage height divergences that interfered with determining salinity changes due to Facility withdrawals (see **Figures 4.53** and **4.73**)

Actual measured stage height data were only collected at the two USGS recorders. Stage height data shown for the three HBMP locations were determined by analyzing and applying appropriate lags using corresponding stage height data from the two USGS sites.

Table 4.4

Summary of Graphical Analyses for each of the Sixteen "Pump Test" Sampling Events

Pump Test Event	Harbour Heights RK 15.5	MZ4 RK21.9	MZ3 RK 23.4	MZ2 RK24.5	Peace River Heights RK 26.7
December 11th through 13th	Figure 4.3	Figure 4.4	Figure 4.5	Figure 4.6	Figure 4.7
December 18th through 20th	Figure 4.8	Figure 4.9	Figure 4.10	Figure 4.11	Figure 4.12
December 24th through 26th	Figure 4.13	Figure 4.14	Figure 4.15	Figure 4.16	Figure 4.17
December 28th through 30th	Figure 4.18	Figure 4.19	Figure 4.20	Figure 4.21	Figure 4.22
January 11th through 13th	Figure 4.23	Figure 4.24	Figure 4.25	Figure 4.26	Figure 4.27
January 14th through 16th	Figure 4.28	Figure 4.29	Figure 4.30	Figure 4.31	Figure 4.32
January 23rd through 25th	Figure 4.33	Figure 4.34	Figure 4.35	Figure 4.36	Figure 4.37
January 28th through 30th	Figure 4.38	Figure 4.39	Figure 4.40	Figure 4.41	Figure 4.42
February 11th through 13th	Figure 4.43	Figure 4.44	Figure 4.45	Figure 4.46	Figure 4.47
February 24th through 26th	Figure 4.48	Figure 4.49	Figure 4.50	Figure 4.51	Figure 4.52
March 6th through 8th	Figure 4.53	Figure 4.54	Figure 4.55	Figure 4.56	Figure 4.57
March 12th through 14th	Figure 4.58	Figure 4.59	Figure 4.60	Figure 4.61	Figure 4.62
March 26th through 28th	Figure 4.63	Figure 4.64	Figure 4.65	Figure 4.66	Figure 4.67
April 3rd and 4th *	Figure 4.68	Figure 4.69	Figure 4.70	Figure 4.71	Figure 4.72
April 14th through 16th	Figure 4.73	Figure 4.74	Figure 4.75	Figure 4.76	Figure 4.77
April 18th through 20th	Figure 4.78	Figure 4.79	Figure 4.80	Figure 4.81	Figure 4.82

* No withdrawals on day 3 due to low flows

An observed change of 250 uS/cm is approximately equal to 0.1 psu, while a change of 1000 uS/cm is roughly equitant to 0.5 psu

The series of graphical analyses presented in Table 4.4 were evaluated in relation to the flow and withdrawal information presented in **Table 4.3** in order to determine the potential magnitude and duration of salinity changes during each of the "pump test" events that might be attributable to Facility withdrawals. Analyses of the relationships between average hourly gage heights and conductivities showed that under ideal conditions of similar flows and tides, differences attributable to withdrawals were, as expected, relatively small given the normal daily range of variation. Analyses of the data found that salinity changes due to withdrawals were primarily confined to the peaks of incoming tides when differences in flows might be expected to have the greatest influences. The results of these graphical analyses are summarized in Table 4.5.

Table 4.5

Summary of Graphical Analyses
Maximum Salinity Changes Attributable to Facility Withdrawals

"Pump Test" Event	Conditions		Estimated Changes in Salinity				
	"USGS Revised" Average Arcadia Gaged Flows (cfs)	Average Facility Withdrawals (cfs)	USGS RK 15.5	MZ4 RK 21.9	MZ3 RK 23.4	MZ2 RK 24.5	USGS RK 26.7
Flows Above 130 cfs Threshold							
December 28th through 30th	271	26.8	NA	NA	NA	NA	NA
January 28th through 30th	239	21.0	< 0.1	< 0.1	< 0.1	-----	-----
February 11th through 13th	238	21.9	< 0.1	< 0.1	< 0.1	-----	-----
February 24th through 26th	181	20.9	< 0.1	< 0.3	< 0.1	< 0.2	-----
January 11th through 13th	178	17.4	< 0.1	< 0.4	< 0.2	< 0.2	-----
January 14th through 16th	159	15.5	NA	NA	NA	NA	NA
December 24th through 26th	158	13.2	NA	NA	NA	NA	NA
March 6th through 8th	143	15.6	< 0.2	< 0.4	< 0.2	< 0.1	< 0.1
January 23rd through 25th	136	11.7	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
December 18th through 20th	134	15.0	< 0.1	< 0.2	< 0.4	< 0.1	< 0.4
Flows Between 130 cfs Threshold and Temporary 90 cfs Cutoff							
March 12th through 14th	120	13.3	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
April 14th through 16th	113	13.6	NA	NA	NA	NA	NA
April 18th through 20th	98	12.6	< 0.5	< 0.5	< 0.8	< 0.5	< 0.5
Flows Below 90 cfs Cutoff							
March 26th through 28th	90	10.7	< 0.4	< 0.2	< 0.4	< 0.4	< 0.4
December 11th through 13th	82	9.6	< 0.3	< 0.2	< 0.2	< 0.3	< 0.3
April 3rd and 4th	79	7.0	< 0.2	< 0.2	< 0.2	< 0.1	< 0.1

* NA – analyses indicate either flow or tidal variability too great to accurately estimate salinity changes due to Facility withdrawals

----- dashed line indicates that under flow conditions the recorder location is predominantly fresh and there are no effects of withdrawals on salinity

4.3.2 Summary of Graphical Analyses Results

The following summarizes the primary findings and results of the graphical analyses of data from the series of low flow "pump test" events conducted between December 1, 2006 and May 1, 2007.

- The summary results presented in Table 4.5 show expected declines in the influences of tidal patterns on salinity moving downstream with increasing flows. Potential changes in salinity resulting from Facility withdrawals are increasingly limited to the downstream reaches of the lower river as flows increase.

- The largest observed changes in salinity that could be directly related to withdrawals occurred during flows below the original 130 cfs threshold. The magnitude of salinity changes due to withdrawals was generally similar over a wide reach of the lower river.

- However, even when withdrawals occurred below the 90 cfs cutoff, the maximum observed differences were found to only occur at the top end of incoming tides.

- The observed maximum differences were well within the limits predicted by previous statistical models. In fact, when averaged over the entire range of the daily tidal cycles, directly observed daily changes were far less than those previously estimated by the statistical models.

4.4 Statistical Comparisons

A number of additional graphical and statistical procedures were further used to evaluate and confirm the magnitude of differences in surface salinities at each of the five continuous recorder locations under conditions with and without Facility withdrawals.

- Box & whisker plot comparisons were used to graphically depict average hourly surface salinities at the five continuous recorder locations along the HBMP monitoring transect during the three individual days of each "pump test" event.

- Statistical comparisons of median, mean, minimum, and maximum salinities from the 15-minute interval data from each of the five continuous recorders are presented in tabular form, and statistical tests were used to determine if there were significant differences in salinity among days at individual locations during each of the "pump test" events.

- The available historical data for each of the five recorders were also assessed to determine the natural variability of surface salinities at each of the five recorder locations under conditions of Peace River at Arcadia flows of 50-70, 70-90, 90-110, 110-130, 130-150, and 150-170 cfs. Analyses were conducted to determine if such historical data collected using the 130 cfs threshold could be used to provide accurate comparisons with salinity data collected between December 1, 2006 and May 1, 2007 under the temporary 90 cfs cutoff.

4.4.1 Box & Whisker Plot Comparisons

The figures summarized in Table 4.6 use box & whisker plots to graphically depict average hour surface salinities at the five continuous recorder locations along the HBMP monitoring transect during each of the three individual days of each "pump test" event. The graphics in Table 4.6 are summarized relative to categories of gaged Peace River at Arcadia flow as was done previously in Table 4.5 (above). Again, **Table 4.3** provides specific corresponding daily summaries of flows and withdrawals during each of the sixteen "pump test" periods.

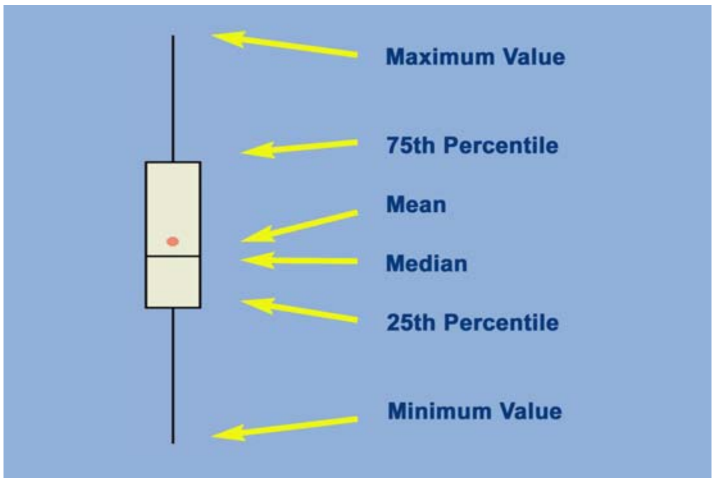


Diagram of box & whisker format

- **Top whisker extends to the maximum value**
- **Top of the box equals the 75th percentile**
- **Rose dot equals the mean**
- **Black line equals the median**
- **Bottom of the box equals the 25th percentile**
- **Bottom whisker extends to the minimum value**

Table 4.6

Box & Whisker Comparisons of Continuous Recorder Surface Salinities along the HBMP Monitoring Transect of Daily Salinities during "Pump Test" Events

Flows Above 130 cfs Threshold		**Flows Between 130 cfs Threshold and Temporary 90 cfs Cutoff**	
December 28th through 30th **	**Figure 4.83**	March 12th through 14th	**Figure 4.93**
January 28th through 30th	**Figure 4.84**	April 14th through 16th **	**Figure 4.94**
February 11th through 13th	**Figure 4.85**	April 18th through 20th	**Figure 4.95**
February 24th through 26th	**Figure 4.86**	**Flows Below 90 cfs Cutoff**	
January 11th through 13th	**Figure 4.87**	March 26th through 28th	**Figure 4.96**
January 14th through 16th **	**Figure 4.88**	December 11th through 13th	**Figure 4.97**
December 24th through 26th **	**Figure 4.89**	April 3rd and 4th	**Figure 4.98**
March 6th through 8th	**Figure 4.90**		
January 23rd through 25th	**Figure 4.91**		
December 18th through 20th	**Figure 4.92**		

** Analyses indicate times when either flow or tidal variability were too great to accurately estimate salinity changes due to Facility withdrawals

Again, under conditions of relatively similar tidal patterns and flows, turning the Facility's pumps off during the second day of each "pump test" event should have resulted in about a ten percent increase in flows and lower observed salinities along the series of continuous monitoring locations. The following summarizes the patterns observed from the box & whisker plots used to summarize the data for each of the individual "pump test" periods.

- Attempts were taken in advance to limit the "pump tests" to those conditions characterized by very similar predicted tides and the events were conducted over short durations to limit fluctuations in flows. However, the actual field data show how variable daily surface salinities along the lower river can be under even relatively small variations in tide stage and flow.

- When compared from conditions of higher to lower flows, the sequence of figures visibly points out the overall pattern of increasing salinity and variability upstream as river flows decline.

- **Figures 4.85**, **4.89** and **4.94** all clearly show the relatively large influences that short term differences in tide stages can have on salinities even under relatively similar flow conditions along the entire lower river.

- **Figures 4.93**, **4.95** and **4.96** provide the best opportunities under relatively similar daily tidal patterns to evaluate the influences of Facility withdrawals on surface salinities along the HBMP monitoring transect when Arcadia gaged Peace River flows were below the 130 cfs threshold. The results of these graphical comparisons do not clearly show any consistent daily differences in mean, median or range of variation of salinities at the monitoring locations among the two days with and the one day without Facility withdrawals.

4.4.2 Statistical Comparisons

The combined results of applying three different statistical procedures were then used to further test the results obtained from the graphical analyses. These statistical methods were used to test for differences in mean surface salinities at the individual continuous recorders over the three days of each "pump test" period. The applied Analysis of Variances statistical procedures used were generally similar, but differ in their emphasis of differing types of error and robustness to outlying values.

1. Waller-Duncan K-ratio t Test
2. Ryan-Einot-Gabriel-Welsch Multiple Range Test
3. Bonferroni (Dunn) t Tests

The statistical results from these tests showed very similar results (see **Appendices A** through **E**). Differences in mean values among the days at each location are summarized in **Table 4.7**. As expected, the observed differences were relatively small in comparison to the observed natural range of variation. These statistical analyses showed that in a number of instances there were significant differences in mean daily salinities observed at some of the locations during the three days of individual "pump test" periods. However, in each of these instances the observed statistically significant differences corresponded with previous described differences (see **Table 4.3** and the figures summarized in Table 4.4) that could be directly attributable to dissimilarities among the days in stage (tides/wind) or flows. The applied statistical procedures were therefore unable to separate the previously described salinity changes attributed to withdrawals, occurring within localized phases of the normal daily tidal cycle, from the normal range of daily salinity variation resulting from other more dominant factors.

Comprehensive summaries of common statistical metrics (minimum, median, mean, and maximum) salinity values for each day, at each recorder, over each of the "pump test" periods are provided in **Table 4.8**. This information provides additional detail to the graphical information summarized in **Tables 4.4** and **4.6** (see previous summary conclusions).

Complete results of the statistical tests of mean daily salinity values at each of the five continuous recorder locations during each of the sixteen "pump test" periods are included in this report's appendices.

- **Appendix A** – Harbour Heights (RK 15.5)
- **Appendix B** – MZ4 (RK 21.9)
- **Appendix C** – MZ3 (RK 23.4)
- **Appendix D** – MZ2 (RK 24.5)
- **Appendix E** – Peace River Heights (RK 26.7)

4.4.3 Comparisons with Historical Data

Additional analyses were also conducted to determine whether previous historical continuous recorder data collected when the 130 cfs threshold was being applied could be used to provide accurate comparisons with surface salinity data collected during the five month reporting period between December 1, 2006 and May 1, 2007 when the temporary 90 cfs cutoff was in effect. Available historical continuous recorder data were analyzed to determine the natural variability of surface salinities under conditions of Peace River at Arcadia flow categories of 50-70, 70-90, 90-110, 110-130, 130-150, and 150-170 cfs. The primary objective was thus to attempt to provide comparisons between the periods when the 130 cfs and 90 cfs low flow thresholds were in effect for each of these flow categories between 50 and 170 cfs.

Previous HBMP summary reports (PBS&J 1999, 2002, 2004) have repeatedly emphasized the observation that the salinity structure of the lower river is characteristically different under similar lower flow conditions depending on the time of year. Low flows in the range of 50 to 170 cfs during the winter/spring periods are usually preceded by flow conditions that are only, if any, slightly higher. Under such conditions, the downstream water in the upper harbor is typically seasonally characterized by high salinities, and this higher salinity water can characteristically rapidly move upstream during the spring dry-season as a result of relatively small declines in flows. This is in marked contrast to when similar low flow conditions occur as flows decline following the summer wet-season. During the late fall/early winter, salinities in the upper harbor are usually seasonally at their lowest levels due to the combined influences of the large volumes of freshwater inflows that have occurred during the summer, and the harbor's relatively long residence times (PBS&J 1999). During this period, similar changes in flows are generally reflected in far smaller increases in salinity along the lower river when compared to corresponding conditions during the spring dry-season.

Comparisons among the selected six low flow categories were therefore initially limited to contrasting salinities along the lower river over the dry season periods from January to May during 2006 (when the 130 cfs threshold was in effect) and 2007 (under the temporary 90 cfs cutoff). There were a number of advantages to initially limiting such comparisons to these two years.

1. Continuous recorder information was available for the winter/spring dry-seasons of both 2006 and 2007 for not only the two USGS long-term continuous recorders, but also for all three of the newer HBMP recorder locations.

2. 2006 and 2007 were both generally characterized by relatively dry springs.

3. Both years were after Hurricanes Charley, Frances and Jeanne that affected the lower Peace River watershed during the late summer of 2004. The winds, tides and high flows associated with these storms influenced the size and locations of a number of shallow areas along the lower river. The effects of these changes on localized salinity/low flow relationships along the lower Peace River were probably small, but unknown.

Box & whisker plots similar to those used previously (see Section 4.4.1) were utilized in **Figures 4.99** through **4.104** (Table 4.9) to compare statistical metrics of salinities between the dry-seasons of 2006 and 2007, at the five continuous recorder locations along the lower Peace River monitoring transect, for each of the six selected low flow categories. The results presented in these figures indicated that salinities at all of the locations within each of the six tested categories were uniformly higher during 2007. However, since the results show that salinities during 2007 were consistently higher for categories both below the temporary 90 cfs cutoff and above the original 130 cfs threshold, it is evident that the change in low flow withdrawals was not the cause of the observed differences of higher salinities during 2007.

A more plausible explanation can be found in comparing actual daily Peace River at Arcadia flows between the two periods (**Figure 4.111**). Even though both years had similar flows during the typically dry months of March and April, the winter of 2006 was characterized by unusually high cold front related flows in February. These high flows in February resulted in lower conductivities in the lower river and upper harbor and most likely were the cause of the observed lower salinities within each of the six low flow categories between 50 and 170 cfs during 2006, when compared with 2007.

Alternatively, a second set of similar analyses using box & whisker plots were then applied (**Figures 4.105** through **4.110)** to compare salinities between the dry-seasons of 2000 and 2007. **Figure 4.112** shows that gaged Peace River at Arcadia flows over the entire winter/spring periods of these two very dry years were far more similar than the previous comparison of 2006 to 2007. However, as the results summarized in Table 4.9 show, the comparisons between 2000 and 2007 were also inconclusive in trying to evaluate differences between the influences of the two withdrawal thresholds. Salinities were observed to be higher during 2007 than during 2000 under flows of both 90-110 and 110-130 cfs. However, salinities during 2007 were also observed to be higher for the 50-70 and 70-90 cfs flow categories, and lower for the 130-150 and 150-170 cfs categories when compared to salinities during 2000. If this methodology was effective in comparing the affects of altering the low flow withdrawal threshold, then salinities in these later instances should have been similar, since changes in the threshold from 130 to 90 cfs should not have had any influence.

Table 4.9

Box & Whisker Comparisons of Continuous Recorder Surface Salinities for Categories of Peace River at Arcadia Flows between 50 and 170 cfs

Comparisons of Winter/Spring 2006 with 2007		Comparisons of Winter/Spring 2000 with 2007	
50 – 70 cfs	**Figure 4.99**	50 – 70 cfs	**Figure 4.105**
70 – 90 cfs	**Figure 4.100**	70 – 90 cfs	**Figure 4.106**
90 – 110 cfs	**Figure 4.101**	90 – 110 cfs	**Figure 4.107**
1100 – 130 cfs	**Figure 4.102**	1100 – 130 cfs	**Figure 4.108**
130 – 150 cfs	**Figure 4.103**	130 – 150 cfs	**Figure 4.109**
150 – 170 cfs	**Figure 4.104**	150 – 170 cfs	**Figure 4.110**

Assessments of potential differences in tide stage were evaluated to determine whether they could be used to explain the results of the 2000/2007 comparisons of dry-season salinities. Similar box & whisker plots of stage heights showed that there were no corresponding differences with the observed differences in salinities between the two tested periods. However, while tides can vary greatly over short intervals from highs to lows, when averaged over days or longer intervals they can be expected to approximate normal sea level under similar flows (given both astronomical and seasonal temperature differences). Thus, while the daily mean tidal stage levels may be very similar among different days (periods), there can be notable differences in the resulting average salinities depending on the actual magnitude and duration of the particular tidal cycles being tested.

These results clearly show that even by categorizing for differences in flows, it is difficult to evaluate salinity differences of the magnitude caused by withdrawals by making comparisons among years. Salinity differences caused by more dominant factors such as the preceding flow conditions, and/or variability in the magnitude and duration of tidal cycles obscured any differences due to changes in the low flow threshold from 130 to 90 cfs.

4.5 Comparisons Using Statistical Models

The objective of this section was to determine and present statistical relationships between the measured variability in surface salinity and gaged Peace River at Arcadia flow, tide stage, and Facility withdrawal under lower flow conditions (50-250 cfs) at each of the established continuous recorders locations (**Figure 1.1**) along the HBMP lower river monitoring transect. Similar statistical models were previously developed over wider ranges of flows using data from the two USGS continuous recorders as part of the *2002 HBMP Comprehensive Summary Report* (PBS&J 2004). As previously discussed above (Section 2.5), these models and those developed for the District (Janicki Environmental, 2002) have been used as predictive tools to assess the spatial extent and magnitude of possible salinity changes due to both historic and future potential maximum freshwater withdrawals under the Facility's existing twenty-year permit. The following summarizes the principle goals of the specific low flow statistical models developed for this report.

- Develop statistical models of variations in surface salinities under low flow conditions between 50-250 as related to observed variability in gaged Peace River at Arcadia freshwater inflows, tide stage and Facility withdrawals at each of the five continuous recorder locations.

- Apply the developed statistical models to predict the magnitude of potential salinity changes at each location resulting resulting from the temporary reduction in the Facility's low flow threshold from 130 cfs to 90 cfs.

- Compare these results with those of previous spatial and fixed salinity models developed for the lower Peace River.

4.5.1 Development of Statistical Models

The presented specific series of low flow statistical models were developed using averaged hourly data gathered during the first four months of 2007 at the five continuous recording sites. The data were used to develop statistical models of salinity versus flow relationships using measured sub-surface salinities as the dependent variables, and expressions of gaged freshwater inflows minus withdrawals as well as measured stage (water level) as independent variables. The following assumptions and criteria were applied during the development of these models.

- The modeled flow terms were limited to total daily gaged freshwater inflows measured at the Peace River at Arcadia USGS gage. Some enhancement of the models would potentially have resulted from also including corresponding gaged flows from both Horse and Joshua Creeks (and for the Harbor Heights recorder location also using Shell Creek). However, these additional inputs were not included since a primary objective of the study was to determine specific relationships relative to the low flow threshold based on gaged river flows at the Arcadia gage.

- Actual daily withdrawals by the Facility were subtracted from the daily average Peace River at Arcadia flow for each observation in order to determine the final resultant flow terms.

- A second lagged, long-term cumulative flow term was applied in each of the statistical models to establish some indication of background conditions and the "resident memory" associated with the characteristic of the longer-term salinity gradient within the upper estuary.

- All gaged continuous recorder data were averaged over one-hour intervals. Stage heights corresponding with the same interval of the measured salinity were added to the models to account for the daily variability in the influences of tides/wind on salinity (see previous discussions).

- A final term was tested for each model to account for the interactions of flow with stage and tidal influences. When freshwater inflows are low (such as the spring dry-season), there are very close correlations between tidal stage and the observed daily variability in measured conductivities (salinity). However, as flow increases and overall conductivities decline, the influences of daily tidal variability on observed salinity patterns decline.

- As an initial step in the development of each statistical model, the SAS Stepwise General Linear Model and RSREG procedures were used to screen the potential significance of a number of possible applied linear, non-linear, and interactive terms. Logs of the flow term were tested to account for the often-observed curvilinear response of salinity to increasing freshwater flow. Conversely, non-transformed variables were used within the models for those independent terms found to have more linear interactions. (All model parameters were tested and met the statistical requirements for normal distributions due to the very large number of observations.)

- Using an iterative process, surface salinity models were developed for each of the continuous recorder sites using the fewest number of independent variables that were both significant at the 0.01 level and added appreciably (at least one percent) to the overall explained error of the model. In developing the statistical models, enhancement of the explained error (R-square) was considered secondary to increasing the establishment of enhancement of the relationships between predicted and observed salinities (model fit).

The initial surface salinity model for each of the continuous recorder locations utilized the following general form, and were then modified to include only those significant terms that directly increase the fit. (Tide stages for the three HBMP recorders were interpolated from the corresponding gage heights measurements from the downstream and upstream USGS gages.)

$$Salinity = \beta_{\alpha} + (\beta_1 x\ Flow1) + (\beta_2 \times Flow2) + (\beta_3 x Stage) + (\beta_4 x (Stage / Flow))$$

where:

β_{α} = specific intercept

β_1 = "short-terms" flow slopes (linear and/or non-linear)

β_2 = "long-terms" flow slopes (linear and/or non-linear)

β_3 = gage height specific slope

β_4 = gage height/flow interaction specific slope

4.5.2 Results of Statistical Models

Table 4.10 summarizes findings for the five continuous recorder locations of each of the various types of analyses undertaken during the development of the statistical models.

- In each instance, plots are shown comparing salinity/flow relationships using gaged Peace River at Arcadia flows between 50-250 cfs both for the overall period of record at each recorder, and then specifically just for the first four months of 2007. These graphics include both average hourly measured salinity values as well as a fitted, smoothed line, which was plotted using a SAS (Statistical Analysis Software) cubic spline method that minimizes both the linear combination of the sums of squares of the residuals of the fit as well as the integral of the square of the second derivative. These figures clearly show the great degree of variability in salinity that can be observed at locations along the lower river even over a very narrow range of flows. As previously discussed, the high degree of observed salinity variability primarily results from the combined influences of normal daily tidal patterns, periodic strong winds predominantly blowing from either the north or south, and preceding seasonal flow patterns.

- **Tables 4.11** through **4.15** provide the detailed results of the best-fit statistical models developed for each of the five monitoring site locations. These models ranged from explaining approximately seventy to eighty-five percent of the observed variation in salinity at the five recorder locations. These tables clearly demonstrate the dominant importance relative stage height and flows have in determining salinity. Comparisons of the Type I and Type III error terms show the degree of importance these two dominant variables and the interactions of other factors have in determining the range in salinity variation naturally observed along the lower river.

Table 4.10
Seasonal and Daily Ranges of Salinity at the Two USGS and Three HBMP Continuous Recorders during 2006

Continuous Recorder Location	Flow vs. Salinity All Flows 50-250 cfs	Flow vs. Salinity Jan-May 2007 Flows 50-250 cfs	Developed Statistical Model	Predicted vs. Observed Fit of Statistical Model	Predicted vs. Observed Results Apr 12th – 21st 2007
Harbour Heights (RK 15.5)	Figure 4.113	Figure 4.114	Table 4.11	Figure 4.115	Figure 4.116
MZ4 (RK 21.9)	Figure 4.117	Figure 4.118	Table 4.12	Figure 4.119	Figure 4.120
MZ3 (RK 23.4)	Figure 4.121	Figure 4.122	Table 4.13	Figure 4.123	Figure 4.124
MZ2 (RK 24.5)	Figure 4.125	Figure 4.126	Table 4.14	Figure 4.127	Figure 4.128
Peace River Heights (RK 26.7)	Figure 4.129	Figure 4.130	Table 4.15	Figure 4.131	Figure 4.132

- The relative degree of fit of the statistical models developed for each recorder location is also shown by plots of predicted versus observed values. In these figures, the black dashed line represents a regression predicted versus observed (with the ninety-five percent confidence interval shown in yellow), while the solid red line shows a relative idealized one-for-one line. Overall, the plots of predicted versus observed salinities indicate that the models slightly over-predict salinities at low levels and correspondingly under-predict at higher levels. However, over the typical range of salinities observed at each of the gaging sites, the developed models provide a good fit and explain most of the observed variation in measured salinities.

- The final figures for each recorder location show hourly salinities predicted using the corresponding statistical model versus averaged recorded observations during the ten day interval in 2007 between April 12th and April 21st. Peace River at Arcadia flows during this time period were consistently below the original 130 cfs low flow threshold. Final approved USGS flows ranged from 122 to 77 cfs. However, the Facility was withdrawing water (except for two pump test days) over the entire period based on initial provisional USGS daily flow estimates. The figures show that the developed statistical models were relatively accurate (with some exceptions) in predicting the frequency, duration and magnitude of observed daily salinity variations over this low flow interval along the HBMP monitoring transect.

- The statistical models were next used (Table 4.16) to provide estimates of differences in selected metrics during this ten day period under conditions with and without withdrawals.

Table 4.16
Comparisons of Predicted Salinities from the Statistical Models With and Without Withdrawals for the Ten-Day Period between April 12th - 21st

Continuous Recorder	Mean Salinity		Median Salinity		Minimum Salinity		Maximum Salinity	
	With Withdrawals	Without Withdrawals	With Withdrawals	Without Withdrawals	With Withdrawals	Without Withdrawals	With Withdrawals	Without Withdrawals
Harbour Heights (RK 15.5)	15.8	15.6	15.7	15.5	10.9	10.4	21.2	21.0
MZ4 (RK 21.9)	6.9	6.5	6.9	6.5	1.9	1.3	11.8	11.5
MZ3 (RK 23.4)	4.8	4.5	4.7	4.5	0.5	0.0	9.0	8.7
MZ2 (RK 24.5)	3.7	3.5	3.7	3.5	0.0	0.0	7.2	7.0
Peace River Heights (RK 26.7)	1.9	1.4	1.8	1.4	0.0	0.0	3.9	3.8

- The results of these analyses were similar to those of previous statistical models that have indicated that the magnitude of salinity differences due to Peace River Facility withdrawals were probably between 0.1 and 0.5 psu, and are relatively small even at flows below the 130 cfs threshold when compared to the normal range of salinity variation observed due to tides and wind.

5.0 Summary of Key Findings

The following series of bullets provide brief summaries of some of the key findings presented in this report.

- During the period of study between December 1, 2006 and May 1, 2007, Peace River at Arcadia gaged flows were between the previous 130 cfs threshold and the temporary 90 cfs cutoff only approximately twenty-four percent of the time. This and the timing of such occurrences suggest that any salinity changes downstream of the Facility due to the temporary reduction of the low flow cutoff from 130 cfs to 90 cfs would have been limited in both frequency and duration.

- Graphical analyses of the relationships between average hourly gage heights and conductivities showed that under ideal conditions of similar flows and tides, differences attributable to withdrawals were, as expected, relatively small given the normal daily range of variation.

- These graphical analyses of continuous recorder data found that salinity changes due to withdrawals were primarily confined to the peaks of incoming tides when differences in flows might be expected to have the greatest influences.

- The results showed declines in the influences of tidal patterns on salinity moving downstream with increasing flows. Potential changes in salinity resulting from Facility withdrawals were also found to increasingly move further downstream as river flows increased.

- The largest directly observed changes in salinity apparently related to withdrawals occurred during flows below the original 130 cfs threshold. The magnitude of such changes was found to be generally similar over a relatively wide reach of the lower river.

- However, even when withdrawals occurred below the 90 cfs cutoff, the maximum observed differences were found to predominantly occur at the top end of incoming tides.

- The maximum salinity differences observed from the graphical analyses of the continuous recorder data were well within those limits predicted by previous statistical models. In fact, when averaged over the entire range of the daily tidal cycles, these directly observed daily changes were far less than those estimated from such statistical models.

- The graphical analyses visibly point out patterns of increasing salinity and variability upstream as river flows decline, and the relatively large influences that short term differences in tide stages can have on salinities even under relatively similar flow conditions along the entire lower river.

- Graphical & and whisker plot comparisons did not clearly show any consistent daily differences in mean, median or range of variation of salinities at any of the monitoring locations among the two days with and the one day without Facility withdrawals.

- Further statistical comparisons of mean daily salinities further supported these findings.

- Additional analyses were conducted to determine whether previous historical continuous recorder data collected when the 130 cfs threshold was being applied could be used to provide accurate comparisons with surface salinity data collected during the five month reporting period between December 1, 2006 and May 1, 2007 when the temporary 90 cfs cutoff was in effect. The results indicated that, even categorizing for differences in flows, it was extremely difficult to make comparisons using such data. Salinity differences caused by more dominant factors such as the preceding flow conditions, and/or variability in the magnitude and duration of tidal cycles, obscured any differences due to changes in the low flow threshold from 130 to 90 cfs.

- Low flow statistical models were developed using averaged hourly data gathered during the first four months of 2007 at the five continuous recording sites. The resulting statistical models were found to be relatively accurate (having R-square values between 0.70 and 0.87) in predicting the frequency, duration and magnitude of the observed daily variation in salinity along the HBMP monitoring transect.

- The results of analyses using these specifically developed low flow models were similar to those of previous statistical models, which indicated that the magnitude of salinity differences due to Peace River Facility withdrawals were probably between 0.1 and 0.5 psu. The model results indicated that such salinity changes due to Facility withdrawals were relatively small even at flows below the 130 cfs threshold when compared to the normal range of salinity variation observed due to tides and wind.

6.0 Responses to Questions Raised by HBMP Scientific Review Panel

A presentation of the initial draft findings of the "pump test" results was made to the HBMP Scientific Review Panel in December 2007 in conjunction with the District's presentation of the proposed methodologies for the draft minimum flows and levels (MFLs) for both the lower Peace River and Shell Creek. The following provides summary information in response to the two questions raised by panel members in response to the initial "pump test" findings.

6.1 Use of Predictive Models to Assess Spatial and Temporal Salinity Changes

Several panel members requested that similar statistical models based on the continuous recorder data could be used to address the question of, "How much of a difference in salinity is predicted to occur over what stretch of the river, over what period of time, under the existing diversion schedule?"

In order to provide answers to this question, new empirical statistical surface salinity models were developed using the 15-minute data available through the end of 2007 for each of the five continuous recorder monitoring locations (**Figure 1.1**). As an initial step, hourly averaged salinities were plotted versus flows to provide estimates of the appropriate flow domain for the model developed for each location. The recorder data were then limited to include only the normal range of conditions where changes in flows were observed to be associated with resulting changes in salinity.

- RK 15.5 – (Harbour Heights **Figure 6.1**) – data were cut off when combined flows for both the lower Peace River and Shell Creek USGS gages were above 2800 cfs.
- RK 21.9 – (MZ4 **Figure 6.2**) – data were cut off when total gaged upstream lower Peace River flows were above 500 cfs.
- RK 23.4 – (MZ3 **Figure 6.3**) – data were cut off when total gaged upstream lower Peace River flows were above 400 cfs.
- RK 24.5 – (MZ2 **Figure 6.4**) – data were cut off when total gaged upstream lower Peace River flows were above 350 cfs.
- RK 26.7 – (Peace River Heights **Figure 6.5**) – data were cut off when total gaged upstream lower Peace River flows were above 300 cfs.

The series of site specific statistical models were developed using averaged hourly data gathered during the periods-of-record for the five continuous recording locations. Statistical models were constructed using measured sub-surface salinity as the dependent variables, and expressions of gaged freshwater inflows minus withdrawals as well as measured stage (water level) as independent variables. The following assumptions and criteria were applied during the development of the individual statistical models.

- The modeled flow terms used combined USGS gaged inflows measured for the Peace River at Arcadia, Horse Creek near Arcadia and Joshua Creek at Nocatee, after accounting for daily Facility withdrawals. The exception was the model for the Harbor Heights recorder location, which also included the additional freshwater flow measured for at the Shell Creek near Punta Gorda USGS gage.

- A second lagged, long-term cumulative flow term was then applied to the statistical models to establish some indication of background conditions and the "resident memory" associated with the characteristic of the longer-term salinity gradient within the lower river/upper harbor estuarine system.

- Hourly averaged stage heights corresponding with the same interval of the measured salinity were added to the models to account for the daily variability in the influences of tides/wind on salinity. Water level heights were measured directly at the two USGS recorders at Harbour Heights (RK 15.5) and Peace River Heights (RK 26.7). Corresponding water levels were interpolated for the HBMP recorder locations between these two USGS sites using their relative distances (River Kilometers 21.9, 23.4 and 24.5) and the measured lags in tide stage.

- A final term was tested for each model to account for the interactions of flow with stage and tidal influences. When freshwater inflows are low (such as the spring dry-season), there are very close correlations between tidal stage and the observed daily variability in measured conductivities (salinity). However, as flow increases and overall conductivities decline, the influences of daily tidal variability on observed salinity patterns decline.

- As an initial step in the development of each statistical model, the Statistical Analysis Software (SAS) "Stepwise General Linear Model" and "RSREG" procedures were used to screen the potential significance of a number of possible applied linear, non-linear, and interactive terms. Logs of the flow term were tested to account for the often-observed curvilinear response of salinity to increasing freshwater flow. Conversely, non-transformed variables were used within the models for those independent terms found to have more linear interactions. (All model parameters were tested and met the statistical requirements for normal distributions due to the very large number of observations.)

- Using an iterative process, surface salinity models were developed for each of the continuous recorder sites using the fewest number of independent variables that were both significant at the 0.01 level and added appreciably (at least one percent) to the overall explained error of the model. In developing the statistical models, enhancement of the explained error (R-square) was considered secondary to increasing the relationships between predicted and observed salinities (model fit).

The developed statistical models used to predict salinity levels at each of the continuous recorder locations initially utilized the following generalized form. Each model was then specifically modified to include only those significant terms that directly increase the overall fit using statistically significant terms. Only a single term was selected and applied to represent multiple significant terms that were themselves highly autocorrelated (i.e. one, five and seven day lag flow terms).

$$Salinity = \beta_{\alpha} + (\beta_1 x\ Flow1) + (\beta_2 \times Flow2) + (\beta_3 x Stage) + (\beta_4 x (Stage / Flow))$$

where:

β_{α} = specific intercept

β_1 = "short-term" flow slopes (linear and/or non-linear)

β_2 = "long-term" flow slopes (linear and/or non-linear)

β_3 = gage height specific slope

β_4 = gage height/flow interaction specific slope

The developed statistical models for each of the five continuous recorder locations were then used to produce the graphical depictions summarized in Table 6.1. The table indicates the R^2 values for the statistical model developed for each of the five continuous recorder locations, and shows predicted surface salinity increases above the "baseline," no-withdrawal scenario under both actual and theoretical maximum Facility withdrawals during each of the past four years. As indicated, the annual hydrographs for each of these four years were characterized by very differing rainfall conditions.

- **2004 –** This year was characterized by unusually wet conditions toward the end of the normal summer wet-season. In August, Hurricane Charley entered Charlotte Harbor and the eye generally followed a path northward through the Peace River Watershed. During the first week of September, Hurricane Frances brought additional extensive rainfall to the Peace River watershed as it moved diagonally across the state on a path from south of Fort Pierce to just north of Tampa before turning northward. Hurricane Ivan during the second week of September was well west of Florida's west coast (with landfall in the Panhandle), however, the size of the storm influenced rainfall in the upper Peace River watershed. Finally, during the last week in September, Hurricane Jeanne followed a very similar path across Florida as Hurricane Frances had three weeks earlier, bringing additional heavy rainfall throughout the Peace River watershed.

- **2005 –** This year was characterized by a much wetter than normal flow during the winter (January and February), unusually high flows during the typical spring dry-season (especially during March and May), much higher than normal flow through the first part of the summer wet-season (June, July and August), and seasonally very high flows from the end of October through mid November. Both the magnitude and duration of the high flows observed in the Peace River watershed during the summer wet-season were either directly or indirectly influenced by the succession of hurricanes during 2005 that passed near enough to influence rainfall in the watershed. Officially the hurricane season begins on June 1st, and lasts until the end of November. However, the 2005 hurricane season persisted effectively into January 2006 due to continued storm activity. A record twenty-eight tropical and subtropical storms formed, of which a record fifteen became hurricanes. Of these, seven strengthened into major hurricanes, a record-tying five became Category 4 hurricanes and a record four reached Category 5 strength, the highest categorization for hurricanes on the Saffir-Simpson Scale. Among these Category 5 storms was Hurricane Wilma which briefly was the most intense hurricane ever observed in the Atlantic.

- **2006** – Freshwater inflows during 2006 were characterized by much drier than normal conditions throughout much of the year. The two notable exceptions to these generally much drier than usual conditions were the brief intervals of higher than average flows during much of February (during the drier winter months), and from the end of August through mid-September following Tropical Storm Ernesto, which passed from south to north across Florida east of the Peace River watershed. Much of the decline in summer flows observed during 2006 can be directly attributed to the unusual patterns of wet-season afternoon thunderstorm activity that took place throughout much of the summer. Normally, summer thunderstorms in southwest Florida build up in the early afternoon in the interior of the state and move towards the west coast later in the afternoon. However, during 2006 the thunderstorm activity seemed to predominantly build along the coast and remain there. The result was that while many of the coastal USGS stream flow gages in southwest Florida were experiencing higher than normal (or near record) flows throughout much of the summer, gaged flows in the interior of the Peace River watershed were simultaneously recording period-of-record low flows during many summer days during 2006. In addition, the influence of tropical storms on summer wet-season rainfall patterns was far less during 2006 than during the previous two years.

- **2007** – Freshwater inflows to the lower Peace River during 2007 were characterized by extremely dry conditions, extending the drought conditions that began in 2006. Again, as in 2006, much of the decline in summer flows observed during 2007 was directly attributable to the predominant atypical patterns of wet-season afternoon thunderstorm activity that took place throughout much of the summer, with normal afternoon thunderstorm activity predominantly building up along the coast and remaining there.

Table 6.1
Predicted Surface Salinities at the Two USGS and Three HBMP Continuous Recorders

Continuous Recorder Location	R^2 of Developed Statistical Model	Predicted Salinity Increase Under Actual and Permitted Maximum Facility Withdrawals			
		2004	2005	2006	2007
RK 15.5 (Harbour Heights)	0.69	Figure 6.6	Figure 6.7	Figure 6.8	Figure 6.9
RK 21.9 (MZ4)	0.80	Figure 6.10	Figure 6.11	Figure 6.12	Figure 6.13
RK 23.4 (MZ3)	0.80	Figure 6.14	Figure 6.15	Figure 6.16	Figure 6.17
RK 24.5 (MZ2)	0.87	Figure 6.18	Figure 6.19	Figure 6.20	Figure 6.21
RK 26.7 (Peace River Heights)	0.79	Figure 6.22	Figure 6.23	Figure 6.24	Figure 6.25

The following briefly summaries the results of the analyses shown in Table 6.1 for each of the five continuous recorder sites. Comparisons among the years at each location along the lower Peace River HBMP monitoring transect provide indications of the relative magnitude of both seasonal and annual predicted salinity increases due to Facility withdrawals. Alternatively, comparisons among sites within and between years shows the relative spatial differences in predicted increases due to withdrawals among the sites. These differences are shown in comparison to the timing of both seasonal and annual differences in freshwater inflows. Generally the predicted salinity increases were larger (around 0.5 psu) and more frequent downstream. However, during the very low flows that characterized 2007, and under the District's revised emergency withdrawal schedule, the developed statistical models predicted instances of higher salinity at the more upstream recorder sites.

- **RK 15.5** (USGS Harbour Heights Gage) – The presented series of figures (**Figures 6.6** through **6.9**) show both modeled average daily predicted changes in surface salinities due to actual Facility withdrawals and those that would have occurred if the Facility had withdrawn the maximum daily amount allowed under the 1996 Water Use Permit's (WUP) withdrawal schedule. As indicated, under conditions when combined upstream USGS gaged freshwater inflows (lower Peace River and Shell Creek) are above approximately 1500 cfs, the constructed statistical model predicts that neither actual nor maximum permitted Facility withdrawals result in increases in salinities at this location. Seasonally, during periods characterized by lower flows above the minimum 130 cfs flow at the Peace River at Arcadia gage, average daily predicted salinity increases resulting from maximum permitted withdrawals are shown to be around 0.5 psu. Until December 2006, when the District issued a series of emergency changes to the withdrawal schedule to address the heightening drought conditions in the Peace River watershed, predicted salinity changes resulting from actual withdrawals are indicated to have been typically less than under the maximum 1996 permitted amounts. However, even during the very intense drought conditions that characterized 2007, the predicted increases due to Facility withdrawals under the revised District withdrawal schedule were again typically less than 0.5 psu.

- **RK 21.9** (HBMP MZ4 Gage) – **Figures 6.10** through **6.13** indicate the range of modeled daily average increases in surface salinities expected due to both actual and maximum permitted maximum Facility withdrawals during the past four years. Recently during both the relatively wet years of 2004 and 2005, the constructed statistical model indicates that surface salinities at this location in the lower river were only briefly influenced by withdrawals. However, during the much drier conditions that characterized much of 2006 and 2007, Facility withdrawals are predicted to have resulted in salinity increases typically in the range between 0.3 and 0.5 psu. The developed statistical models further indicate notable differences in the predicted salinity under similar flow conditions between the first part and the end of 2007. This expected result reflects the cumulative impact of the recent extreme drought conditions and the influences of seasonally increasing salinity levels that developed in regions of upper Charlotte Harbor and the lower Peace River.

- **RK 23.4** (HBMP MZ3 Gage) – **Figures 6.14** through **6.17** illustrate both modeled actual and maximum daily average surface salinity increases predicted to have resulted due to Facility withdrawals during each of the past four years. Both the frequency and magnitude of the salinity increase due to withdrawals during the wetter years (2004 and 2005) at this recorder location are less that those predicted at the more downstream sites. However, during the drier periods of 2006 and 2007, some of the USGS's downward revisions of provisional flows and the District's emergency changes to the withdrawal schedule in December 2006 resulted in periods when salinity increases due to actual withdrawals exceeded those estimated by applying the maximum 1996 permitted amounts by 0.1 – 0.5 psu. In addition, the unusually high salinities in this reach of the lower river resulting from the extended 2007 drought conditions briefly resulted in predicted salinity increases above those typically seen downstream (0.5 – 1.0 psu).

- **RK 24.5** (HBMP MZ2 Gage) – The predicted salinity increases shown in **Figures 6.18** through **6.21** are shown to be less than corresponding changes downstream during the wetter years of 2004 and 2005, and exhibit very similar seasonal patterns to those predicted immediately downstream at RK 23.4 during the much drier conditions that characterized much of both 2006 and 2007.

- **RK 26.7 (**USGS Peace River Heights Gage) – As **Figures 6.22** through **6.25** indicate, the increases in surface salinities predicted at this upstream location (**Figure 1.1**) are reduced in comparison with the more downstream sites during both wetter and drier time intervals. Even following two years of drought, the predicted salinity increases due to Facility withdrawals at the end of 2007 were always below 0.4 psu.

The results from the constructed statistical models were further used to graphically depict the relative differences in magnitudes between actual measured seasonal/annual variability in surface salinities at each of these five locations and that predicted to have occurred due to actual Facility withdrawals.

Table 6.2
Measured Daily Range and Predicted Surface Salinities
at the Two USGS and Three HBMP Continuous Recorders

Continuous Recorder Location	Daily Range in Salinities in Comparison to Predicted Salinity Increases Due to Actual Facility Withdrawals			
	2004	2005	2006	2007
Harbour Heights (RK 15.5)	Figure 6.26	Figure 6.27	Figure 6.28	Figure 6.29
MZ4 (RK 21.9)	NA	NA	Figure 6.30	Figure 6.31
MZ3 (RK 23.4)	NA	NA	Figure 6.32	Figure 6.33
MZ2 (RK 24.5)	NA	NA	Figure 6.34	Figure 6.35
Peace River Heights (RK 26.7)	Figure 6.36	Figure 6.37	Figure 6.38	Figure 6.39

NA – Continuous recorders were not installed at these three locations until December 2005.

The following briefly summarizes the results of the analyses shown in Table 6.2 for each of the five continuous recorder sites.

- **RK 15.5** (USGS Harbour Heights Gage) – Seasonally and annually, the daily average salinity increases predicted by the constructed statistical model are shown in **Figures 6.26** through **6.29** in comparison to the magnitude of actual measured daily variations in surface salinities. As indicated, predicted salinity increases due to Facility withdrawals (0.1 – 0.5 psu) are comparatively small when compared to the normal range of daily salinity variability (4.0 – 14.0 psu) that seasonally occurs during low to moderate levels of freshwater flow.

- **RK 21.9** (HBMP MZ4 Gage) – During the dry conditions that characterized much of the 2006 to 2007 time interval (**Figures 6.30** and **6.31**), the magnitude of the predicted salinity increases (0.1 – 0.8 psu) were again shown to be relatively small when compared to the natural degree of observed typical daily variability (2.0 – 10.0 psu) in measured surface salinities.

- **RK 23.4** (MBMP MZ3 Gage) – This reach of the lower river was often characterized by fairly broad ranges of daily variation in actual measured salinities (4 to 10 psu) during the unusually dry years of 2006 and 2007 (**Figures 6.32** and **6.33**). Predicted salinity increases due to withdrawals (0.1 – 0.8 psu) again typically represent a small fraction of this variability. It should be noted that these figures occasionally indicate somewhat random possible very high predicted salinity increases. A thorough review of the data however indicate that these unusual model results simply reflect the model's sensitivity to higher tide stage during periods of low to moderate freshwater inflows. Very brief periods of high water levels (often associated with very strong southerly winds) can result in an over prediction of resulting salinities. In comparison, sustained strong southerly winds can move the saltwater interface well upstream.

- **RK 24.5** (HBMP MZ2 Gage) – **Figures 6.34** and **6.35** indicate that the daily range of measured surface salinity variability (1 to 10 psu), as expected, continues to decline moving upstream, and that the predicted increases due to Facility withdrawals (0.1 – 0.8 psu) remain relatively small in magnitude when compared with both natural daily and seasonal variations.

- **RK 26.7 (**USGS Peace River Heights Gage) – **Figures 6.36** and **6.37** illustrate that higher saline waters normally only extend upstream into this typically freshwater reach of the lower Peace River during the later part of the spring dry-season. However, during the unusually dry 2006-2007 interval (**Figures 6.38** and **6.39**), daily variations between 4 and 10 psu were commonly observed at this upstream location. Predictable increases in salinity resulting from Facility withdrawals (0.1 – 0.4 psu) are primarily seasonally and annually confined to drier time intervals, when they constitute a relatively small part of the natural variability.

Finally, the developed statistical models were used to visually indicate relative predicted averaged increases in surface salinities along the lower Peace River HBMP monitoring transect resulting from Facility withdrawals, seasonally during each of the past four years and then overall combining the predicted increases during the wet and dry years between 2004 and 2007. The following conclusions summarize the findings presented in Table 6.3.

Table 6.3
Seasonally Average Predicted Increases in Salinity Due to Facility Withdrawals Along the Lower Peace River HBMP Monitoring Transect

Season	2004	2005	2006	2007	2004-2007
March – May (Warm Dry-Season)	Figure 6.40	Figure 6.43	Figure 6.46	Figure 6.49	Figure 6.52
June – September (Hot Wet-Season)	Figure 6.41	Figure 6.44	Figure 6.47	Figure 6.50	Figure 6.53
October – February (Cool Dry Season)	Figure 6.42	Figure 6.45	Figure 6.48	Figure 6.51	Figure 6.54

- 2004 was characterized by a relatively typical annual seasonal pattern, with a much wetter than usual end of the summer wet season. Spatially, under such flows, the greatest increases in salinity resulting from Facility withdrawals were predicted downstream at the Harbour Heights recorder, and then progressively decreasing moving upstream. Seasonally, as expected, the largest increases were predicted to have occurred during the period of low flows during the spring dry-season.

- Seasonally, the spatial distributions of predicted salinity increases due to withdrawals during 2005 clearly reflect the much wetter than usual conditions that characterized much of the year. This is most clearly shown by the very low predicted salinity increase at the more upstream recorder locations.

- Conversely, the influences of the increasing drought conditions that characterized the 2006-2007 interval are shown by higher salinity changes comparatively occurring much further up stream. In fact, the models suggest that the largest average changes in salinities (still below 0.5 psu) during the typically wet months of 2007 occurred upstream below RK 23.4 (Navigator Marina) rather than at the downstream recorder near Harbour Heights (RK 15.5).

- Overall, the spatial gradient of predicted salinity increases shows a strong declining pattern moving upstream. Seasonally, the period of the greatest potential changes occurs during the typical spring dry-season, and the smallest changes are predicted during the normal summer wet-season.

6.2 Comparisons with Previous Empirical Model Results

Panel members also suggested that these salinity results should be compared to predicted values from previous existing empirical modeling tools developed to assess the potential impacts of Facility withdrawals on the salinity structure of the lower Peace River/upper Charlotte Harbor estuarine system.

The preceding statistical models were specifically developed from hourly averaged data gathered over the period-of-record at each of the current five continuous recorder locations along the lower Peace River monitoring transect (**Figure 1.1**). These statistically based models were applied to predict salinity changes due to Facility withdrawals using measured hourly variations in gage height with daily averaged rates of freshwater inflows and withdrawals. Historically, there have been a number of previous modeling efforts that have similarly attempted to quantify the potential impacts of Peace River Facility withdrawals on both the salinity structure of the lower river as well as the movement of specific isohalines. The methods, findings and conclusions of these previous modeling efforts are presented in **Section 2.0**. Historically, these previous analyses have generally relied on monthly or daily averaged values, and typically did not account for estimated tidal influences (gage height). Overall, the results of these previous efforts have suggested the predicted effects of freshwater withdrawals on salinity to typically be between 0.1-0.5 psu, and probably could not easily be detected given the normal distributions or daily tidal ranges of salinity along the lower Peace River/upper Charlotte Harbor HBMP monitoring transect. **Table 6.4** briefly summarizes the significant conclusions of both the current "pump test" results and previous historic modeling efforts used to predict the relative impacts of Facility withdrawals on lower Peace River salinity/isohaline changes. Overall, the statistical models based on the array of USGS and HBMP continuous recorders confirm the general findings of the previous historical modeling efforts. However, the new model suggest that the predicted effects of Facility withdrawals have generally been between 0.1-0.8 psu recently during 2006 and 2007, which is somewhat higher than previous modeled predictions of 0.1-0.5 psu. This increase in predicted salinity reflects the District's response to the ongoing recent drought when the permit threshold was reduced from 130 cfs measured at the Arcadia gage to 90 cfs using the combined three gages upstream of the Facility (Peace River at Arcadia, Horse Creek near Arcadia and Joshua Creek at Nocatee).

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HBMP Low Flow Pump Test Tables

This section contains tables not included directly in the text for each section

Table 2.1

Summary of Previous Lower Peace River Estuary Salinity / Isohaline Models

Study	Year	Descriptions	Summary of Potential Impacts of Withdrawals
University of Miami	1975	Statistical models were developed from monthly salinity data collected between 1973-1974 at fixed sampling locations along the lower Peace River, and Arcadia gaged flows.	Potential increase of 1.3 to 3.2 ppt with 30 mgd withdrawals during flows of 100 cfs
Environmental Quality Laboratory	1982, 1984, 1989, 1996	Statistical models were developed of surface and bottom salinities at HBMP long-term fixed monitoring sites in the lower river and upper Charlotte Harbor based on monthly data and daily gaged freshwater inflows and withdrawals. Additional models were used to indicate the spatial variability of both freshwater interface and isohalines in relation to inflows and withdrawals.	Less than 0.5 ppt change under 1988 revised withdrawal schedule, and isohaline movement less than 0.4 kilometers
2000 HBMP Midterm Interpretive Report	2002	Long-term monthly HBMP fixed station and moving isohaline data were combined to develop statistical models of the spatial salinity relationships in the lower Peace River with daily gaged inflows and withdrawals.	Less than 0.5 ppt change under the 1996 revised permit withdrawals schedule
Janicki Environmental	2003	Updated long-term monthly HBMP fixed station and moving isohaline data were used to develop predictive models of salinity water column profile and relative isohaline relationships in the lower Peace River with daily gaged inflows and withdrawals.	Average potential increases of 0.1 to 0.3 ppt in salinity and upstream movement of 0.1 to 0.3 kilometers of the isohalines under 1996 withdrawal schedule
2002 HBMP Comprehensive Summary Report	2004	Statistical models were developed using hourly averaged subsurface and near bottom salinities collected at 15-minute intervals between 1997 and 2002 at river kilometers 15.5 and 26.7 with corresponding stage level and daily gaged inflows and Facility withdrawals.	Increases in salinities at each site under 1996 permit conditions predicted to be less than 0.4 ppt (actual predicted increases have exceeded this approximately ten percent of the time).

Table 4.3
Summary of Peace River at Arcadia Flows and Facility Withdrawals during each of the Sixteen "Pump Test" Sampling Events

Test Period	Daily Average Peace River at Arcadia Flows (cfs)			Daily Average Facility Withdrawals (cfs)		
	Day 1 Withdrawals	Day 2 No Withdrawals	Day 3 Withdrawals	Day 1 Withdrawals	Day 2 No Withdrawals	Day 3 Withdrawals
December 11th through 13th	82	81	82	10.1	0	9.0
December 18th through 20th	138	136	130	17.2	0	12.9
December 24th through 26th	132	163	207	11.5	0	14.9
December 28th through 30th	298	267	249	28.6	0	25.1
January 11th through 13th	184	178	173	18.0	0	16.7
January 14th through 16th	167	158	153	16.2	0	14.7
January 23rd through 25th	128	132	149	11.4	0	11.9
January 28th through 30th	252	231	236	21.3	0	20.7
February 11th through 13th	252	234	229	23.6	0	20.1
February 24th through 26th	203	190	181	22.2	0	19.5
March 6th through 8th	142	145	142	15.6	0	15.5
March 12th through 14th	121	121	118	13.5	0	13.1
March 26th through 28th	94	89	88	11.1	0	10.2
April 3rd and 4th *	83	75	74	7.0	0	0 *
April 14th through 16th	116	112	112	14.1	0	13.1
April 18th through 20th	104	99	90	13.2	0	12.0

* No withdrawals on day 3 due to low flows

Table 4.7

Mean Daily Salinity (based on hourly averages from 15 minute measurements)

(Daily mean values for each pump test event and continuous recorder location followed by different letters are significantly different at the 0.05 level)

Pump Test Event	Conditions		Continuous Recorder Location				
	Arcadia Flow (cfs)	Withdrawal (cfs)	USGS RK 15.5	HBMP RK 21.9	HBMP RK 23.4	HBMP RK 24.5	HBMP RK 26.7
Test #1							
December 11th - On	82	10.1	14.0 b	6.0 a	4.2 a	3.3 a	1.4 a
December 12th - Off	81	0	14.2 a,b	6.1 a	4.1 a	3.2 a	1.2 a
December 13th - On	82	9.0	15.1 a	7.0 a	4.9 a	3.9 a	1.5 a
Test #2							
December 18th - On	138	17.2	16.7 a	7.4 a	5.2 a	3.8 a	1.7 a
December 19th - Off	136	0	15.9 a	6.3 a	3.9 a	3.1 a	1.3 a
December 20th - On	130	12.9	16.2 a	6.3 a	4.1 a	3.3 a	1.3 a
Test #3							
December 24th - On	132	11.5	17.3 b	7.8 a	5.5 b	4.2 a	2.0 a
December 25th - Off	163	0	18.5 a	8.6 a	6.5 a	4.9 a	2.1 a
December 26th - On	207	14.9	13.8 c	4.0 b	2.1 c	1.4 b	0.4 b
Test #4							
December 28th - On	298	28.6	10.2 a	1.8 a	0.7 a	0.5 b	0.3 b
December 29th - Off	267	0	10.2 a	1.6 a	0.6 a	0.4 b	0.3 b
December 30th - On	249	25.1	11.5 a	2.5 a	1.1 a	0.7 a	0.3 a
Test #5							
January 11th - On	184	18.0	6.7 c	1.0 b	0.5 b	0.4 b	0.3 b
January 12th - Off	178	0	8.2 b	1.6 b	0.7 a,b	0.5 b	0.3 b
January 13th - On	173	16.7	9.5 a	2.4 a	0.9 a	0.7 a	0.3 a
Test #6							
January 14th - On	167	16.3	10.7 b	2.8 a	1.5 b	0.9 b	0.4 b
January 15th - Off	158	0	12.7 a	3.4 a	2.0 a,b	1.1 a,b	0.5 a
January 16th - On	153	14.7	13.3 a	3.8 a	2.4 a	1.5 a	0.6 a
Test #7							
January 23rd - On	128	11.4	13.4 a	4.3 a	2.6 a	1.6 a	0.6 a
January 24th - Off	132	0	12.1 b	3.5 a,b	1.8 b	1.2 b	0.4 b
January 25th - On	149	11.9	11.2 c	2.7 b	1.1 c	0.9 b	0.4 b
Test #8							
January 28th - On	252	21.3	14.3 a	4.3 a	2.6 a	1.7 a	0.7 a
January 29th - Off	231	0	11.2 b	2.4 b	1.1 b	0.8 b	0.4 b
January 30th - On	236	20.7	11.3 b	3.0 b	1.5 b	1.1 b	0.4 a,b
Test #9							
February 11th - On	252	23.6	7.9 b	1.6 b	0.7 b	0.5 b	0.3 b
February 12th - Off	234	0	8.0 b	1.8 b	0.7 b	0.6 b	0.3 b
February 13th - On	229	20.1	13.5 a	3.8 a	3.0 a	1.6 a	0.4 a

Table 4.7

Mean Daily Salinity (based on hourly averages from 15 minute measurements)

(Daily mean values for each pump test event and continuous recorder location followed by different letters are significantly different at the 0.05 level)

Pump Test Event	Conditions		Continuous Recorder Location				
	Arcadia Flow (cfs)	Withdrawal (cfs)	USGS RK 15.5	HBMP RK 21.9	HBMP RK 23.4	HBMP RK 24.5	HBMP RK 26.7
Test #10							
February 24th - On	203	22.2	10.4 a	2.0 a	1.3 a	0.9 a	0.3 a
February 25th - Off	190	0	12.5 a	2.6 a	2.1 a	1.2 a	0.3 a
February 26th - On	181	19.5	11.8 a	2.3 a	1.7 a	1.0 a	0.3 a
Test #11							
March 6th - On	142	15.6	8.1 b	1.1 b	0.5 b	0.4 b	0.3 b
March 7th - Off	145	0	11.1 a	2.4 a	1.3 a	0.8 a	0.3 a,b
March 8th - On	142	15.5	11.3 a	2.6 a	1.4 a	0.8 a	0.4 a
Test #12							
March 12th - On	121	13.5	11.7 b	4.0 a	2.2 b	1.7 b	0.6 b
March 13th - Off	121	0	12.7 b	4.6 a	2.8 a, b	2.0 a, b	0.7 a,b
March 14th - On	118	13.1	14.7 a	5.6 a	3.7 a	2.7 a	1.0 a
Test #13							
March 26th - On	94	11.1	15.1 b	6.7 a	4.4 b	3.3 b	1.4 b
March 27th - Off	89	0	16.5 a	7.3 a	5.1 a,b	4.0 a,b	1.9 a,b
March 28th - On	88	10.2	17.5 a	8.1 a	6.0 a	4.6 a	2.3 a
Test #14							
April 3rd - On	83	7.0	20.0 a	9.9 a	7.6 a	6.2 a	3.0 a
April 4th - Off	75	0	19.7 a	9.7 a	7.5 a	6.1 a	2.9 a
April 5th - Off	74	0	20.2 a	10.4 a	8.2 a	6.6 a	3.7 a
Test #15							
April 14th - On	116	14.1	18.2 b	9.2 b	7.0 b	5.4 b	2.8 b
April 15th - Off	112	0	21.3 a	11.9 a	10.0 a	7.8 a	4.8 a
April 16th - On	112	13.1	15.9 c	5.2 c	3.1 c	2.2 c	0.8 c
Test #16							
April 18th - On	104	13.2	17.6 a	7.6 a	5.7 a	4.1 a	2.1 a
April 19th - Off	99	0	17.4 a	7.3 a	5.0 a	3.8 a	1.6 a
April 20th - On	90	12.0	16.4 a	6.3 a	4.3 a	3.2 a	1.5 a

Table 4.8

Summary Statistics of Salinity at each of the Five Continuous Recorder Locations Along the Lower Peace River during each of the Sixteen Facility Pump Test Events

Pump Test Dates	Arcadia Flow (cfs)	Withdrawal (cfs)	Harbour Heights – RK 15.5				MZ4 – RK21.9				MZ3 – RK 23.4				MZ2 – RK24.5				Peace River Heights – RK 26.7			
			Min	Median	Mean	Max	Min	Median	Mean	Max	Min	Median	Mean	Max	Min	Median	Mean	Max	Min	Median	Mean	Max
Test #1																						
December 11th - on	82	10.1	11.4	13.8	14.0	17.0	3.4	6.0	6.0	8.3	1.9	4.3	4.2	6.2	1.2	3.6	3.3	4.7	0.4	1.1	1.4	2.8
December 12th - off	81	0	12.0	13.5	14.2	18.3	3.5	5.6	6.1	9.9	2.0	3.6	4.1	7.3	1.2	3.1	3.2	6.5	0.4	0.7	1.2	3.7
December 13h - on	82	9.0	12.9	14.9	15.1	18.4	4.3	6.9	7.0	10.1	3.0	5.1	4.9	7.7	1.9	3.9	3.9	6.7	0.5	1.2	1.5	3.8
Test #2																						
December 18th- on	138	17.2	12.5	17.3	16.7	19.3	2.6	7.8	7.4	12.2	1.2	6.2	5.2	8.1	0.7	3.8	3.8	7.7	0.4	1.7	1.7	4.2
December 19th - off	136	0	12.2	15.7	15.9	19.3	2.2	6.2	6.3	12.0	1.0	3.4	3.9	8.2	0.6	2.9	3.1	7.5	0.3	1.0	1.3	3.9
December 20th - on	130	12.9	11.5	16.6	16.2	19.2	2.0	6.8	6.3	11.4	1.0	4.7	4.1	7.2	0.6	3.4	3.3	6.3	0.3	1.3	1.3	3.0
Test #3																						
December 24th- on	132	11.5	12.5	17.7	17.3	20.4	3.2	8.1	7.8	12.1	1.7	5.2	5.5	8.9	1.0	4.1	4.2	8.1	0.4	1.6	2.0	5.1
December 25th - off	163	0	15.4	18.5	18.5	21.2	5.7	8.3	8.6	12.6	4.0	5.6	6.5	11.0	2.2	4.3	4.9	9.3	0.7	1.6	2.1	5.5
December 26th- on	207	14.9	11.3	13.5	13.8	16.4	1.4	3.9	4.0	7.4	0.8	1.9	2.1	4.4	0.4	1.2	1.4	3.2	0.3	0.3	0.4	0.7
Test #4																						
December 28th- on	298	28.6	7.7	10.1	10.2	13.2	0.5	1.4	1.8	4.8	0.3	0.5	0.7	1.8	0.3	0.4	0.5	1.0	0.3	0.3	0.3	0.3
December 29th - off	267	0	6.6	10.2	10.2	14.5	0.4	1.4	1.6	4.2	0.3	0.5	0.6	1.5	0.3	0.4	0.4	1.0	0.3	0.3	0.3	0.3
December 30th- on	249	25.1	5.6	10.8	11.5	18.3	0.4	1.8	2.5	8.1	0.3	0.7	1.1	3.9	0.3	0.4	0.7	2.4	0.3	0.3	0.3	0.5
Test #5																						
January 11th- on	184	18.0	5.1	5.9	6.7	11.5	0.4	0.6	1.0	3.3	0.3	0.4	0.5	1.2	0.3	0.3	0.4	0.6	0.3	0.3	0.3	0.3
January 12th - off	178	0	6.1	7.4	8.2	12.4	0.4	1.2	1.6	5.1	0.3	0.4	0.7	2.0	0.3	0.4	0.5	1.2	0.3	0.3	0.3	0.3
January 13th- on	173	16.7	6.2	10.0	9.5	13.8	0.5	2.2	2.4	7.3	0.3	0.7	0.9	2.7	0.3	0.4	0.7	2.1	0.3	0.3	0.3	0.5
Test #6																						
January 14th- on	167	16.25	7.6	11.1	10.7	13.4	0.6	2.9	2.8	6.7	0.4	1.5	1.5	3.1	0.4	0.7	0.9	2.8	0.3	0.3	0.4	0.6
January 15th - off	158	0	8.1	12.8	12.7	16.6	0.7	3.4	3.4	6.9	0.4	2.4	2.0	3.7	0.4	1.2	1.1	2.9	0.3	0.4	0.5	0.9
January 16th- on	153	14.7	8.0	13.9	13.3	16.8	0.9	3.6	3.8	8.2	0.5	2.7	2.4	4.3	0.4	1.6	1.5	3.9	0.3	0.5	0.6	1.3
Test #7																						
January 23rd- on	128	11.4	10.3	13.6	13.4	15.7	1.4	4.1	4.3	7.2	0.8	2.3	2.6	5.6	0.5	1.4	1.6	3.6	0.3	0.4	0.6	1.4
January 24th - off	132	0	10.8	12.3	12.1	13.2	1.5	3.3	3.5	5.7	0.7	1.7	1.8	3.3	0.5	1.2	1.2	2.1	0.3	0.4	0.4	0.7
January 25th- on	149	11.9	10.0	11	11.2	12.3	1.0	2.3	2.7	6.6	0.5	1.0	1.1	2.5	0.4	0.7	0.9	1.9	0.3	0.3	0.4	0.5
Test #8																						
January 28th-- on	252	21.3	12.2	13.7	14.3	18.3	1.9	3.7	4.3	9.2	1.0	2.0	2.6	7.8	0.5	1.2	1.7	5.2	0.3	0.4	0.7	3.4
January 29th - off	231	0	7.4	12.1	11.2	13.2	0.5	2.1	2.4	6.9	0.4	0.9	1.1	2.8	0.4	0.5	0.8	2.3	0.3	0.3	0.4	0.5
January 30th- on	236	20.7	8.3	11.7	11.3	13.1	0.8	2.8	3.0	7.0	0.5	1.7	1.5	2.8	0.4	1.1	1.1	2.5	0.3	0.4	0.4	0.8

Table 4.8

Summary Statistics of Salinity at each of the Five Continuous Recorder Locations Along the Lower Peace River during each of the Sixteen Facility Pump Test Events

Pump Test Dates	Arcadia Flow (cfs)	Withdrawal (cfs)	Harbour Heights – RK 15.5				MZ4 – RK21.9				MZ3 – RK 23.4				MZ2 – RK24.5				Peace River Heights – RK 26.7			
			Min	Median	Mean	Max	Min	Median	Mean	Max	Min	Median	Mean	Max	Min	Median	Mean	Max	Min	Median	Mean	Max
Test #9																						
February 11th- on	252	23.6	5.3	7.9	7.9	11.4	0.4	0.9	1.6	4.2	0.4	0.4	0.7	1.9	0.4	0.4	0.5	1.3	0.2	0.3	0.3	0.3
February 12th - off	234	0	5.9	8.2	8.0	10.3	0.5	1.2	1.8	5.3	0.4	0.7	0.7	1.5	0.4	0.5	0.6	1.4	0.3	0.3	0.3	0.3
February 13th - on	229	20.1	7.2	12.3	13.5	19.2	0.5	3.0	3.8	8.3	0.4	1.6	3.0	6.8	0.4	1.0	1.6	4.7	0.3	0.3	0.4	0.7
Test #10																						
February 24h- on	203	22.2	4.6	9.4	10.4	16.5	0.3	1.2	2.0	6.1	0.4	0.5	1.3	3.7	0.4	0.4	0.9	2.5	0.3	0.3	0.3	0.4
February 25th - off	190	0	5.8	13.2	12.5	17.3	0.4	3.3	2.6	4.6	0.4	1.7	2.1	4.6	0.4	0.8	1.2	2.9	0.3	0.3	0.3	0.4
February 26th - on	181	19.5	7.0	13.1	11.8	15.3	0.6	2.6	2.3	4.5	0.5	1.8	1.7	3.3	0.4	1.0	1.0	1.9	0.3	0.3	0.3	0.5
Test #11																						
March 6th- on	142	15.6	6.5	8.2	8.1	10.1	0.4	1.0	1.1	2.3	0.3	0.4	0.5	1.2	0.3	0.3	0.4	0.6	0.3	0.3	0.3	0.3
March 7th - off	145	0	7.7	10.5	11.1	15.9	0.6	2.4	2.4	4.7	0.4	1.1	1.3	3.5	0.3	0.5	0.8	2.3	0.3	0.3	0.3	0.7
March 8th- on	142	15.5	8.1	10.4	11.3	16.7	0.7	2.4	2.6	5.2	0.4	0.9	1.4	4.0	0.4	0.6	0.8	2.5	0.3	0.3	0.4	0.8
Test #12																						
March 12th- on	121	13.5	8.0	11.5	11.7	15.8	0.8	4.1	4.0	8.7	0.4	1.5	2.2	5.5	0.4	1.1	1.7	4.6	0.3	0.4	0.6	1.4
March 13th - off	121	0	8.4	12.8	12.7	16.8	1.1	4.7	4.6	8.7	0.6	2.6	2.8	5.6	0.4	1.7	2.0	4.7	0.3	0.4	0.7	1.8
March 14th- on	118	13.1	9.8	14.3	14.7	19.4	1.6	5.9	5.6	10.7	0.8	3.8	3.7	7.0	0.5	2.7	2.7	5.9	0.3	0.8	1.0	2.7
Test #13																						
March 26th- on	94	11.1	11.8	15.1	15.1	18.4	2.3	7.1	6.7	10.8	1.3	4.4	4.4	7.4	0.7	3.5	3.3	6.3	0.4	1.0	1.4	3.2
March 27th - off	89	0	12.7	16.9	16.5	19	3.0	8.1	7.3	10.6	1.7	5.4	5.1	7.6	0.8	4.7	4.0	6.9	0.4	1.9	1.9	4.1
March 28th- on	88	10.2	14.0	18.0	17.5	19.6	4.2	8.3	8.1	11.2	2.1	6.2	6.0	8.5	1.2	5.1	4.6	7.3	0.4	2.6	2.3	4.4
Test #14																						
April 3rd- on	83	7.0	17.3	20.2	20.0	22.6	7.1	10.1	9.9	12.6	5.3	7.6	7.6	10.9	3.1	6.6	6.2	9.4	1.0	2.7	3.0	6.0
April 4th - off	75	0	16.0	19.9	19.7	22.3	6.3	10.0	9.7	12.4	4.1	7.6	7.5	11.2	2.5	6.3	6.1	9.3	0.9	2.4	2.9	6.6
April 5th- on	74	0	15.8	20.0	20.2	24.0	6.2	10.5	10.4	14.1	3.5	7.8	8.2	12.9	2.3	6.6	6.6	11.2	0.8	3.2	3.7	8.2
Test #15																						
April 14th- on	116	14.1	14.6	18.4	18.2	20.7	5.2	9.7	9.2	11.6	3.0	7.4	7.0	10.4	1.7	5.8	5.4	8.4	0.7	2.8	2.8	5.6
April 15th - off	112	0	17.3	21.3	21.3	24.8	6.6	12.8	11.9	13.9	4.2	10.7	10.0	13.3	2.3	8.3	7.8	11.4	0.9	5.2	4.8	7.6
April 16th- on	112	13.1	12	16	15.9	19.4	2.4	4.8	5.2	8.7	1.5	2.7	3.1	5.4	0.7	2.0	2.2	4.9	0.5	0.6	0.8	1.5
Test #16																						
April 18th- on	104	13.2	11.3	17	17.6	22.8	2.6	7.3	7.6	12.0	1.5	5.3	5.7	10.9	0.8	3.6	4.1	8.8	0.5	1.5	2.1	5.7
April 19th - off	99	0	14	17.3	17.4	20.4	3.9	7.3	7.3	10.9	2.3	5.1	5.0	7.9	1.1	3.8	3.8	7.5	0.6	1.2	1.6	4.5
April 20th- on	90	12.0	11.5	16	16.4	20.9	2.5	6.1	6.3	10.4	1.5	3.7	4.3	8.1	0.8	2.6	3.2	7.2	0.5	1.0	1.5	4.2

Table 4.11 Best Fit GLM Model of Surface Salinity at Harbour Heights (RK 15.5)

The GLM Procedure

Dependent Variable: SAL_T

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	3	42834.95442	14278.31814	3500.43	<.0001
Error	2876	11731.27079	4.07902		
Corrected Total	2879	54566.22521			

R-Square	Coeff Var	Root MSE	SAL_T Mean
0.785009	15.16122	2.019659	13.32122

Source	DF	Type I SS	Mean Square	F Value	Pr > F
GHEIGHT	1	19259.50294	19259.50294	4721.60	<.0001
LF5	1	23014.96904	23014.96904	5642.27	<.0001
LF60	1	560.48243	560.48243	137.41	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
GHEIGHT	1	15960.82467	15960.82467	3912.90	<.0001
LF5	1	22112.00994	22112.00994	5420.91	<.0001
LF60	1	560.48243	560.48243	137.41	<.0001

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	33.24309353	0.90361652	36.79	<.0001
GHEIGHT	3.13000488	0.05003748	62.55	<.0001
LF5	-6.68375612	0.09077883	-73.63	<.0001
LF60	2.27917553	0.19443519	11.72	<.0001

Table 4.12 Best Fit GLM Model of Surface Salinity at MZ4 Heights (RK 21.9)

The GLM Procedure

Dependent Variable: SAL_T

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	32075.90211	5345.98368	3227.48	<.0001
Error	2873	4758.82439	1.65640		
Corrected Total	2879	36834.72649			

R-Square	Coeff Var	Root MSE	SAL_T Mean
0.870806	27.86327	1.287010	4.619021

Source	DF	Type I SS	Mean Square	F Value	Pr > F
GHEIGHT	1	13475.46914	13475.46914	8135.42	<.0001
F5	1	15406.36810	15406.36810	9301.14	<.0001
F52	1	2484.94291	2484.94291	1500.21	<.0001
F53	1	96.45119	96.45119	58.23	<.0001
F60	1	165.77640	165.77640	100.08	<.0001
FGH	1	446.89436	446.89436	269.80	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
GHEIGHT	1	3533.735878	3533.735878	2133.39	<.0001
F5	1	898.575331	898.575331	542.49	<.0001
F52	1	323.955964	323.955964	195.58	<.0001
F53	1	135.133029	135.133029	81.58	<.0001
F60	1	154.552332	154.552332	93.31	<.0001
FGH	1	446.894361	446.894361	269.80	<.0001

Figure 4.118 Surface salinity at MZ4 gage (RK 21.9) versus Peace River at Arcadia flow

Table 4.12 Best Fit GLM Model of Surface Salinity at MZ4 Heights (RK 21.9)

The GLM Procedure

Dependent Variable: SAL_T

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	15.20752206	0.34406255	44.20	<.0001
GHEIGHT	3.86452058	0.08366824	46.19	<.0001
F5	-0.17315432	0.00743427	-23.29	<.0001
F52	0.00063981	0.00004575	13.98	<.0001
F53	-0.00000079	0.00000009	-9.03	<.0001
F60	0.00829414	0.00085865	9.66	<.0001
FGH	-0.00827301	0.00050367	-16.43	<.0001

Figure 4.118 Surface salinity at MZ4 gage (RK 21.9) versus Peace River at Arcadia flow

Table 4.13 Best Fit GLM Model of Surface Salinity at MZ3 Heights (RK 23.4)

The GLM Procedure

Dependent Variable: SAL_T

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	20502.63249	3417.10542	1976.37	<.0001
Error	2873	4967.36681	1.72898		
Corrected Total	2879	25469.99930			

R-Square	Coeff Var	Root MSE	SAL_T Mean
0.804972	41.10889	1.314908	3.198597

Source	DF	Type I SS	Mean Square	F Value	Pr > F
GHEIGHT	1	8766.899540	8766.899540	5070.55	<.0001
F5	1	8642.316538	8642.316538	4998.50	<.0001
F52	1	2121.198668	2121.198668	1226.85	<.0001
F53	1	225.258279	225.258279	130.28	<.0001
F60	1	200.867093	200.867093	116.18	<.0001
FGH	1	546.092374	546.092374	315.85	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
GHEIGHT	1	2908.873158	2908.873158	1682.42	<.0001
F5	1	1037.243324	1037.243324	599.92	<.0001
F52	1	510.961146	510.961146	295.53	<.0001
F53	1	283.723684	283.723684	164.10	<.0001
F60	1	187.301655	187.301655	108.33	<.0001
FGH	1	546.092374	546.092374	315.85	<.0001

Figure 4.122 Surface salinity at MZ3 gage (RK 23.4) versus Peace River at Arcadia flow

Table 4.13 Best Fit GLM Model of Surface Salinity at MZ3 Heights (RK 23.4)

The GLM Procedure

Dependent Variable: SAL_T

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	13.34974531	0.35149107	37.98	<.0001
GHEIGHT	3.50630422	0.08548354	41.02	<.0001
F5	-0.18602101	0.00759481	-24.49	<.0001
F52	0.00080349	0.00004674	17.19	<.0001
F53	-0.00000115	0.00000009	-12.81	<.0001
F60	0.00913080	0.00087727	10.41	<.0001
FGH	-0.00914388	0.00051451	-17.77	<.0001

Figure 4.122 Surface salinity at MZ3 gage (RK 23.4) versus Peace River at Arcadia flow

Table 4.14 Best Fit GLM Model of Surface Salinity at MZ2 Heights (RK 24.5)

The GLM Procedure

Dependent Variable: SAL_T

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	14417.40822	2883.48164	2315.36	<.0001
Error	2874	3579.18889	1.24537		
Corrected Total	2879	17996.59711			

R-Square	Coeff Var	Root MSE	SAL_T Mean
0.801119	46.04353	1.115961	2.423708

Source	DF	Type I SS	Mean Square	F Value	Pr > F
GHEIGHT	1	5464.239432	5464.239432	4387.65	<.0001
F5	1	6186.577716	6186.577716	4967.67	<.0001
LF52	1	1775.727981	1775.727981	1425.87	<.0001
LF602	1	185.670561	185.670561	149.09	<.0001
FGH	1	805.192530	805.192530	646.55	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
GHEIGHT	1	2668.757181	2668.757181	2142.95	<.0001
F5	1	673.612315	673.612315	540.89	<.0001
LF52	1	1554.001955	1554.001955	1247.83	<.0001
LF602	1	171.726867	171.726867	137.89	<.0001
FGH	1	805.192530	805.192530	646.55	<.0001

Table 4.14 Best Fit GLM Model of Surface Salinity at MZ2 Heights (RK 24.5)

The GLM Procedure

Dependent Variable: SAL_T

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	30.48619992	0.91432574	33.34	<.0001
GHEIGHT	3.35116309	0.07239190	46.29	<.0001
F5	0.03754865	0.00161450	23.26	<.0001
LF52	-4.18342562	0.11842822	-35.32	<.0001
LF602	0.64957680	0.05531722	11.74	<.0001
FGH	-0.01107776	0.00043566	-25.43	<.0001

Table 4.15 Best Fit GLM Model of Surface Salinity at Peace River Heights (RK 26.7)

The GLM Procedure

Dependent Variable: SAL_T

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	4626.638415	771.106402	1082.89	<.0001
Error	2873	2045.811602	0.712082		
Corrected Total	2879	6672.450017			

R-Square	Coeff Var	Root MSE	SAL_T Mean
0.693394	73.16933	0.843850	1.153283

Source	DF	Type I SS	Mean Square	F Value	Pr > F
GHEIGHT	1	1512.896767	1512.896767	2124.61	<.0001
F5	1	1680.997195	1680.997195	2360.68	<.0001
F52	1	651.972704	651.972704	915.59	<.0001
F53	1	79.684409	79.684409	111.90	<.0001
F60	1	27.935190	27.935190	39.23	<.0001
FGH	1	673.152149	673.152149	945.33	<.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
GHEIGHT	1	1407.268971	1407.268971	1976.27	<.0001
F5	1	244.415112	244.415112	343.24	<.0001
F52	1	127.216237	127.216237	178.65	<.0001
F53	1	70.004092	70.004092	98.31	<.0001
F60	1	21.209398	21.209398	29.79	<.0001
FGH	1	673.152149	673.152149	945.33	<.0001

Table 4.15 Best Fit GLM Model of Surface Salinity at Peace River Heights (RK 26.7)

The GLM Procedure

Dependent Variable: SAL_T

Parameter	Estimate	Standard Error	t Value	Pr > |t|
Intercept	6.176775296	0.22388266	27.59	<.0001
GHEIGHT	2.300583407	0.05175049	44.46	<.0001
F5	-0.090191130	0.00486816	-18.53	<.0001
F52	0.000400877	0.00002999	13.37	<.0001
F53	-0.000000571	0.00000006	-9.92	<.0001
F60	0.003074434	0.00056333	5.46	<.0001
FGH	-0.009580914	0.00031161	-30.75	<.0001

Table 6.4
Summary of Previous Lower Peace River Estuary Salinity / Isohaline Models

Study	Year	Descriptions	Summary of Potential Impacts of Withdrawals
University of Miami	1975	Statistical models were developed from monthly salinity data collected between 1973-1974 at fixed sampling locations along the lower Peace River, and Arcadia gaged flows.	Potential increase of 1.3 to 3.2 psu with 30 mgd withdrawals during flows of 100 cfs
Environmental Quality Laboratory	1982, 1984, 1989, 1996	Statistical models were developed of surface and bottom salinities at HBMP long-term fixed monitoring sites in the lower river and upper Charlotte Harbor based on monthly data and daily gaged freshwater inflows and withdrawals. Additional models were used to indicate the spatial variability of both freshwater interface and isohalines in relation to inflows and withdrawals.	Less than 0.5 psu change under 1988 revised withdrawal schedule, and isohaline movement less than 0.4 kilometers
2000 HBMP Midterm Interpretive Report	2002	Long-term monthly HBMP fixed station and moving isohaline data were combined to develop statistical models of the spatial salinity relationships in the lower Peace River with daily gaged inflows and withdrawals.	Less than 0.5 psu change under the 1996 revised permit withdrawals schedule
Janicki Environmental	2002	Updated long-term monthly HBMP fixed station and moving isohaline data were used to develop predictive models of salinity water column profile and relative isohaline relationships in the lower Peace River with daily gaged inflows and withdrawals.	Average potential increases of 0.1 to 0.3 psu in salinity and upstream movement of 0.1 to 0.3 kilometers of the isohalines under 1996 withdrawal schedule
2002 HBMP Comprehensive Summary Report	2004	Statistical models were developed using hourly averaged subsurface and near bottom salinities collected at 15-minute intervals between 1997 and 2002 at river kilometers 15.5 and 26.7 with corresponding stage level and daily gaged inflows and Facility withdrawals	Increases in salinities at each site under 1996 permit conditions predicted to be less than 0.4 psu (actual predicted increases have exceeded this approximately ten percent of the time).
Evaluation of Low Flow "Pump Test" Findings using Observed Data and Modeled Results from the Lower Peace River USGS and HBMP Continuous Recorders	2008	The primary object of this report was to graphically and statistically summarize and present conclusions from a series of sixteen "pump test" events conducted during the period between December 2006 and May 2007. Statistical models were developed using hourly averaged salinities collected at 15-minute intervals at river kilometers 15.5, 21.9, 23.4, 24.5 and 26.7 with corresponding stage level and daily gaged inflows and Facility withdrawals.	The results of specifically developed low flow models indicated that the magnitude of daily salinity differences due to withdrawals were typically between 0.1 and 0.5 psu, and somewhat higher during the recent drought. The largest differences were observed were generally were confined to the top end of incoming tides.

HBMP Low Flow Pump Test Figures

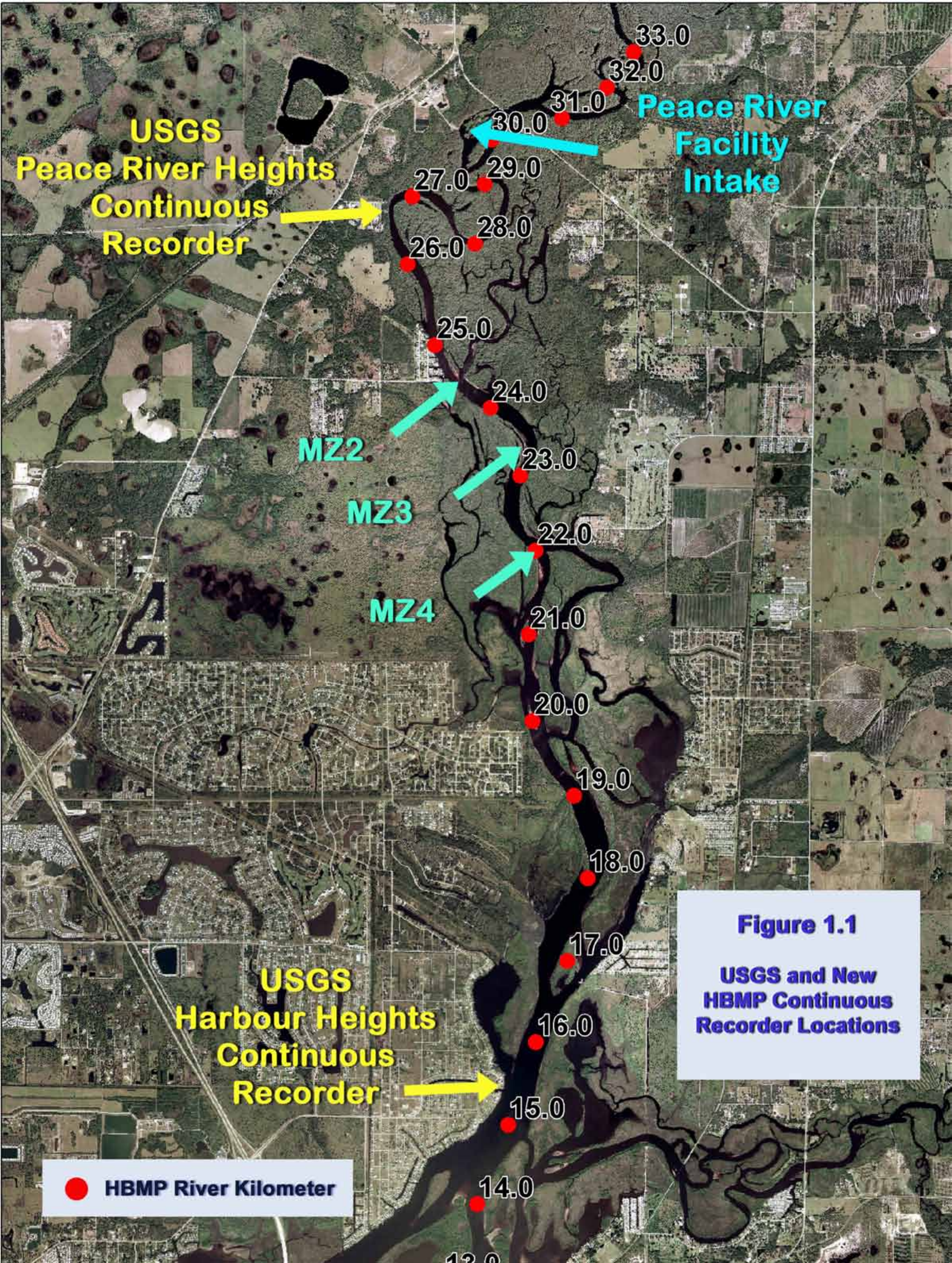
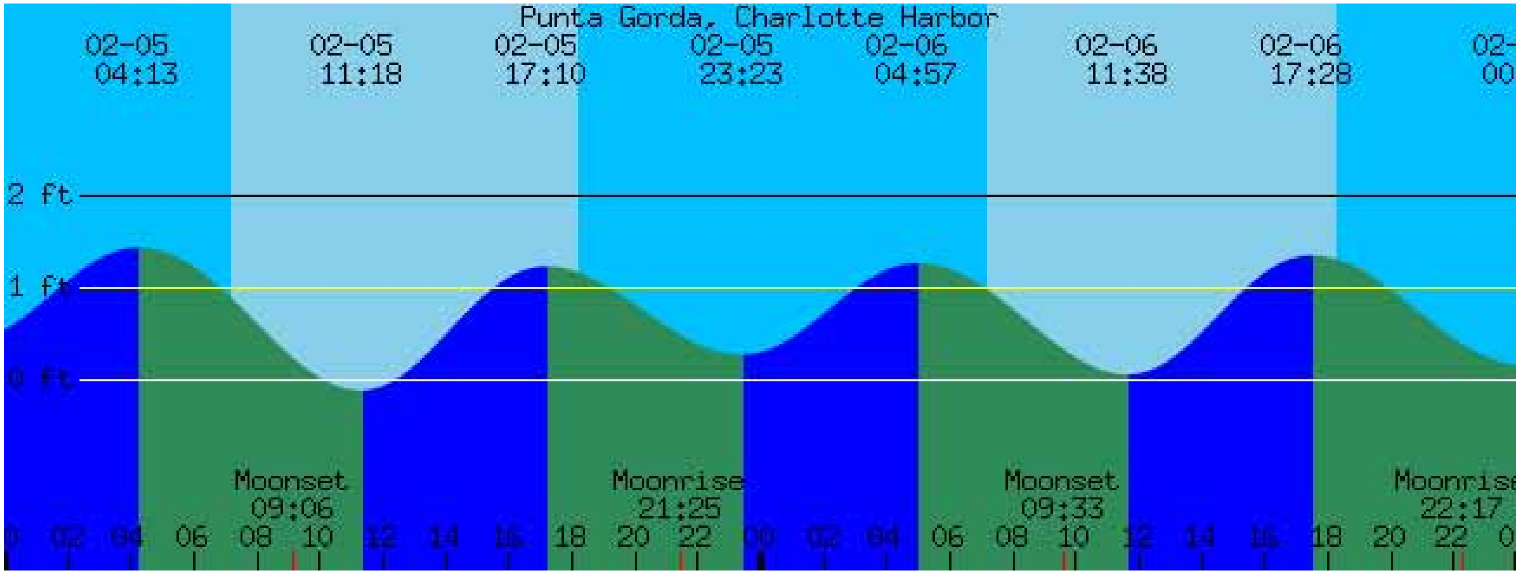
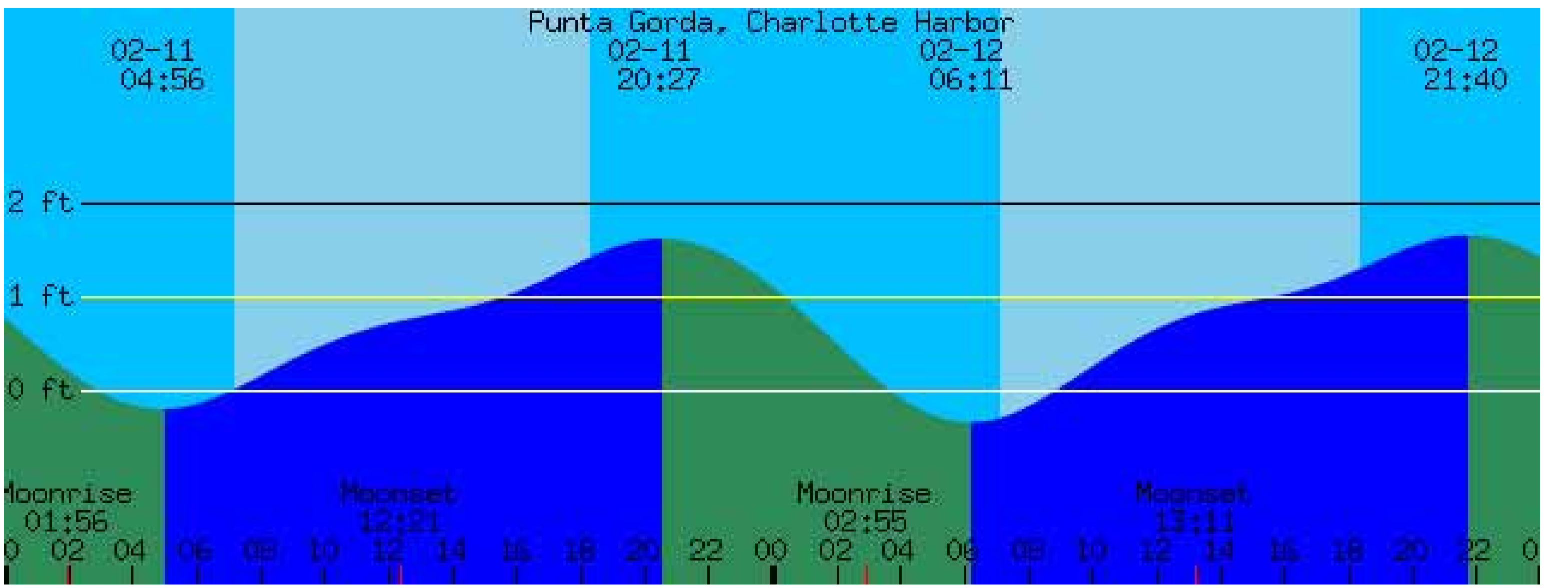


Figure 1.1

USGS and New HBMP Continuous Recorder Locations



February 5th and 6th 2007



February 11th and 12th 2007

Figure 3.1 Examples of potential "paired days" of similar predicted tides that provide opportunities to run "pump tests" and directly evaluate observed salinity differences resulting from Facility withdrawals.

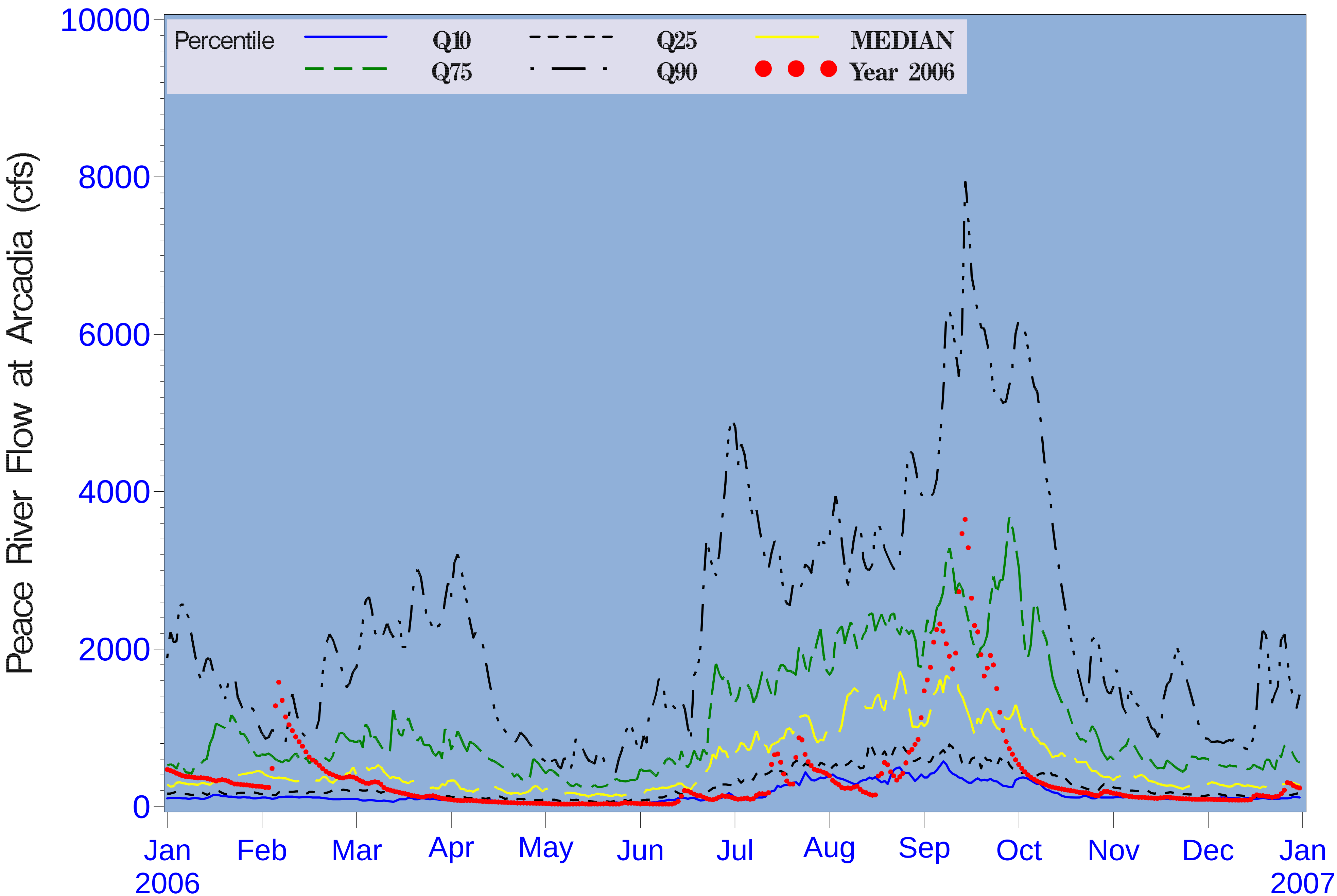


Figure 4.1 Daily Peace River flow at Arcadia in relation to long-term statistical averages

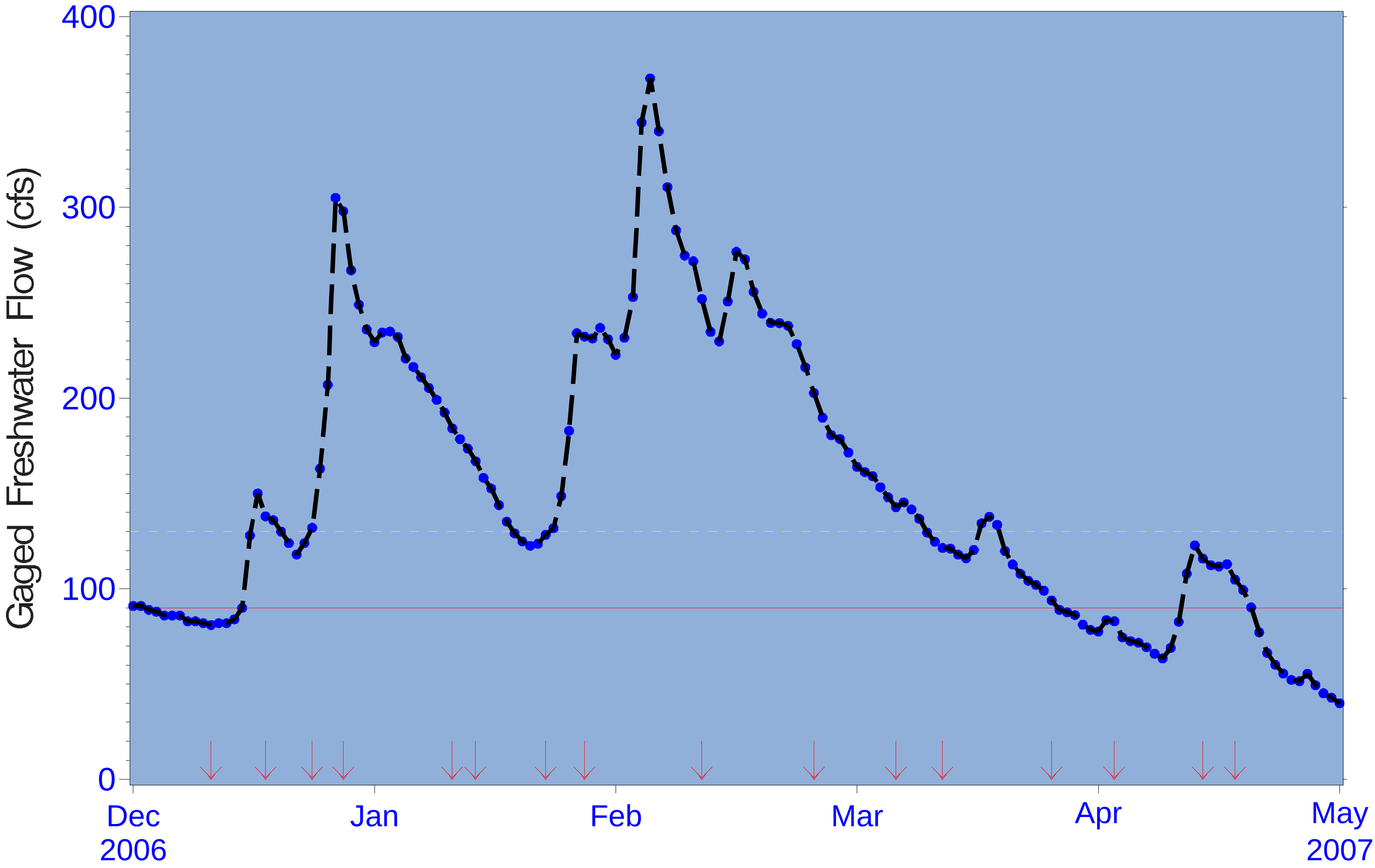


Figure 4.2a Daily gaged Peace River flow (cfs) at Arcadia during pump test period (Dec 2006 - April 2007)
Upper yellow line denotes permit 130 cfs threshold, while lower red line indicates temporary 90 cfs cutoff
Red arrows indicate timing of 16 pump test events

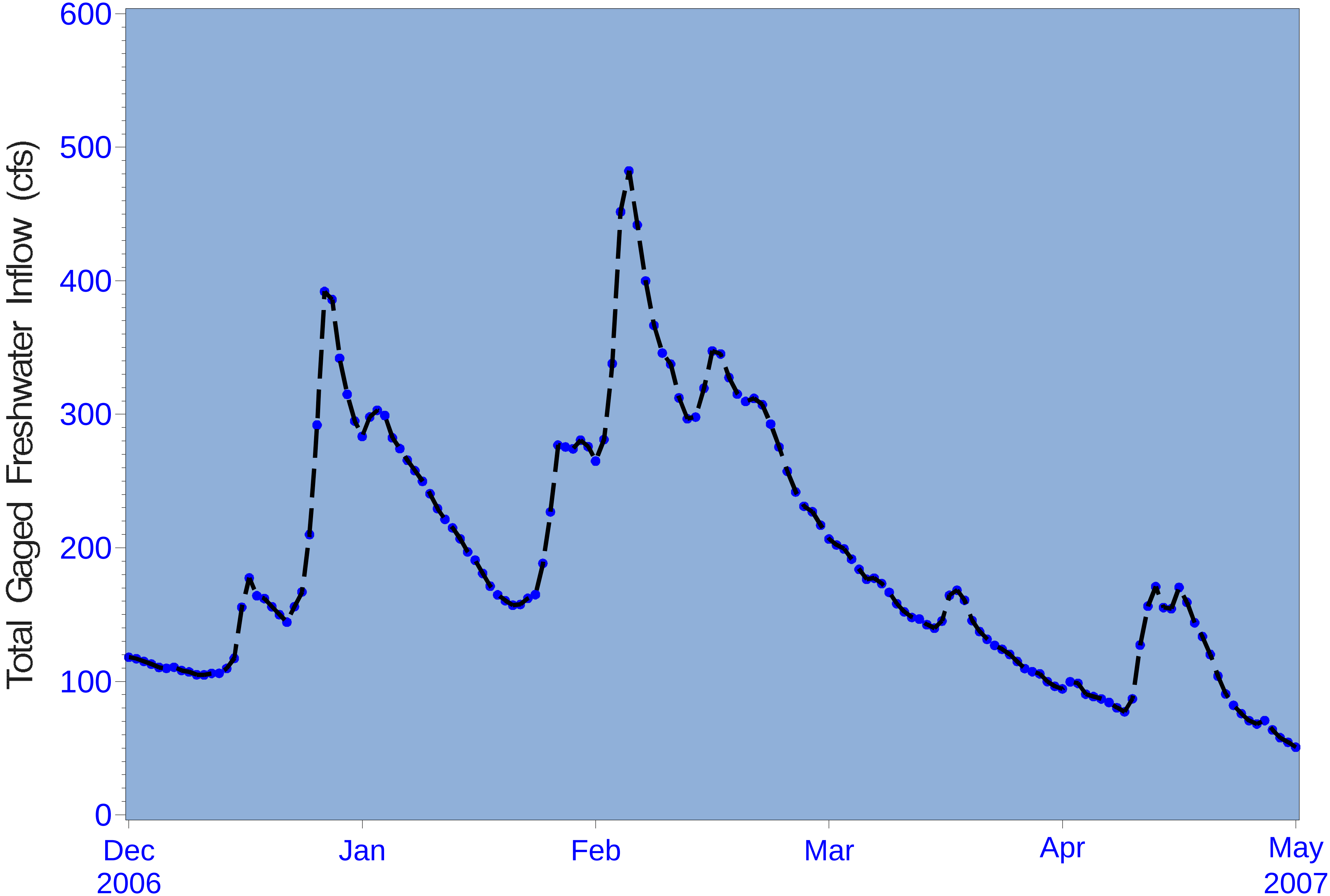


Figure 4.2b Total daily gaged flow - Peace River at Arcadia + Horse & Joshua Creeks during pump test (Dec 2006 - April 2007)

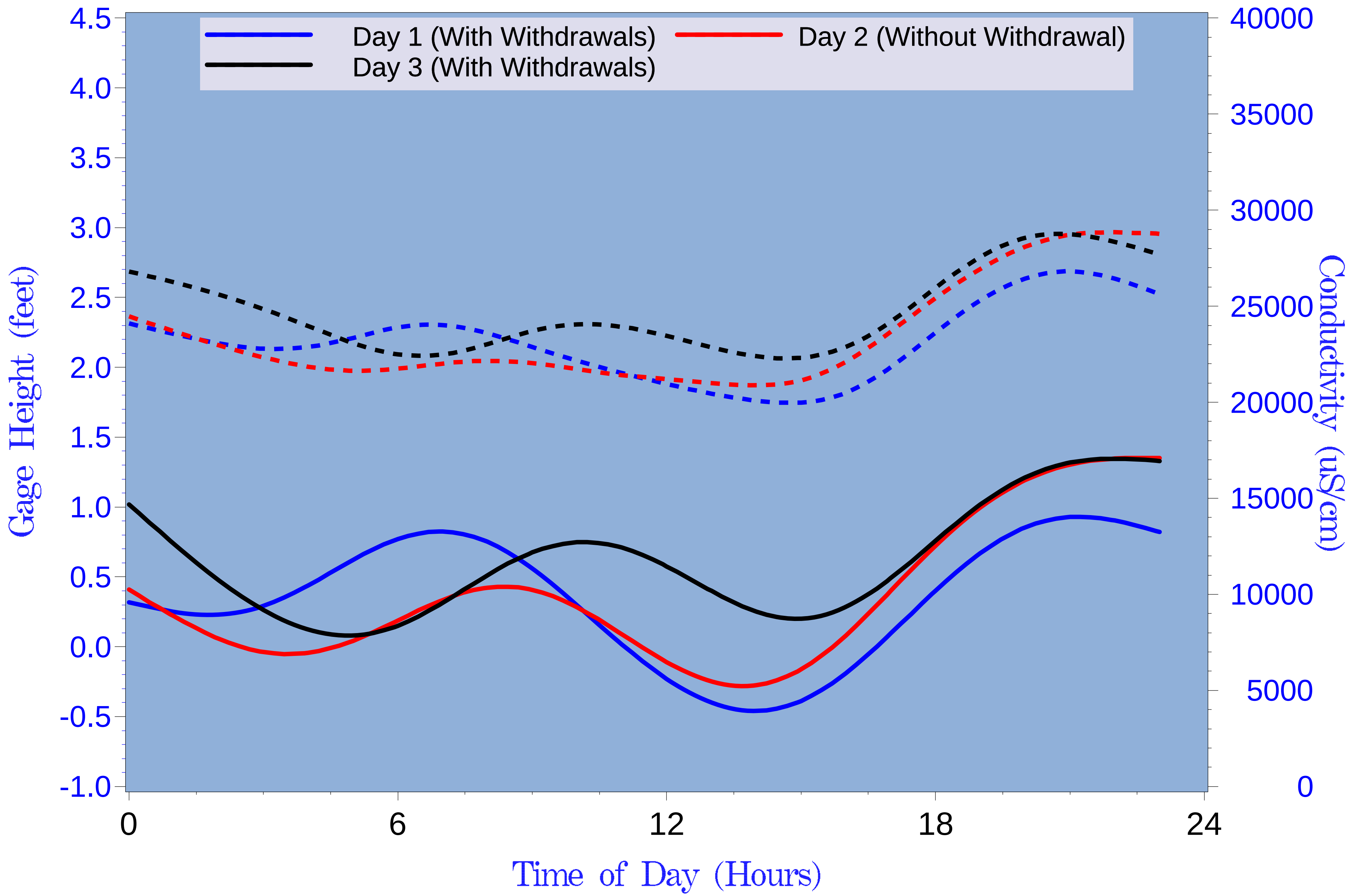


Figure 4.3 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Harbour Height Gage (RK 15.5)
December 11th through 13th, flows = 82, 81 & 82 cfs, withdrawals = 10.1, 0.0 & 9.0 cfs

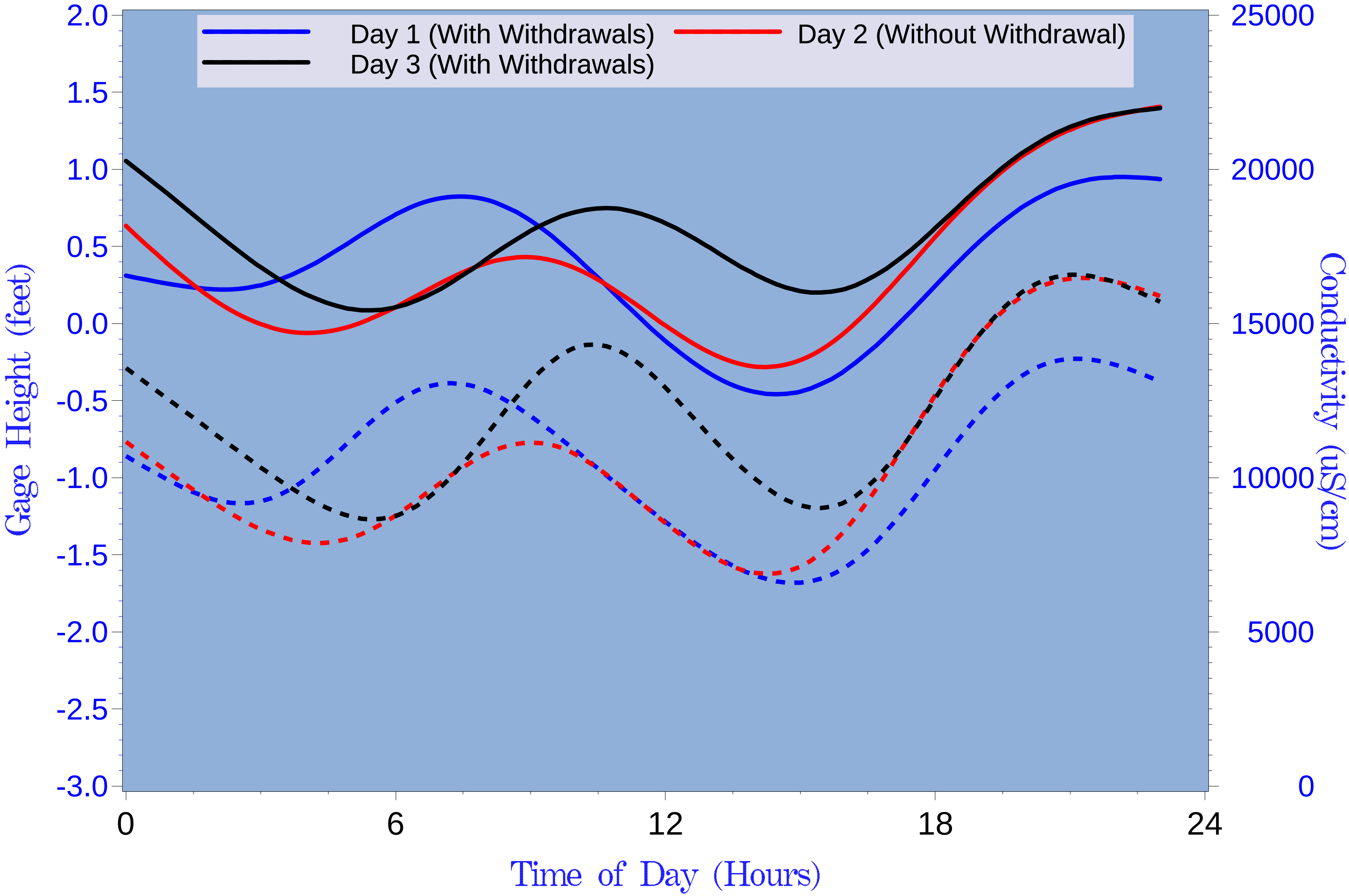


Figure 4.4 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ4 Gage (RK 21.9)
December 11th through 13th, flows = 82, 81 & 82 cfs, withdrawals = 10.1, 0.0 & 9.0 cfs

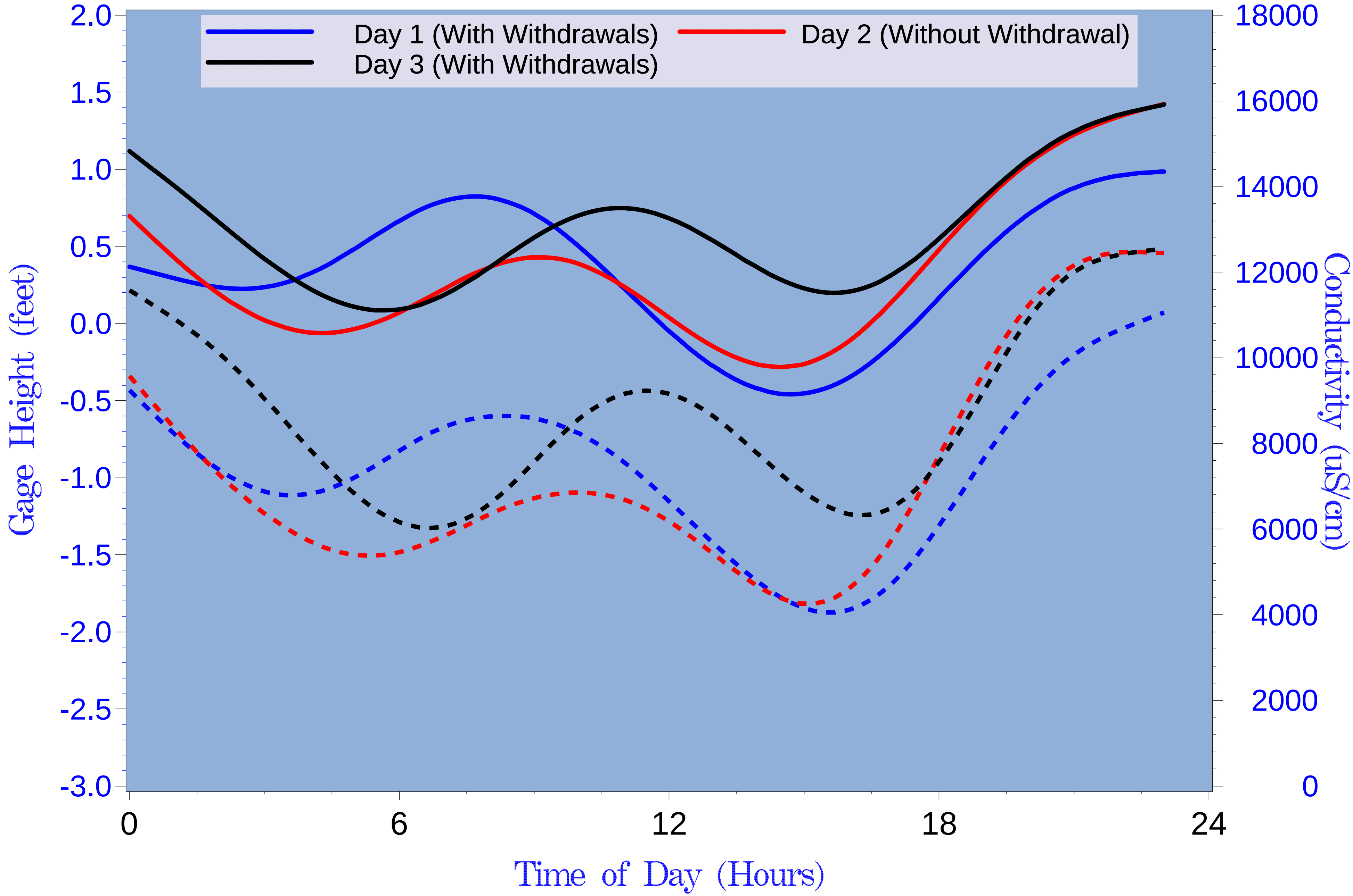


Figure 4.5 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ3 Gage (RK 23.4)
December 11th through 13th, flows = 82, 81 & 82 cfs, withdrawals = 10.1, 0.0 & 9.0 cfs

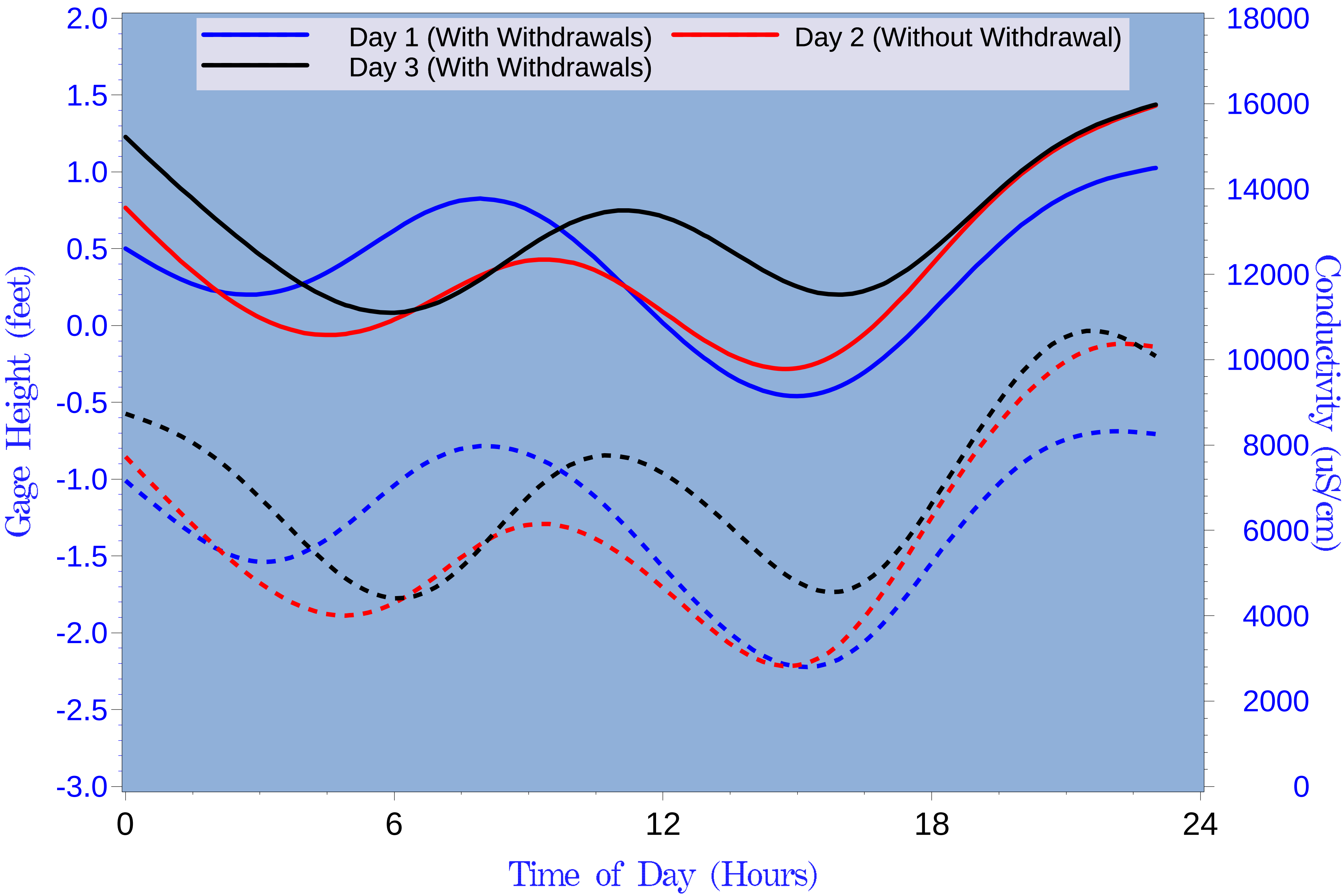


Figure 4.6 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ2 Gage (RK 24.5)
December 11th through 13th, flows = 82, 81 & 82 cfs, withdrawals = 10.1, 0.0 & 9.0 cfs

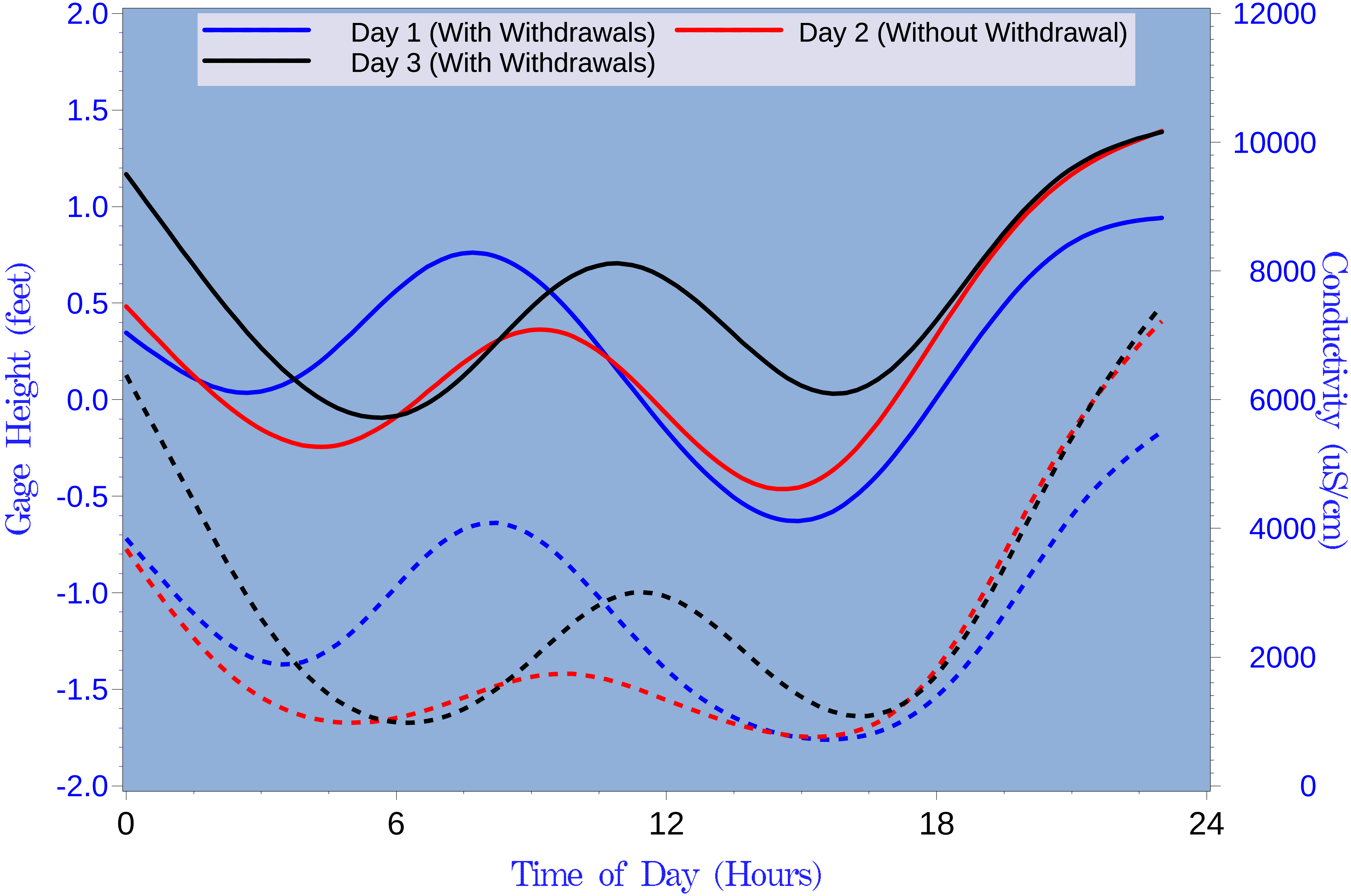


Figure 4.7 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Peace River Height Gage (RK 26.7) December 11th through 13th, flows = 82, 81 & 82 cfs, withdrawals = 10.1, 0.0 & 9.0 cfs

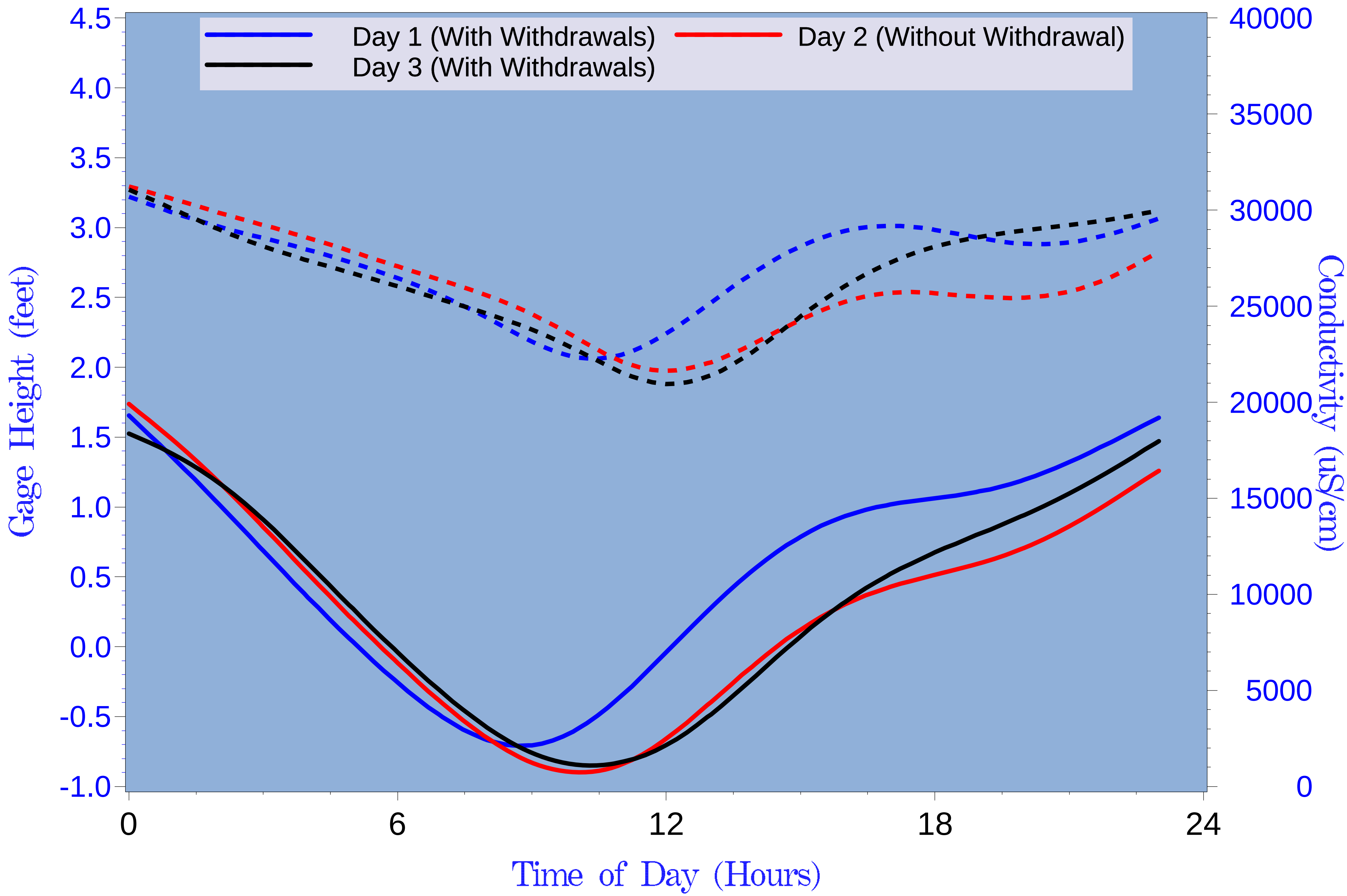


Figure 4.8 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Harbour Height Gage (RK 15.5) December 18th through 20th, flows = 138, 136 & 130 cfs, withdrawals = 17.2, 0.0 & 12.9 cfs

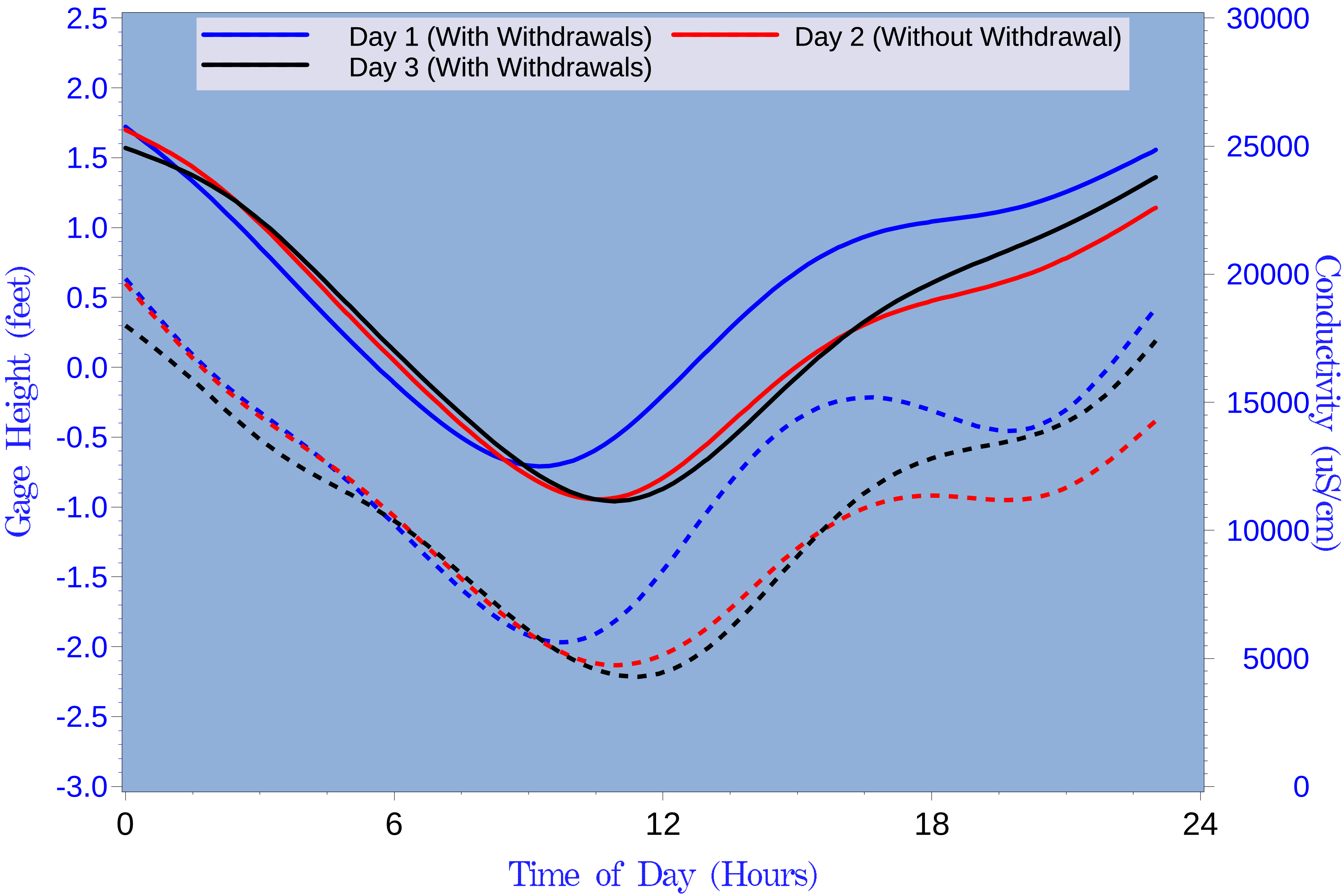


Figure 4.9 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ4 Gage (RK 21.9)
December 18th through 20th, flows = 138, 136 & 130 cfs, withdrawals = 17.2, 0.0 & 12.9 cfs

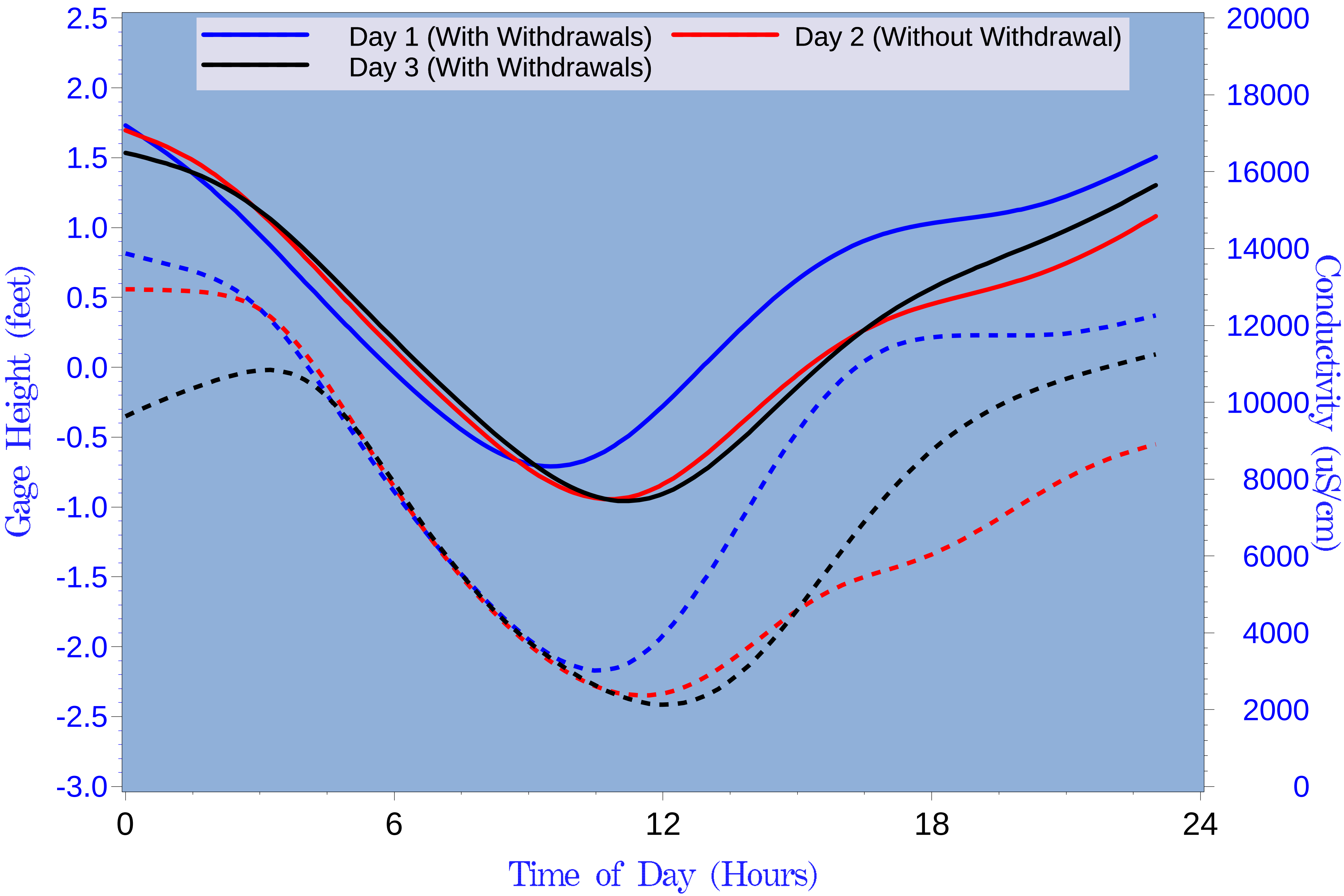


Figure 4.10 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ3 Gage (RK 23.4)
December 18th through 20th, flows = 138, 136 & 130 cfs, withdrawals = 17.2, 0.0 & 12.9 cfs

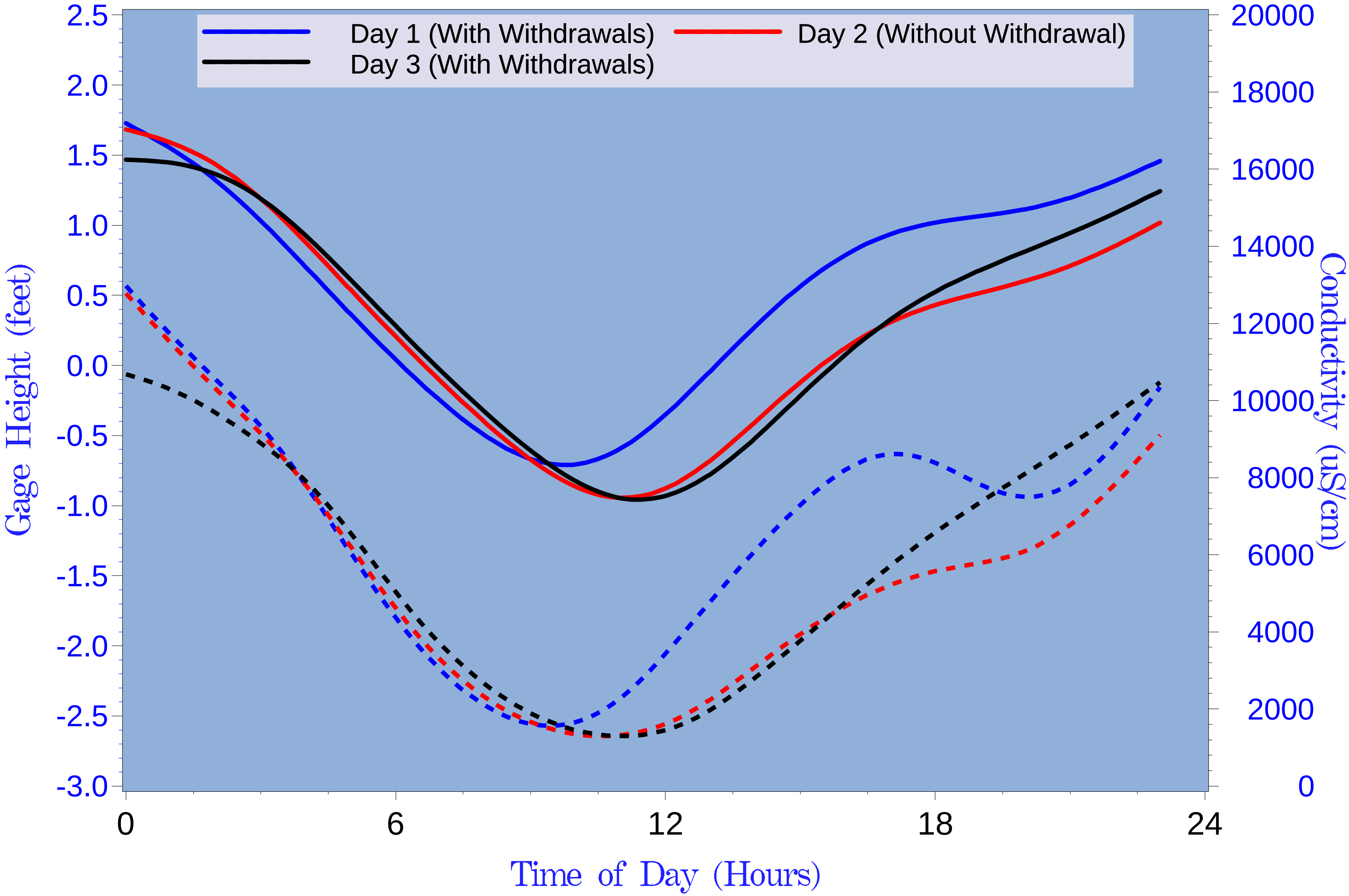


Figure 4.11 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ2 Gage (RK 24.5)
December 18th through 20th, flows = 138, 136 & 130 cfs, withdrawals = 17.2, 0.0 & 12.9 cfs

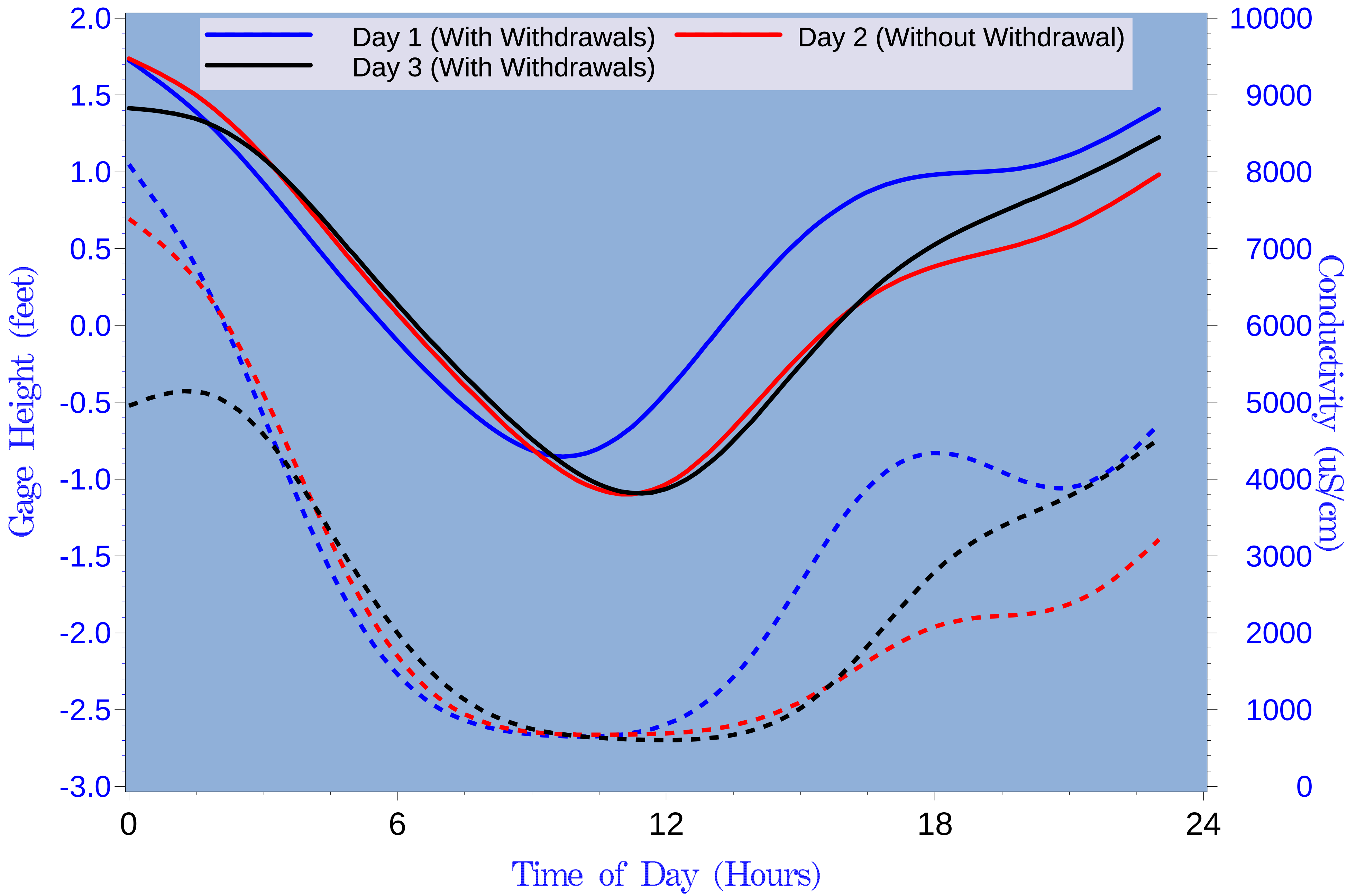


Figure 4.12 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Peace River Height Gage (RK 26.7) December 18th through 20th, flows = 138, 136 & 130 cfs, withdrawals = 17.2, 0.0 & 12.9 cfs

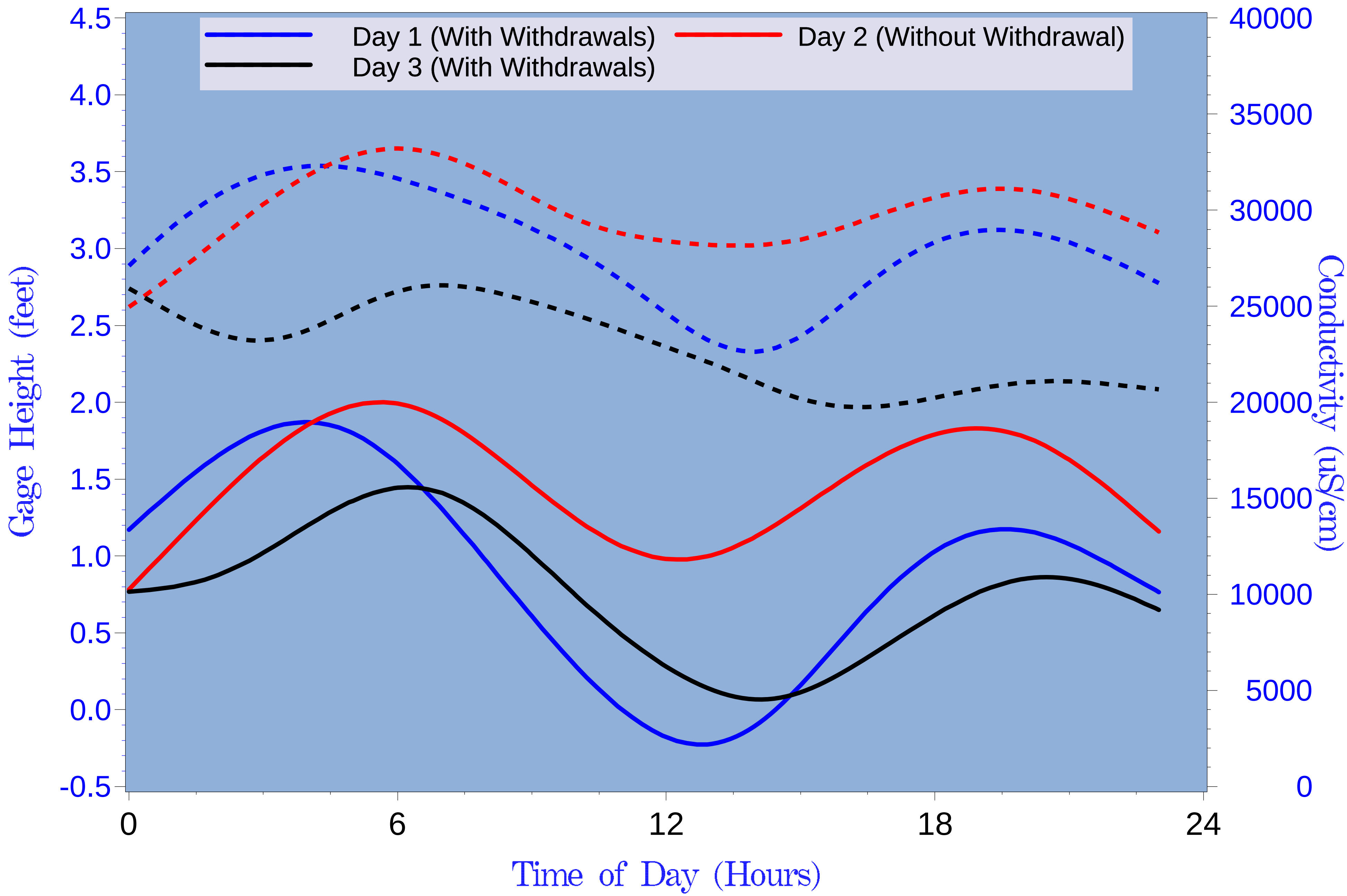


Figure 4.13 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Harbour Height Gage (RK 15.5) December 24th through 26th, flows = 132, 163 & 207 cfs, withdrawals = 11.5, 0.0 & 14.9 cfs

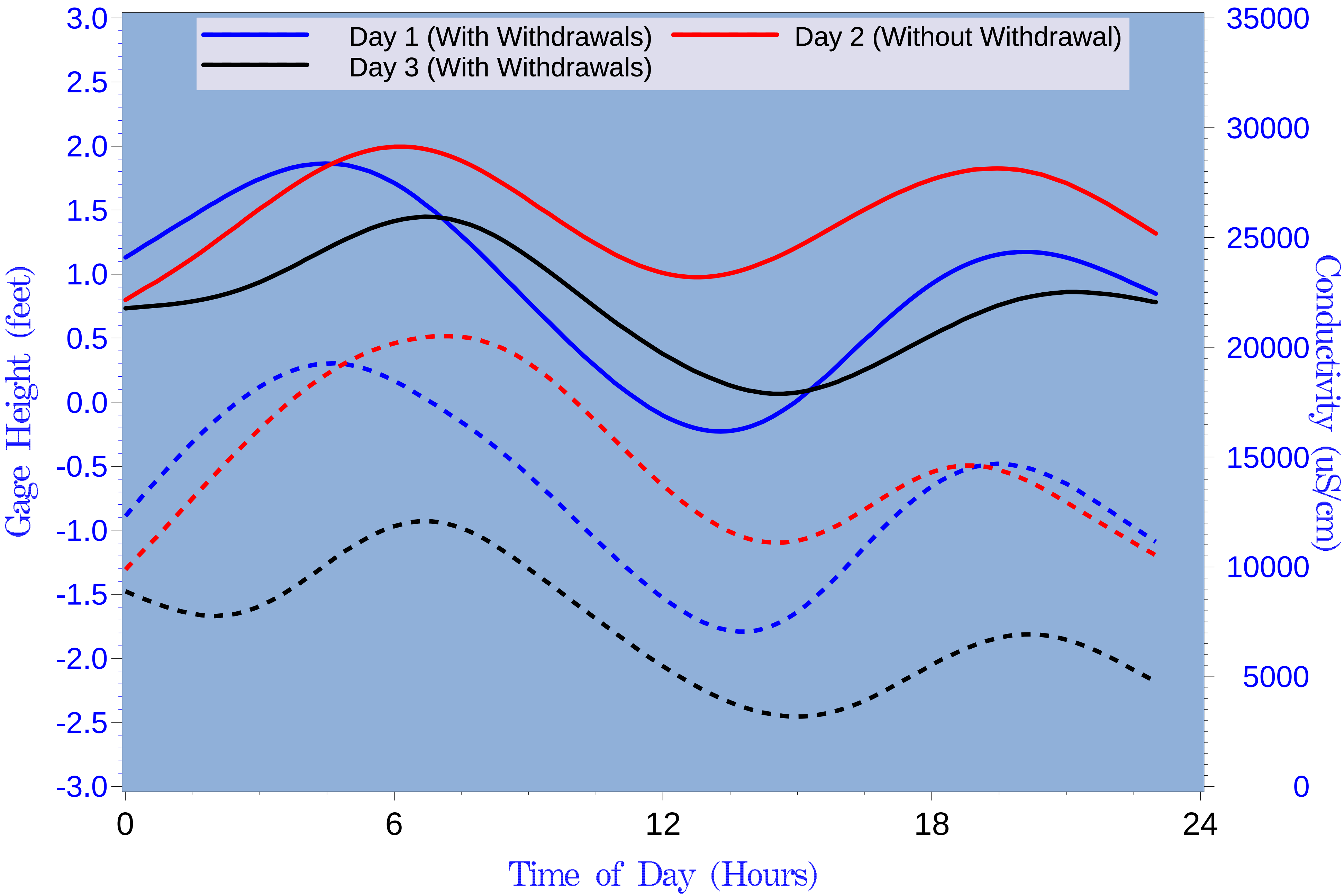


Figure 4.14 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ4 Gage (RK 21.9)
December 24th through 26th, flows = 132, 163 & 207 cfs, withdrawals = 11.5, 0.0 & 14.9 cfs

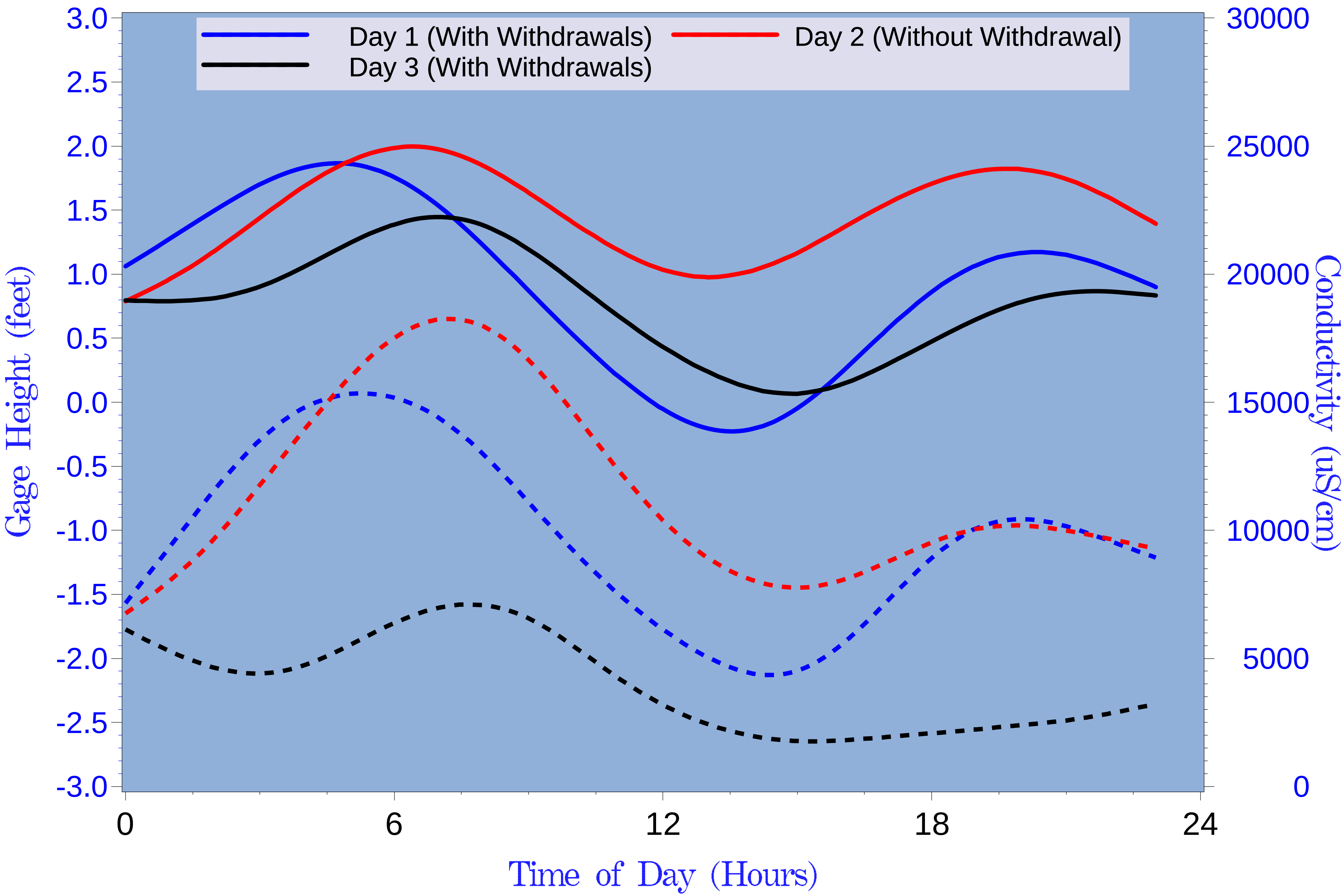


Figure 4.15 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ3 Gage (RK 23.4) December 24th through 26th, flows = 132, 163 & 207 cfs, withdrawals = 11.5, 0.0 & 14.9 cfs

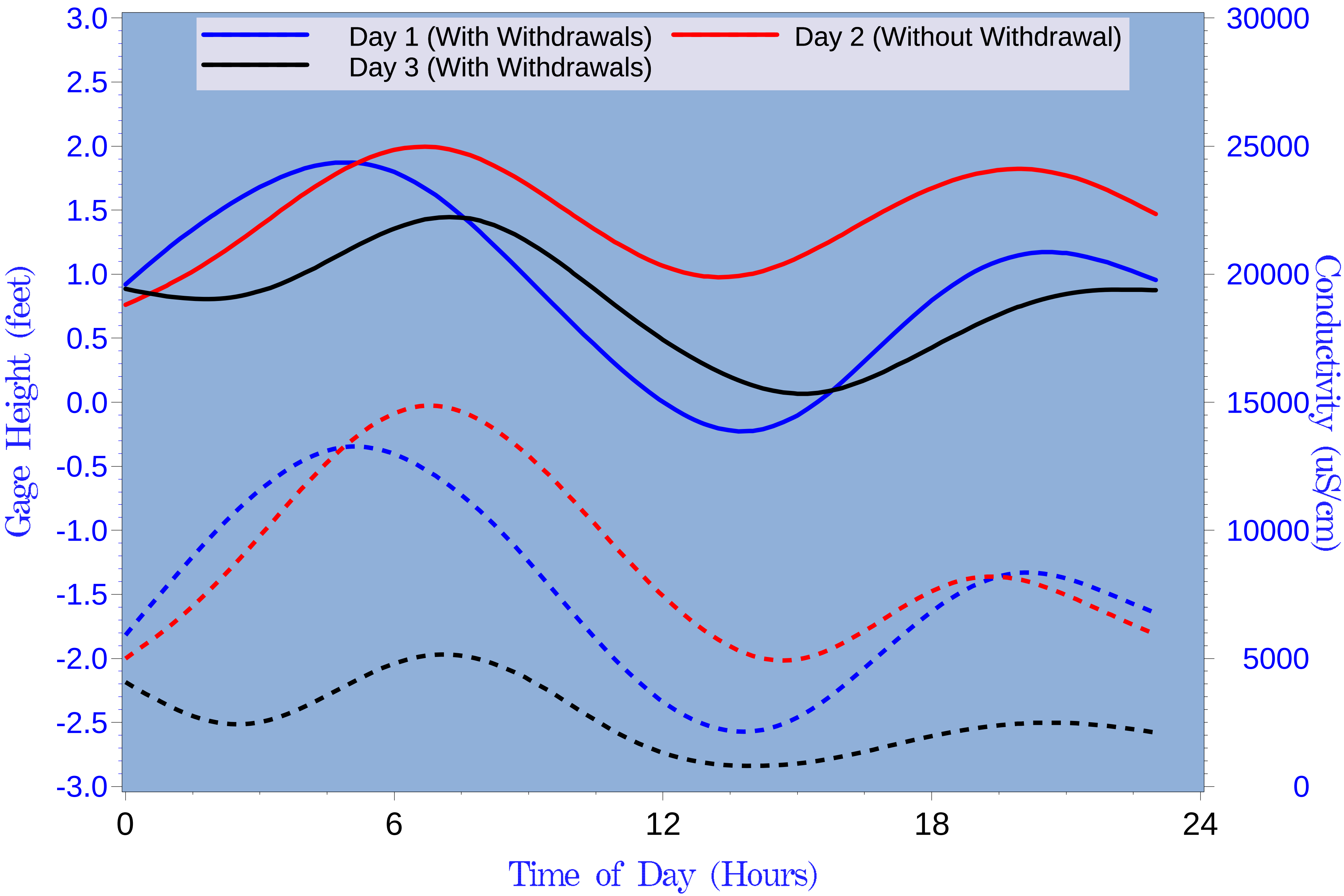


Figure 4.16 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ2 Gage (RK 24.5)
December 24th through 26th, flows = 132, 163 & 207 cfs, withdrawals = 11.5, 0.0 & 14.9 cfs

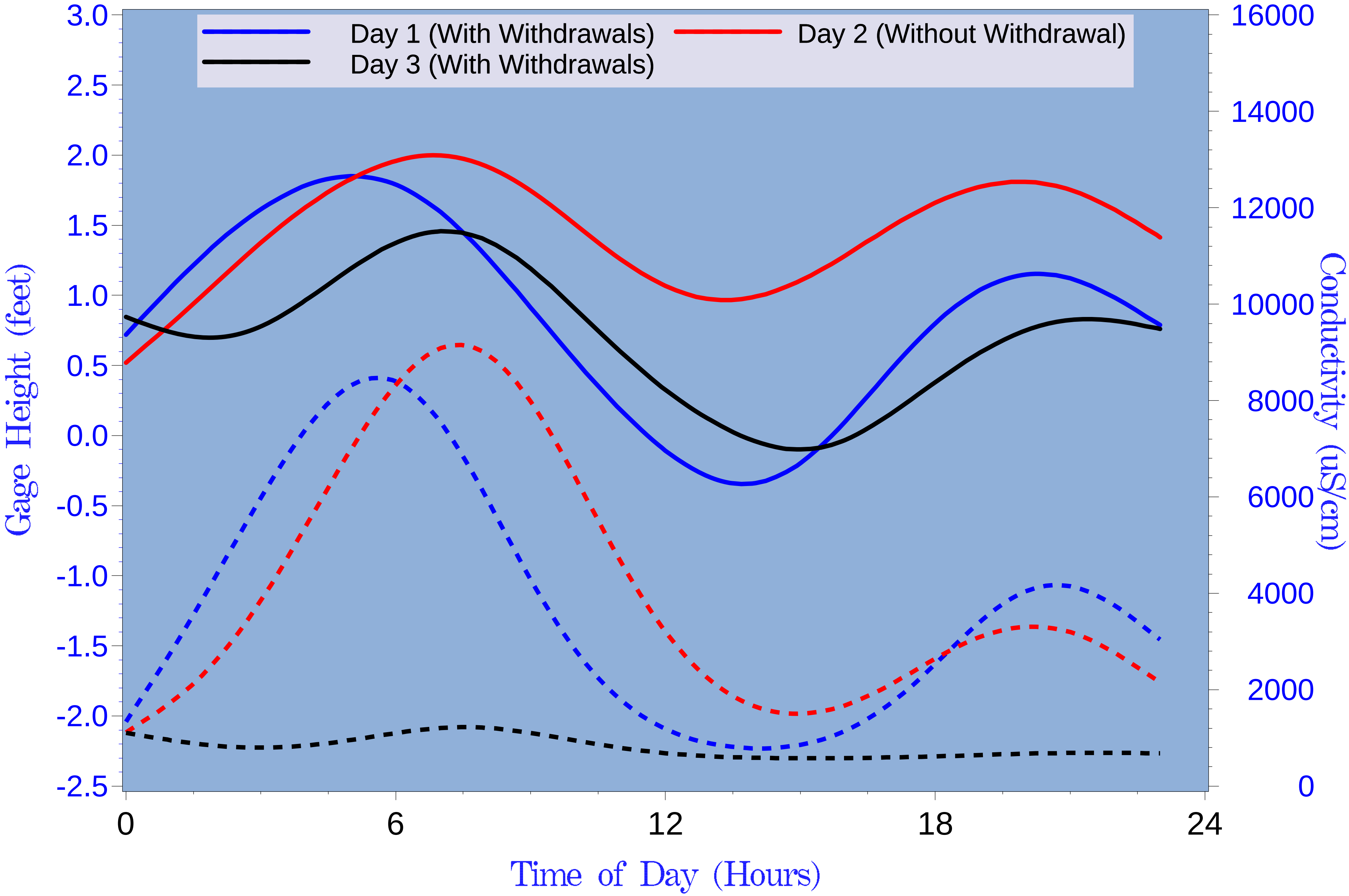


Figure 4.17 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Peace River Height Gage (RK 26.7) December 24th through 26th, flows = 132, 163 & 207 cfs, withdrawals = 11.5, 0.0 & 14.9 cfs

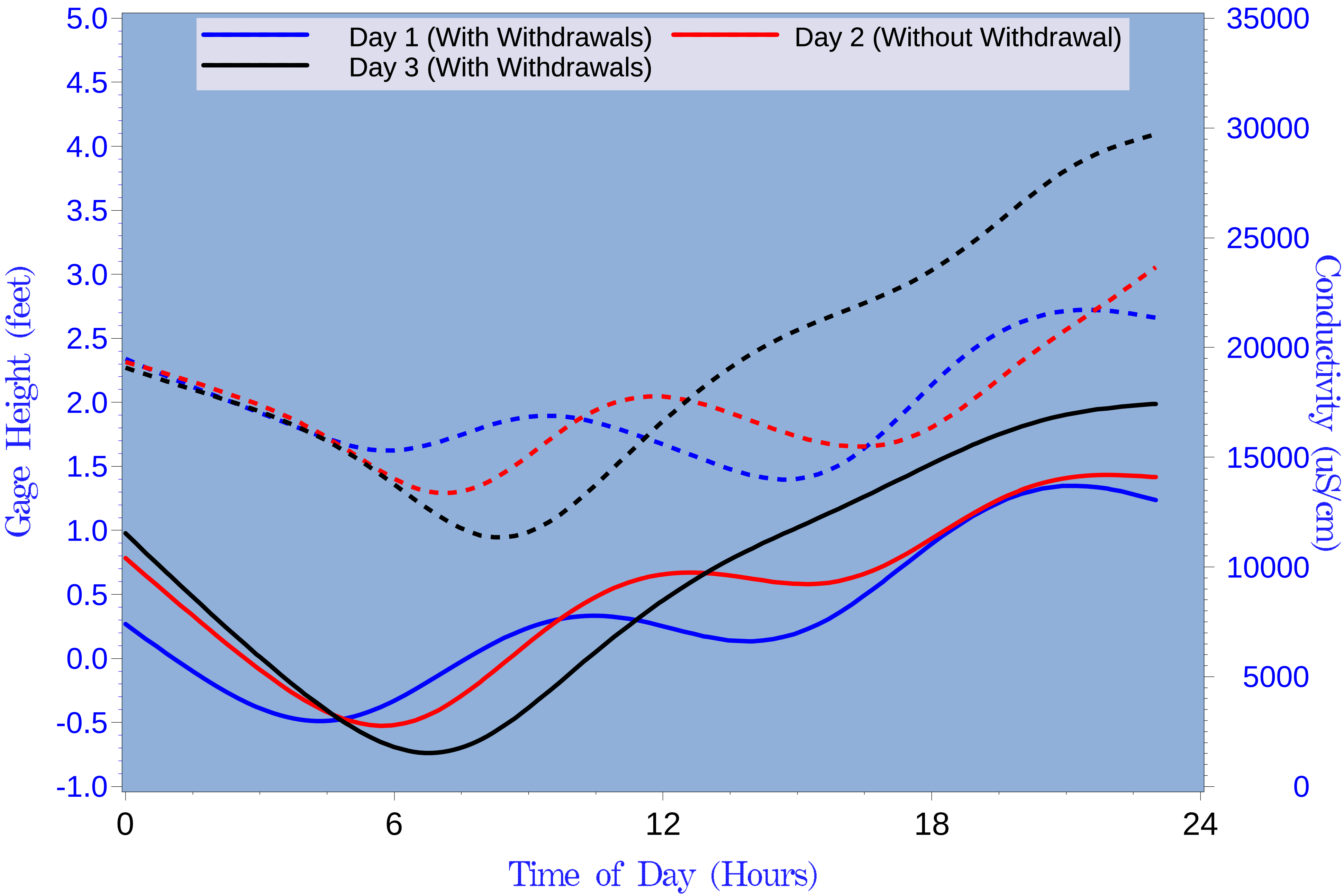


Figure 4.18 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Harbour Height Gage (RK 15.5) December 28th through 30th, flows = 298, 267 & 249 cfs, withdrawals = 28.6, 0.0 & 25.1 cfs

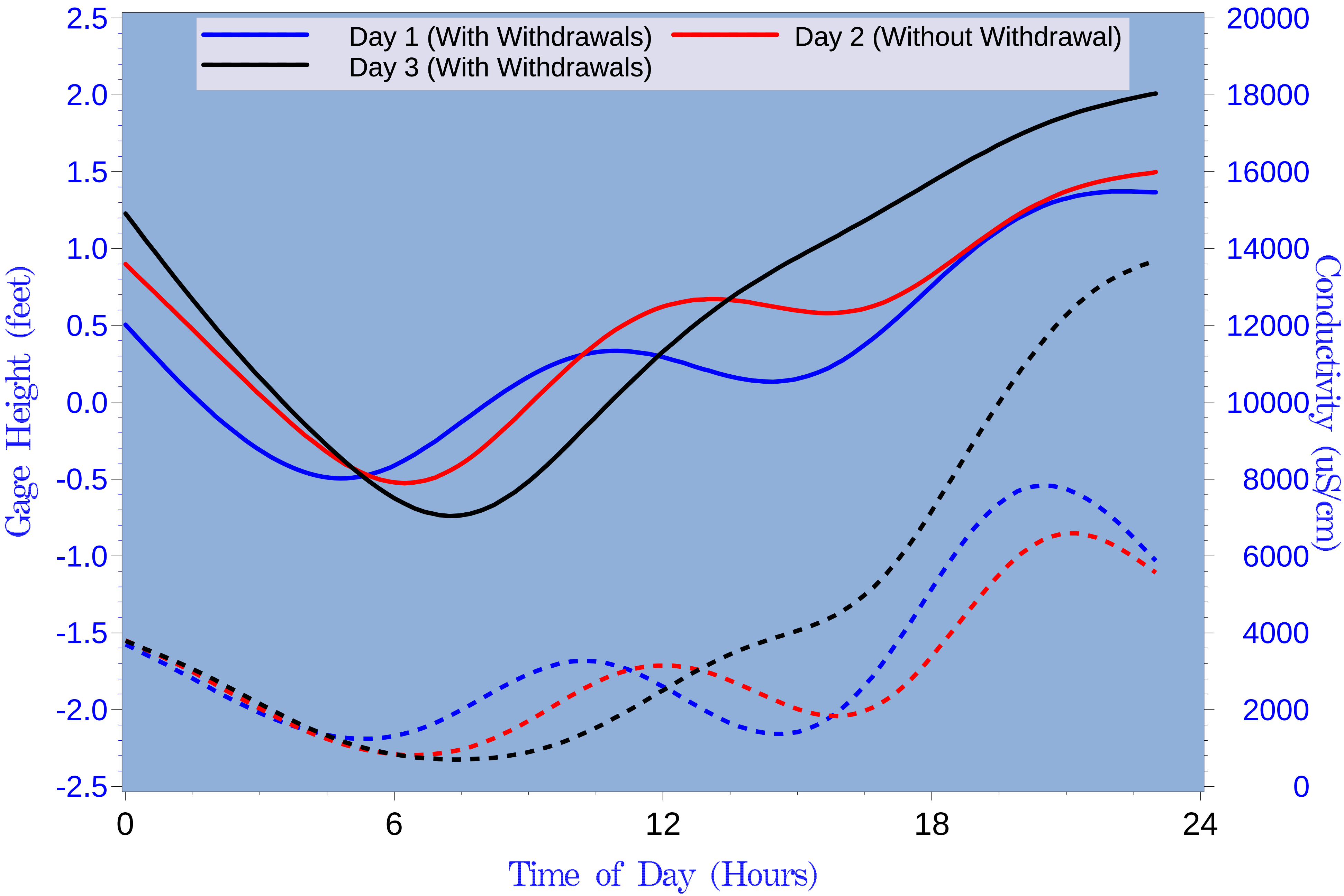


Figure 4.19 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ4 Gage (RK 21.9)
December 28th through 30th, flows = 298, 267 & 249 cfs, withdrawals = 28.6, 0.0 & 25.1 cfs

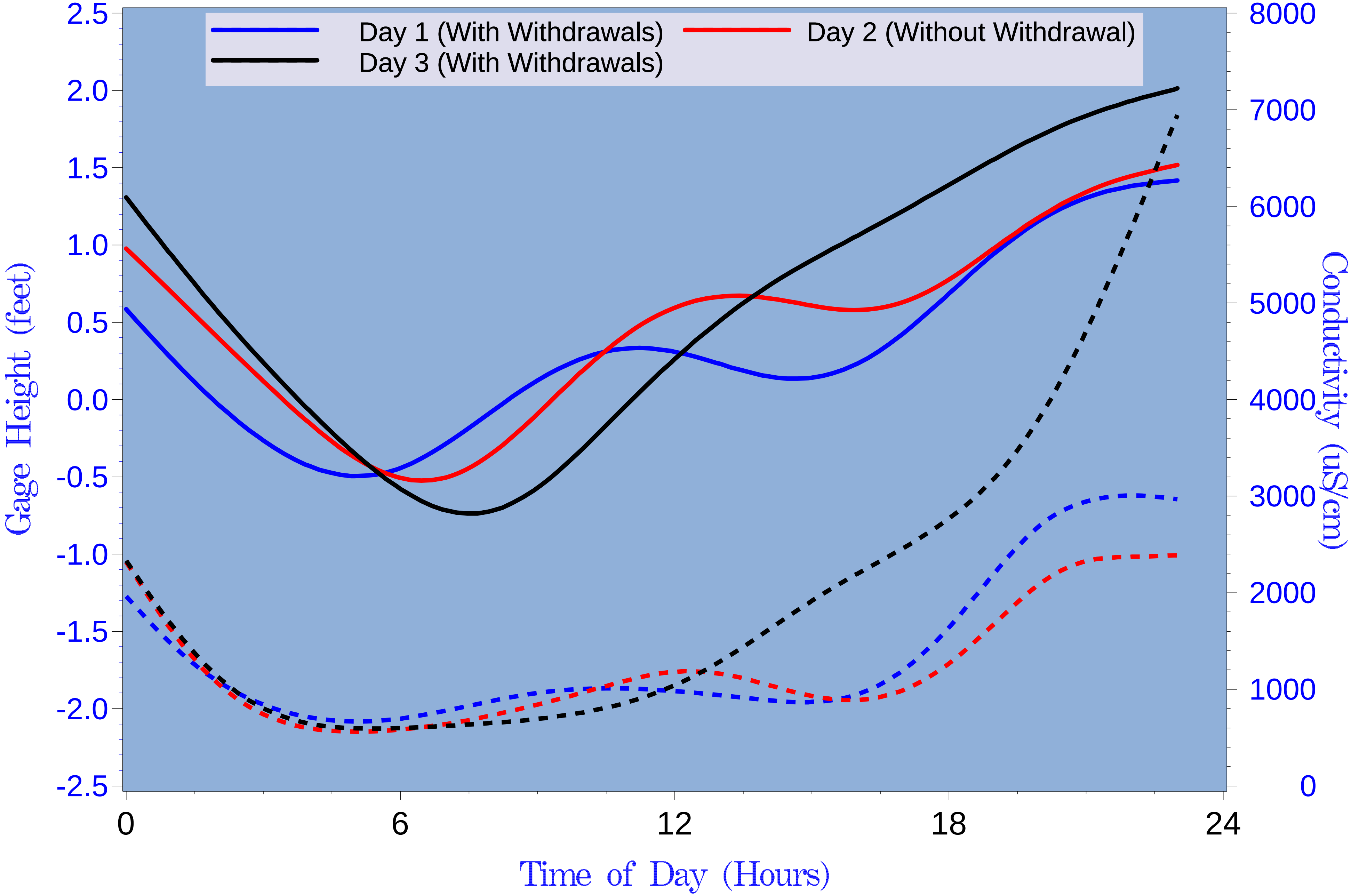


Figure 4.20 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ3 Gage (RK 23.4) December 28th through 30th, flows = 298, 267 & 249 cfs, withdrawals = 28.6, 0.0 & 25.1 cfs

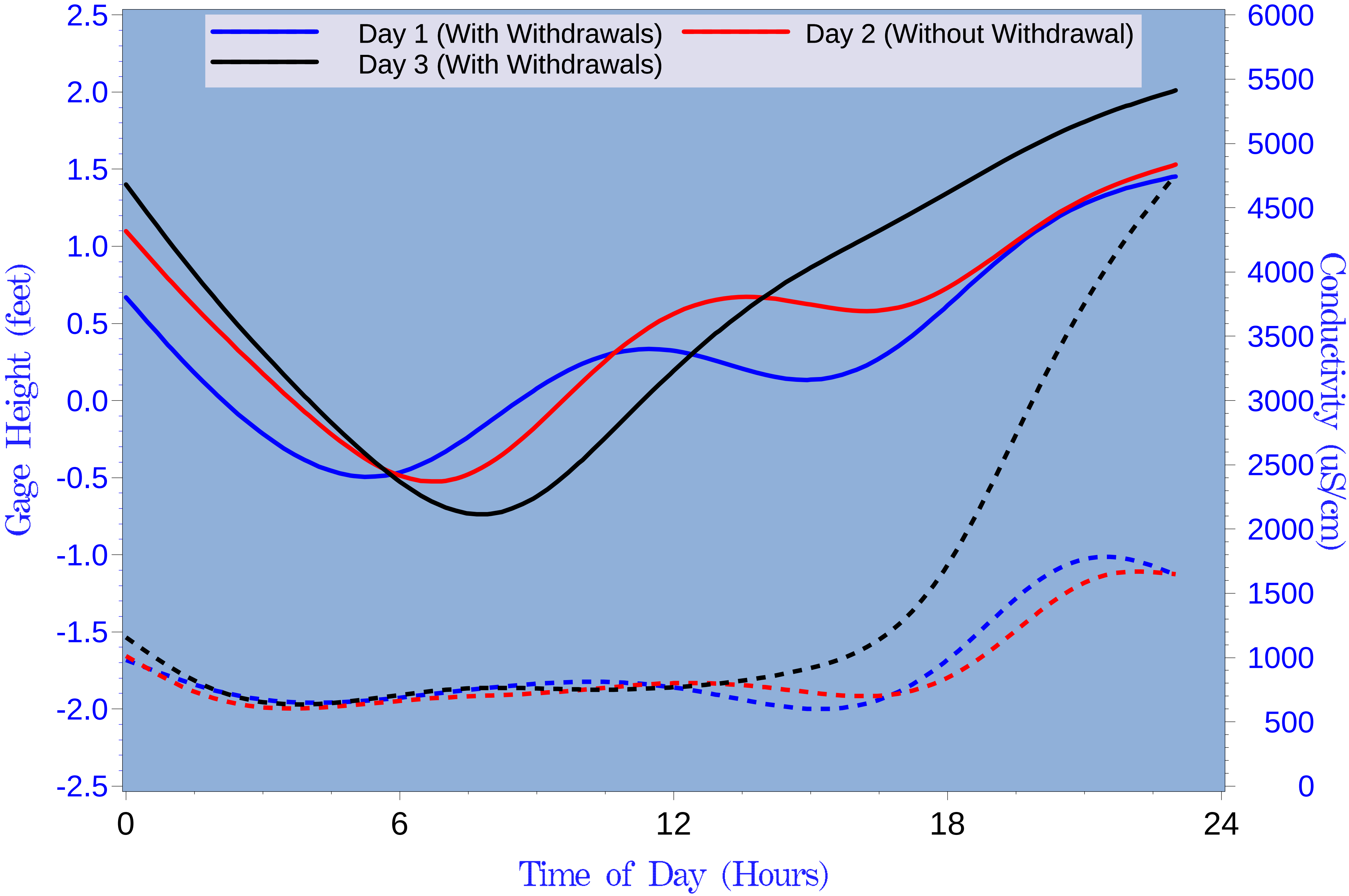


Figure 4.21 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ2 Gage (RK 24.5)
December 28th through 30th, flows = 298, 267 & 249 cfs, withdrawals = 28.6, 0.0 & 25.1 cfs

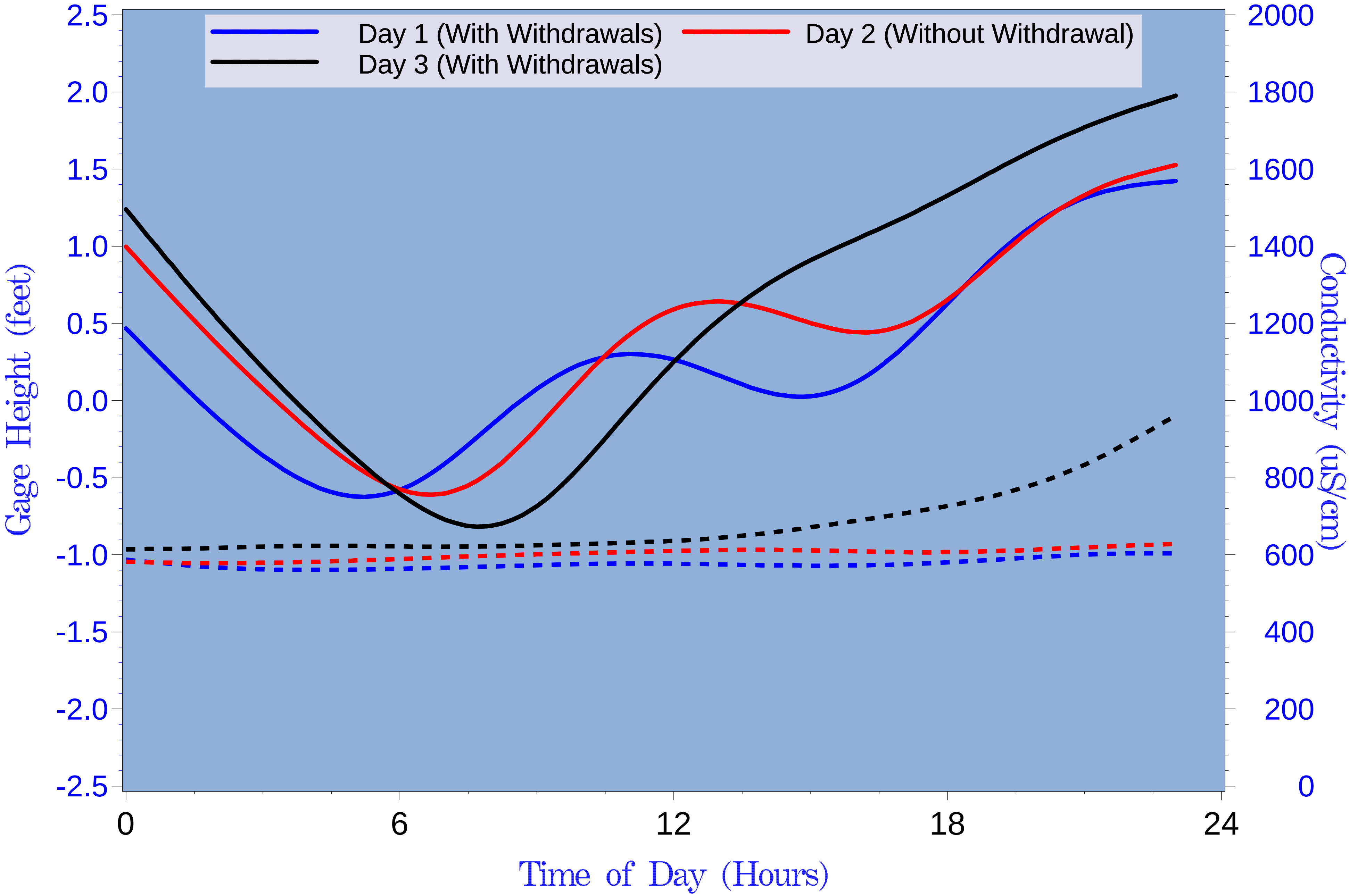


Figure 4.22 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Peace River Height Gage (RK 26.7) December 28th through 30th, flows = 298, 267 & 249 cfs, withdrawals = 28.6, 0.0 & 25.1 cfs

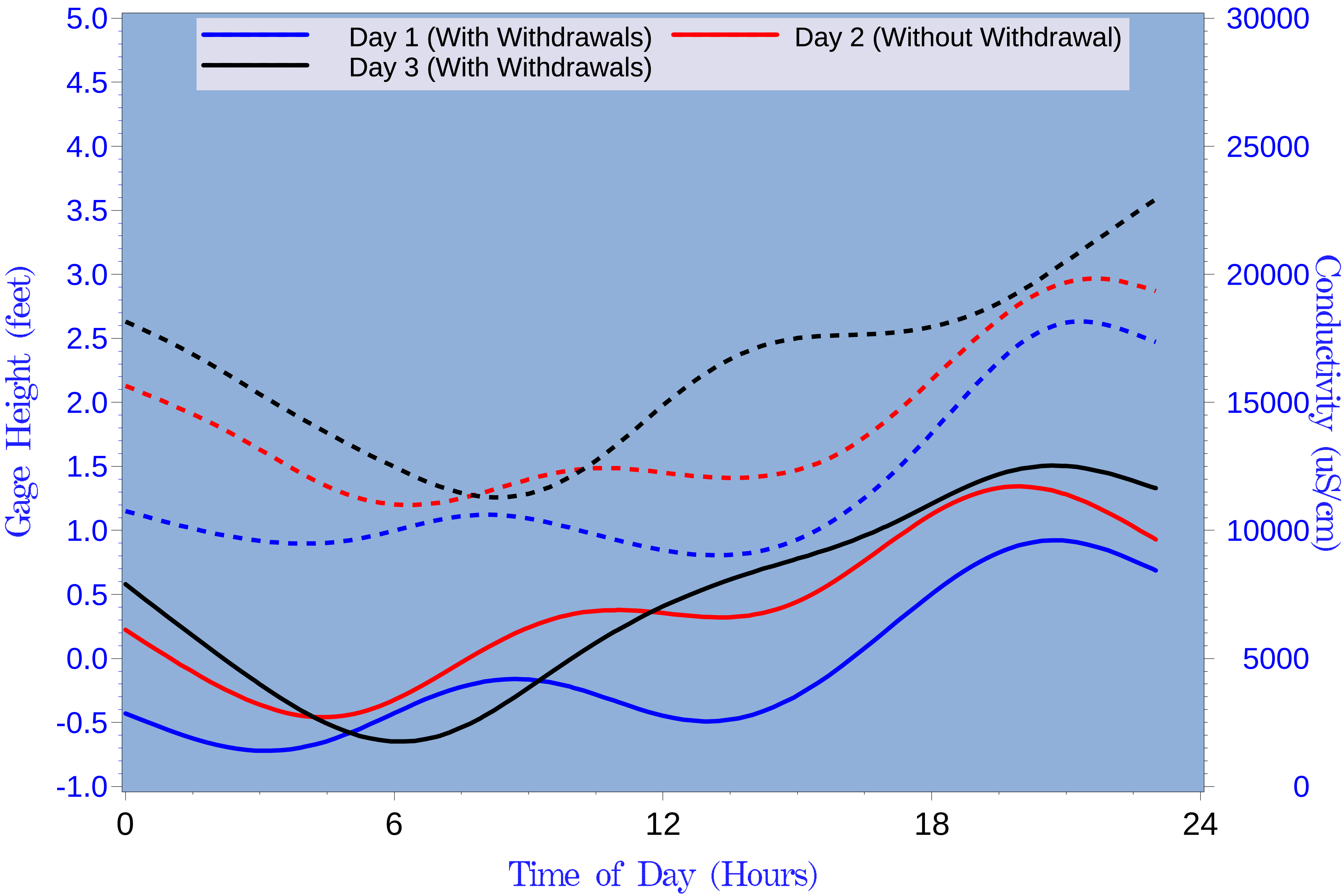


Figure 4.23 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Harbour Height Gage (RK 15.5) January 11th through 13th, flows = 184, 178 & 173 cfs, withdrawals = 18.0, 0.0 & 16.7 cfs

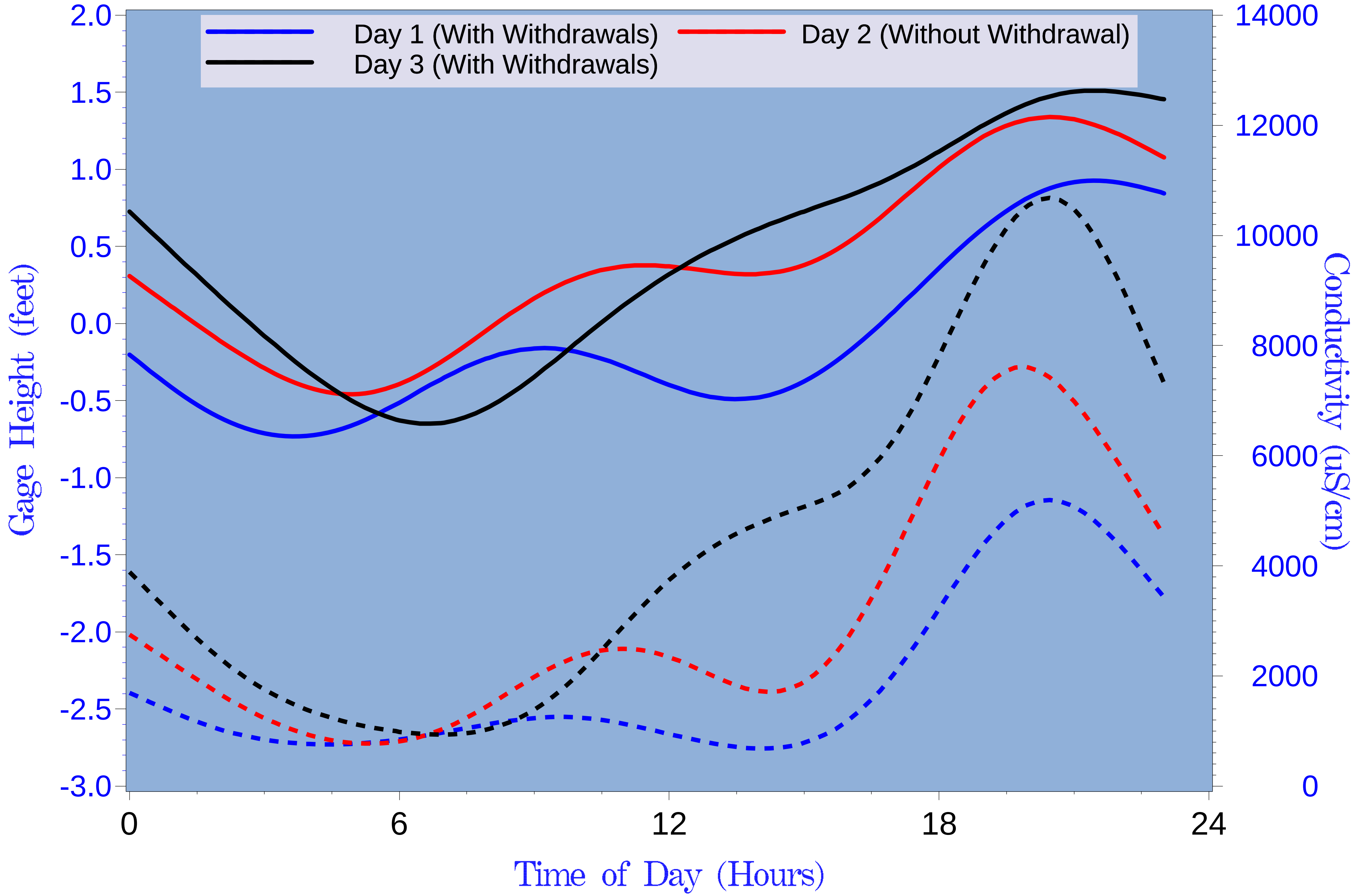


Figure 4.24 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ4 Gage (RK 21.9) January 11th through 13th, flows = 184, 178 & 173 cfs, withdrawals = 18.0, 0.0 & 16.7 cfs

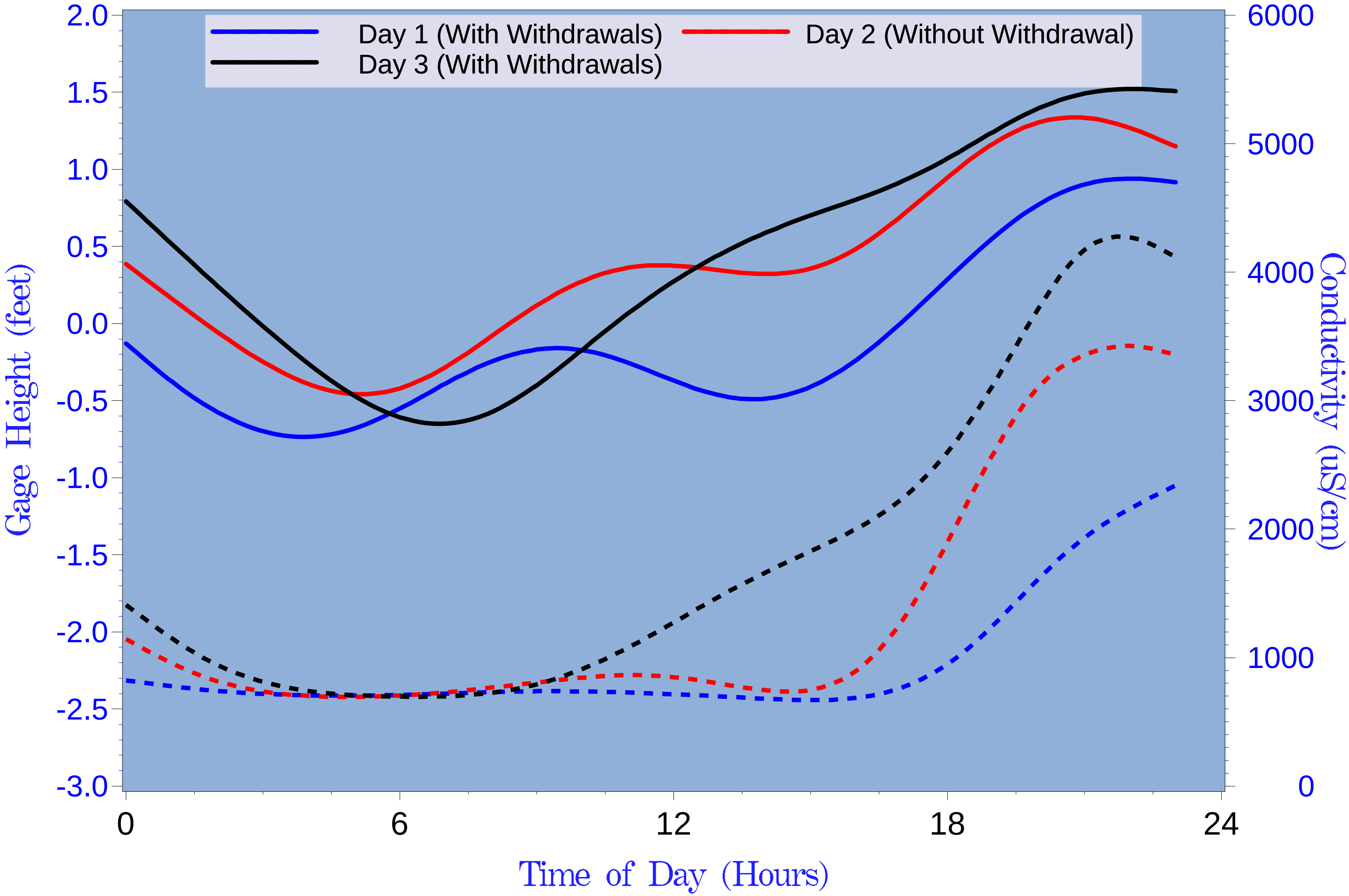


Figure 4.25 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ3 Gage (RK 23.4)
January 11th through 13th, flows = 184, 178 & 173 cfs, withdrawals = 18.0, 0.0 & 16.7 cfs

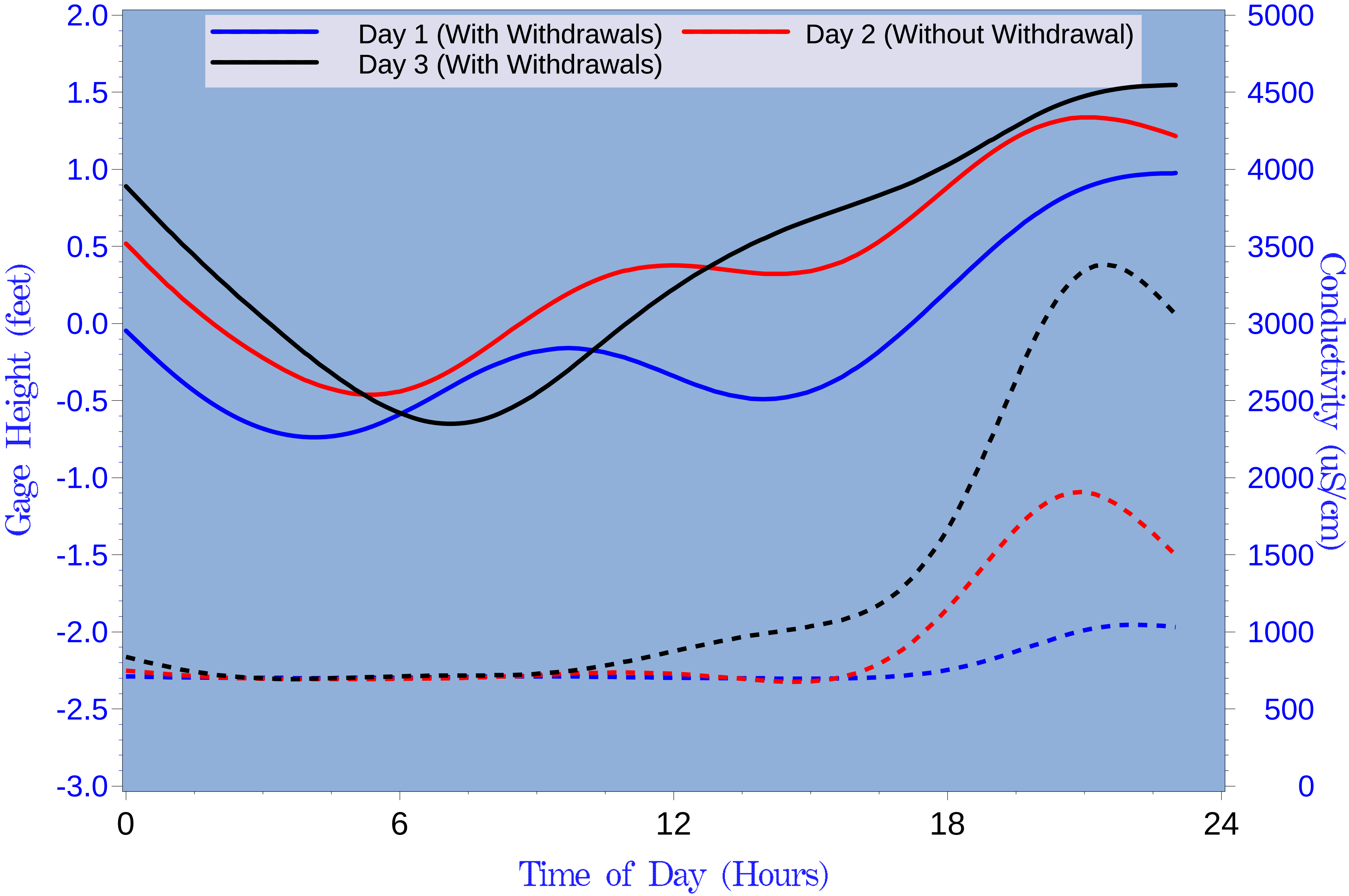


Figure 4.26 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ2 Gage (RK 24.5)
January 11th through 13th, flows = 184, 178 & 173 cfs, withdrawals = 18.0, 0.0 & 16.7 cfs

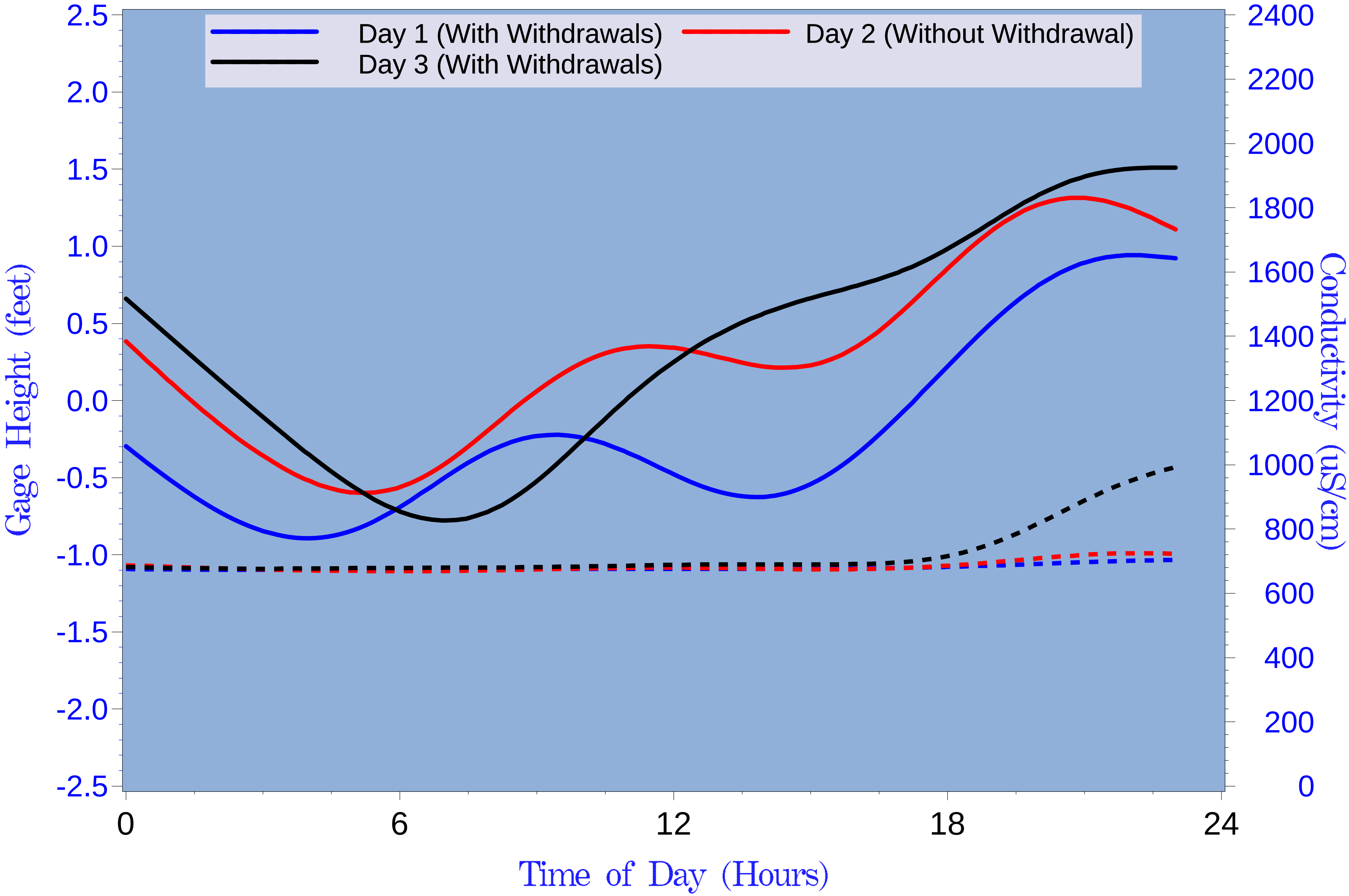


Figure 4.27 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Peace River Height Gage (RK 26.7) January 11th through 13th, flows = 184, 178 & 173 cfs, withdrawals = 18.0, 0.0 & 16.7 cfs

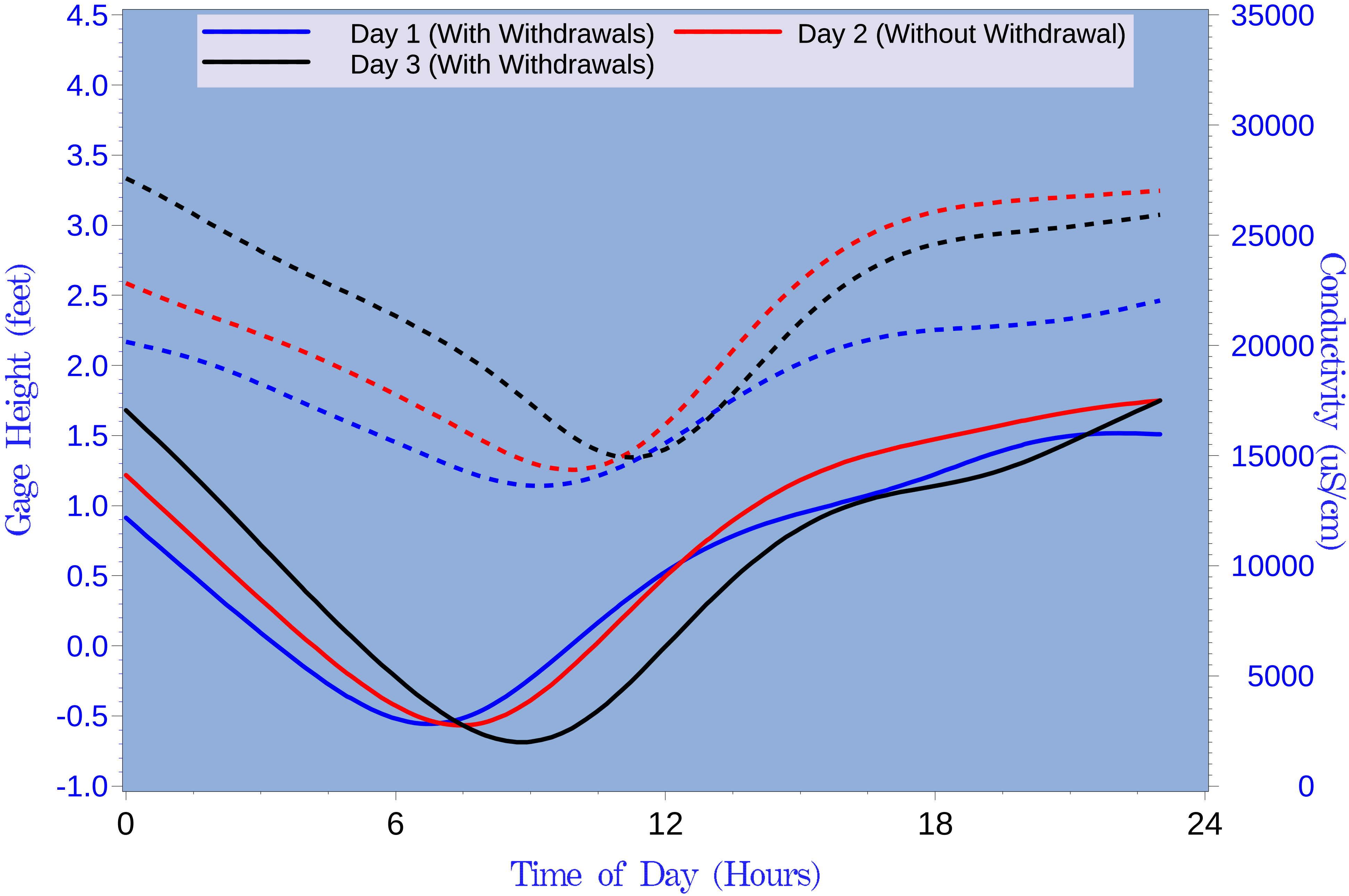


Figure 4.28 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Harbour Height Gage (RK 15.5) January 14th through 16th, flows = 167, 158 & 153 cfs, withdrawals = 16.2, 0.0 & 14.7 cfs

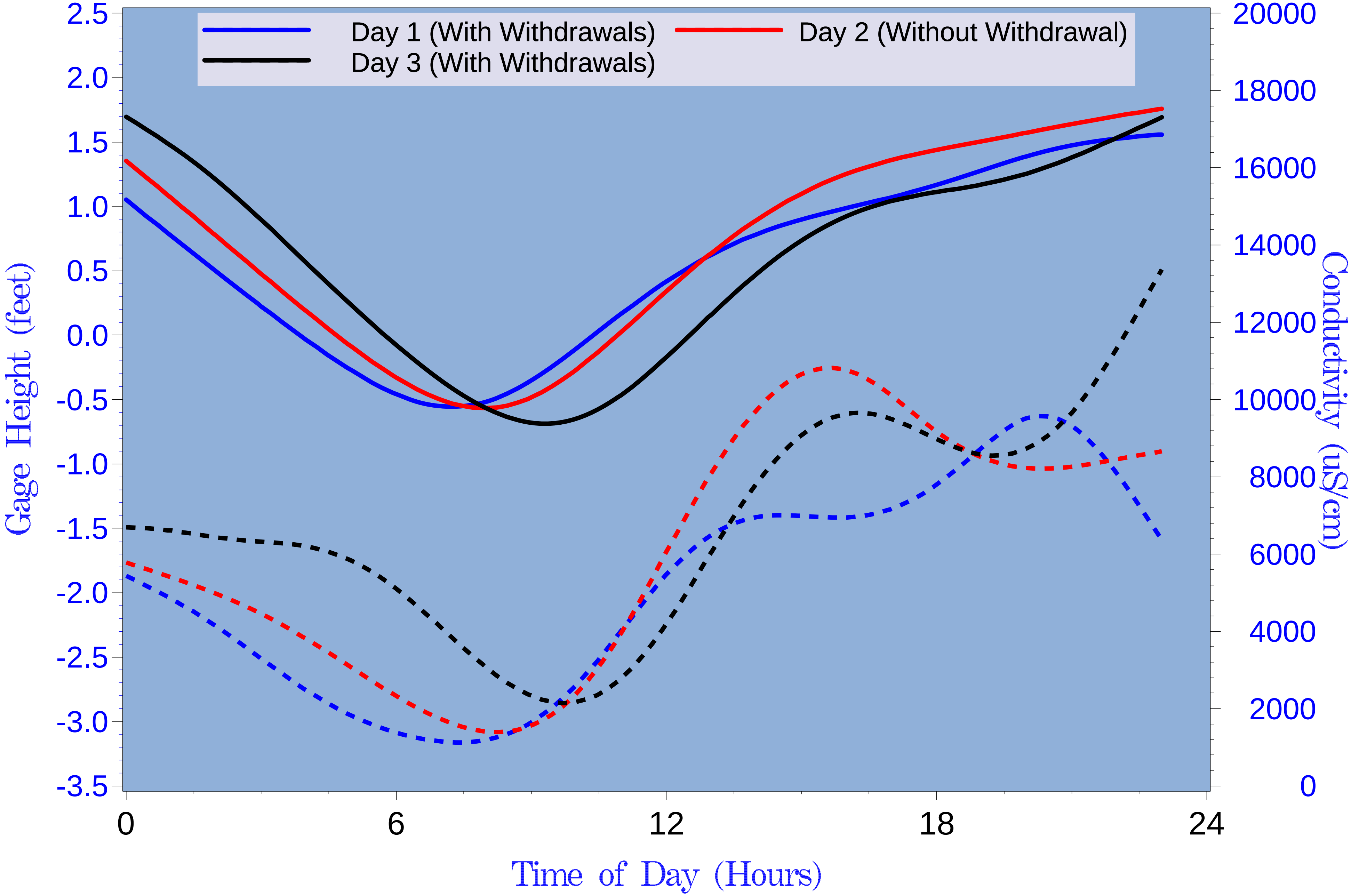


Figure 4.29 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ4 Gage (RK 21.9)
January 14th through 16th, flows = 167, 158 & 153 cfs, withdrawals = 16.2, 0.0 & 14.7 cfs

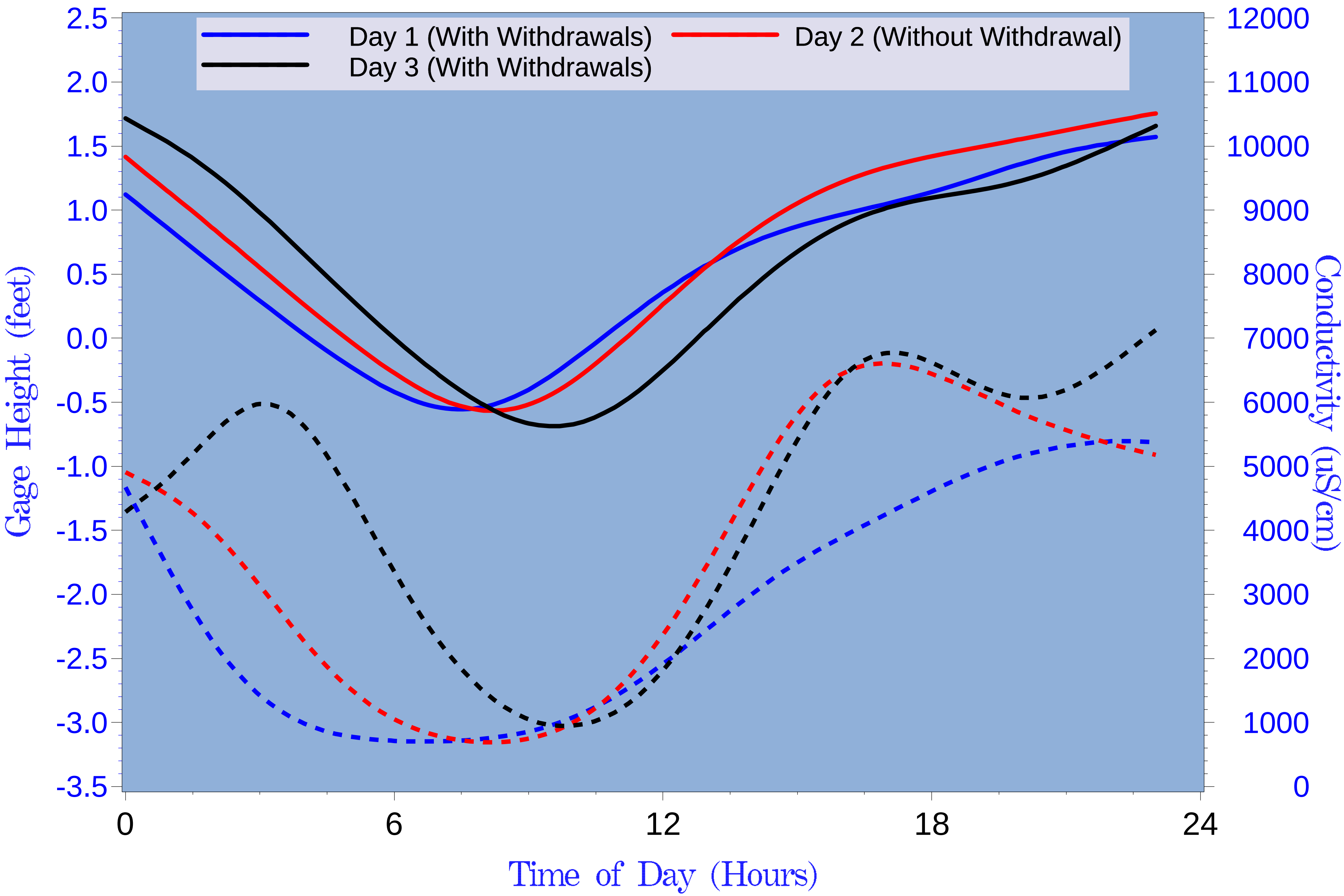


Figure 4.30 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ3 Gage (RK 23.4) January 14th through 16th, flows = 167, 158 & 153 cfs, withdrawals = 16.2, 0.0 & 14.7 cfs

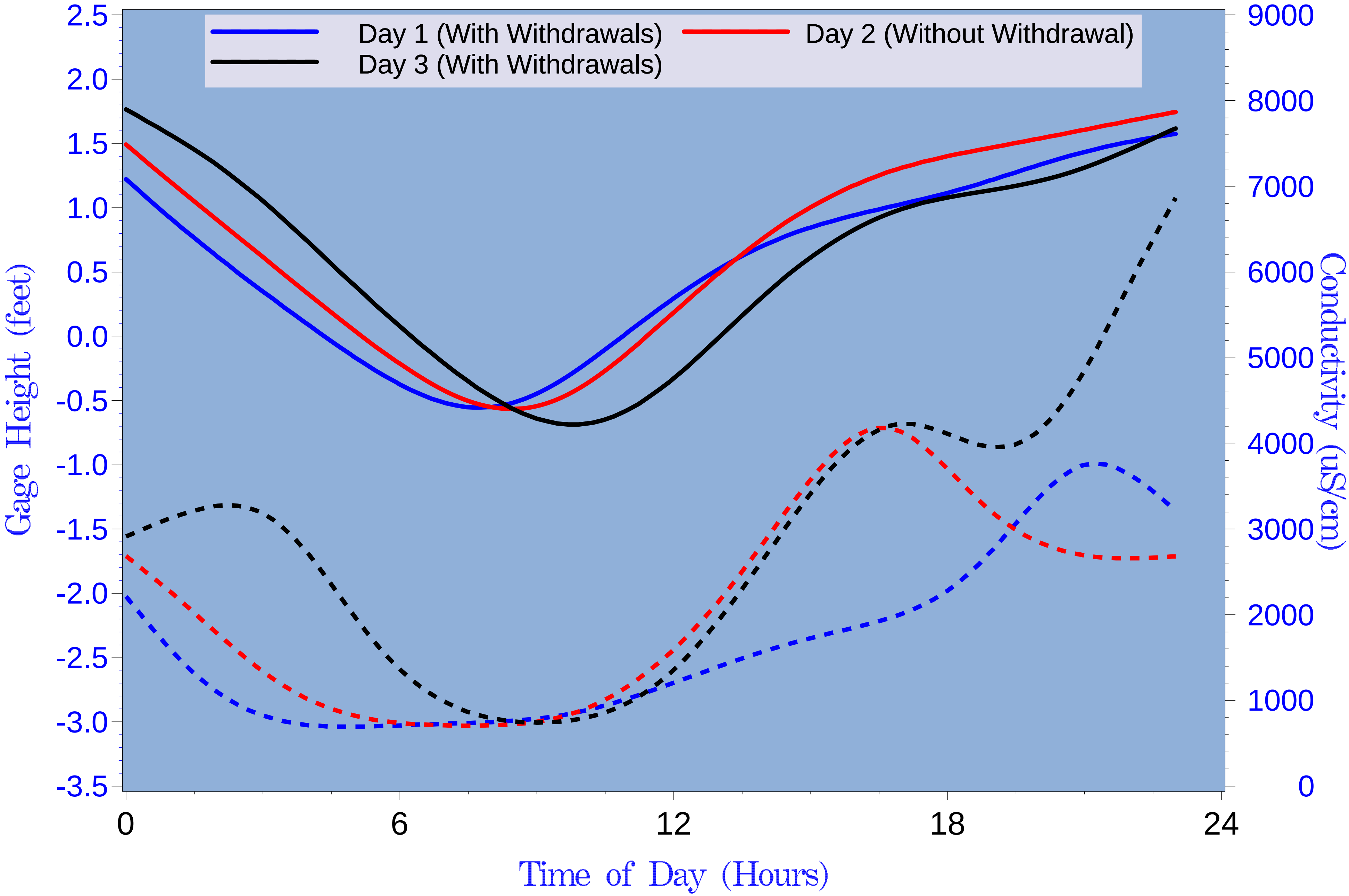


Figure 4.31 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ2 Gage (RK 24.5) January 14th through 16th, flows = 167, 158 & 153 cfs, withdrawals = 16.2, 0.0 & 14.7 cfs

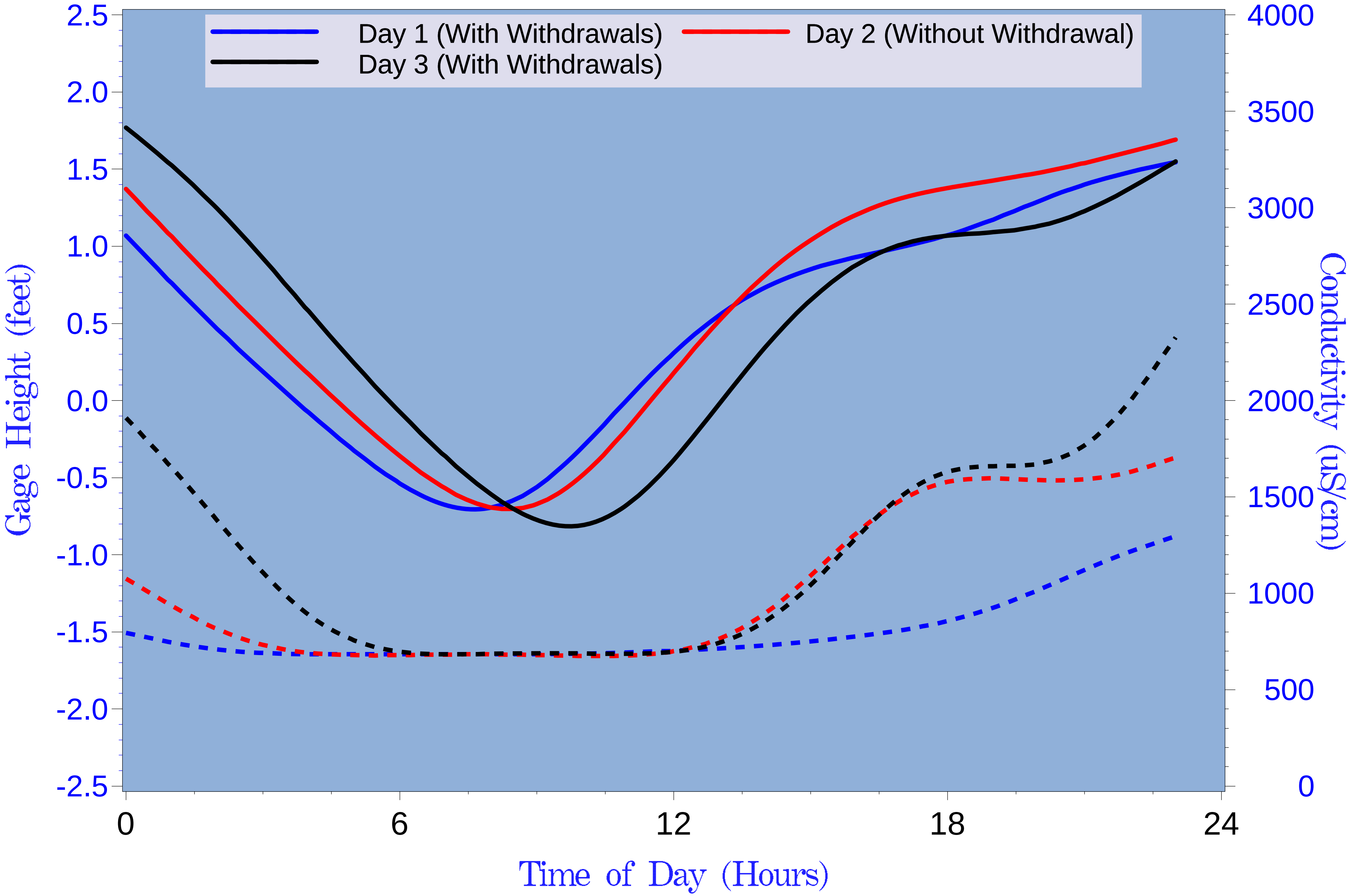


Figure 4.32 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Peace River Height Gage (RK 26.7) January 14th through 16th, flows = 167, 158 & 153 cfs, withdrawals = 16.2, 0.0 & 14.7 cfs

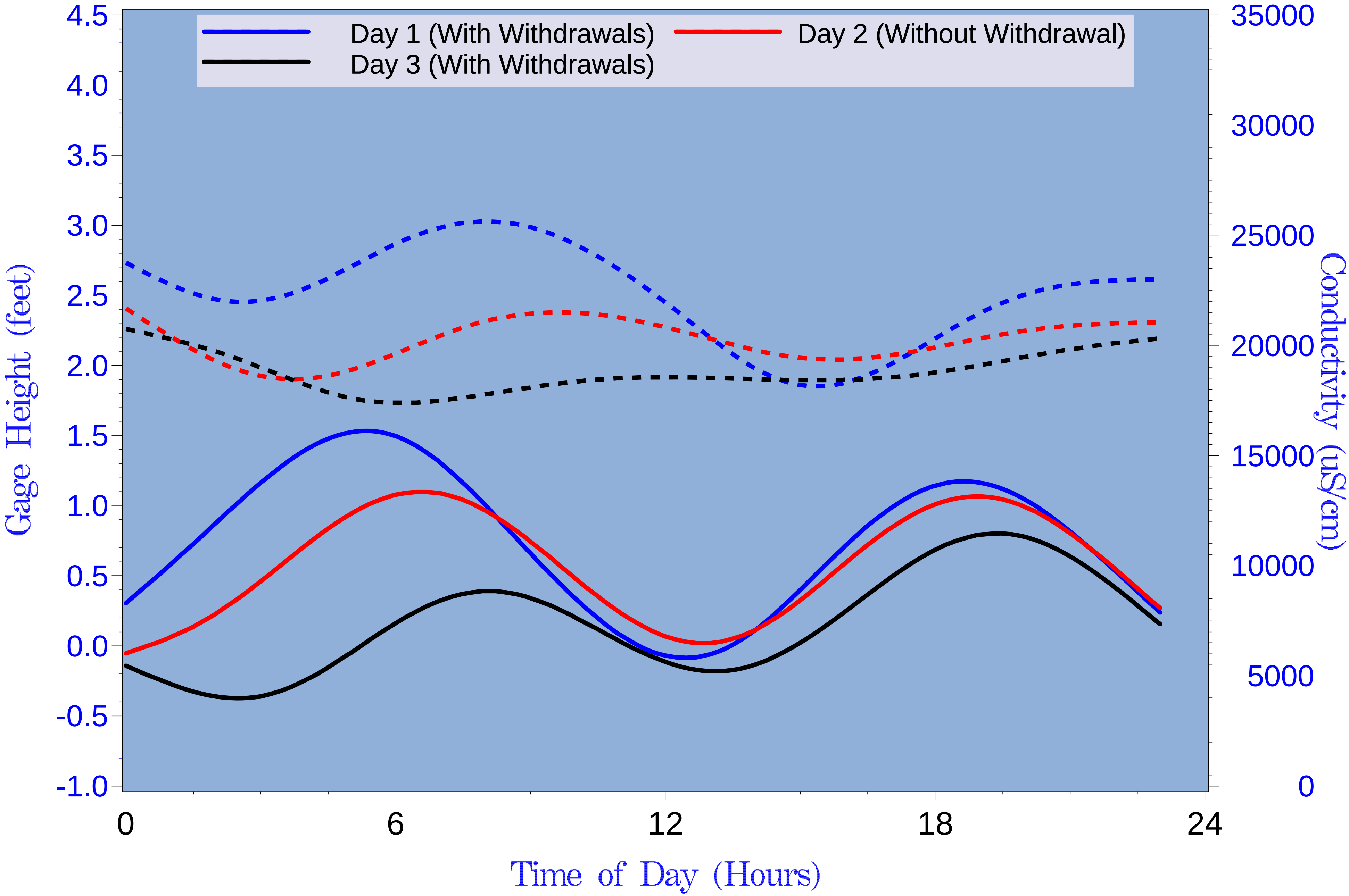


Figure 4.33 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Harbour Height Gage (RK 15.5)
January 23rd through 25th, flows = 128, 132 & 149 cfs, withdrawals = 11.4, 0.0 & 11.9 cfs

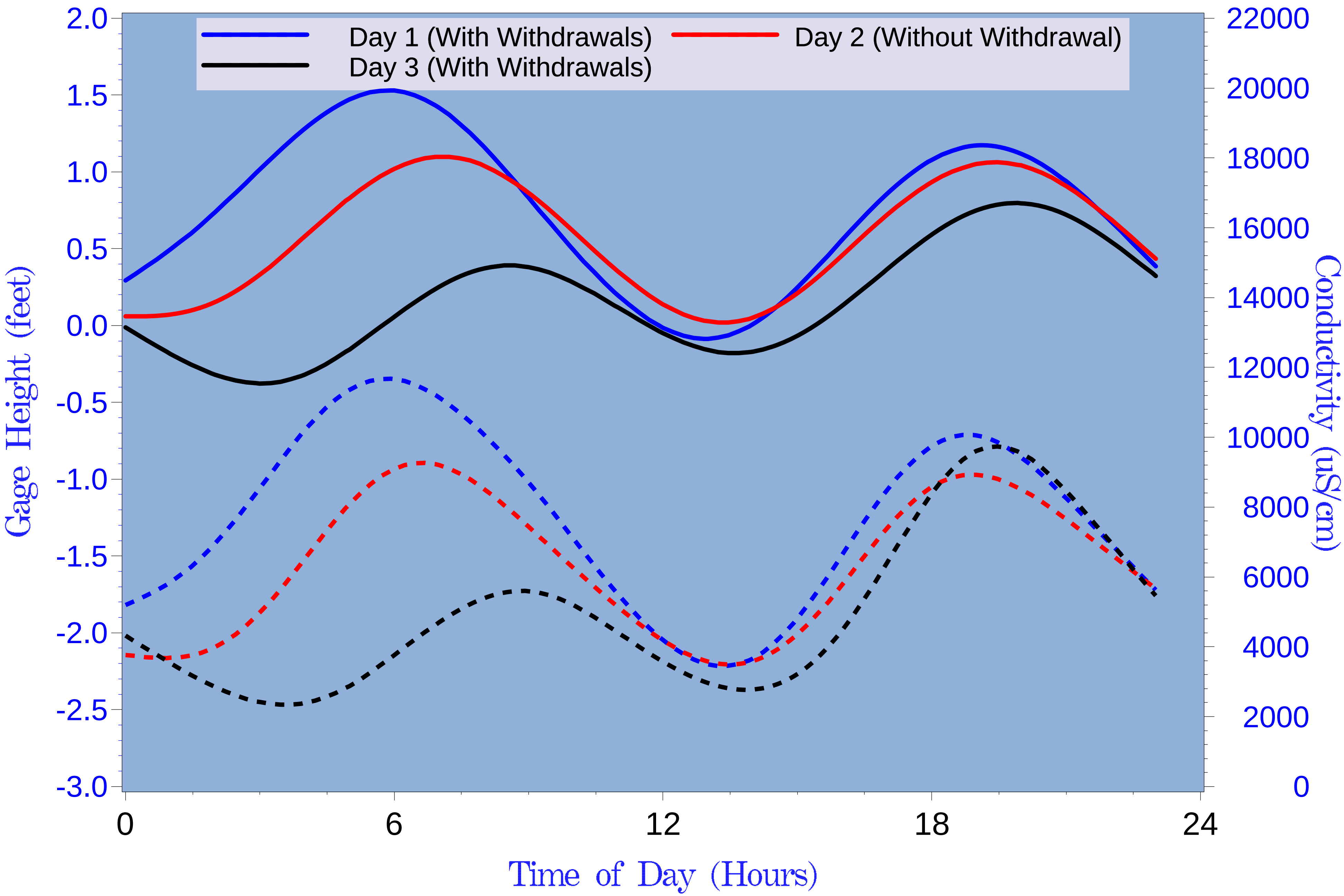


Figure 4.34 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ4 Gage (RK 21.9) January 23rd through 25th, flows = 128, 132 & 149 cfs, withdrawals = 11.4, 0.0 & 11.9 cfs

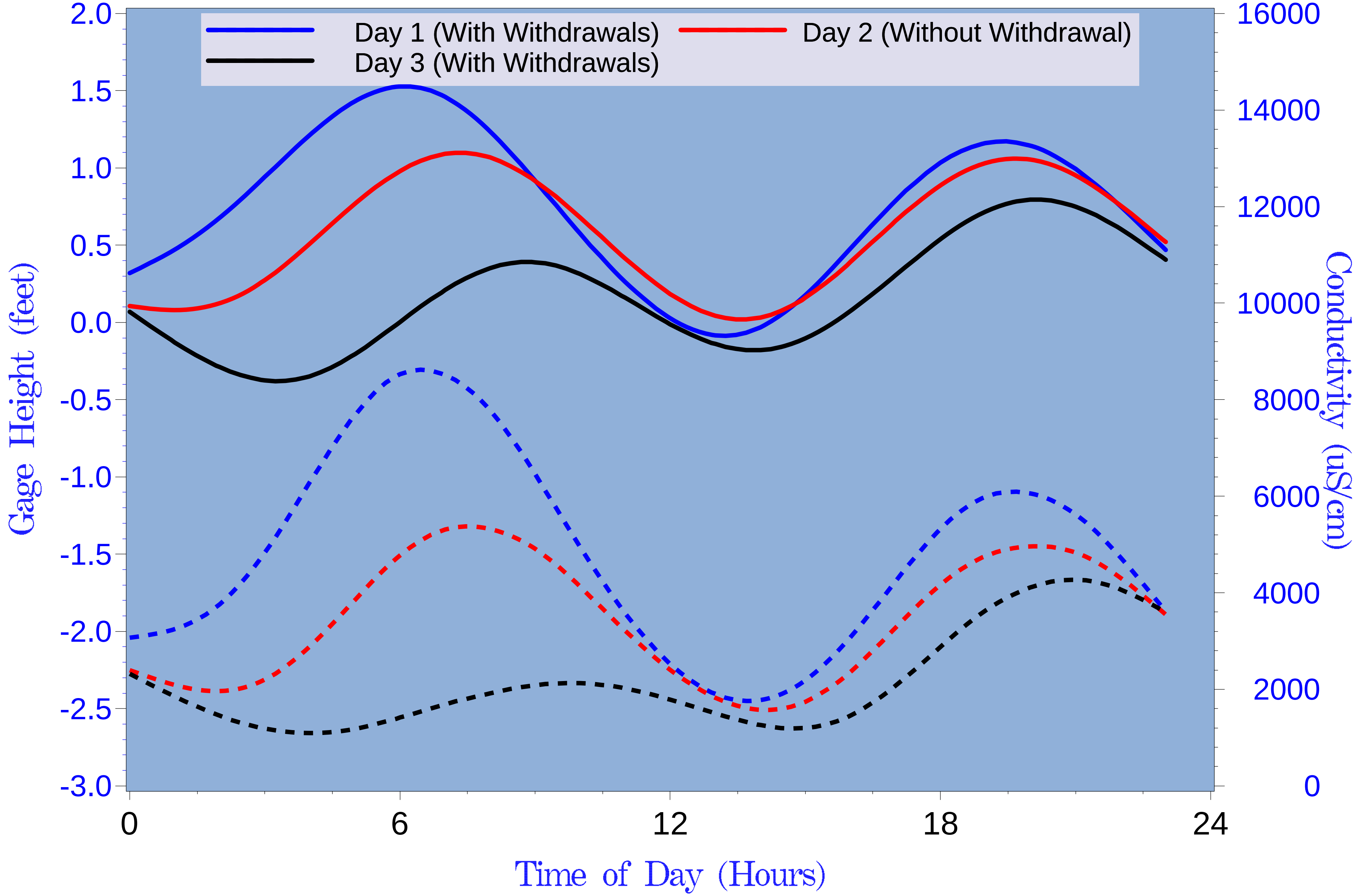


Figure 4.35 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ3 Gage (RK 23.4)
January 23rd through 25th, flows = 128, 132 & 149 cfs, withdrawals = 11.4, 0.0 & 11.9 cfs

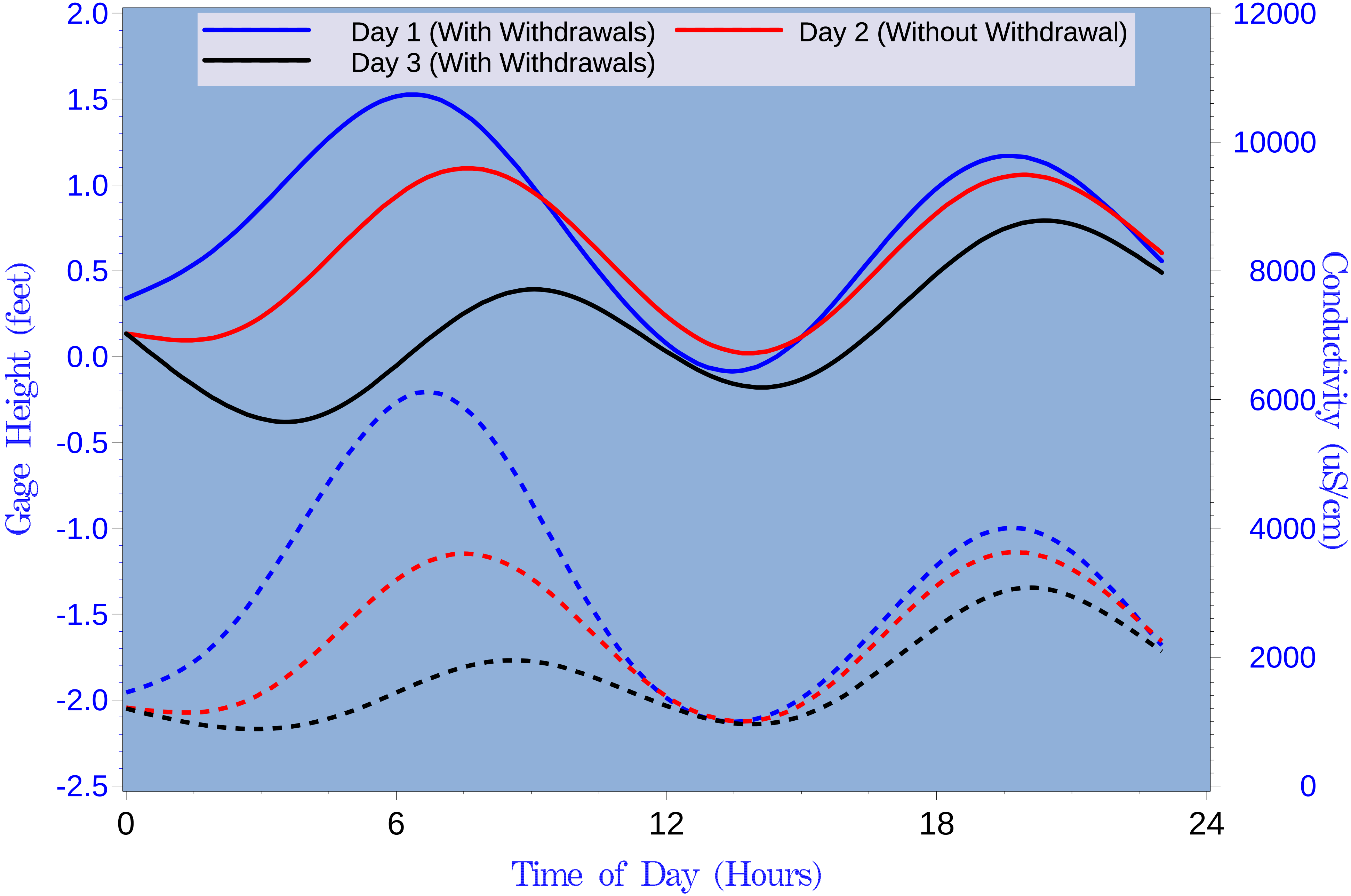


Figure 4.36 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ2 Gage (RK 24.5) January 23rd through 25th, flows = 128, 132 & 149 cfs, withdrawals = 11.4, 0.0 & 11.9 cfs

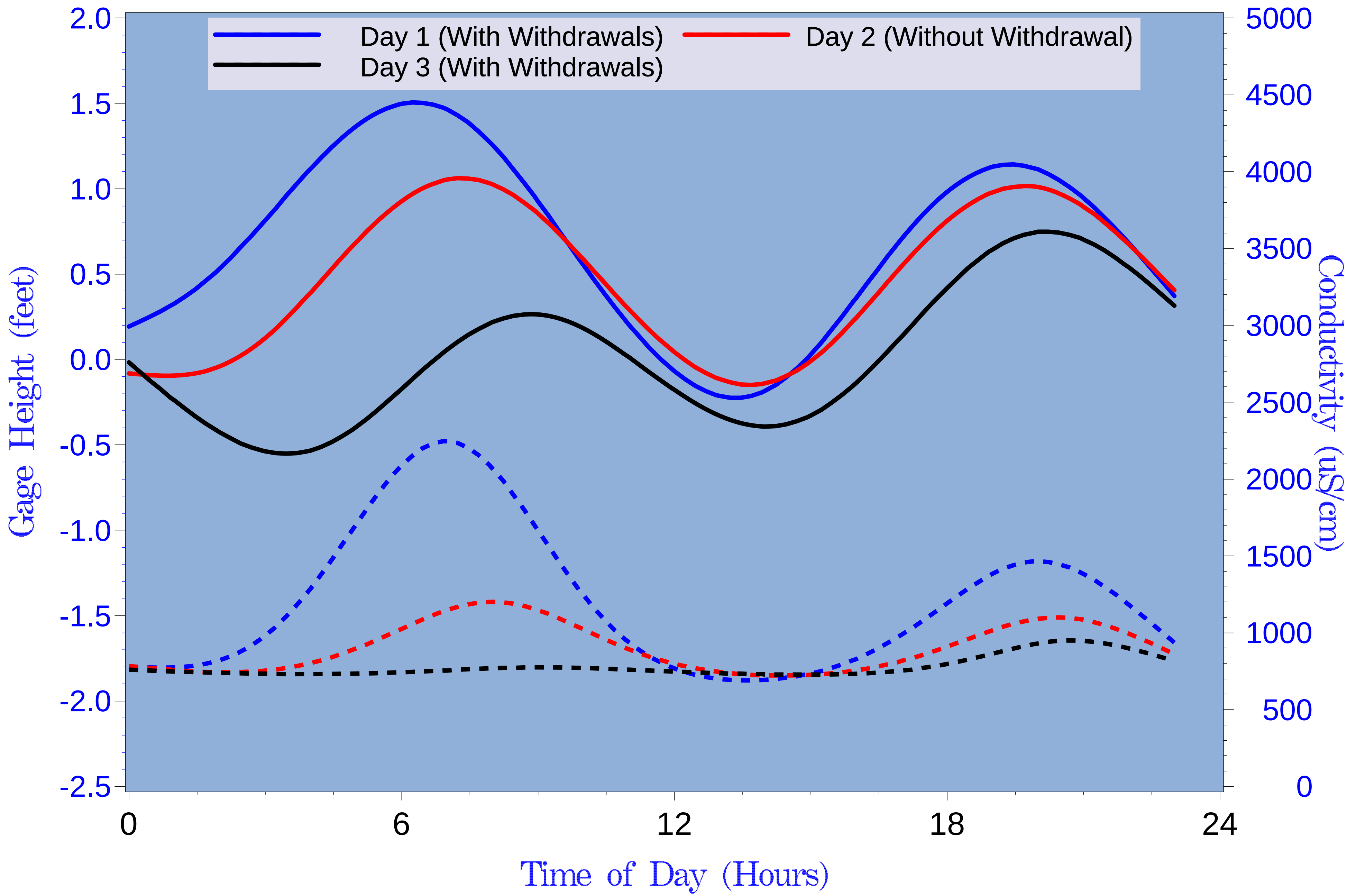


Figure 4.37 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Peace River Height Gage (RK 26.7) January 23rd through 25th, flows = 128, 132 & 149 cfs, withdrawals = 11.4, 0.0 & 11.9 cfs

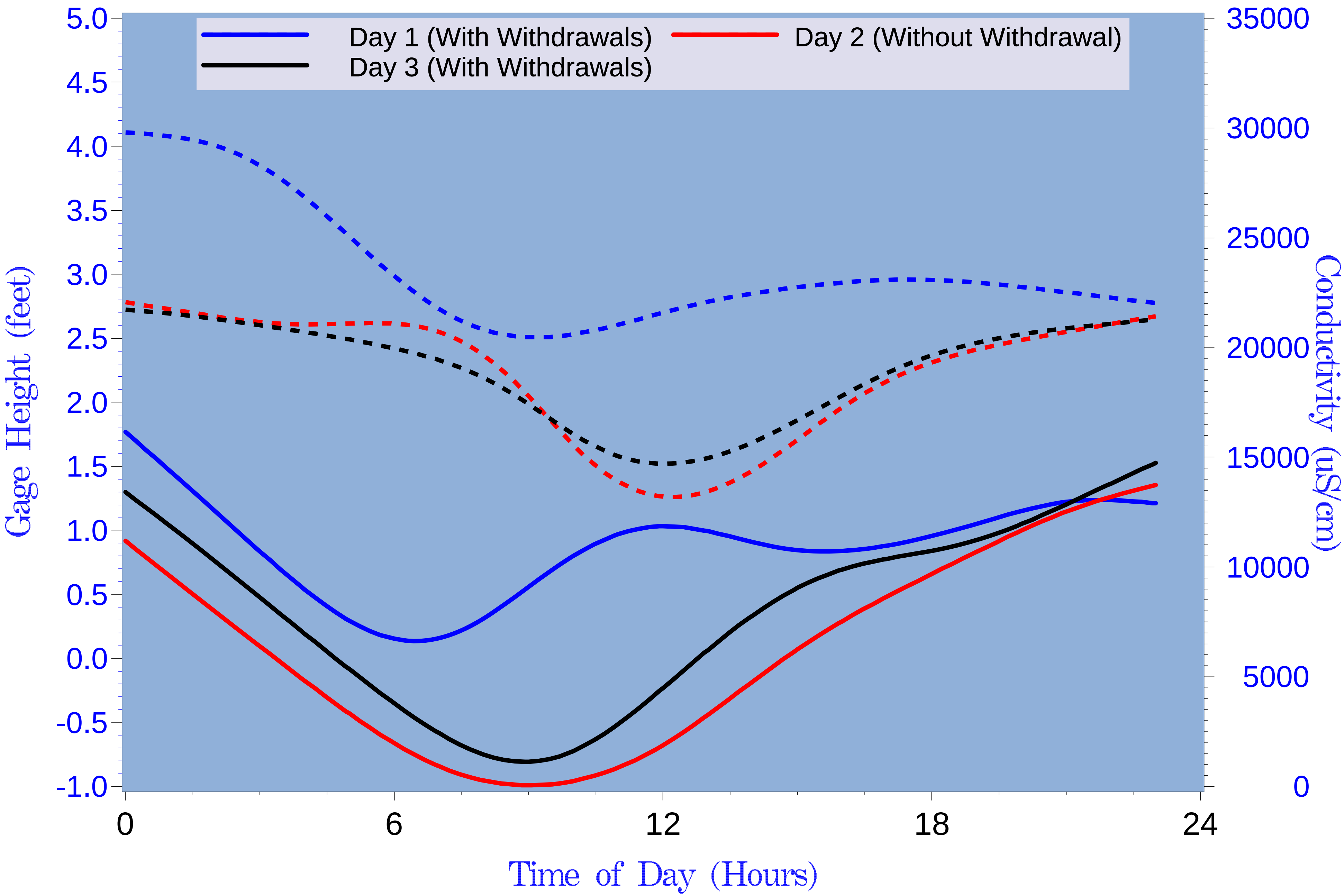


Figure 4.38 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Harbour Height Gage (RK 15.5) January 28th through 30th, flows = 252, 231 & 236 cfs, withdrawals = 21.3, 0.0 & 20.7 cfs

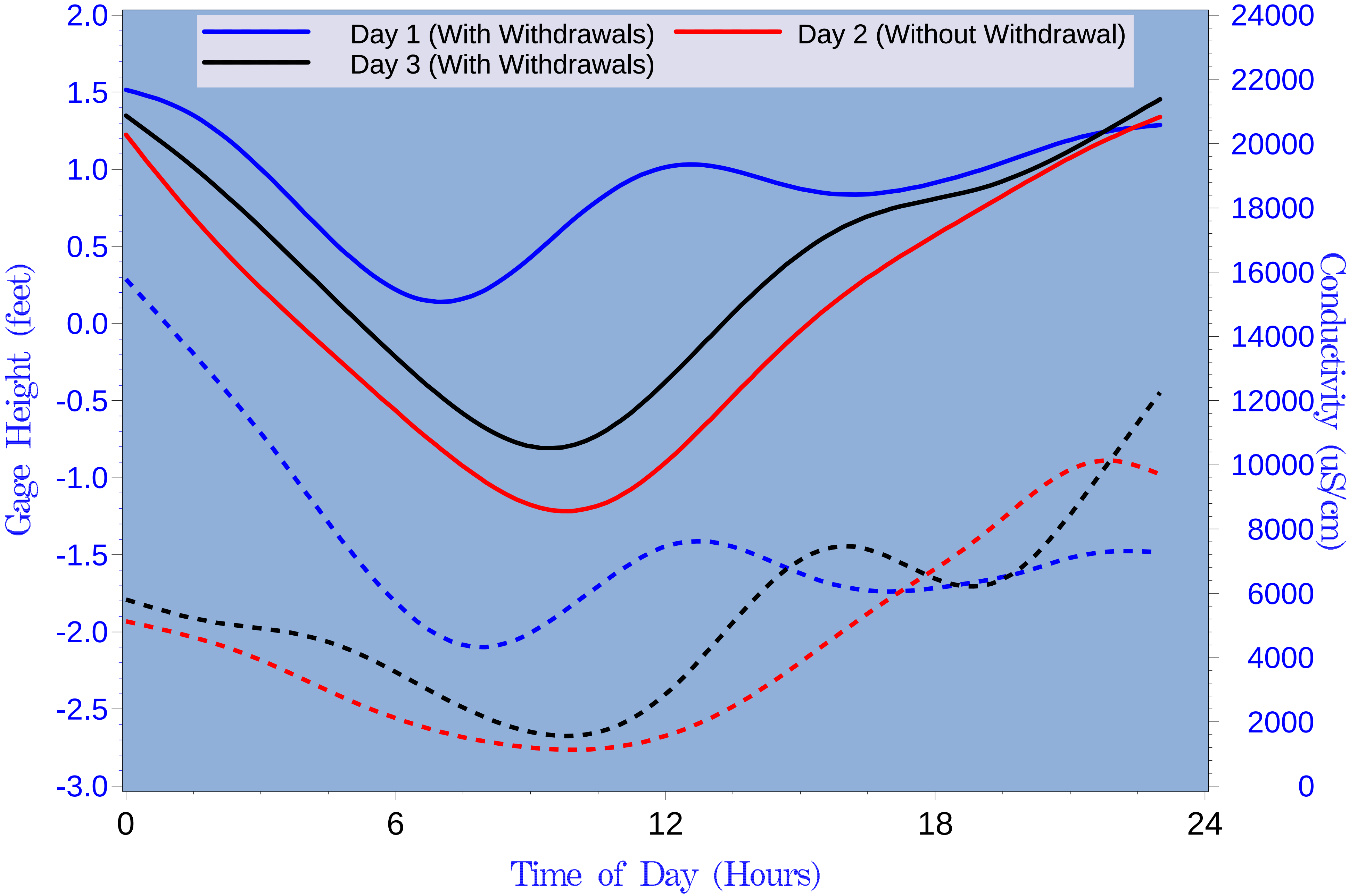


Figure 4.39 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ4 Gage (RK 21.9)
January 28th through 30th, flows = 252, 231 & 236 cfs, withdrawals = 21.3, 0.0 & 20.7 cfs

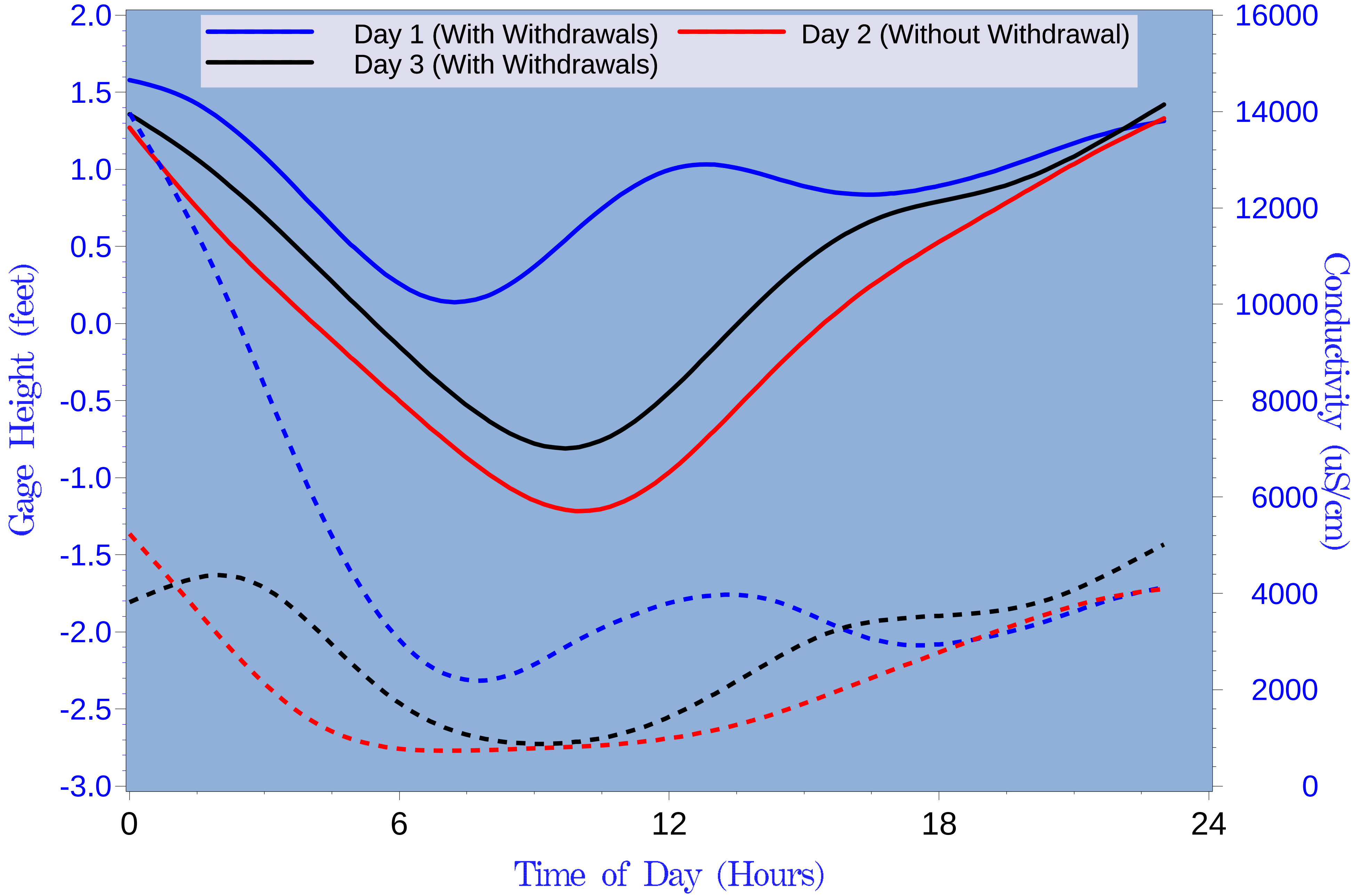


Figure 4.40 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ3 Gage (RK 23.4)
January 28th through 30th, flows = 252, 231 & 236 cfs, withdrawals = 21.3, 0.0 & 20.7 cfs

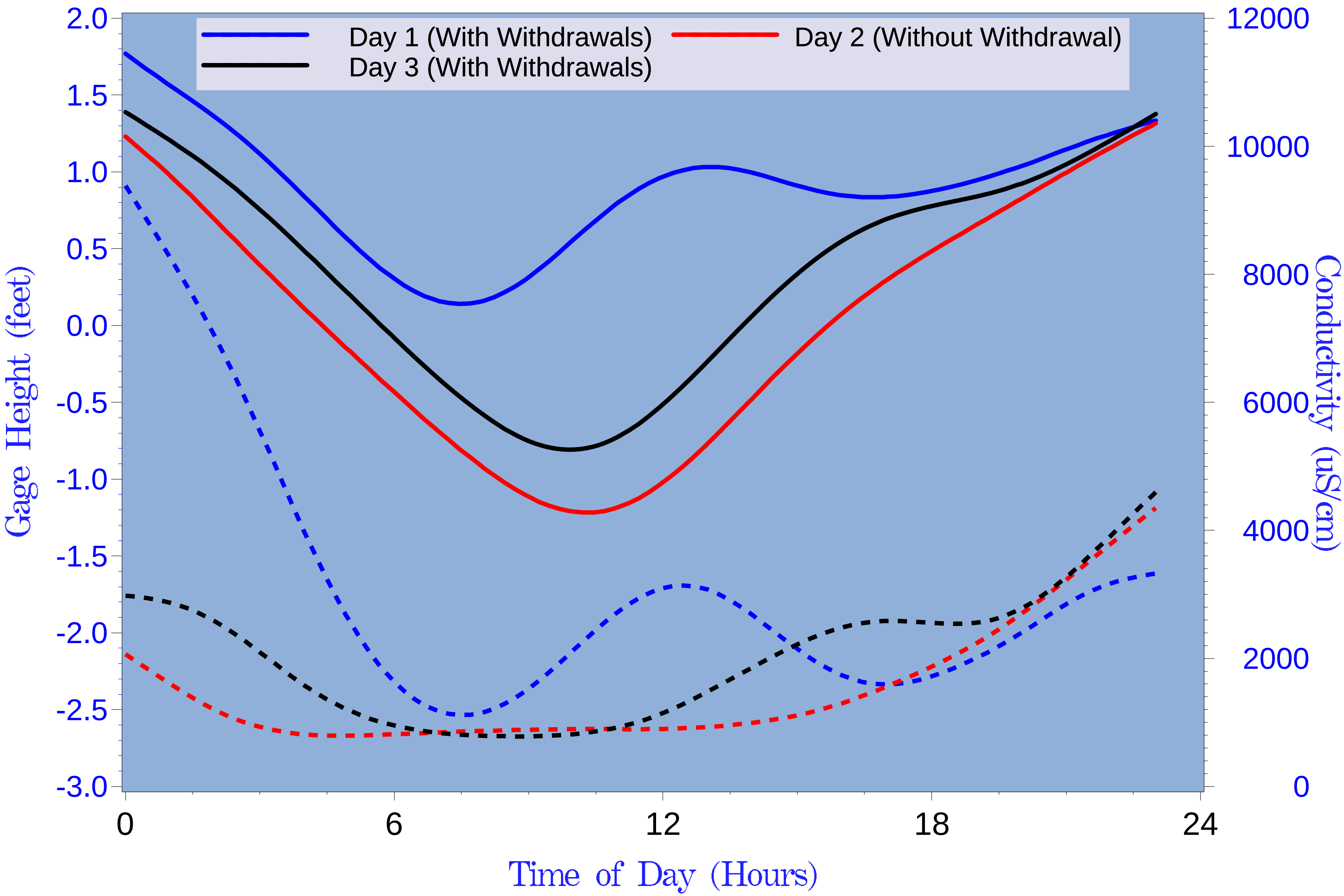


Figure 4.41 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ2 Gage (RK 24.5)
January 28th through 30th, flows = 252, 231 & 236 cfs, withdrawals = 21.3, 0.0 & 20.7 cfs

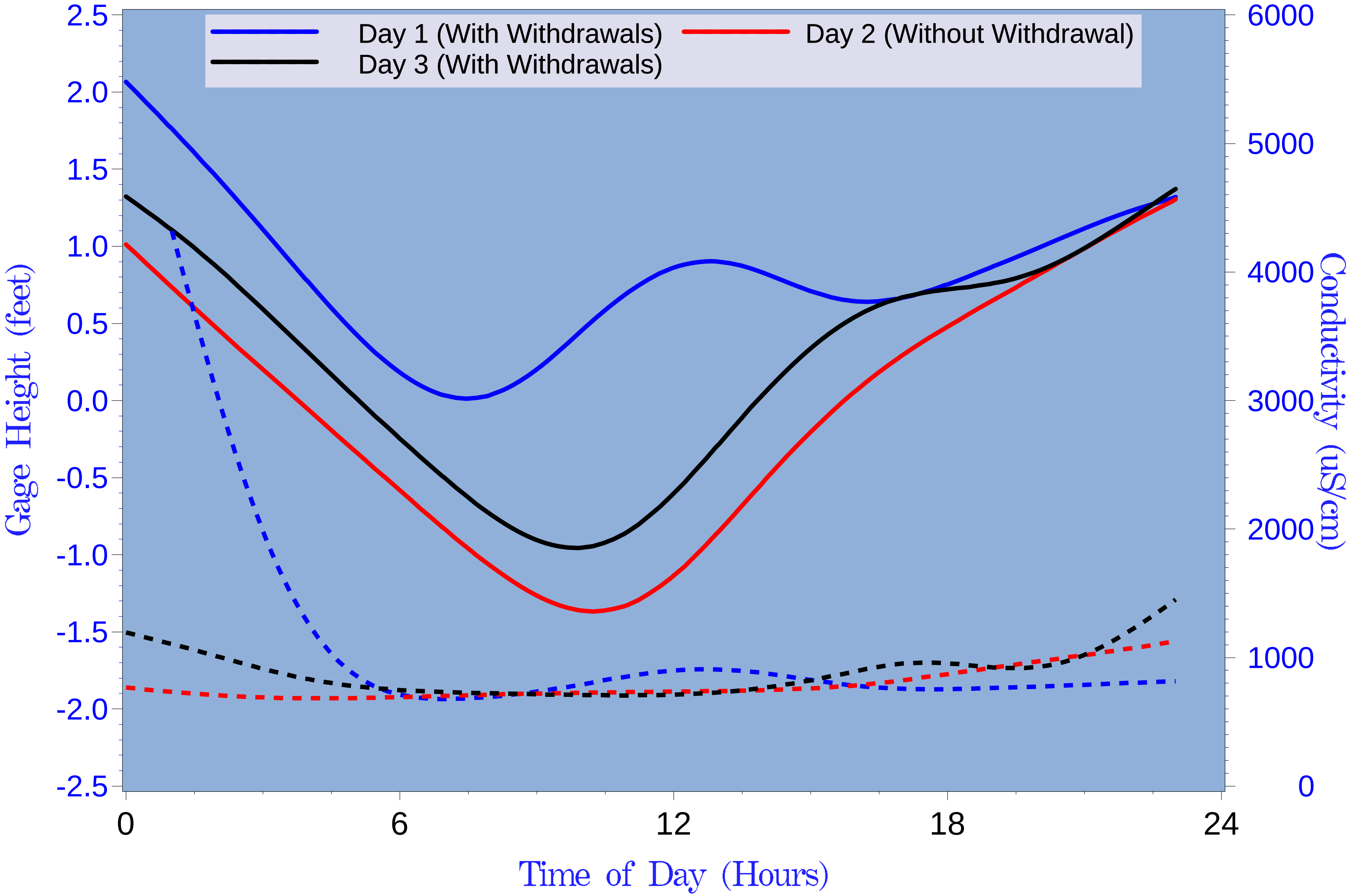


Figure 4.42 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Peace River Height Gage (RK 26.7) January 28th through 30th, flows = 252, 231 & 236 cfs, withdrawals = 21.3, 0.0 & 20.7 cfs

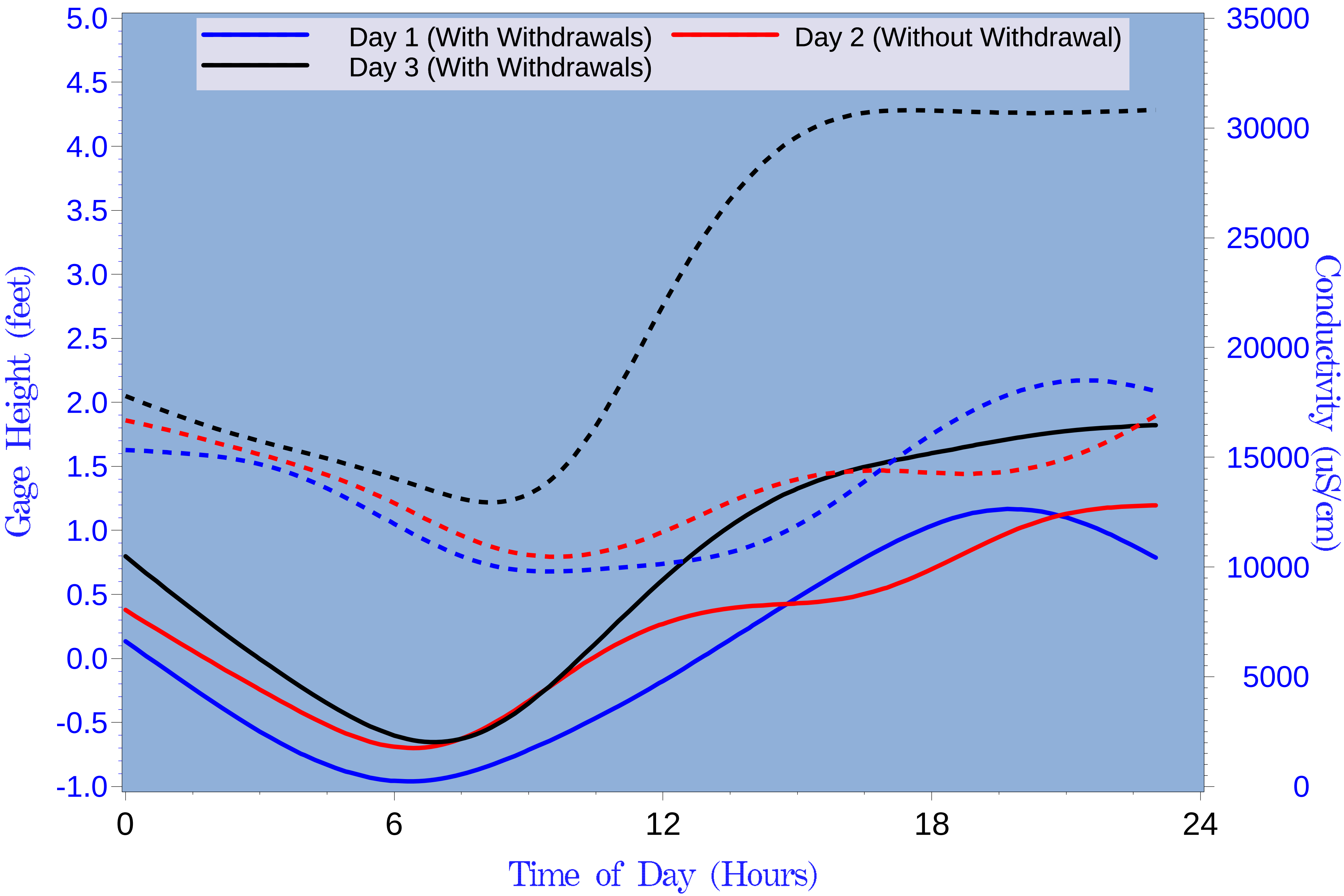


Figure 4.43 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Harbour Height Gage (RK 15.5) February 11th through 13th, flows = 252, 234 & 229 cfs, withdrawals = 23.6, 0.0 & 20.1 cfs

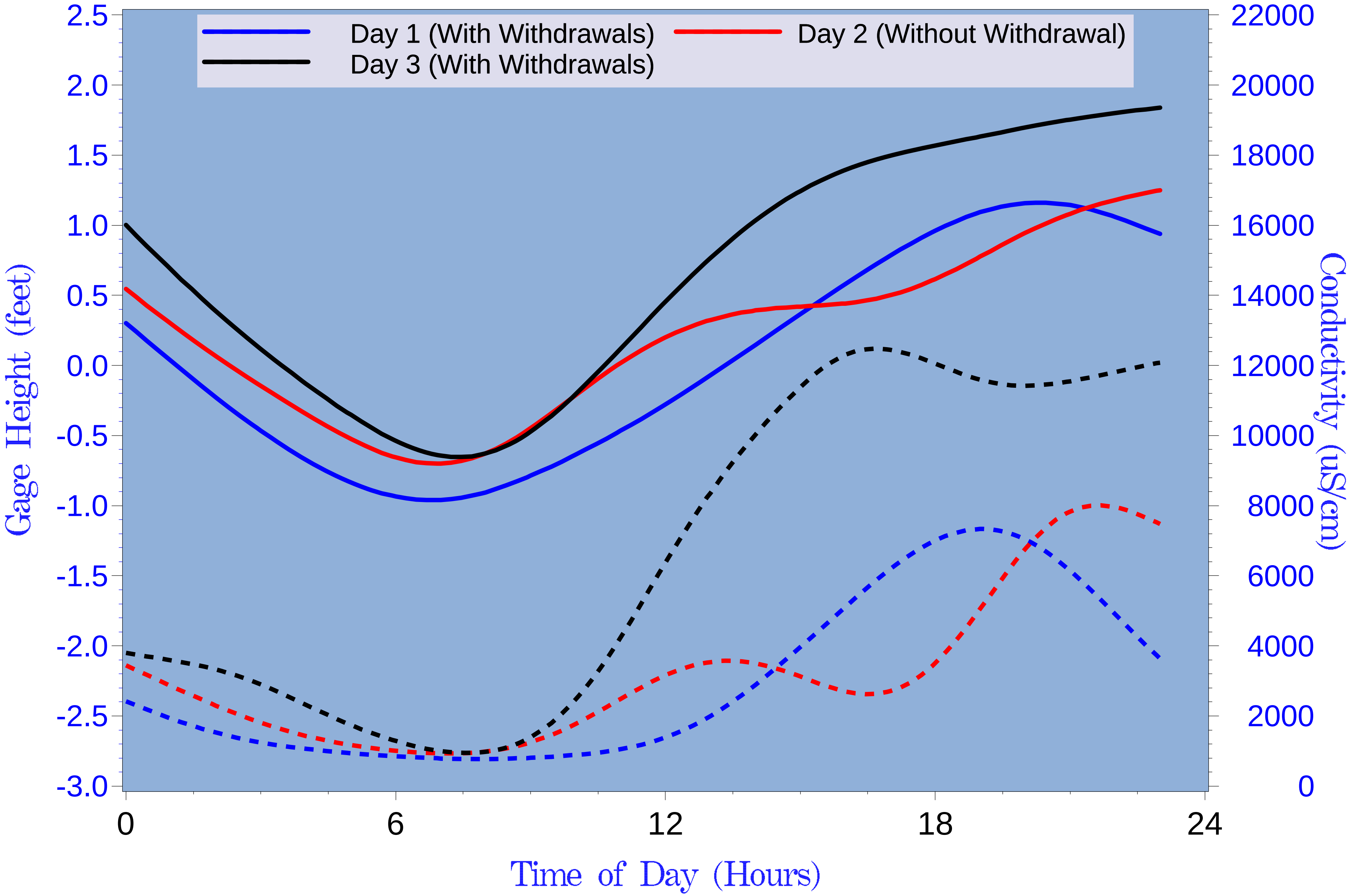


Figure 4.44 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ4 Gage (RK 21.9)
February 11th through 13th, flows = 252, 234 & 229 cfs, withdrawals = 23.6, 0.0 & 20.1 cfs

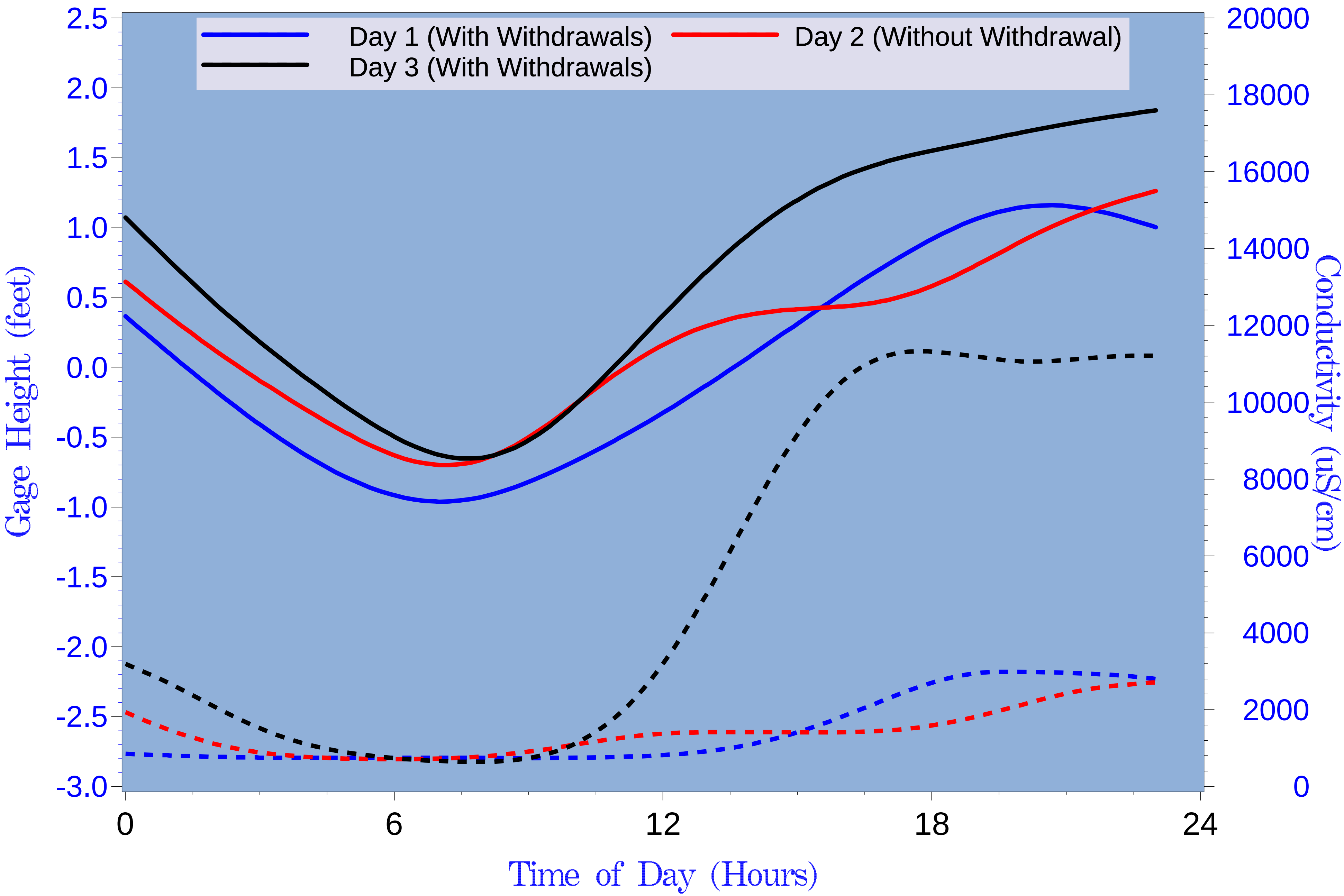


Figure 4.45 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ3 Gage (RK 23.4) February 11th through 13th, flows = 252, 234 & 229 cfs, withdrawals = 23.6, 0.0 & 20.1 cfs

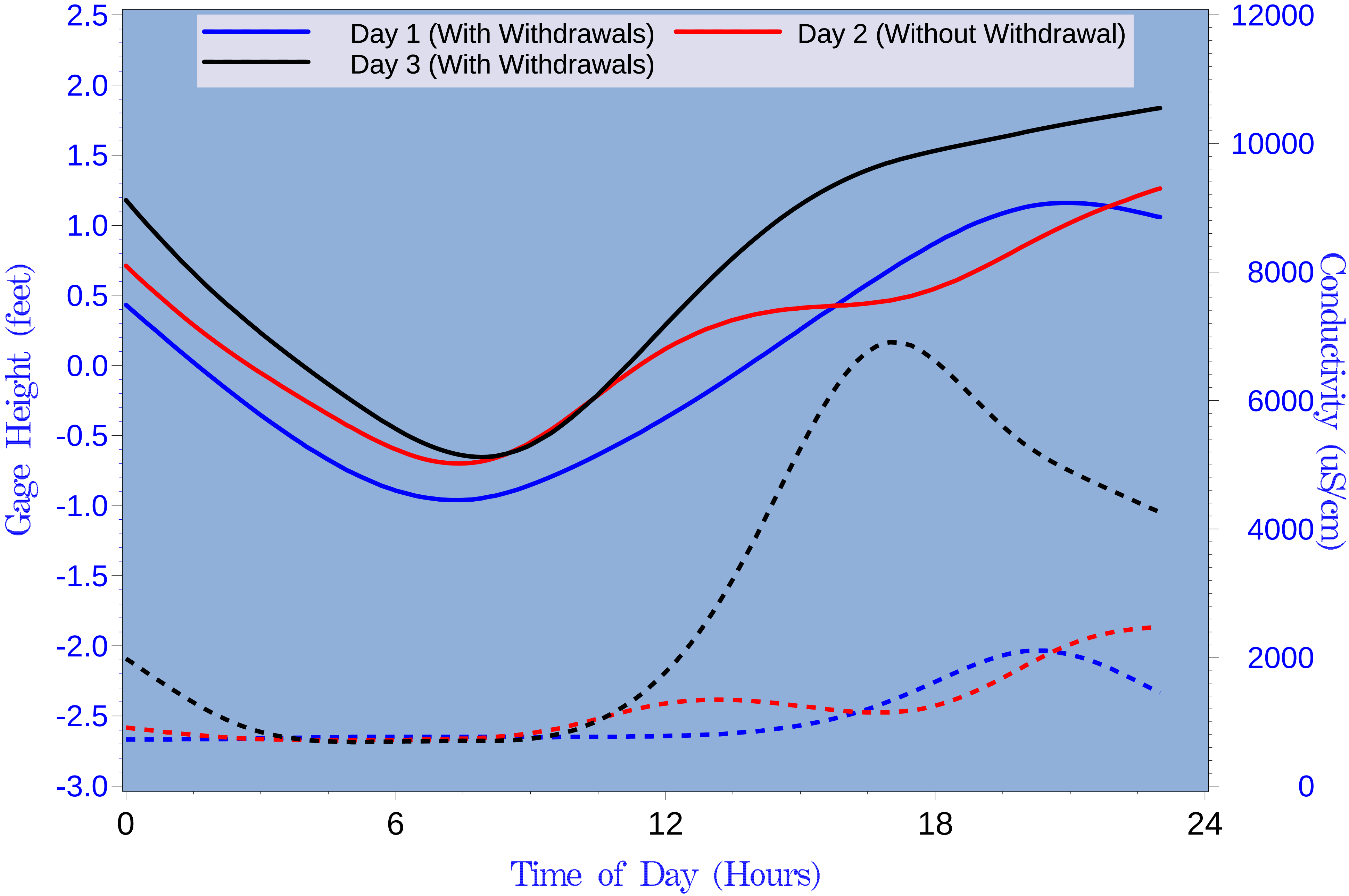


Figure 4.46 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ2 Gage (RK 24.5)
February 11th through 13th, flows = 252, 234 & 229 cfs, withdrawals = 23.6, 0.0 & 20.1 cfs

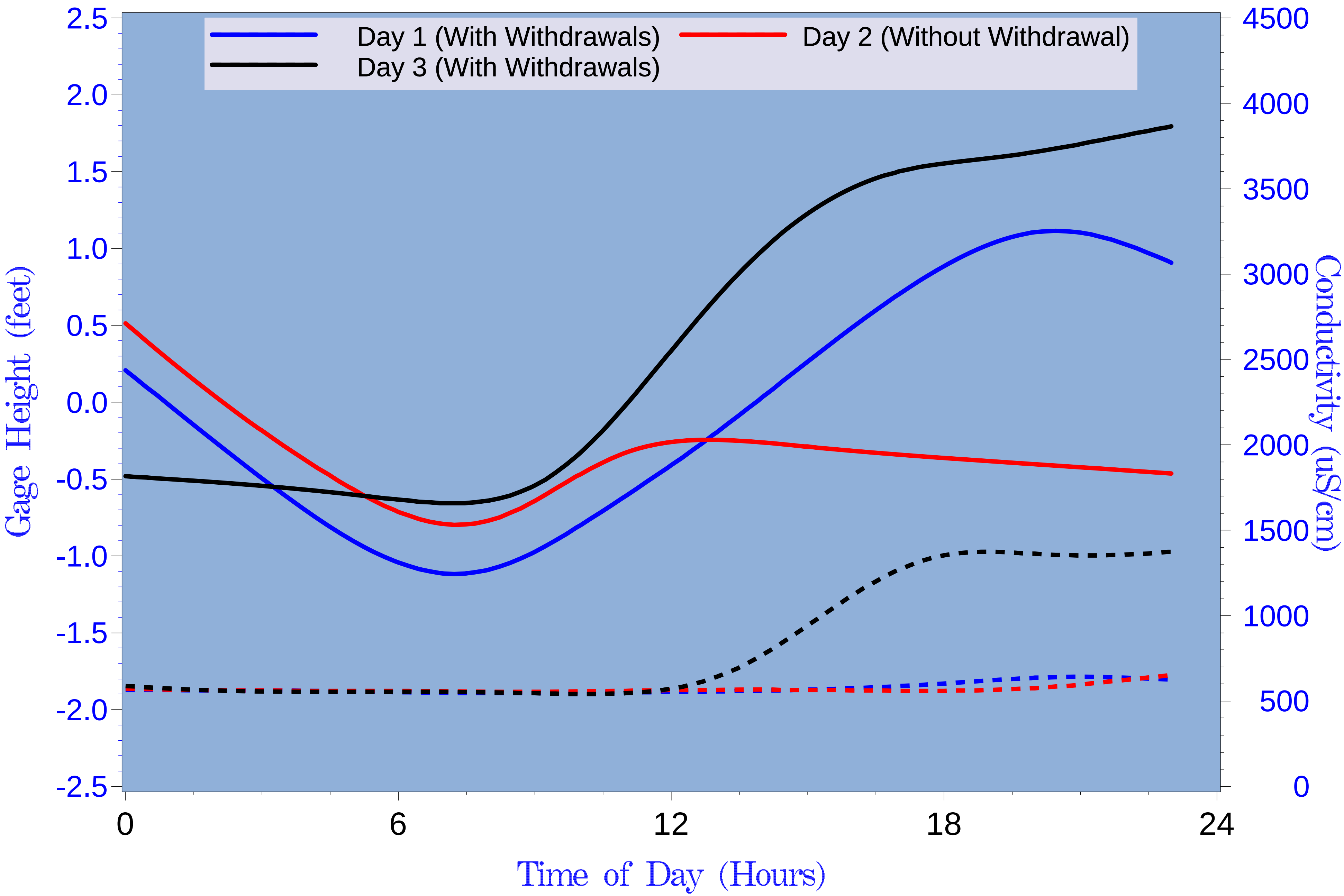


Figure 4.47 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Peace River Height Gage (RK 26.7)
February 11th through 13th, flows = 252, 234 & 229 cfs, withdrawals = 23.6, 0.0 & 20.1 cfs

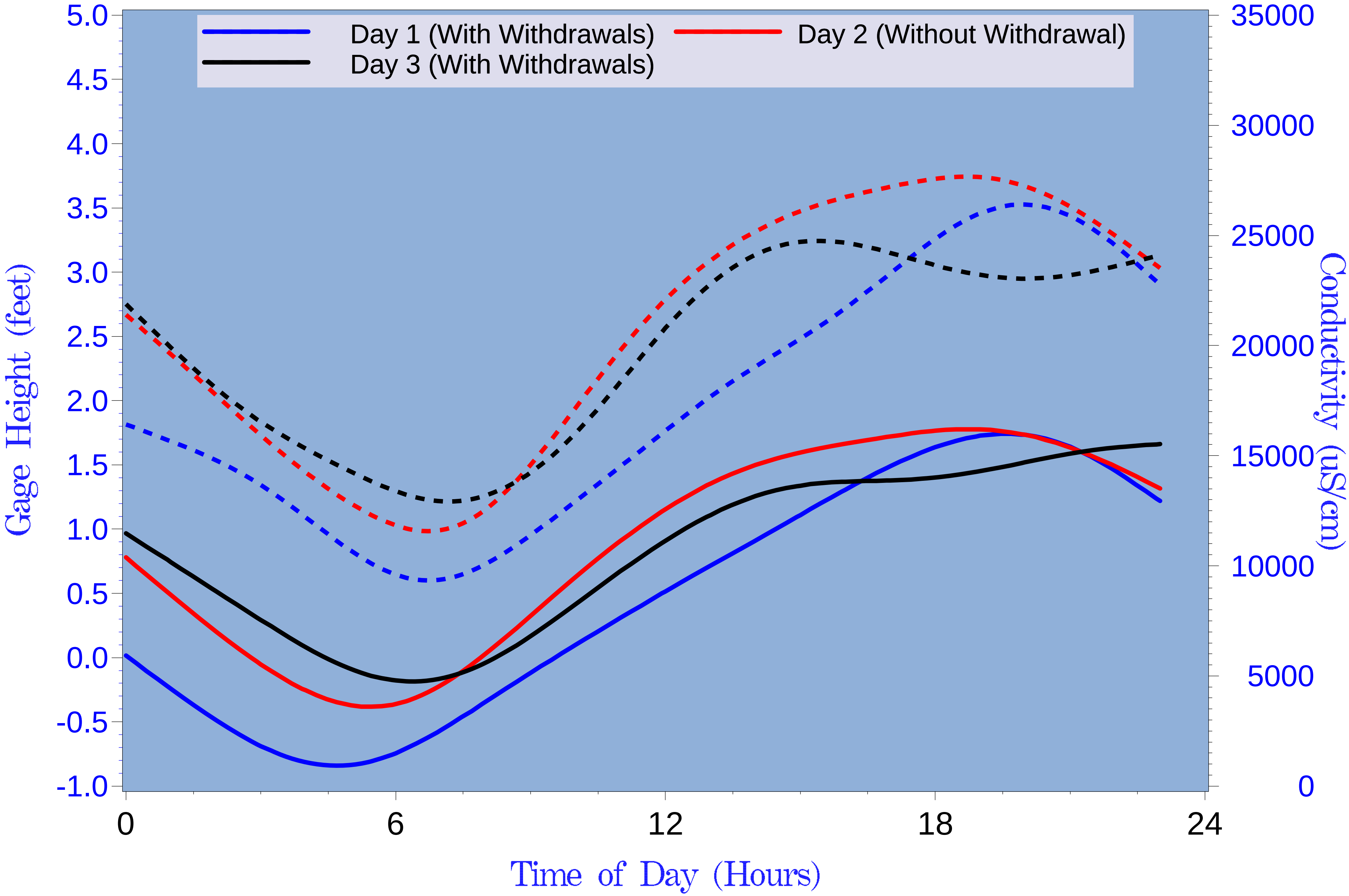


Figure 4.48 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Harbour Height Gage (RK 15.5) February 24th through 26th, flows = 203, 190 & 181 cfs, withdrawals = 22.2, 0.0 & 19.5 cfs

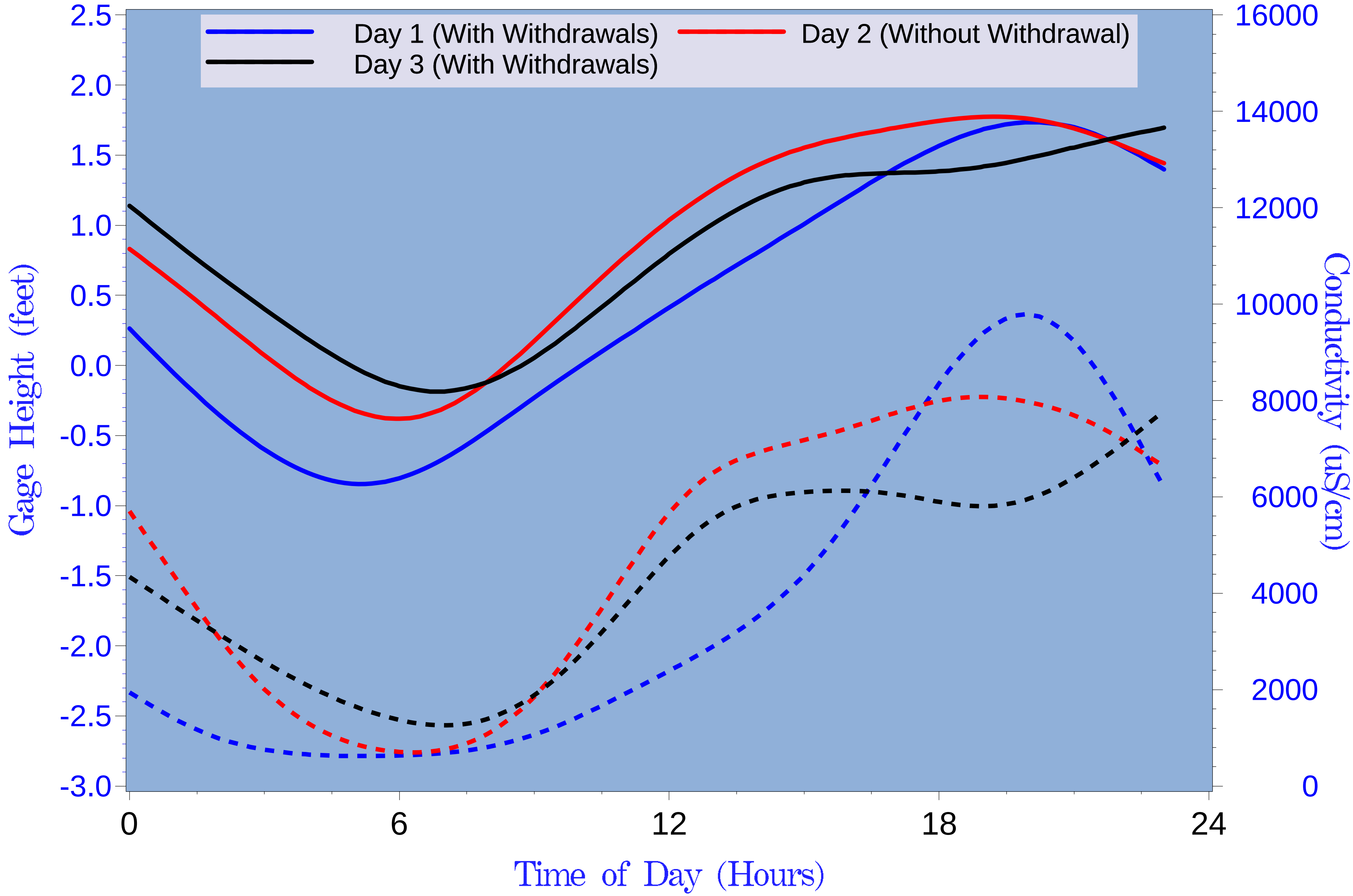


Figure 4.49 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ4 Gage (RK 21.9)
February 24th through 26th, flows = 203, 190 & 181 cfs, withdrawals = 22.2, 0.0 & 19.5 cfs

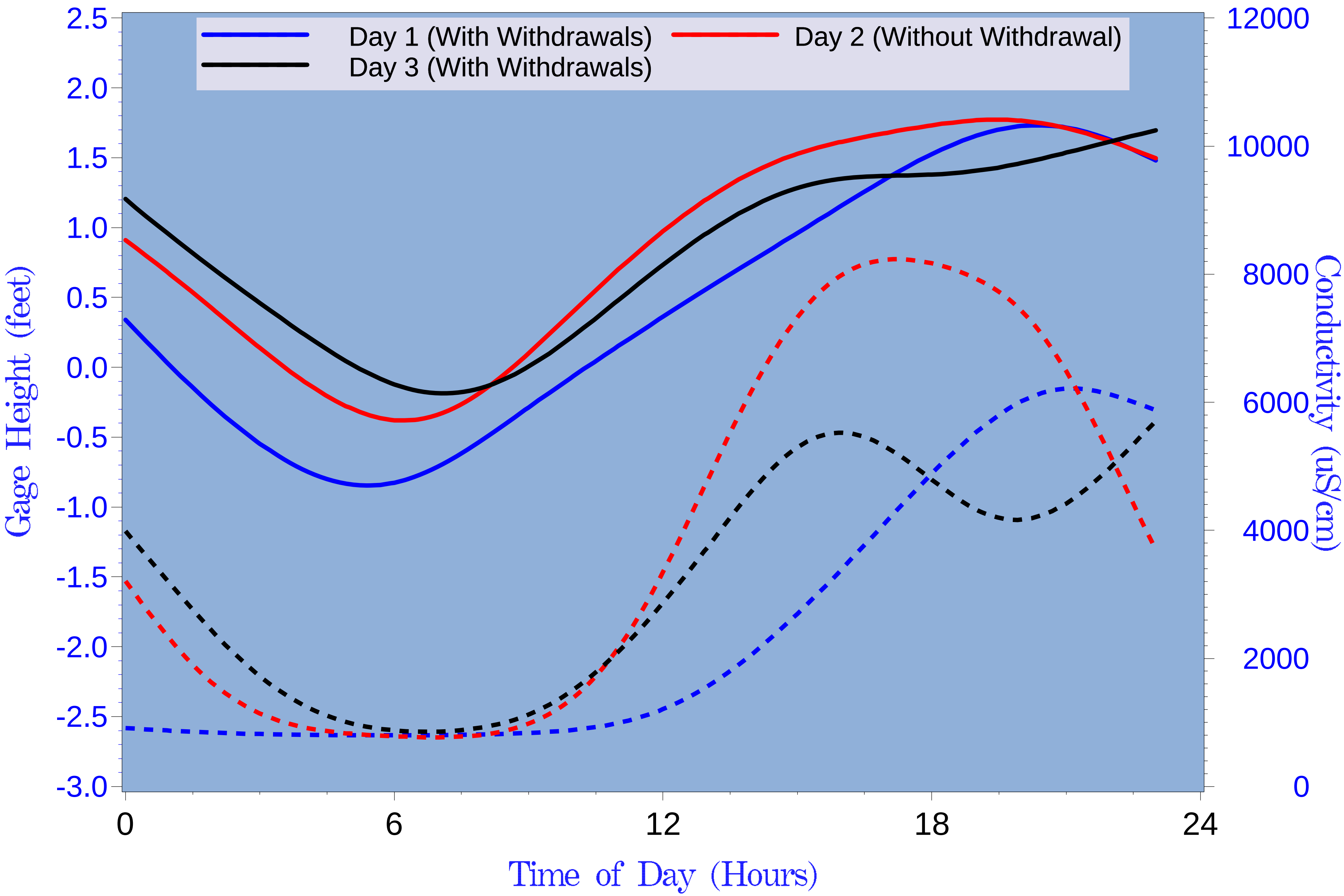


Figure 4.50 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ3 Gage (RK 23.4) February 24th through 26th, flows = 203, 190 & 181 cfs, withdrawals = 22.2, 0.0 & 19.5 cfs

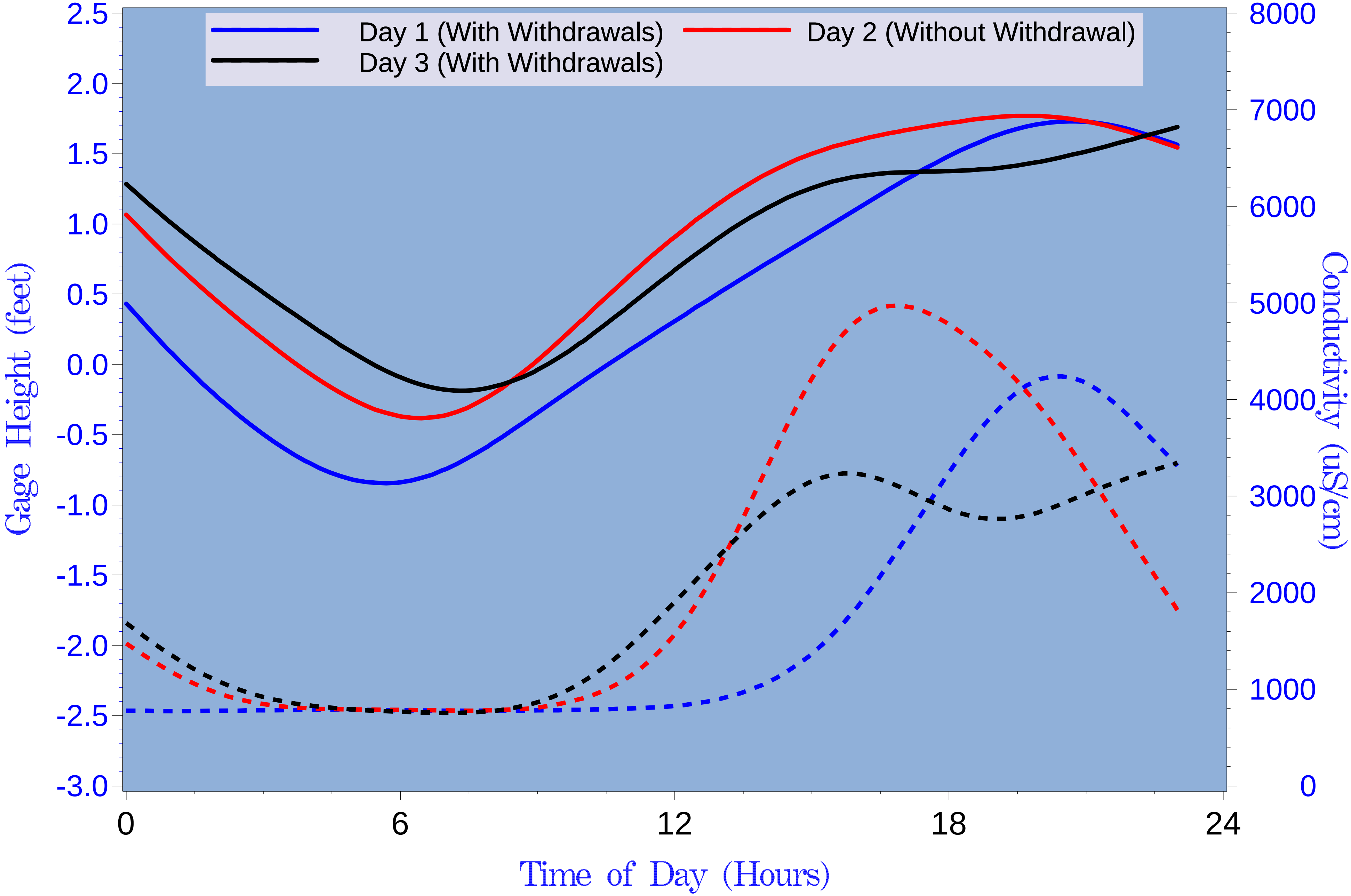


Figure 4.51 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ2 Gage (RK 24.5)
February 24th through 26th, flows = 203, 190 & 181 cfs, withdrawals = 22.2, 0.0 & 19.5 cfs

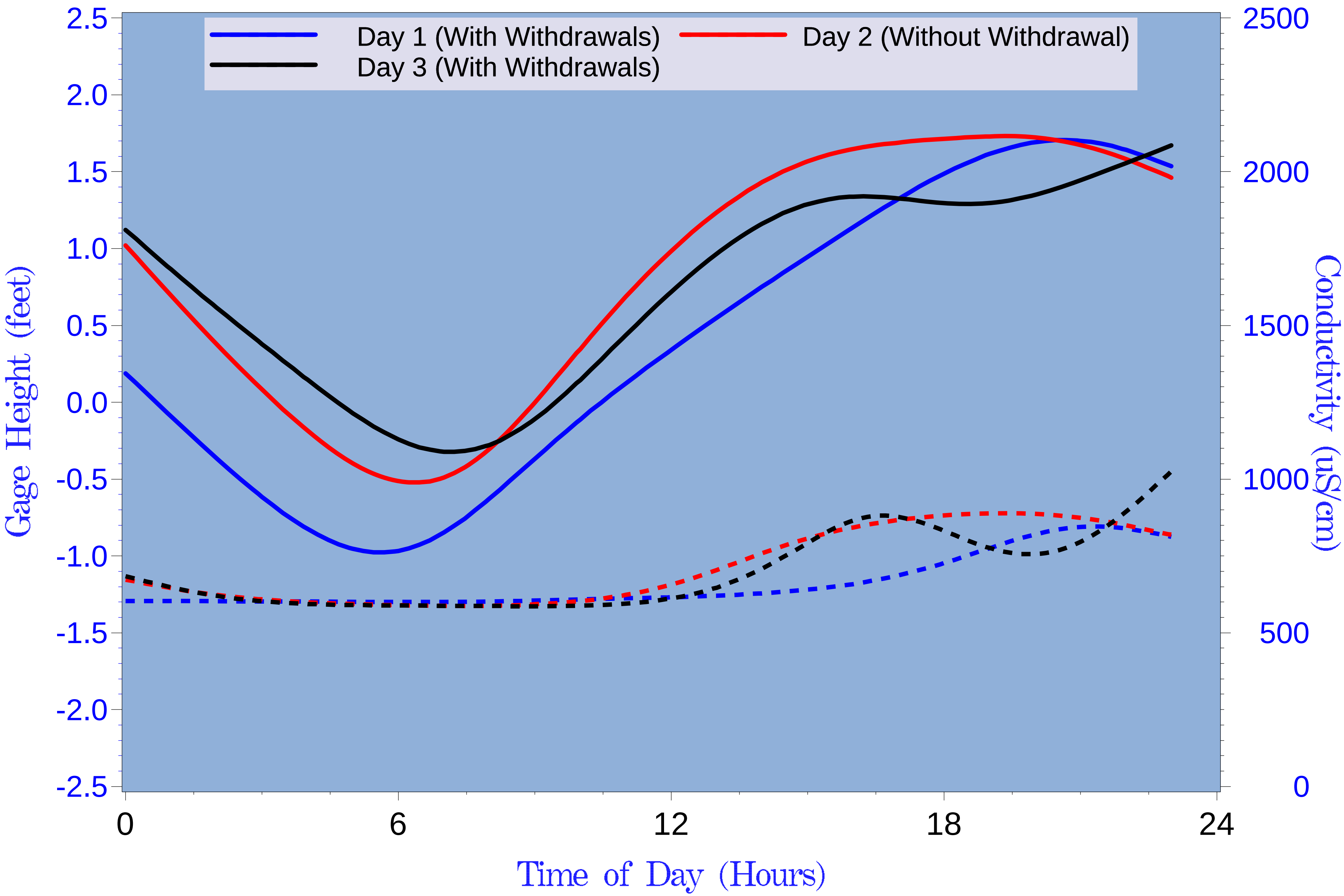


Figure 4.52 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Peace River Height Gage (RK 26.7) February 24th through 26th, flows = 203, 190 & 181 cfs, withdrawals = 22.2, 0.0 & 19.5 cfs

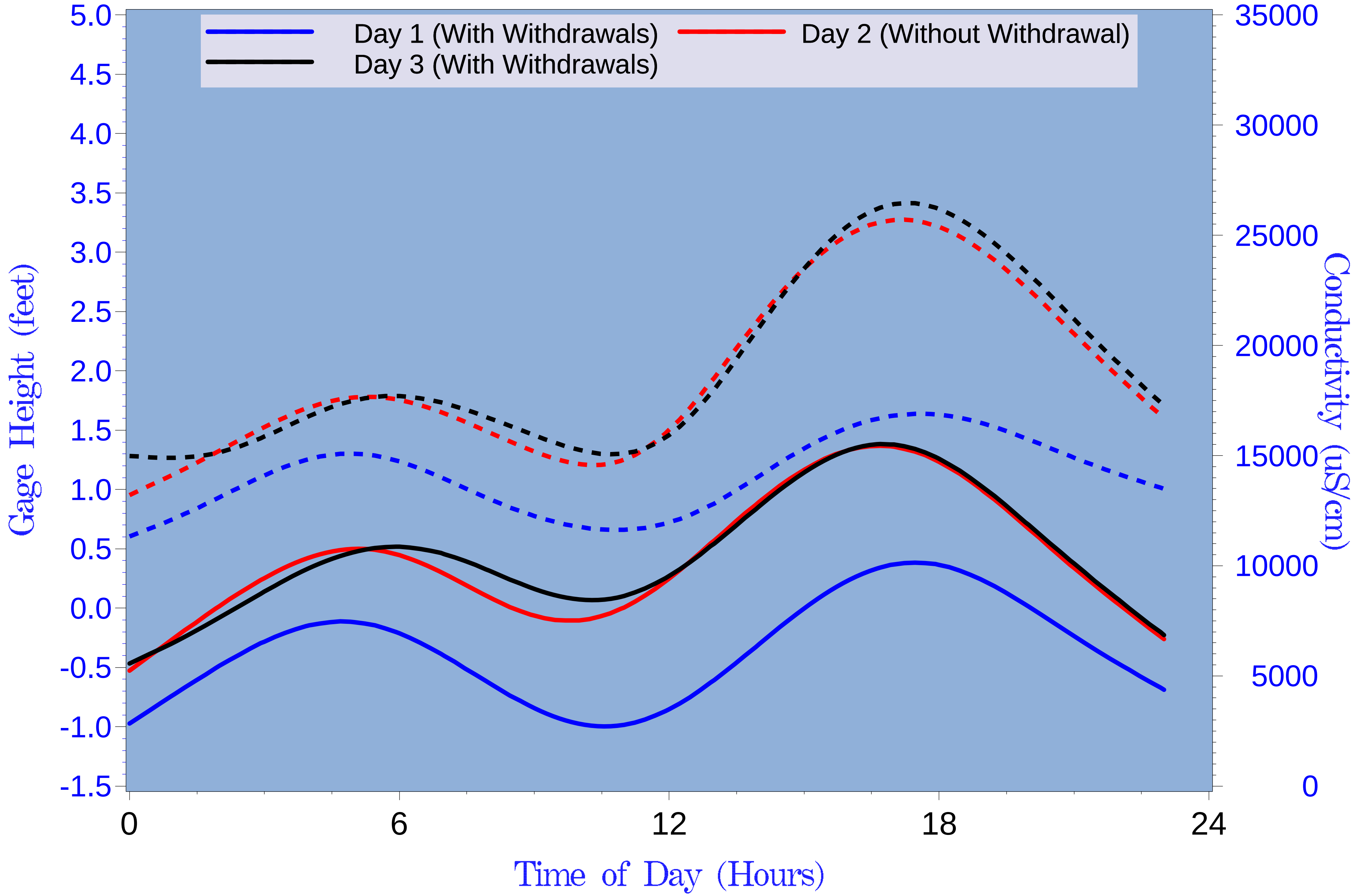


Figure 4.53 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Harbour Height Gage (RK 15.5) March 6th through 8th, flows = 142, 145 & 142 cfs, withdrawals = 15.6, 0.0 & 15.5 cfs

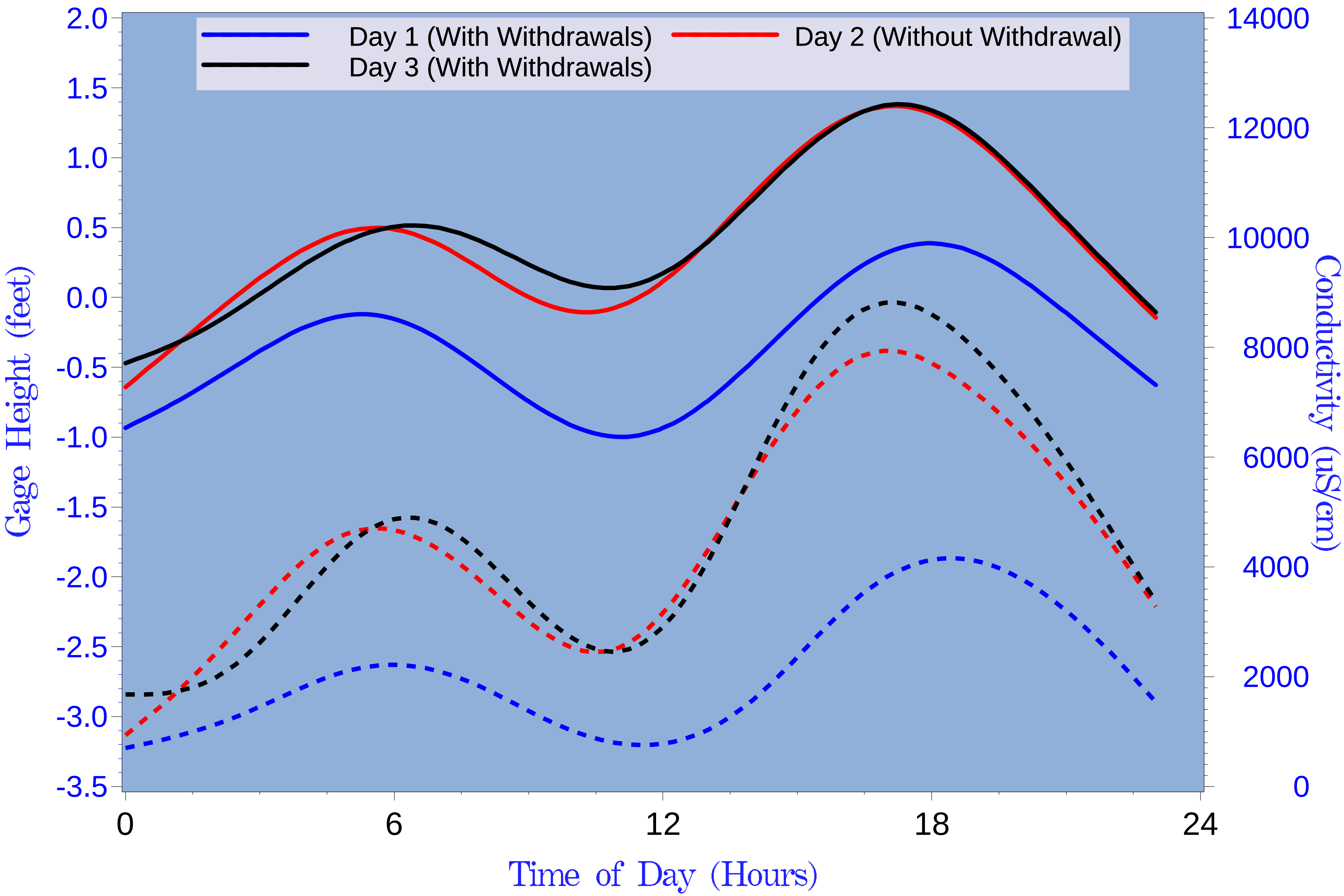


Figure 4.54 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ4 Gage (RK 21.9)
March 6th through 8th, flows = 142, 145 & 142 cfs, withdrawals = 15.6, 0.0 & 15.5 cfs

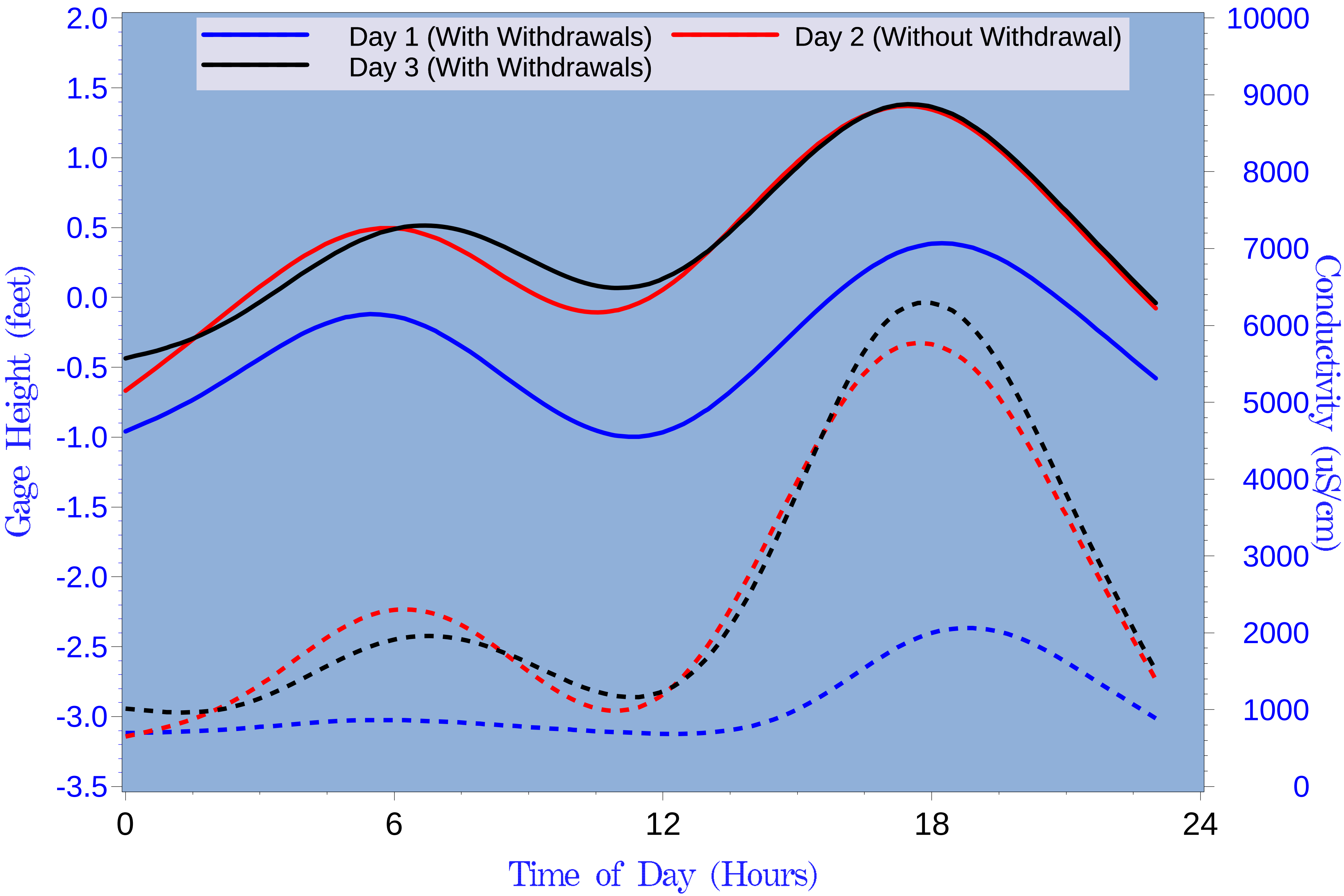


Figure 4.55 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ3 Gage (RK 23.4)
March 6th through 8th, flows = 142, 145 & 142 cfs, withdrawals = 15.6, 0.0 & 15.5 cfs

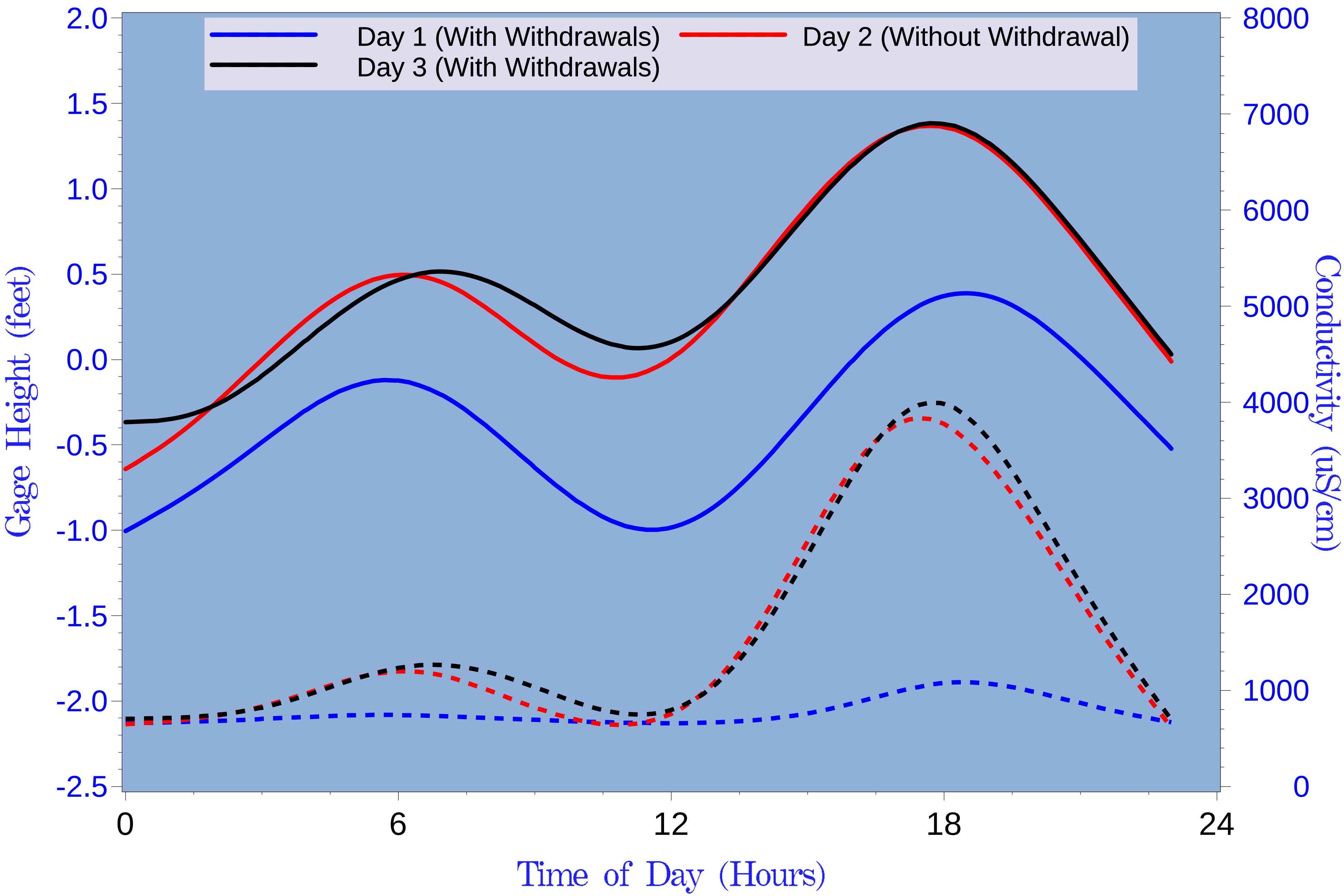


Figure 4.56 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ2 Gage (RK 24.5)
March 6th through 8th, flows = 142, 145 & 142 cfs, withdrawals = 15.6, 0.0 & 15.5 cfs

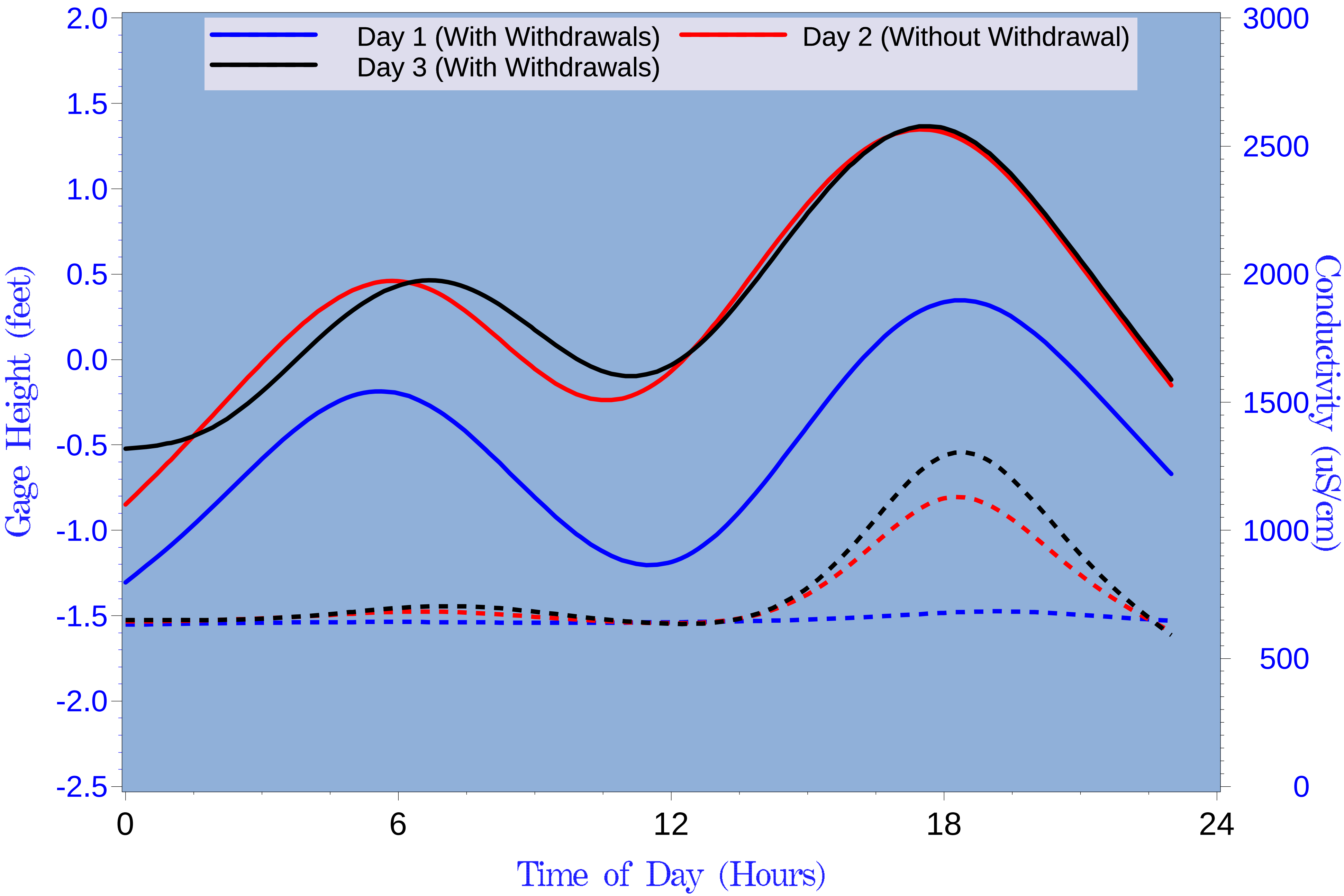


Figure 4.57 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Peace River Height Gage (RK 26.7)
March 6th through 8th, flows = 142, 145 & 142 cfs, withdrawals = 15.6, 0.0 & 15.5 cfs

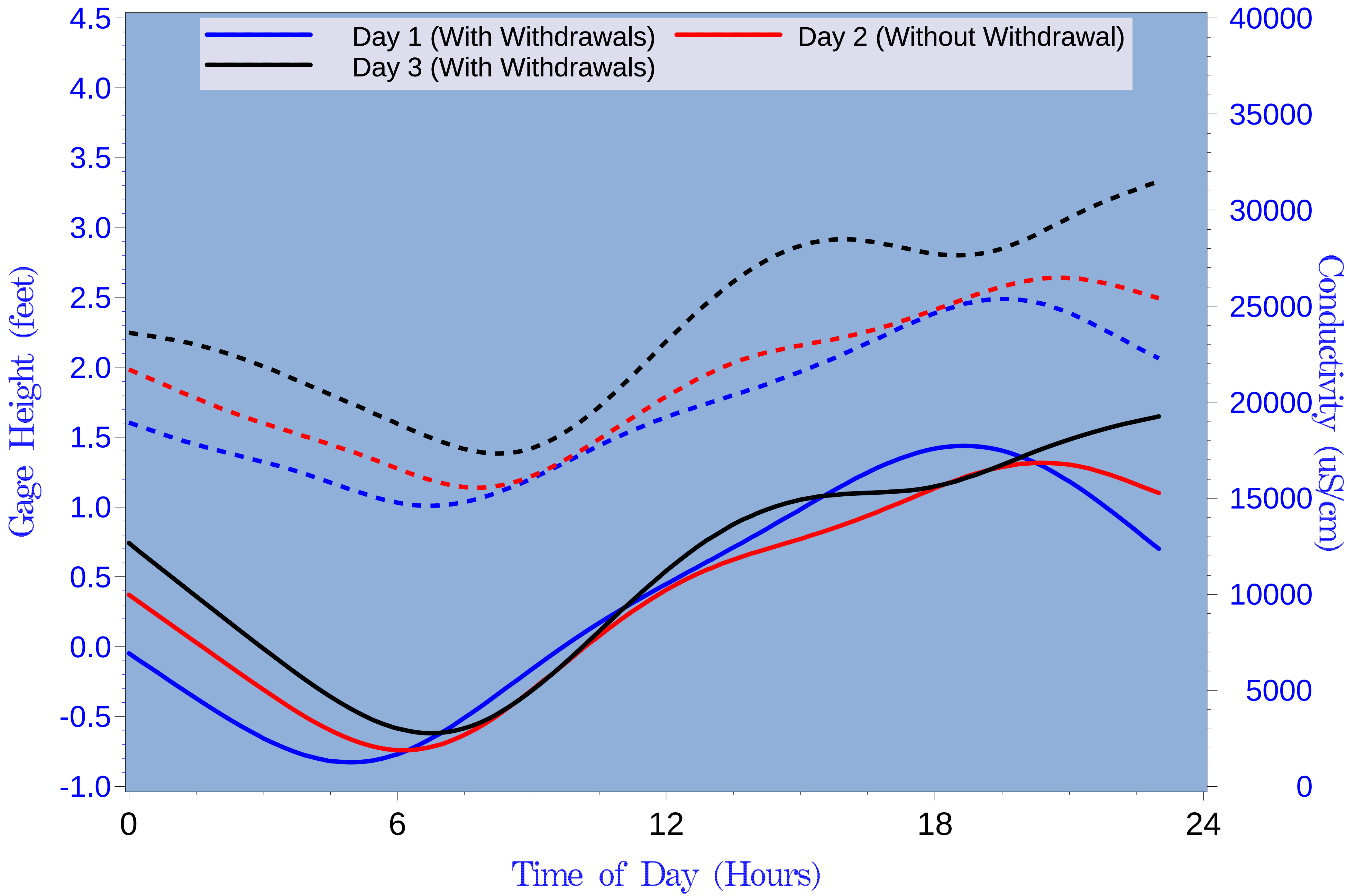


Figure 4.58 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Harbour Height Gage (RK 15.5) March 12th through 14th, flows = 121, 121 & 118 cfs, withdrawals = 13.5, 0.0 & 13.1 cfs

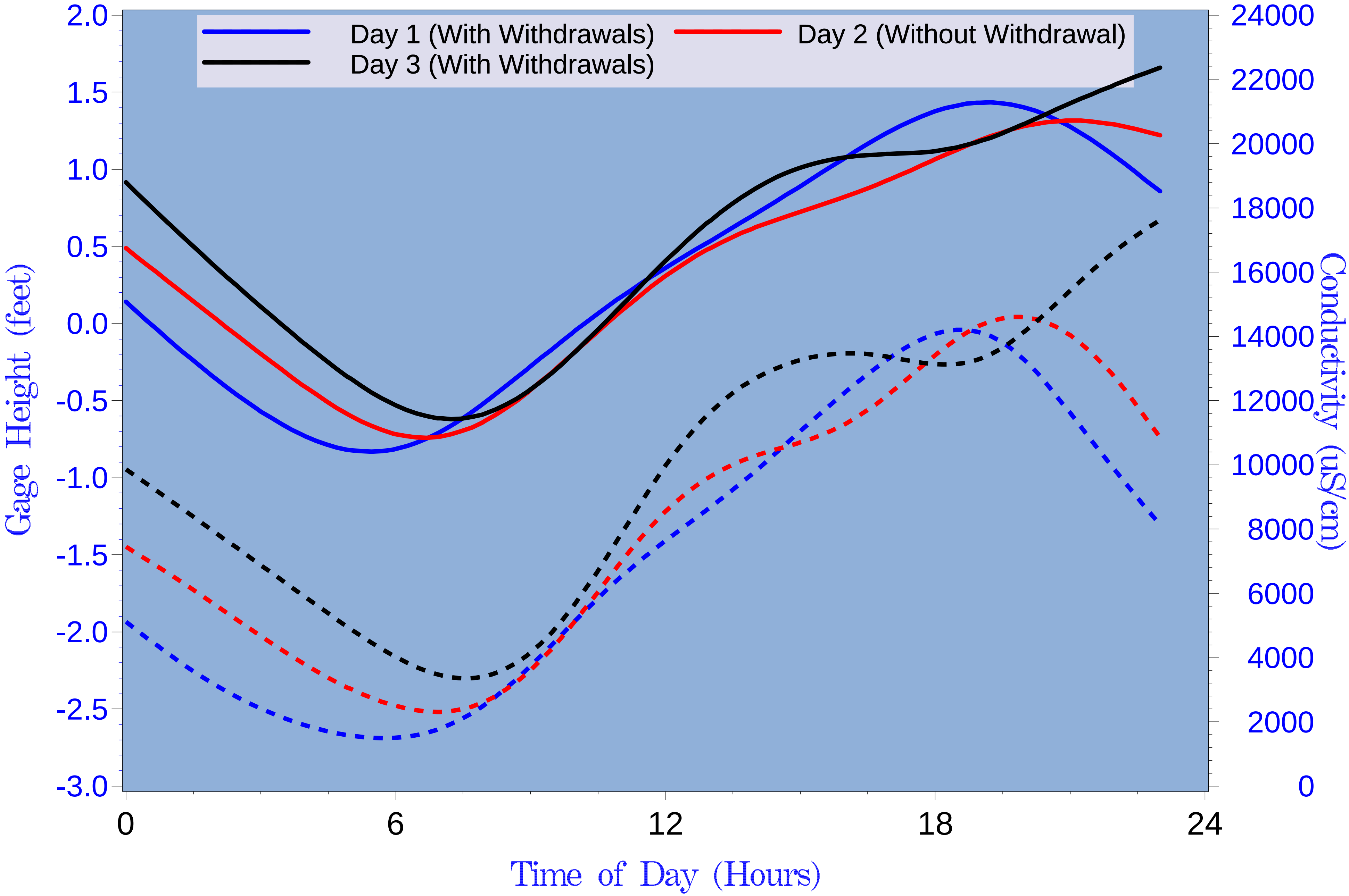


Figure 4.59 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ4 Gage (RK 21.9)
March 12th through 14th, flows = 121, 121 & 118 cfs, withdrawals = 13.5, 0.0 & 13.1 cfs

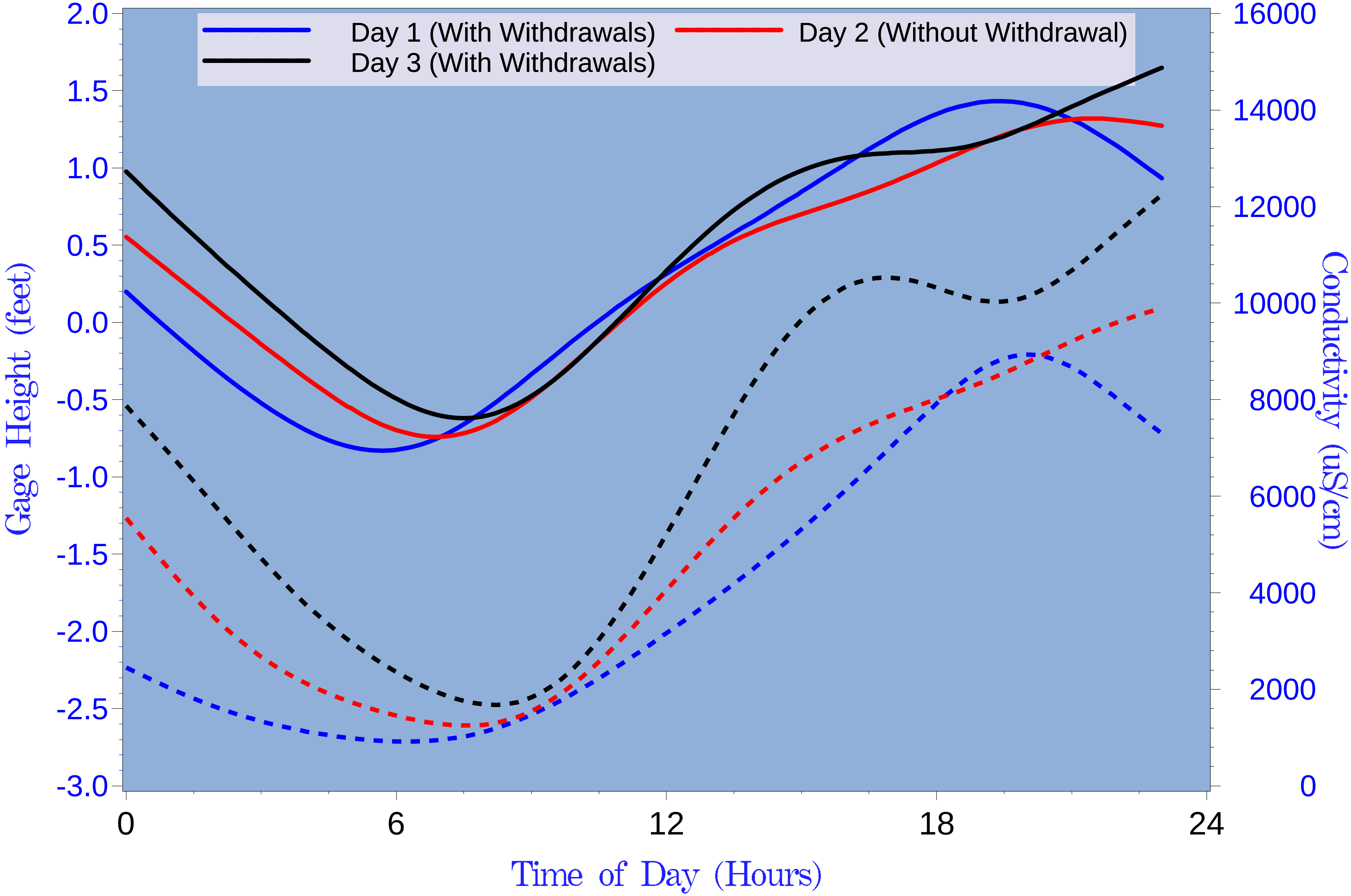


Figure 4.60 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ3 Gage (RK 23.4) March 12th through 14th, flows = 121, 121 & 118 cfs, withdrawals = 13.5, 0.0 & 13.1 cfs

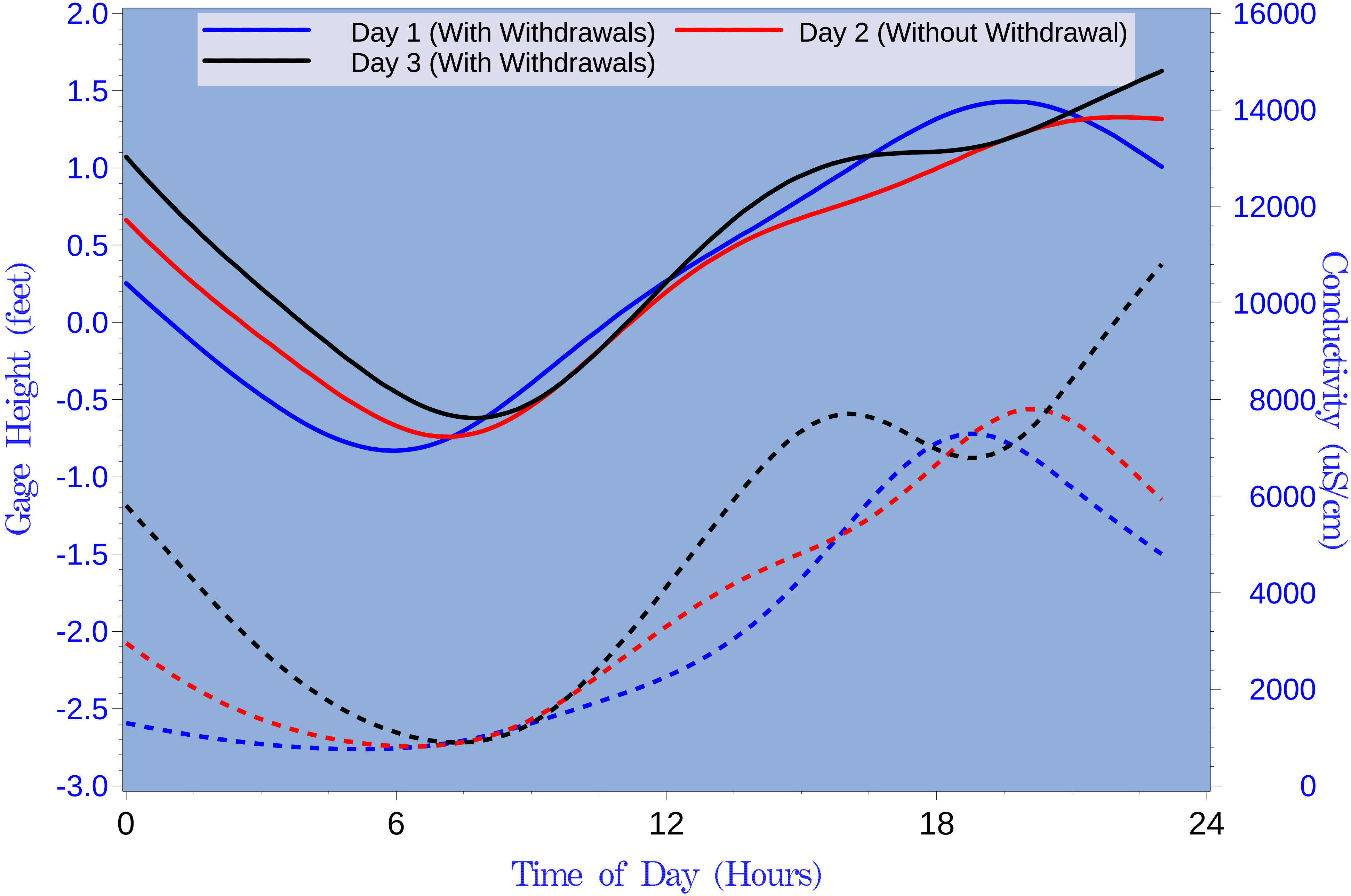


Figure 4.61 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ2 Gage (RK 24.5)
March 12th through 14th, flows = 121, 121 & 118 cfs, withdrawals = 13.5, 0.0 & 13.1 cfs

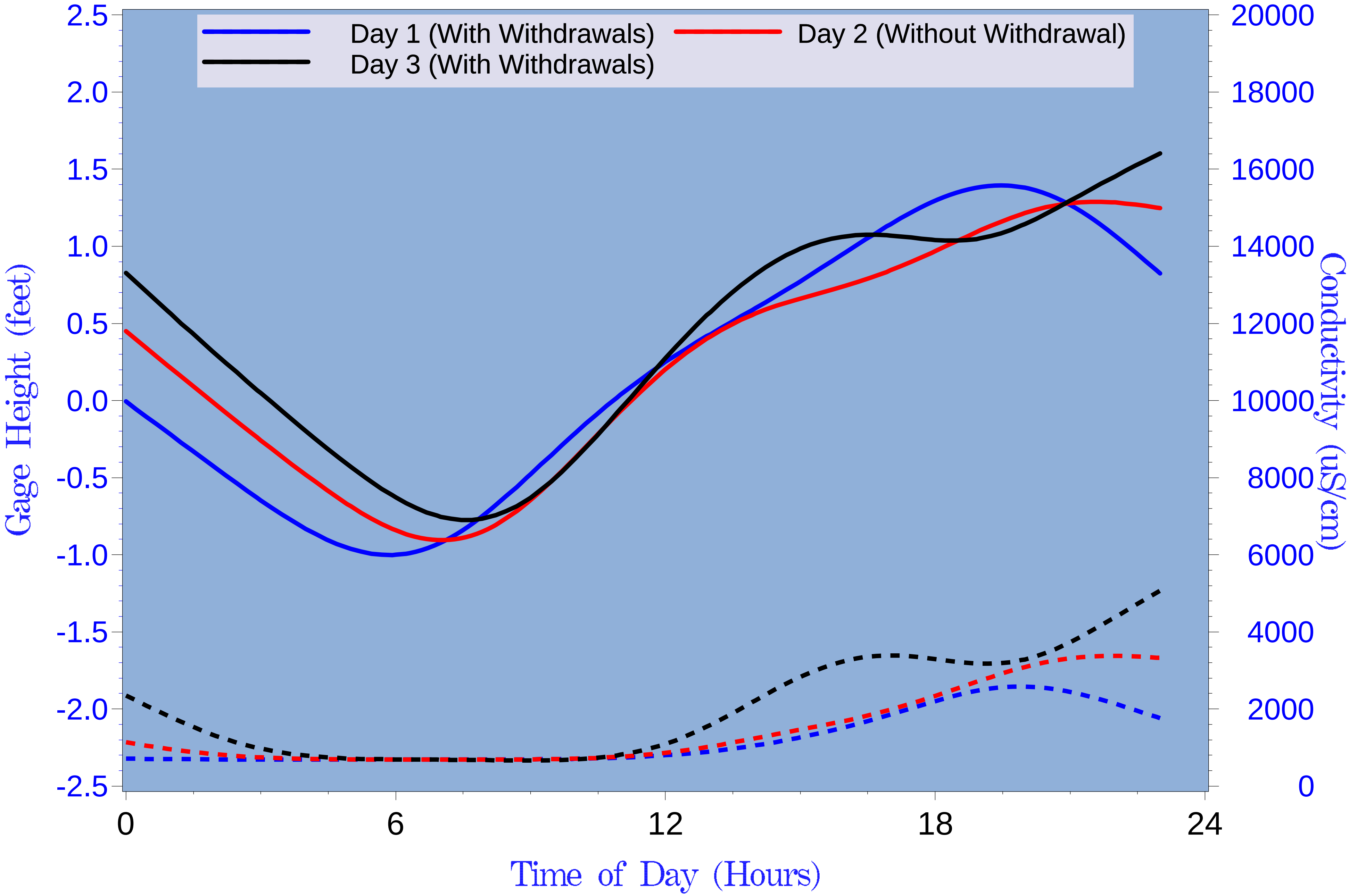


Figure 4.62 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Peace River Height Gage (RK 26.7) March 12th through 14th, flows = 121, 121 & 118 cfs, withdrawals = 13.5, 0.0 & 13.1 cfs

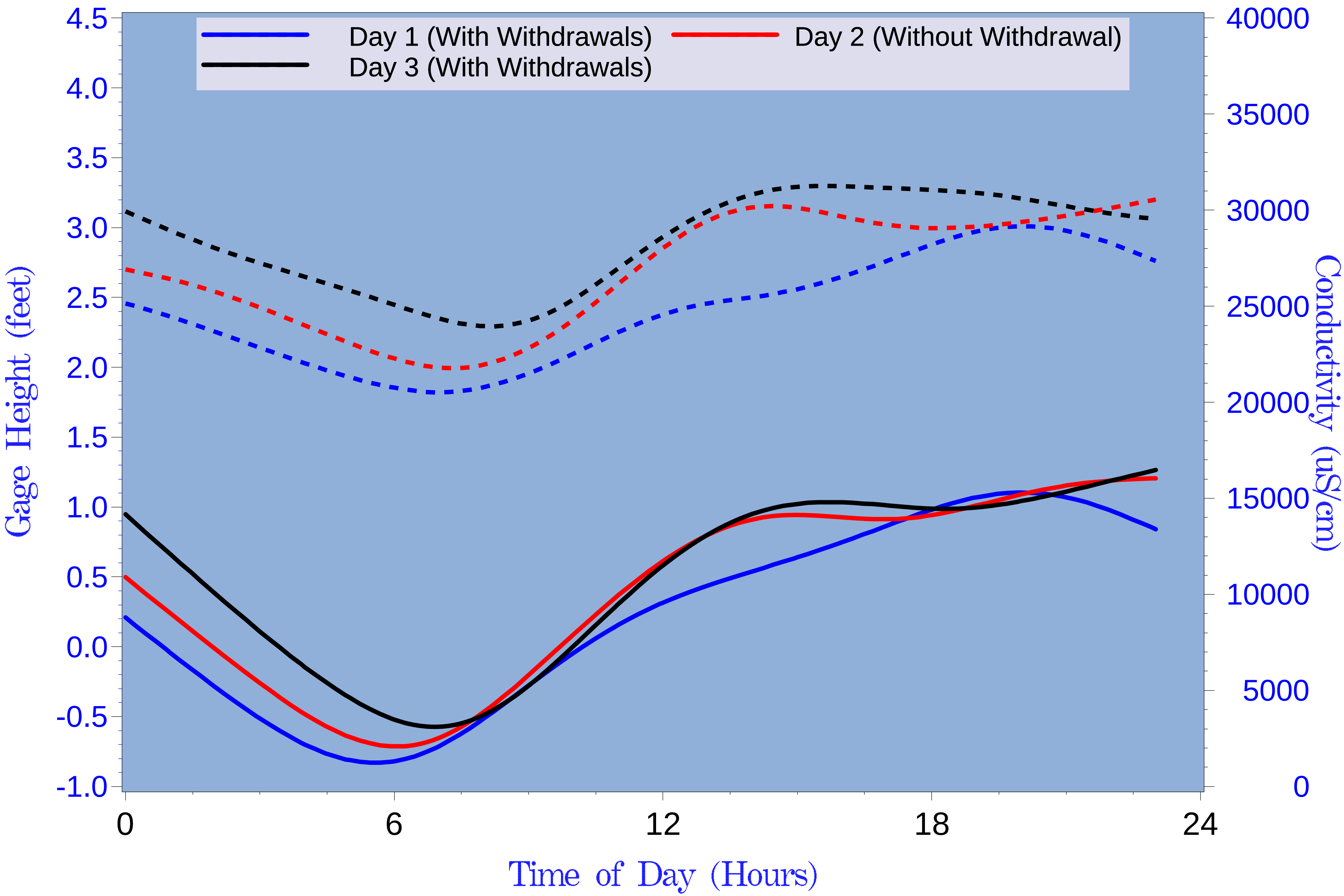


Figure 4.63 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Harbour Height Gage (RK 15.5) March 26th through 28th, flows = 94, 89 & 88 cfs, withdrawals = 11.1, 0.0 & 10.2 cfs

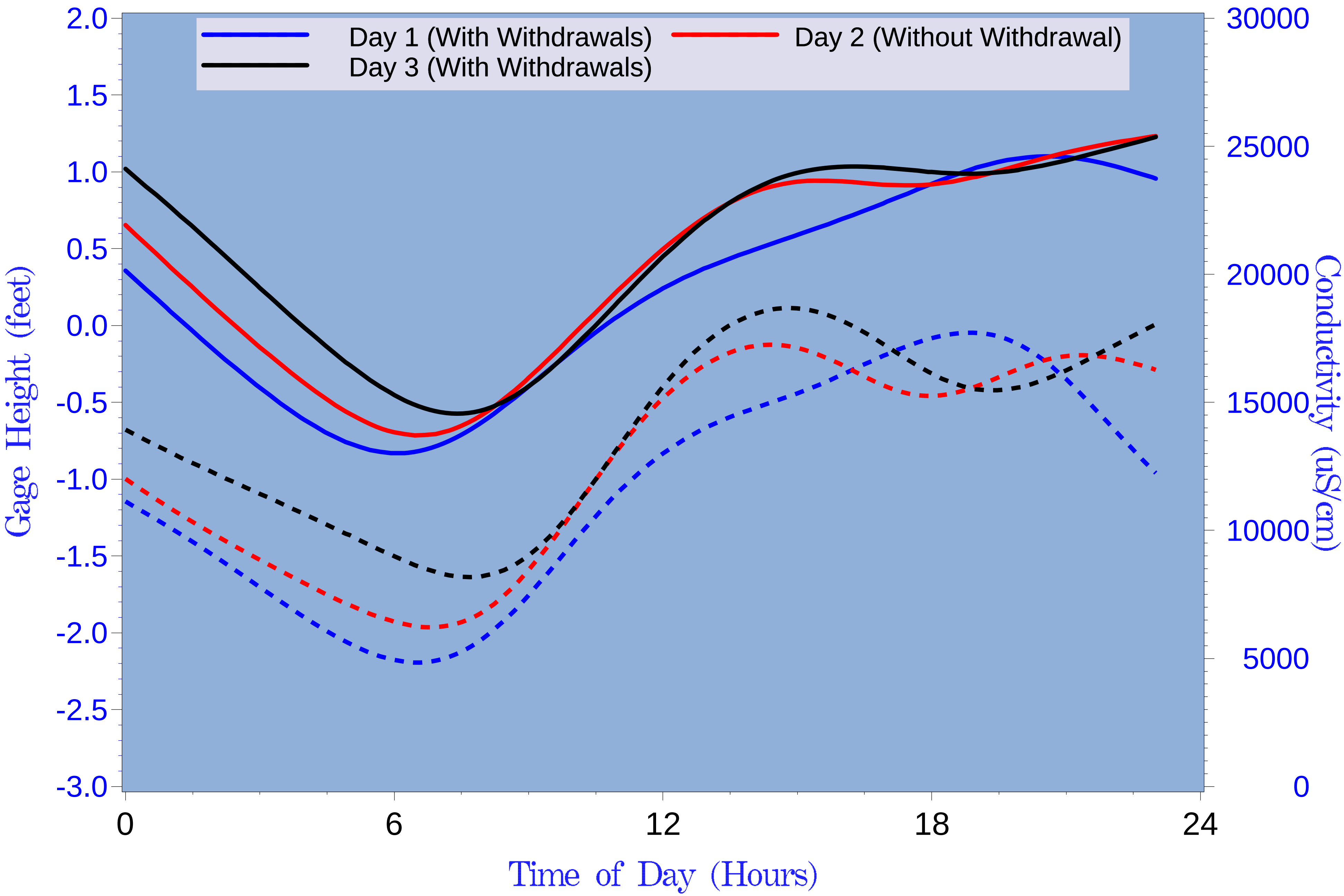


Figure 4.64 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ4 Gage (RK 21.9)
March 26th through 28th, flows = 94, 89 & 88 cfs, withdrawals = 11.1, 0.0 & 10.2 cfs

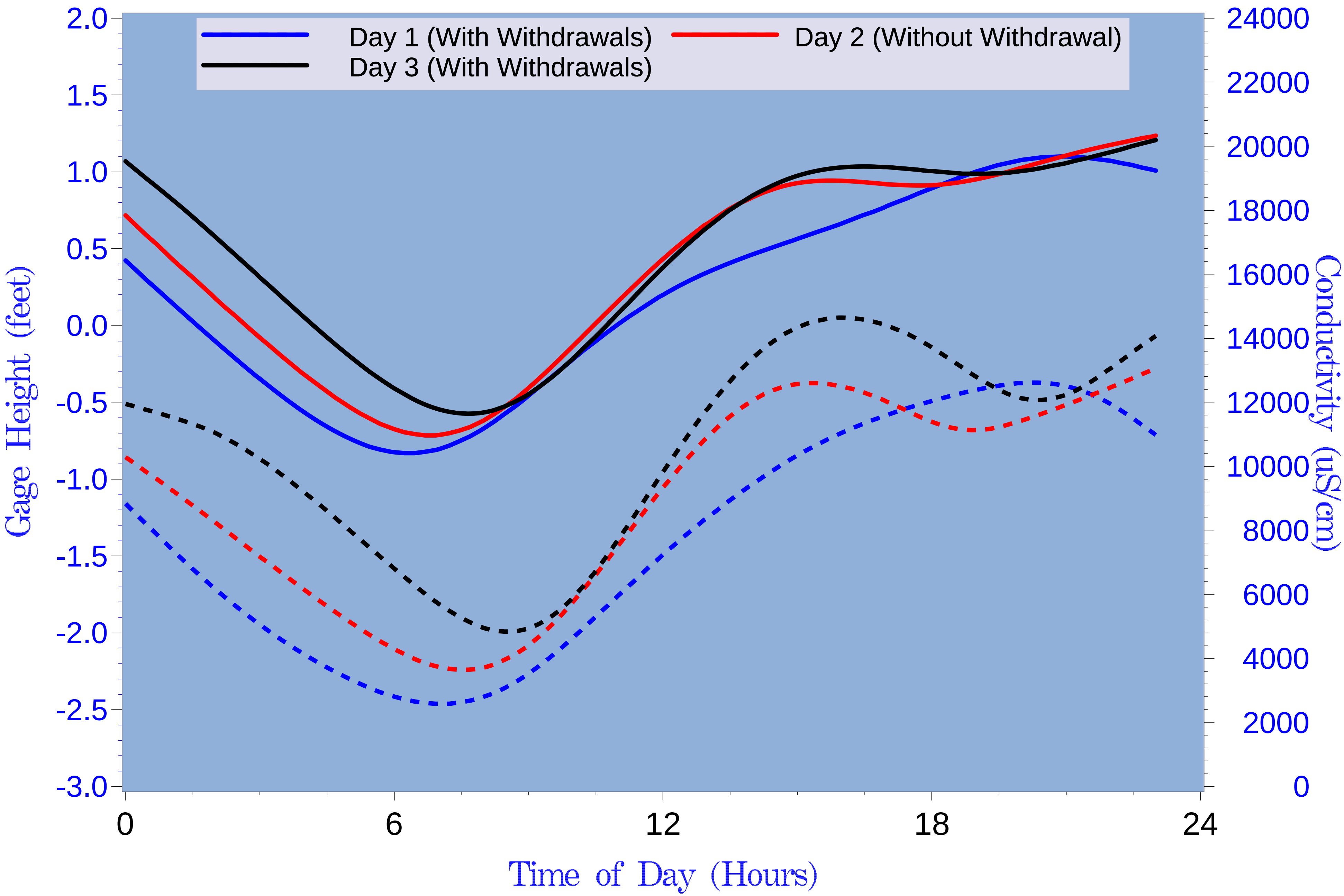


Figure 4.65 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ3 Gage (RK 23.4)
March 26th through 28th, flows = 94, 89 & 88 cfs, withdrawals = 11.1, 0.0 & 10.2 cfs

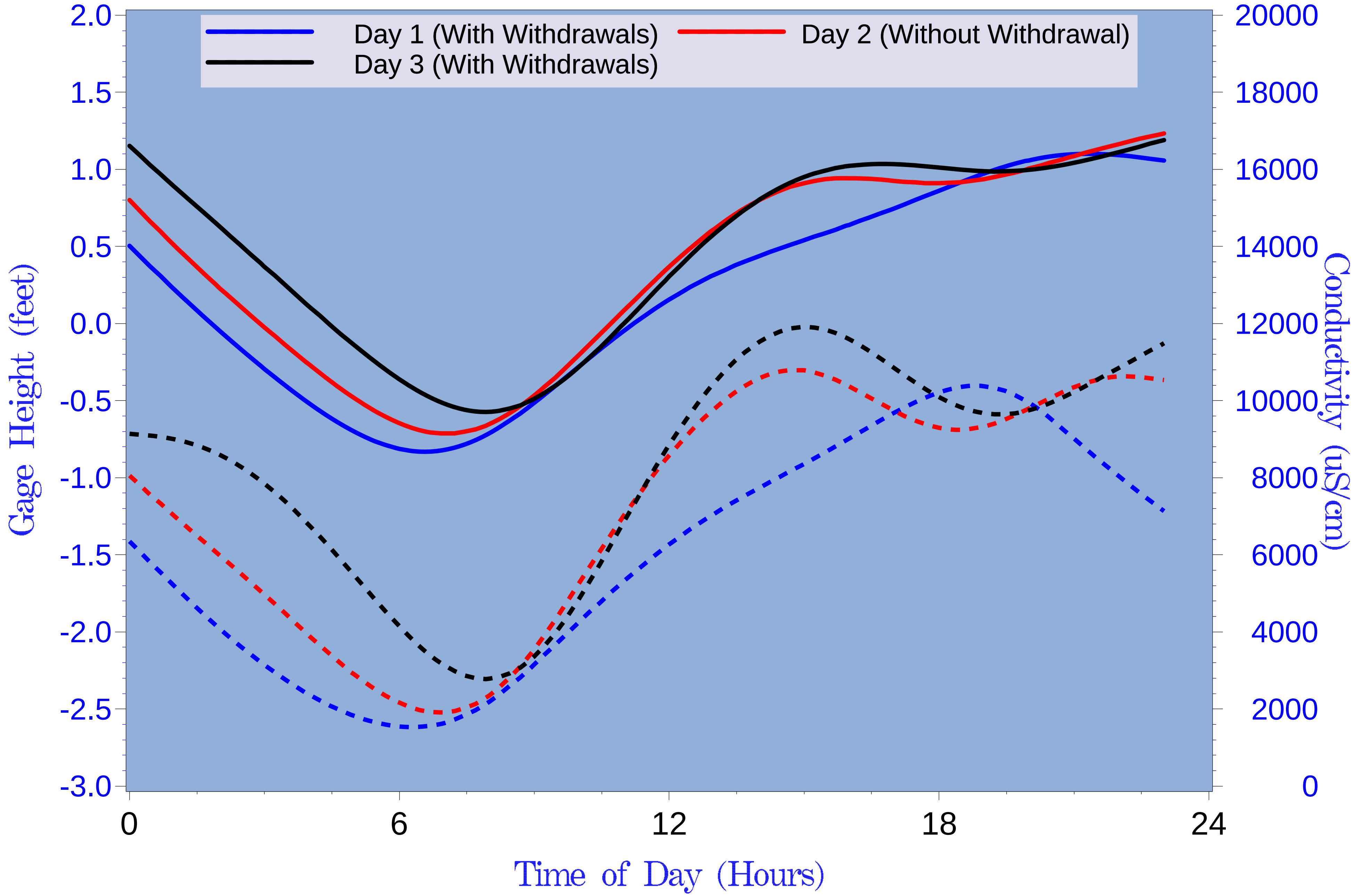


Figure 4.66 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ2 Gage (RK 24.5)
March 26th through 28th, flows = 94, 89 & 88 cfs, withdrawals = 11.1, 0.0 & 10.2 cfs

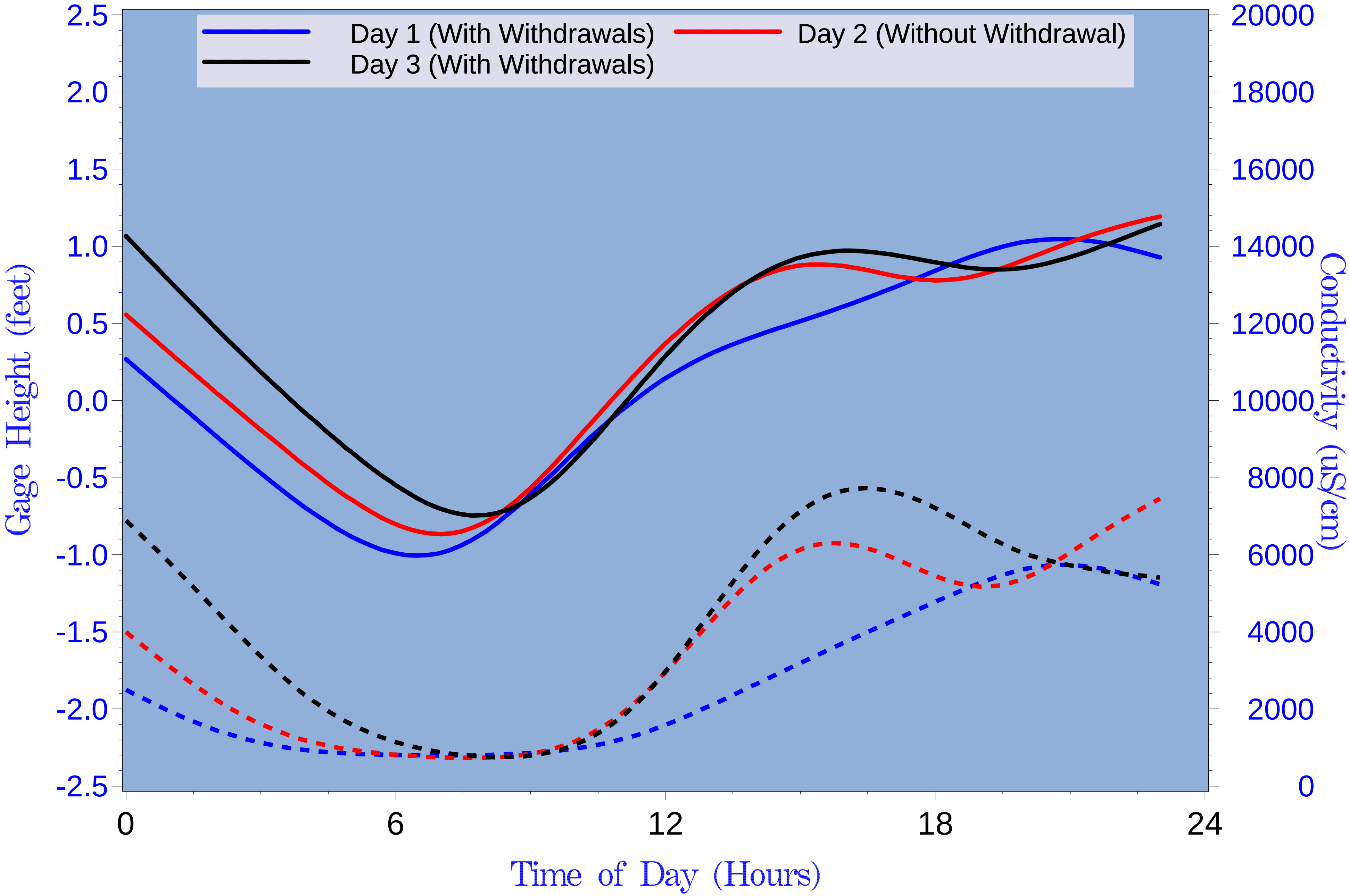


Figure 4.67 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Peace River Height Gage (RK 26.7)
March 26th through 28th, flows = 94, 89 & 88 cfs, withdrawals = 11.1, 0.0 & 10.2 cfs

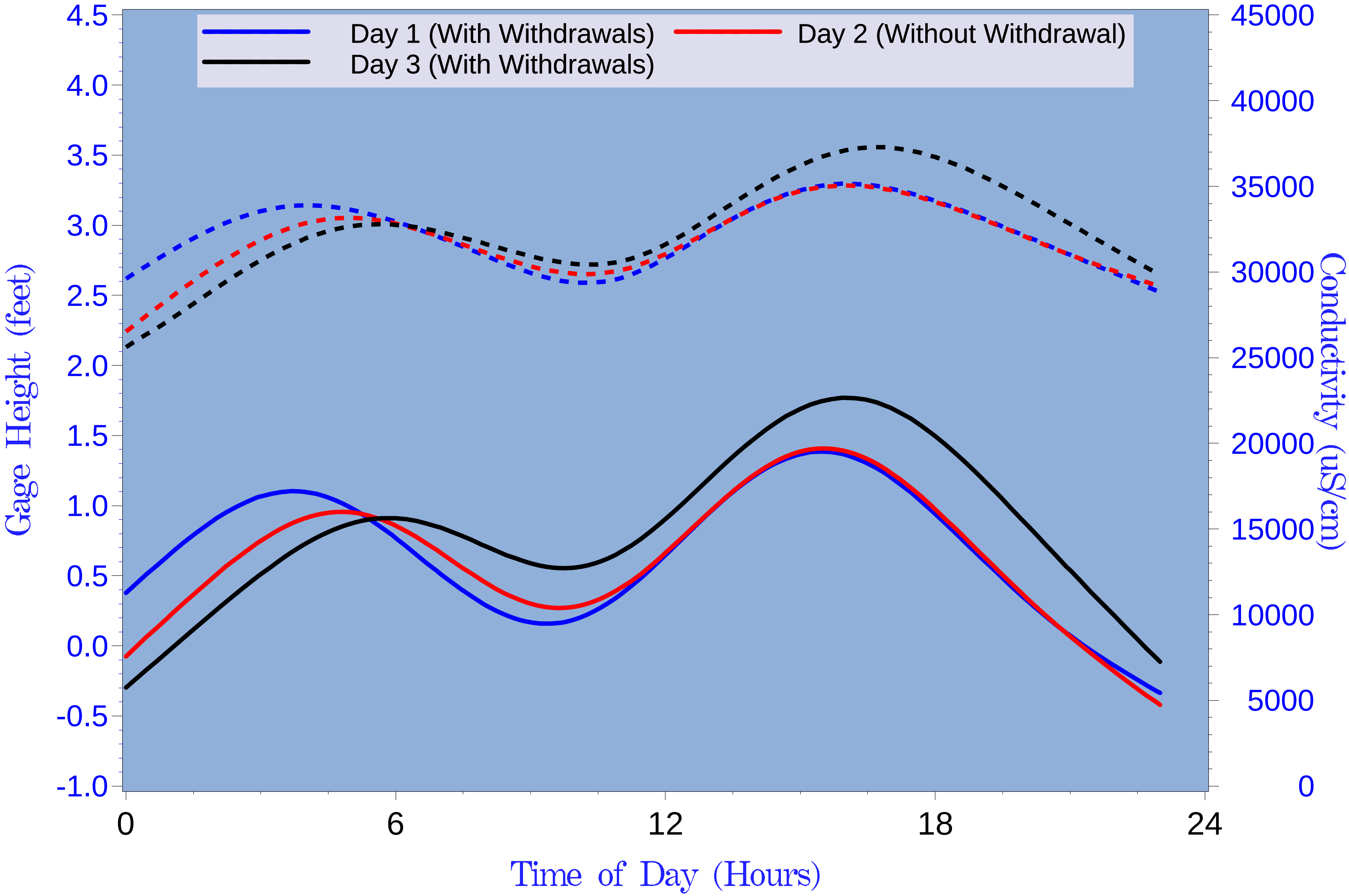


Figure 4.68 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Harbour Height Gage (RK 15.5) April 3rd and 4th, flows = 83 & 75 cfs, withdrawals = 7.0 & 0.0 cfs (no withdrawals on April 5th)

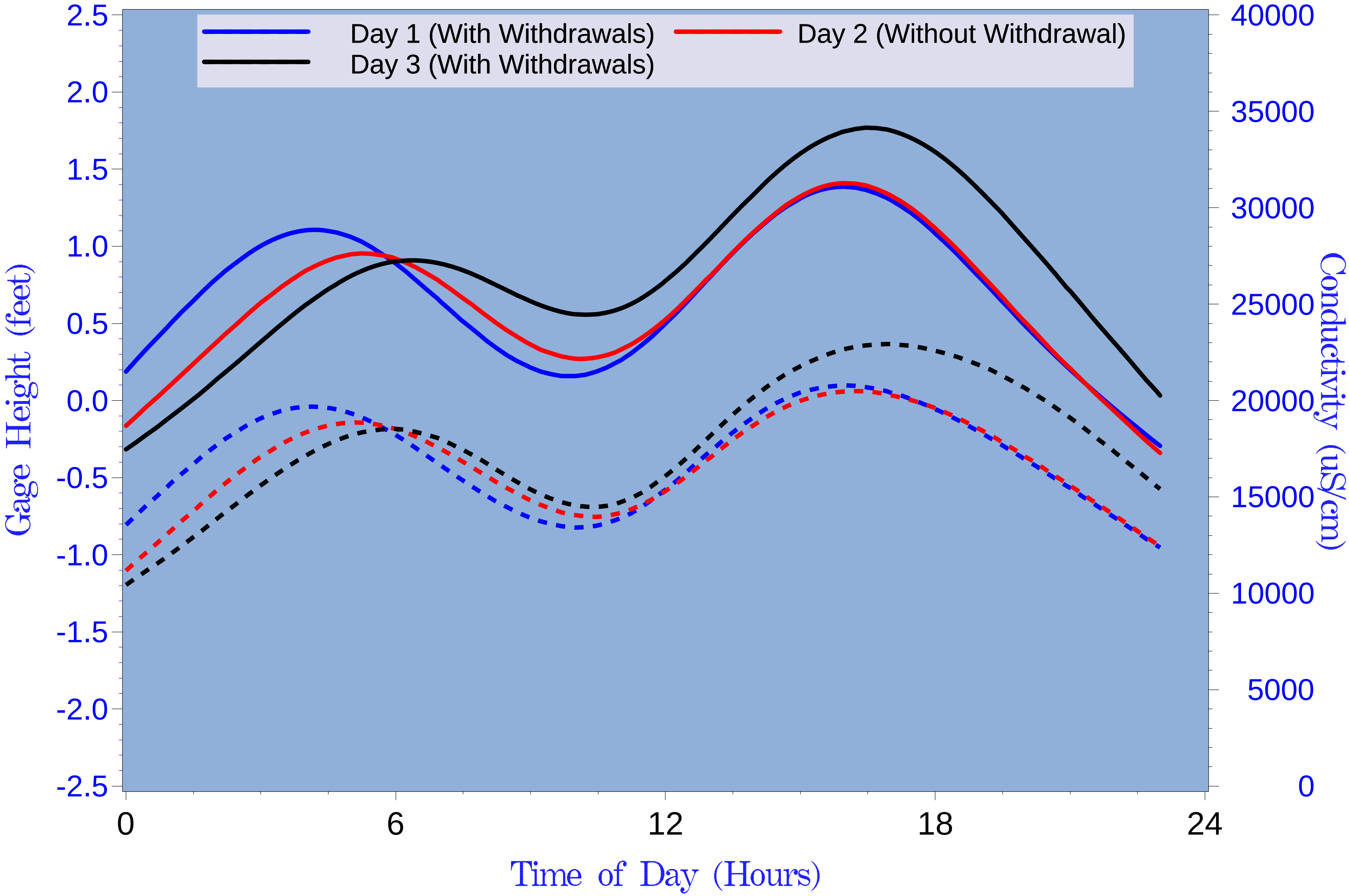


Figure 4.69 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ4 Gage (RK 21.9)
April 3rd and 4th, flows = 83 & 75 cfs, withdrawals = 7.0 & 0.0 cfs

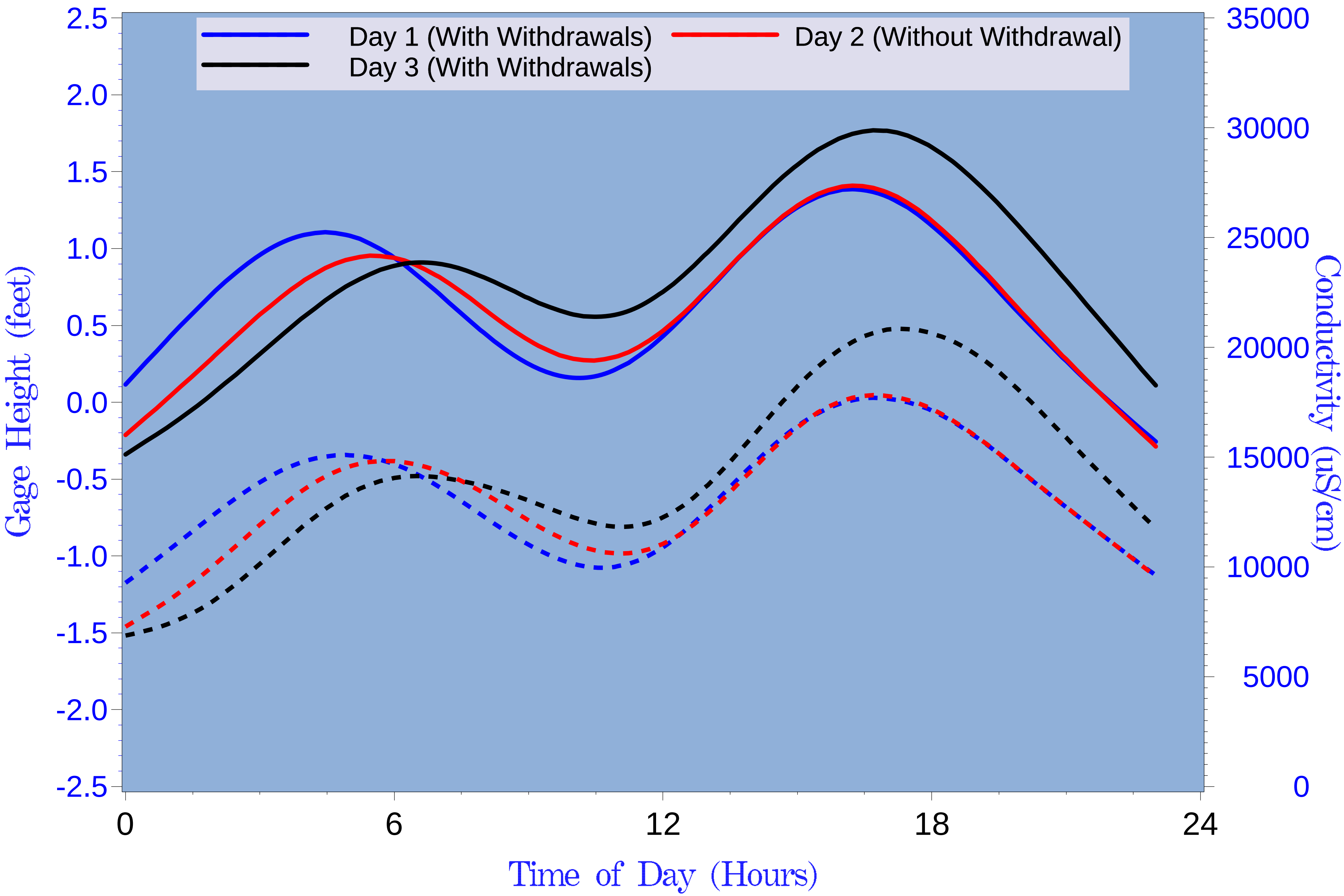


Figure 4.70 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ3 Gage (RK 23.4)
April 3rd and 4th, flows = 83 & 75 cfs, withdrawals = 7.0 & 0.0 cfs

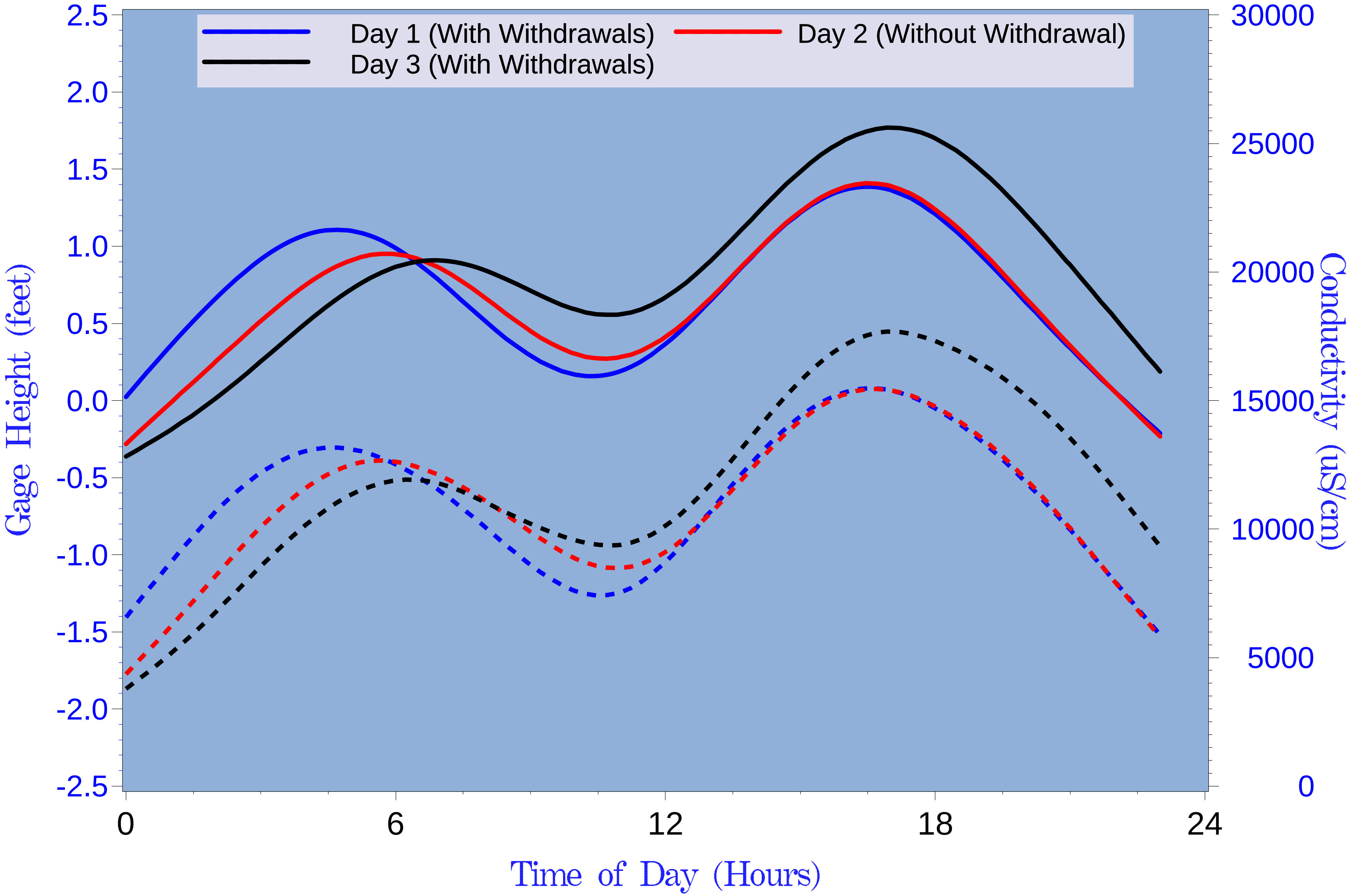


Figure 4.71 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ2 Gage (RK 24.5)
April 3rd and 4th, flows = 83 & 75 cfs, withdrawals = 7.0 & 0.0 cfs

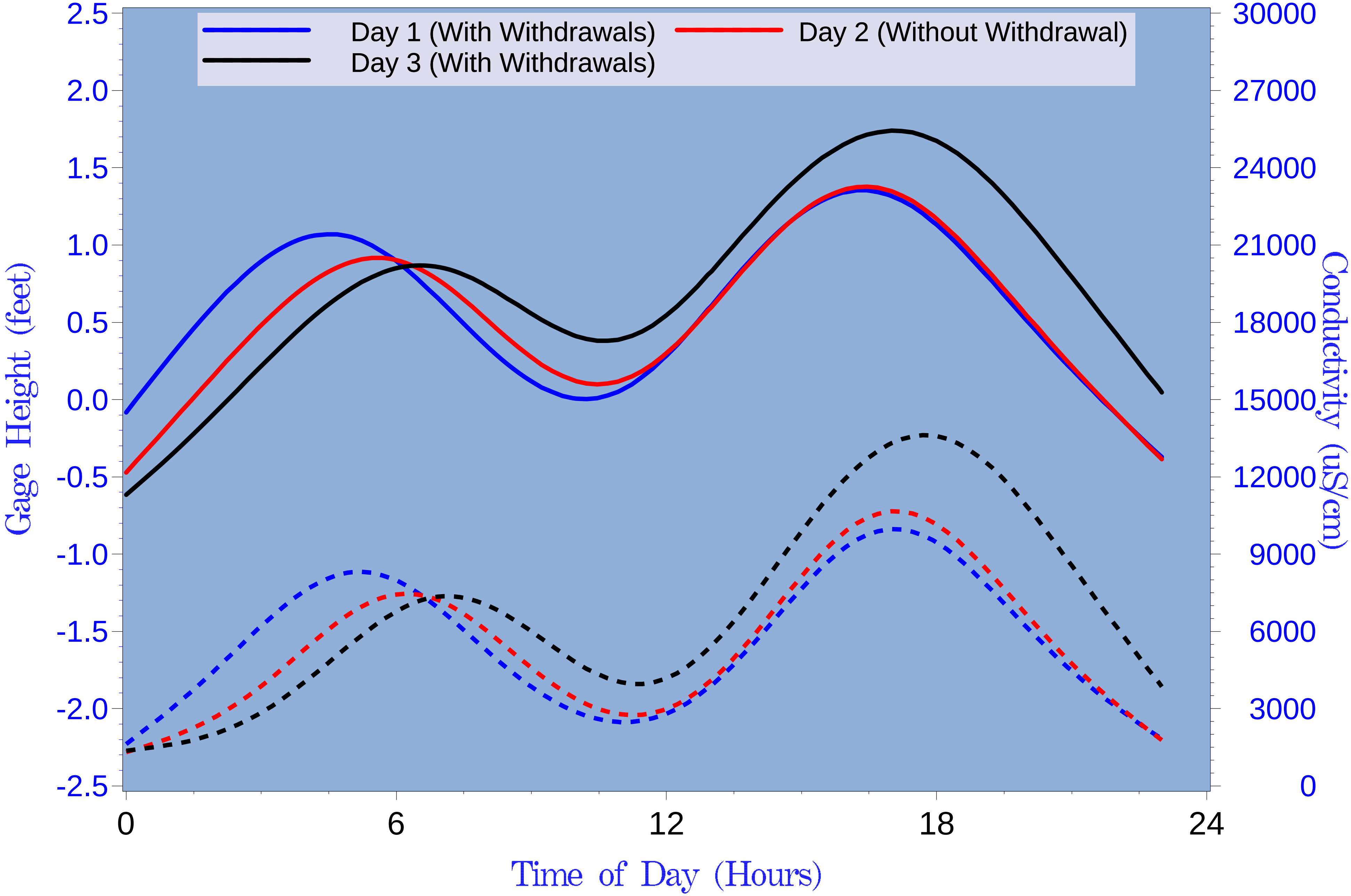


Figure 4.72 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Peace River Height Gage (RK 26.7)
April 3rd and 4th, flows = 83 & 75 cfs, withdrawals = 7.0 & 0.0 cfs

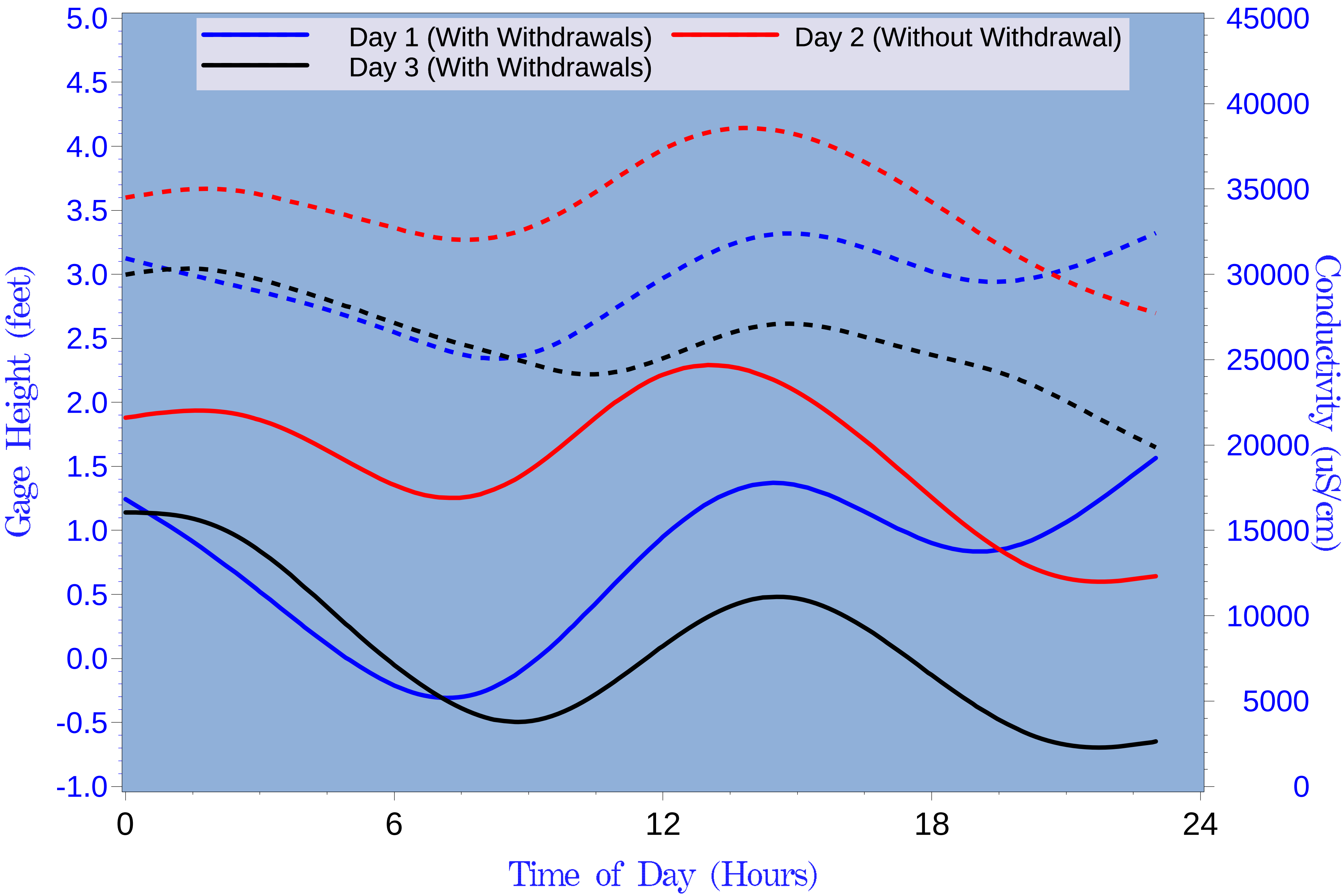


Figure 4.73 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Harbour Height Gage (RK 15.5)
April 14th through 16th, flows = 116, 112 & 112 cfs, withdrawals = 14.1, 0.0 & 13.1 cfs

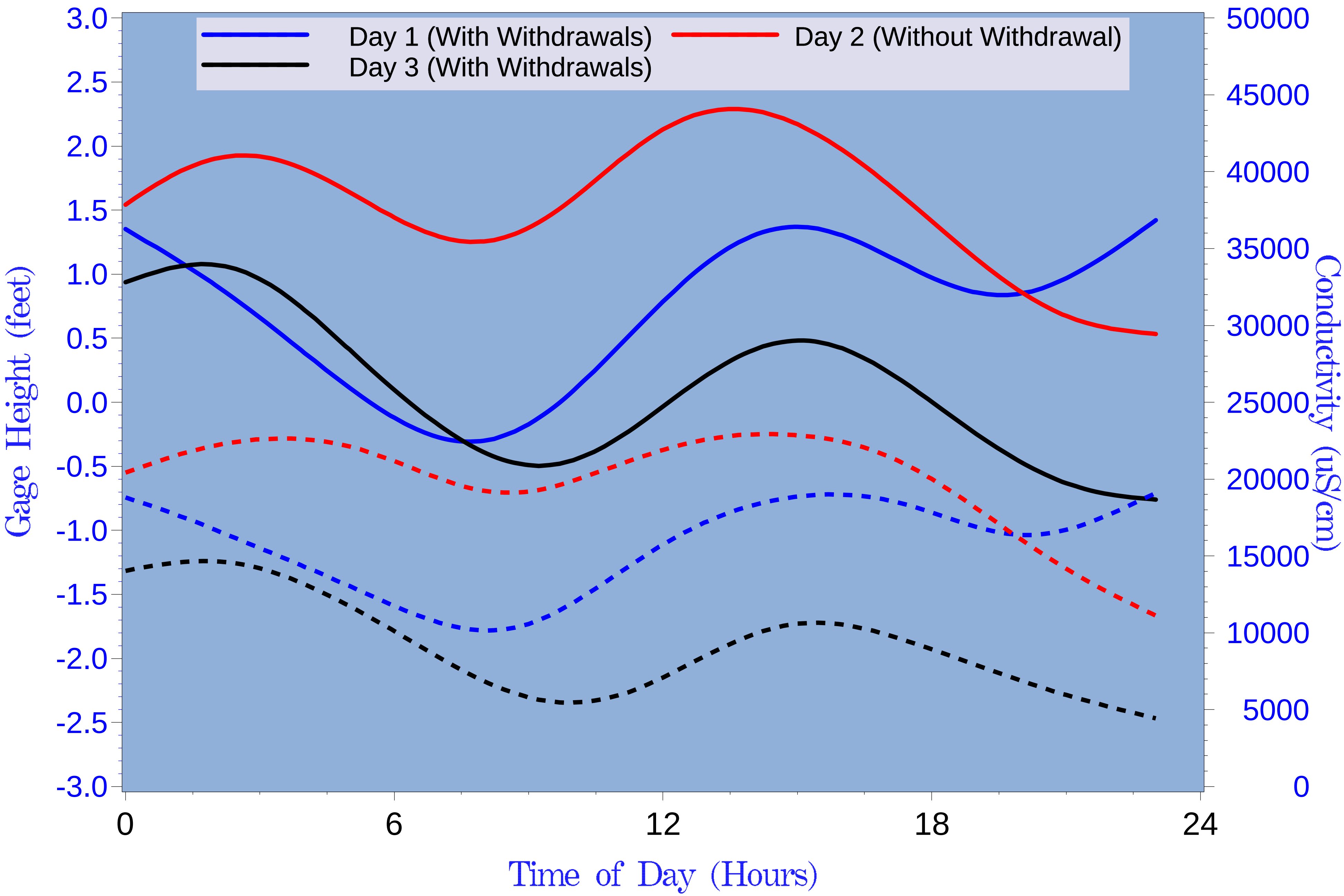


Figure 4.74 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ4 Gage (RK 21.9)
April 14th through 16th, flows = 116, 112 & 112 cfs, withdrawals = 14.1, 0.0 & 13.1 cfs

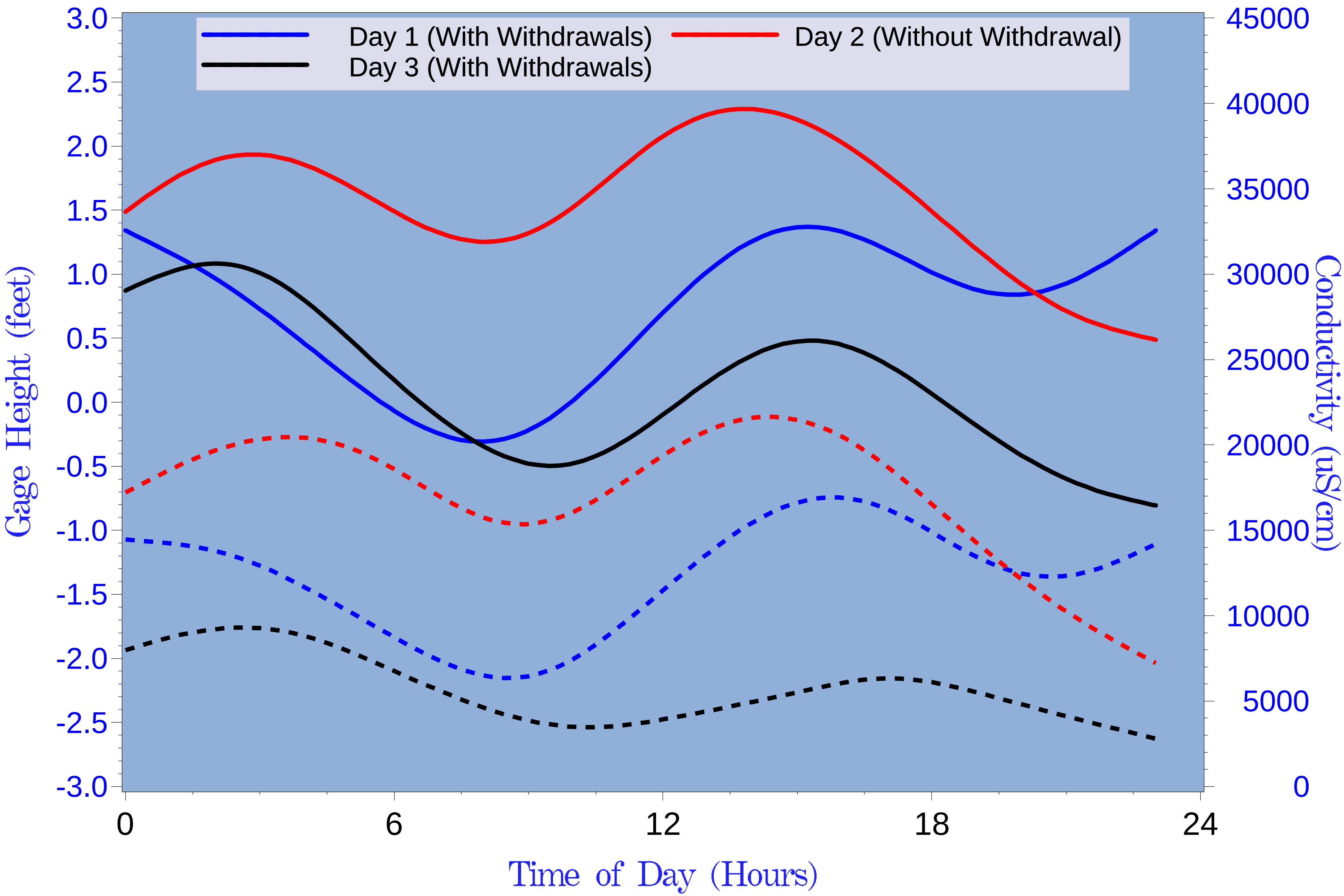


Figure 4.75 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ3 Gage (RK 23.4)
April 14th through 16th, flows = 116, 112 & 112 cfs, withdrawals = 14.1, 0.0 & 13.1 cfs

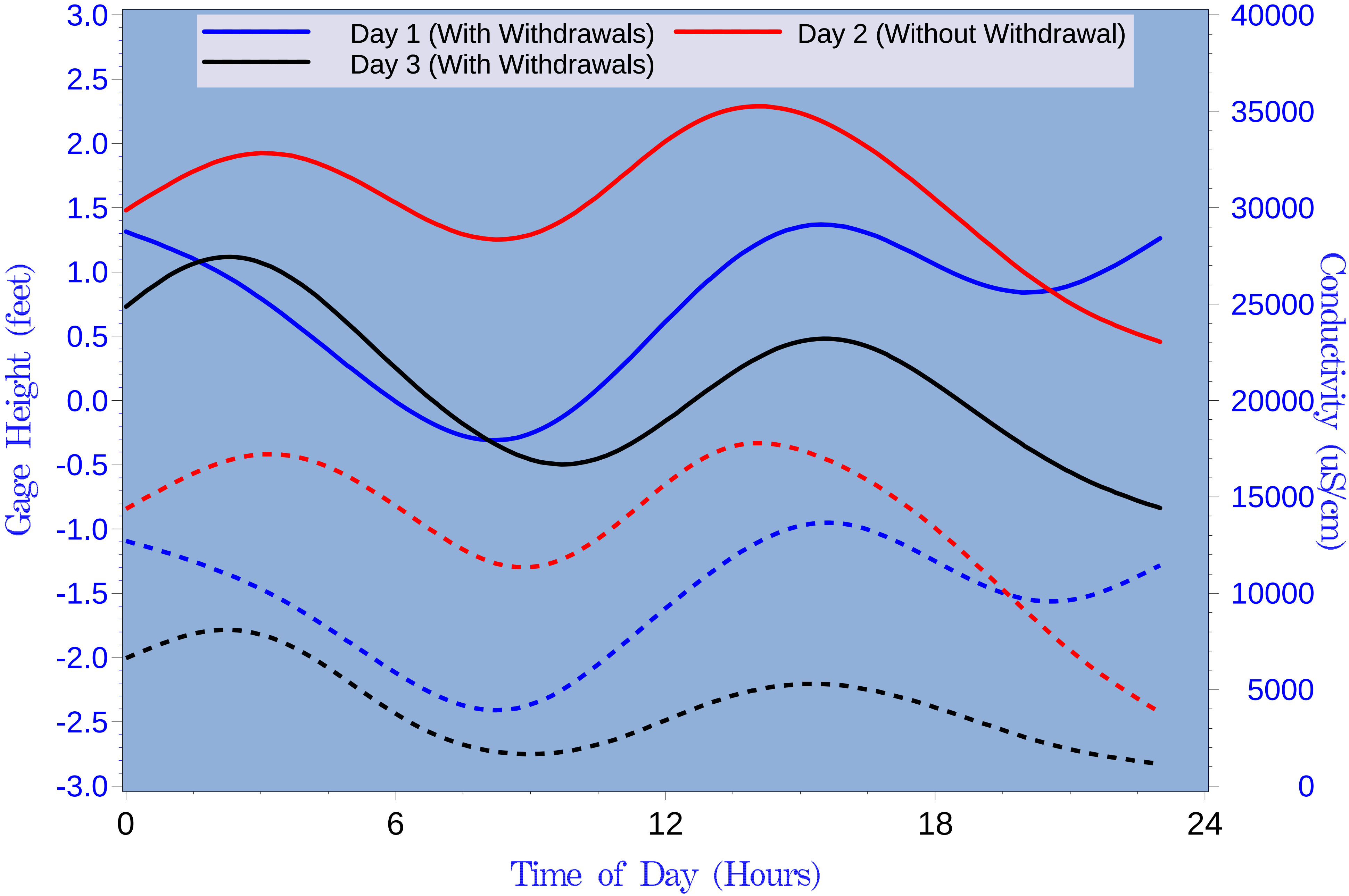


Figure 4.76 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ2 Gage (RK 24.5)
April 14th through 16th, flows = 116, 112 & 112 cfs, withdrawals = 14.1, 0.0 & 13.1 cfs

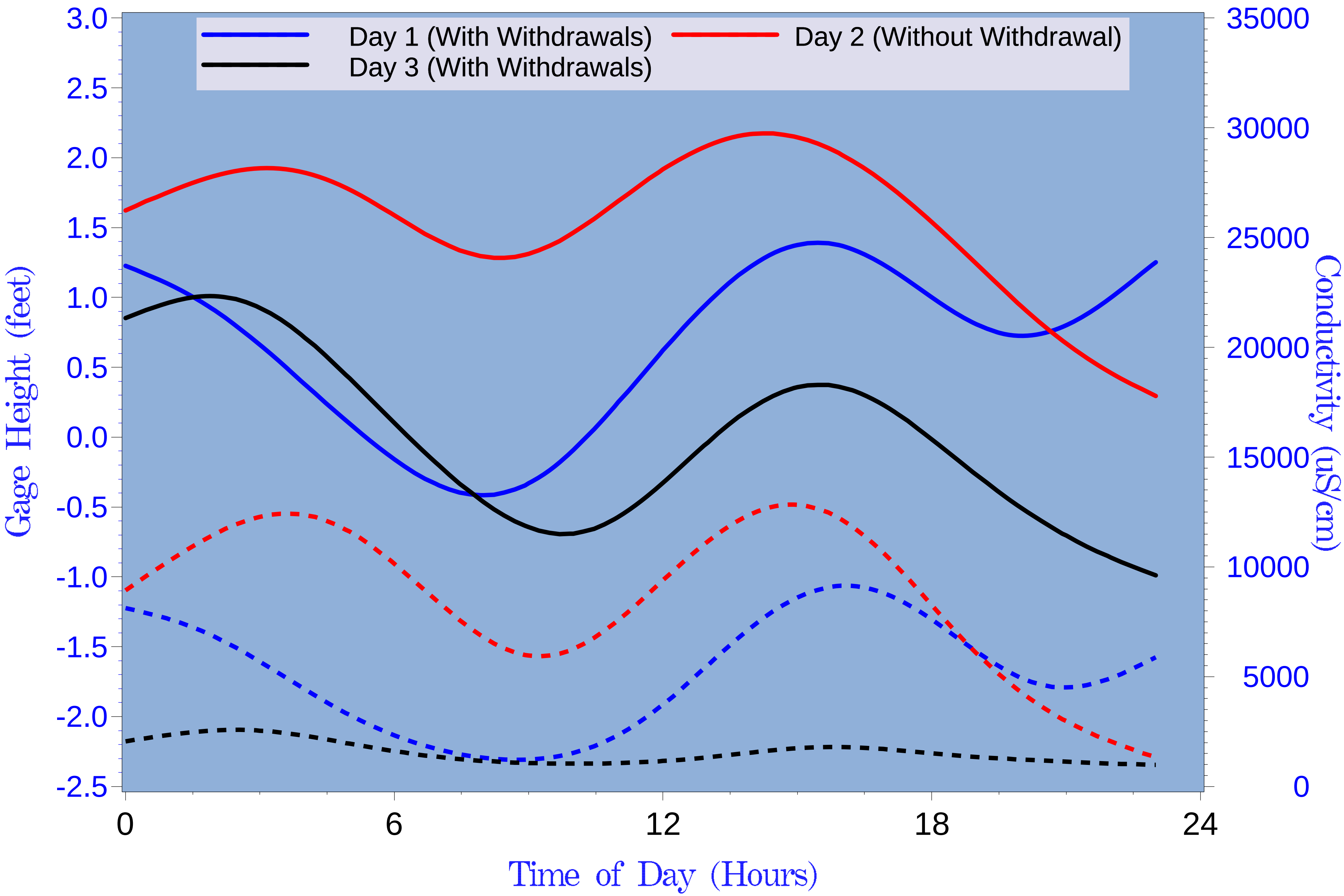


Figure 4.77 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Peace River Height Gage (RK 26.7) April 14th through 16th, flows = 116, 112 & 112 cfs, withdrawals = 14.1, 0.0 & 13.1 cfs

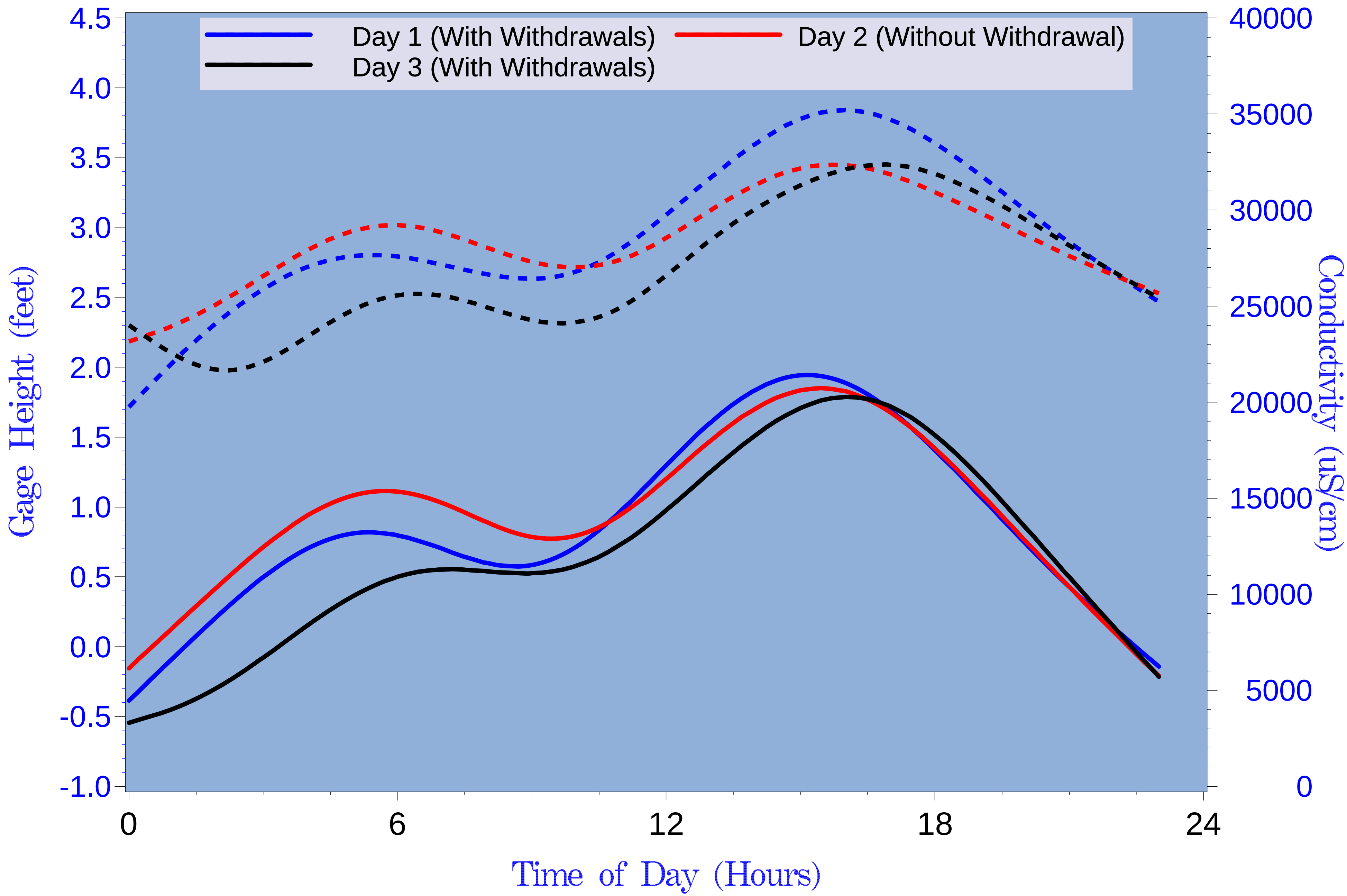


Figure 4.78 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Harbour Height Gage (RK 15.5)
April 18th through 20th, flows = 104, 99 & 90 cfs, withdrawals = 13.2, 0.0 & 12.0 cfs

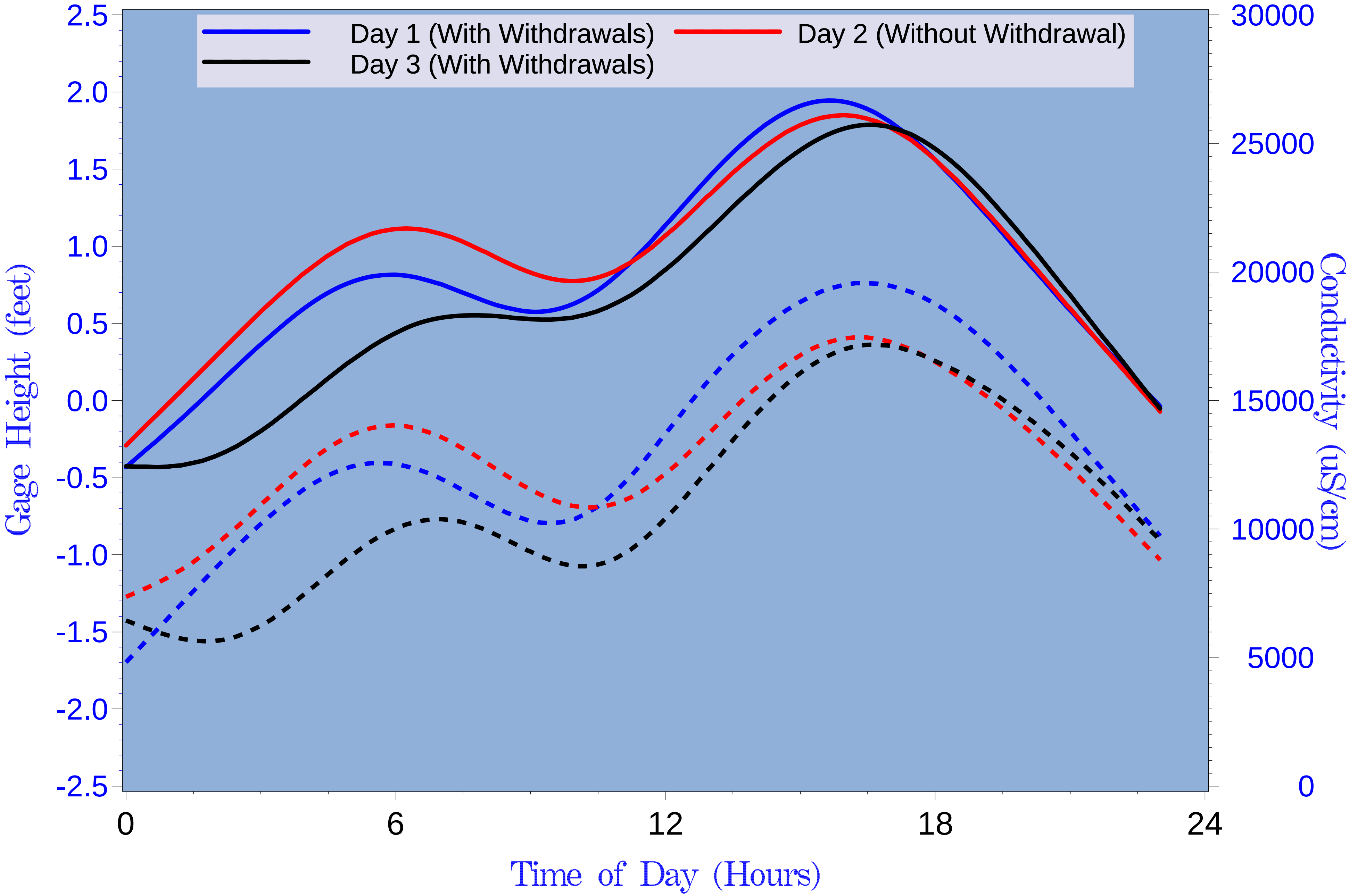


Figure 4.79 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ4 Gage (RK 21.9)
April 18th through 20th, flows = 104, 99 & 90 cfs, withdrawals = 13.2, 0.0 & 12.0 cfs

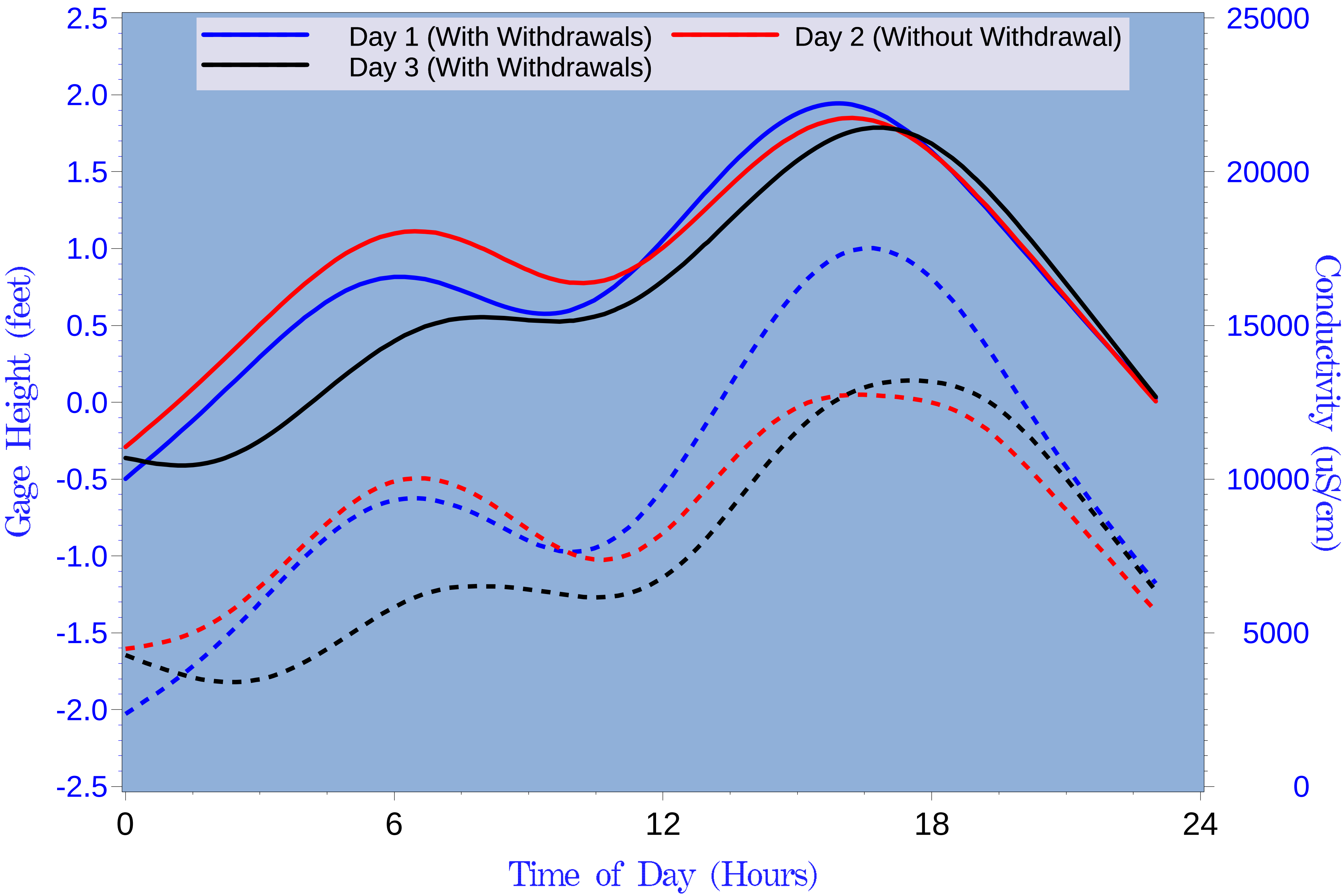


Figure 4.80 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ3 Gage (RK 23.4)
April 18th through 20th, flows = 104, 99 & 90 cfs, withdrawals = 13.2, 0.0 & 12.0 cfs

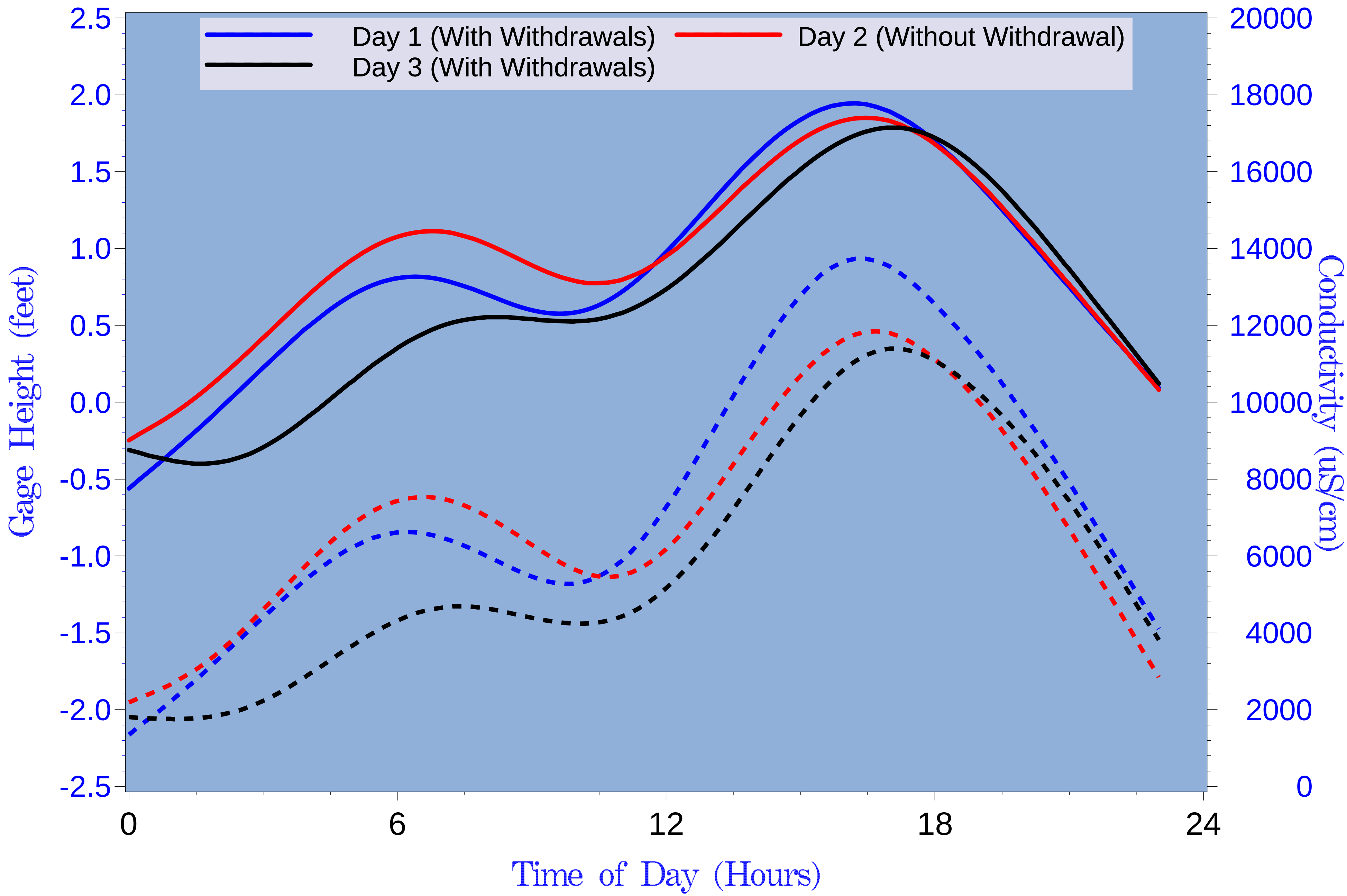


Figure 4.81 Gage height (solid lines) and surface conductivity (dashed lines) at HBMP MZ2 Gage (RK 24.5)
April 18th through 20th, flows = 104, 99 & 90 cfs, withdrawals = 13.2, 0.0 & 12.0 cfs

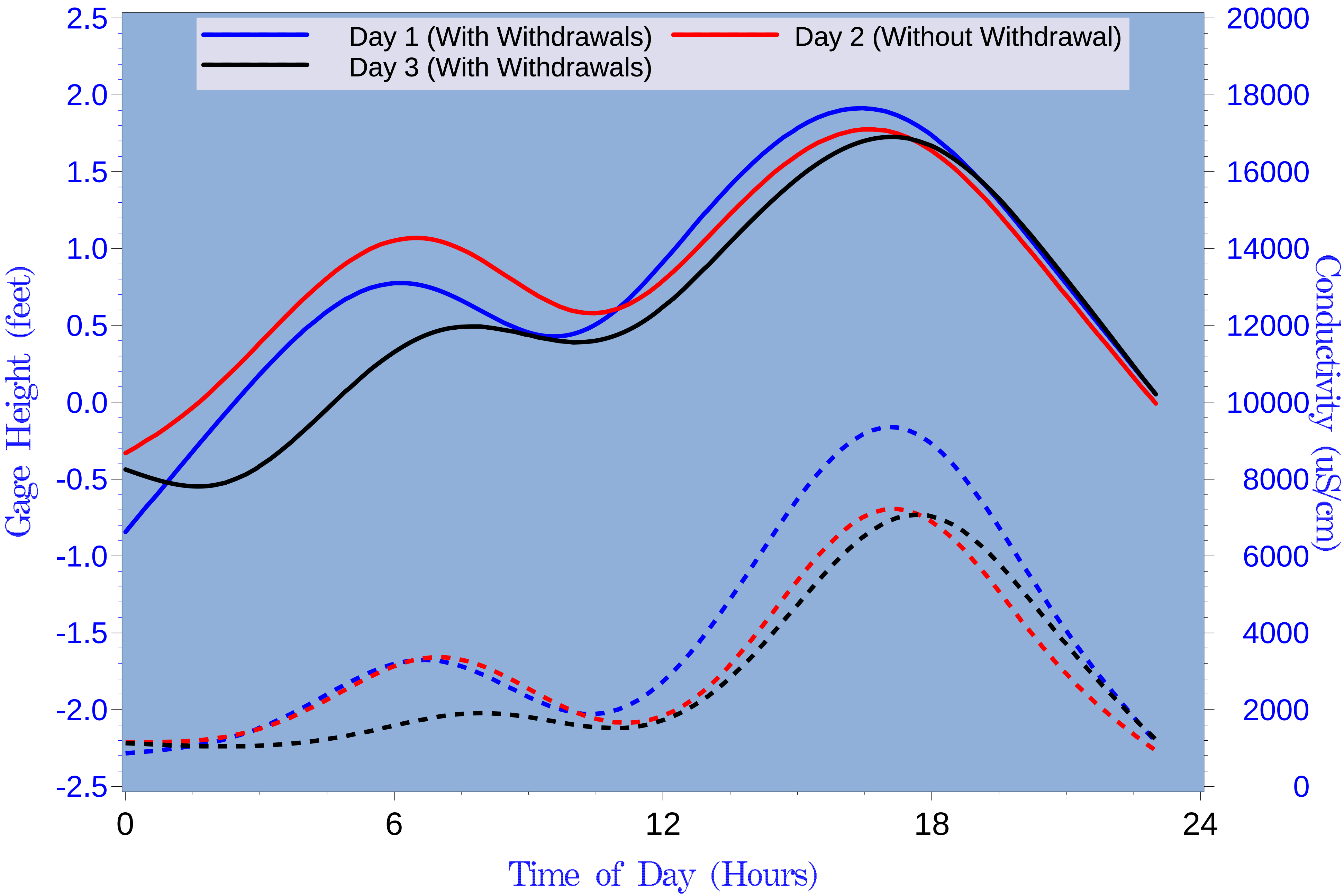


Figure 4.82 Gage height (solid lines) and surface conductivity (dashed lines) at USGS Peace River Height Gage (RK 26.7) April 18th through 20th, flows = 104, 99 & 90 cfs, withdrawals = 13.2, 0.0 & 12.0 cfs

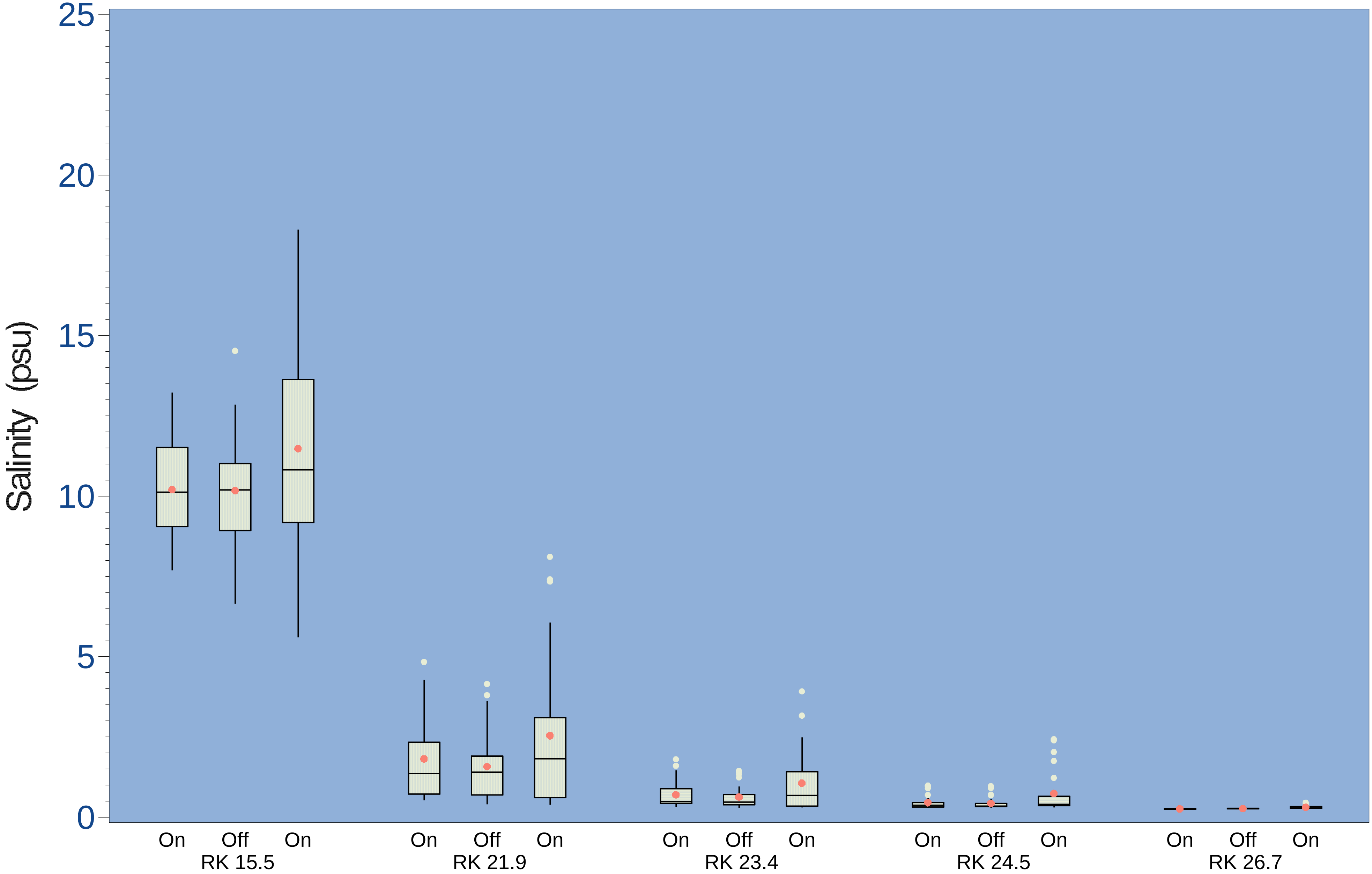


Figure 4.83 Boxplots of average hour salinities by location (RK) and by date (On=days with withdrawals, Off=days with no withdrawals)
December 28th through 30th, flows = 298, 267 & 249 cfs, withdrawals = 28.6, 0.0 & 25.1 cfs

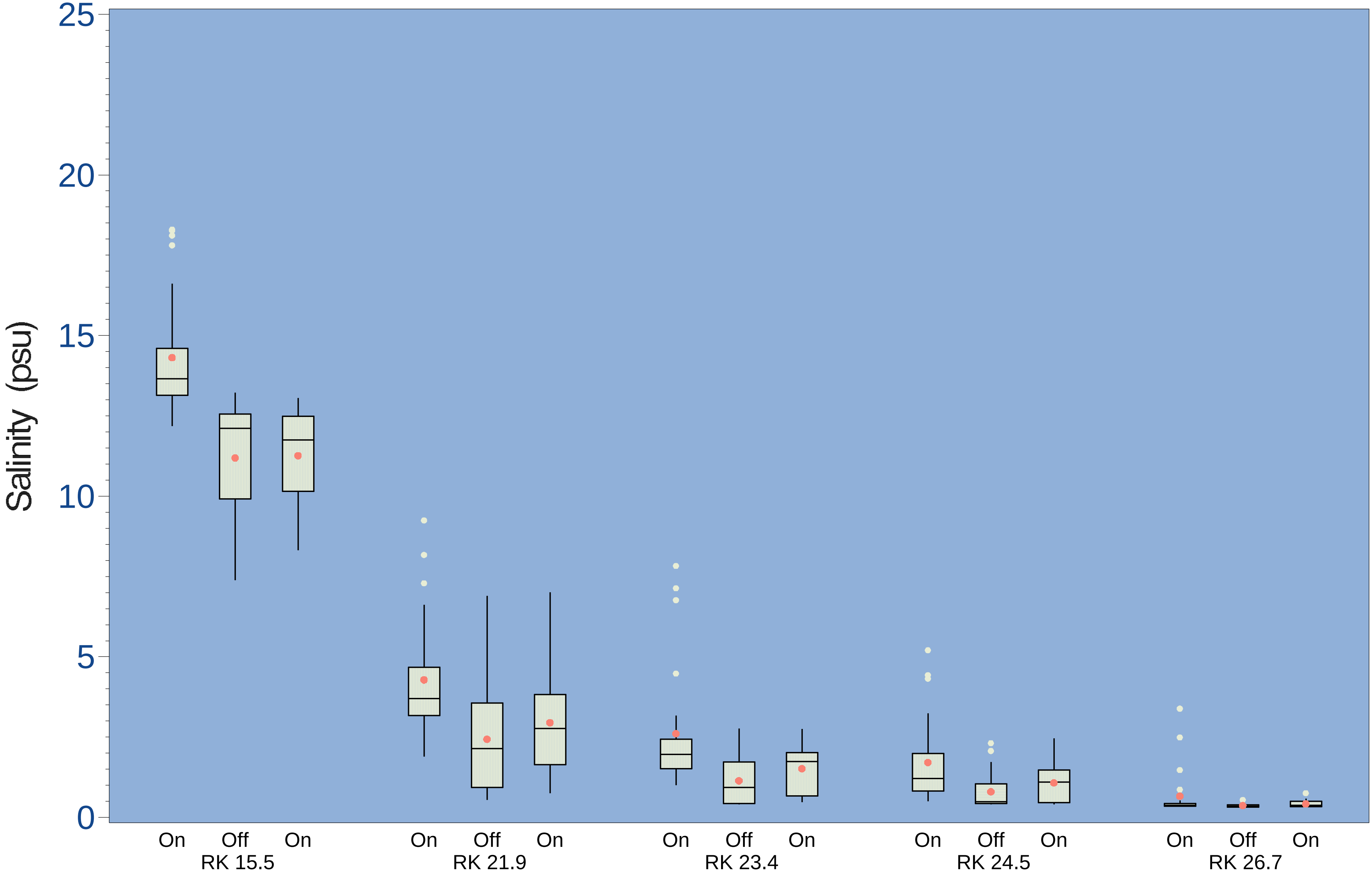


Figure 4.84 Boxplots of average hour salinities by location (RK) and by date (On=days with withdrawals, Off=days with no withdrawals)
January 28th through 30th, flows = 252, 231 & 236 cfs, withdrawals = 21.3, 0.0 & 20.7 cfs

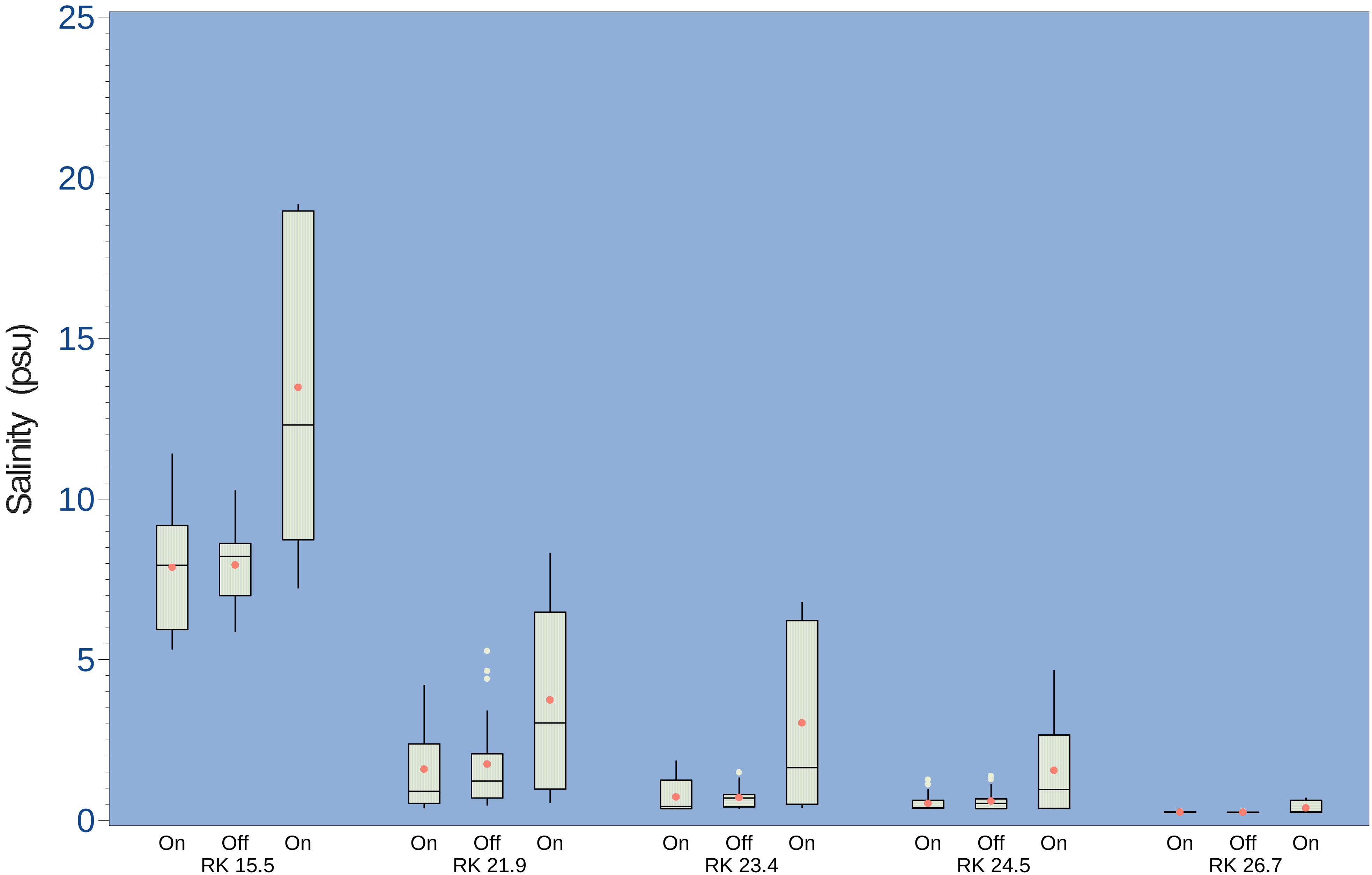


Figure 4.85 Boxplots of average hour salinities by location (RK) and by date (On=days with withdrawals, Off=days with no withdrawals)
February 11th through 13th, flows = 252, 234 & 229 cfs, withdrawals = 23.6, 0.0 & 20.1 cfs

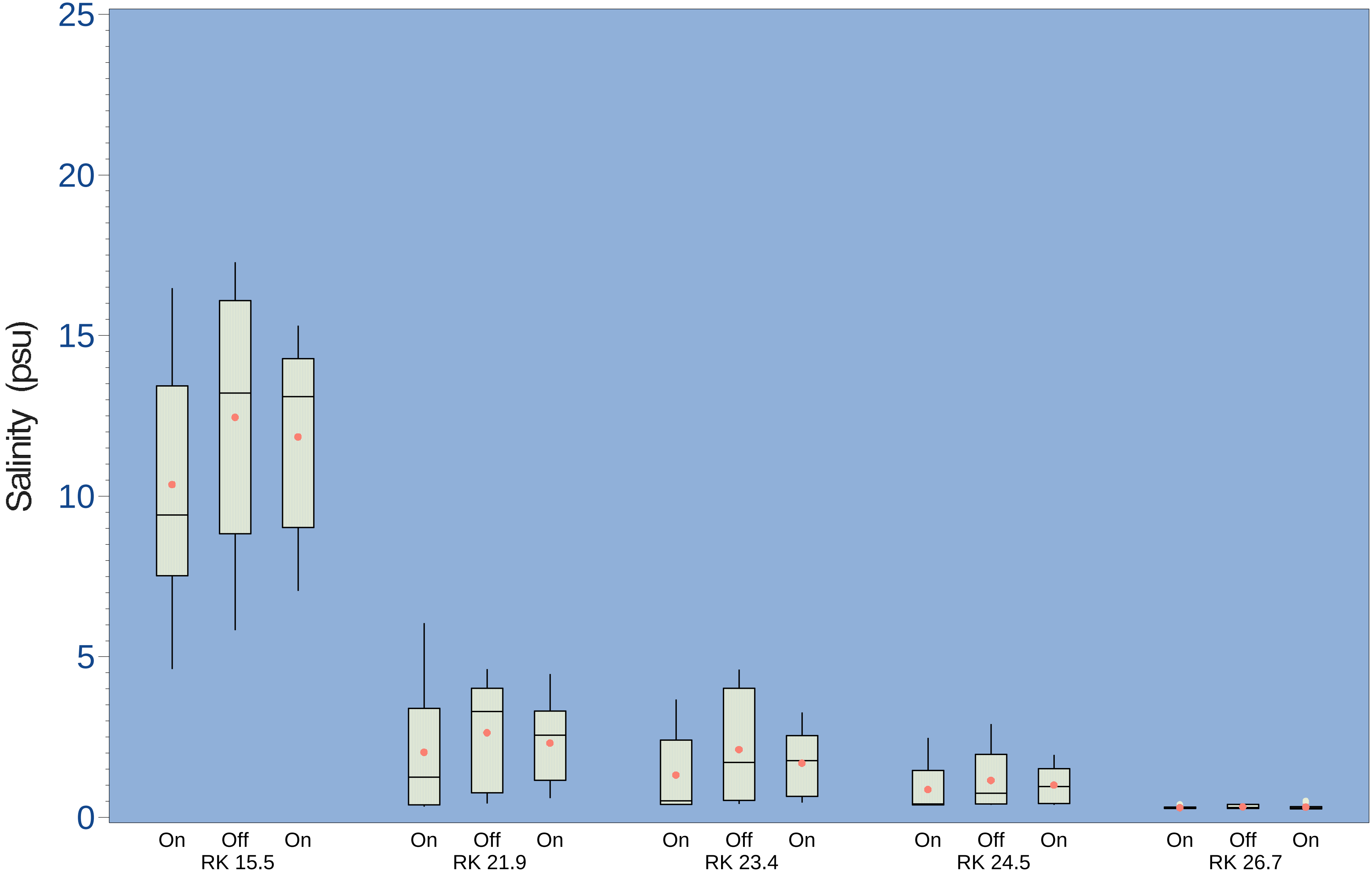


Figure 4.86 Boxplots of average hour salinities by location (RK) and by date (On=days with withdrawals, Off=days with no withdrawals)
February 24th through 26th, flows = 203, 190 & 181 cfs, withdrawals = 22.2, 0.0 & 19.5 cfs

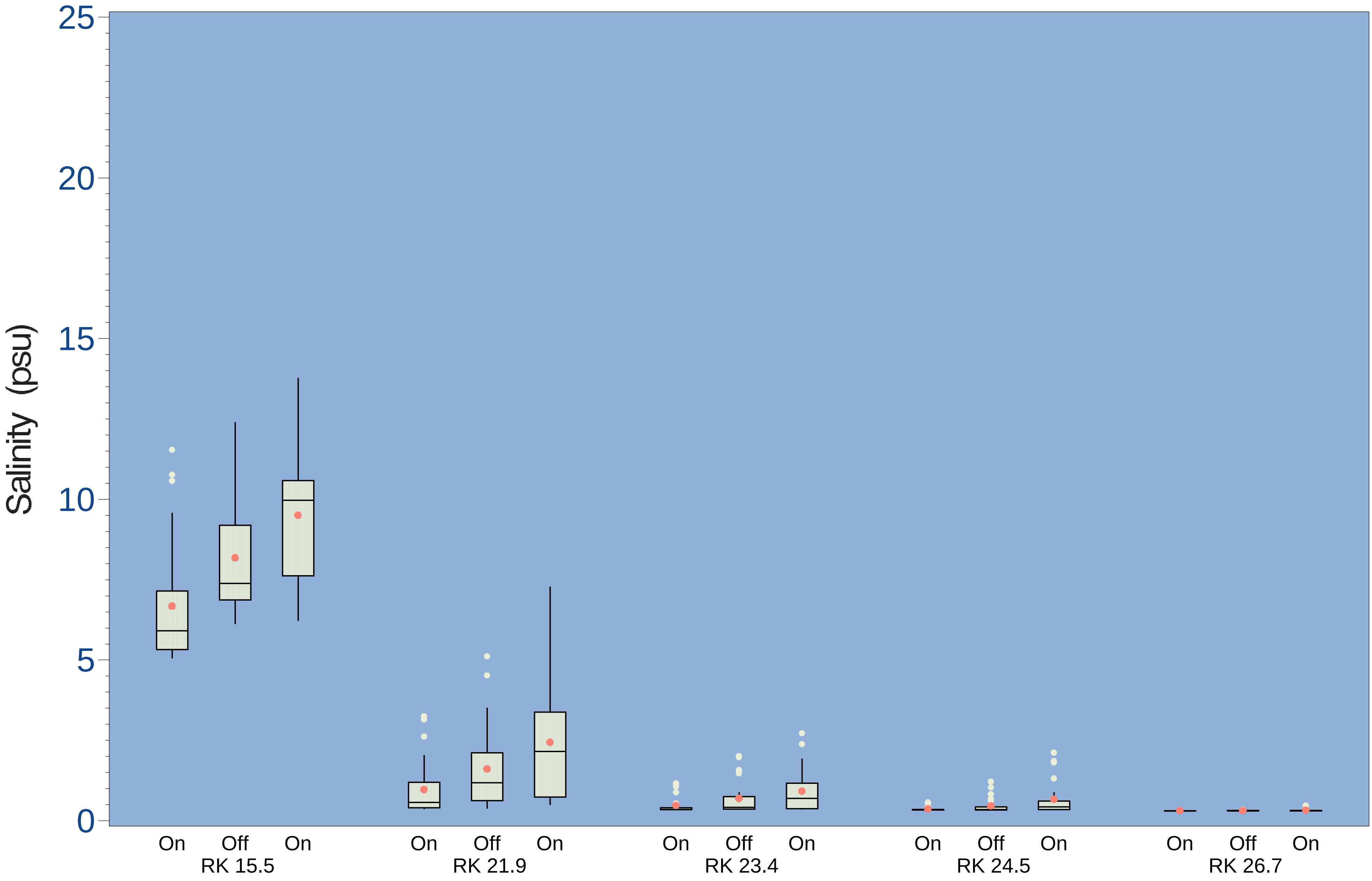


Figure 4.87 Boxplots of average hour salinities by location (RK) and by date (On=days with withdrawals, Off=days with no withdrawals)
January 11th through 13th, flows = 184, 178 & 173 cfs, withdrawals = 18.0, 0.0 & 16.7 cfs

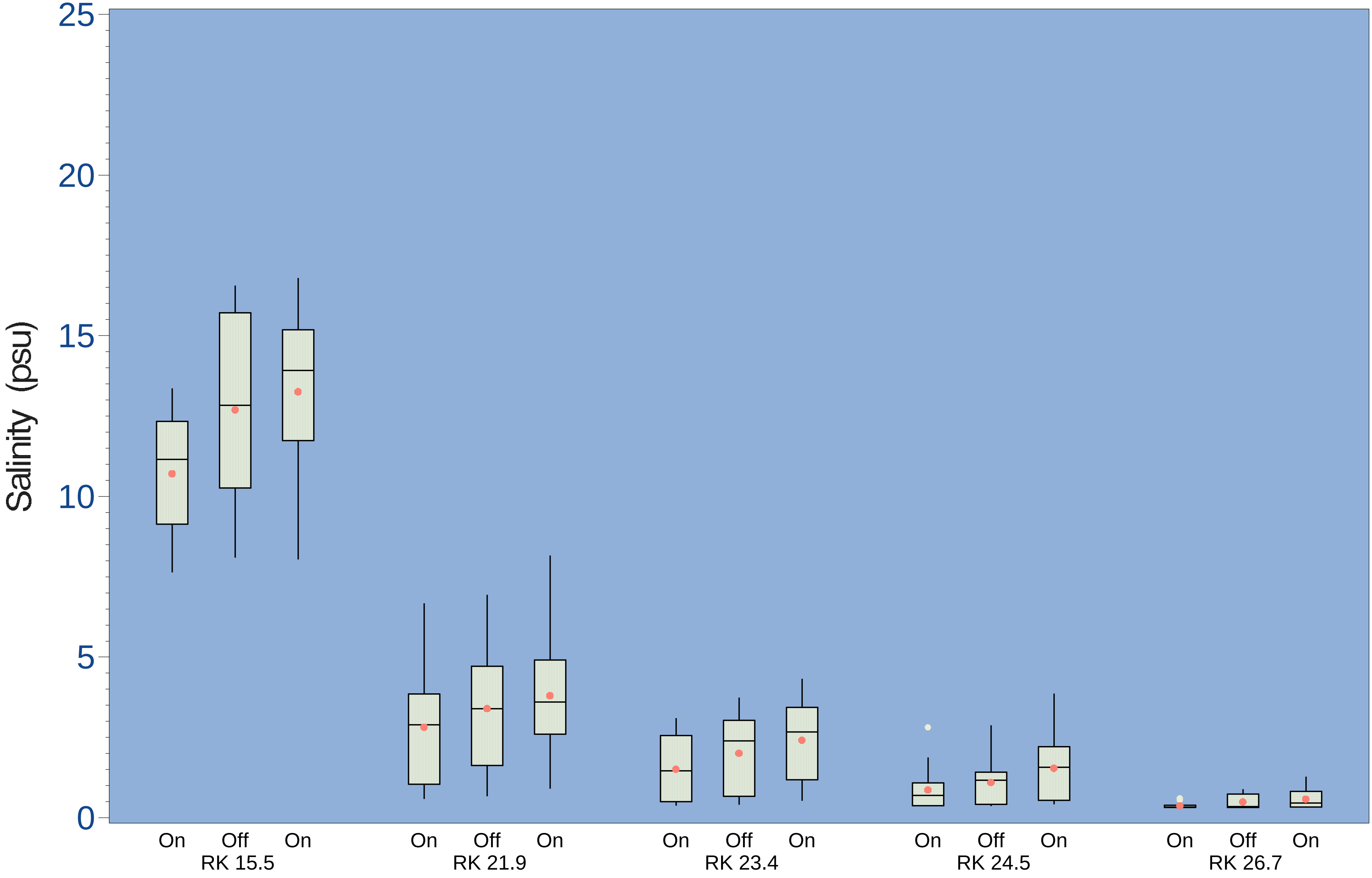


Figure 4.88 Boxplots of average hour salinities by location (RK) and by date (On=days with withdrawals, Off=days with no withdrawals)
January 14th through 16th, flows = 167, 158 & 153 cfs, withdrawals = 16.2, 0.0 & 14.7 cfs

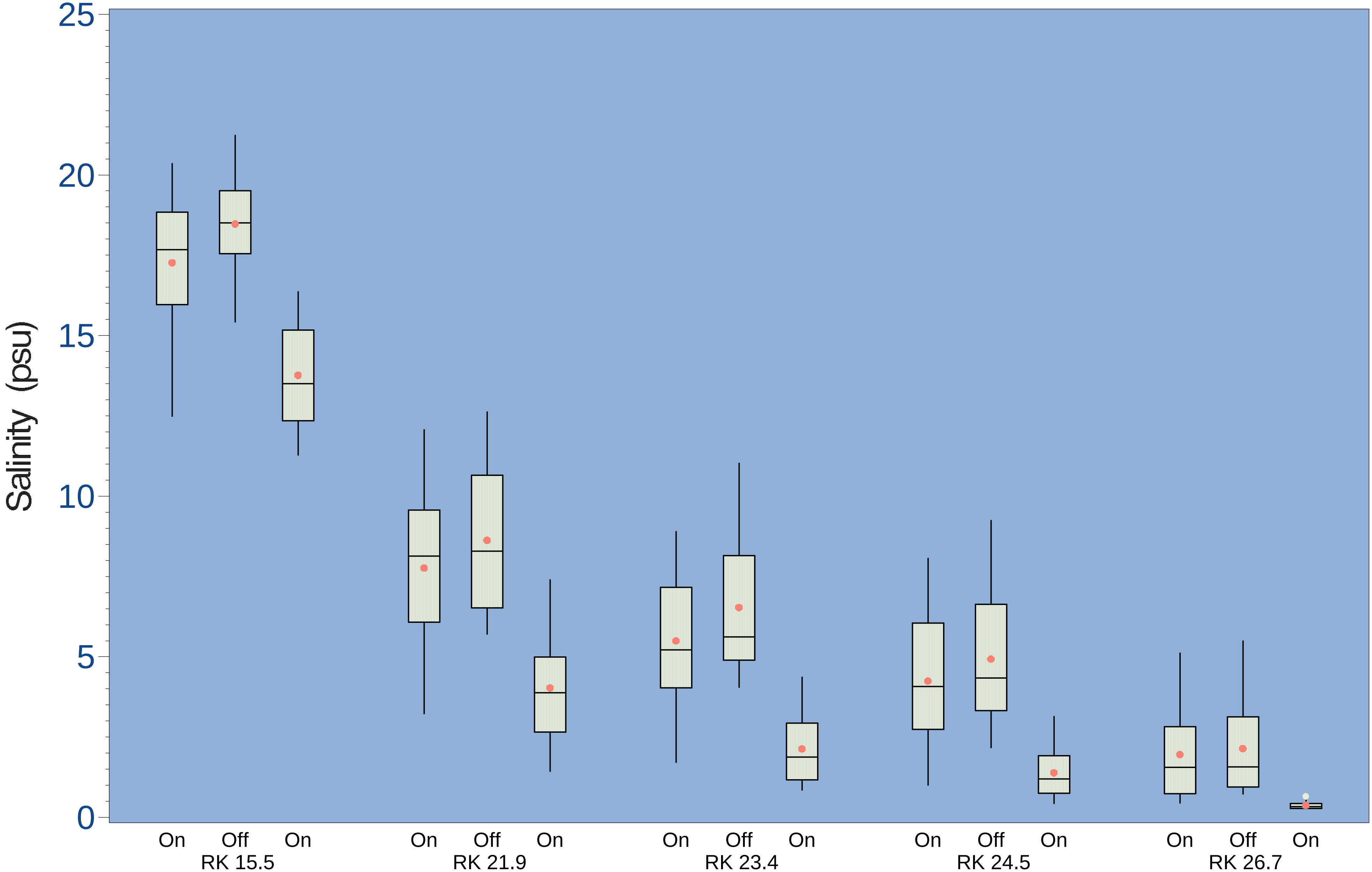


Figure 4.89 Boxplots of average hour salinities by location (RK) and by date (On=days with withdrawals, Off=days with no withdrawals)
December 24th through 26th, flows = 132, 163 & 207 cfs, withdrawals = 11.5, 0.0 & 14.9 cfs

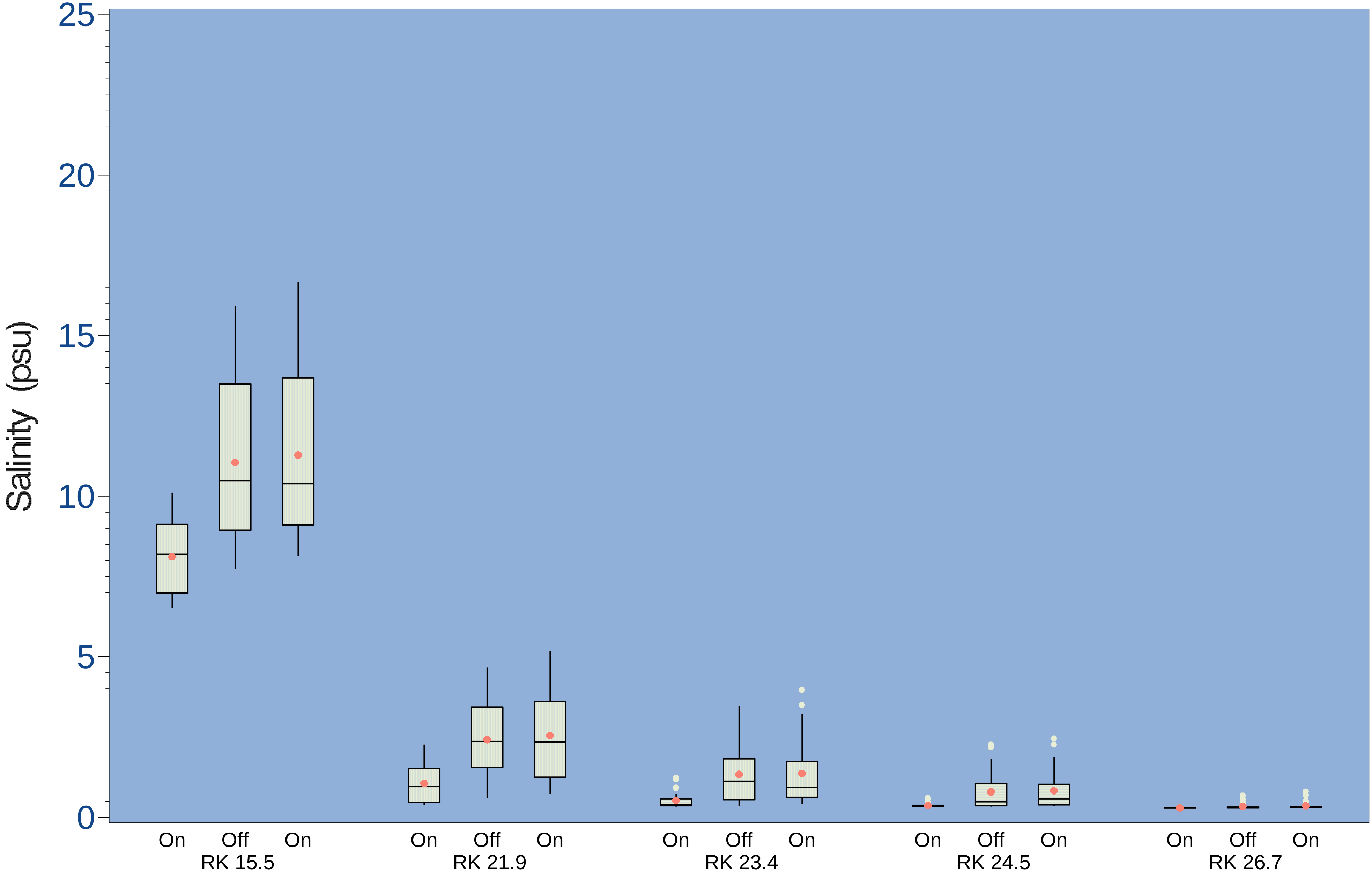


Figure 4.90 Boxplots of average hour salinities by location (RK) and by date (On=days with withdrawals, Off=days with no withdrawals)
March 6th through 8th, flows = 142, 145 & 142 cfs, withdrawals = 15.6, 0.0 & 15.5 cfs

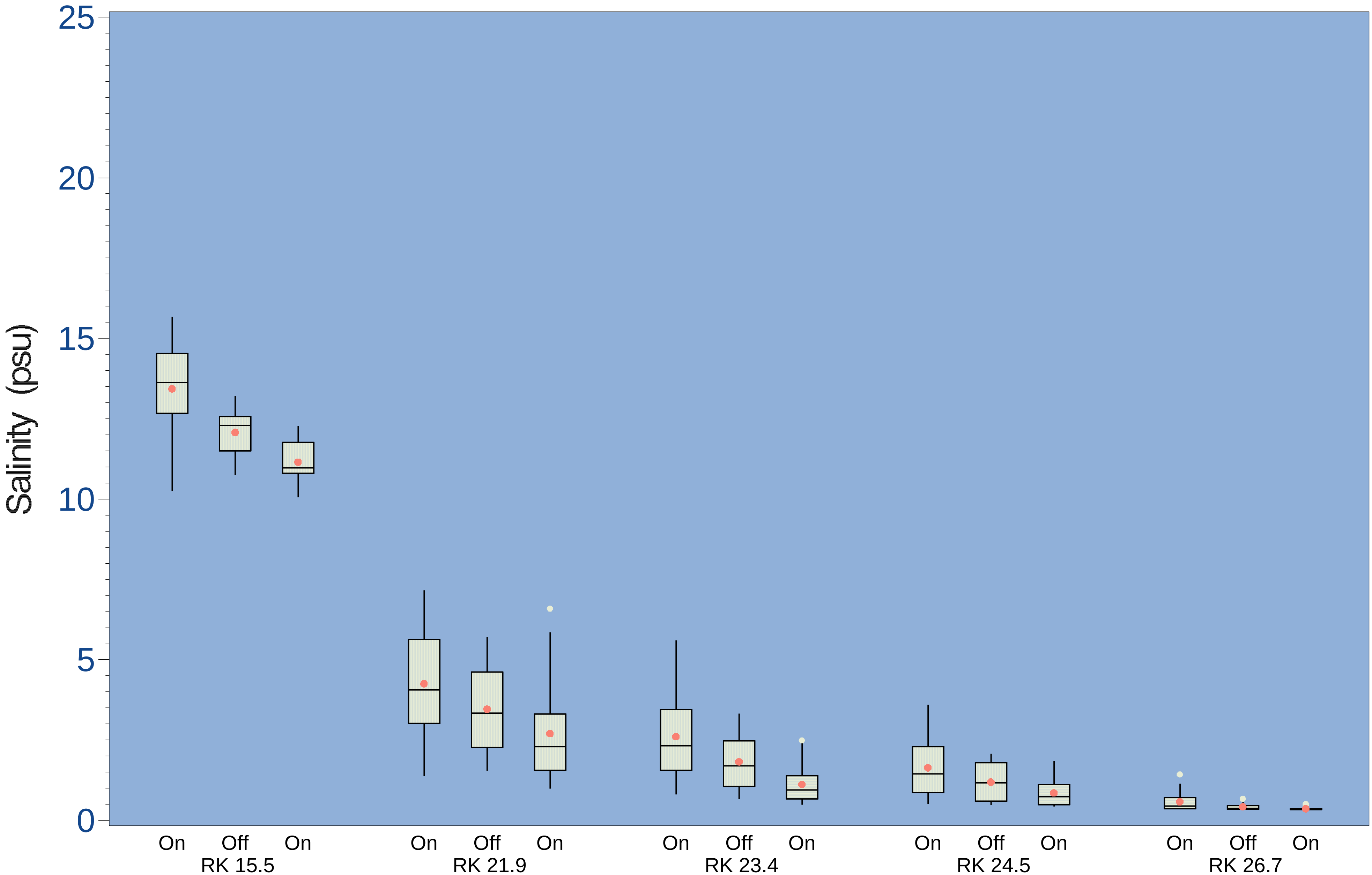


Figure 4.91 Boxplots of average hour salinities by location (RK) and by date (On=days with withdrawals, Off=days with no withdrawals)
January 23rd through 25th, flows = 128, 132 & 149 cfs, withdrawals = 11.4, 0.0 & 11.9 cfs

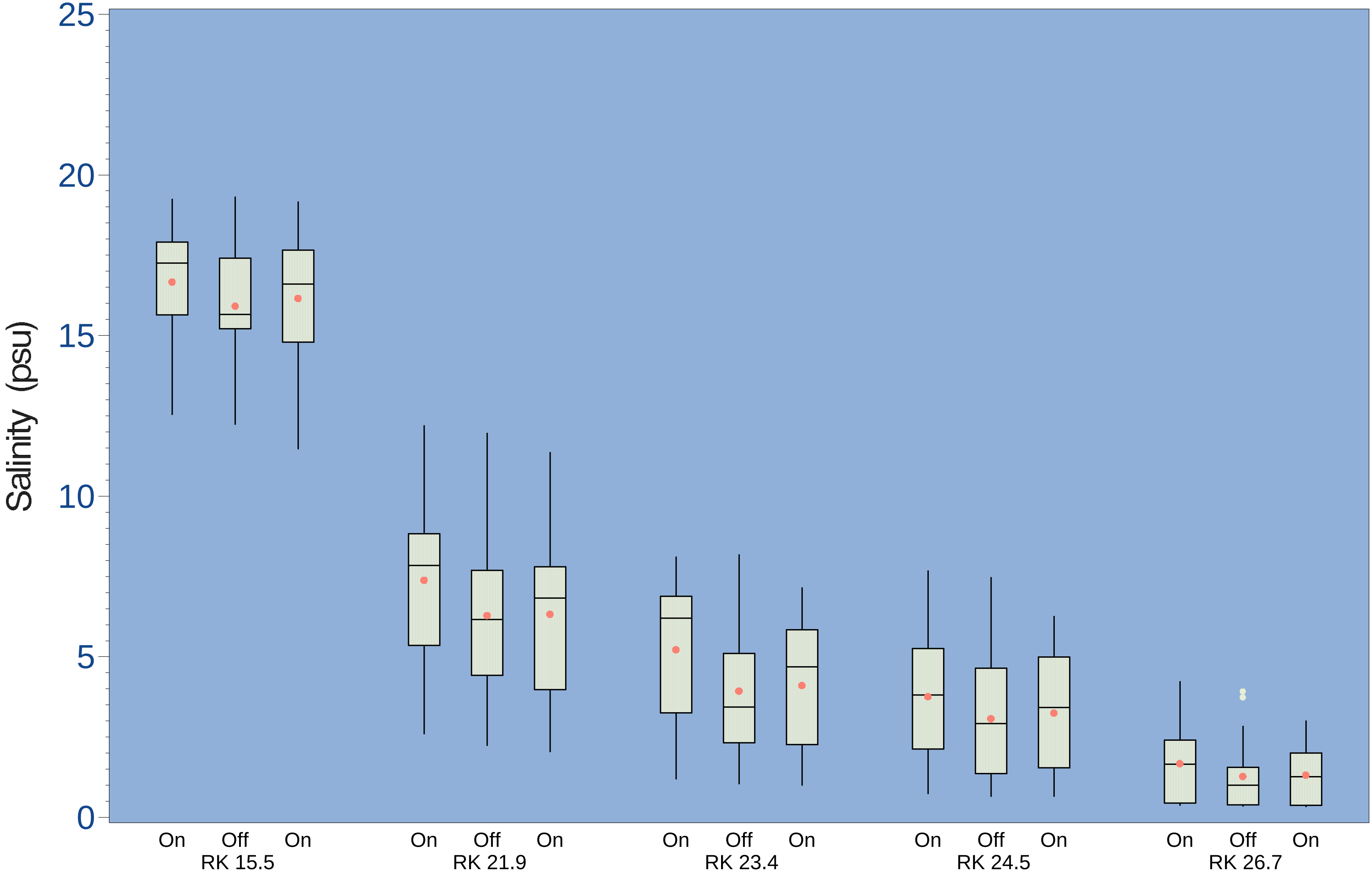


Figure 4.92 Boxplots of average hour salinities by location (RK) and by date (On=days with withdrawals, Off=days with no withdrawals)
December 18th through 20th, flows = 138, 136 & 130 cfs, withdrawals = 17.2, 0.0 & 12.9 cfs

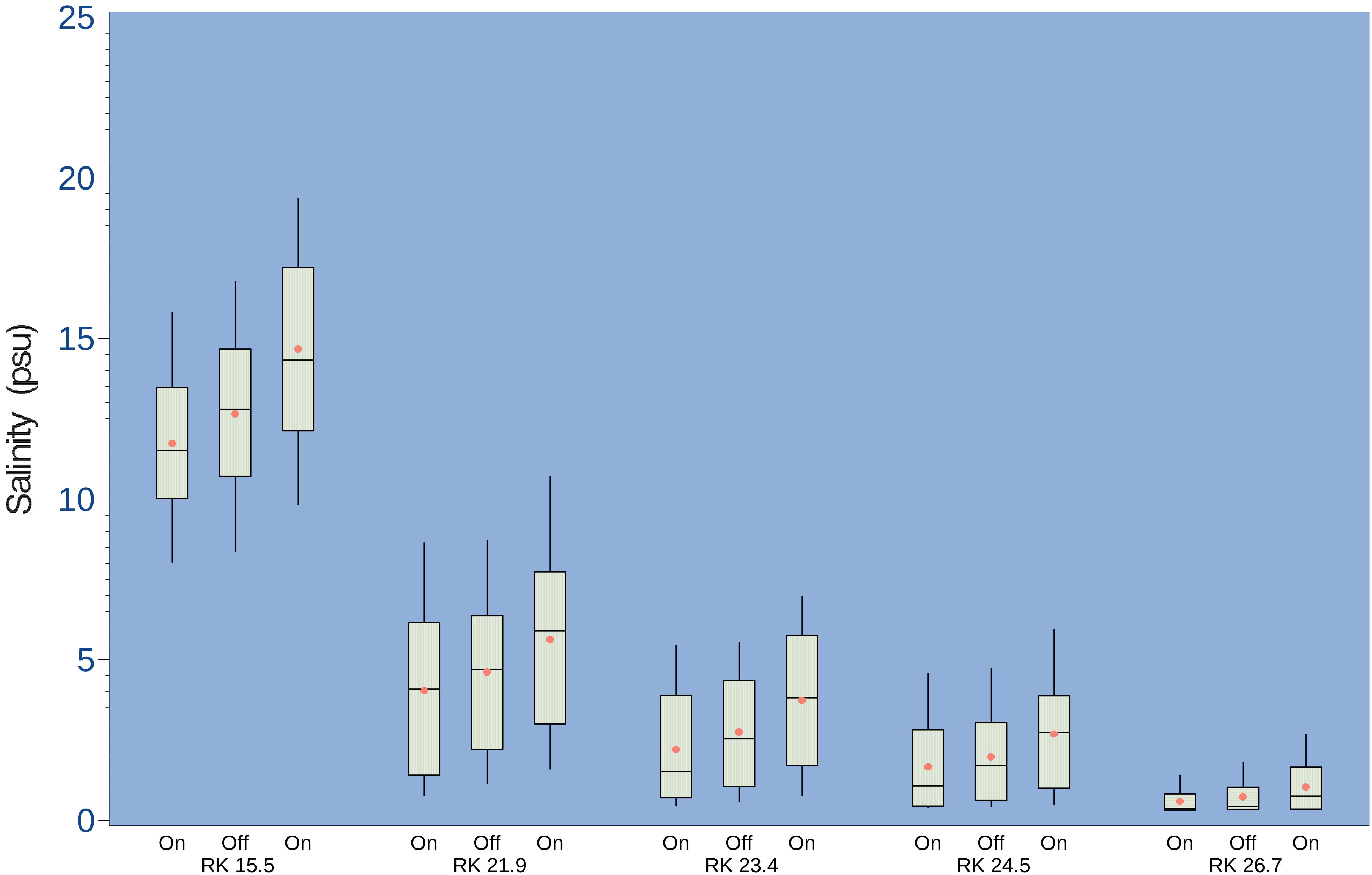


Figure 4.93 Boxplots of average hour salinities by location (RK) and by date (On=days with withdrawals, Off=days with no withdrawals)
March 12th through 14th, flows = 121, 121 & 118 cfs, withdrawals = 13.5, 0.0 & 13.1 cfs

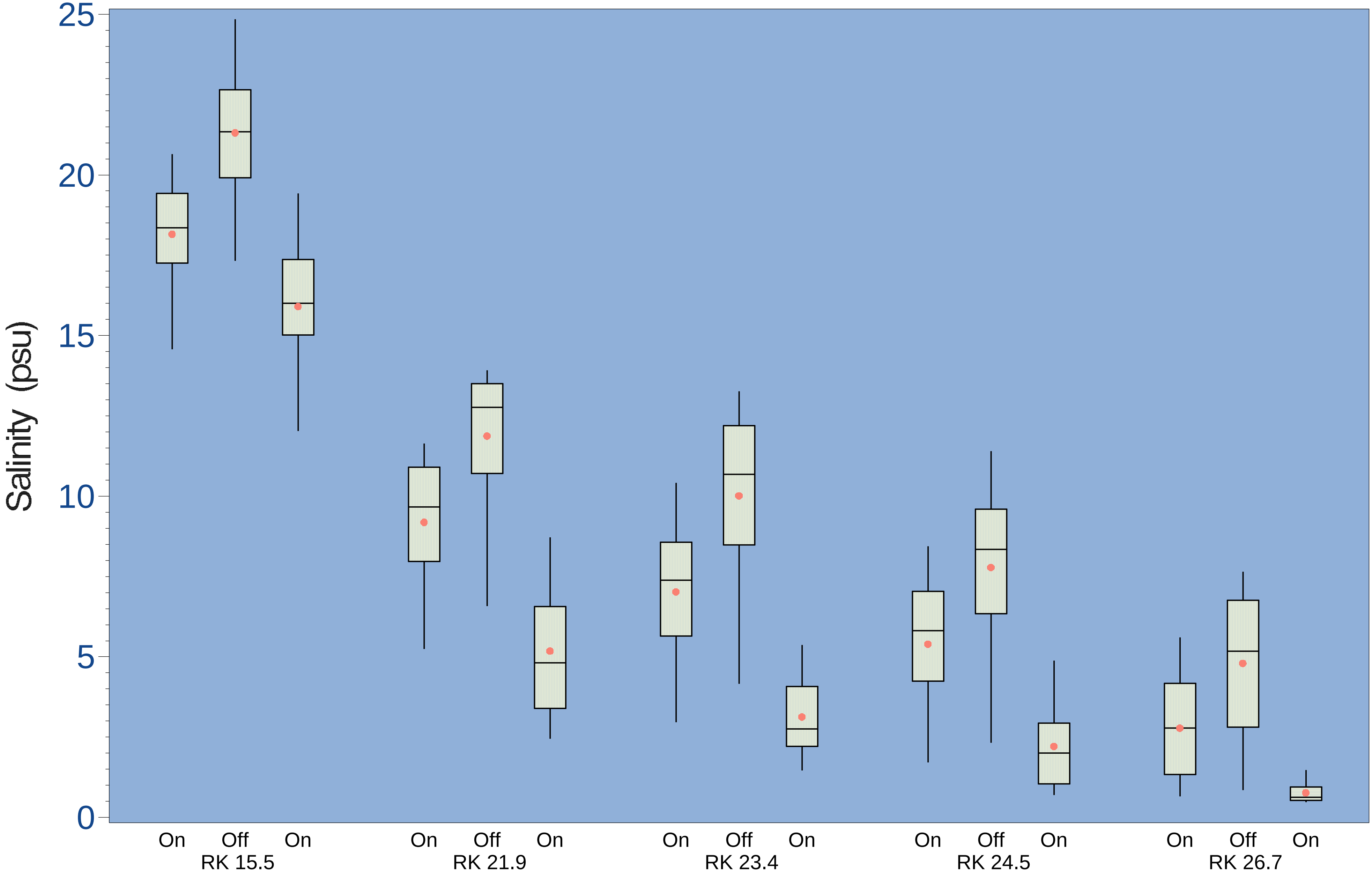


Figure 4.94 Boxplots of average hour salinities by location (RK) and by date (On=days with withdrawals, Off=days with no withdrawals)
April 14th through 16th, flows = 116, 112 & 112 cfs, withdrawals = 14.1, 0.0 & 13.1 cfs

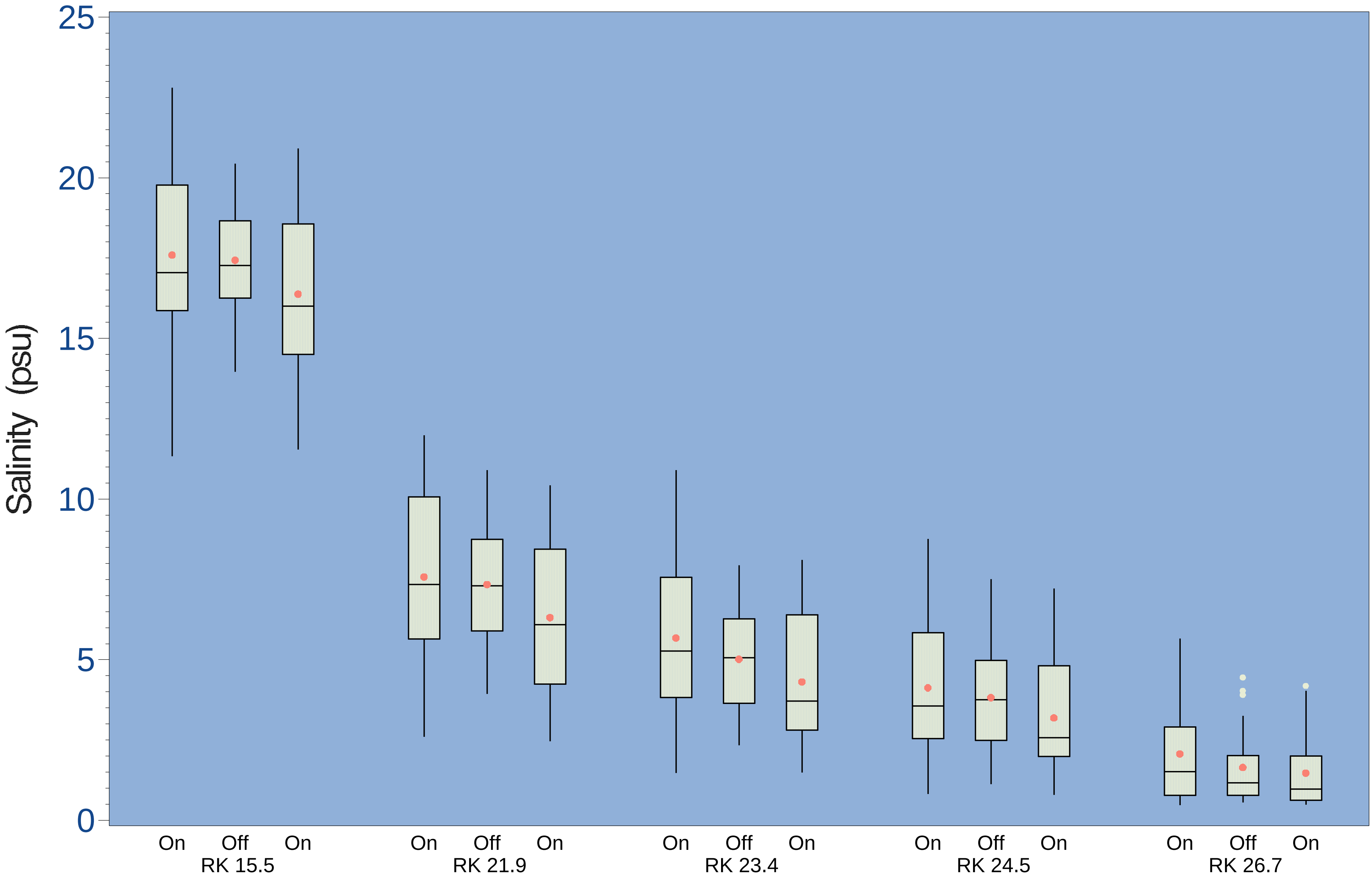


Figure 4.95 Boxplots of average hour salinities by location (RK) and by date (On=days with withdrawals, Off=days with no withdrawals)
April 18th through 20th, flows = 104, 99 & 90 cfs, withdrawals = 13.2, 0.0 & 12.0 cfs

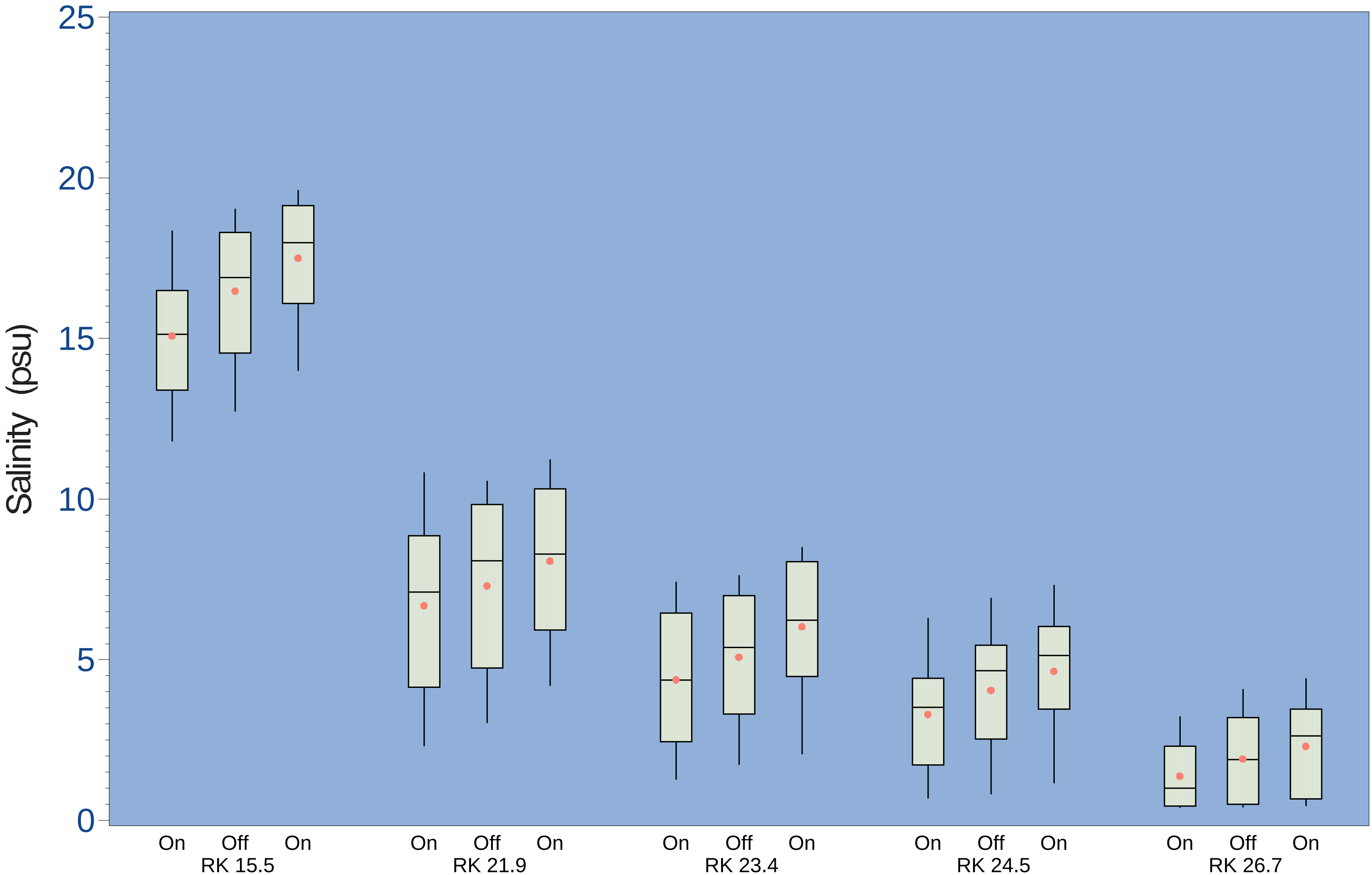


Figure 4.96 Boxplots of average hour salinities by location (RK) and by date (On=days with withdrawals, Off=days with no withdrawals)
March 26th through 28th, flows = 94, 89 & 88 cfs, withdrawals = 11.1, 0.0 & 10.2 cfs

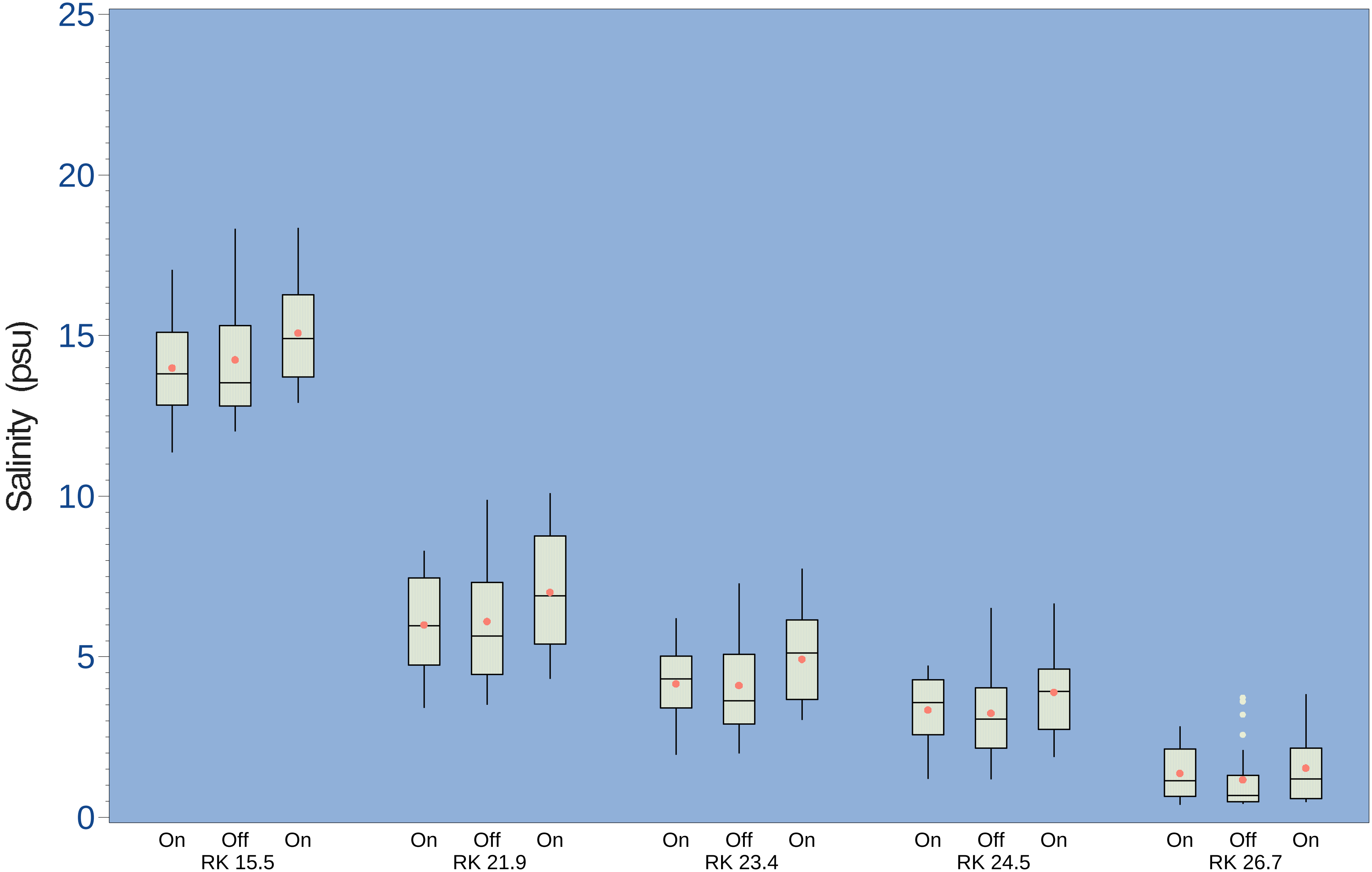


Figure 4.97 Boxplots of average hour salinities by location (RK) and by date (On=days with withdrawals, Off=days with no withdrawals)
December 11th through 13th, flows = 82, 81 & 82 cfs, withdrawals = 10.1, 0.0 & 9.0 cfs

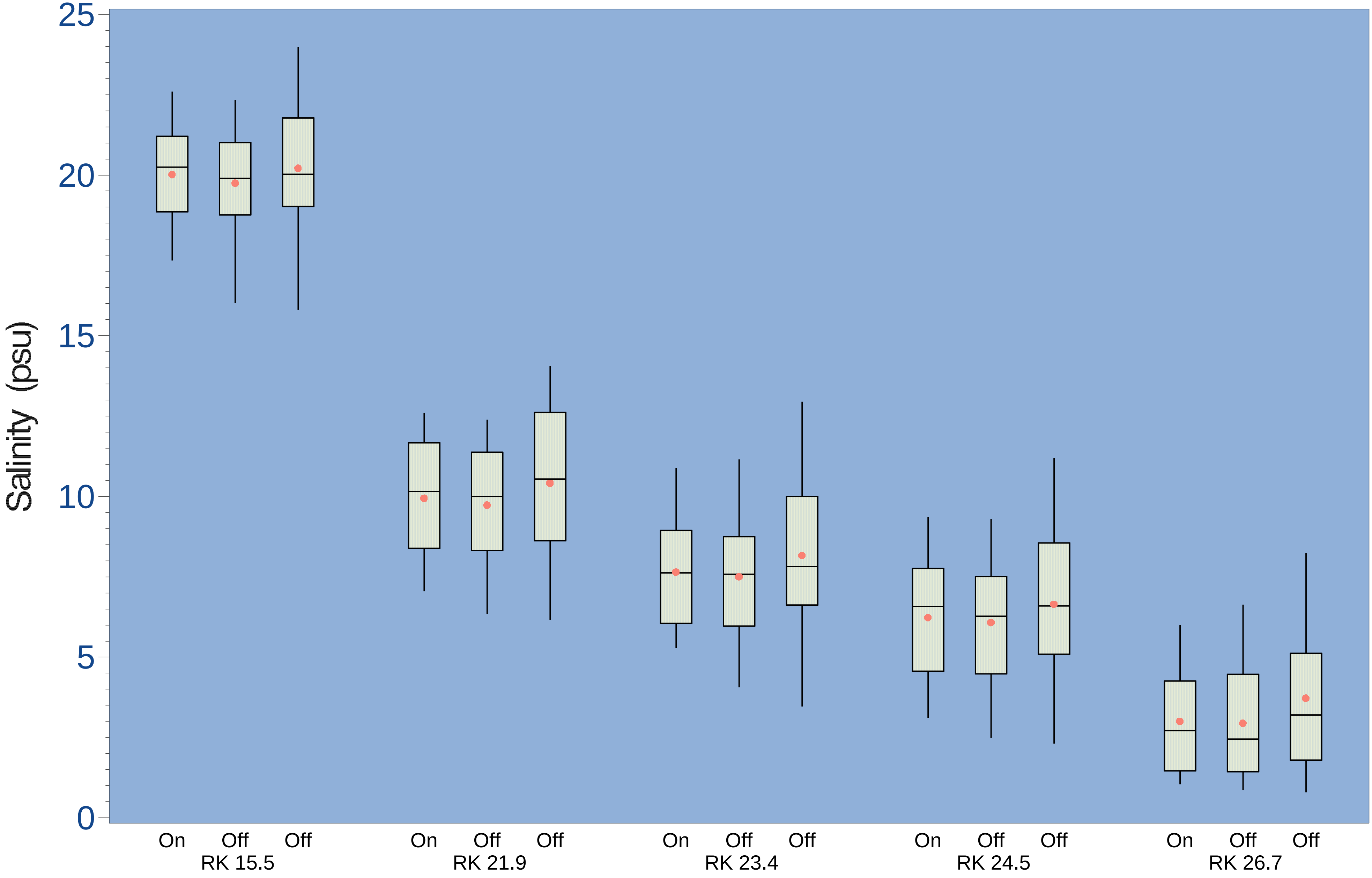


Figure 4.98 Boxplots of average hour salinities by location (RK) and by date (On=days with withdrawals, Off=days with no withdrawals)
April 3rd through 5th, flows = 83, 75 & 74 cfs, withdrawals = 7.0, 0.0 & 0.0 cfs

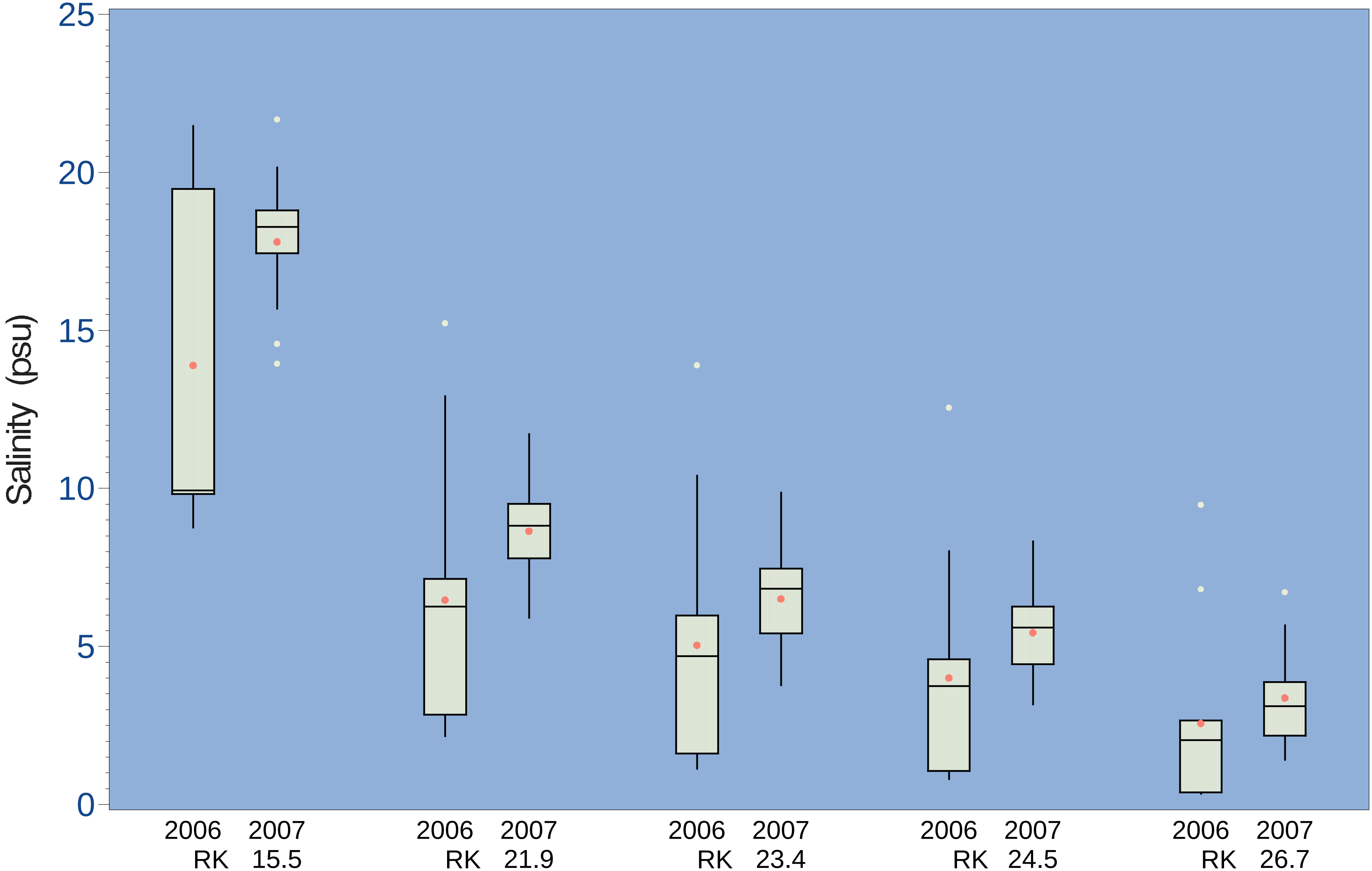


Figure 4.99 Boxplots of average daily salinities by location (RK), without (pre-test) and with (test) withdrawals)
Range of flows 50-70 cfs (below temporary 90 cfs cutoff)

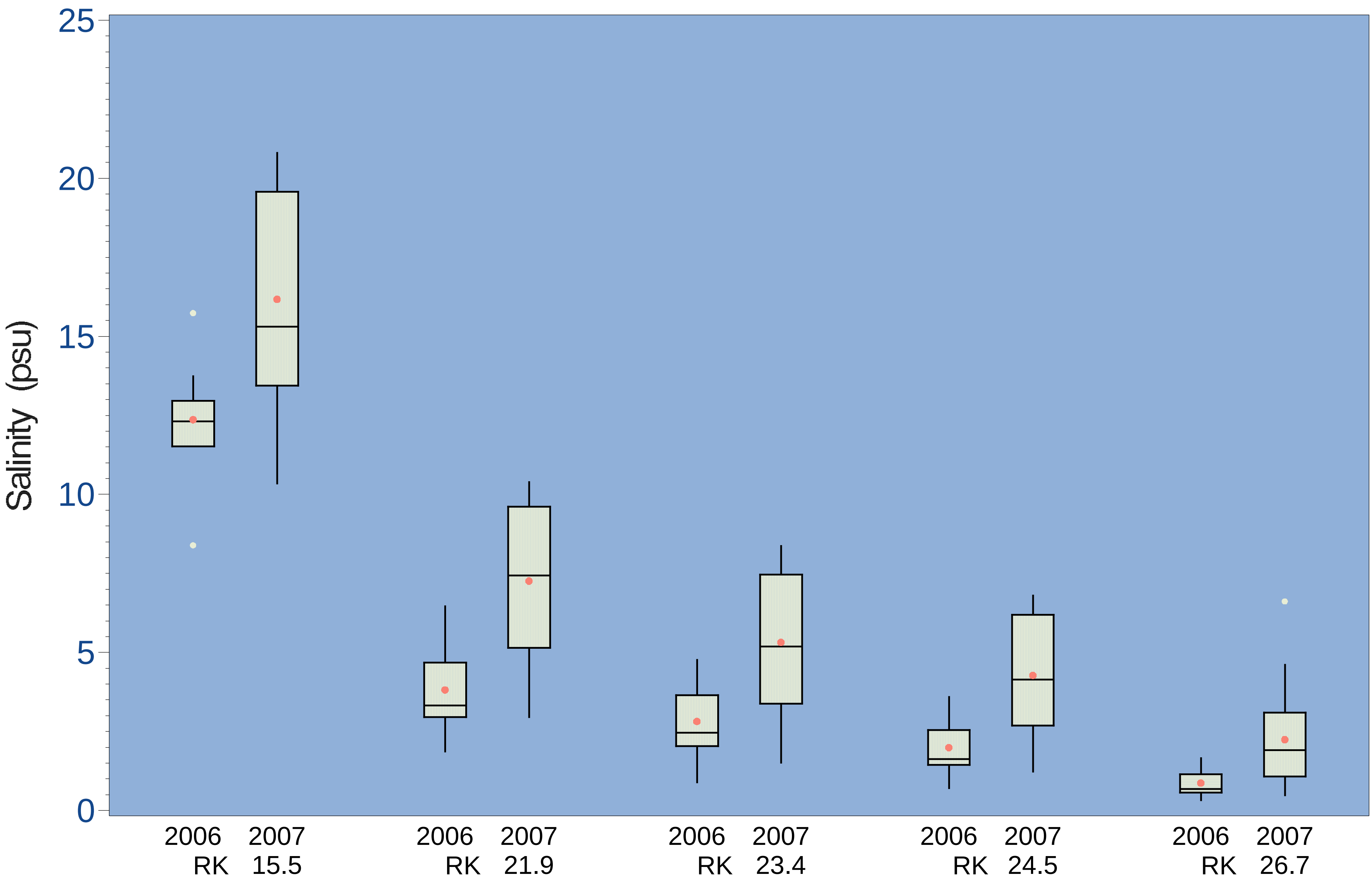


Figure 4.100 Boxplots of average daily salinities by location (RK), without (pre-test) and with (test) withdrawals)
Range of flows 70-90 cfs (below temporary 90 cfs cutoff)

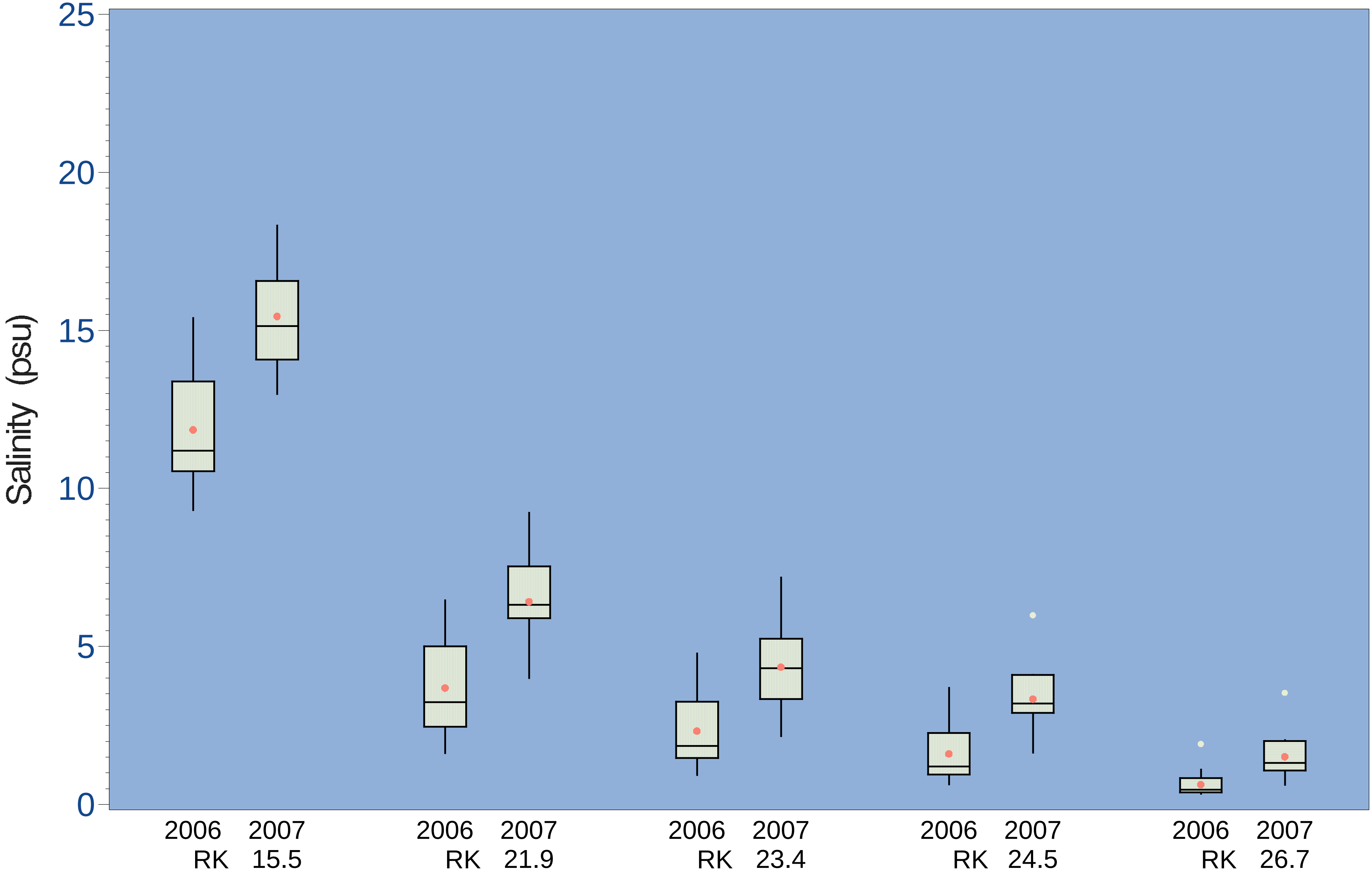


Figure 4.101 Boxplots of average daily salinities by location (RK), without (pre-test) and with (test) withdrawals)
Range of flows 90-110 cfs (above temporary 90 cfs cutoff and below previous 130 cfs permit threshold)

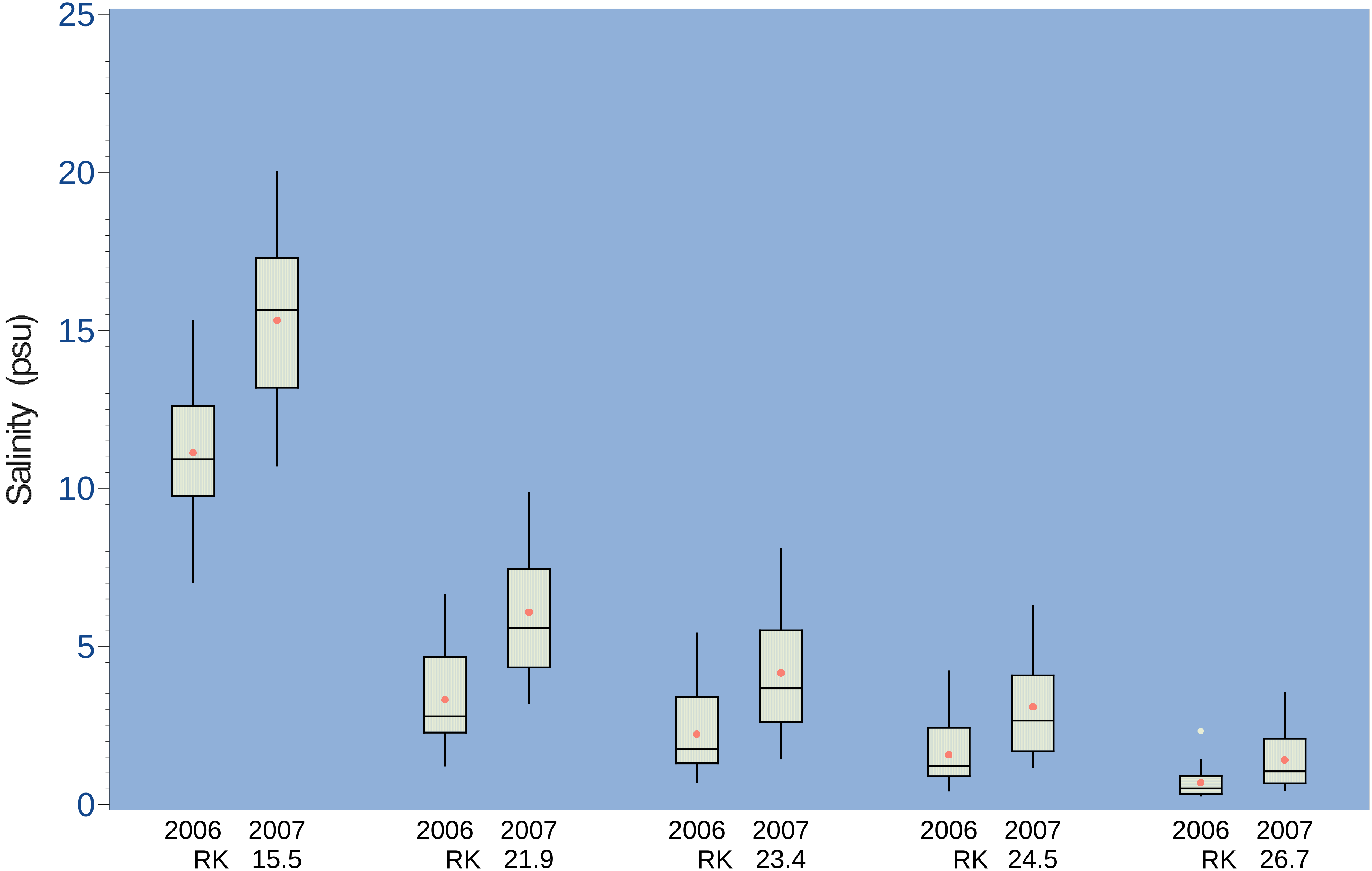


Figure 4.102 Boxplots of average daily salinities by location (RK), without (pre-test) and with (test) withdrawals)
Range of flows 110-130 cfs (above temporary 90 cfs cutoff and below previous 130 cfs permit threshold)

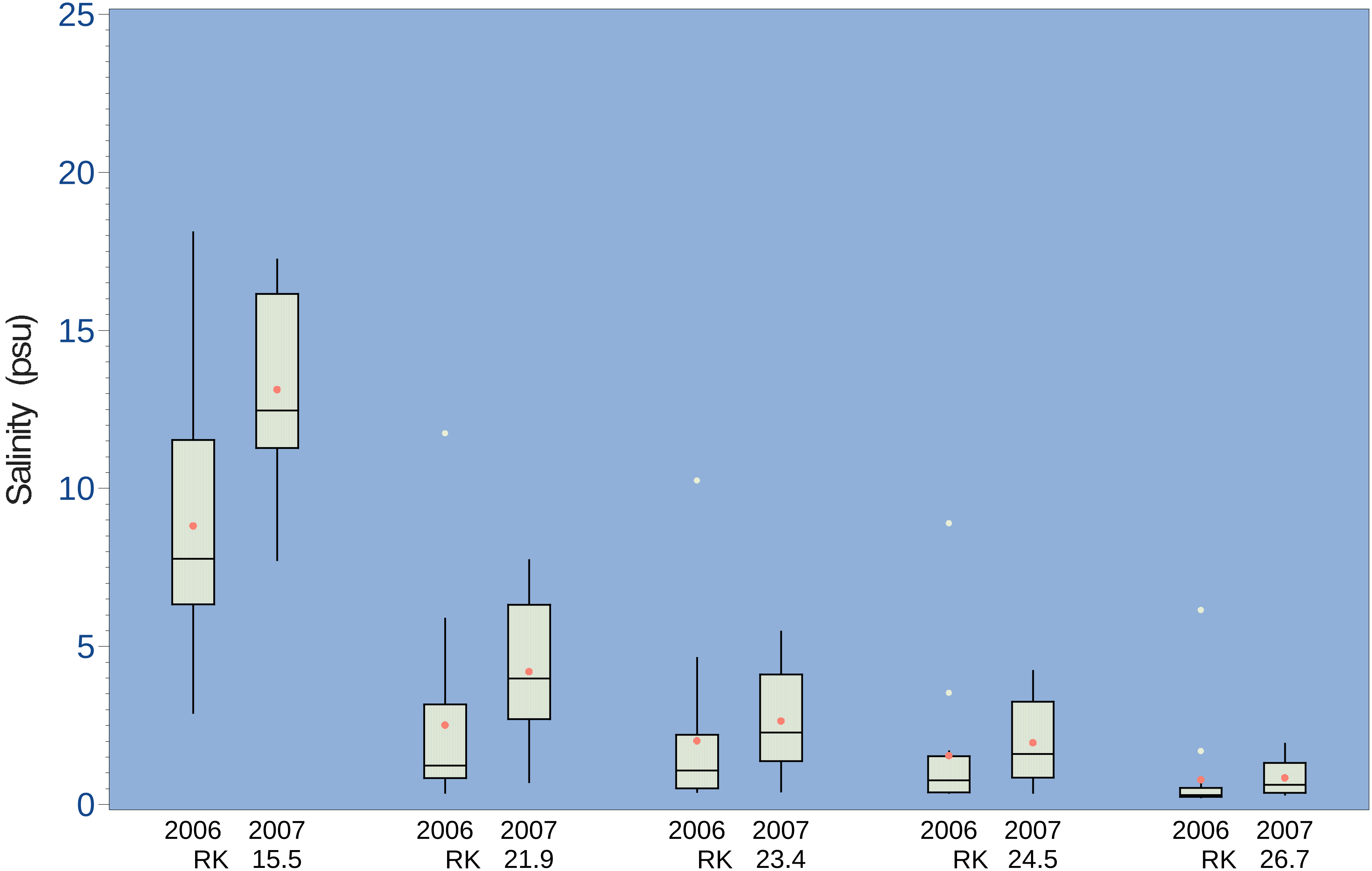


Figure 4.103 Boxplots of average daily salinities by location (RK), without (pre-test) and with (test) withdrawals)
Range of flows 130-150 cfs (above 130 cfs permit threshold)

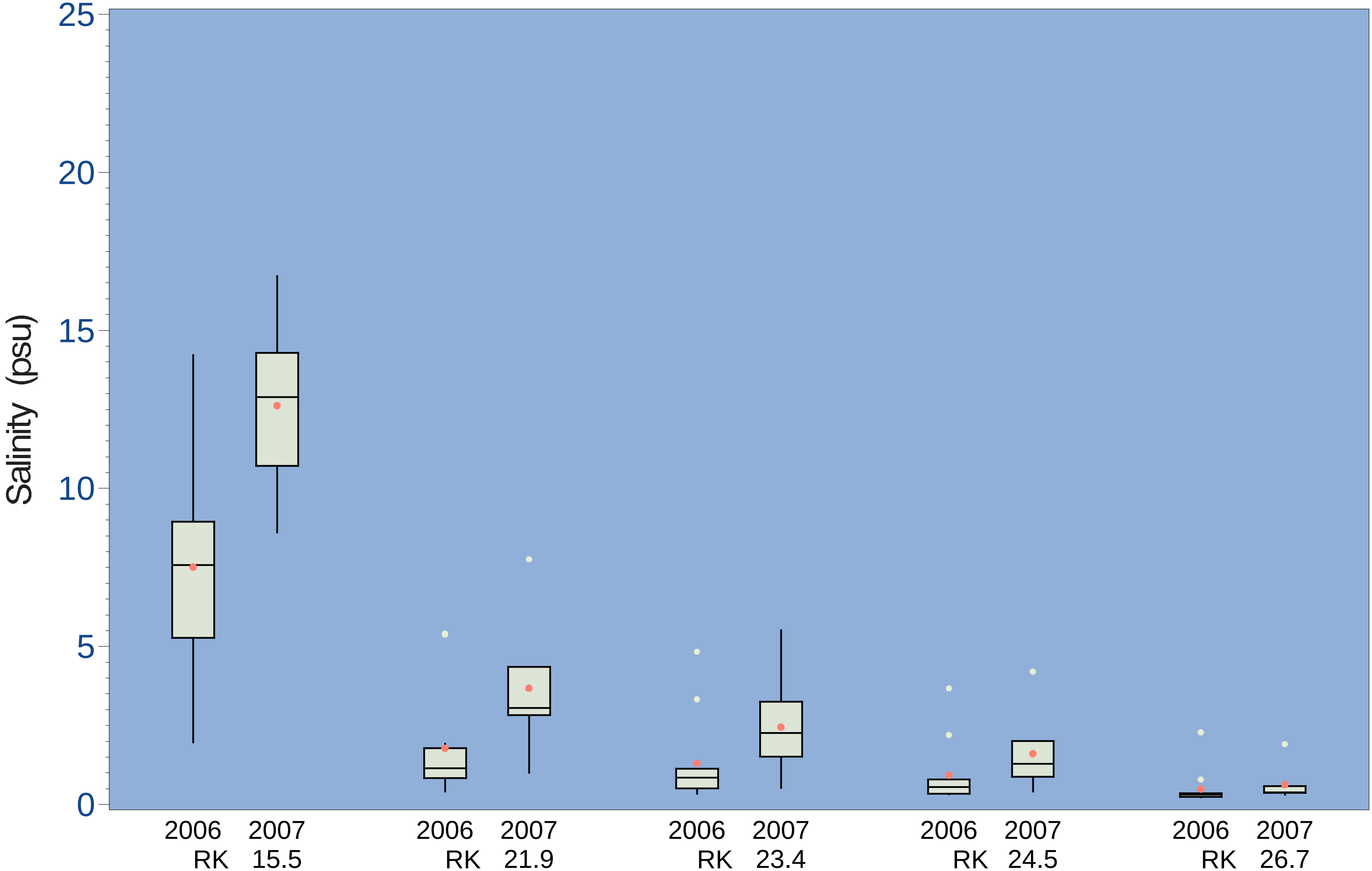


Figure 4.104 Boxplots of average daily salinities by location (RK), without (pre-test) and with (test) withdrawals)
Range of flows 150-170 cfs (above 130 cfs permit threshold)

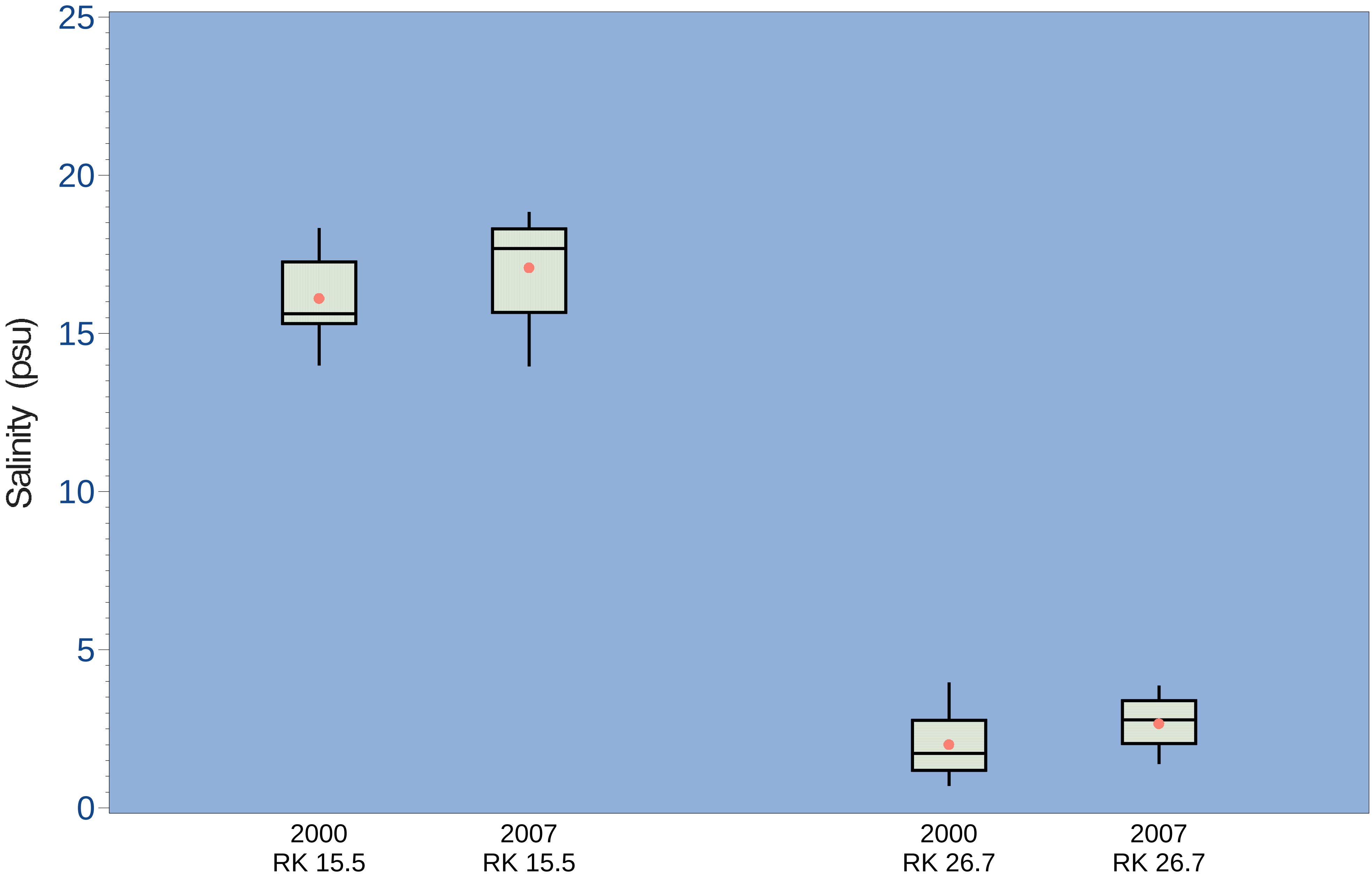


Figure 4.105 Boxplots of average daily salinities by location (RK), without (2000) and with (2007) withdrawals)
Range of flows 50-70 cfs (below temporary 90 cfs cutoff)

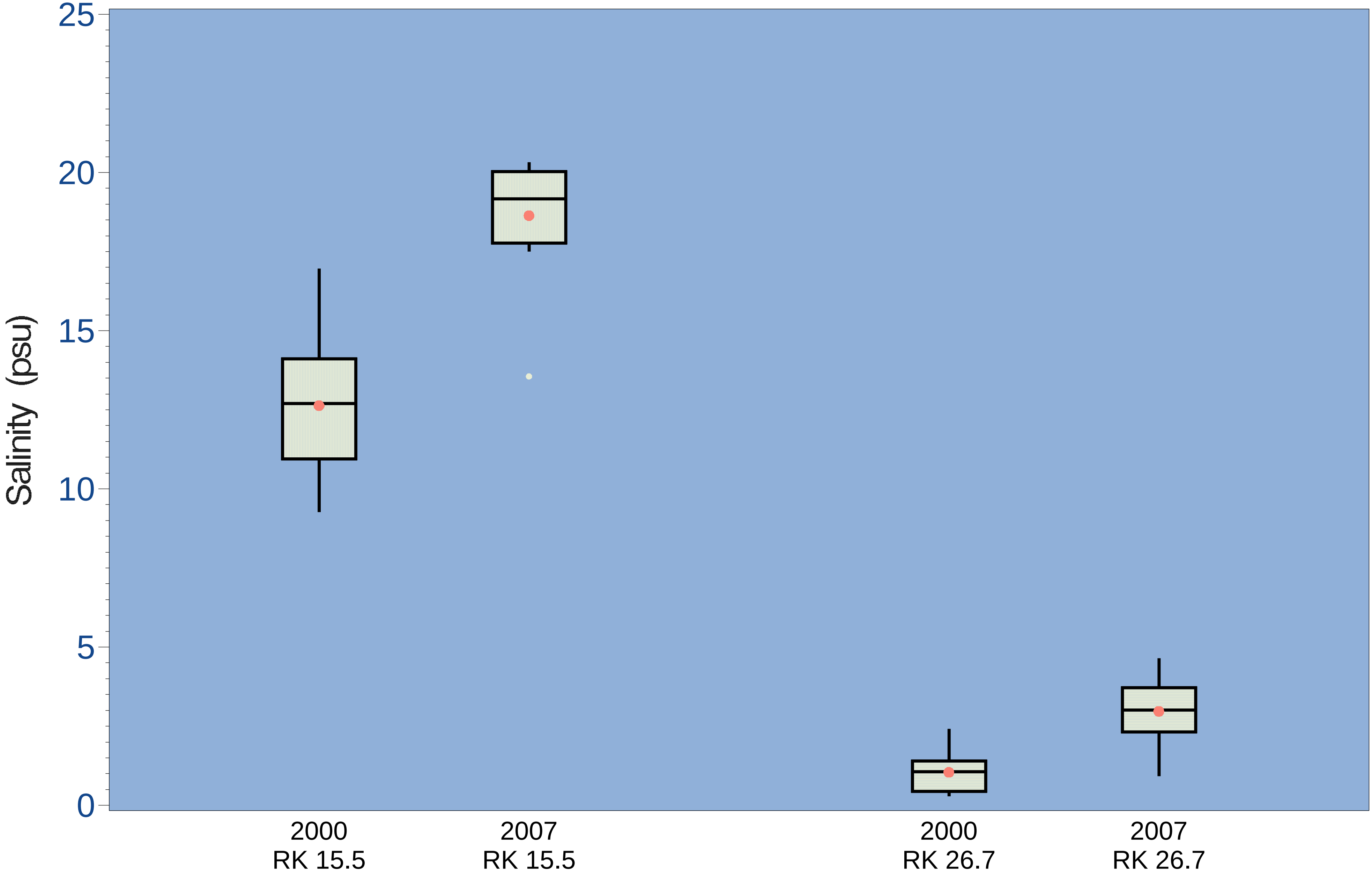


Figure 4.106 Boxplots of average daily salinities by location (RK), without (2000) and with (2007) withdrawals)
Range of flows 70-90 cfs (below temporary 90 cfs cutoff)

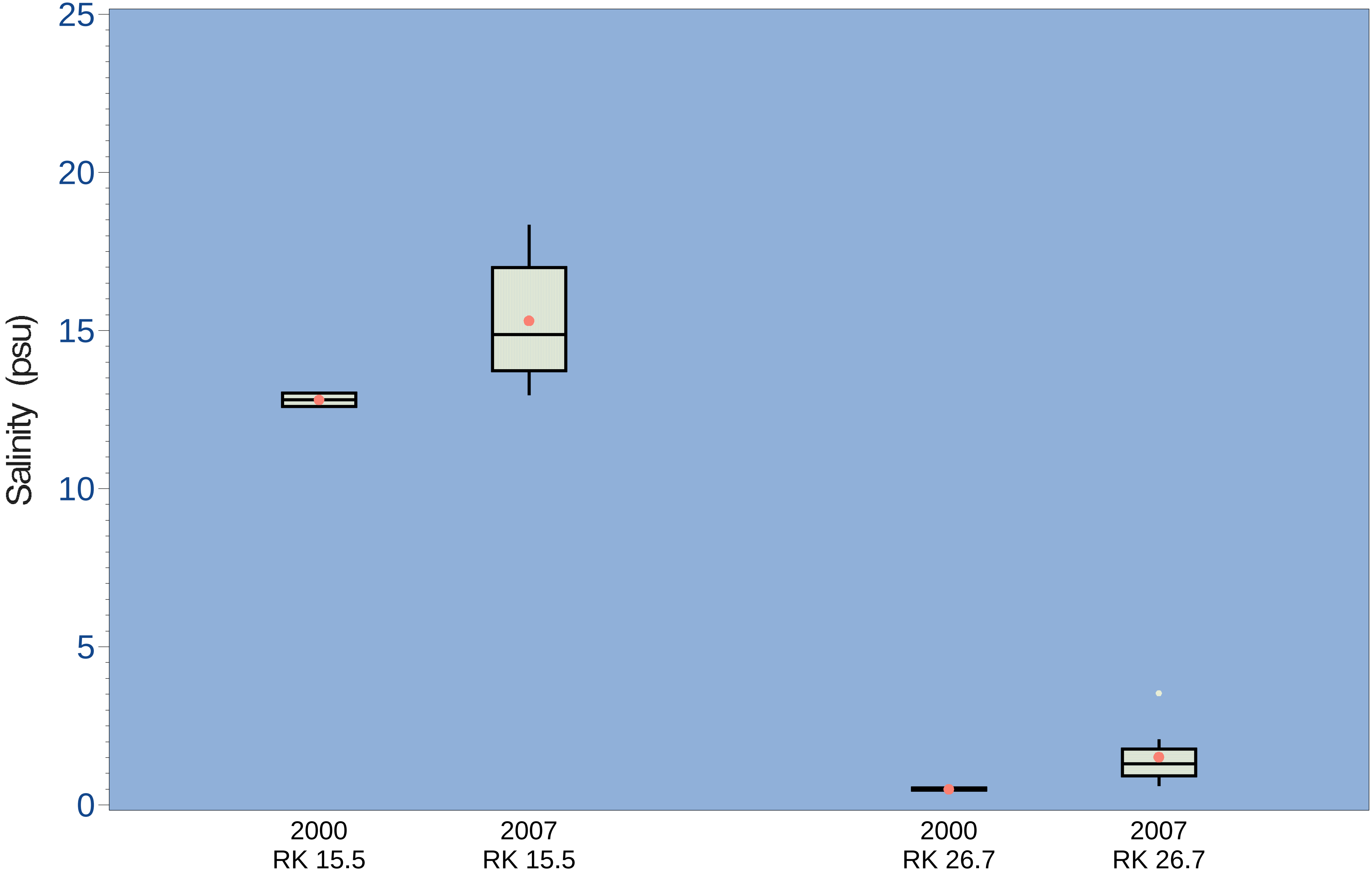


Figure 4.107 Boxplots of average daily salinities by location (RK), without (2000) and with (2007) withdrawals)
Range of flows 90-110 cfs (above temporary 90 cfs cutoff and below previous 130 cfs permit threshold)

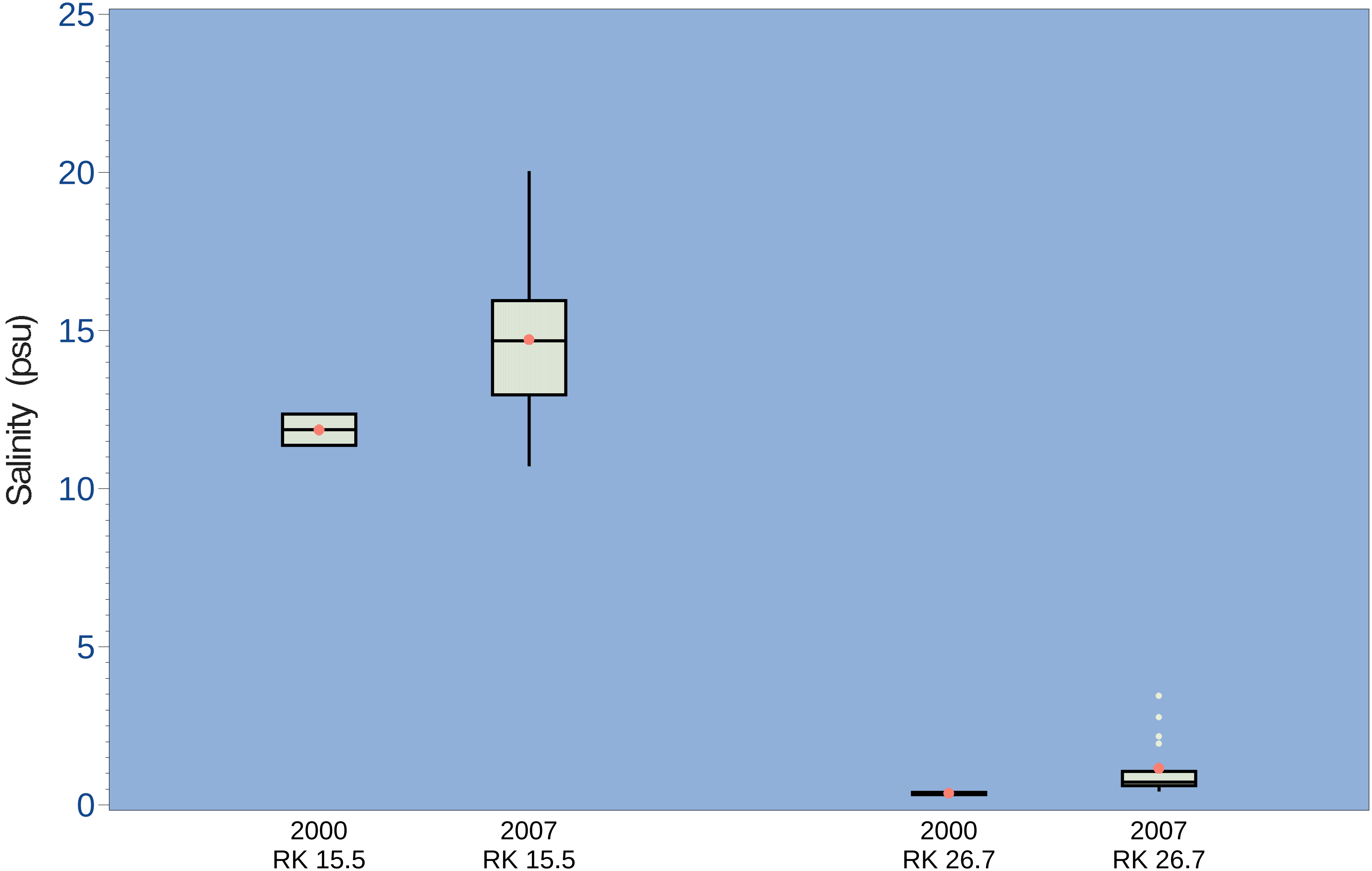


Figure 4.108 Boxplots of average daily salinities by location (RK), without (pre-test) and with (test) withdrawals)
Range of flows 110-130 cfs (above temporary 90 cfs cutoff and below previous 130 cfs permit threshold)

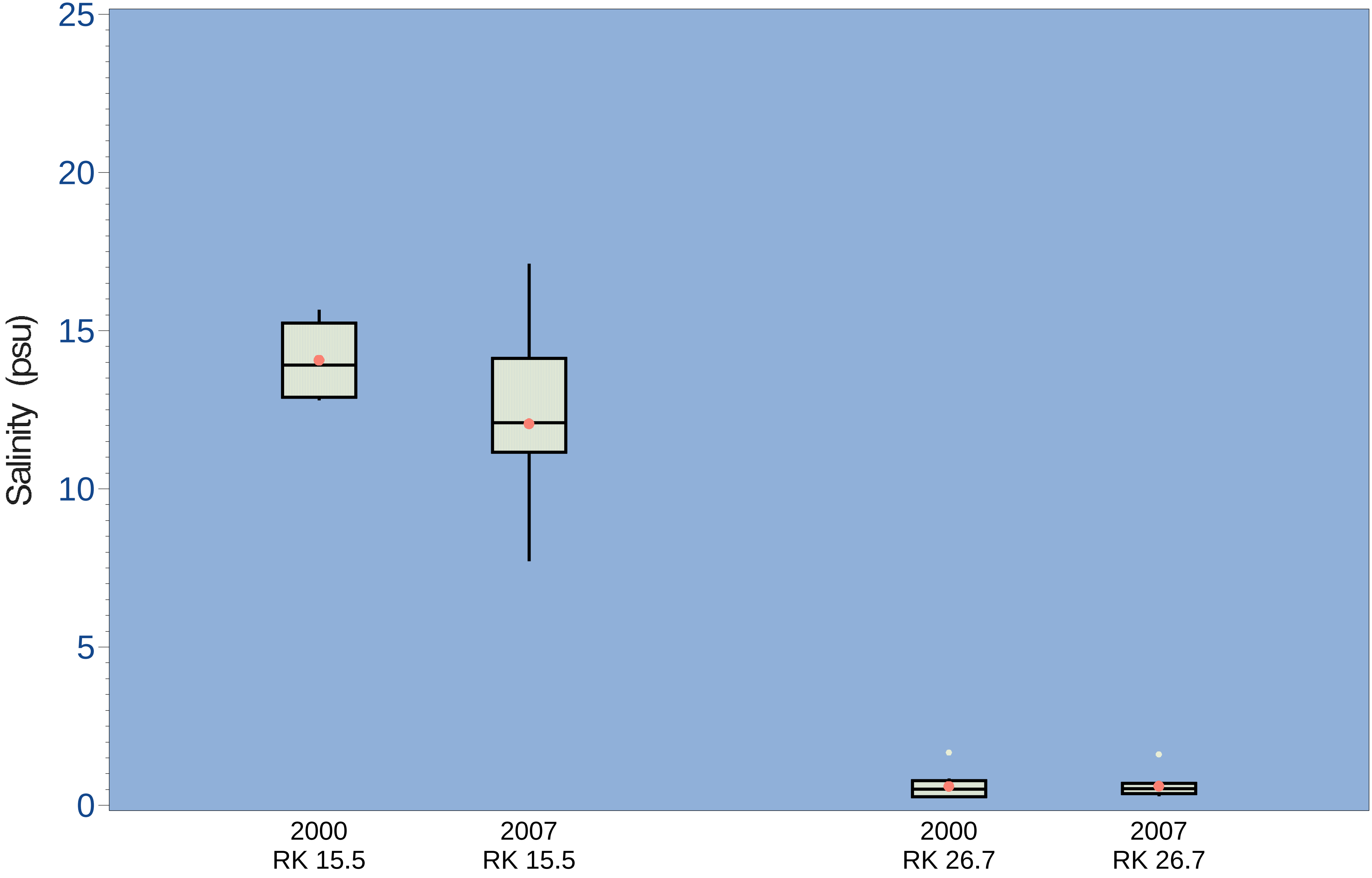


Figure 4.109 Boxplots of average daily salinities by location (RK), without (2000) and with (2007) withdrawals)
Range of flows 130-150 cfs (above 130 cfs permit threshold)

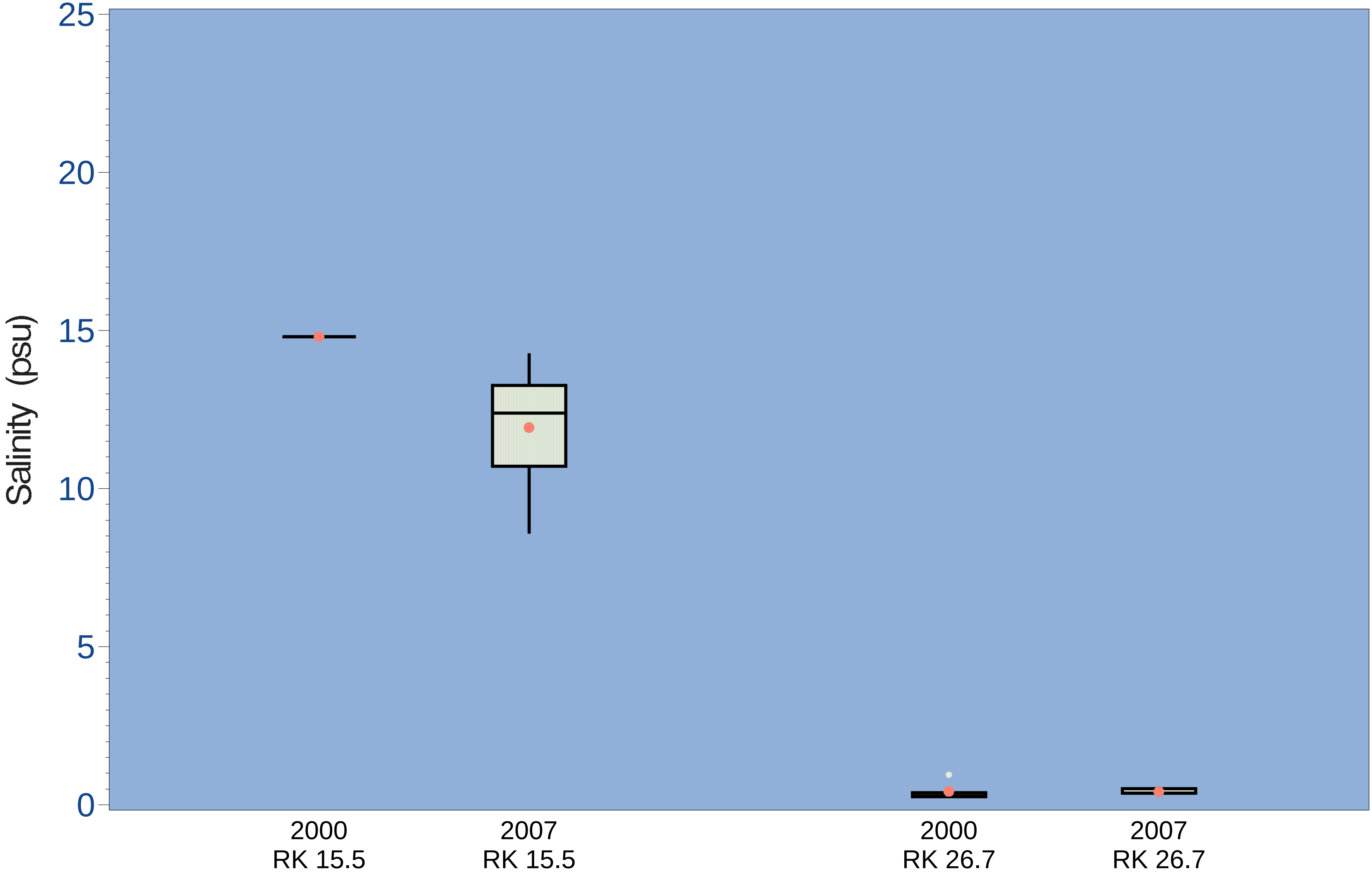


Figure 4.110 Boxplots of average daily salinities by location (RK), without (2000) and with (2007) withdrawals)
Range of flows 150-170 cfs (above 130 cfs permit threshold)

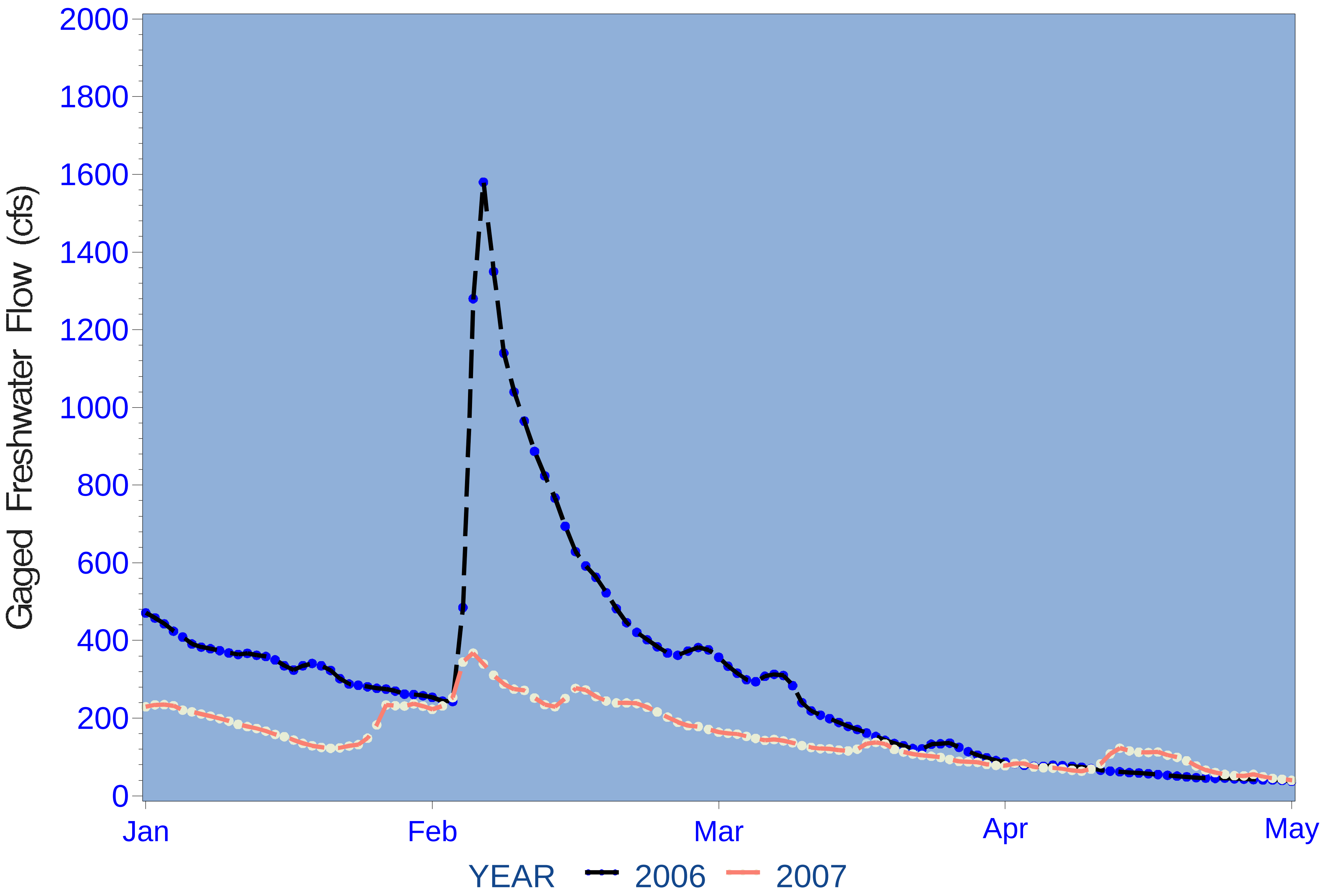


Figure 4.111 Comparisons of daily gaged Peace River flow (cfs) at Arcadia during winter/spring 2006 and 2007 dry seasons)

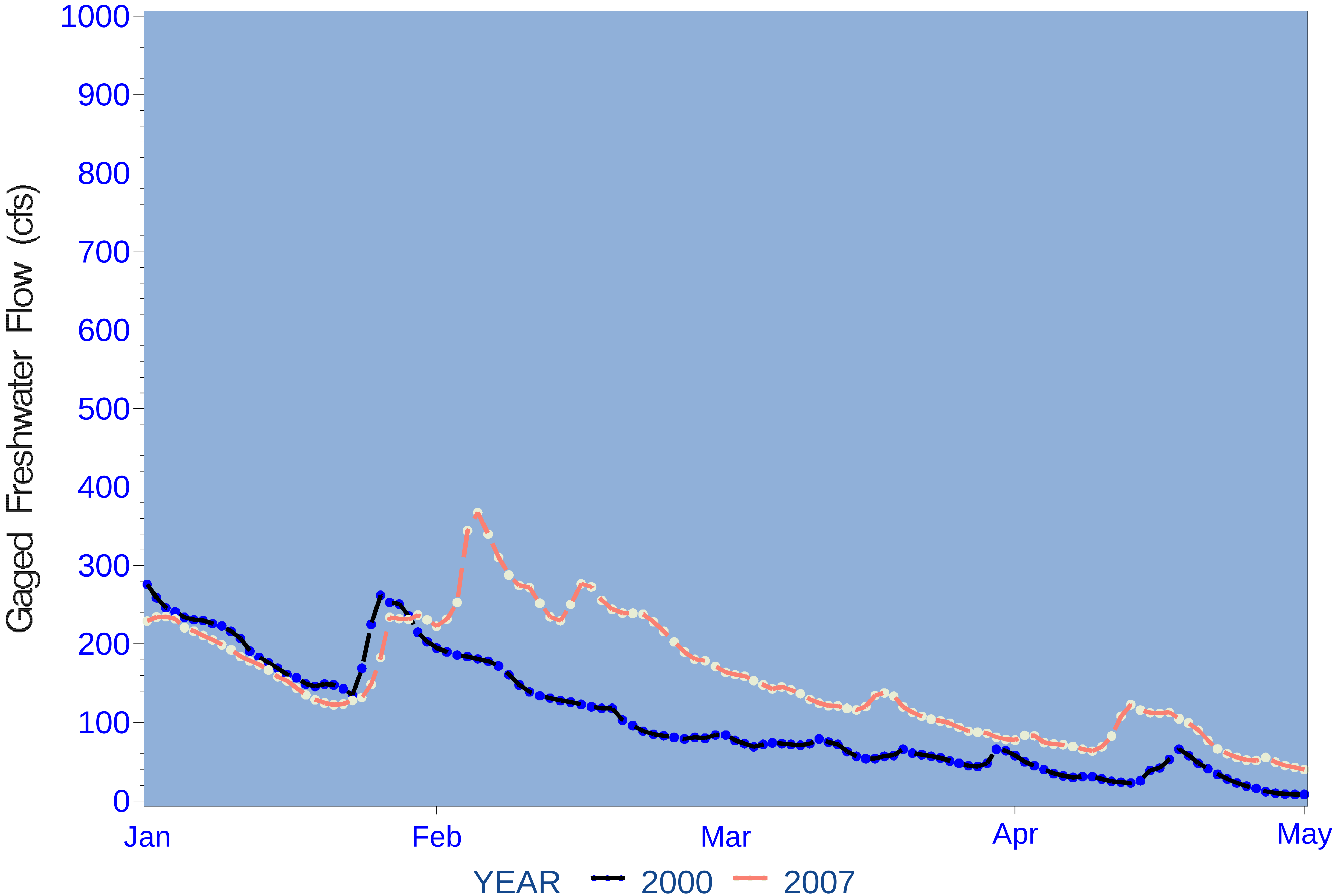


Figure 4.112 Comparisons of daily gaged Peace River flow (cfs) at Arcadia during winter/spring 2006 and 2007 dry seasons)

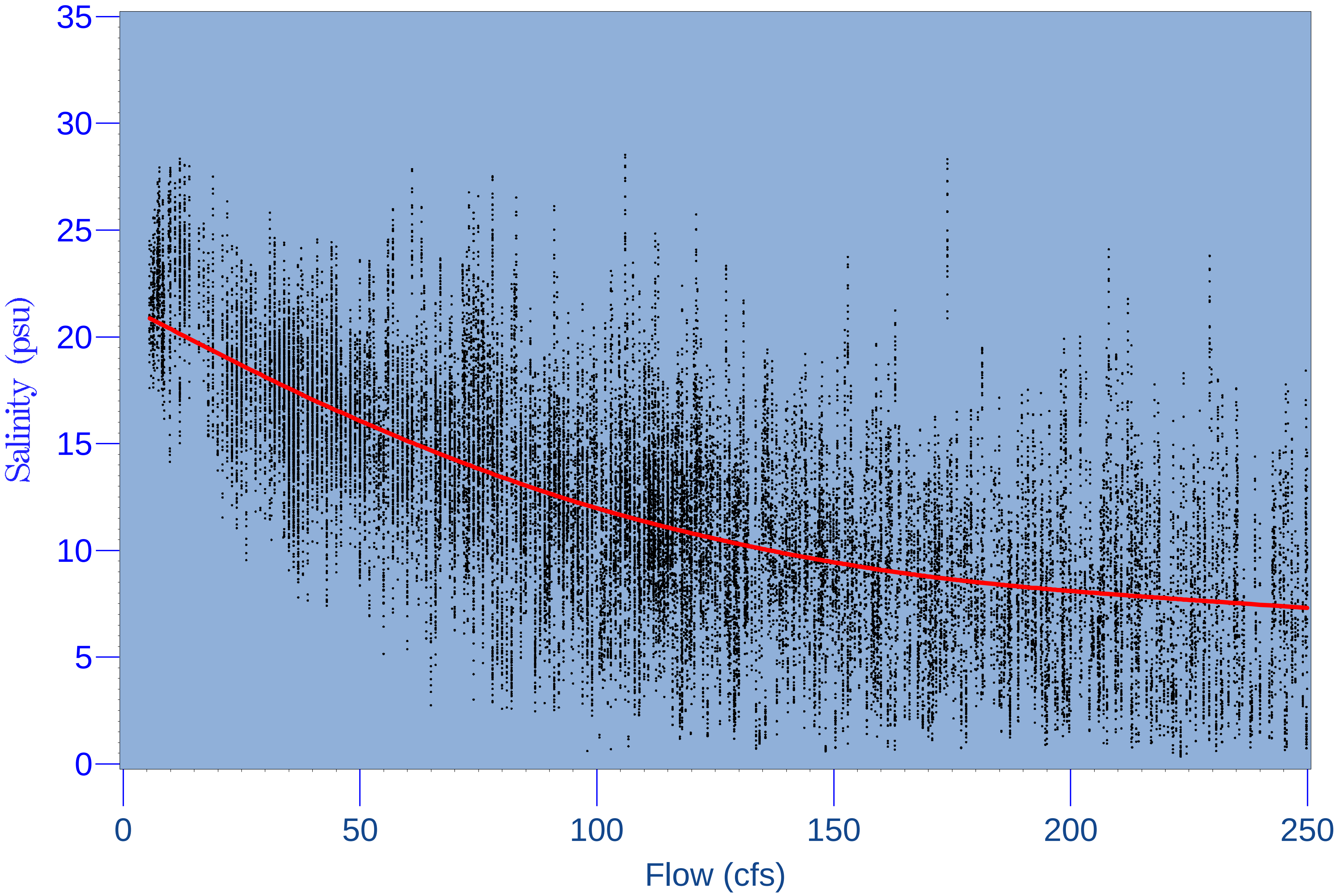


Figure 4.113 Surface salinity at USGS Harbour Height gage (RK 15.5) versus Peace River at Arcadia flow

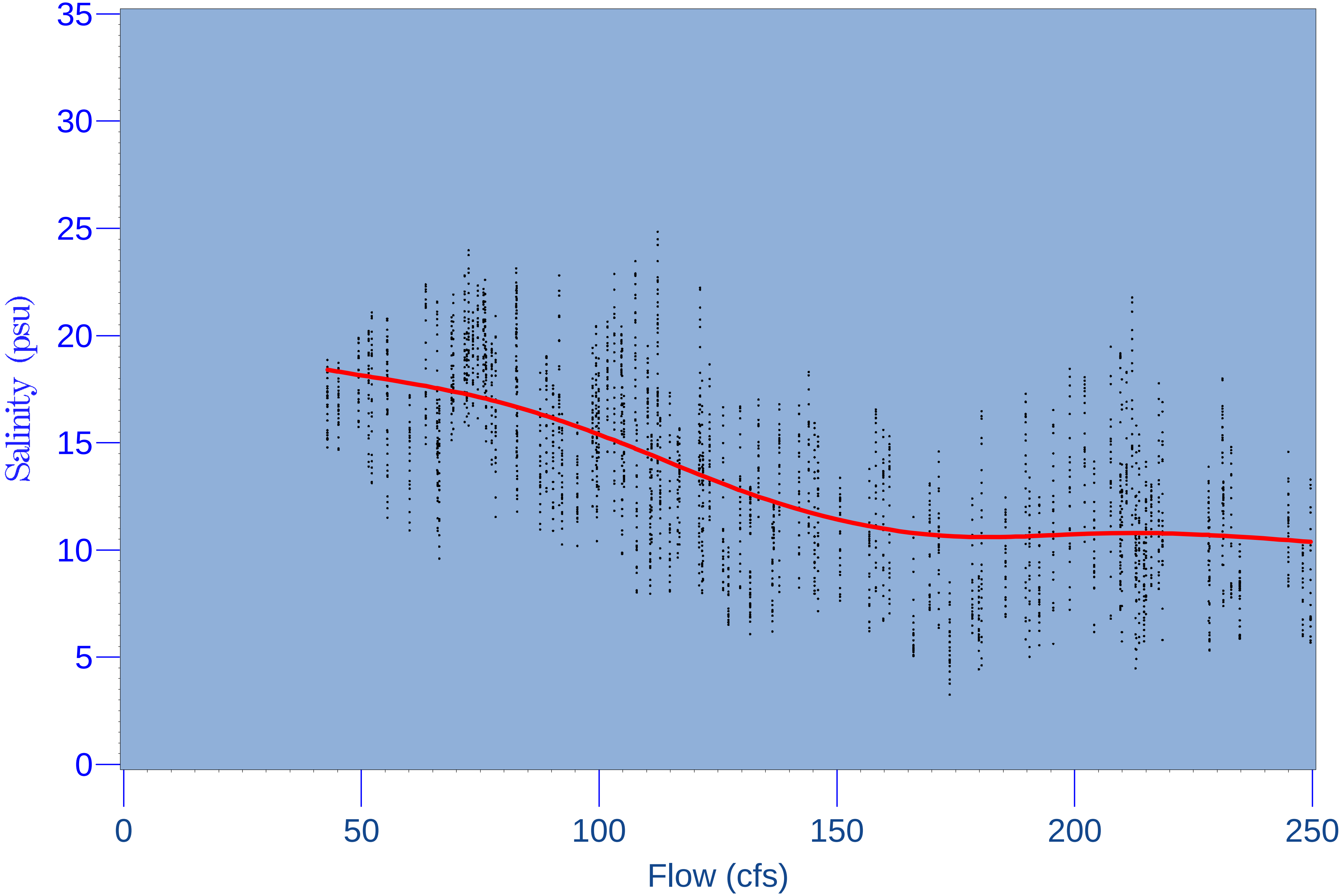


Figure 4.114 Surface salinity at USGS Harbour Height gage (RK 15.5) versus Peace River at Arcadia flow

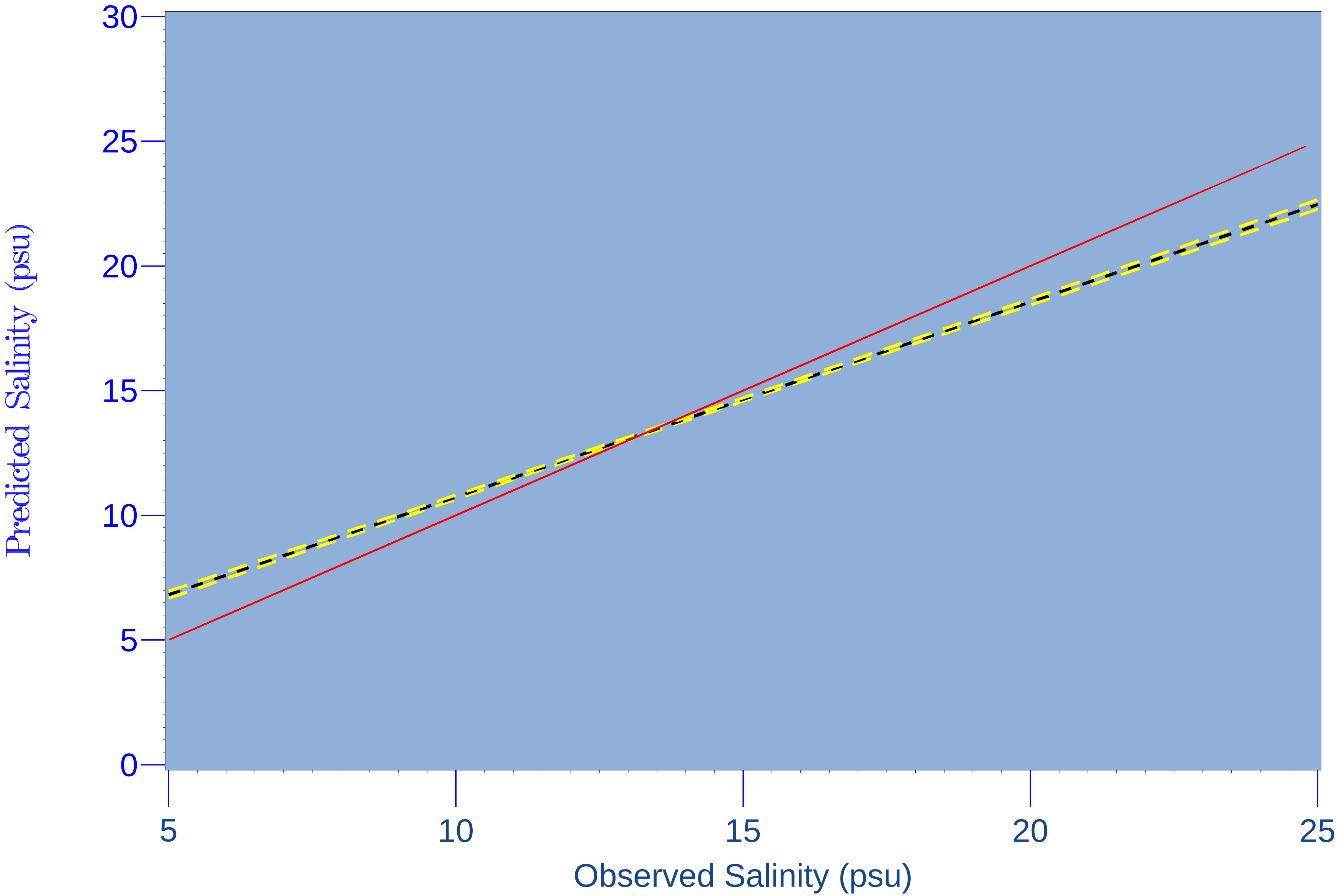


Figure 4.115 Predicted versus observed of modeled surface salinity at Harbour Heights (RK 15.5)

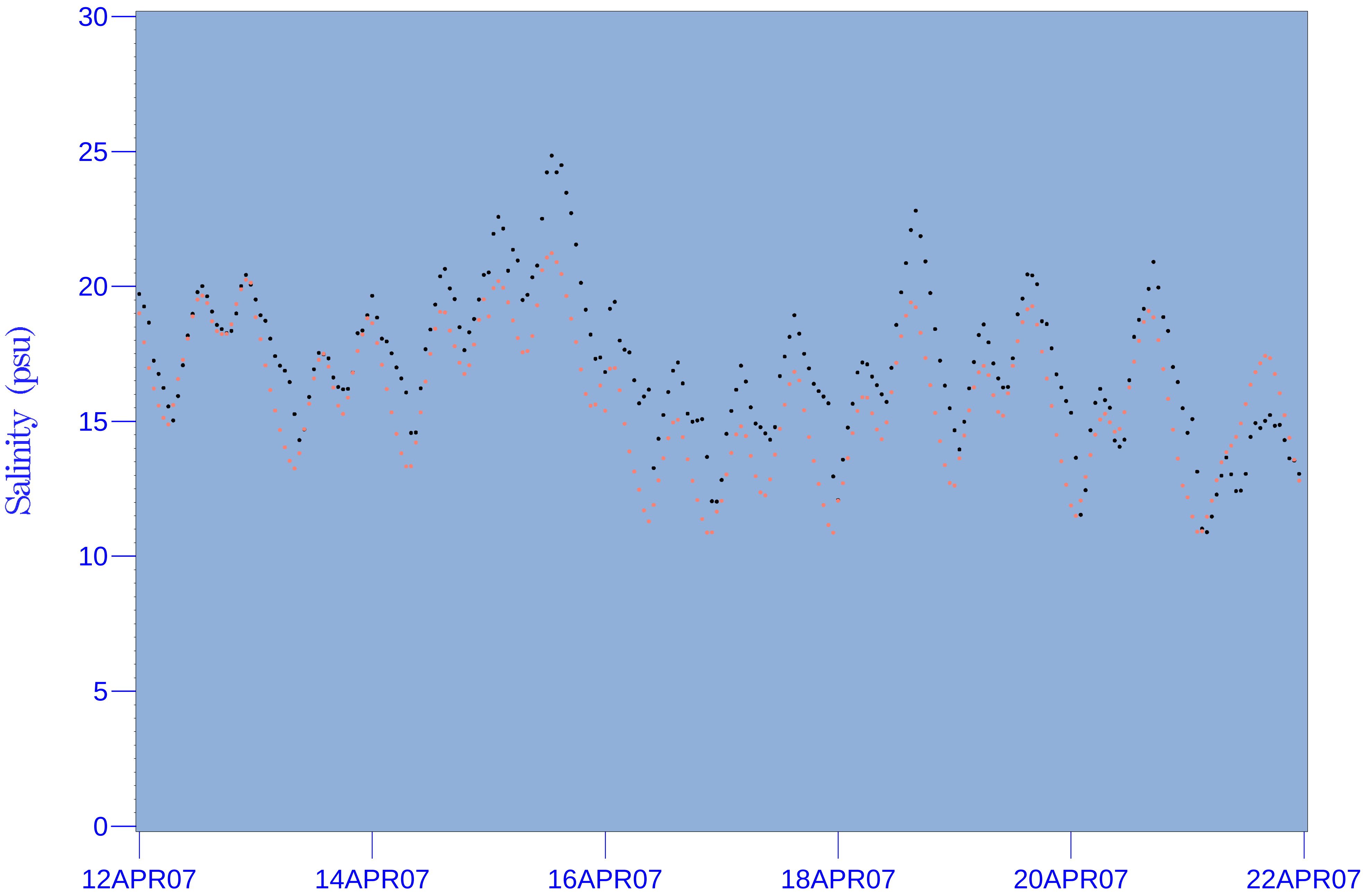


Figure 4.116 Modeled predicted (rose) versus observed (black) surface salinity at Harbour Heights (RK 15.5)
Hourly values April 12th throught April 21st 2007

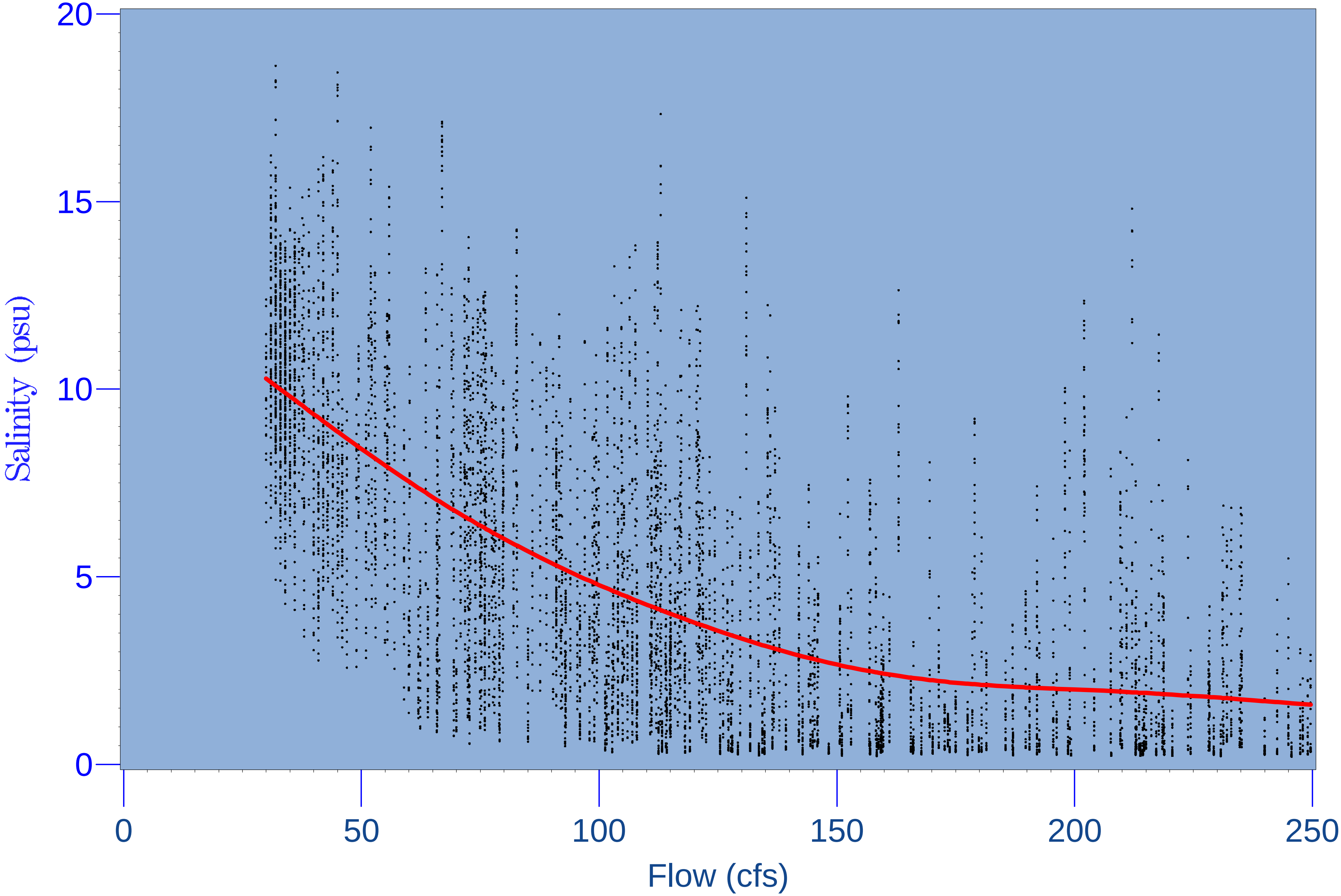


Figure 4.117 Surface salinity at MZ4 gage (RK 21.9) versus Peace River at Arcadia flow

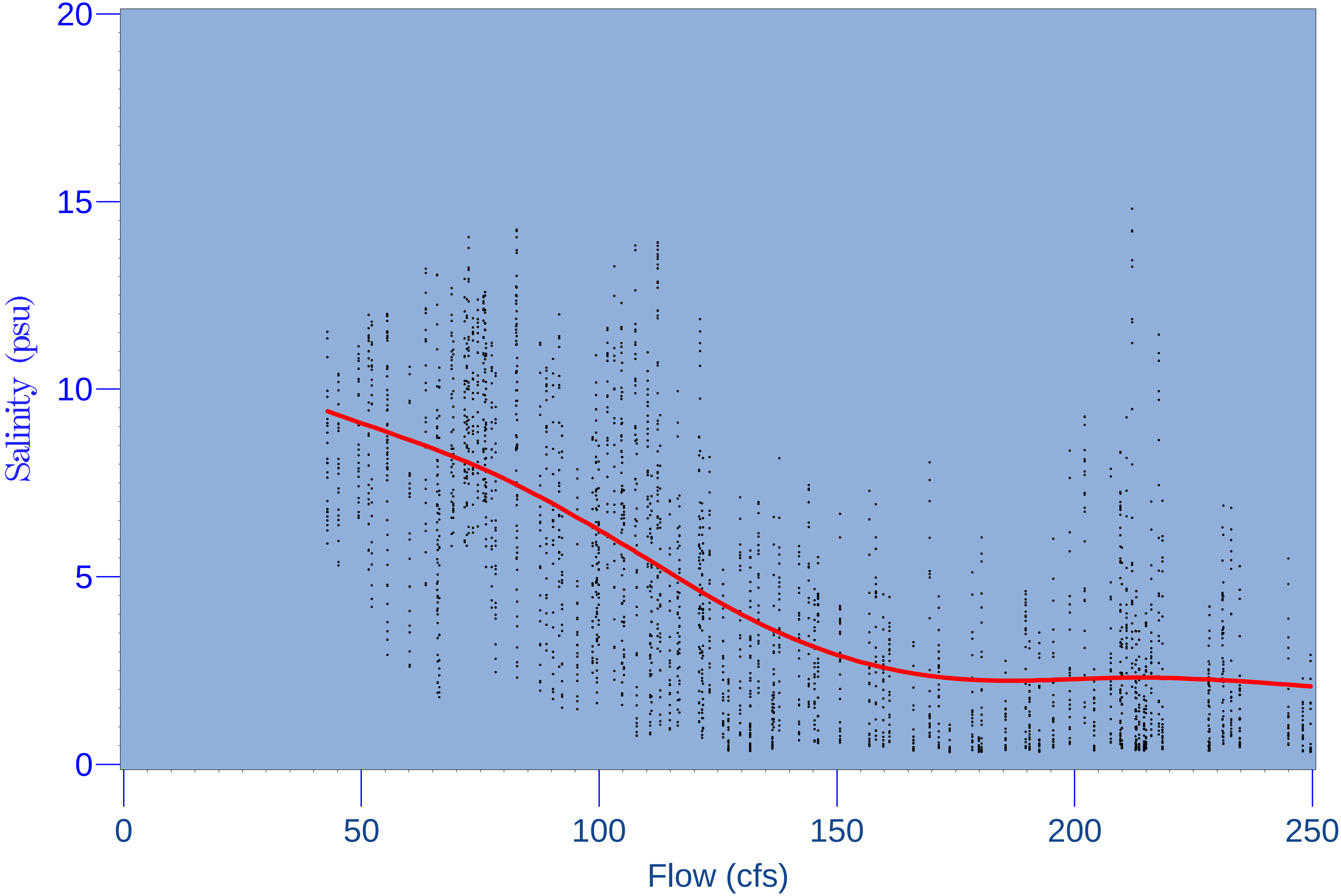


Figure 4.118 Surface salinity at MZ4 gage (RK 21.9) versus Peace River at Arcadia flow

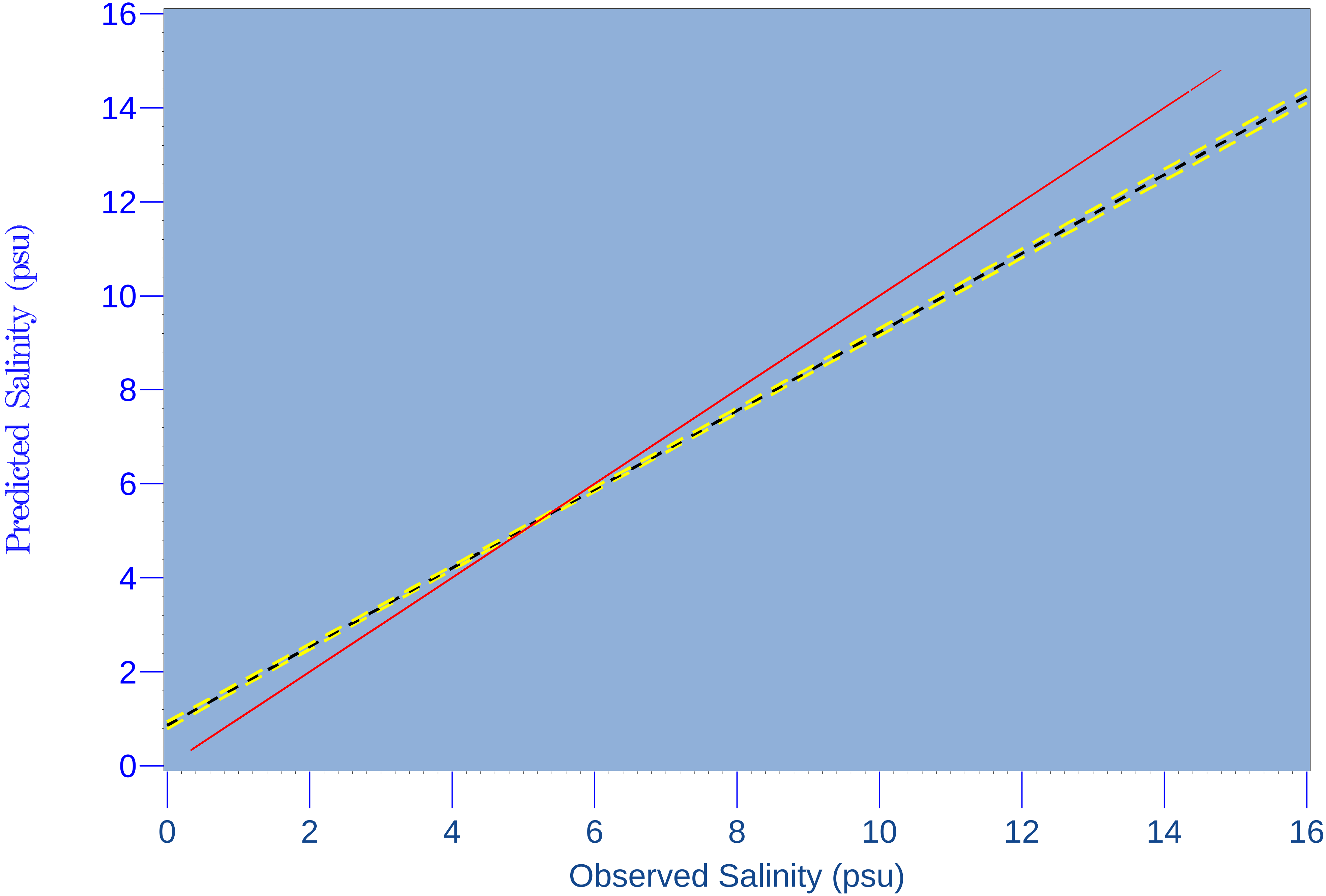


Figure 4.119 Predicted versus observed of modeled surface salinity at MZ4 Peace River HBMP gage (RK 21.9)

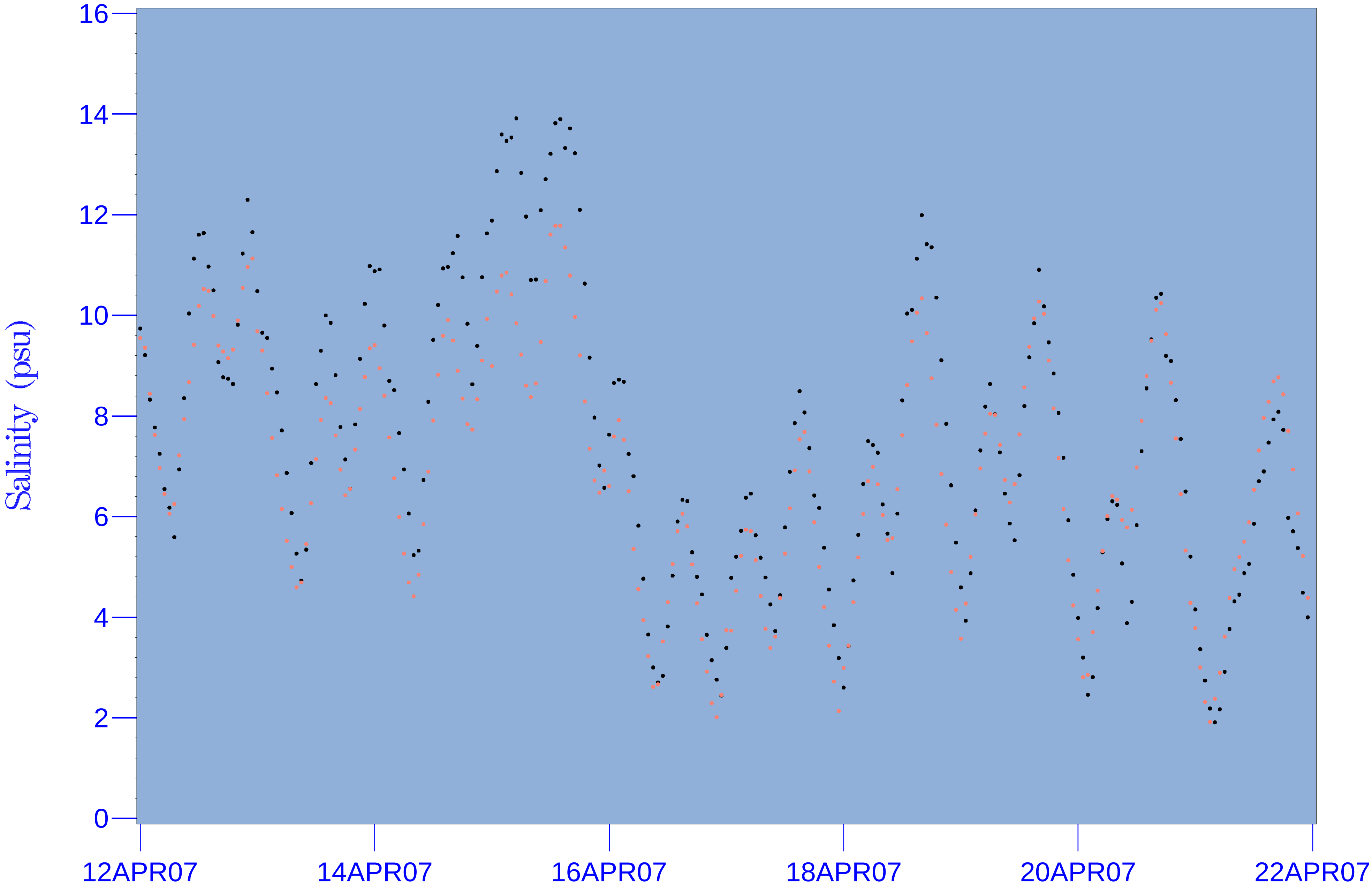


Figure 4.120 Modeled predicted (rose) versus observed (black) surface salinity at MZ4 gage (RK 21.9)

Hourly values April 12th throught April 21st 2007

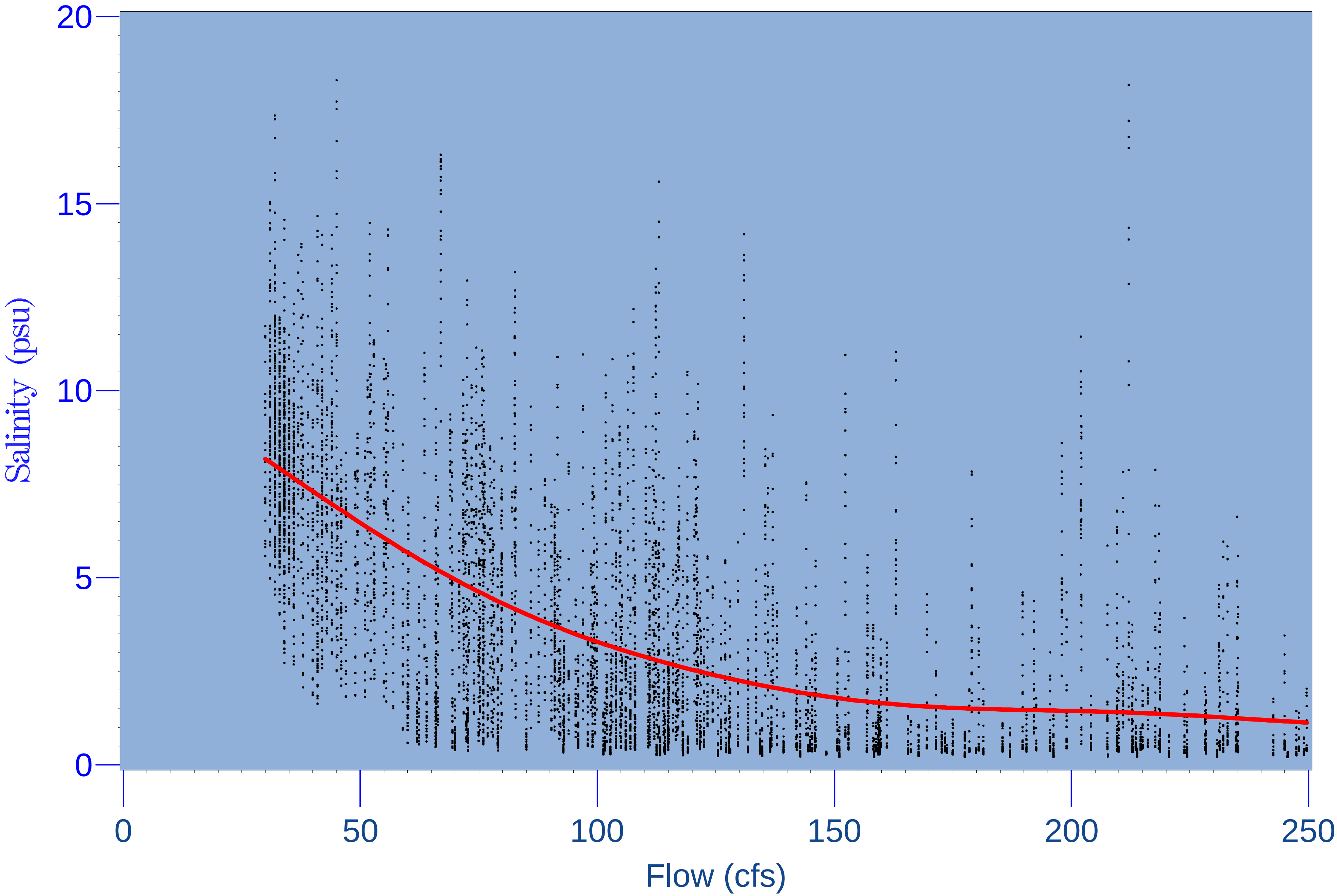


Figure 4.121 Surface salinity at MZ3 gage (RK 23.4) versus Peace River at Arcadia flow

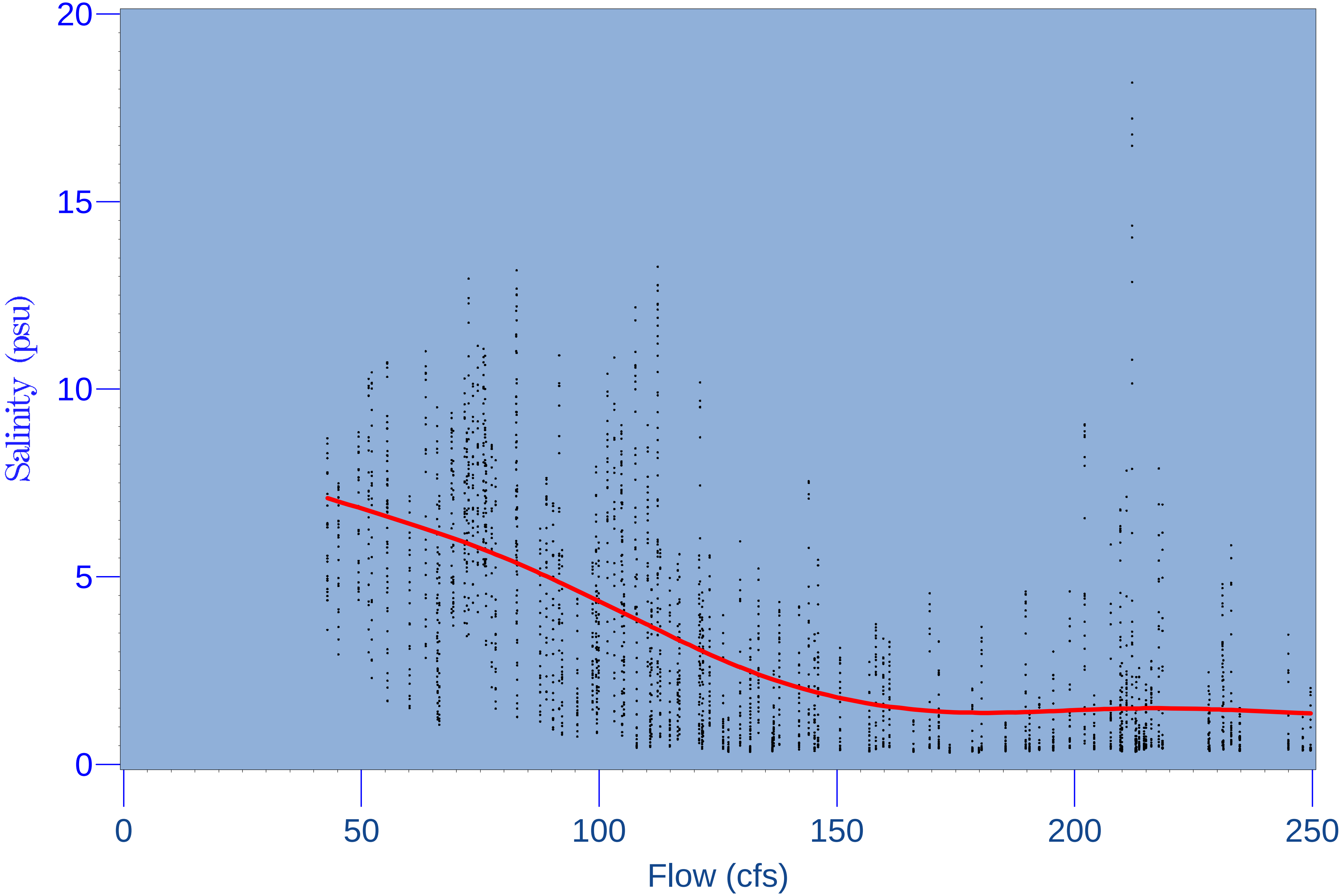


Figure 4.122 Surface salinity at MZ3 gage (RK 23.4) versus Peace River at Arcadia flow

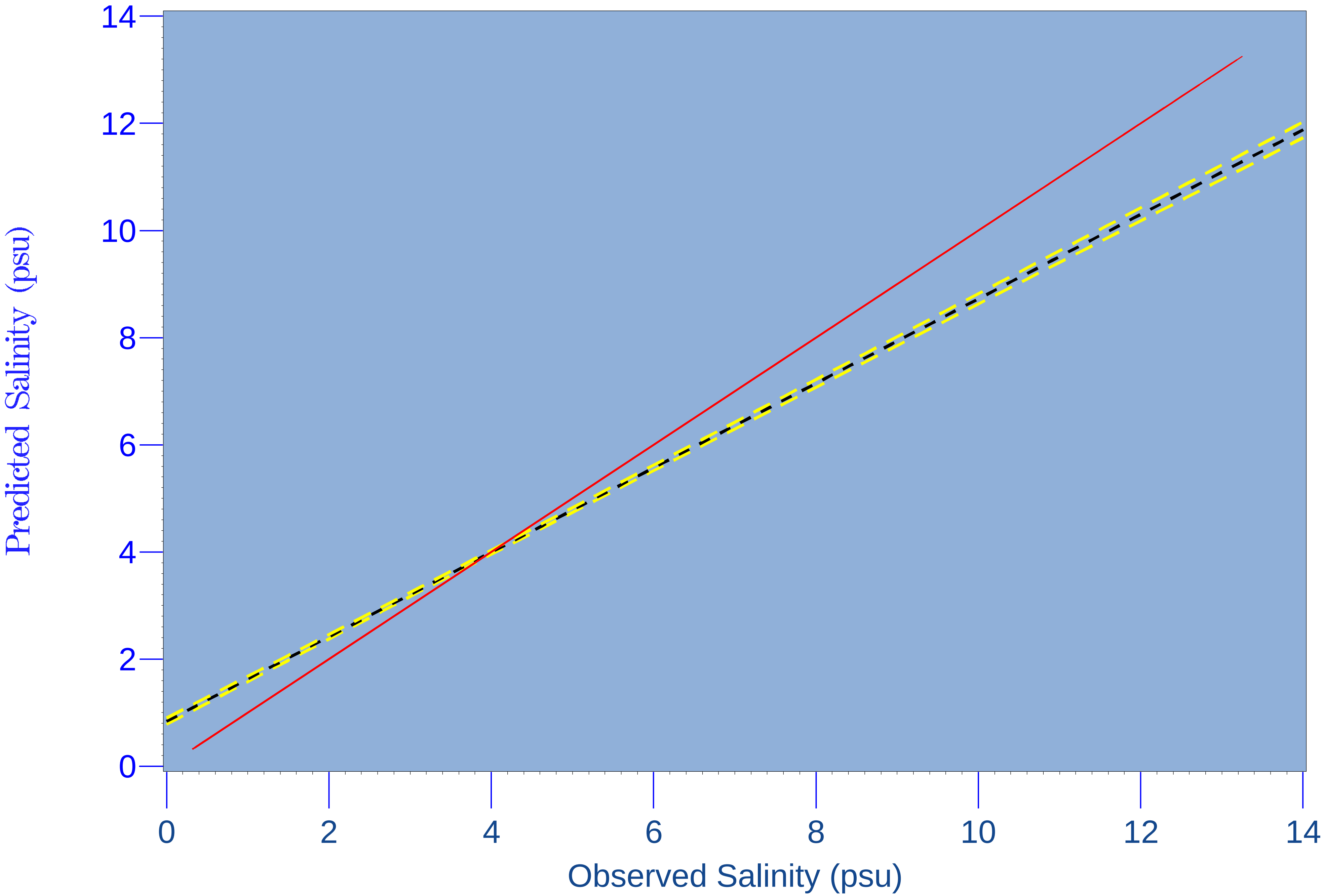


Figure 4.123 Predicted versus observed of modeled surface salinity at MZ3 Peace River HBMP gage (RK 23.4)

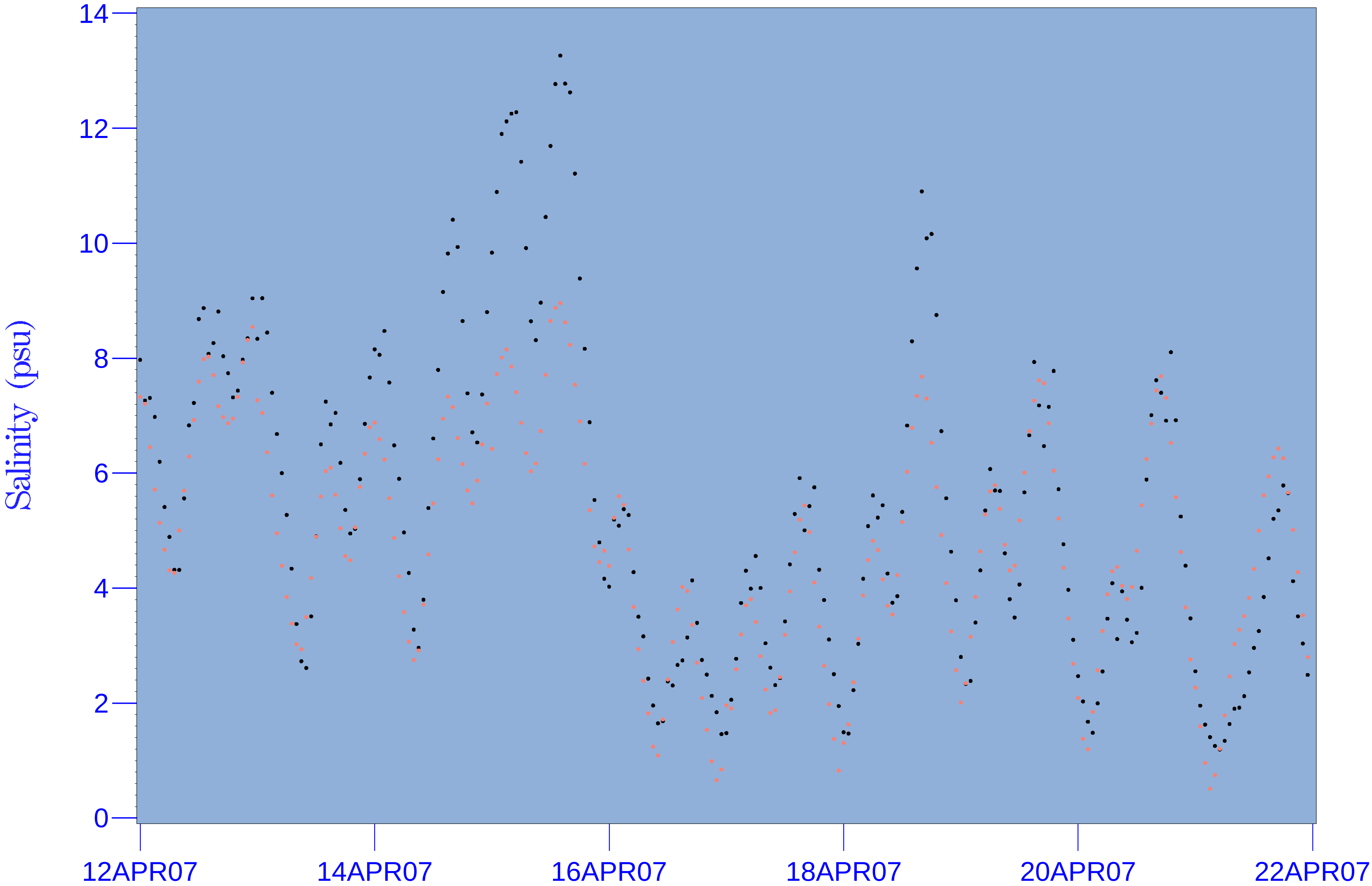


Figure 4.124 Modeled predicted (rose) versus observed (black) surface salinity at MZ3 gage (RK 23.4)
Hourly values April 12th throught April 21st 2007

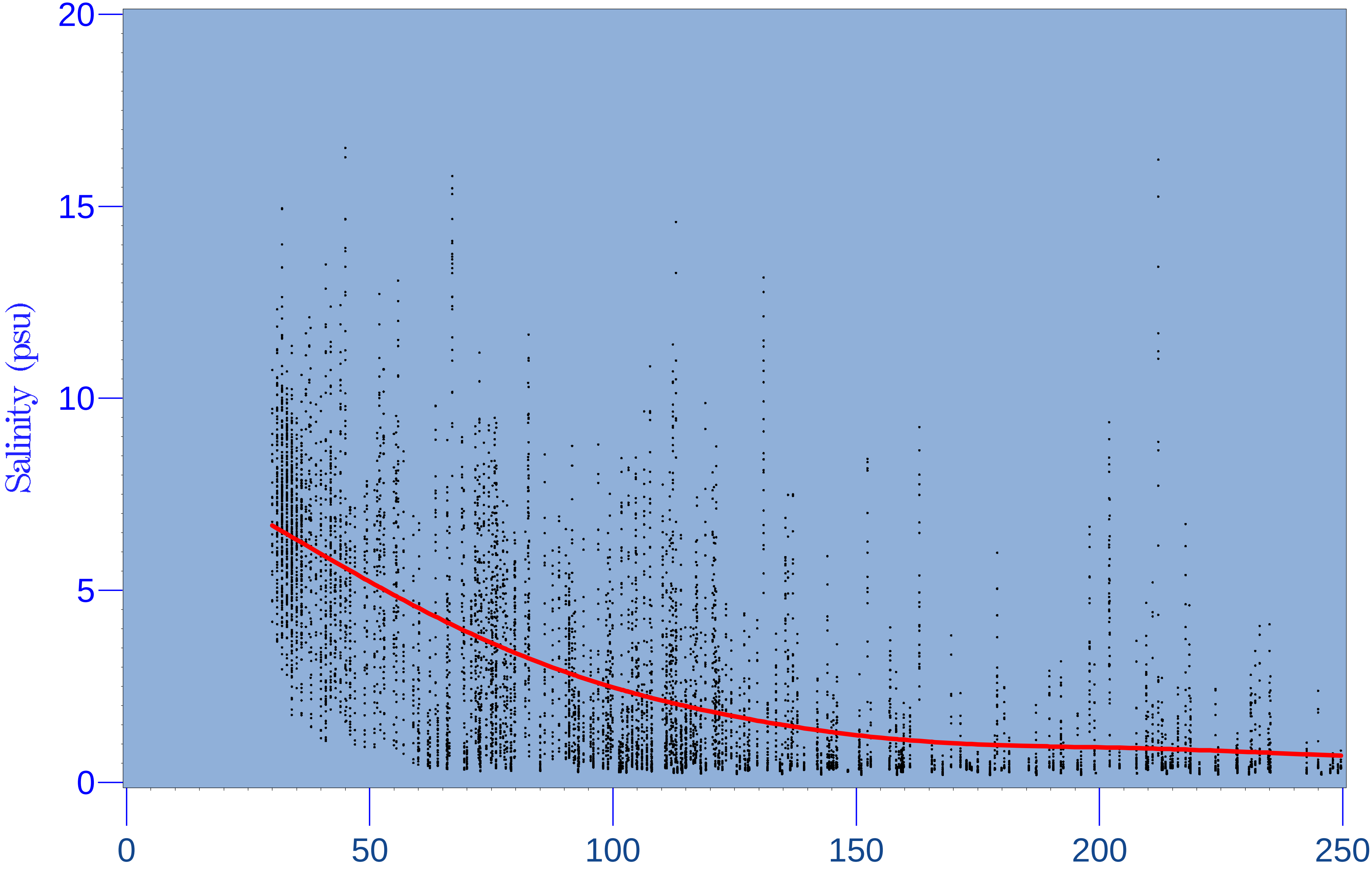


Figure 4.125 Surface salinity at MZ2 gage (RK 24.5) versus Peace River at Arcadia flow

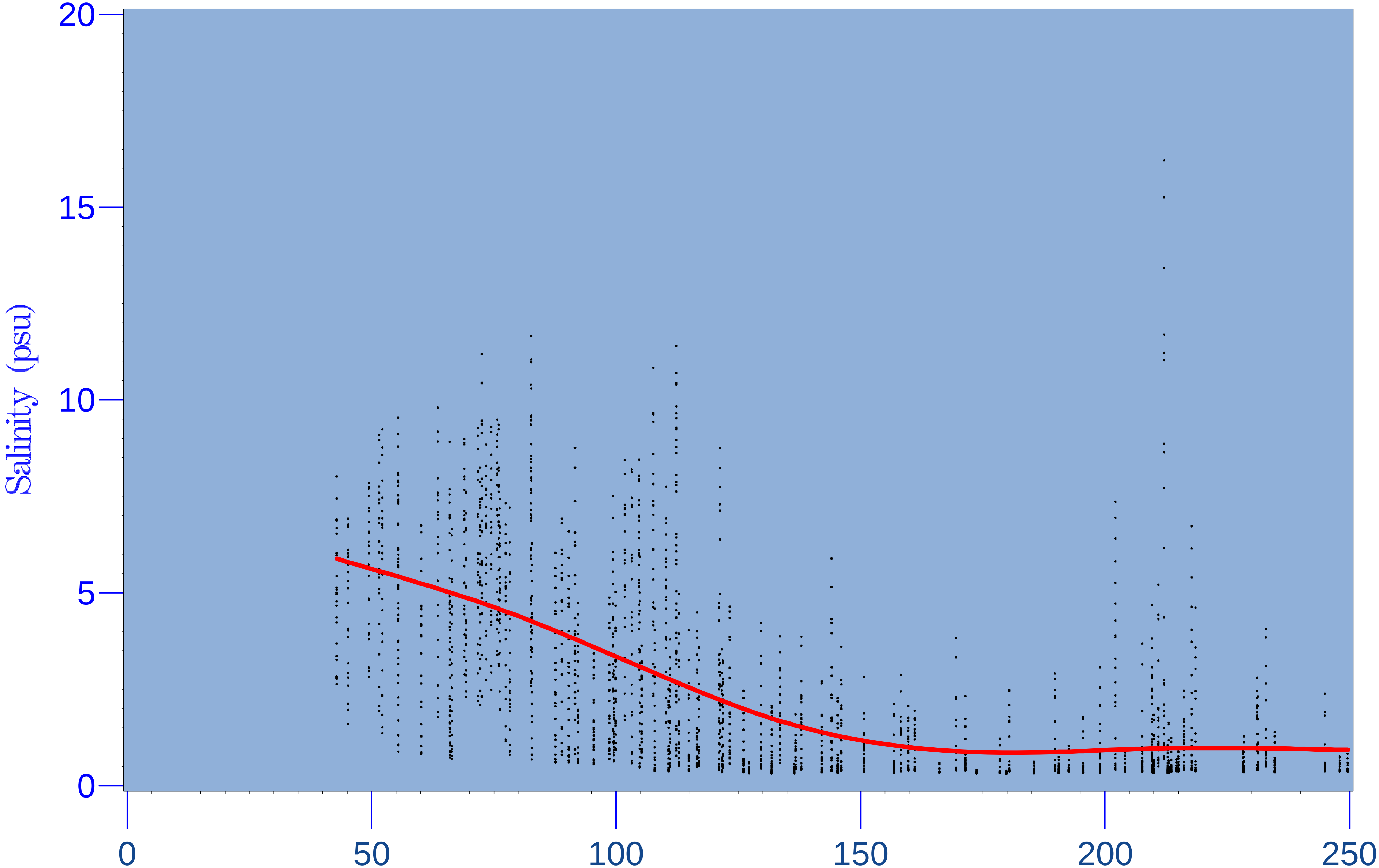


Figure 4.126 Surface salinity at MZ3 gage (RK 24.5) versus Peace River at Arcadia flow

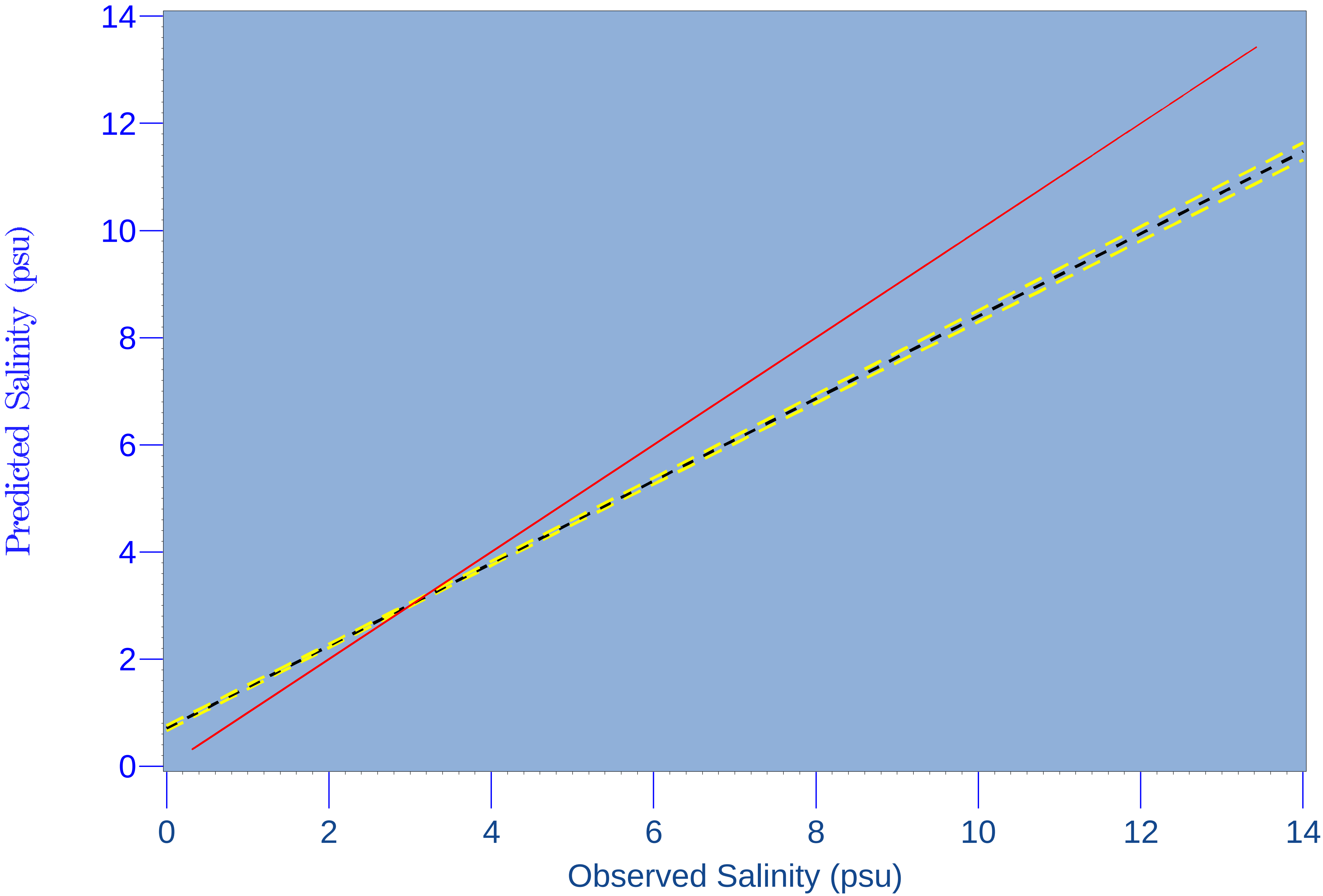


Figure 4.127 Predicted versus observed of modeled surface salinity at MZ2 Peace River HBMP gage (RK 24.5)

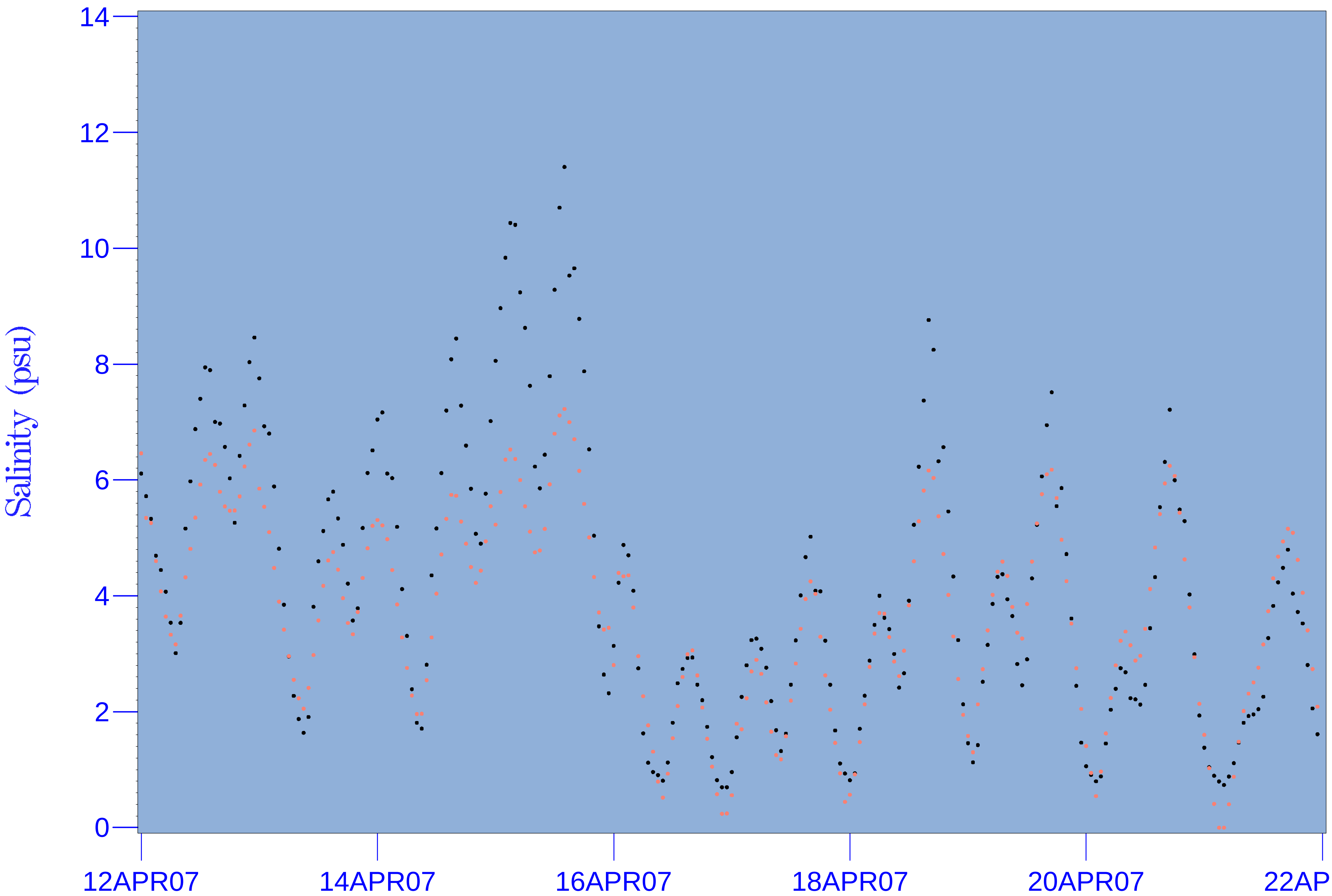


Figure 4.128 Modeled predicted (rose) versus observed (black) of surface salinity at MZ2 gage (RK 24.5)
Hourly values April 12th throught April 21st 2007

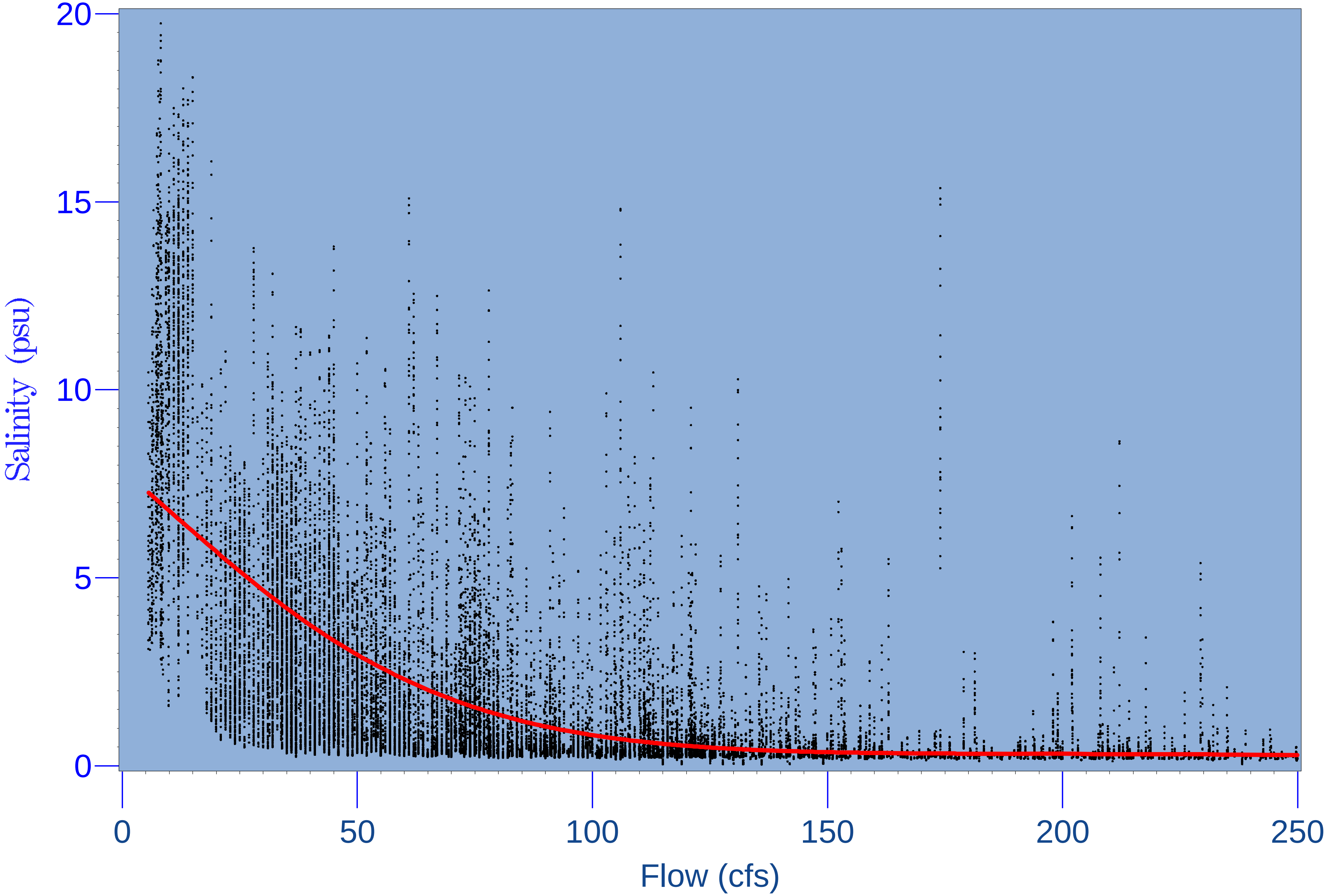


Figure 4.129 Surface salinity at USGS Peace River Heights gage (RK 26.7) versus Peace River at Arcadia flow

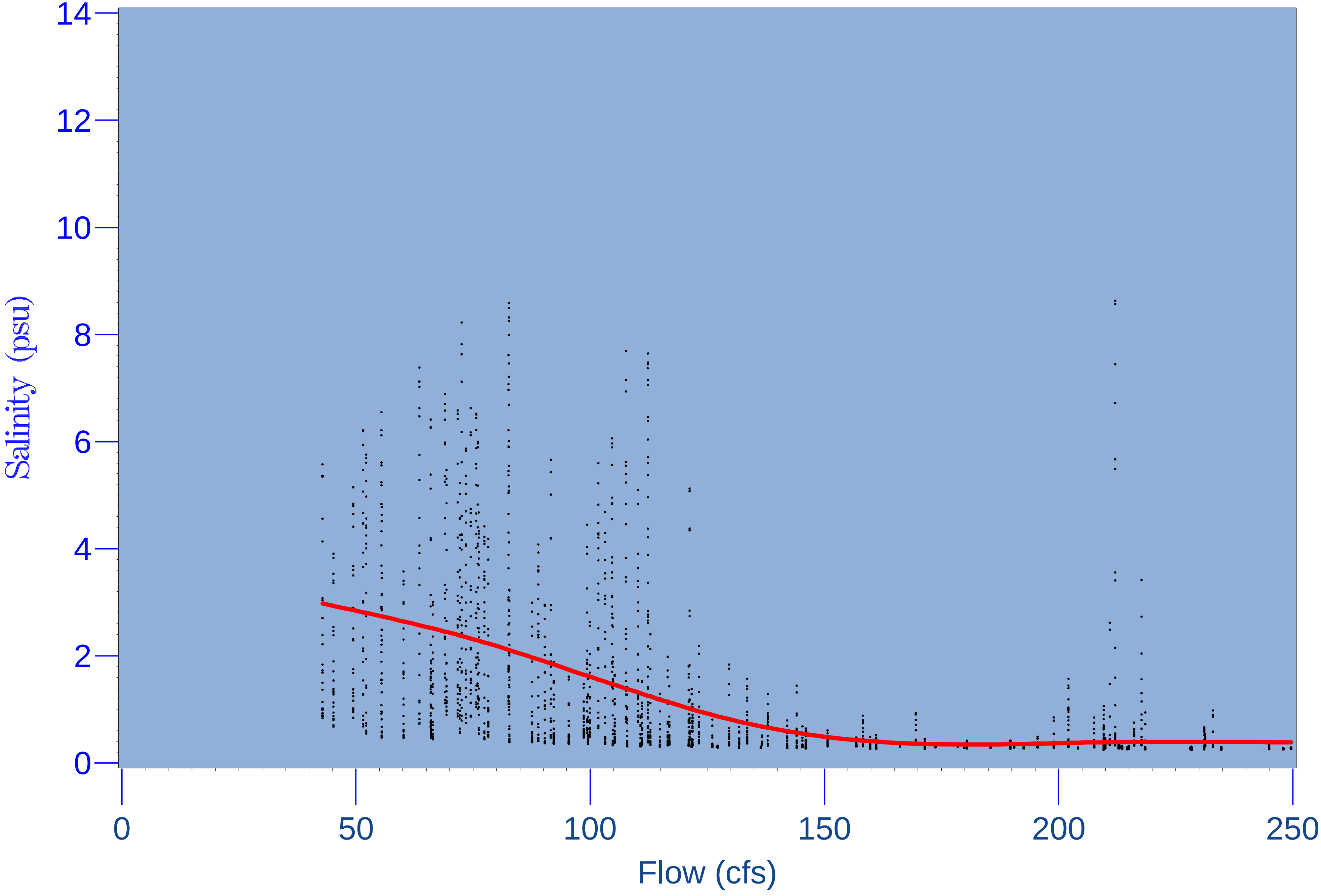


Figure 4.130 Surface salinity at USGS Peace River Heights gage (RK 26.7) versus Peace River at Arcadia flow

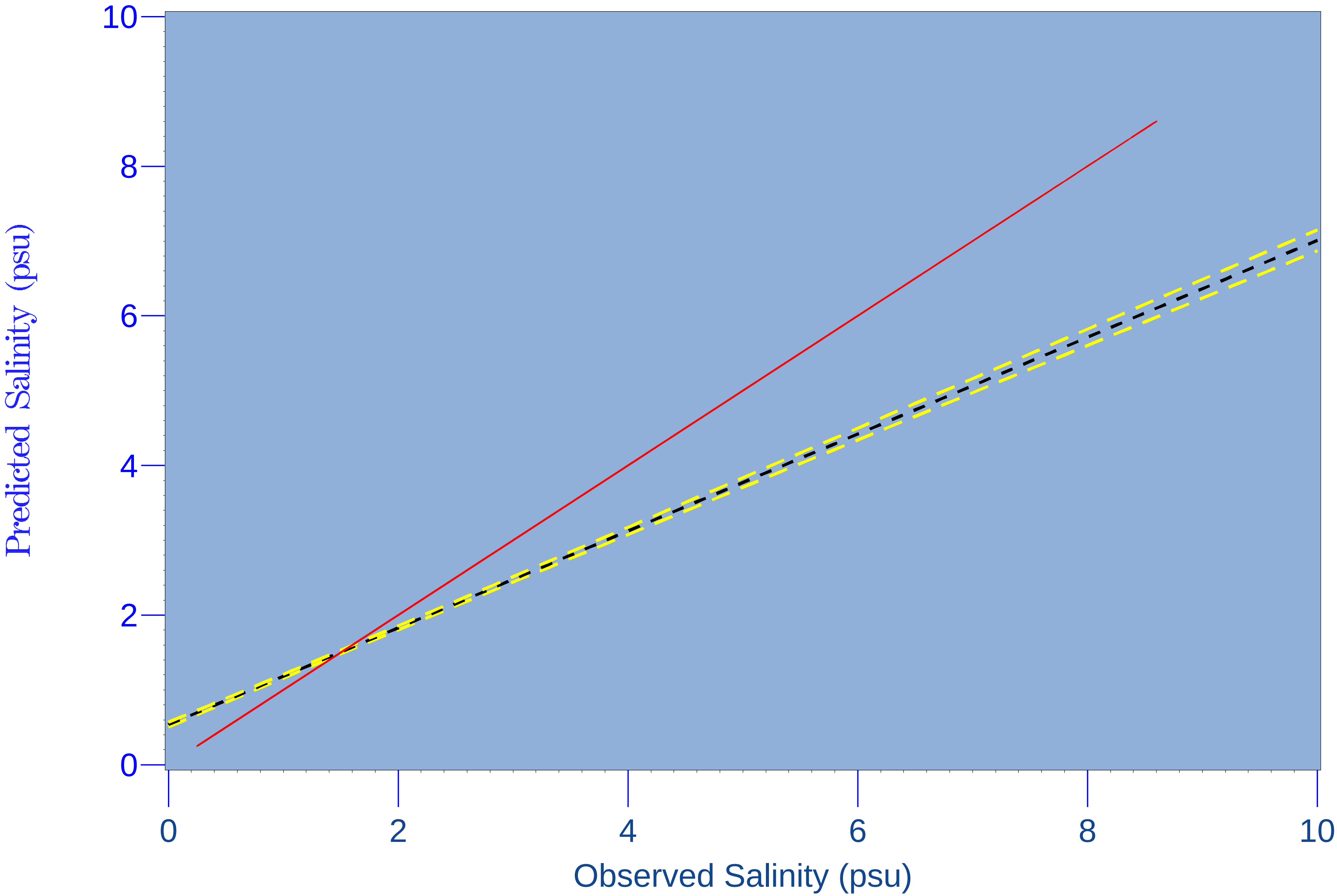


Figure 4.131 Predicted versus observed of modeled surface salinity at Peace River Heights (RK 26.7)

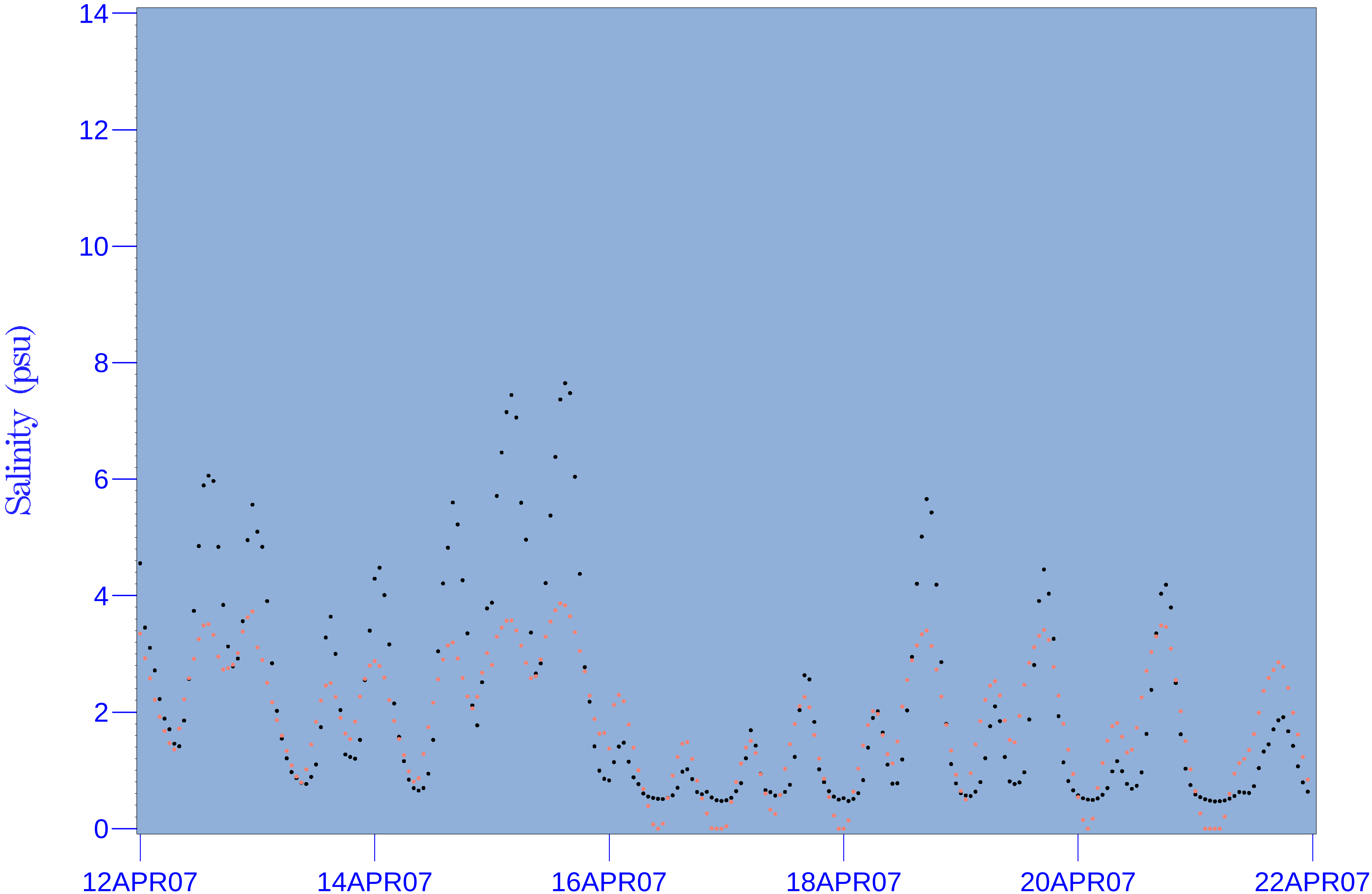


Figure 4.132 Modeled predicted (rose) versus observed (black) surface salinity at Peace River Heights (RK 26.7)
Hourly values April 12th throught April 21st 2007

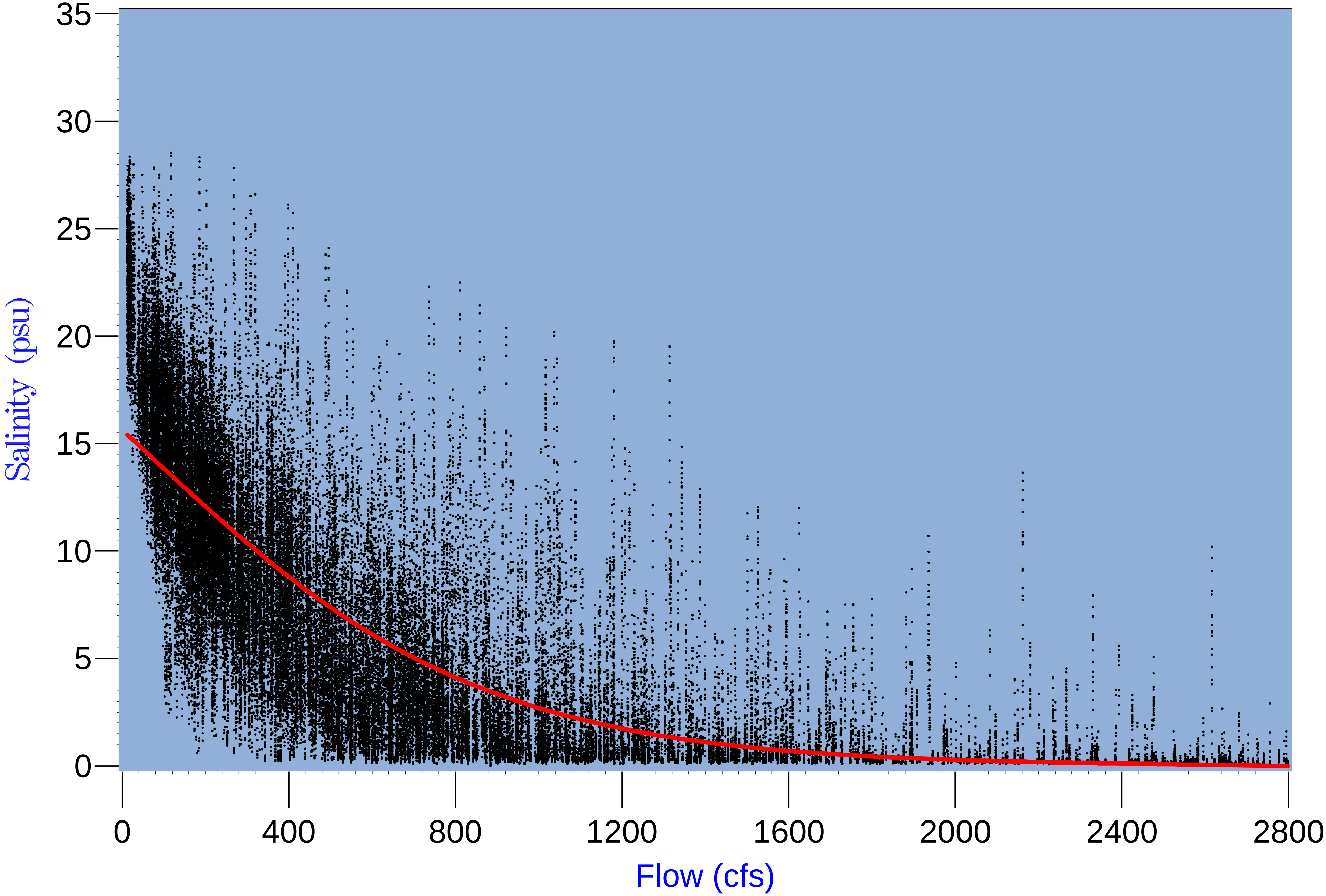


Figure 6.1 Surface salinity at USGS Harbour Height gage (RK 15.5) versus combined Peace River and Shell Creek flow

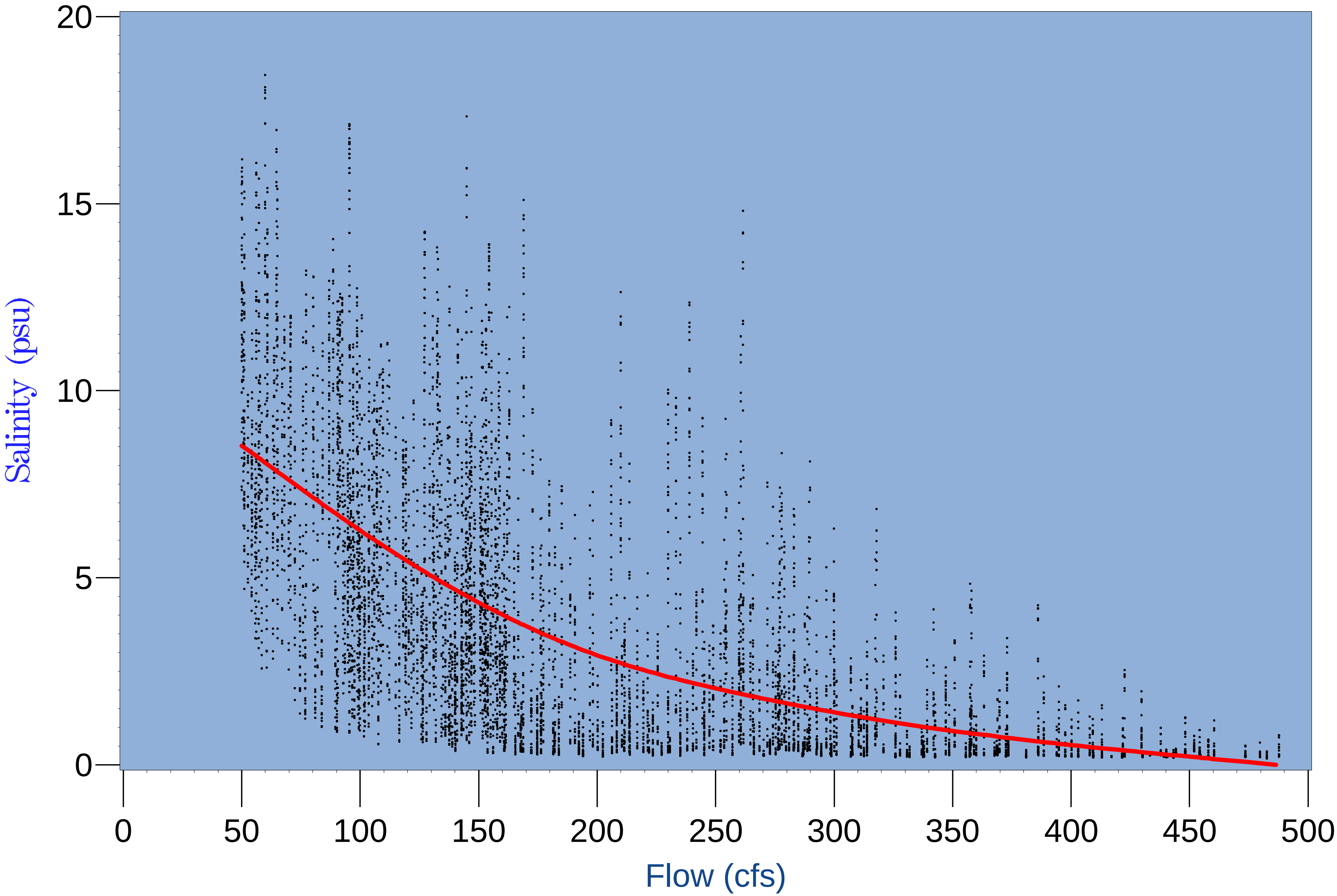


Figure 6.2 Surface salinity at MZ4 gage (RK 21.9) versus upstream Peace River gaged flow

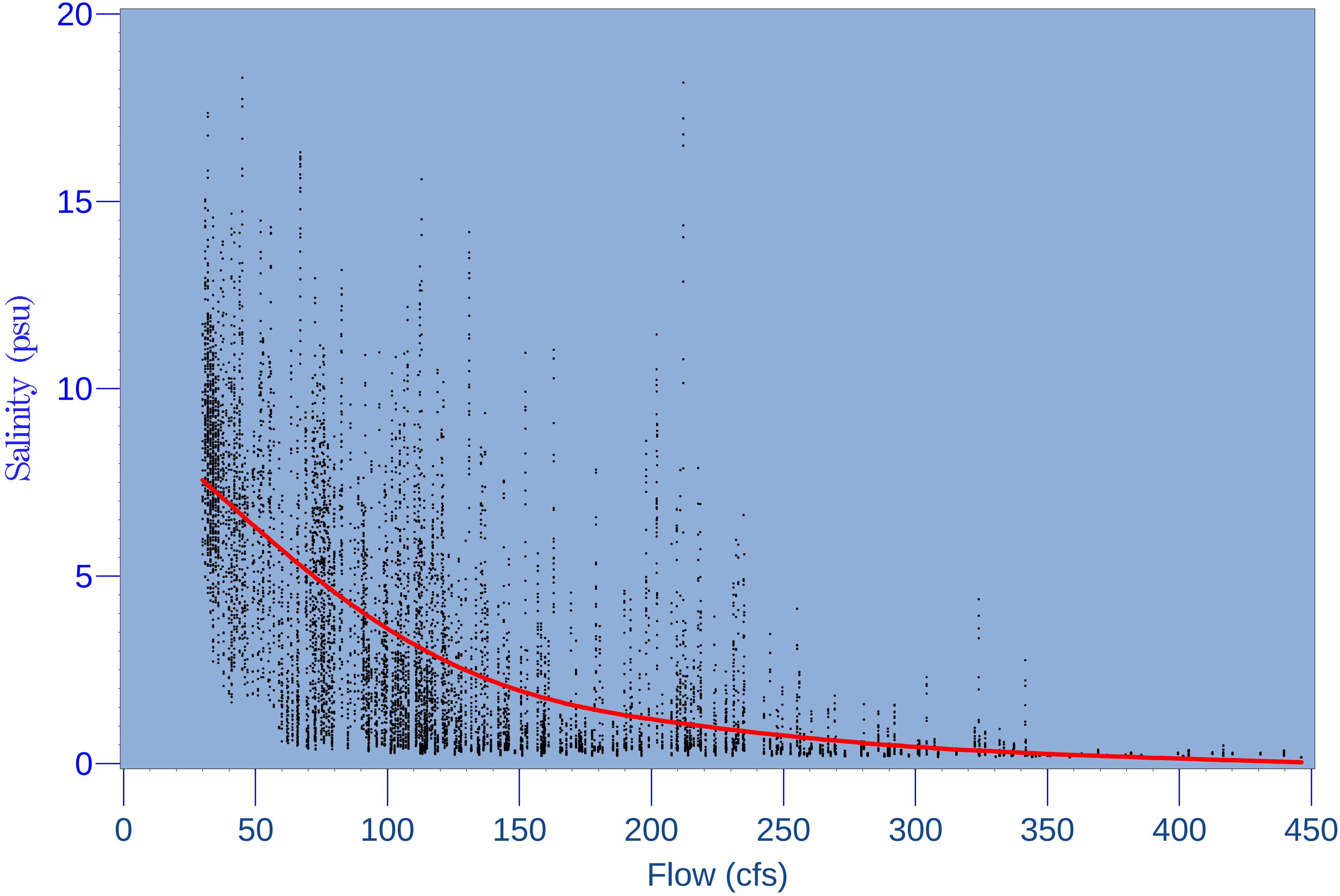


Figure 6.3 Surface salinity at MZ3 gage (RK 23.4) versus Peace River at Arcadia flow

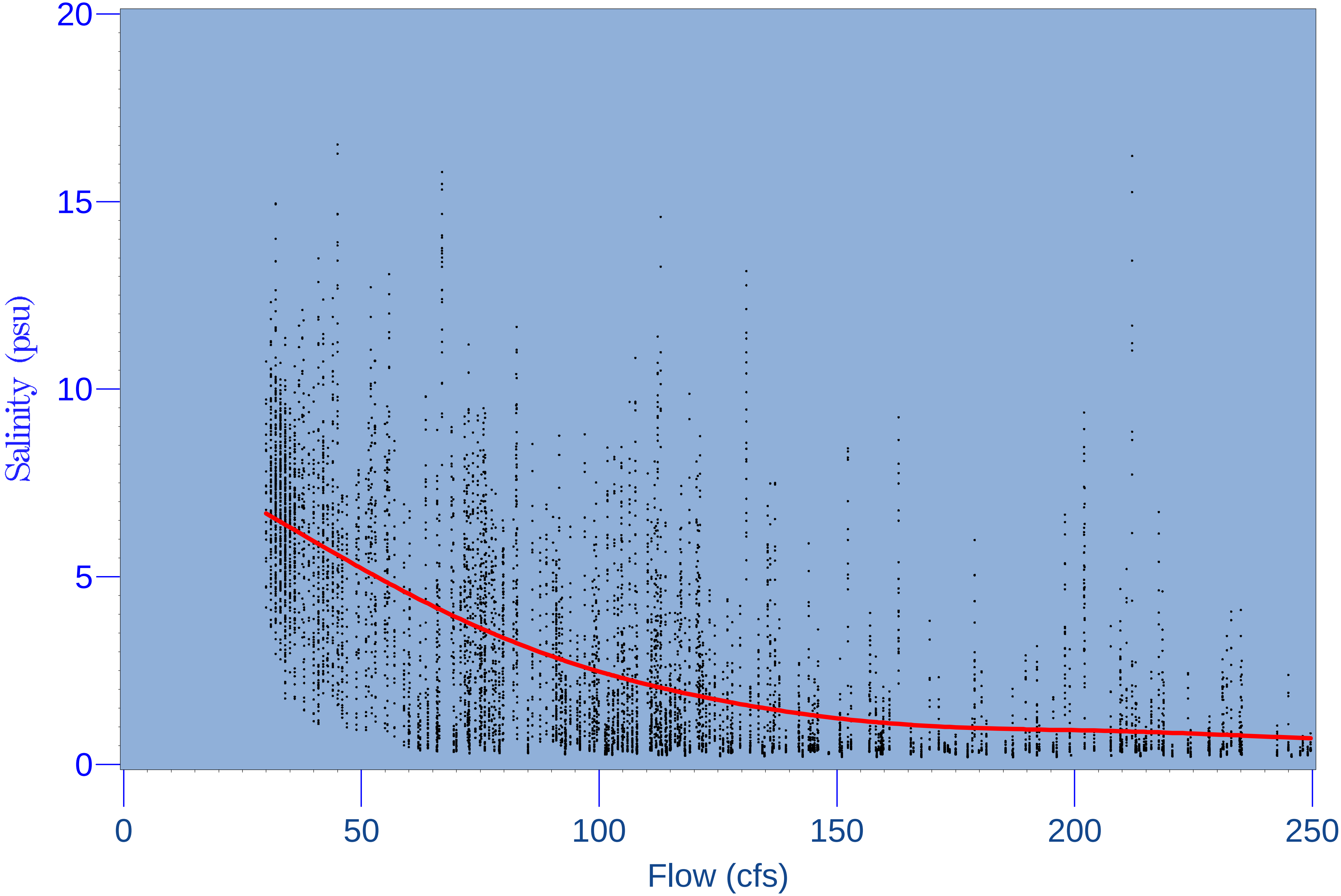


Figure 6.4 Surface salinity at MZ2 gage (RK 24.5) versus Peace River at Arcadia flow

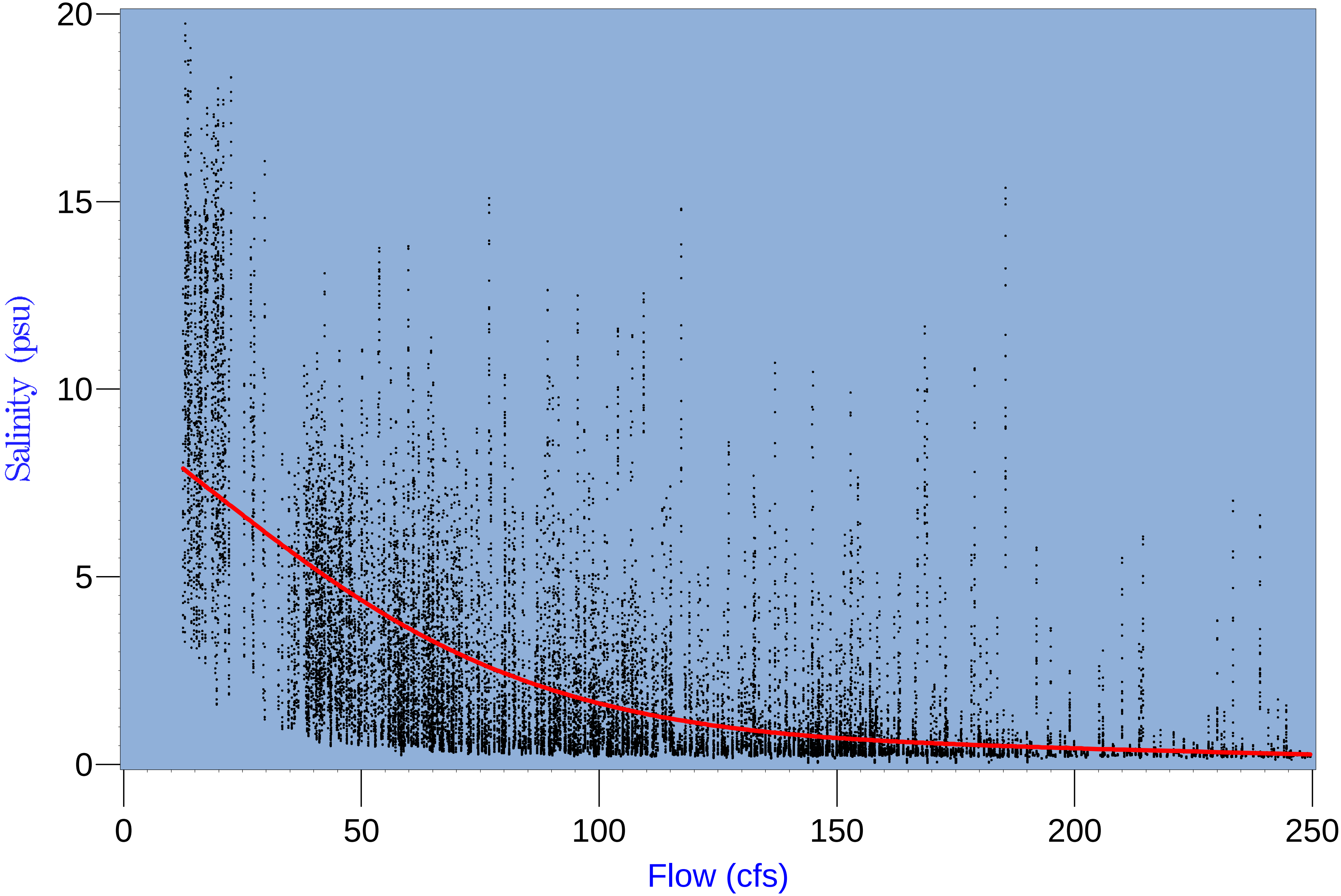


Figure 6.5 Surface salinity at USGS Peace River Heights gage (RK 26.7) versus upstream gaged flow

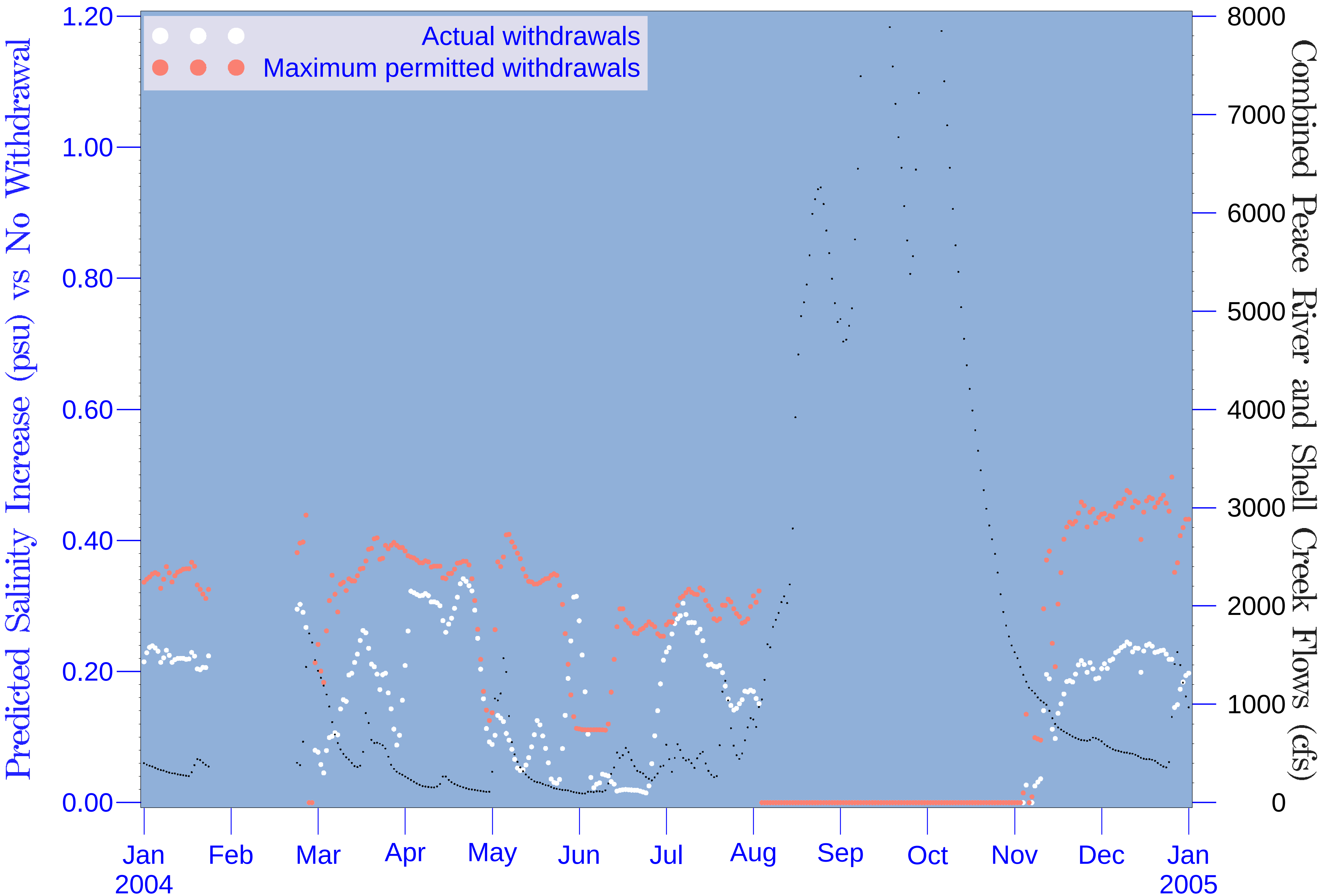


Figure 6.6 2004 predicted surface salinity increases at Harbour Heights (RK 15.5)

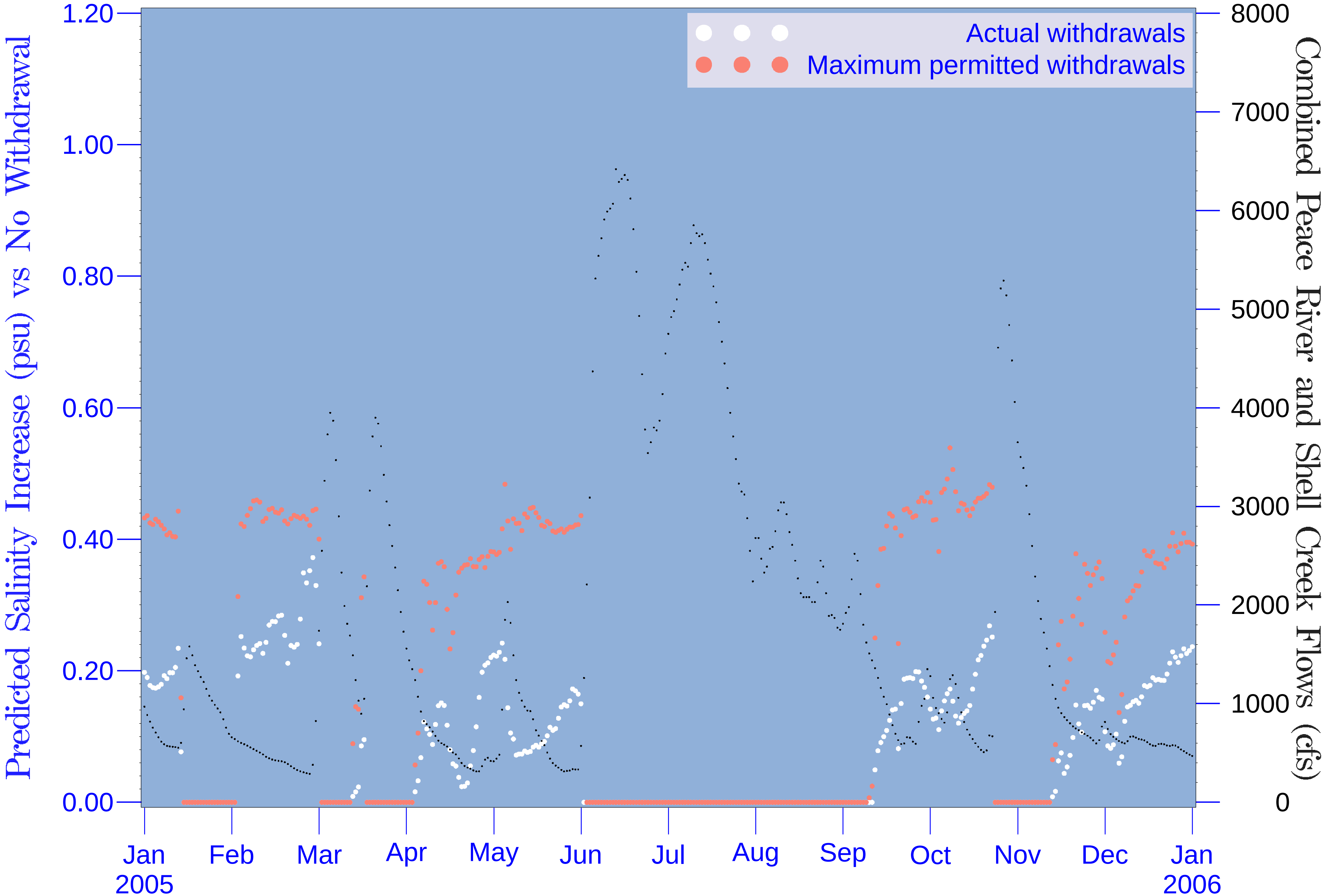


Figure 6.7 2005 predicted surface salinity increases at Harbour Heights (RK 15.5)

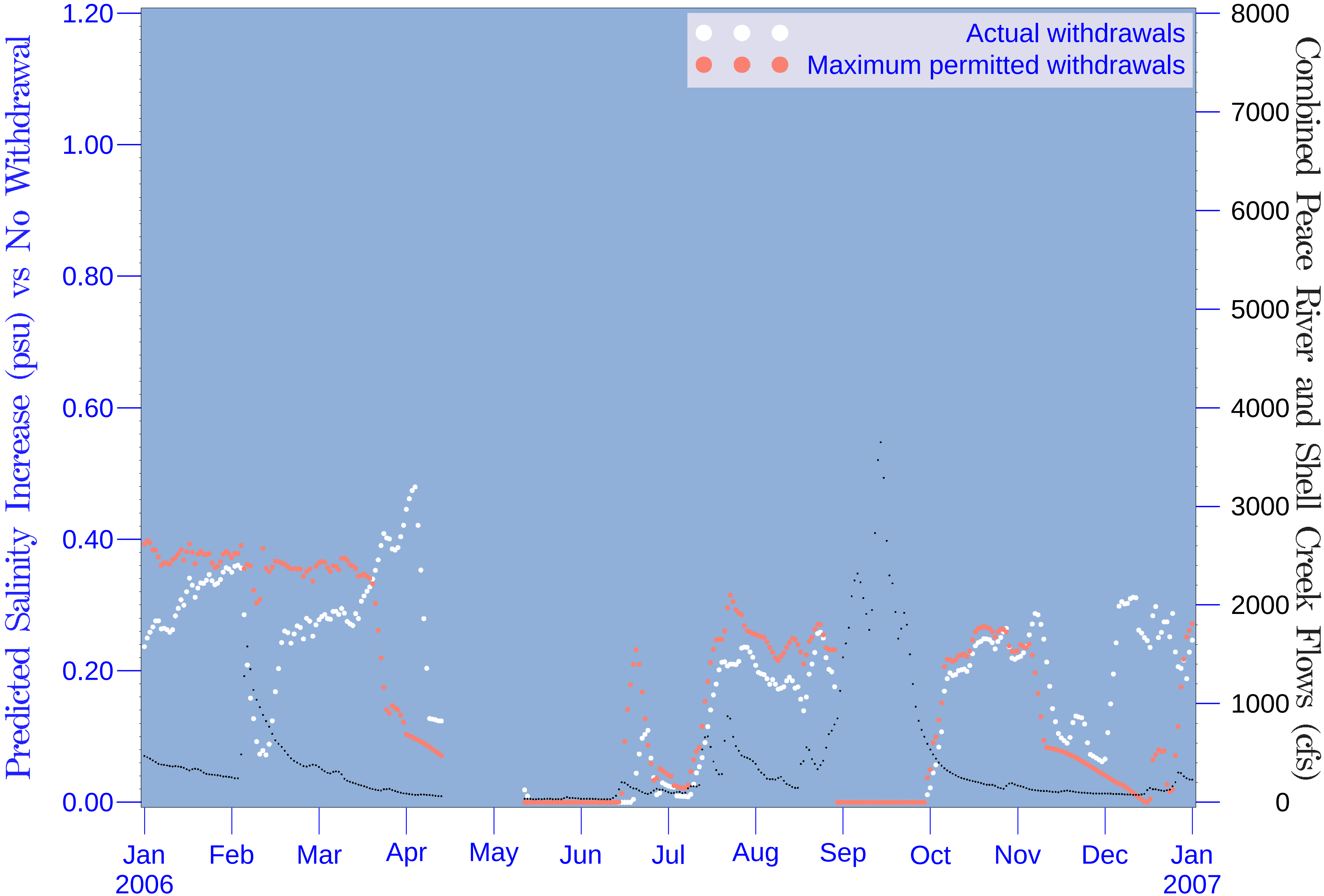


Figure 6.8 2006 predicted surface salinity increases at Harbour Heights (RK 15.5)

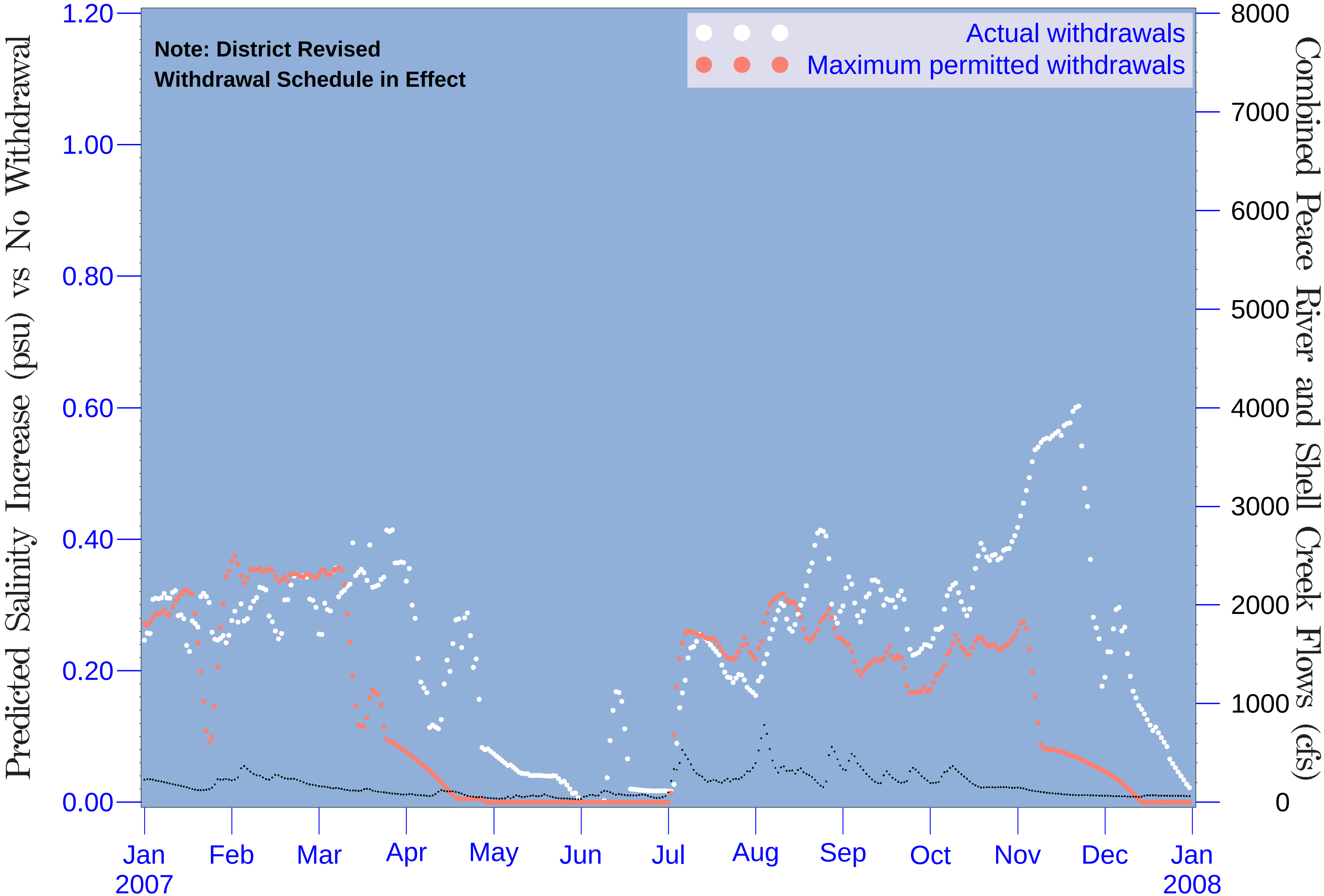


Figure 6.9 2007 predicted surface salinity increases at Harbour Heights (RK 15.5)

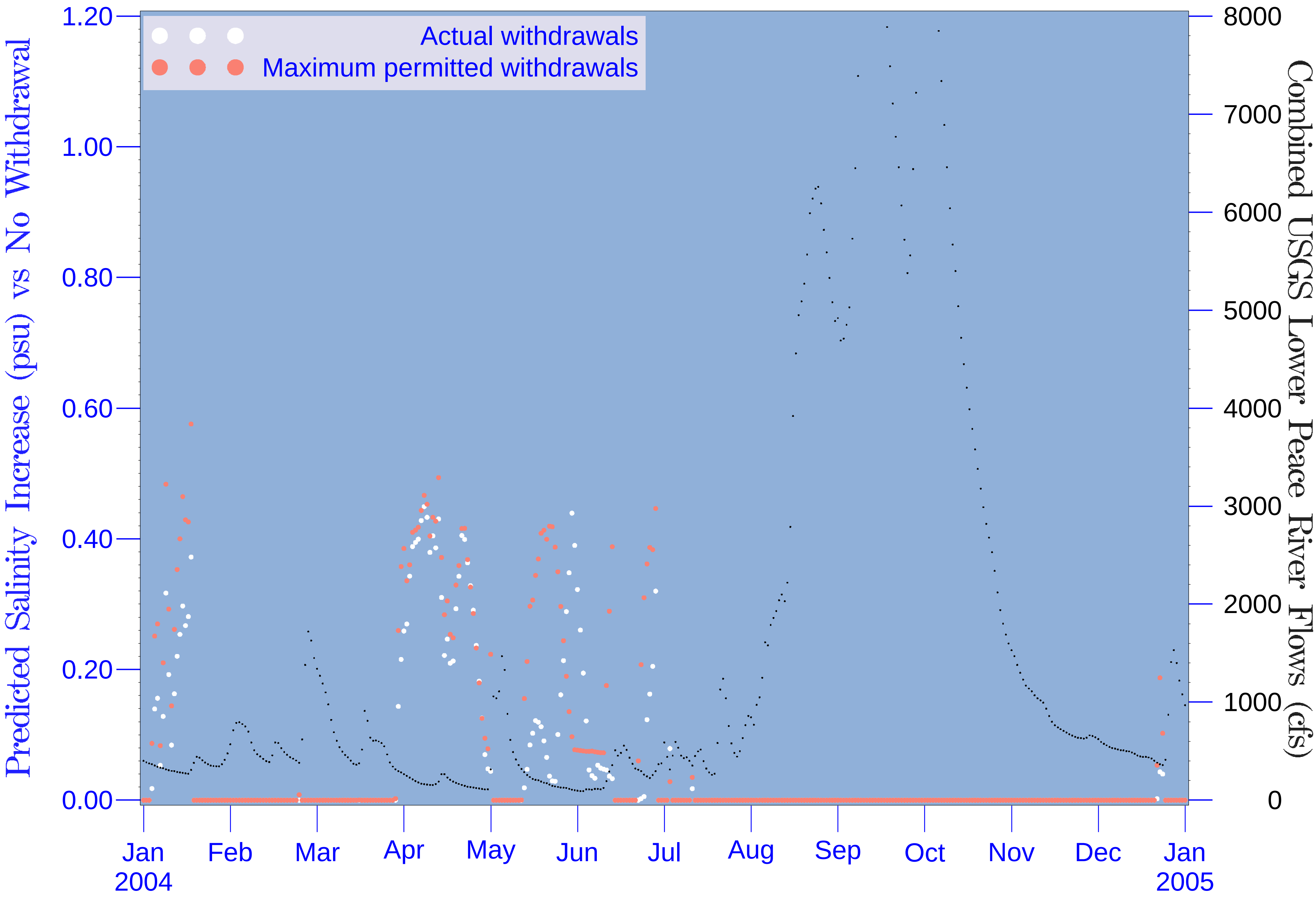


Figure 6.10 2004 predicted surface salinity increases at RK 21.9

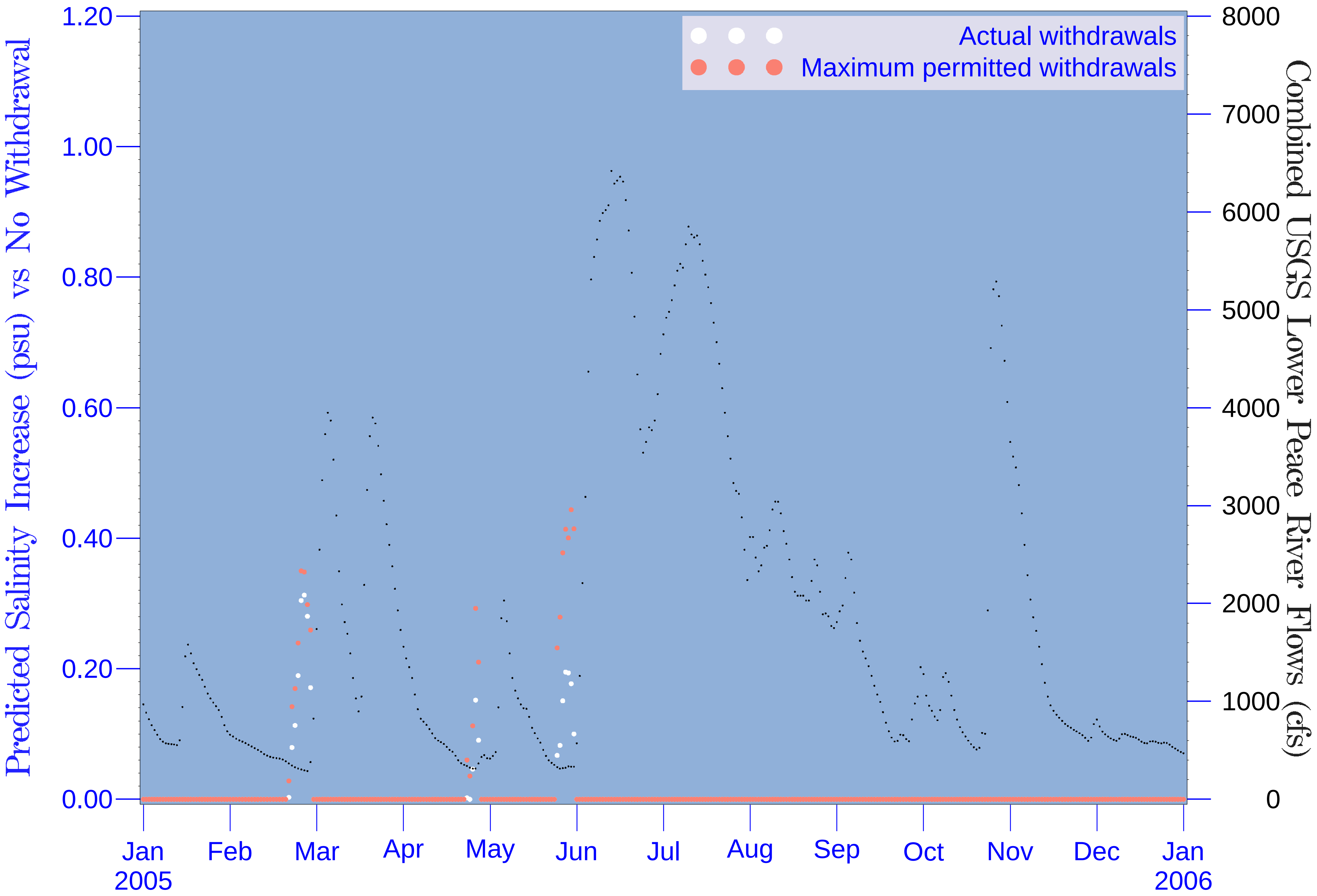


Figure 6.11 2005 predicted surface salinity increases at RK 21.9

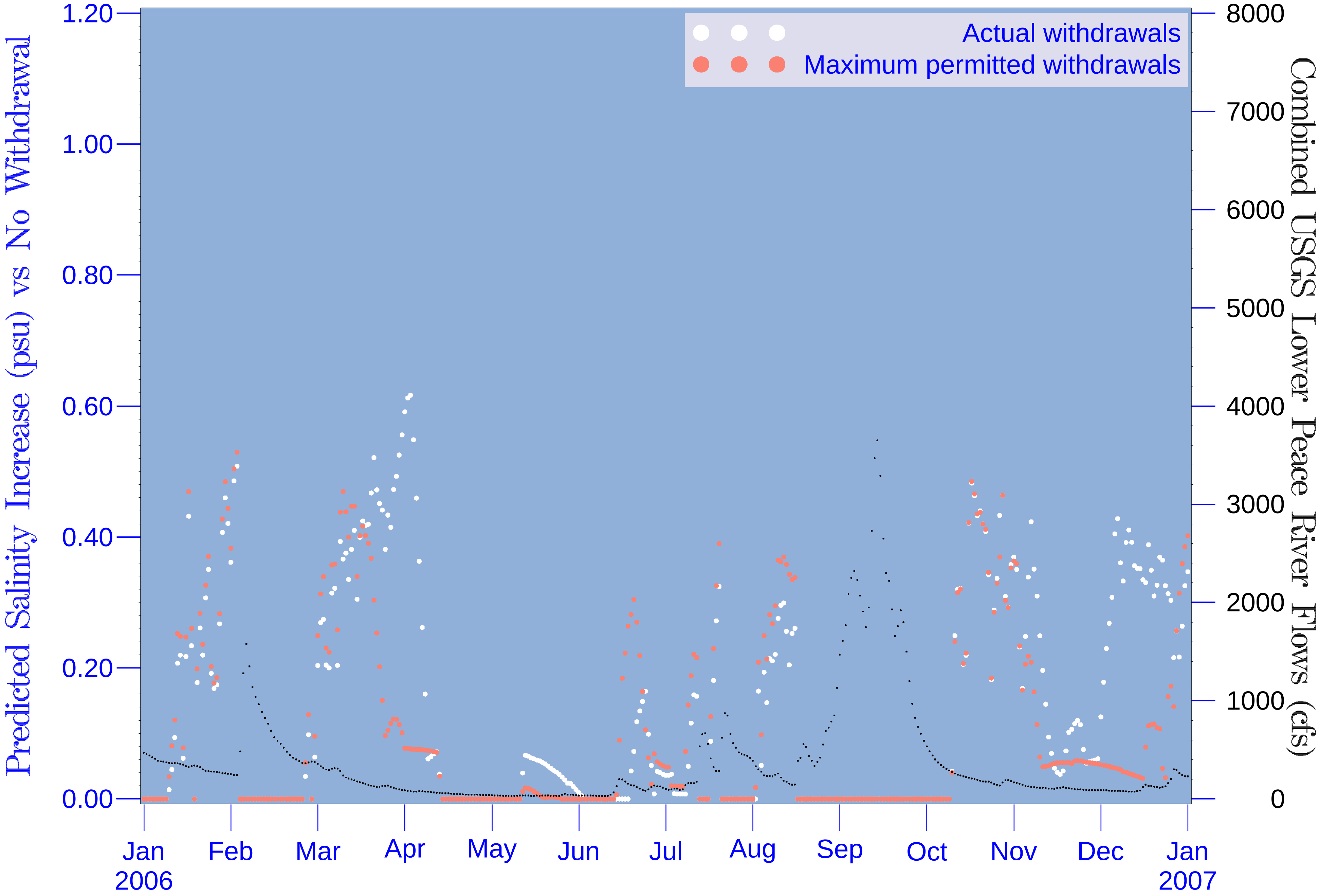


Figure 6.12 2006 predicted surface salinity increases at RK 21.9

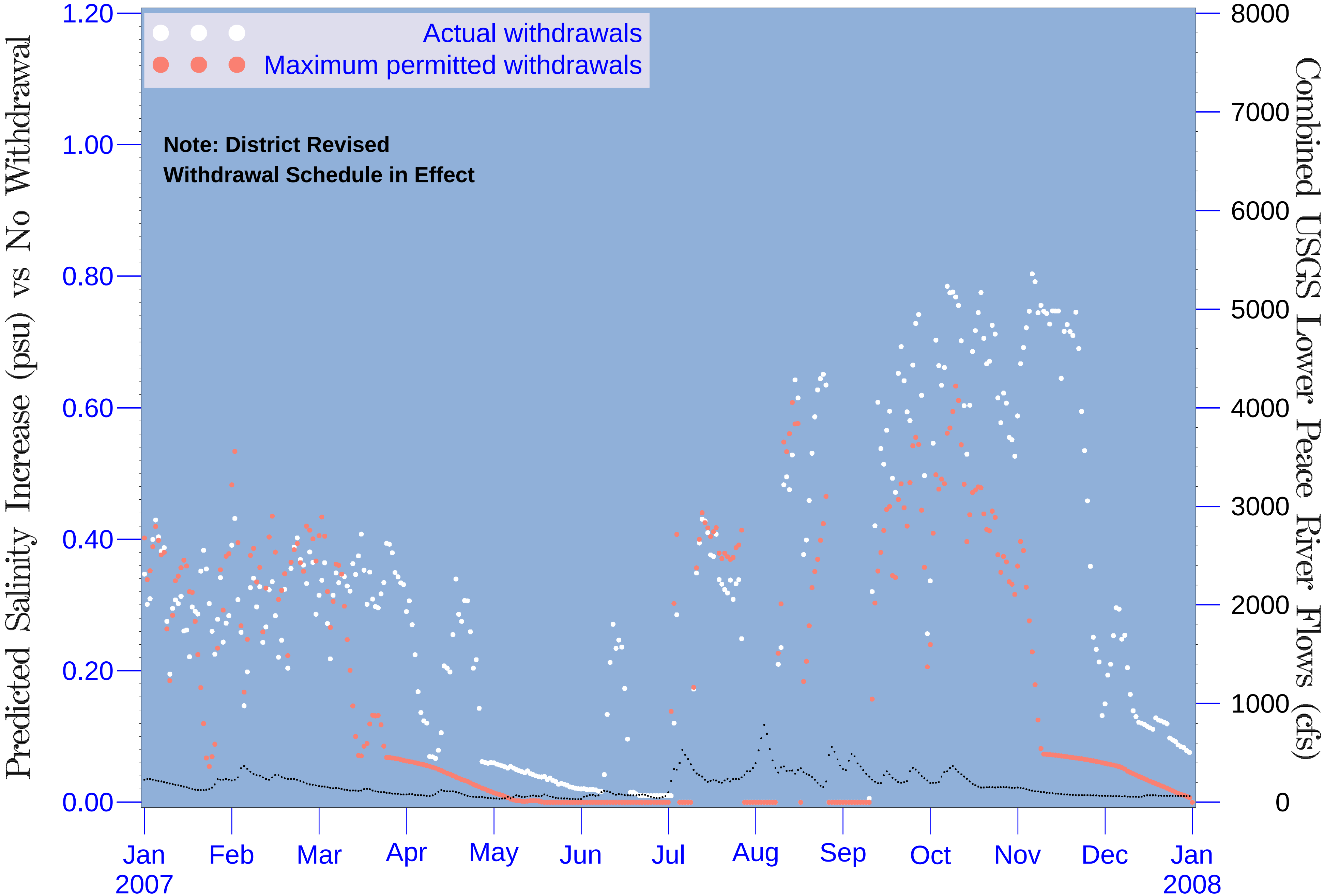


Figure 6.13 2007 predicted surface salinity increases at RK 21.9

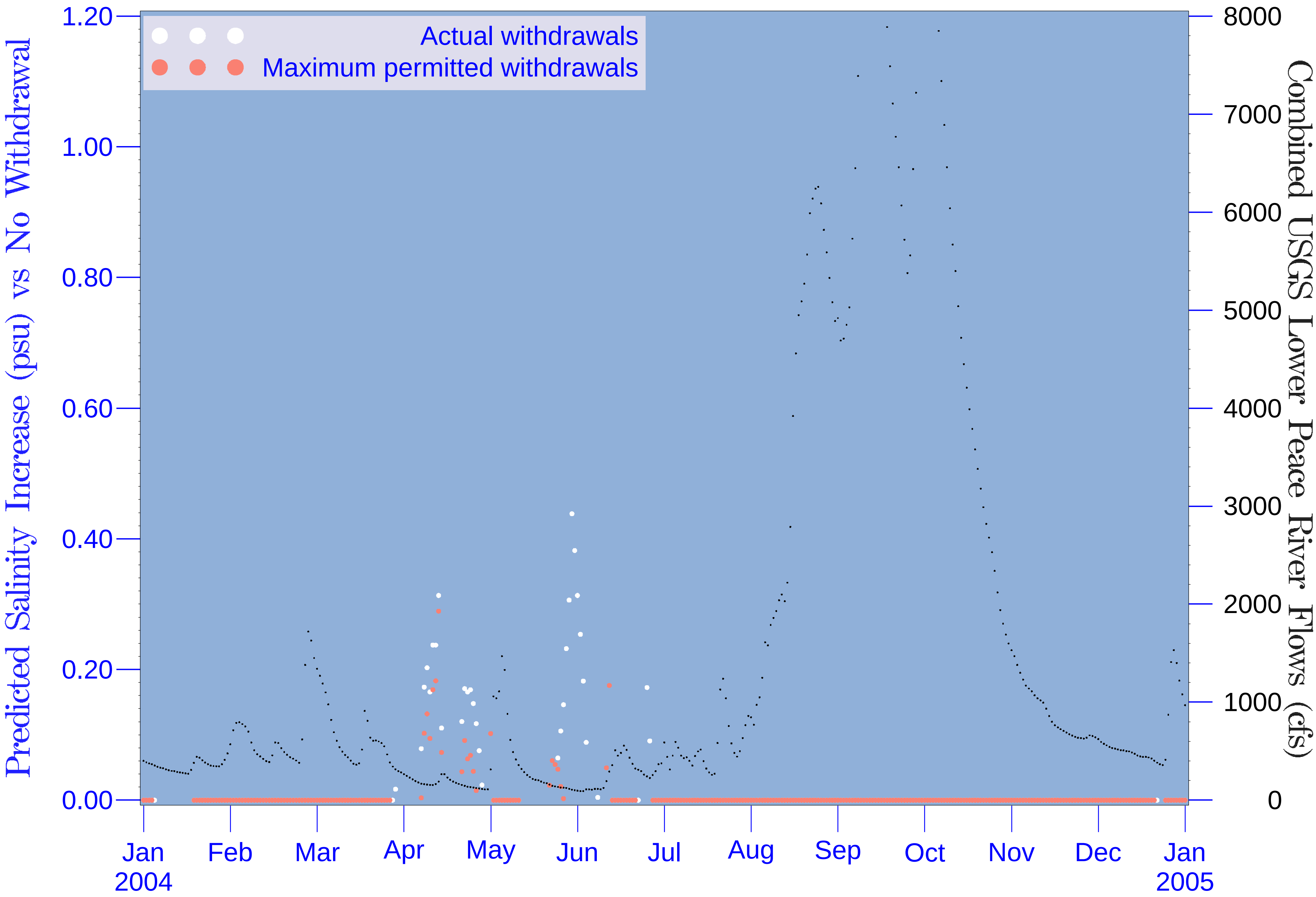


Figure 6.14 2004 predicted surface salinity increases at RK 23.4

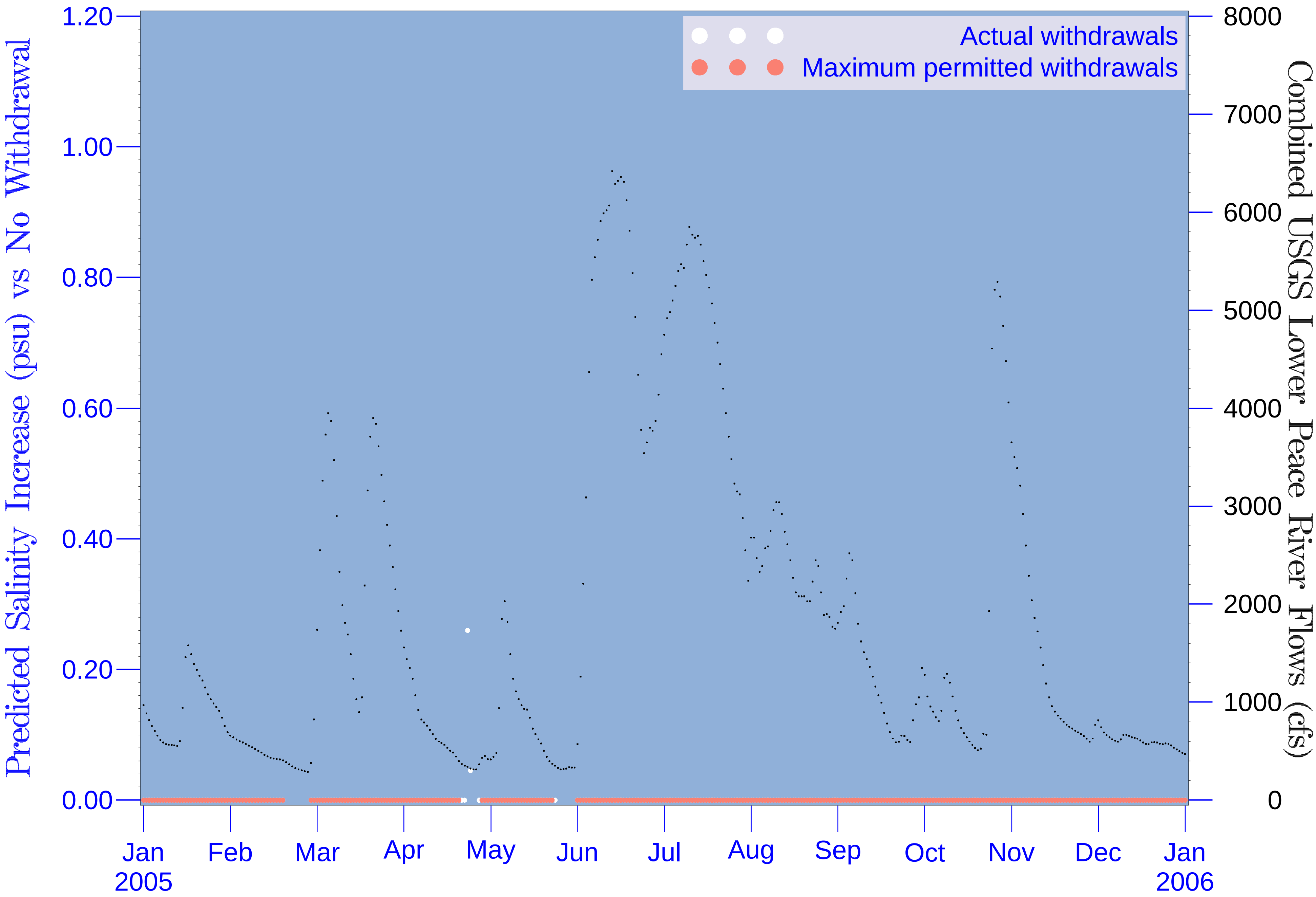


Figure 6.15 2005 predicted surface salinity increases at RK 23.4

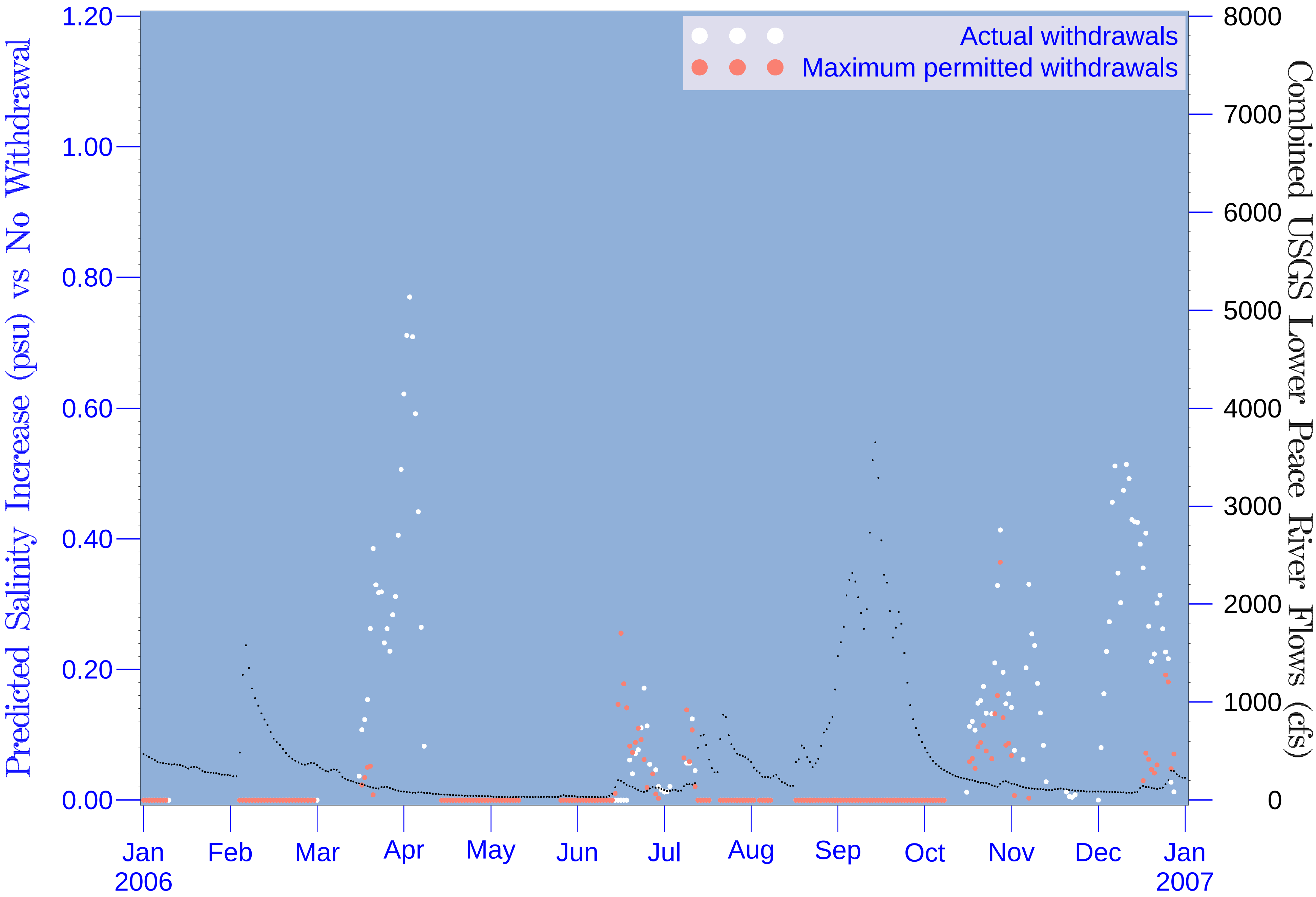


Figure 6.16 2006 predicted surface salinity increases at RK 23.4

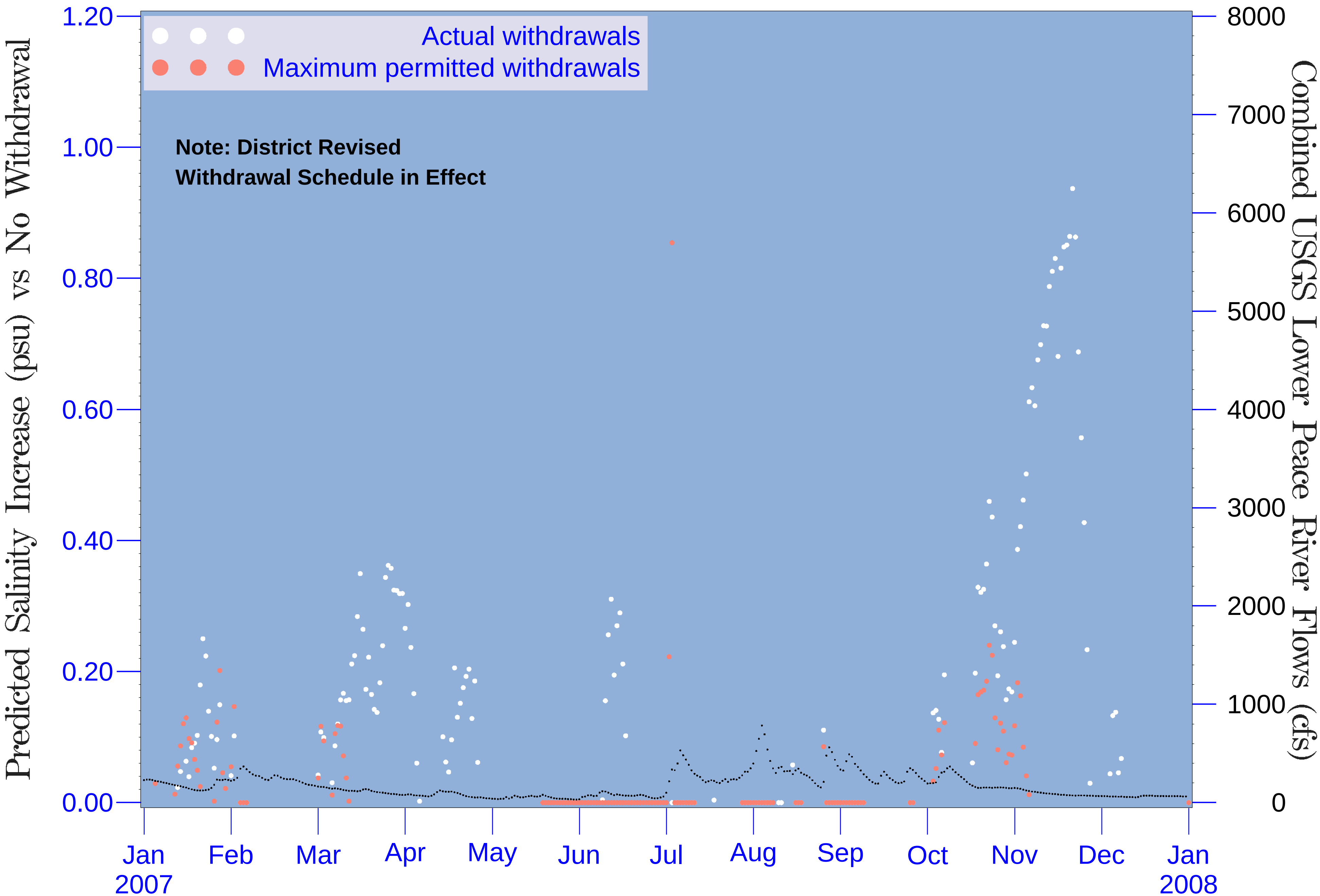


Figure 6.17 2007 predicted surface salinity increases at RK 23.4

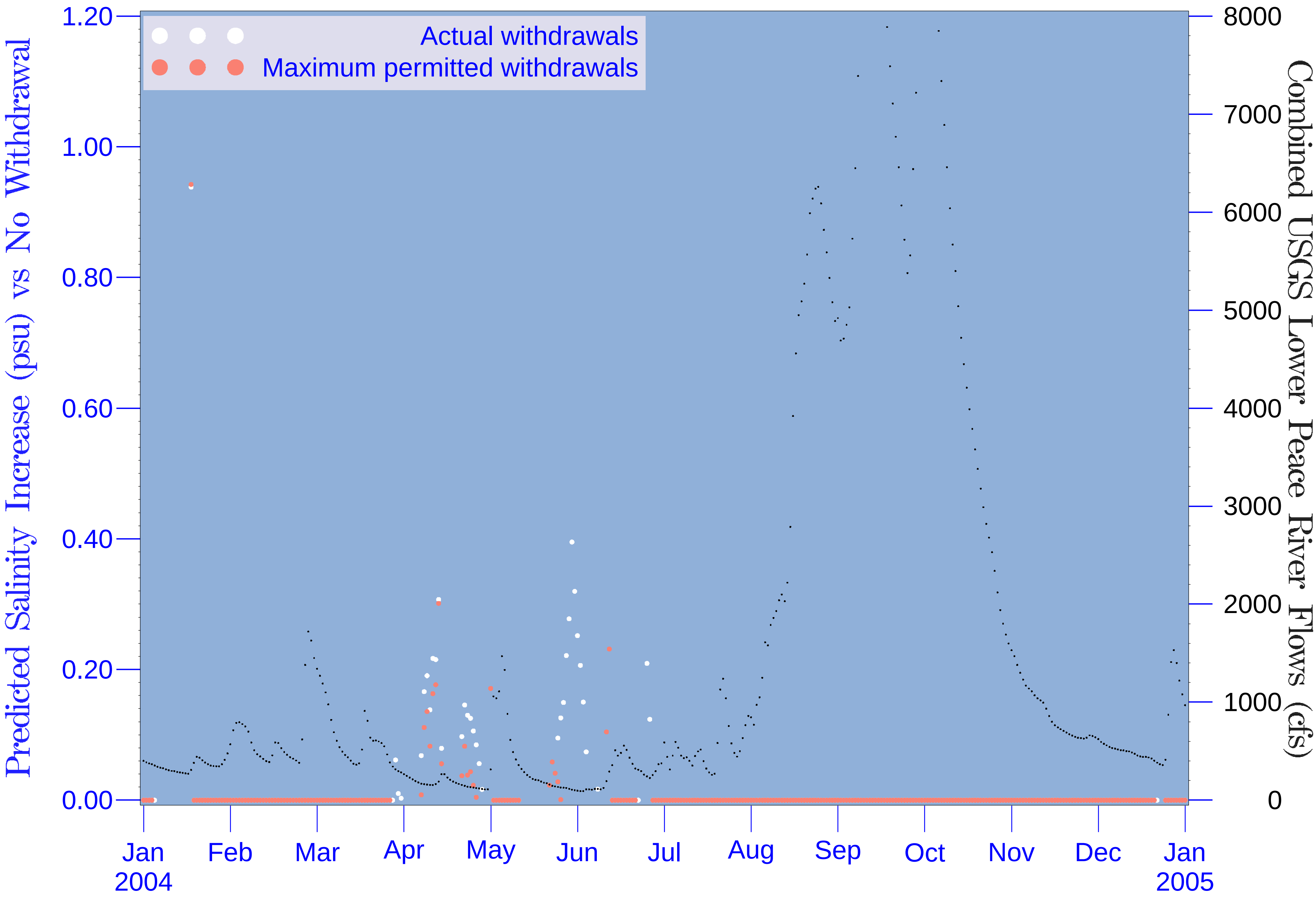


Figure 6.18 2004 predicted surface salinity increases at RK 24.5

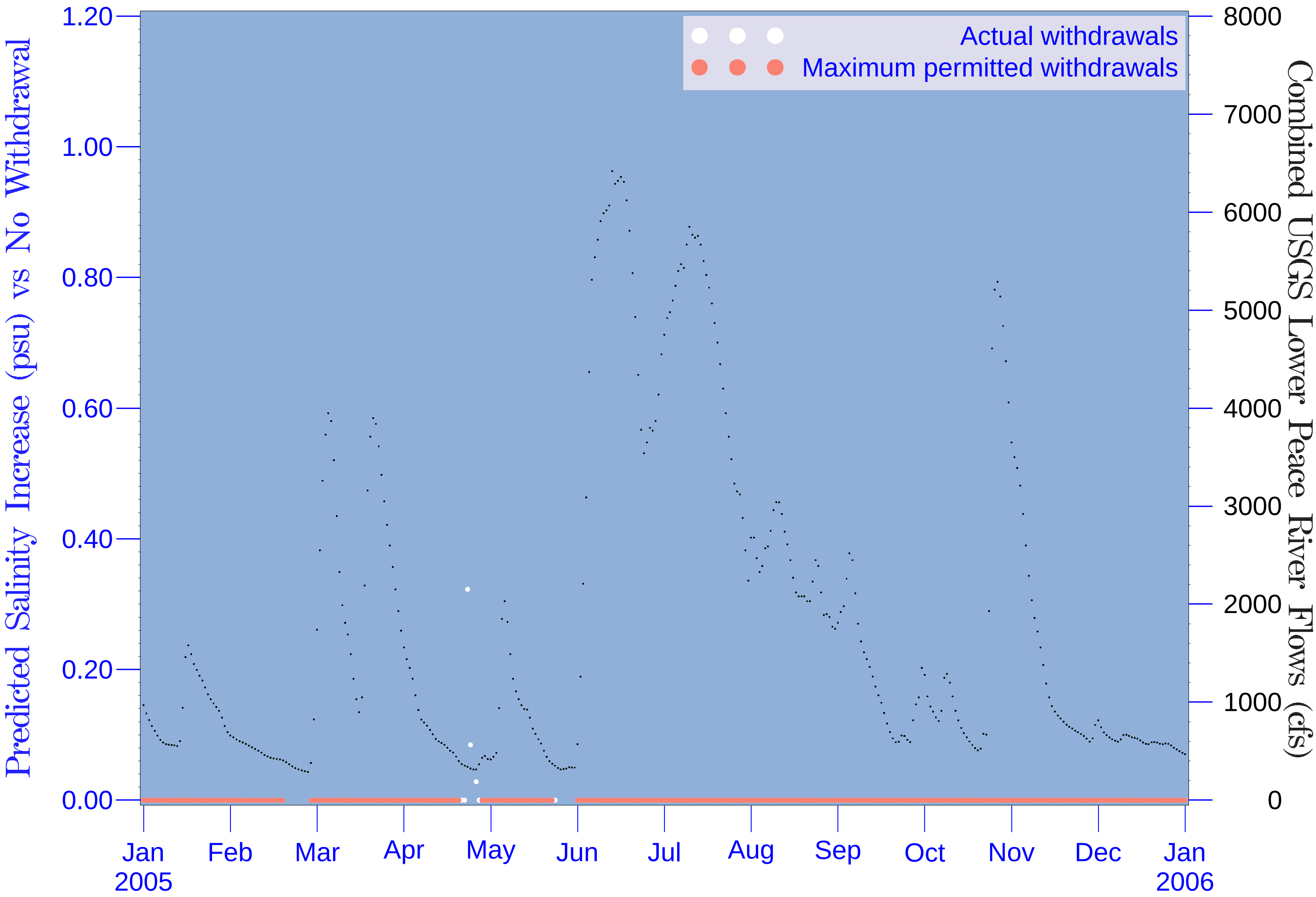


Figure 6.19 2005 predicted surface salinity increases at RK 24.5

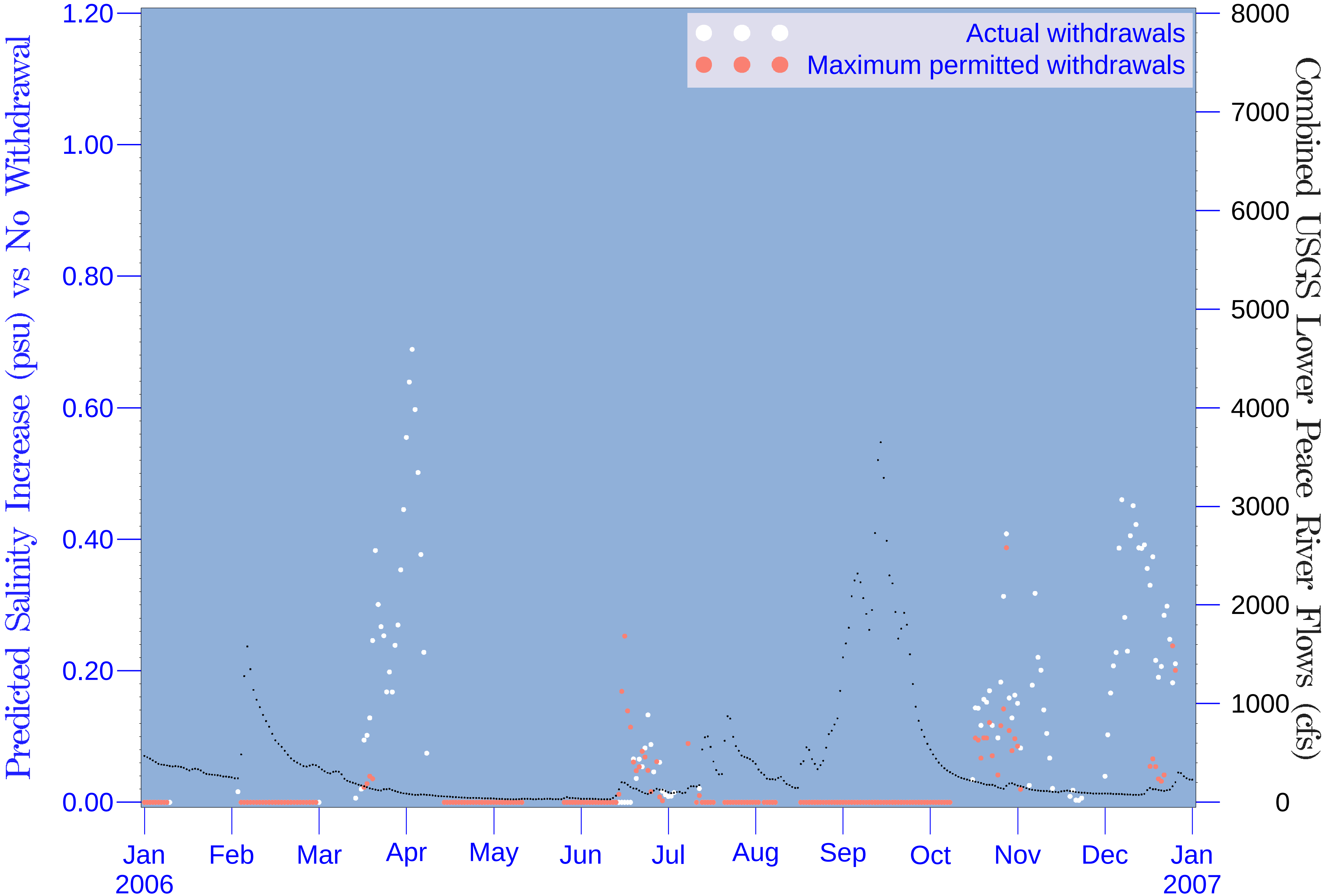


Figure 6.20 2006 predicted surface salinity increases at RK 24.5

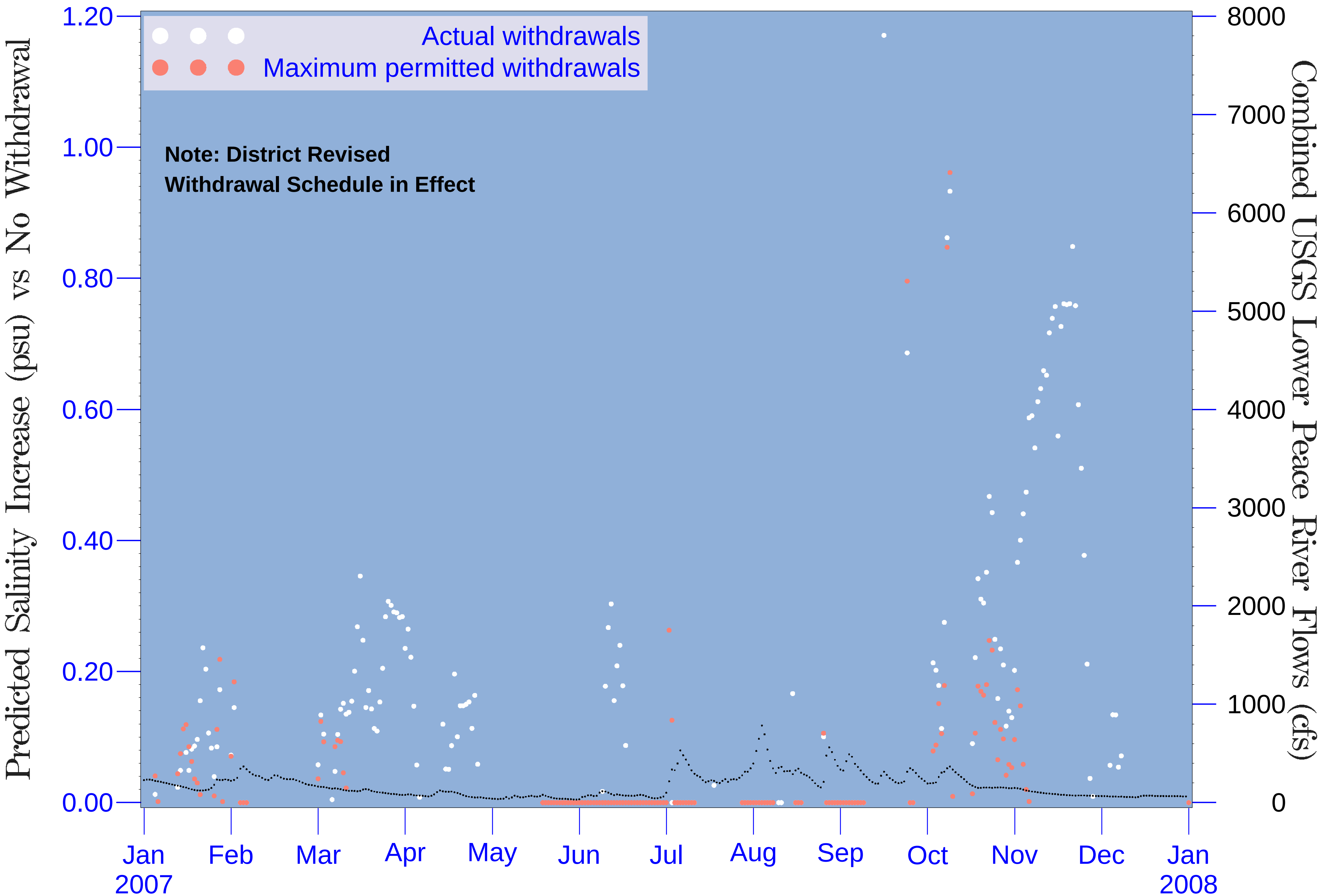


Figure 6.21 2007 predicted surface salinity increases at RK 24.5

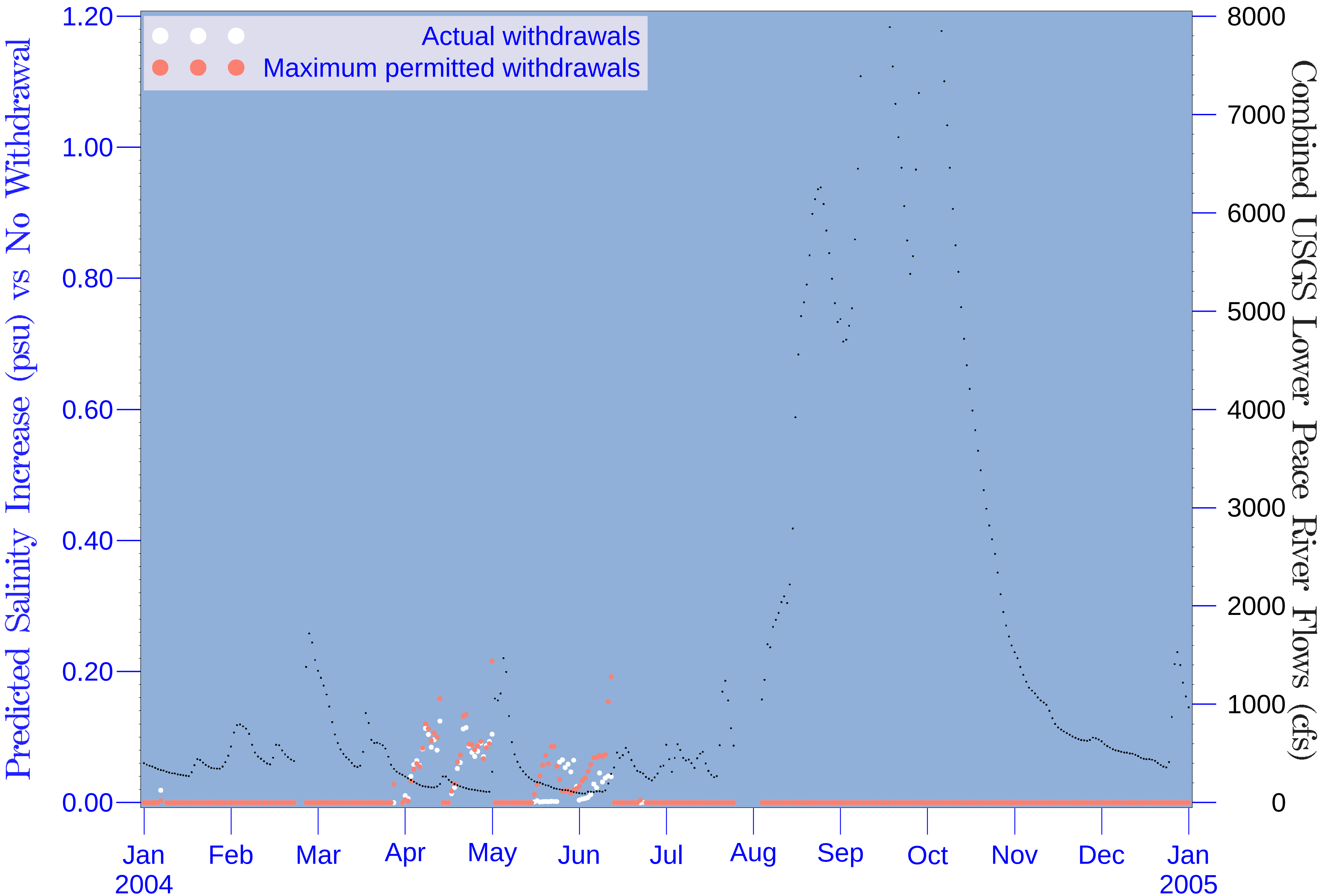


Figure 6.22 2004 predicted surface salinity increases at Peace River Heights (RK 26.7)

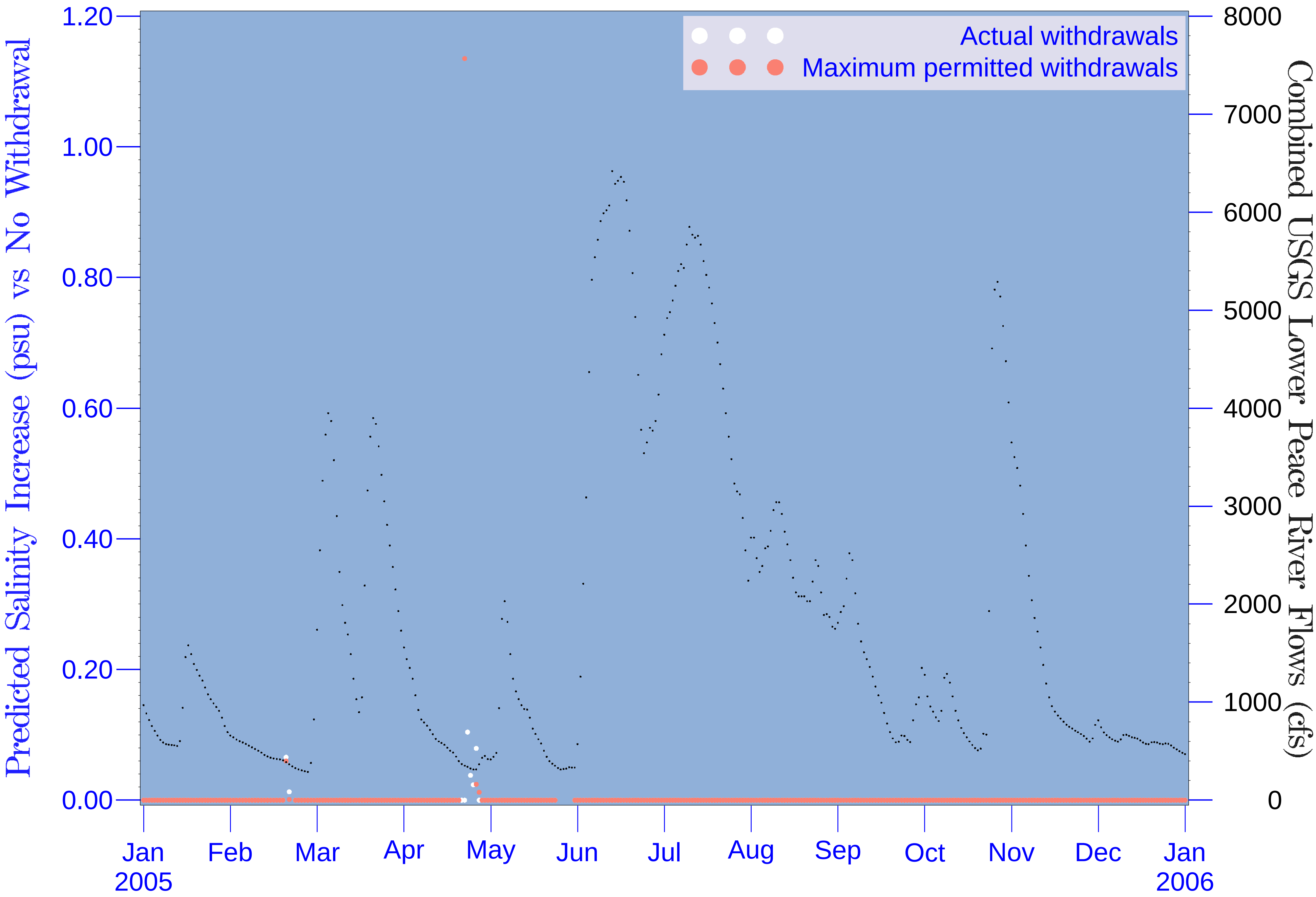


Figure 6.23 2005 predicted surface salinity increases at Peace River Heights (RK 26.7)

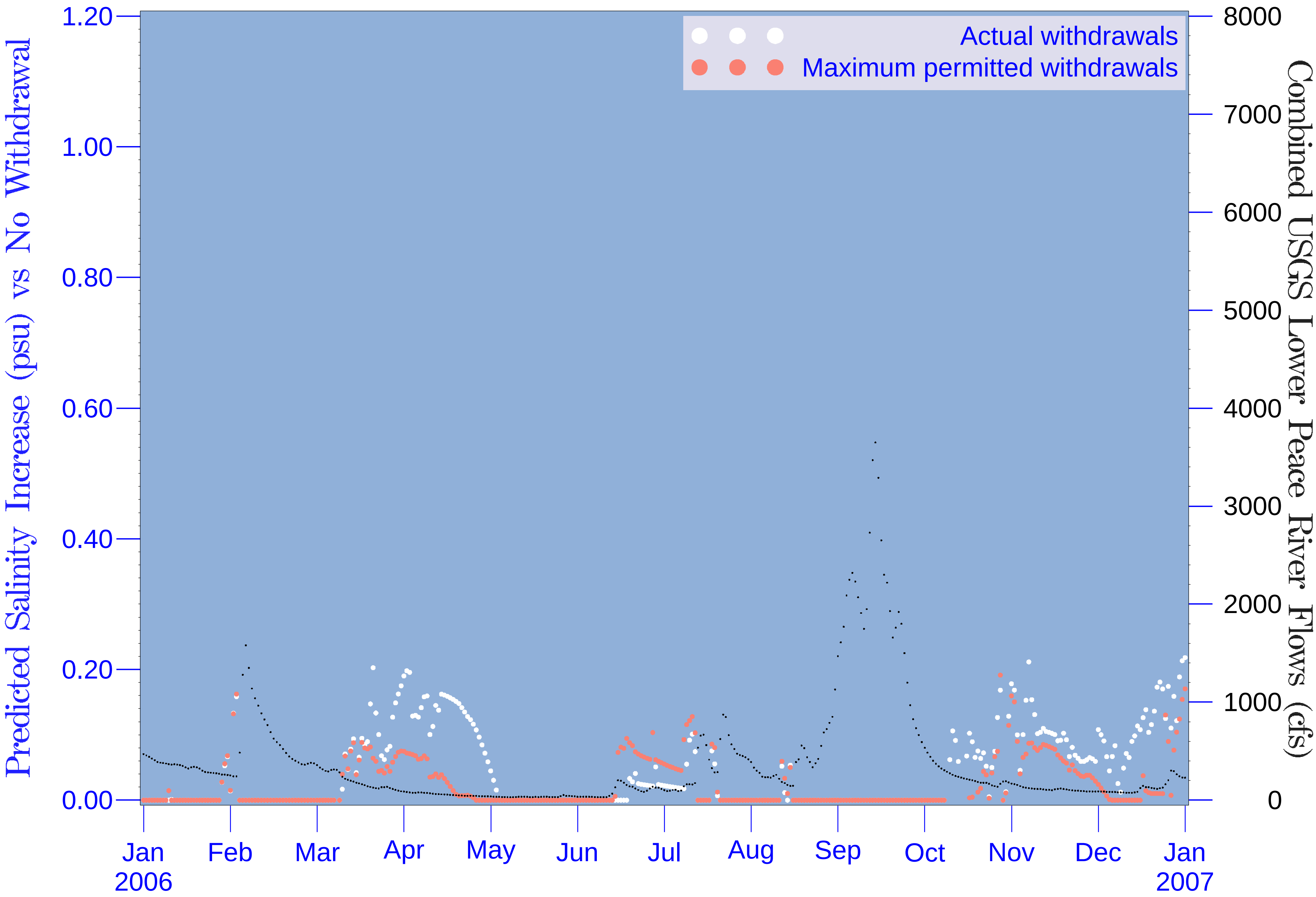


Figure 6.24 2006 predicted surface salinity increases at Peace River Heights (RK 26.7)

HBMP Pump Test

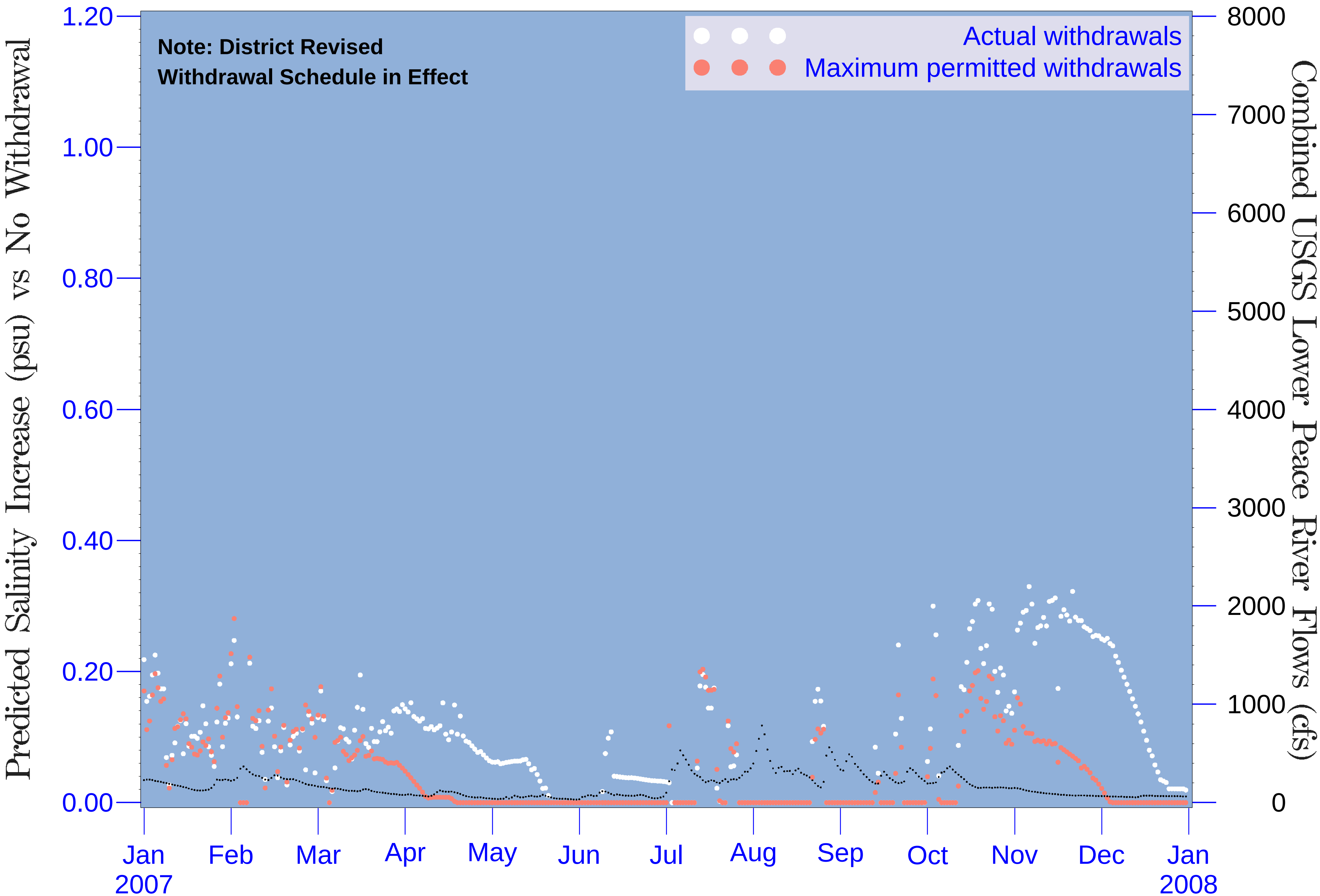


Figure 6.25 2007 predicted surface salinity increases at Peace River Heights (RK 26.7)

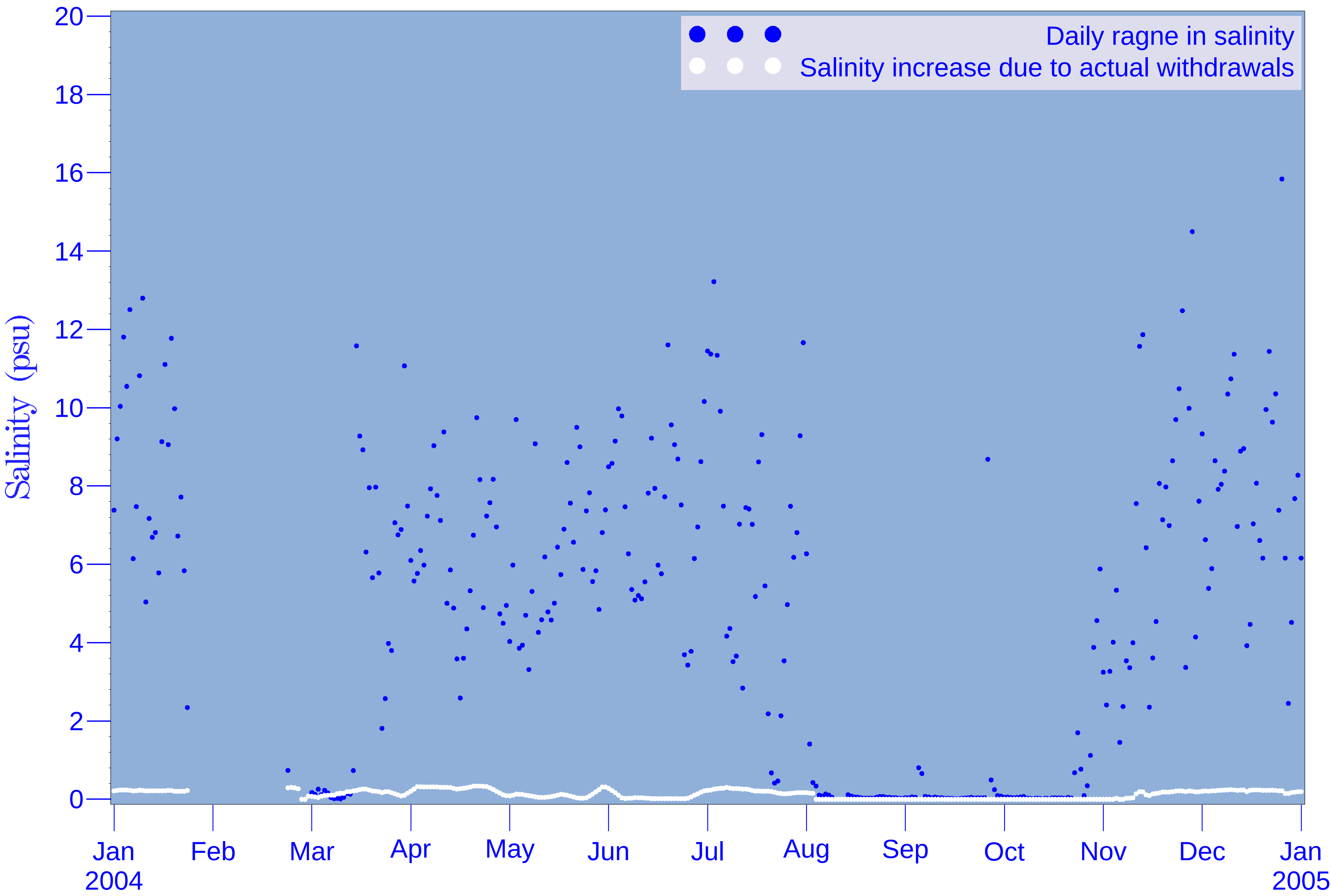


Figure 6.26 2004 surface salinity at Harbour Heights (RK 15.5)

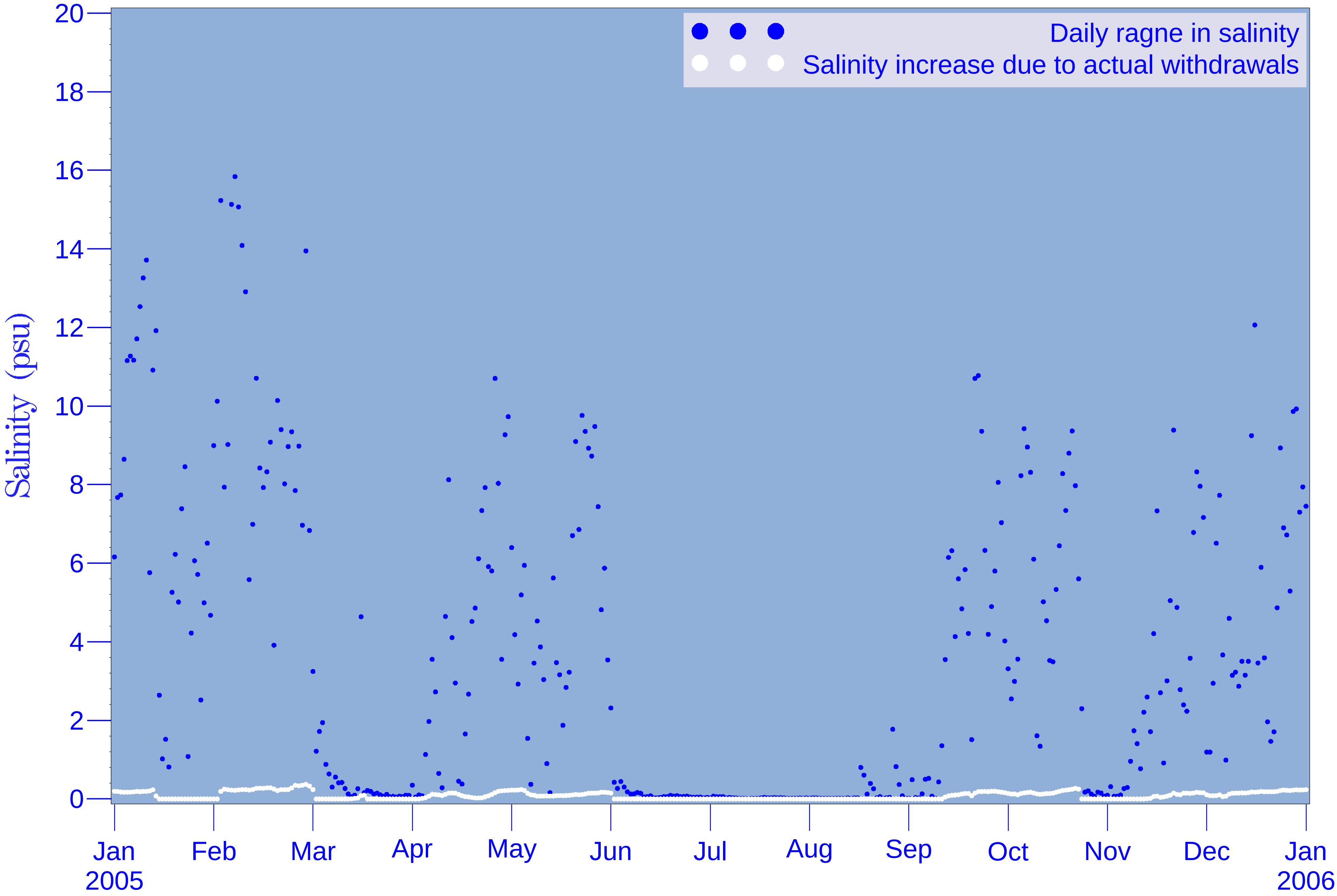


Figure 6.27 2005 surface salinity at Harbour Heights (RK 15.5)

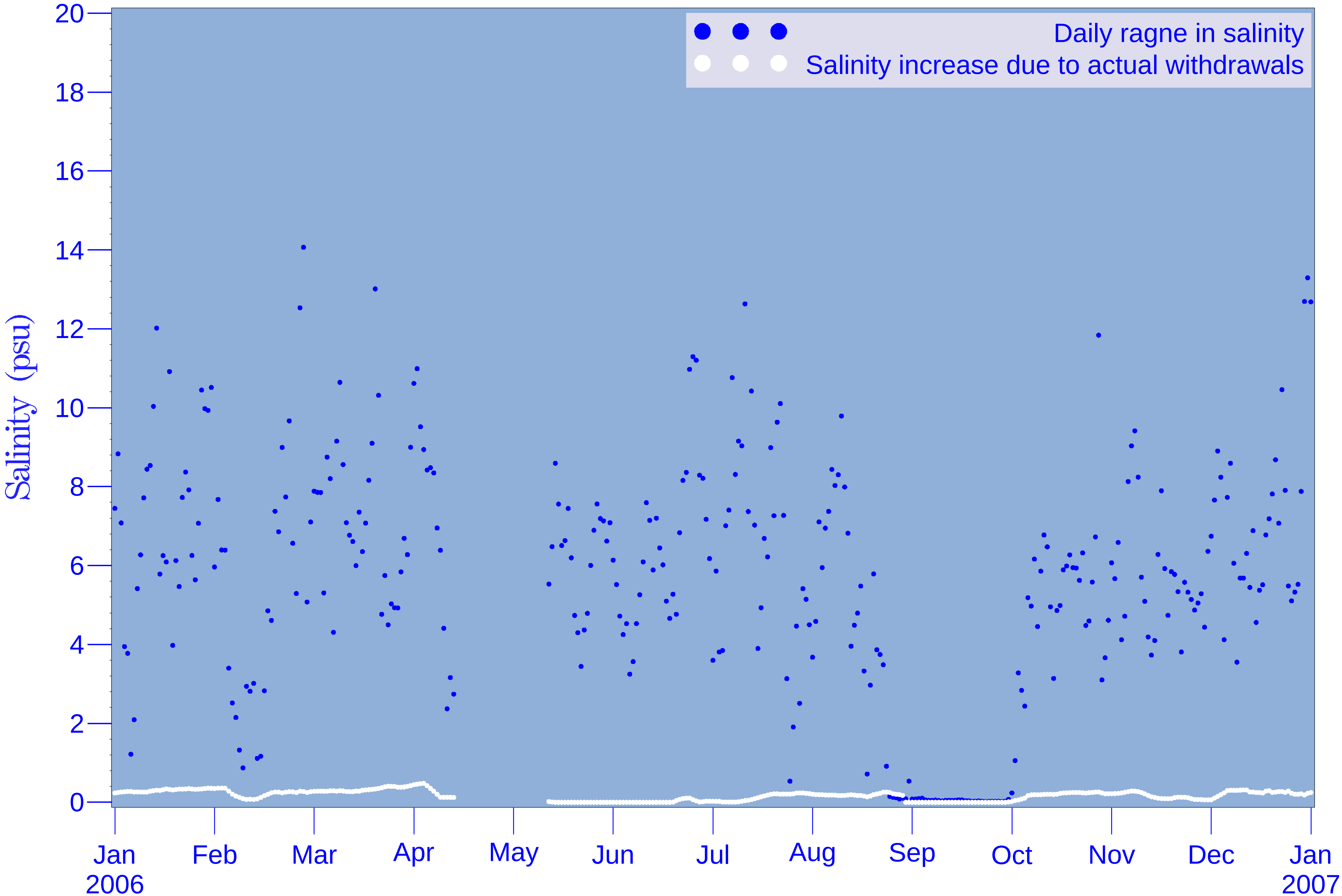


Figure 6.28 2006 surface salinity at Harbour Heights (RK 15.5)

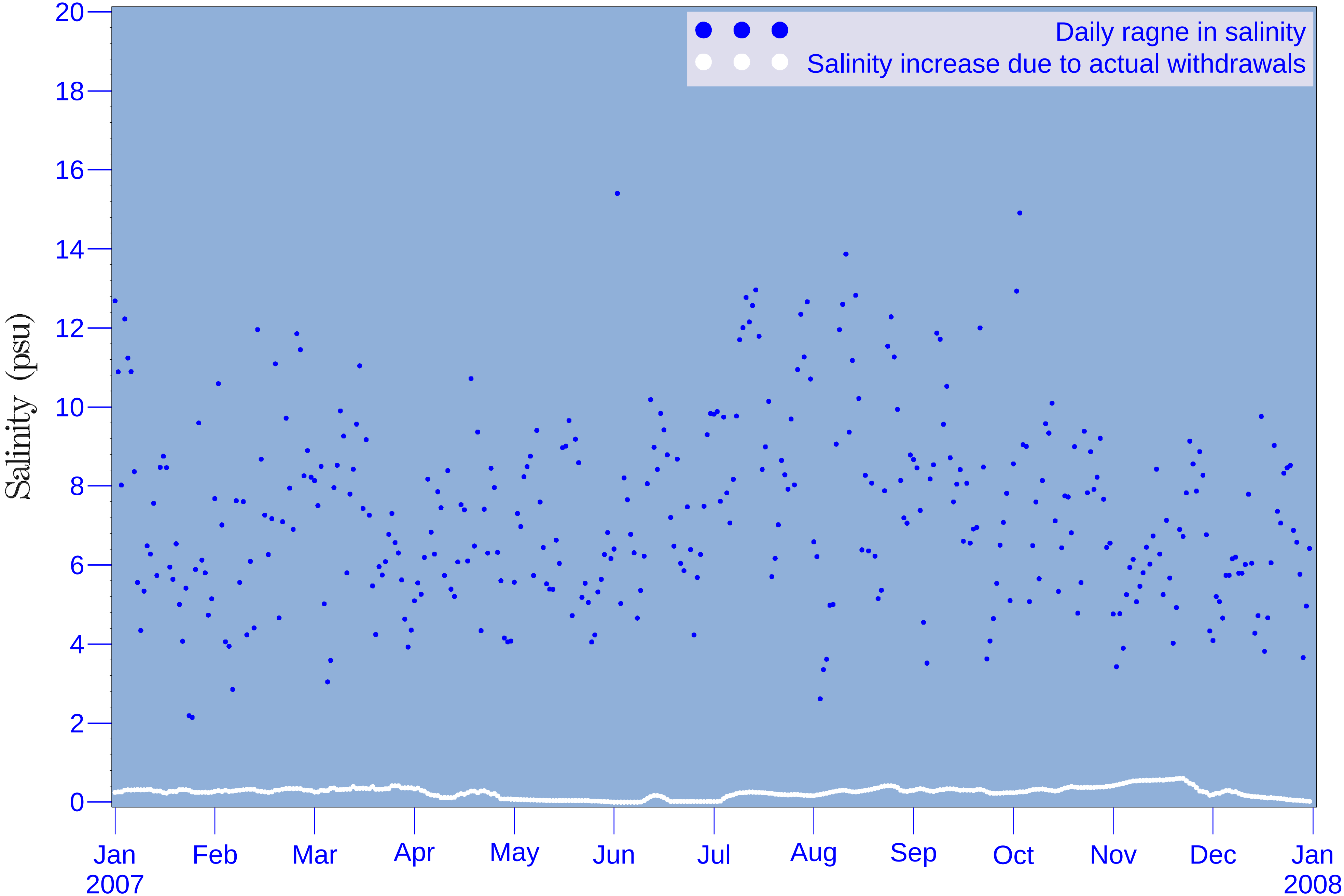


Figure 6.29 2007 surface salinity at Harbour Heights (RK 15.5)

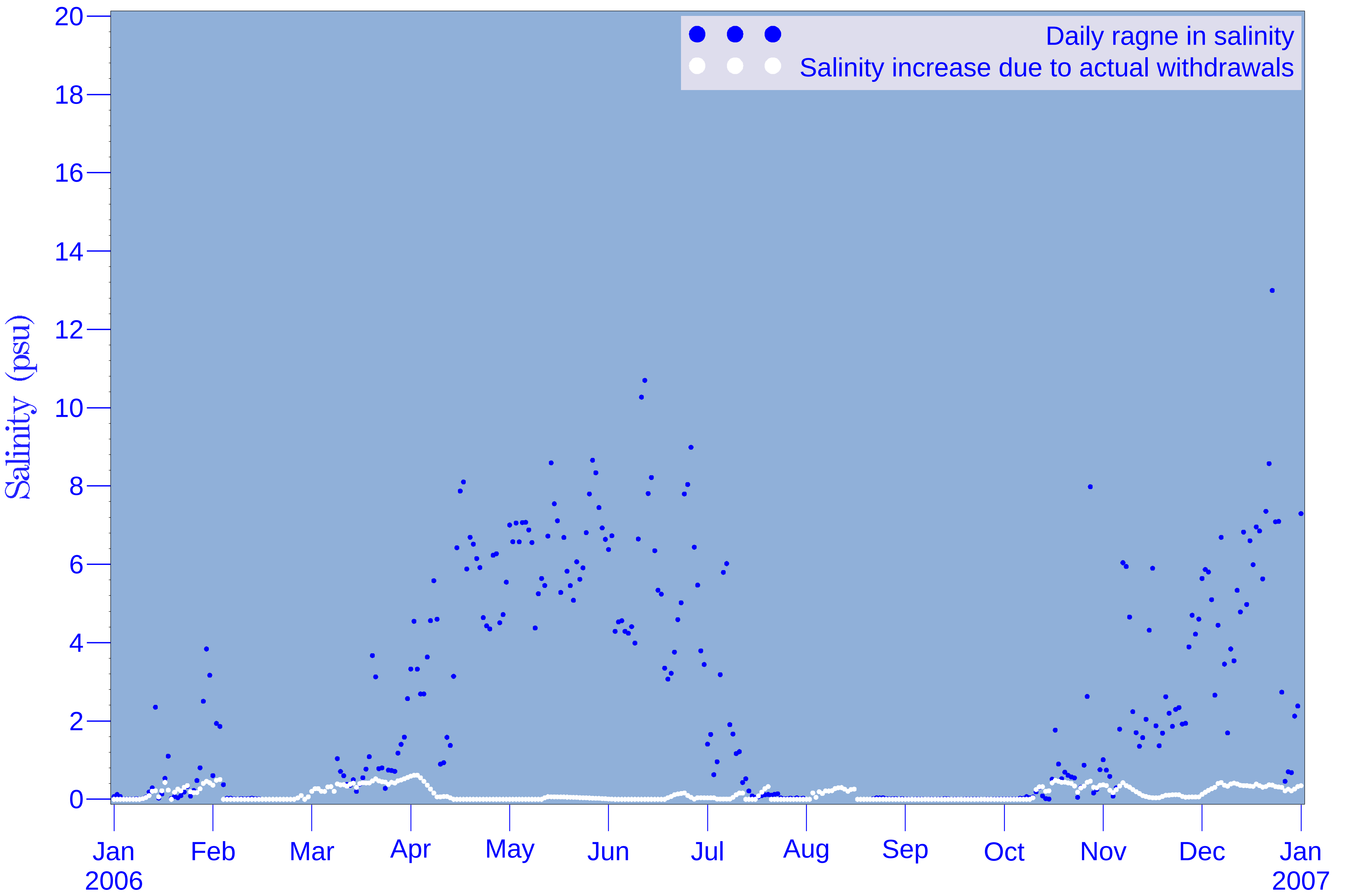


Figure 6.30 2006 surface salinity at RK 21.9

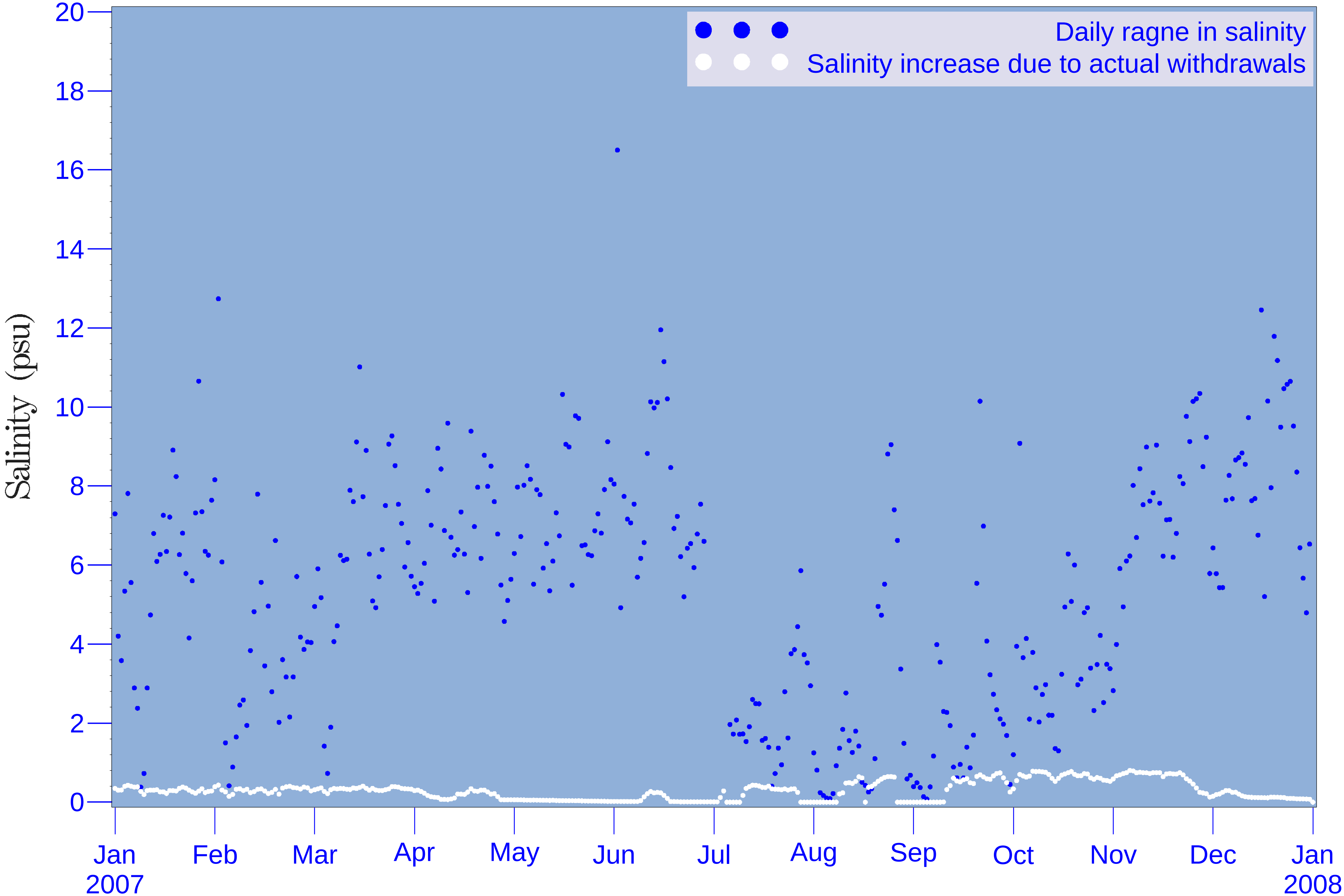


Figure 6.31 2007 surface salinity at RK 21.9

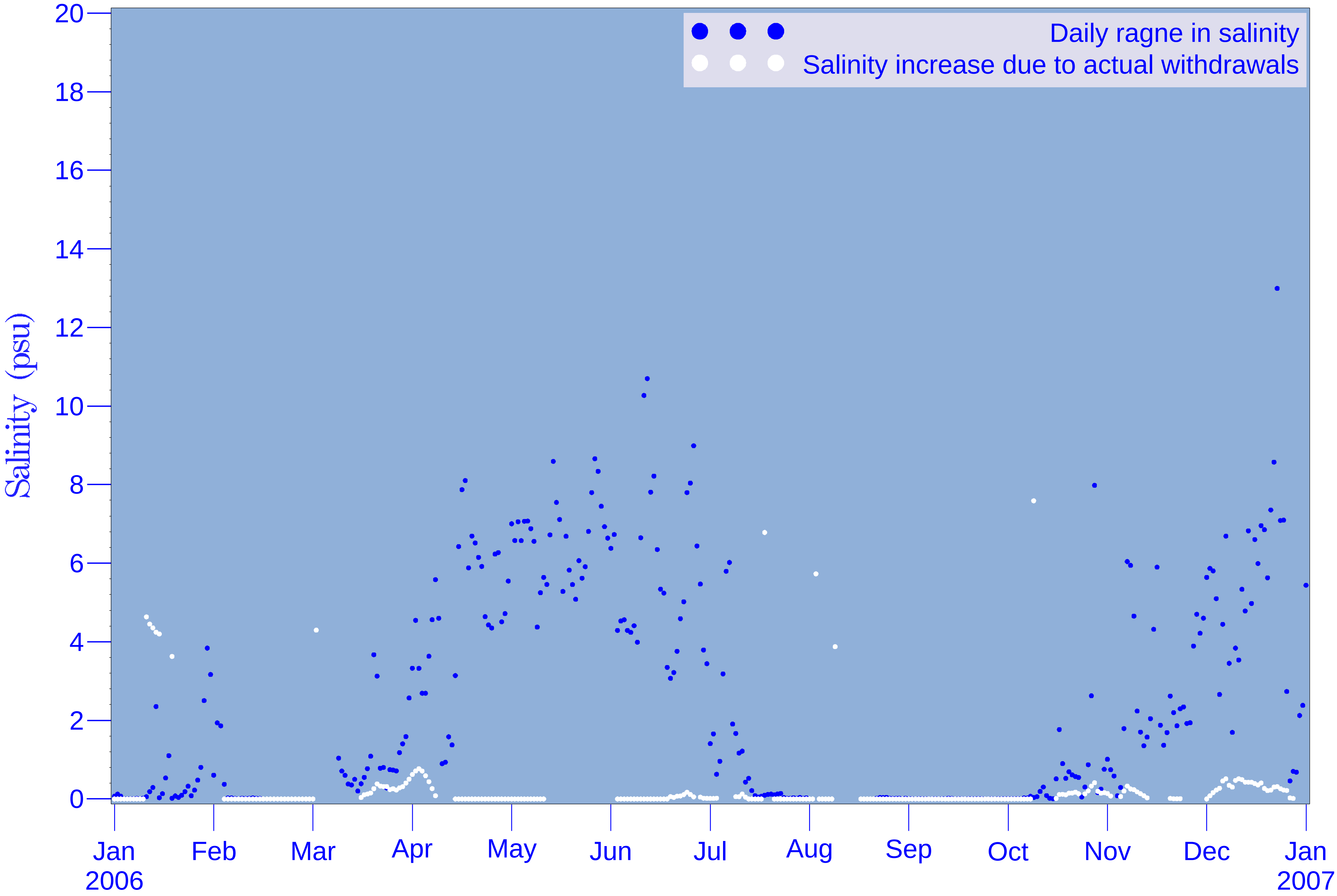


Figure 6.32 2006 surface salinity at RK 23.4

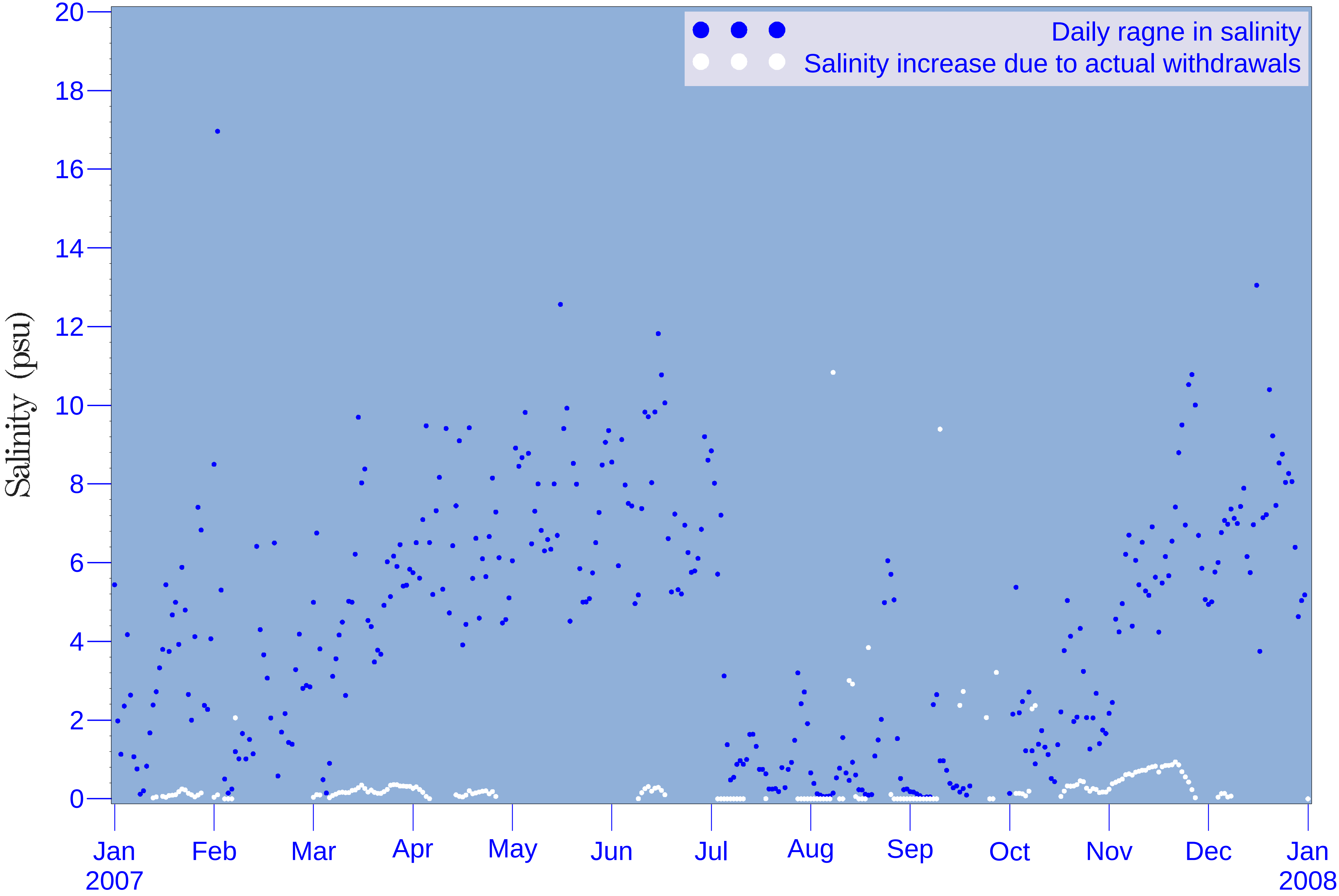


Figure 6.33 2007 surface salinity at RK 23.4

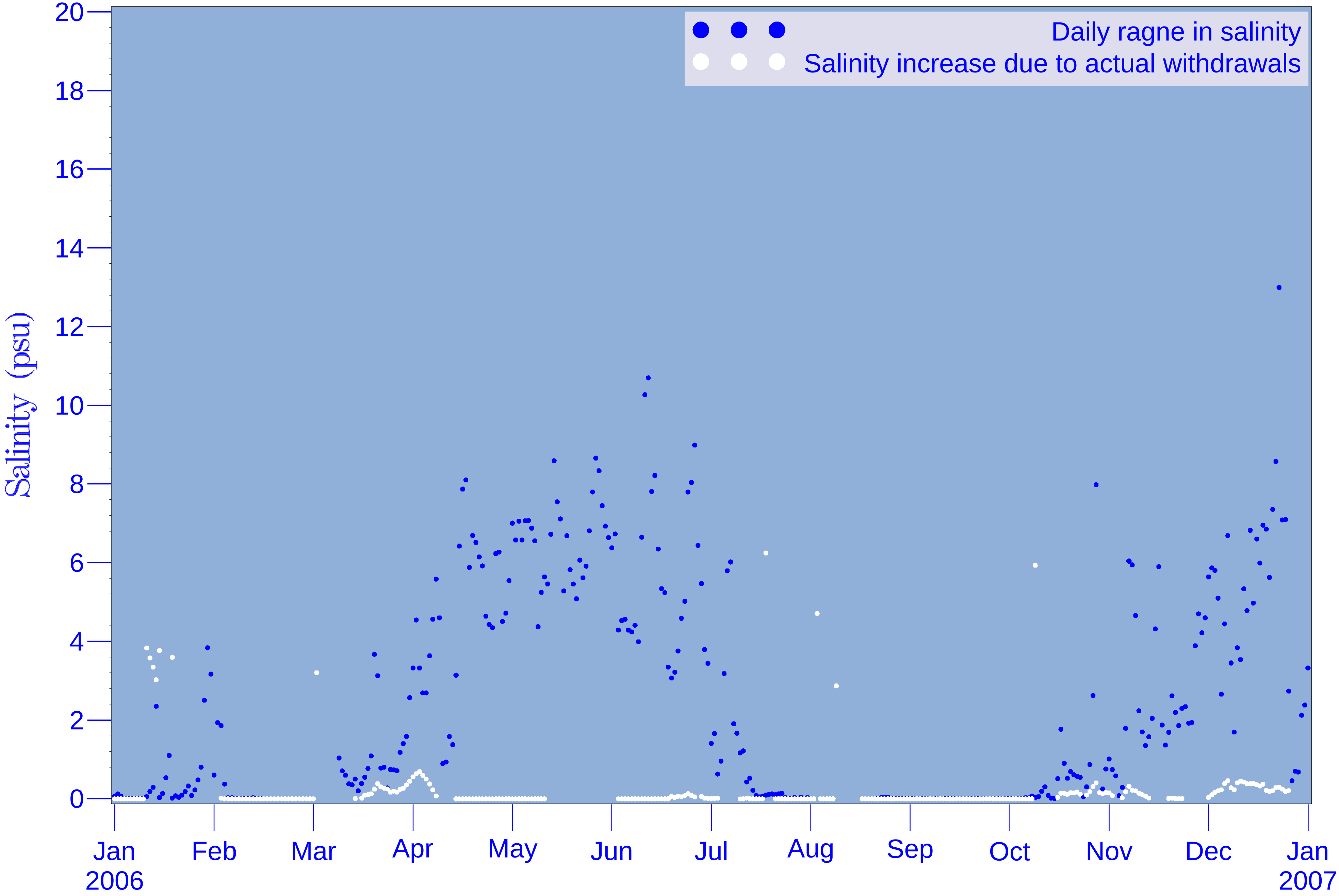


Figure 6.34 2006 surface salinity at RK 24.5

HBMP Pump Test

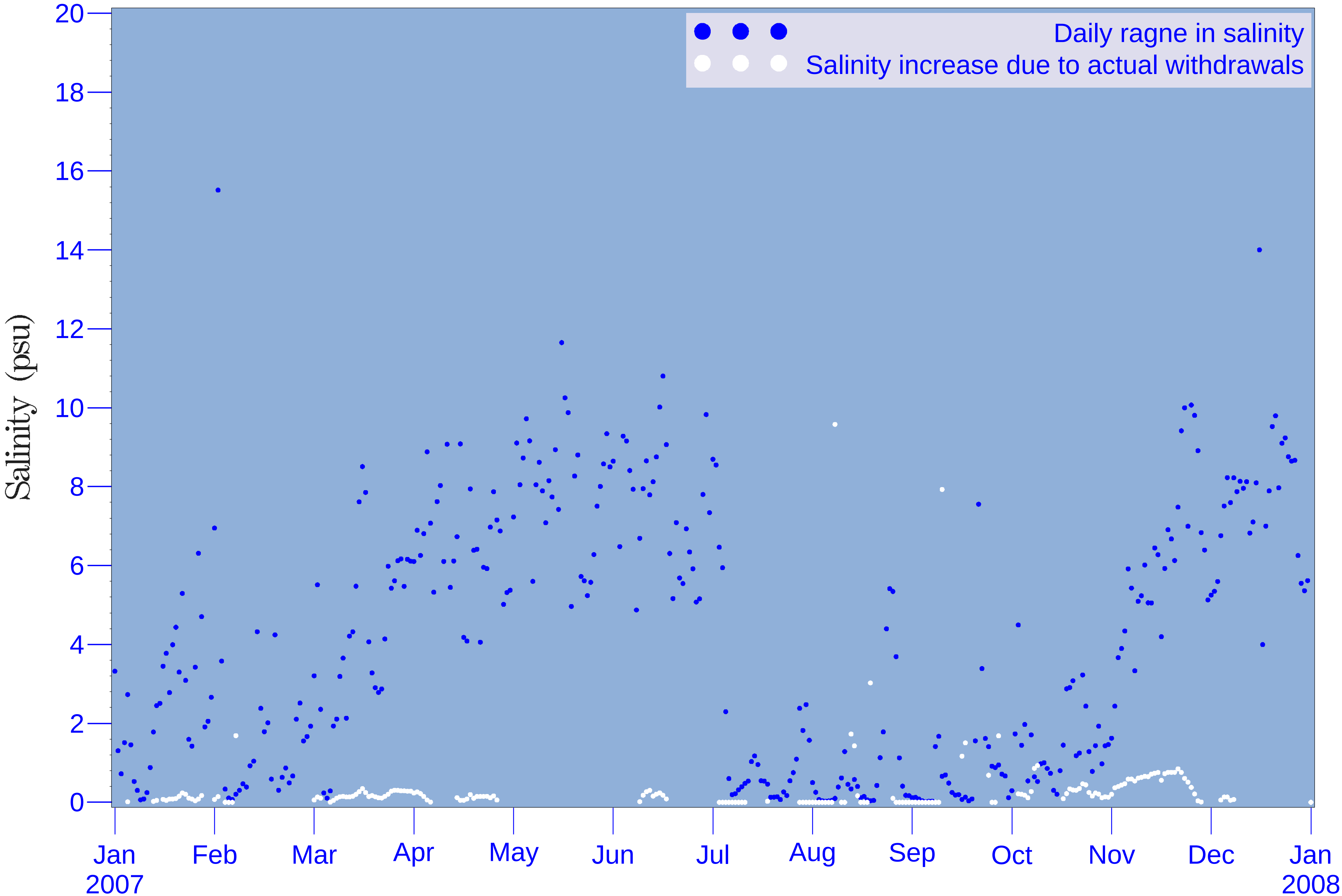


Figure 6.35 2007 surface salinity at RK 24.5

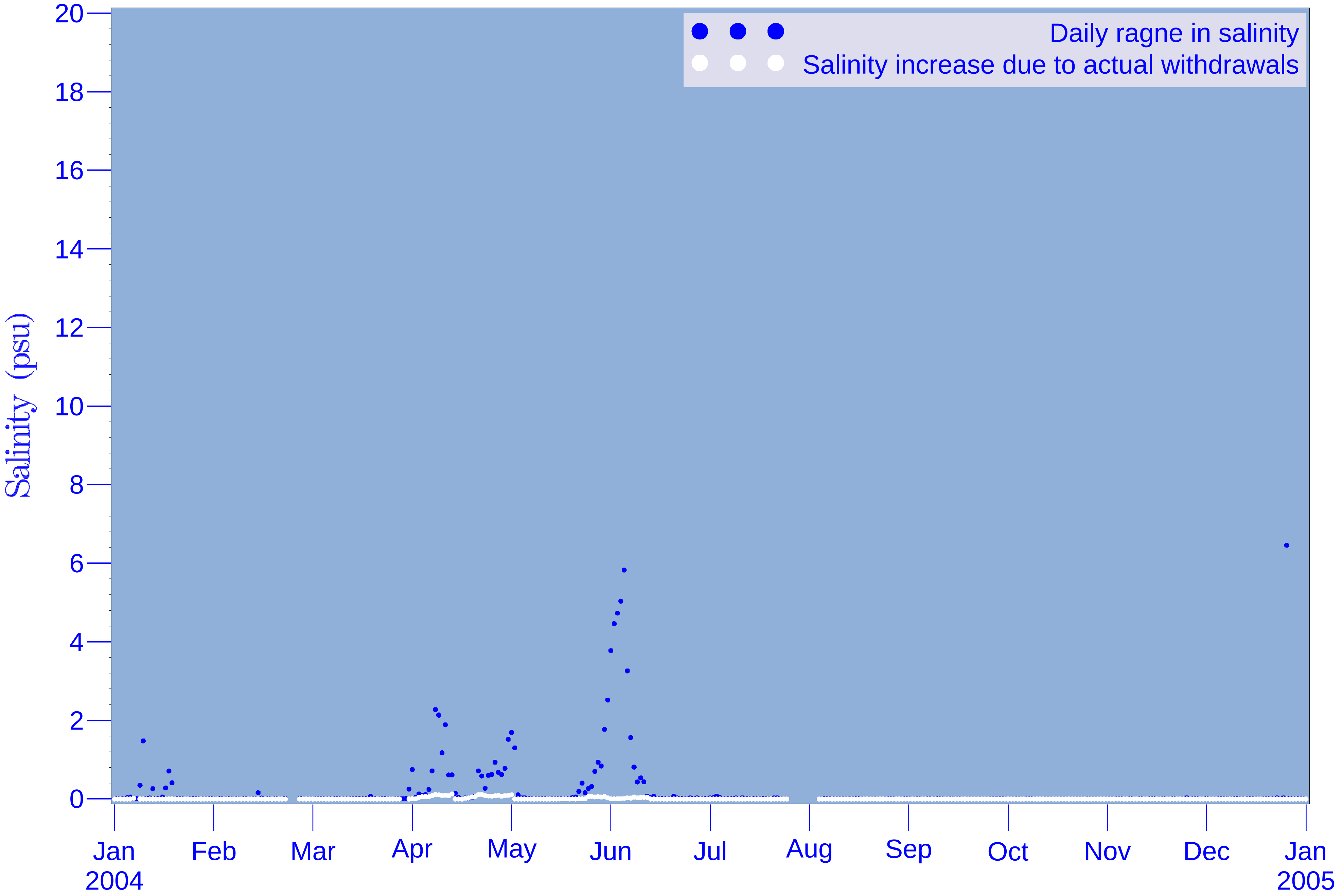


Figure 6.36 2004 surface salinity at Peace River Heights (RK 26.7)

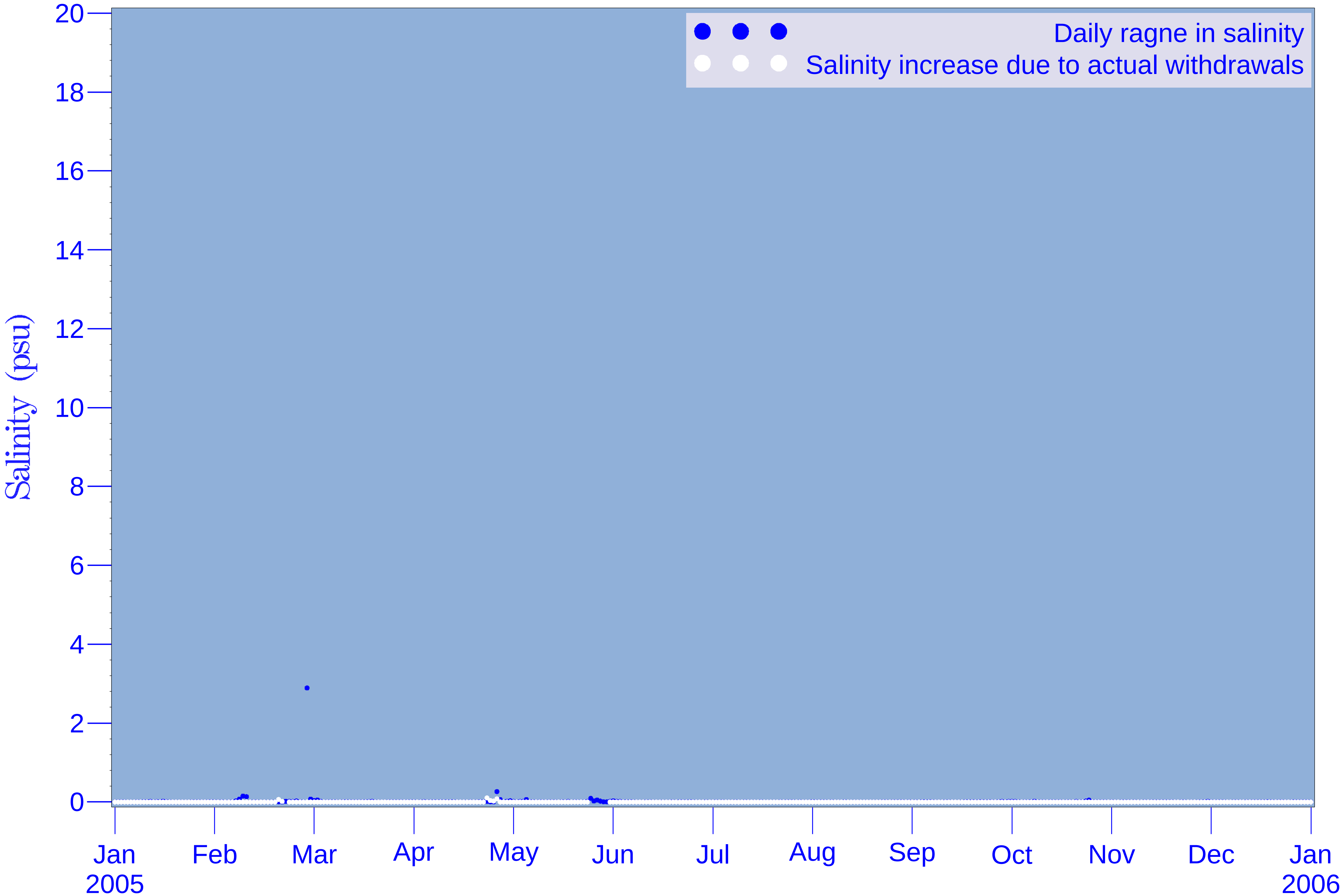


Figure 6.37 2005 surface salinity at Peace River Heights (RK 26.7)

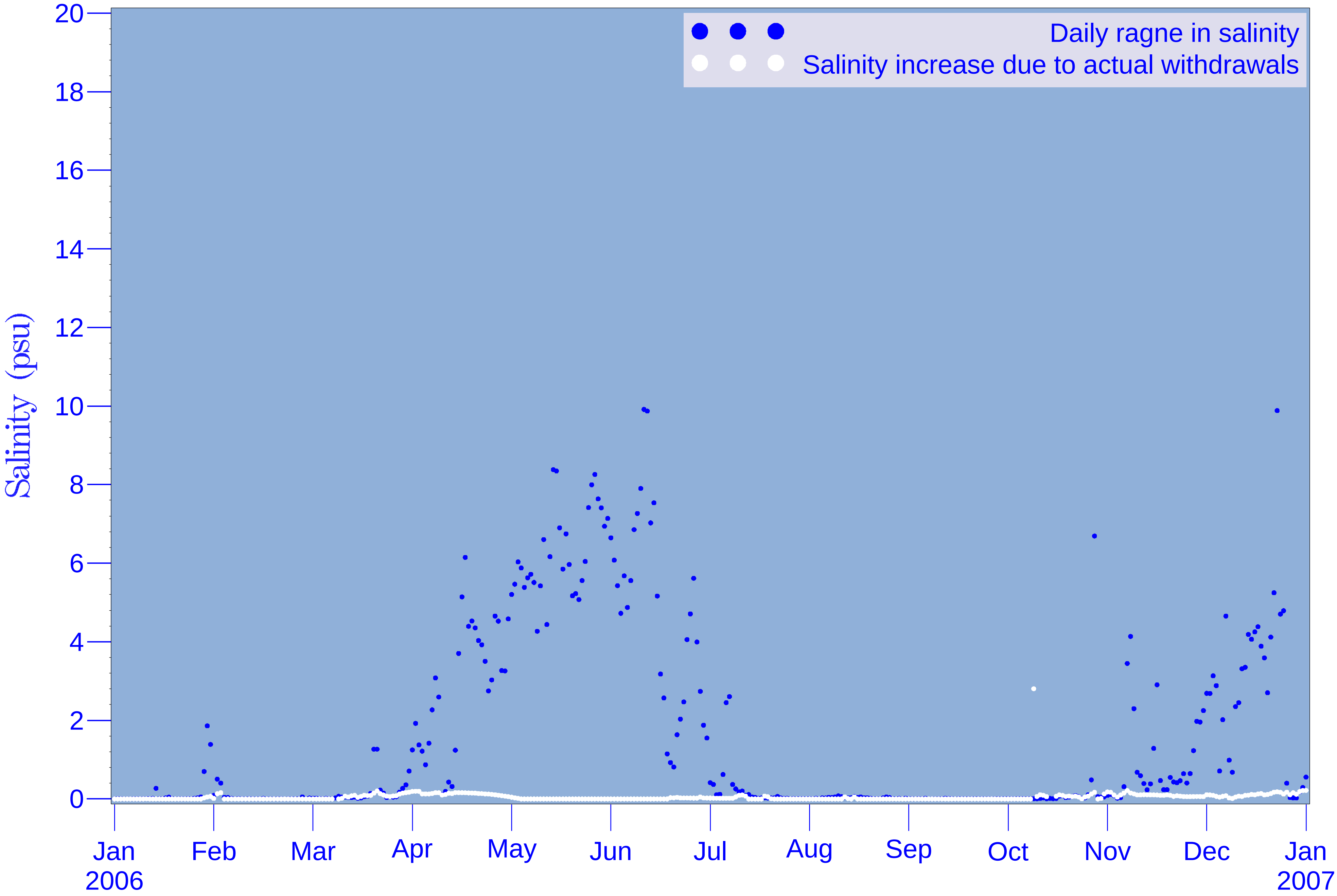


Figure 6.38 2006 surface salinity at Peace River Heights (RK 26.7)

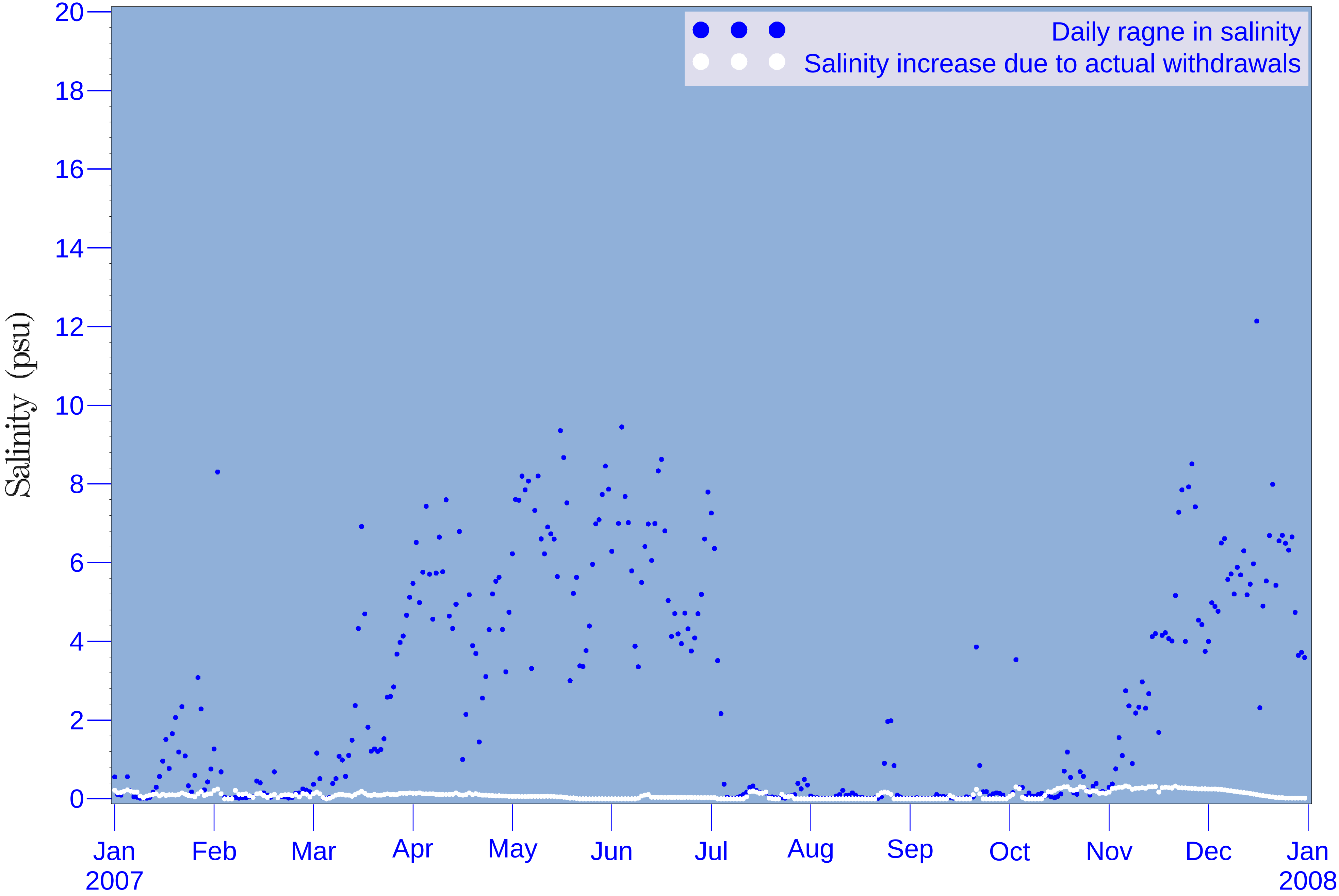


Figure 6.39 2007 surface salinity at Peace River Heights (RK 26.7)

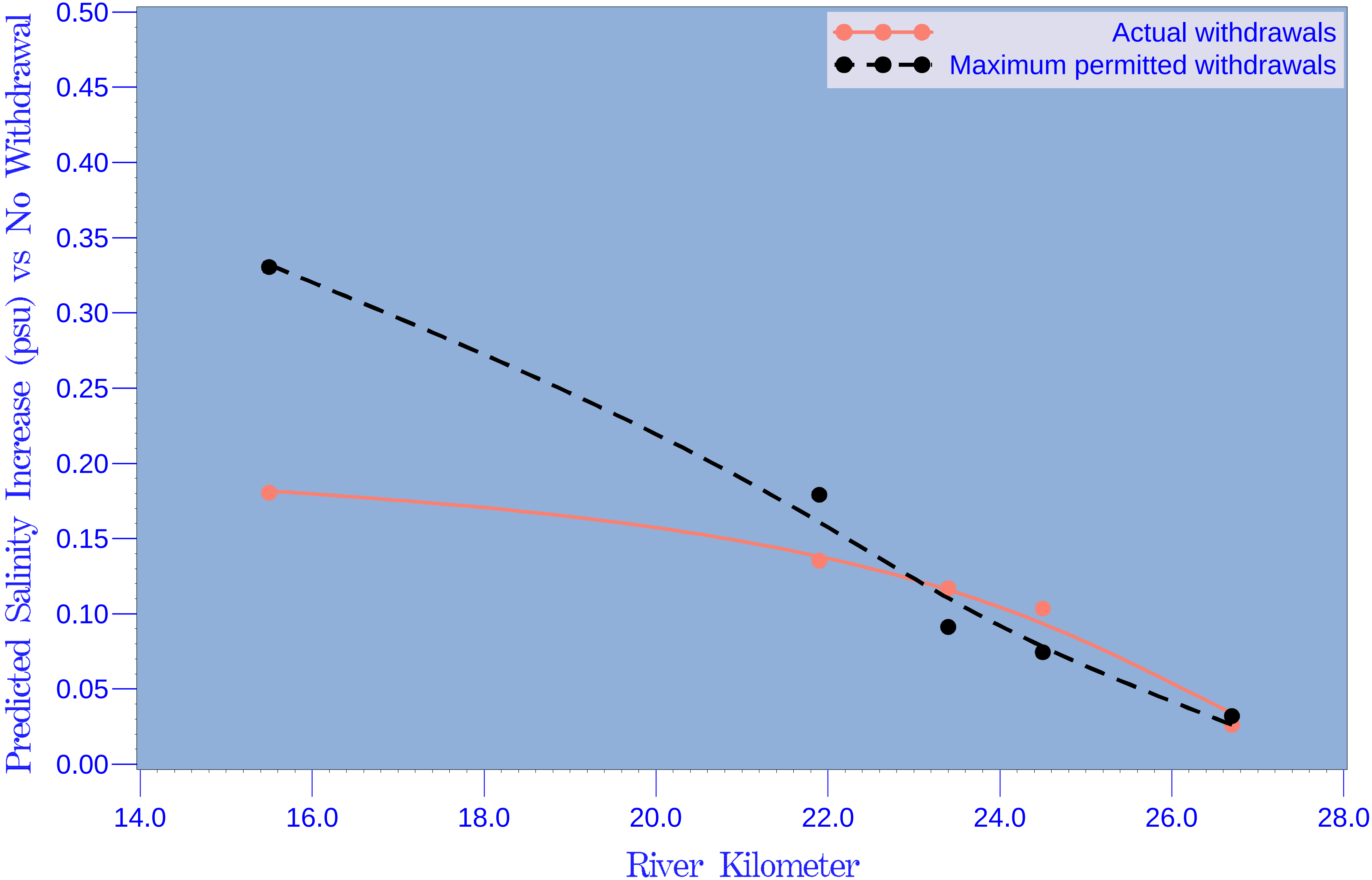


Figure 6.40 Predicted surface salinity increases between Harbour Heights and Peace River Heights
March through May - 2004

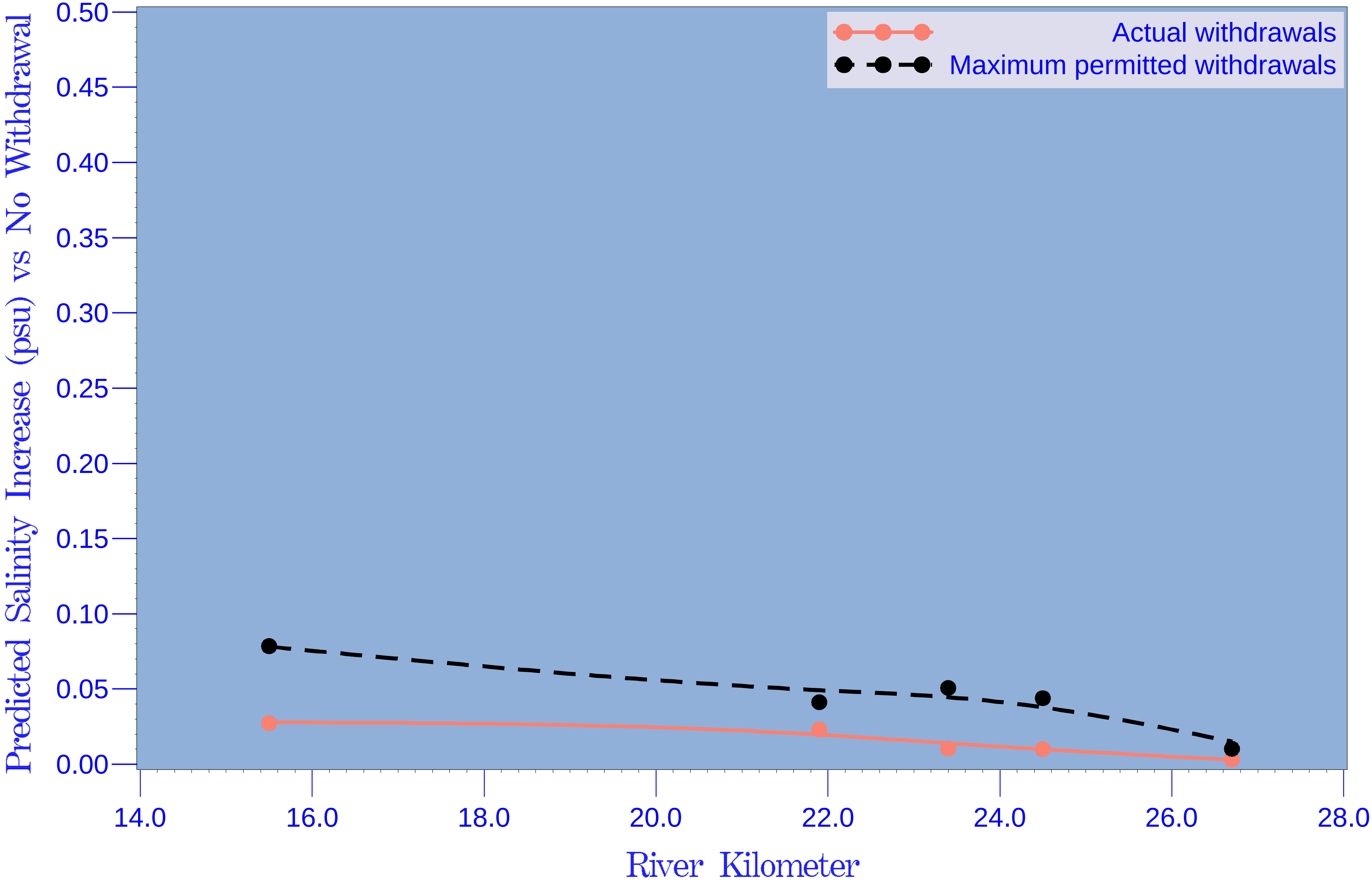


Figure 6.41 Predicted surface salinity increases between Harbour Heights and Peace River Heights
June through September - 2004

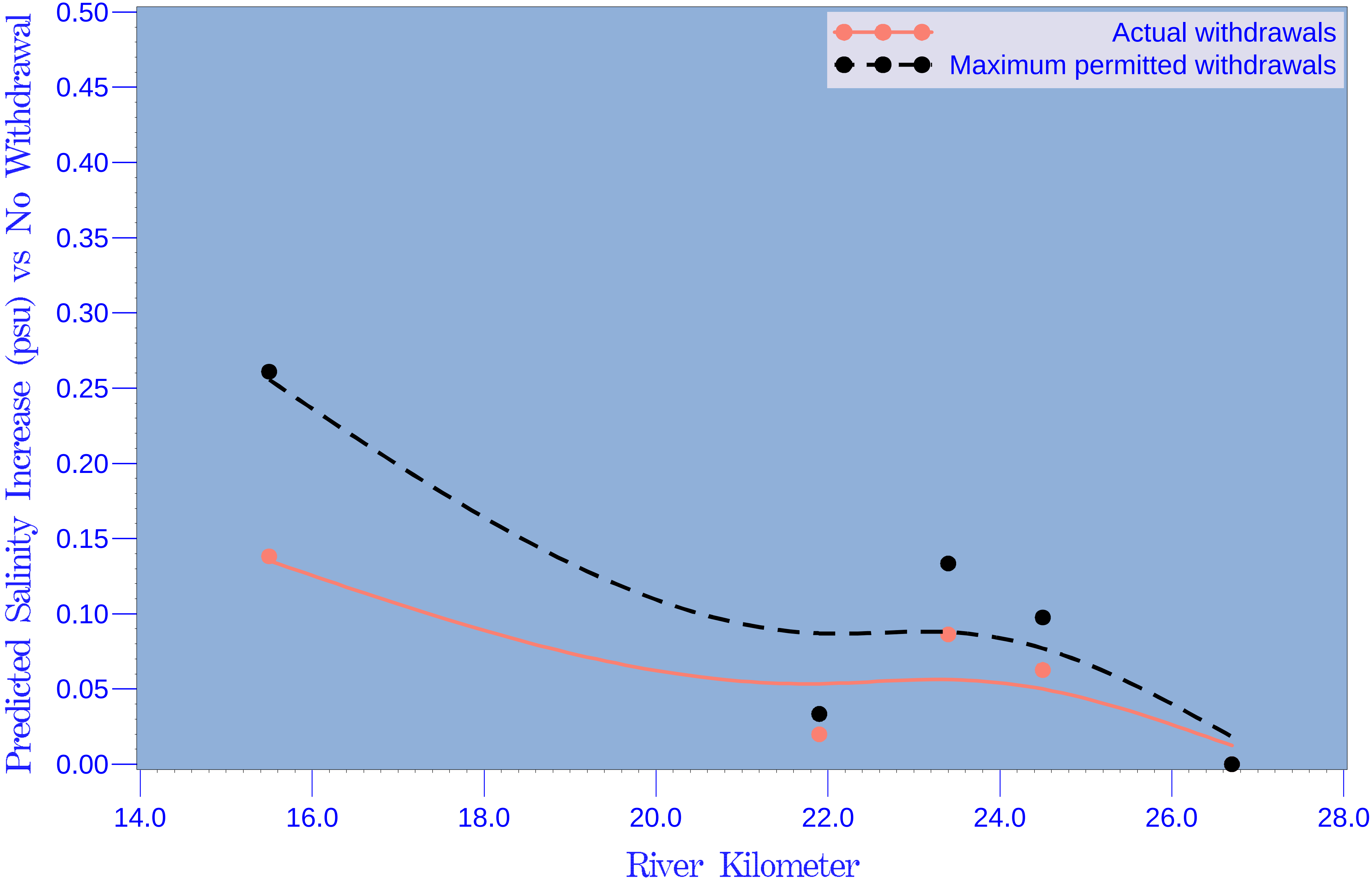


Figure 6.42 Predicted surface salinity increases between Harbour Heights and Peace River Heights
January and February, October through December - 2004

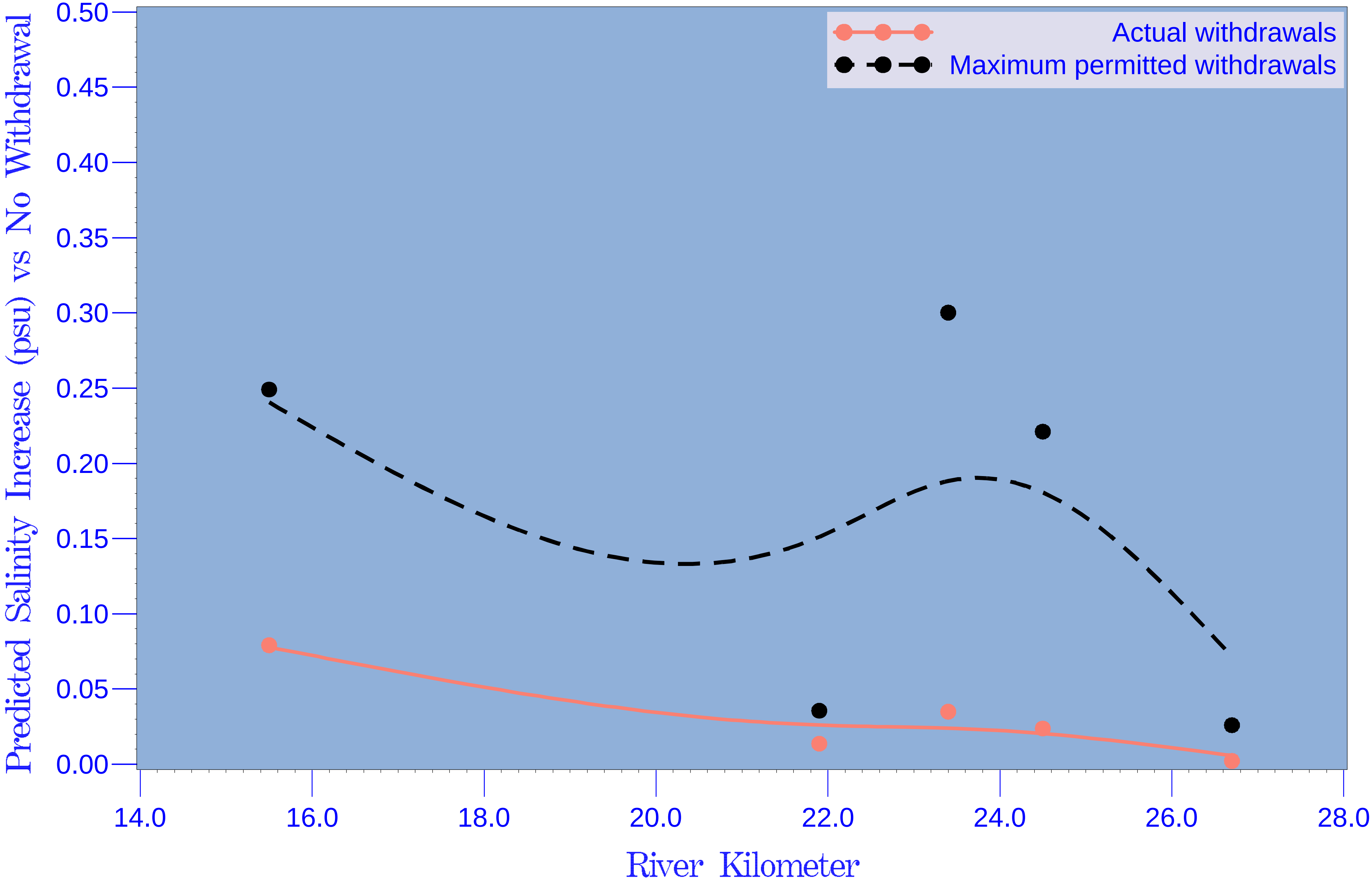


Figure 6.43 Predicted surface salinity increases between Harbour Heights and Peace River Heights
March through May - 2005

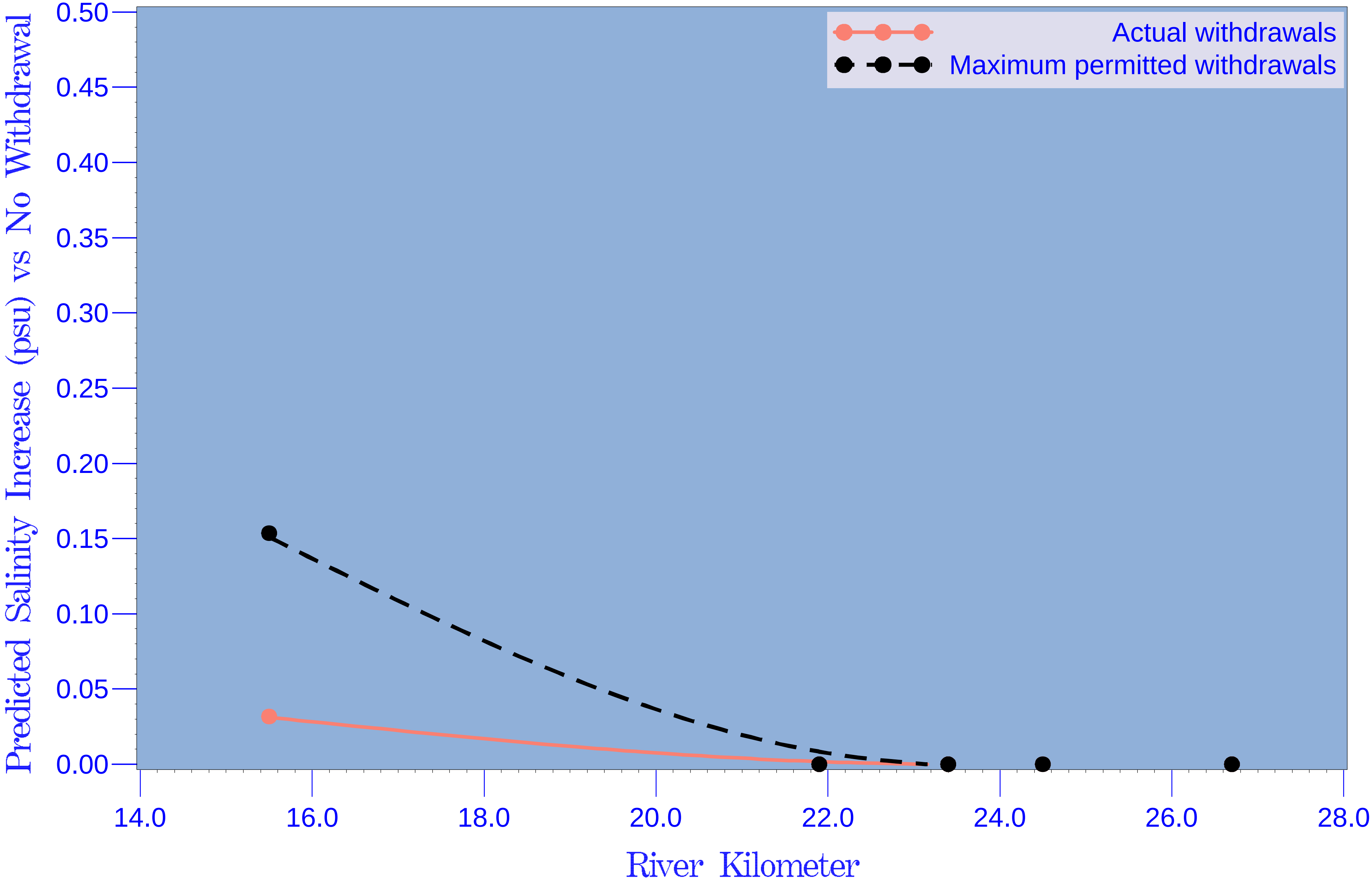


Figure 6.44 Predicted surface salinity increases between Harbour Heights and Peace River Heights June through September - 2005

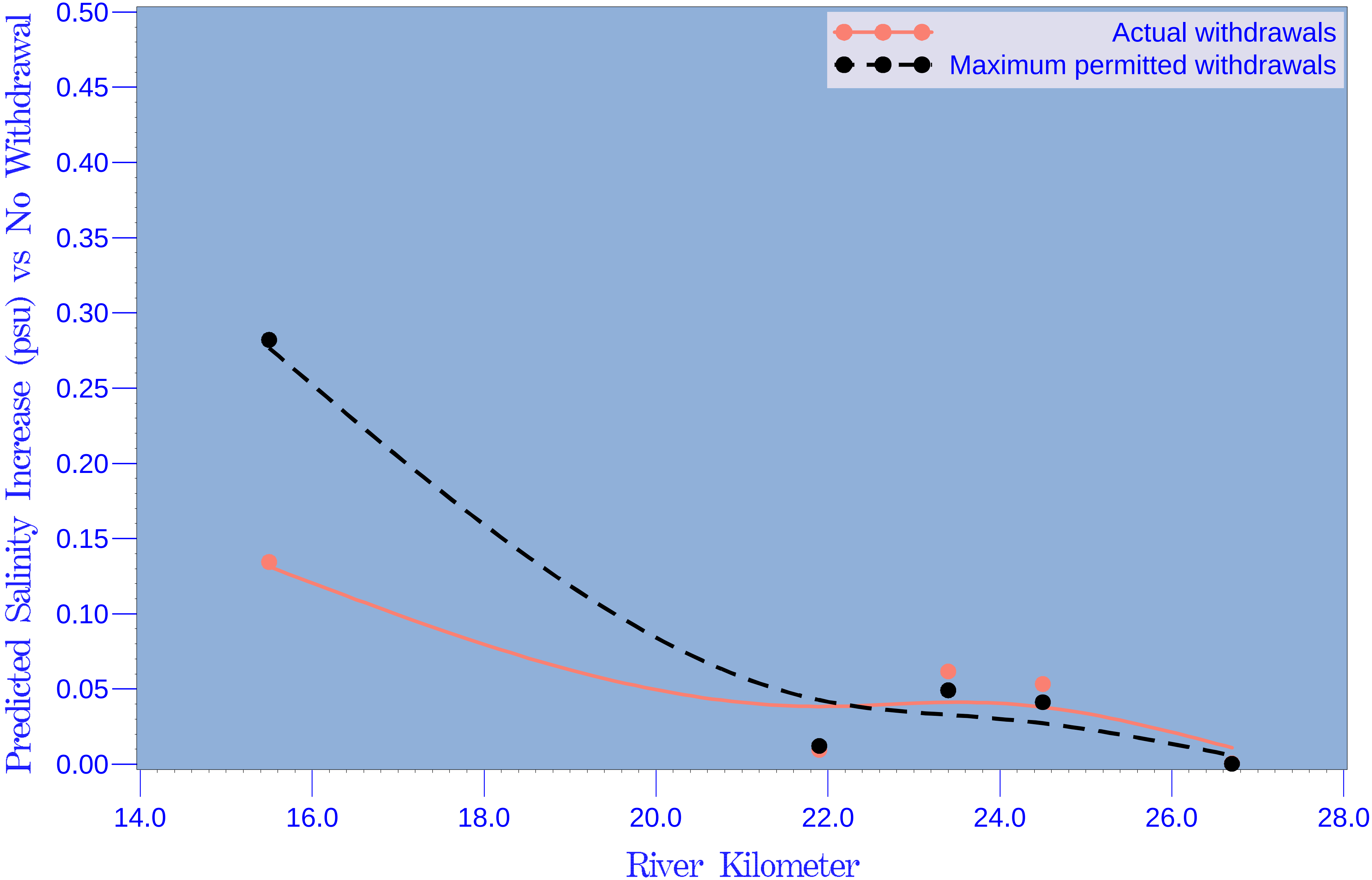


Figure 6.45 Predicted surface salinity increases between Harbour Heights and Peace River Heights
January and February, October through December - 2005

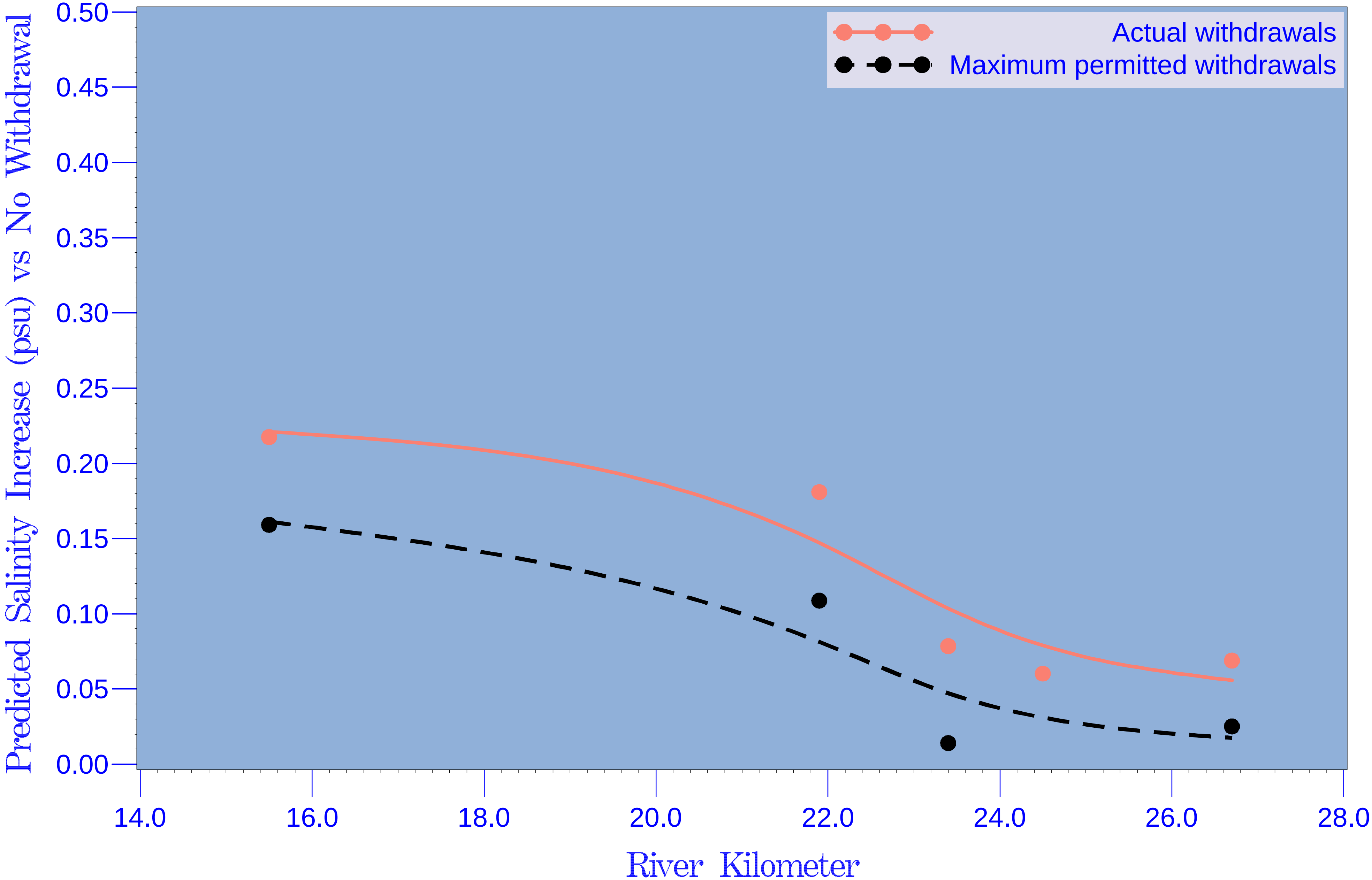


Figure 6.46 Predicted surface salinity increases between Harbour Heights and Peace River Heights March through May - 2006

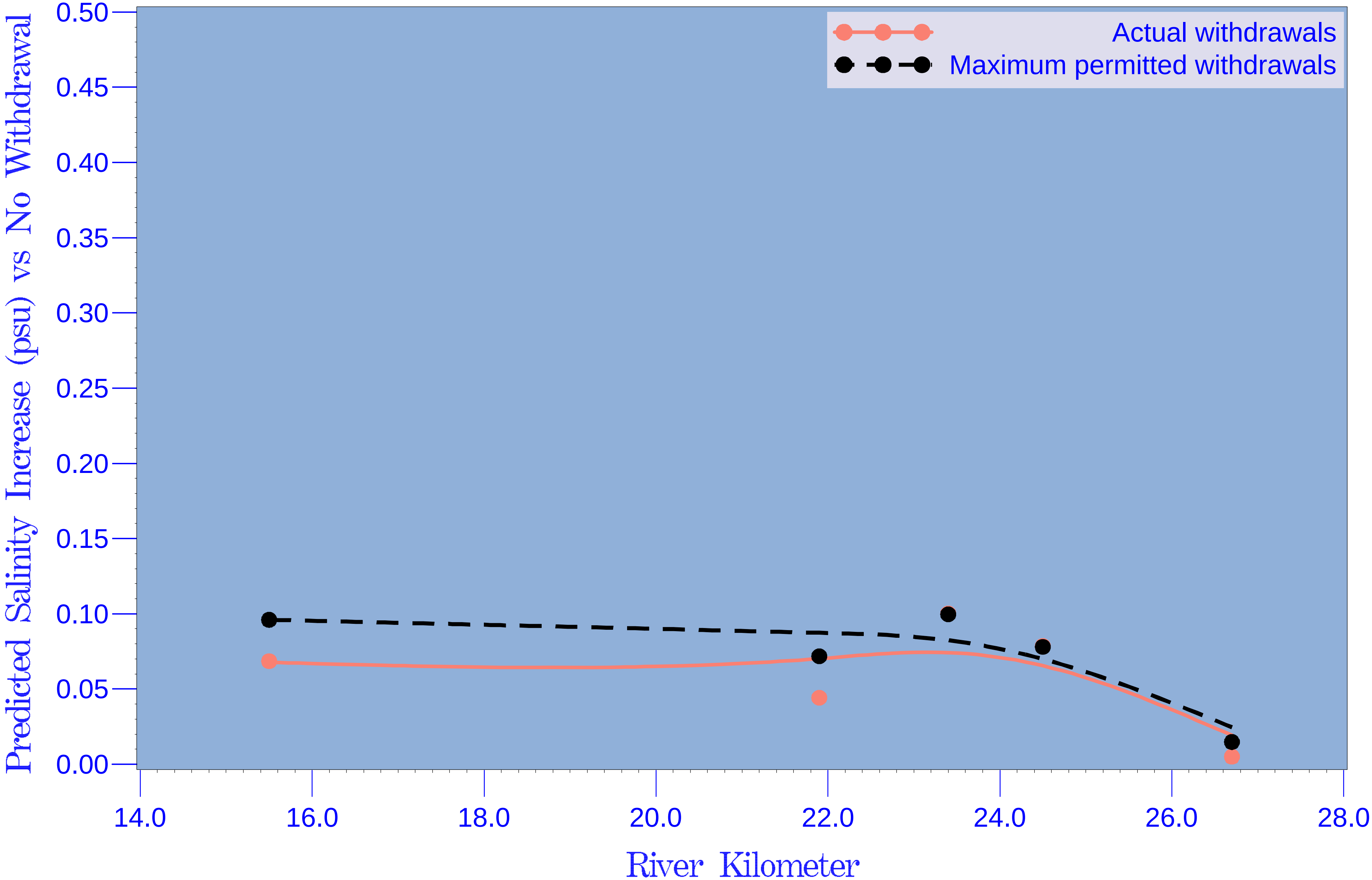


Figure 6.47 Predicted surface salinity increases between Harbour Heights and Peace River Heights
June through September - 2006

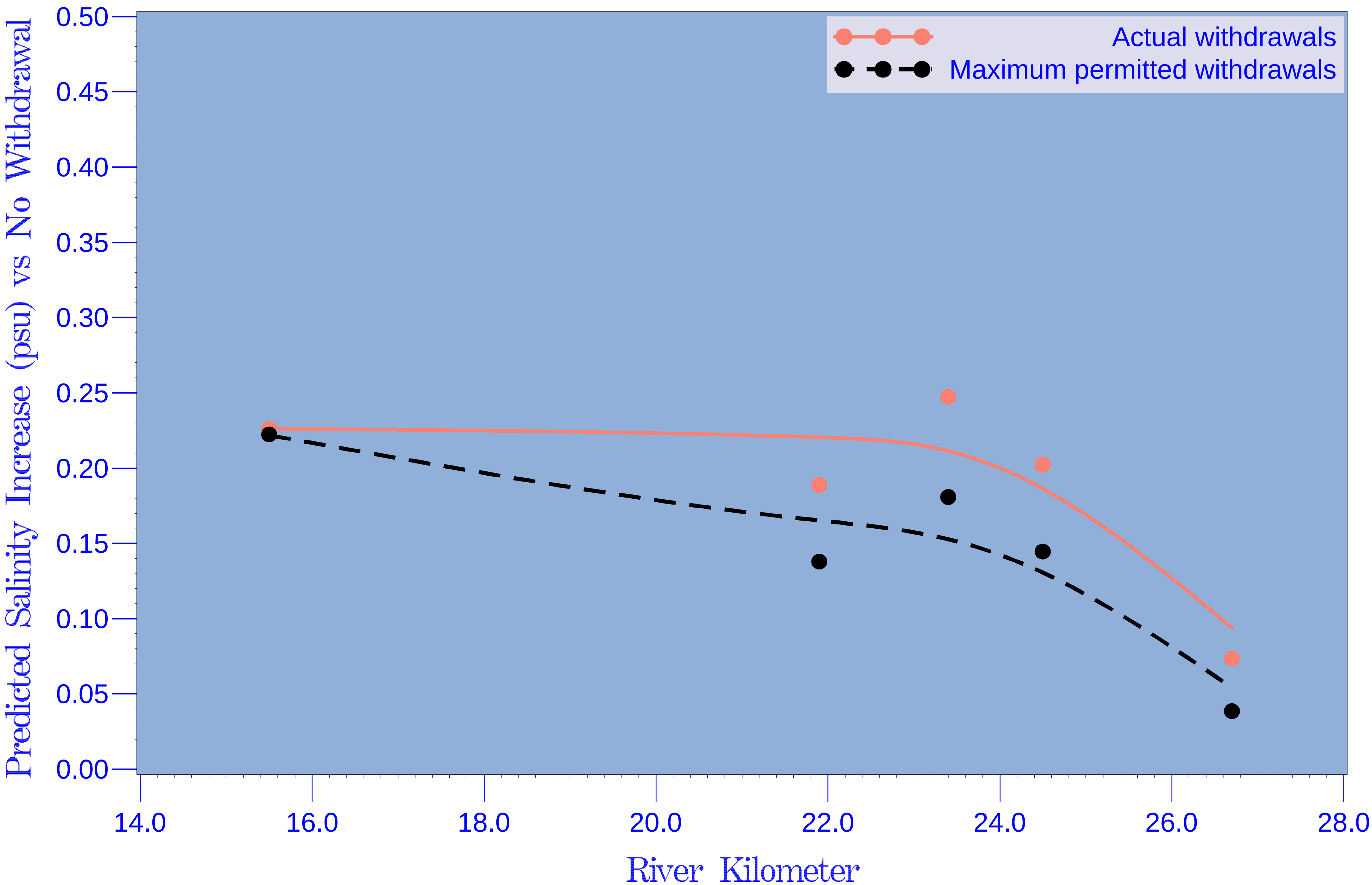


Figure 6.48 Predicted surface salinity increases between Harbour Heights and Peace River Heights
January and February, October through December - 2006

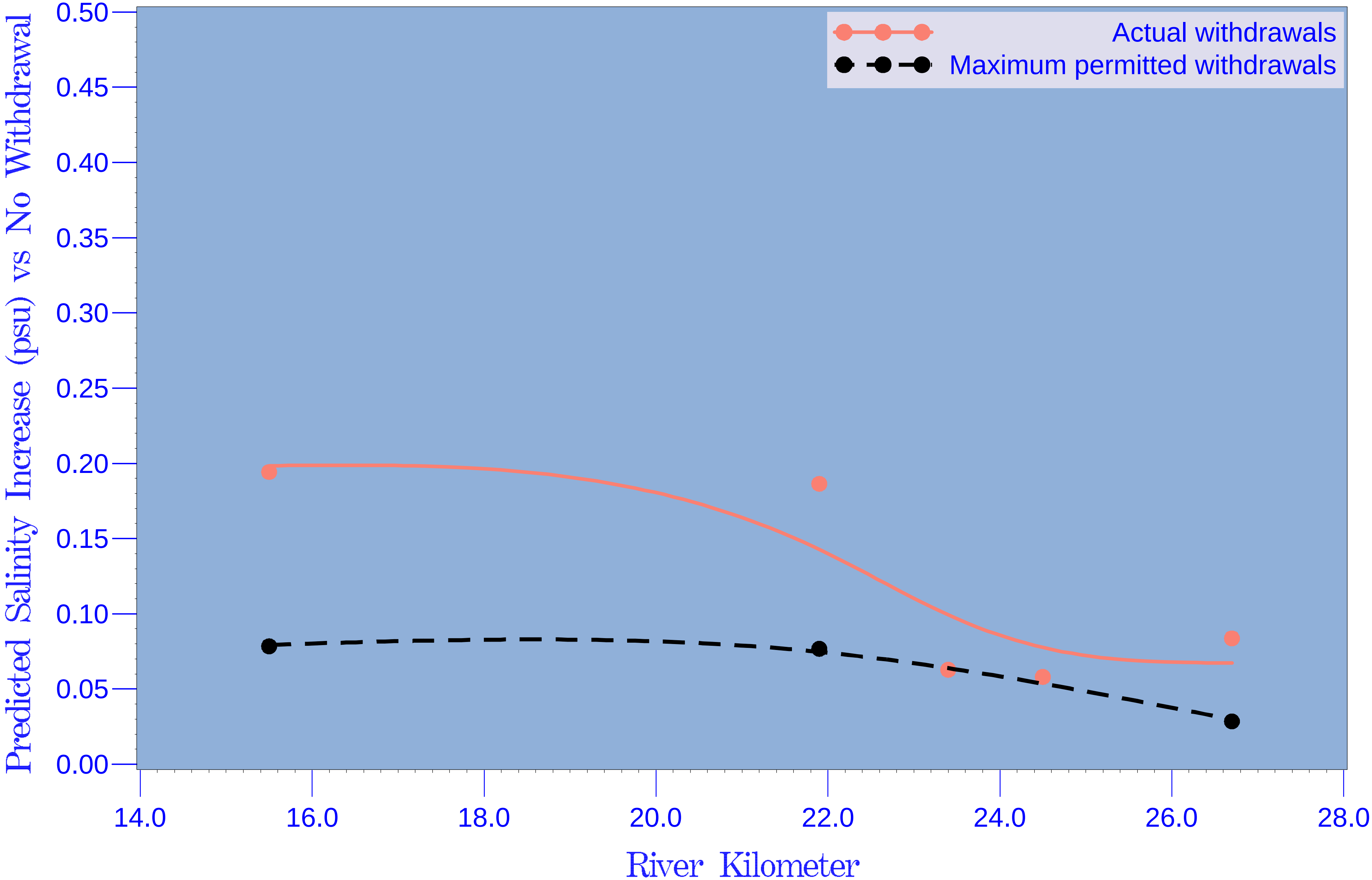


Figure 6.49 Predicted surface salinity increases between Harbour Heights and Peace River Heights
March through May - 2007

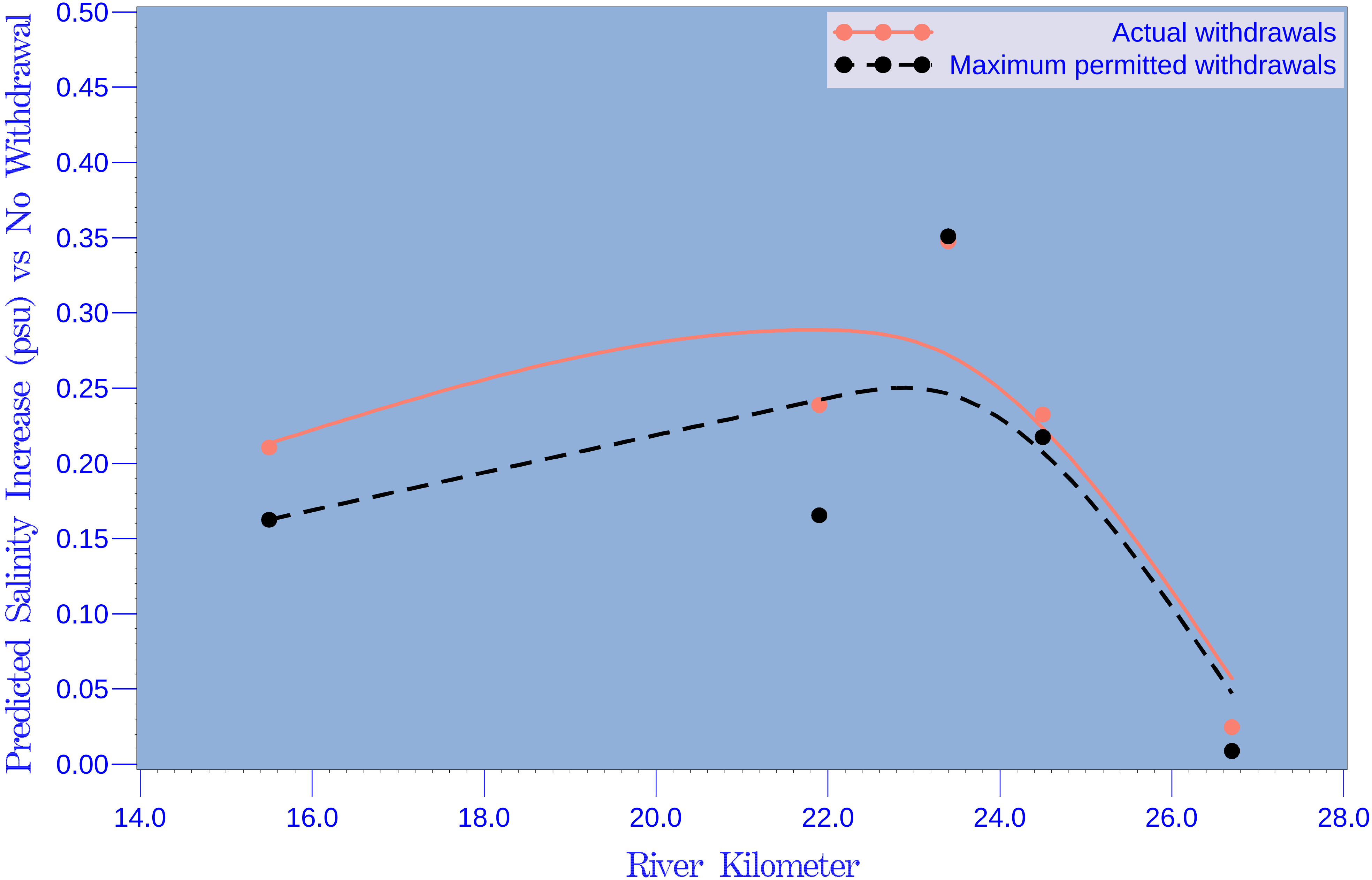


Figure 6.50 Predicted surface salinity increases between Harbour Heights and Peace River Heights
June through September - 2007

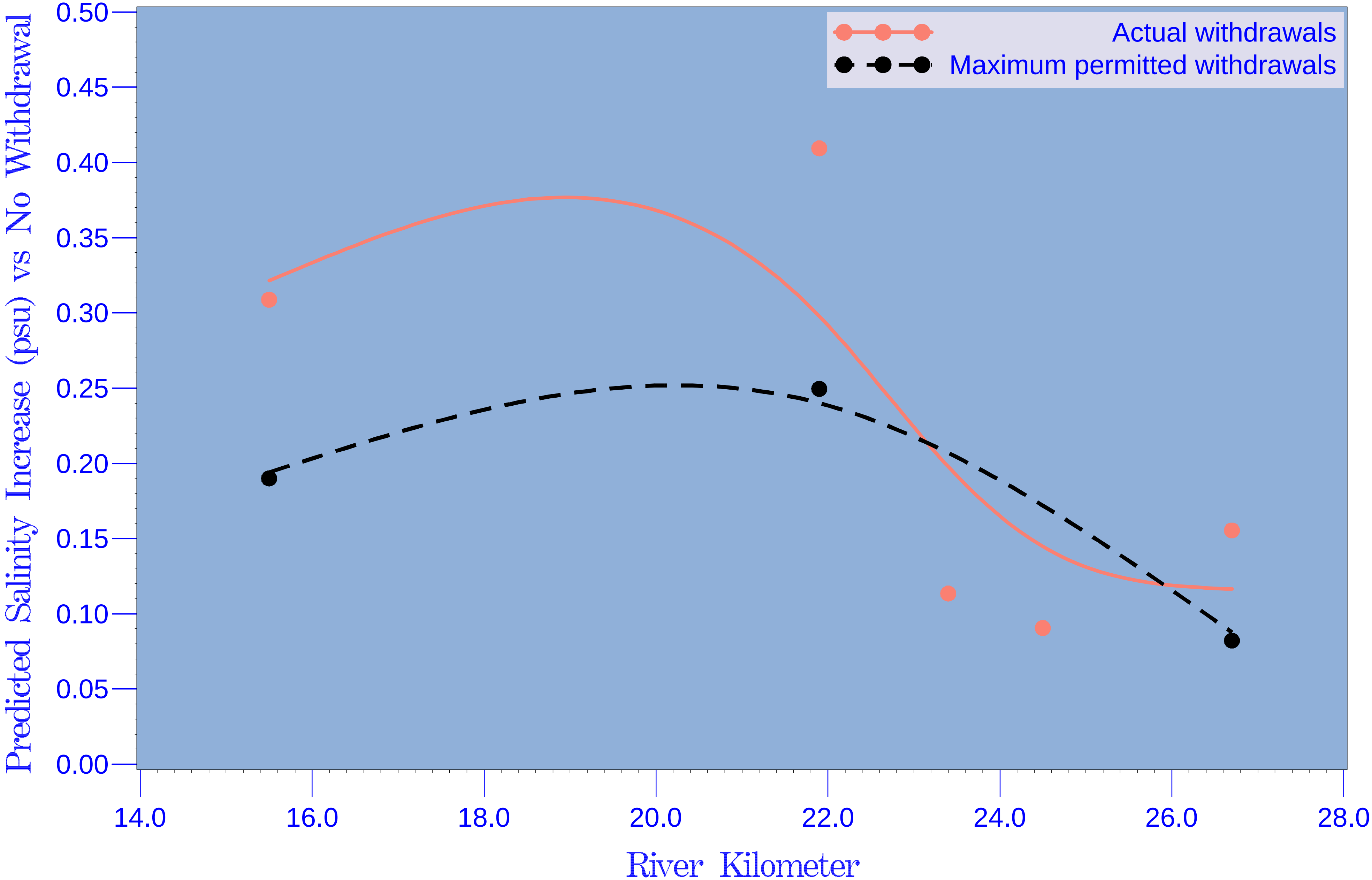


Figure 6.51 Predicted surface salinity increases between Harbour Heights and Peace River Heights
January and February, October through December - 2007

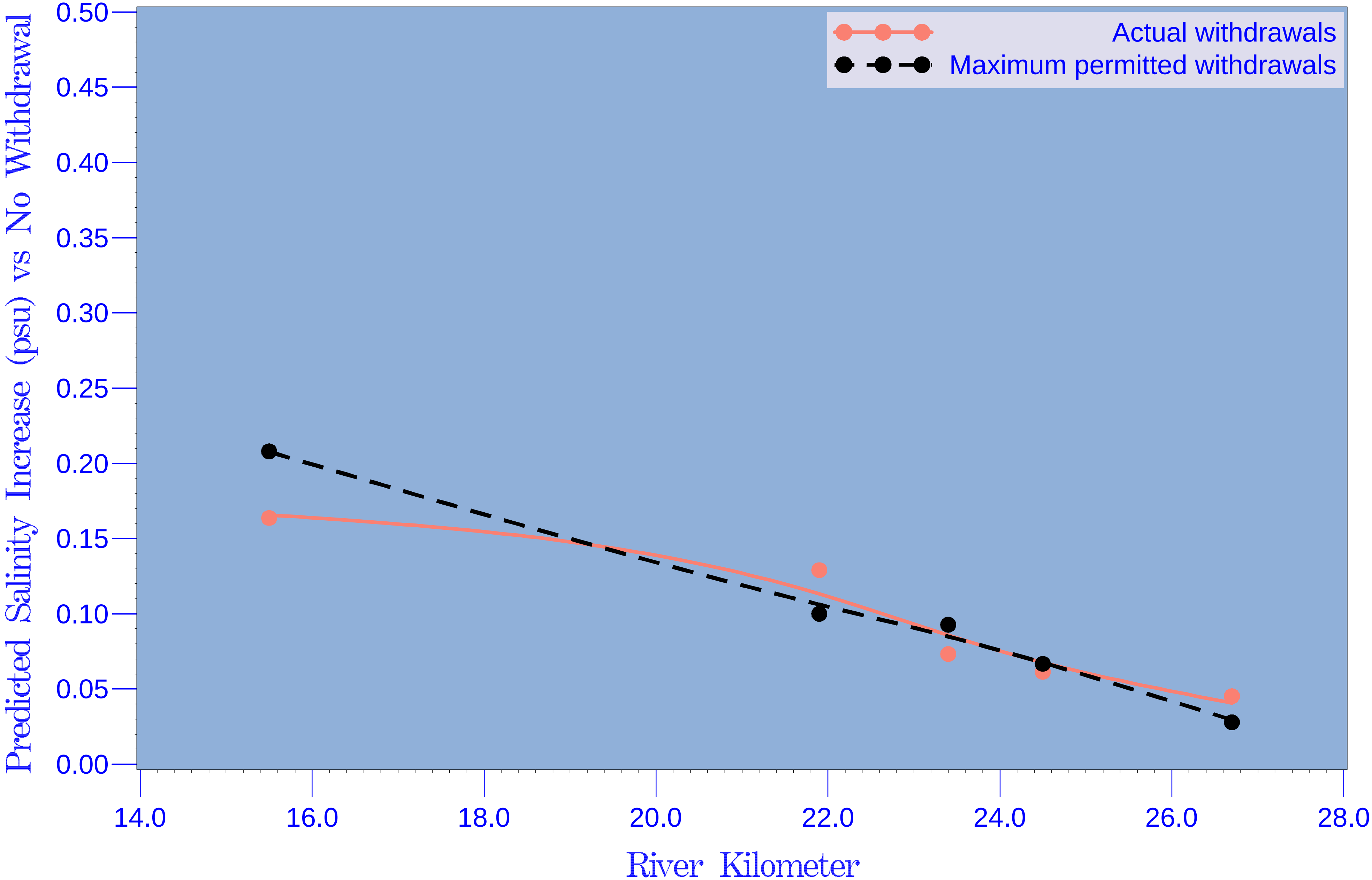


Figure 6.52 Predicted surface salinity increases between Harbour Heights and Peace River Heights
March through May

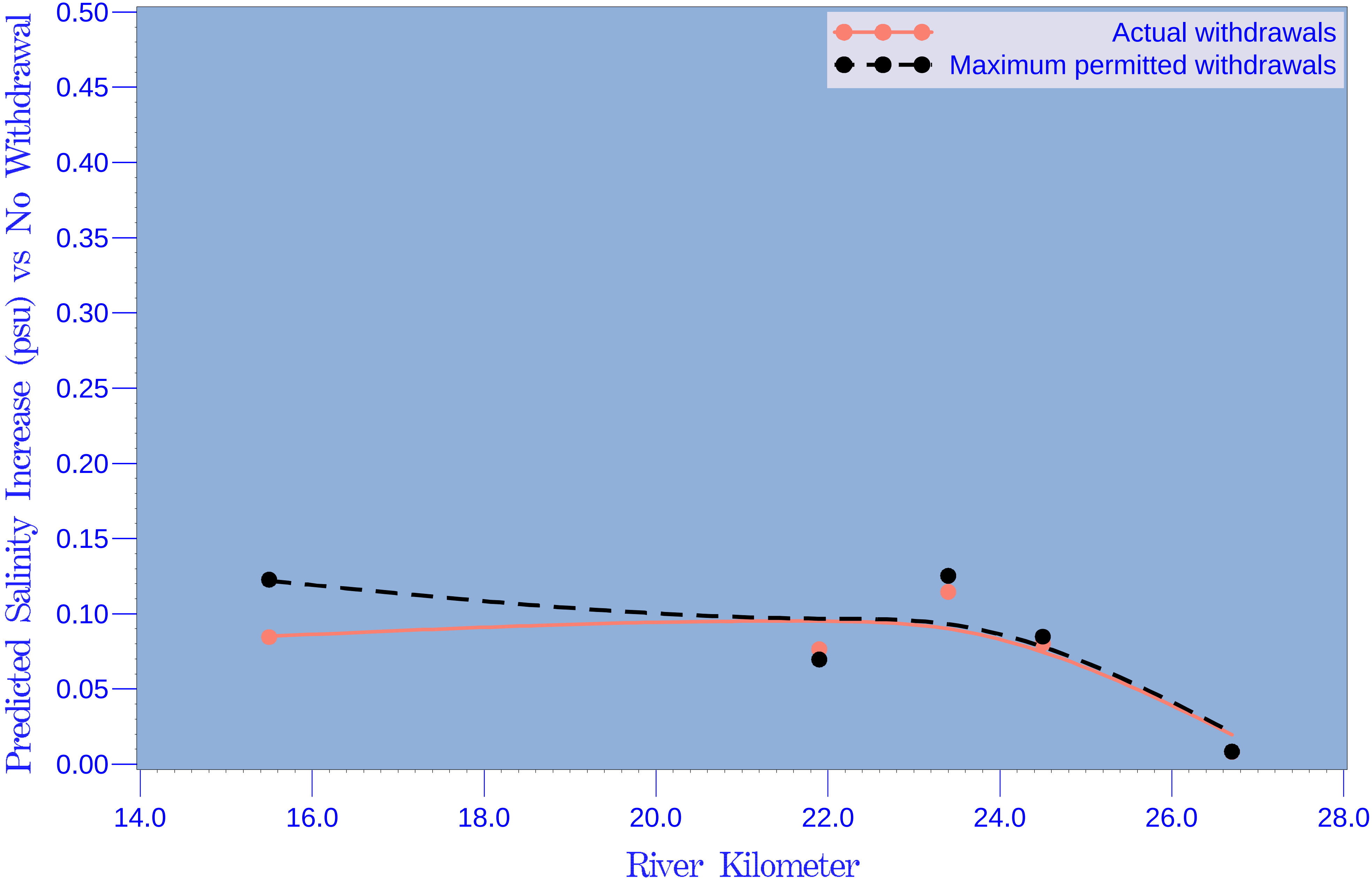


Figure 6.53 Predicted surface salinity increases between Harbour Heights and Peace River Heights
June through September

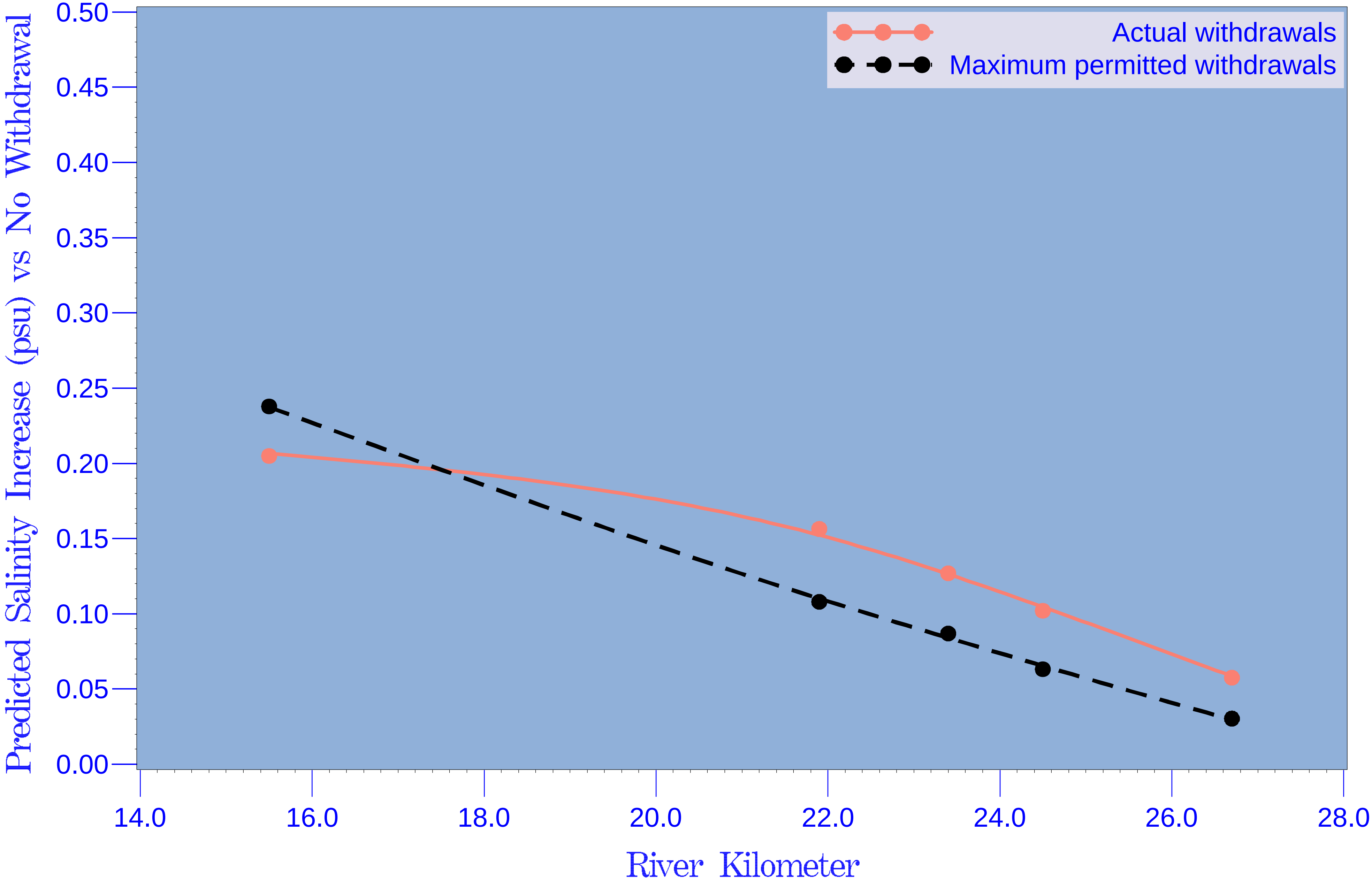


Figure 6.54 Predicted surface salinity increases between Harbour Heights and Peace River Heights
January and February, October through December

HBMP Low Flow Pump Test Appendices

Appendix A – **Results from analysis of variance for Harbour Heights (RK 15.5)**

Appendix B – **Results from analysis of variance MZ4 (RK 21.9)**

Appendix C – **Results from analysis of variance MZ3 (RK 23.4)**

Appendix D – **Results from analysis of variance MZ2 (RK 24.5)**

Appendix E – **Results from analysis of variance Peace Rive Heights (RK 26.7)**

Appendix A

Results from analysis of variance for Harbour Heights (RK 15.5)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	2.78942
F Value	2.79
Critical Value of t	2.15591
Minimum Significant Difference	1.0394

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	15.0789	24	Day 3 (With Withdrawals)
	A			
B	A	14.2434	24	Day 2 (Without Withdrawal)
B				
B		13.9912	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.78942

Number of Means	**2**	**3**
Critical Range	0.9618636	1.1548622

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	15.0789	24	Day 3 (With Withdrawals)
A			
A	14.2434	24	Day 2 (Without Withdrawal)
A			
A	13.9912	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.78942
Critical Value of t	2.45375
Minimum Significant Difference	1.183

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	15.0789	24	Day 3 (With Withdrawals)
A			
A	14.2434	24	Day 2 (Without Withdrawal)
A			
A	13.9912	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.727619
F Value	0.95
Critical Value of t	2.43008
Minimum Significant Difference	1.3544

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	16.6679	24	Day 1 (With Withdrawals)
A			
A	16.1560	24	Day 3 (With Withdrawals)
A			
A	15.9168	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.727619

Number of Means	**2**	**3**
Critical Range	1.1119168	1.3350236

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	16.6679	24	Day 1 (With Withdrawals)
A			
A	16.1560	24	Day 3 (With Withdrawals)
A			
A	15.9168	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.727619
Critical Value of t	2.45375
Minimum Significant Difference	1.3676

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	16.6679	24	Day 1 (With Withdrawals)
A			
A	16.1560	24	Day 3 (With Withdrawals)
A			
A	15.9168	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.064756
F Value	46.88
Critical Value of t	1.77942
Minimum Significant Difference	0.8993

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	18.4743	24	Day 2 (Without Withdrawal)
B	17.2702	24	Day 1 (With Withdrawals)
C	13.7645	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.064756

Number of Means	**2**	**3**
Critical Range	1.008218	1.2105176

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	18.4743	24	Day 2 (Without Withdrawal)
B	17.2702	24	Day 1 (With Withdrawals)
C	13.7645	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.064756
Critical Value of t	2.45375
Minimum Significant Difference	1.24

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	18.4743	24	Day 2 (Without Withdrawal)
A			
A	17.2702	24	Day 1 (With Withdrawals)
B	13.7645	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	6.52009
F Value	2.05
Critical Value of t	2.24549
Minimum Significant Difference	1.6552

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	11.4810	24	Day 3 (With Withdrawals)
A			
A	10.2028	24	Day 1 (With Withdrawals)
A			
A	10.1745	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	6.52009

Number of Means	**2**	**3**
Critical Range	1.4705619	1.7656311

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	11.4810	24	Day 3 (With Withdrawals)
A			
A	10.2028	24	Day 1 (With Withdrawals)
A			
A	10.1745	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	6.52009
Critical Value of t	2.45375
Minimum Significant Difference	1.8087

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	11.4810	24	Day 3 (With Withdrawals)
A			
A	10.2028	24	Day 1 (With Withdrawals)
A			
A	10.1745	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	4.075302
F Value	11.79
Critical Value of t	1.84841
Minimum Significant Difference	1.0772

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	9.5075	24	Day 3 (With Withdrawals)
B	8.1825	24	Day 2 (Without Withdrawal)
C	6.6796	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.075302

Number of Means	**2**	**3**
Critical Range	1.1626163	1.395896

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	9.5075	24	Day 3 (With Withdrawals)
B	8.1825	24	Day 2 (Without Withdrawal)
C	6.6796	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.075302
Critical Value of t	2.45375
Minimum Significant Difference	1.4299

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	9.5075	24	Day 3 (With Withdrawals)
A			
A	8.1825	24	Day 2 (Without Withdrawal)
B	6.6796	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	6.195182
F Value	6.94
Critical Value of t	1.92277
Minimum Significant Difference	1.3815

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	13.2579	24	Day 3 (With Withdrawals)
A			
A	12.6933	24	Day 2 (Without Withdrawal)
B	10.7097	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	6.195182

Number of Means	**2**	**3**
Critical Range	1.4334533	1.7210766

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	13.2579	24	Day 3 (With Withdrawals)
A			
A	12.6933	24	Day 2 (Without Withdrawal)
B	10.7097	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	6.195182
Critical Value of t	2.45375
Minimum Significant Difference	1.7631

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	13.2579	24	Day 3 (With Withdrawals)
A			
A	12.6933	24	Day 2 (Without Withdrawal)
B	10.7097	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	1.118434
F Value	28.22
Critical Value of t	1.79364
Minimum Significant Difference	0.5476

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	13.4336	24	Day 1 (With Withdrawals)
B	12.0741	24	Day 2 (Without Withdrawal)
C	11.1543	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.118434

Number of Means	**2**	**3**
Critical Range	0.6090621	0.7312709

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	13.4336	24	Day 1 (With Withdrawals)
B	12.0741	24	Day 2 (Without Withdrawal)
C	11.1543	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.118434
Critical Value of t	2.45375
Minimum Significant Difference	0.7491

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	13.4336	24	Day 1 (With Withdrawals)
B	12.0741	24	Day 2 (Without Withdrawal)
C	11.1543	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.457488
F Value	22.02
Critical Value of t	1.80406
Minimum Significant Difference	0.9684

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	14.3119	24	Day 1 (With Withdrawals)
B	11.2647	24	Day 3 (With Withdrawals)
B			
B	11.1908	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.457488

Number of Means	**2**	**3**
Critical Range	1.0708703	1.2857412

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	14.3119	24	Day 1 (With Withdrawals)
B	11.2647	24	Day 3 (With Withdrawals)
B			
B	11.1908	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.457488
Critical Value of t	2.45375
Minimum Significant Difference	1.3171

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	14.3119	24	Day 1 (With Withdrawals)
B	11.2647	24	Day 3 (With Withdrawals)
B			
B	11.1908	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	10.05162
F Value	24.64
Critical Value of t	1.79897
Minimum Significant Difference	1.6465

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	13.4833	24	Day 3 (With Withdrawals)
B	7.9543	24	Day 2 (Without Withdrawal)
B			
B	7.8846	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	10.05162

Number of Means	**2**	**3**
Critical Range	1.8258898	2.1922558

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	13.4833	24	Day 3 (With Withdrawals)
B	7.9543	24	Day 2 (Without Withdrawal)
B			
B	7.8846	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	10.05162
Critical Value of t	2.45375
Minimum Significant Difference	2.2457

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	13.4833	24	Day 3 (With Withdrawals)
B	7.9543	24	Day 2 (Without Withdrawal)
B			
B	7.8846	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	12.1432
F Value	2.29
Critical Value of t	2.21387
Minimum Significant Difference	2.227

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	12.456	24	Day 2 (Without Withdrawal)
A			
A	11.846	24	Day 3 (With Withdrawals)
A			
A	10.364	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	12.1432

Number of Means	**2**	**3**
Critical Range	2.0068881	2.4095716

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	12.456	24	Day 2 (Without Withdrawal)
A			
A	11.846	24	Day 3 (With Withdrawals)
A			
A	10.364	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	12.1432
Critical Value of t	2.45375
Minimum Significant Difference	2.4683

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	12.456	24	Day 2 (Without Withdrawal)
A			
A	11.846	24	Day 3 (With Withdrawals)
A			
A	10.364	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	5.287303
F Value	14.15
Critical Value of t	1.83188
Minimum Significant Difference	1.216

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	11.2836	24	Day 3 (With Withdrawals)
A			
A	11.0515	24	Day 2 (Without Withdrawal)
B	8.1160	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	5.287303

Number of Means	2	3
Critical Range	1.324261	1.5899749

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	11.2836	24	Day 3 (With Withdrawals)
A			
A	11.0515	24	Day 2 (Without Withdrawal)
B	8.1160	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	5.287303
Critical Value of t	2.45375
Minimum Significant Difference	1.6288

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	11.2836	24	Day 3 (With Withdrawals)
A			
A	11.0515	24	Day 2 (Without Withdrawal)
B	8.1160	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	7.061025
F Value	7.69
Critical Value of t	1.90468
Minimum Significant Difference	1.461

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	14.6751	24	Day 3 (With Withdrawals)
B	12.6514	24	Day 2 (Without Withdrawal)
B			
B	11.7355	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	7.061025

Number of Means	**2**	**3**
Critical Range	1.5303487	1.8374142

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	14.6751	24	Day 3 (With Withdrawals)
B	12.6514	24	Day 2 (Without Withdrawal)
B			
B	11.7355	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	7.061025
Critical Value of t	2.45375
Minimum Significant Difference	1.8822

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	14.6751	24	Day 3 (With Withdrawals)
B	12.6514	24	Day 2 (Without Withdrawal)
B			
B	11.7355	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.817945
F Value	9.27
Critical Value of t	1.87661
Minimum Significant Difference	1.0585

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	17.4958	24	Day 3 (With Withdrawals)
A			
A	16.4732	24	Day 2 (Without Withdrawal)
B	15.0770	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.817945

Number of Means	**2**	**3**
Critical Range	1.1253078	1.3511015

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	17.4958	24	Day 3 (With Withdrawals)
A			
A	16.4732	24	Day 2 (Without Withdrawal)
B	15.0770	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.817945
Critical Value of t	2.45375
Minimum Significant Difference	1.3841

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	17.4958	24	Day 3 (With Withdrawals)
A			
A	16.4732	24	Day 2 (Without Withdrawal)
B	15.0770	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.14444
F Value	0.41
Critical Value of t	2.54728
Minimum Significant Difference	1.3039

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	20.2096	24	Day 3 (With Withdrawals)
A			
A	20.0186	24	Day 1 (With Withdrawals)
A			
A	19.7488	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Duncan's Multiple Range Test for SAL_SURF

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.14444

Number of Means	**2**	**3**
Critical Range	1.021	1.074

Means with the same letter are not significantly different.			
Duncan Grouping	**Mean**	**N**	**DAY**
A	20.2096	24	Day 3 (With Withdrawals)
A			
A	20.0186	24	Day 1 (With Withdrawals)
A			
A	19.7488	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.14444

Number of Means	**2**	**3**
Critical Range	1.0212408	1.2261534

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	20.2096	24	Day 3 (With Withdrawals)
A			
A	20.0186	24	Day 1 (With Withdrawals)
A			
A	19.7488	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.14444
Critical Value of t	2.45375
Minimum Significant Difference	1.2561

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	20.2096	24	Day 3 (With Withdrawals)
A			
A	20.0186	24	Day 1 (With Withdrawals)
A			
A	19.7488	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.752848
F Value	47.16
Critical Value of t	1.77930
Minimum Significant Difference	0.995

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	21.3099	24	Day 2 (Without Withdrawal)
B	18.1554	24	Day 1 (With Withdrawals)
C	15.9041	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.752848

Number of Means	**2**	**3**
Critical Range	1.1156732	1.3395338

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	21.3099	24	Day 2 (Without Withdrawal)
B	18.1554	24	Day 1 (With Withdrawals)
C	15.9041	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.752848
Critical Value of t	2.45375
Minimum Significant Difference	1.3722

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	21.3099	24	Day 2 (Without Withdrawal)
B	18.1554	24	Day 1 (With Withdrawals)
C	15.9041	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	5.720246
F Value	1.82
Critical Value of t	2.27782
Minimum Significant Difference	1.5727

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	17.5971	24	Day 1 (With Withdrawals)
A			
A	17.4339	24	Day 2 (Without Withdrawal)
A			
A	16.3821	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	5.720246

Number of Means	**2**	**3**
Critical Range	1.377412	1.6537906

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	17.5971	24	Day 1 (With Withdrawals)
A			
A	17.4339	24	Day 2 (Without Withdrawal)
A			
A	16.3821	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	5.720246
Critical Value of t	2.45375
Minimum Significant Difference	1.6941

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	17.5971	24	Day 1 (With Withdrawals)
A			
A	17.4339	24	Day 2 (Without Withdrawal)
A			
A	16.3821	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.772125
F Value	3.66
Critical Value of t	2.07667
Minimum Significant Difference	1.1643

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	16.5695	24	Day 3 (With Withdrawals)
B	15.3312	24	Day 2 (Without Withdrawal)
B			
B	15.1919	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.772125

Number of Means	**2**	**3**
Critical Range	1.1185349	1.3429697

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	16.5695	24	Day 3 (With Withdrawals)
B	15.3312	24	Day 2 (Without Withdrawal)
B			
B	15.1919	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.772125
Critical Value of t	2.45375
Minimum Significant Difference	1.3757

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	16.5695	24	Day 3 (With Withdrawals)
	A			
B	A	15.3312	24	Day 2 (Without Withdrawal)
B				
B		15.1919	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	5.377554
F Value	0.50
Critical Value of t	2.52516
Minimum Significant Difference	1.6904

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	18.1054	24	Day 1 (With Withdrawals)
A			
A	17.6267	24	Day 3 (With Withdrawals)
A			
A	17.4572	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	5.377554

Number of Means	**2**	**3**
Critical Range	1.3355155	1.6034875

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	18.1054	24	Day 1 (With Withdrawals)
A			
A	17.6267	24	Day 3 (With Withdrawals)
A			
A	17.4572	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	5.377554
Critical Value of t	2.45375
Minimum Significant Difference	1.6426

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	18.1054	24	Day 1 (With Withdrawals)
A			
A	17.6267	24	Day 3 (With Withdrawals)
A			
A	17.4572	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.229061
F Value	40.73
Critical Value of t	1.78262
Minimum Significant Difference	0.9247

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	19.3352	24	Day 2 (Without Withdrawal)
B	18.2631	24	Day 1 (With Withdrawals)
C	14.8524	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.229061

Number of Means	**2**	**3**
Critical Range	1.034891	1.2425426

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	19.3352	24	Day 2 (Without Withdrawal)
B	18.2631	24	Day 1 (With Withdrawals)
C	14.8524	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.229061
Critical Value of t	2.45375
Minimum Significant Difference	1.2728

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	19.3352	24	Day 2 (Without Withdrawal)
A			
A	18.2631	24	Day 1 (With Withdrawals)
B	14.8524	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	9.677211
F Value	1.15
Critical Value of t	2.39038
Minimum Significant Difference	2.1466

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	12.8862	24	Day 3 (With Withdrawals)
A			
A	11.9205	24	Day 2 (Without Withdrawal)
A			
A	11.5695	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	9.677211

Number of Means	**2**	**3**
Critical Range	1.791561	2.151039

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	12.8862	24	Day 3 (With Withdrawals)
A			
A	11.9205	24	Day 2 (Without Withdrawal)
A			
A	11.5695	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	9.677211
Critical Value of t	2.45375
Minimum Significant Difference	2.2035

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	12.8862	24	Day 3 (With Withdrawals)
A			
A	11.9205	24	Day 2 (Without Withdrawal)
A			
A	11.5695	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	8.654075
F Value	8.79
Critical Value of t	1.88392
Minimum Significant Difference	1.5999

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	10.7523	24	Day 3 (With Withdrawals)
A			
A	9.4080	24	Day 2 (Without Withdrawal)
B	7.2241	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	8.654075

Number of Means	**2**	**3**
Critical Range	1.6942084	2.0341525

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	10.7523	24	Day 3 (With Withdrawals)
A			
A	9.4080	24	Day 2 (Without Withdrawal)
B	7.2241	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	8.654075
Critical Value of t	2.45375
Minimum Significant Difference	2.0838

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	10.7523	24	Day 3 (With Withdrawals)
A			
A	9.4080	24	Day 2 (Without Withdrawal)
B	7.2241	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	7.606792
F Value	5.09
Critical Value of t	1.98892
Minimum Significant Difference	1.5835

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	14.4008	24	Day 3 (With Withdrawals)
A			
A	14.0076	24	Day 2 (Without Withdrawal)
B	12.0298	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	7.606792

Number of Means	**2**	**3**
Critical Range	1.5883905	1.9071021

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	14.4008	24	Day 3 (With Withdrawals)
A			
A	14.0076	24	Day 2 (Without Withdrawal)
B	12.0298	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	7.606792
Critical Value of t	2.45375
Minimum Significant Difference	1.9536

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	14.4008	24	Day 3 (With Withdrawals)
A			
A	14.0076	24	Day 2 (Without Withdrawal)
B	12.0298	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	2.640325
F Value	12.87
Critical Value of t	1.84000
Minimum Significant Difference	0.8631

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	14.3376	24	Day 1 (With Withdrawals)
B	13.1022	24	Day 2 (Without Withdrawal)
C	11.9583	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Class Level Information		
Class	**Levels**	**Values**
DAY	3	Day 1 (With Withdrawals) Day 2 (Without Withdrawal) Day 3 (With Withdrawals)

Number of Observations Read	72
Number of Observations Used	72

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.640325

Number of Means	**2**	**3**
Critical Range	0.9358046	1.1235744

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	14.3376	24	Day 1 (With Withdrawals)
B	13.1022	24	Day 2 (Without Withdrawal)
C	11.9583	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.640325
Critical Value of t	2.45375
Minimum Significant Difference	1.151

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	14.3376	24	Day 1 (With Withdrawals)
B	13.1022	24	Day 2 (Without Withdrawal)
B			
B	11.9583	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	4.024392
F Value	14.42
Critical Value of t	1.83038
Minimum Significant Difference	1.06

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	15.1799	24	Day 1 (With Withdrawals)
B	12.5777	24	Day 3 (With Withdrawals)
B			
B	12.4041	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.024392

Number of Means	**2**	**3**
Critical Range	1.1553317	1.3871497

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	15.1799	24	Day 1 (With Withdrawals)
B	12.5777	24	Day 3 (With Withdrawals)
B			
B	12.4041	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.024392
Critical Value of t	2.45375
Minimum Significant Difference	1.421

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	15.1799	24	Day 1 (With Withdrawals)
B	12.5777	24	Day 3 (With Withdrawals)
B			
B	12.4041	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	13.18836
F Value	12.55
Critical Value of t	1.84235
Minimum Significant Difference	1.9314

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	14.353	24	Day 3 (With Withdrawals)
B	10.085	24	Day 2 (Without Withdrawal)
B			
B	9.570	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	13.18836

Number of Means	**2**	**3**
Critical Range	2.0914715	2.5111267

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	14.353	24	Day 3 (With Withdrawals)
B	10.085	24	Day 2 (Without Withdrawal)
B			
B	9.570	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	13.18836
Critical Value of t	2.45375
Minimum Significant Difference	2.5724

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	14.353	24	Day 3 (With Withdrawals)
B	10.085	24	Day 2 (Without Withdrawal)
B			
B	9.570	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	12.65397
F Value	1.90
Critical Value of t	2.26634
Minimum Significant Difference	2.3273

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	13.258	24	Day 2 (Without Withdrawal)
A			
A	12.827	24	Day 3 (With Withdrawals)
A			
A	11.348	24	Day 1 (With Withdrawals)

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	12.65397

Number of Means	**2**	**3**
Critical Range	2.04866	2.459725

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	13.258	24	Day 2 (Without Withdrawal)
A			
A	12.827	24	Day 3 (With Withdrawals)
A			
A	11.348	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	12.65397
Critical Value of t	2.45375
Minimum Significant Difference	2.5197

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	13.258	24	Day 2 (Without Withdrawal)
A			
A	12.827	24	Day 3 (With Withdrawals)
A			
A	11.348	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	5.435942
F Value	19.20
Critical Value of t	1.81120
Minimum Significant Difference	1.219

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	12.2885	24	Day 3 (With Withdrawals)
A			
A	11.9958	24	Day 2 (Without Withdrawal)
B	8.5390	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	5.435942

Number of Means	**2**	**3**
Critical Range	1.3427461	1.612169

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	12.2885	24	Day 3 (With Withdrawals)
A			
A	11.9958	24	Day 2 (Without Withdrawal)
B	8.5390	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	5.435942
Critical Value of t	2.45375
Minimum Significant Difference	1.6515

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	12.2885	24	Day 3 (With Withdrawals)
A			
A	11.9958	24	Day 2 (Without Withdrawal)
B	8.5390	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	10.80722
F Value	2.90
Critical Value of t	2.14399
Minimum Significant Difference	2.0346

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	15.6762	24	Day 3 (With Withdrawals)
	A			
B	A	14.2566	24	Day 2 (Without Withdrawal)
B				
B		13.4136	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	10.80722

Number of Means	**2**	**3**
Critical Range	1.8932739	2.2731606

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	15.6762	24	Day 3 (With Withdrawals)
A			
A	14.2566	24	Day 2 (Without Withdrawal)
A			
A	13.4136	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	10.80722
Critical Value of t	2.45375
Minimum Significant Difference	2.3286

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	15.6762	24	Day 3 (With Withdrawals)
A			
A	14.2566	24	Day 2 (Without Withdrawal)
A			
A	13.4136	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	5.030942
F Value	2.95
Critical Value of t	2.13907
Minimum Significant Difference	1.385

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	18.0217	24	Day 3 (With Withdrawals)
	A			
B	A	17.1854	24	Day 2 (Without Withdrawal)
B				
B		16.4494	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	5.030942

Number of Means	**2**	**3**
Critical Range	1.291758	1.5509502

Means with the same letter are not significantly different.				
REGWQ Grouping		**Mean**	**N**	**DAY**
	A	18.0217	24	Day 3 (With Withdrawals)
	A			
B	A	17.1854	24	Day 2 (Without Withdrawal)
B				
B		16.4494	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	5.030942
Critical Value of t	2.45375
Minimum Significant Difference	1.5888

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	18.0217	24	Day 3 (With Withdrawals)
A			
A	17.1854	24	Day 2 (Without Withdrawal)
A			
A	16.4494	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.125685
F Value	0.62
Critical Value of t	2.49829
Minimum Significant Difference	1.275

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	21.1669	24	Day 3 (With Withdrawals)
A			
A	20.6868	24	Day 2 (Without Withdrawal)
A			
A	20.6607	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.125685

Number of Means	**2**	**3**
Critical Range	1.0181907	1.2224913

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	21.1669	24	Day 3 (With Withdrawals)
A			
A	20.6868	24	Day 2 (Without Withdrawal)
A			
A	20.6607	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.125685
Critical Value of t	2.45375
Minimum Significant Difference	1.2523

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	21.1669	24	Day 3 (With Withdrawals)
A			
A	20.6868	24	Day 2 (Without Withdrawal)
A			
A	20.6607	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.859178
F Value	47.09
Critical Value of t	1.77933
Minimum Significant Difference	1.009

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	21.8003	24	Day 2 (Without Withdrawal)
B	18.5252	24	Day 1 (With Withdrawals)
C	16.3324	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Duncan's Multiple Range Test for SAL_BOT

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.859178

Number of Means	**2**	**3**
Critical Range	1.131	1.190

Means with the same letter are not significantly different.			
Duncan Grouping	**Mean**	**N**	**DAY**
A	21.8003	24	Day 2 (Without Withdrawal)
B	18.5252	24	Day 1 (With Withdrawals)
C	16.3324	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.859178

Number of Means	**2**	**3**
Critical Range	1.131368	1.3583778

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	21.8003	24	Day 2 (Without Withdrawal)
B	18.5252	24	Day 1 (With Withdrawals)
C	16.3324	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.859178
Critical Value of t	2.45375
Minimum Significant Difference	1.3915

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	21.8003	24	Day 2 (Without Withdrawal)
B	18.5252	24	Day 1 (With Withdrawals)
C	16.3324	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	5.018087
F Value	1.98
Critical Value of t	2.25507
Minimum Significant Difference	1.4583

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	17.8281	24	Day 1 (With Withdrawals)
A			
A	17.5590	24	Day 2 (Without Withdrawal)
A			
A	16.6034	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	5.018087

Number of Means	**2**	**3**
Critical Range	1.2901066	1.5489674

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	17.8281	24	Day 1 (With Withdrawals)
A			
A	17.5590	24	Day 2 (Without Withdrawal)
A			
A	16.6034	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	5.018087
Critical Value of t	2.45375
Minimum Significant Difference	1.5867

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	17.8281	24	Day 1 (With Withdrawals)
A			
A	17.5590	24	Day 2 (Without Withdrawal)
A			
A	16.6034	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.236788
F Value	2.36
Critical Value of t	2.20512
Minimum Significant Difference	0.3098

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.6247	24	Day 3 (With Withdrawals)
A			
A	0.3736	24	Day 2 (Without Withdrawal)
A			
A	0.3490	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.236788

Number of Means	**2**	**3**
Critical Range	0.2802443	0.3364755

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.6247	24	Day 3 (With Withdrawals)
A			
A	0.3736	24	Day 2 (Without Withdrawal)
A			
A	0.3490	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.236788
Critical Value of t	2.45375
Minimum Significant Difference	0.3447

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.6247	24	Day 3 (With Withdrawals)
A			
A	0.3736	24	Day 2 (Without Withdrawal)
A			
A	0.3490	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.648663
F Value	0.81
Critical Value of t	2.45850
Minimum Significant Difference	0.5716

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.5575	24	Day 1 (With Withdrawals)
A			
A	0.3280	24	Day 3 (With Withdrawals)
A			
A	0.2813	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Duncan's Multiple Range Test for GHEIGHT

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.648663

Number of Means	**2**	**3**
Critical Range	.4638	.4880

Means with the same letter are not significantly different.			
Duncan Grouping	**Mean**	**N**	**DAY**
A	0.5575	24	Day 1 (With Withdrawals)
A			
A	0.3280	24	Day 3 (With Withdrawals)
A			
A	0.2813	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.648663

Number of Means	**2**	**3**
Critical Range	0.4638376	0.5569069

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.5575	24	Day 1 (With Withdrawals)
A			
A	0.3280	24	Day 3 (With Withdrawals)
A			
A	0.2813	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.648663
Critical Value of t	2.45375
Minimum Significant Difference	0.5705

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.5575	24	Day 1 (With Withdrawals)
A			
A	0.3280	24	Day 3 (With Withdrawals)
A			
A	0.2813	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.26627
F Value	12.81
Critical Value of t	1.84046
Minimum Significant Difference	0.2742

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	1.4679	24	Day 2 (Without Withdrawal)
B	0.8975	24	Day 1 (With Withdrawals)
B			
B	0.7558	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.26627

Number of Means	**2**	**3**
Critical Range	0.2971786	0.3568076

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	1.4679	24	Day 2 (Without Withdrawal)
B	0.8975	24	Day 1 (With Withdrawals)
B			
B	0.7558	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.26627
Critical Value of t	2.45375
Minimum Significant Difference	0.3655

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	1.4679	24	Day 2 (Without Withdrawal)
B	0.8975	24	Day 1 (With Withdrawals)
B			
B	0.7558	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.538517
F Value	0.96
Critical Value of t	2.42865
Minimum Significant Difference	0.5145

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.6341	24	Day 3 (With Withdrawals)
A			
A	0.5024	24	Day 2 (Without Withdrawal)
A			
A	0.3418	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.538517

Number of Means	**2**	**3**
Critical Range	0.4226259	0.5074261

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.6341	24	Day 3 (With Withdrawals)
A			
A	0.5024	24	Day 2 (Without Withdrawal)
A			
A	0.3418	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.538517
Critical Value of t	2.45375
Minimum Significant Difference	0.5198

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.6341	24	Day 3 (With Withdrawals)
A			
A	0.5024	24	Day 2 (Without Withdrawal)
A			
A	0.3418	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.40977
F Value	5.15
Critical Value of t	1.98613
Minimum Significant Difference	0.367

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.4460	24	Day 3 (With Withdrawals)
A			
A	0.3928	24	Day 2 (Without Withdrawal)
B	-0.0923	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.40977

Number of Means	**2**	**3**
Critical Range	0.3686605	0.4426324

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.4460	24	Day 3 (With Withdrawals)
A			
A	0.3928	24	Day 2 (Without Withdrawal)
B	-0.0923	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.40977
Critical Value of t	2.45375
Minimum Significant Difference	0.4534

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.4460	24	Day 3 (With Withdrawals)
A			
A	0.3928	24	Day 2 (Without Withdrawal)
B	-0.0923	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.606959
F Value	0.19
Critical Value of t	2.60020
Minimum Significant Difference	0.5848

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.7080	24	Day 2 (Without Withdrawal)
A			
A	0.6120	24	Day 3 (With Withdrawals)
A			
A	0.5727	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.606959

Number of Means	**2**	**3**
Critical Range	0.4486793	0.5387071

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.7080	24	Day 2 (Without Withdrawal)
A			
A	0.6120	24	Day 3 (With Withdrawals)
A			
A	0.5727	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.606959
Critical Value of t	2.45375
Minimum Significant Difference	0.5518

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.7080	24	Day 2 (Without Withdrawal)
A			
A	0.6120	24	Day 3 (With Withdrawals)
A			
A	0.5727	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.209627
F Value	10.17
Critical Value of t	1.86479
Minimum Significant Difference	0.2465

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.7391	24	Day 1 (With Withdrawals)
A			
A	0.5665	24	Day 2 (Without Withdrawal)
B	0.1588	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Duncan's Multiple Range Test for GHEIGHT

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.209627

Number of Means	**2**	**3**
Critical Range	.2637	.2774

Means with the same letter are not significantly different.			
Duncan Grouping	**Mean**	**N**	**DAY**
A	0.7391	24	Day 1 (With Withdrawals)
A			
A	0.5665	24	Day 2 (Without Withdrawal)
B	0.1588	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.209627

Number of Means	**2**	**3**
Critical Range	0.2636815	0.3165894

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.7391	24	Day 1 (With Withdrawals)
A			
A	0.5665	24	Day 2 (Without Withdrawal)
B	0.1588	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.209627
Critical Value of t	2.45375
Minimum Significant Difference	0.3243

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.7391	24	Day 1 (With Withdrawals)
A			
A	0.5665	24	Day 2 (Without Withdrawal)
B	0.1588	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.485008
F Value	9.02
Critical Value of t	1.88026
Minimum Significant Difference	0.378

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.8889	24	Day 1 (With Withdrawals)
B	0.3770	24	Day 3 (With Withdrawals)
B			
B	0.0408	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.485008

Number of Means	**2**	**3**
Critical Range	0.40108	0.481557

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.8889	24	Day 1 (With Withdrawals)
B	0.3770	24	Day 3 (With Withdrawals)
B			
B	0.0408	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.485008
Critical Value of t	2.45375
Minimum Significant Difference	0.4933

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.8889	24	Day 1 (With Withdrawals)
B	0.3770	24	Day 3 (With Withdrawals)
B			
B	0.0408	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.590076
F Value	4.18
Critical Value of t	2.04002
Minimum Significant Difference	0.4524

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	0.6797	24	Day 3 (With Withdrawals)
	A			
B	A	0.2325	24	Day 2 (Without Withdrawal)
B				
B		0.0586	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.590076

Number of Means	**2**	**3**
Critical Range	0.4423953	0.5311623

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.6797	24	Day 3 (With Withdrawals)
B	0.2325	24	Day 2 (Without Withdrawal)
B			
B	0.0586	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.590076
Critical Value of t	2.45375
Minimum Significant Difference	0.5441

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	0.6797	24	Day 3 (With Withdrawals)
	A			
B	A	0.2325	24	Day 2 (Without Withdrawal)
B				
B		0.0586	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.643209
F Value	1.90
Critical Value of t	2.26618
Minimum Significant Difference	0.5247

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.8670	24	Day 2 (Without Withdrawal)
A			
A	0.8335	24	Day 3 (With Withdrawals)
A			
A	0.4601	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.643209

Number of Means	**2**	**3**
Critical Range	0.4618835	0.5545608

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.8670	24	Day 2 (Without Withdrawal)
A			
A	0.8335	24	Day 3 (With Withdrawals)
A			
A	0.4601	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.643209
Critical Value of t	2.45375
Minimum Significant Difference	0.5681

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.8670	24	Day 2 (Without Withdrawal)
A			
A	0.8335	24	Day 3 (With Withdrawals)
A			
A	0.4601	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.27748
F Value	17.69
Critical Value of t	1.81605
Minimum Significant Difference	0.2762

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.4359	24	Day 3 (With Withdrawals)
A			
A	0.4024	24	Day 2 (Without Withdrawal)
B	-0.3635	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.27748

Number of Means	**2**	**3**
Critical Range	0.30337	0.3642414

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.4359	24	Day 3 (With Withdrawals)
A			
A	0.4024	24	Day 2 (Without Withdrawal)
B	-0.3635	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.27748
Critical Value of t	2.45375
Minimum Significant Difference	0.3731

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.4359	24	Day 3 (With Withdrawals)
A			
A	0.4024	24	Day 2 (Without Withdrawal)
B	-0.3635	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.58247
F Value	0.57
Critical Value of t	2.51049
Minimum Significant Difference	0.5531

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.5385	24	Day 3 (With Withdrawals)
A			
A	0.3508	24	Day 2 (Without Withdrawal)
A			
A	0.3222	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.58247

Number of Means	2	3
Critical Range	0.4395349	0.5277278

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.5385	24	Day 3 (With Withdrawals)
A			
A	0.3508	24	Day 2 (Without Withdrawal)
A			
A	0.3222	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.58247
Critical Value of t	2.45375
Minimum Significant Difference	0.5406

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.5385	24	Day 3 (With Withdrawals)
A			
A	0.3508	24	Day 2 (Without Withdrawal)
A			
A	0.3222	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.444507
F Value	1.10
Critical Value of t	2.39953
Minimum Significant Difference	0.4618

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.5013	24	Day 3 (With Withdrawals)
A			
A	0.3936	24	Day 2 (Without Withdrawal)
A			
A	0.2179	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.444507

Number of Means	**2**	**3**
Critical Range	0.3839688	0.4610125

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.5013	24	Day 3 (With Withdrawals)
A			
A	0.3936	24	Day 2 (Without Withdrawal)
A			
A	0.2179	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.444507
Critical Value of t	2.45375
Minimum Significant Difference	0.4723

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.5013	24	Day 3 (With Withdrawals)
A			
A	0.3936	24	Day 2 (Without Withdrawal)
A			
A	0.2179	24	Day 1 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.299495
F Value	0.86
Critical Value of t	2.44837
Minimum Significant Difference	0.3868

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.8038	24	Day 3 (With Withdrawals)
A			
A	0.6523	24	Day 1 (With Withdrawals)
A			
A	0.6059	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.299495

Number of Means	**2**	**3**
Critical Range	0.3151748	0.3784148

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.8038	24	Day 3 (With Withdrawals)
A			
A	0.6523	24	Day 1 (With Withdrawals)
A			
A	0.6059	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.299495
Critical Value of t	2.45375
Minimum Significant Difference	0.3876

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.8038	24	Day 3 (With Withdrawals)
A			
A	0.6523	24	Day 1 (With Withdrawals)
A			
A	0.6059	24	Day 2 (Without Withdrawal)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.349796
F Value	37.05
Critical Value of t	1.78506
Minimum Significant Difference	0.3048

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	1.5432	24	Day 2 (Without Withdrawal)
B	0.7320	24	Day 1 (With Withdrawals)
C	0.0764	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.349796

Number of Means	2	3
Critical Range	0.3406151	0.4089597

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	1.5432	24	Day 2 (Without Withdrawal)
B	0.7320	24	Day 1 (With Withdrawals)
C	0.0764	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.349796
Critical Value of t	2.45375
Minimum Significant Difference	0.4189

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	1.5432	24	Day 2 (Without Withdrawal)
B	0.7320	24	Day 1 (With Withdrawals)
C	0.0764	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.451901
F Value	1.02
Critical Value of t	2.41617
Minimum Significant Difference	0.4689

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.9194	24	Day 2 (Without Withdrawal)
A			
A	0.8368	24	Day 1 (With Withdrawals)
A			
A	0.6492	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.451901

Number of Means	**2**	**3**
Critical Range	0.3871491	0.4648308

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.9194	24	Day 2 (Without Withdrawal)
A			
A	0.8368	24	Day 1 (With Withdrawals)
A			
A	0.6492	24	Day 3 (With Withdrawals)

USGS Peace River at Harbour Heights Continuous Recorder - River Kilometer 15.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.451901
Critical Value of t	2.45375
Minimum Significant Difference	0.4762

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.9194	24	Day 2 (Without Withdrawal)
A			
A	0.8368	24	Day 1 (With Withdrawals)
A			
A	0.6492	24	Day 3 (With Withdrawals)

Appendix B

Results from analysis of variance MZ4 (RK 21.9)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.341085
F Value	2.22
Critical Value of t	2.22246
Minimum Significant Difference	1.1727

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	7.0074	24	Day 3 (With Withdrawals)
A			
A	6.1001	24	Day 2 (Without Withdrawal)
A			
A	5.9964	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.341085

Number of Means	**2**	**3**
Critical Range	1.0526895	1.2639124

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	7.0074	24	Day 3 (With Withdrawals)
A			
A	6.1001	24	Day 2 (Without Withdrawal)
A			
A	5.9964	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.341085
Critical Value of t	2.45375
Minimum Significant Difference	1.2947

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	7.0074	24	Day 3 (With Withdrawals)
A			
A	6.1001	24	Day 2 (Without Withdrawal)
A			
A	5.9964	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	68
Error Mean Square	6.686663
F Value	1.39
Critical Value of t	2.34846
Minimum Significant Difference	1.7657
Harmonic Mean of Cell Sizes	23.65714

Note: Cell sizes are not equal.

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	7.3870	24	Day 1 (With Withdrawals)
A			
A	6.3242	24	Day 3 (With Withdrawals)
A			
A	6.2876	23	Day 2 (Without Withdrawal)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Duncan's Multiple Range Test for Salinity

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	68
Error Mean Square	6.686663
Harmonic Mean of Cell Sizes	23.65714

Note: Cell sizes are not equal.

Number of Means	**2**	**3**
Critical Range	1.500	1.578

Means with the same letter are not significantly different.			
Duncan Grouping	**Mean**	**N**	**DAY**
A	7.3870	24	Day 1 (With Withdrawals)
A			
A	6.3242	24	Day 3 (With Withdrawals)
A			
A	6.2876	23	Day 2 (Without Withdrawal)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	68
Error Mean Square	6.686663
Harmonic Mean of Cell Sizes	23.65714

Note: Cell sizes are not equal.

Number of Means	**2**	**3**
Critical Range	1.5003732	1.8015339

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	7.3870	24	Day 1 (With Withdrawals)
A			
A	6.3242	24	Day 3 (With Withdrawals)
A			
A	6.2876	23	Day 2 (Without Withdrawal)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than Tukey's for all pairwise comparisons.

Alpha	0.05
Error Degrees of Freedom	68
Error Mean Square	6.686663
Critical Value of t	2.45465

Comparisons significant at the 0.05 level are indicated by *.**				
DAY Comparison	**Difference Between Means**	**Simultaneous 95% Confidence Limits**		
Day 1 (With Withdrawals) - Day 3 (With Withdrawals)	1.0628	-0.7695	2.8951	
Day 1 (With Withdrawals) - Day 2 (Without Withdrawal)	1.0994	-0.7528	2.9515	
Day 3 (With Withdrawals) - Day 1 (With Withdrawals)	-1.0628	-2.8951	0.7695	
Day 3 (With Withdrawals) - Day 2 (Without Withdrawal)	0.0366	-1.8156	1.8887	
Day 2 (Without Withdrawal) - Day 1 (With Withdrawals)	-1.0994	-2.9515	0.7528	
Day 2 (Without Withdrawal) - Day 3 (With Withdrawals)	-0.0366	-1.8887	1.8156	

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	4.709912
F Value	30.41
Critical Value of t	1.79103
Minimum Significant Difference	1.1221

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	8.6281	24	Day 2 (Without Withdrawal)
A			
A	7.7636	24	Day 1 (With Withdrawals)
B	4.0317	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.709912

Number of Means	**2**	**3**
Critical Range	1.2498645	1.5006506

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	8.6281	24	Day 2 (Without Withdrawal)
A			
A	7.7636	24	Day 1 (With Withdrawals)
B	4.0317	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.709912
Critical Value of t	2.45375
Minimum Significant Difference	1.5373

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	8.6281	24	Day 2 (Without Withdrawal)
A			
A	7.7636	24	Day 1 (With Withdrawals)
B	4.0317	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.014723
F Value	2.01
Critical Value of t	2.25097
Minimum Significant Difference	1.1282

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	2.5472	24	Day 3 (With Withdrawals)
A			
A	1.8221	24	Day 1 (With Withdrawals)
A			
A	1.5819	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.014723

Number of Means	**2**	**3**
Critical Range	0.9999544	1.200596

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	2.5472	24	Day 3 (With Withdrawals)
A			
A	1.8221	24	Day 1 (With Withdrawals)
A			
A	1.5819	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.014723
Critical Value of t	2.45375
Minimum Significant Difference	1.2299

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	2.5472	24	Day 3 (With Withdrawals)
A			
A	1.8221	24	Day 1 (With Withdrawals)
A			
A	1.5819	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	2.151382
F Value	6.05
Critical Value of t	1.95010
Minimum Significant Difference	0.8257

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	2.4455	24	Day 3 (With Withdrawals)
B	1.6178	24	Day 2 (Without Withdrawal)
B			
B	0.9771	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.151382

Number of Means	**2**	**3**
Critical Range	0.8447248	1.0142194

Means with the same letter are not significantly different.				
REGWQ Grouping		**Mean**	**N**	**DAY**
	A	2.4455	24	Day 3 (With Withdrawals)
	A			
B	A	1.6178	24	Day 2 (Without Withdrawal)
B				
B		0.9771	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.151382
Critical Value of t	2.45375
Minimum Significant Difference	1.039

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	2.4455	24	Day 3 (With Withdrawals)
	A			
B	A	1.6178	24	Day 2 (Without Withdrawal)
B				
B		0.9771	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.278936
F Value	1.76
Critical Value of t	2.28687
Minimum Significant Difference	1.1954

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	3.8028	24	Day 3 (With Withdrawals)
A			
A	3.3992	24	Day 2 (Without Withdrawal)
A			
A	2.8257	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.278936

Number of Means	**2**	**3**
Critical Range	1.0428527	1.2521018

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	3.8028	24	Day 3 (With Withdrawals)
A			
A	3.3992	24	Day 2 (Without Withdrawal)
A			
A	2.8257	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.278936
Critical Value of t	2.45375
Minimum Significant Difference	1.2826

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	3.8028	24	Day 3 (With Withdrawals)
A			
A	3.3992	24	Day 2 (Without Withdrawal)
A			
A	2.8257	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	2.292132
F Value	6.33
Critical Value of t	1.94055
Minimum Significant Difference	0.8481

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	4.2583	24	Day 1 (With Withdrawals)
	A			
B	A	3.4677	24	Day 2 (Without Withdrawal)
B				
B		2.7031	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.292132

Number of Means	**2**	**3**
Critical Range	0.8719194	1.0468706

Means with the same letter are not significantly different.				
REGWQ Grouping		**Mean**	**N**	**DAY**
	A	4.2583	24	Day 1 (With Withdrawals)
	A			
B	A	3.4677	24	Day 2 (Without Withdrawal)
B				
B		2.7031	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.292132
Critical Value of t	2.45375
Minimum Significant Difference	1.0724

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	4.2583	24	Day 1 (With Withdrawals)
	A			
B	A	3.4677	24	Day 2 (Without Withdrawal)
B				
B		2.7031	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.149284
F Value	6.93
Critical Value of t	1.92299
Minimum Significant Difference	0.9851

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	4.2848	24	Day 1 (With Withdrawals)
B	2.9508	24	Day 3 (With Withdrawals)
B			
B	2.4372	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.149284

Number of Means	**2**	**3**
Critical Range	1.0220271	1.2270976

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	4.2848	24	Day 1 (With Withdrawals)
B	2.9508	24	Day 3 (With Withdrawals)
B			
B	2.4372	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.149284
Critical Value of t	2.45375
Minimum Significant Difference	1.257

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	4.2848	24	Day 1 (With Withdrawals)
B	2.9508	24	Day 3 (With Withdrawals)
B			
B	2.4372	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.774192
F Value	9.18
Critical Value of t	1.87786
Minimum Significant Difference	1.0531

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	3.7559	24	Day 3 (With Withdrawals)
B	1.7570	24	Day 2 (Without Withdrawal)
B			
B	1.6009	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.774192

Number of Means	**2**	**3**
Critical Range	1.1188414	1.3433377

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	3.7559	24	Day 3 (With Withdrawals)
B	1.7570	24	Day 2 (Without Withdrawal)
B			
B	1.6009	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.774192
Critical Value of t	2.45375
Minimum Significant Difference	1.3761

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	3.7559	24	Day 3 (With Withdrawals)
B	1.7570	24	Day 2 (Without Withdrawal)
B			
B	1.6009	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	2.547882
F Value	0.88
Critical Value of t	2.44442
Minimum Significant Difference	1.1264

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	2.6406	24	Day 2 (Without Withdrawal)
A			
A	2.3180	24	Day 3 (With Withdrawals)
A			
A	2.0307	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.547882

Number of Means	**2**	**3**
Critical Range	0.9192765	1.1037299

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	2.6406	24	Day 2 (Without Withdrawal)
A			
A	2.3180	24	Day 3 (With Withdrawals)
A			
A	2.0307	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.547882
Critical Value of t	2.45375
Minimum Significant Difference	1.1307

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	2.6406	24	Day 2 (Without Withdrawal)
A			
A	2.3180	24	Day 3 (With Withdrawals)
A			
A	2.0307	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	1.284028
F Value	12.77
Critical Value of t	1.84070
Minimum Significant Difference	0.6021

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	2.5555	24	Day 3 (With Withdrawals)
A			
A	2.4246	24	Day 2 (Without Withdrawal)
B	1.0627	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Class Level Information		
Class	**Levels**	**Values**
DAY	3	Day 1 (With Withdrawals) Day 2 (Without Withdrawal) Day 3 (With Withdrawals)

Number of Observations Read	72
Number of Observations Used	72

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.284028

Number of Means	**2**	**3**
Critical Range	0.652595	0.7835386

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	2.5555	24	Day 3 (With Withdrawals)
A			
A	2.4246	24	Day 2 (Without Withdrawal)
B	1.0627	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.284028
Critical Value of t	2.45375
Minimum Significant Difference	0.8026

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	2.5555	24	Day 3 (With Withdrawals)
A			
A	2.4246	24	Day 2 (Without Withdrawal)
B	1.0627	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	7.113724
F Value	2.18
Critical Value of t	2.22771
Minimum Significant Difference	1.7152

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	5.6338	24	Day 3 (With Withdrawals)
A			
A	4.6170	24	Day 2 (Without Withdrawal)
A			
A	4.0460	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	7.113724

Number of Means	**2**	**3**
Critical Range	1.5360488	1.844258

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	5.6338	24	Day 3 (With Withdrawals)
A			
A	4.6170	24	Day 2 (Without Withdrawal)
A			
A	4.0460	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	7.113724
Critical Value of t	2.45375
Minimum Significant Difference	1.8892

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	5.6338	24	Day 3 (With Withdrawals)
A			
A	4.6170	24	Day 2 (Without Withdrawal)
A			
A	4.0460	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	6.54475
F Value	1.78
Critical Value of t	2.28460
Minimum Significant Difference	1.6872

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	8.0719	24	Day 3 (With Withdrawals)
A			
A	7.2989	24	Day 2 (Without Withdrawal)
A			
A	6.6816	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	6.54475

Number of Means	**2**	**3**
Critical Range	1.4733402	1.7689669

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	8.0719	24	Day 3 (With Withdrawals)
A			
A	7.2989	24	Day 2 (Without Withdrawal)
A			
A	6.6816	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	6.54475
Critical Value of t	2.45375
Minimum Significant Difference	1.8121

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	8.0719	24	Day 3 (With Withdrawals)
A			
A	7.2989	24	Day 2 (Without Withdrawal)
A			
A	6.6816	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.990373
F Value	0.74
Critical Value of t	2.47275
Minimum Significant Difference	1.4259

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	10.4168	24	Day 3 (With Withdrawals)
A			
A	9.9457	24	Day 1 (With Withdrawals)
A			
A	9.7303	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.990373

Number of Means	**2**	**3**
Critical Range	1.1504381	1.3812743

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	10.4168	24	Day 3 (With Withdrawals)
A			
A	9.9457	24	Day 1 (With Withdrawals)
A			
A	9.7303	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.990373
Critical Value of t	2.45375
Minimum Significant Difference	1.415

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	10.4168	24	Day 3 (With Withdrawals)
A			
A	9.9457	24	Day 1 (With Withdrawals)
A			
A	9.7303	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	4.286961
F Value	63.54
Critical Value of t	1.77394
Minimum Significant Difference	1.0603

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	11.8731	24	Day 2 (Without Withdrawal)
B	9.1874	24	Day 1 (With Withdrawals)
C	5.1786	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.286961

Number of Means	**2**	**3**
Critical Range	1.1924256	1.4316866

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	11.8731	24	Day 2 (Without Withdrawal)
B	9.1874	24	Day 1 (With Withdrawals)
C	5.1786	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.286961
Critical Value of t	2.45375
Minimum Significant Difference	1.4666

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	11.8731	24	Day 2 (Without Withdrawal)
B	9.1874	24	Day 1 (With Withdrawals)
C	5.1786	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	5.422322
F Value	2.00
Critical Value of t	2.25234
Minimum Significant Difference	1.514

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	7.5780	24	Day 1 (With Withdrawals)
A			
A	7.3452	24	Day 2 (Without Withdrawal)
A			
A	6.3147	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	5.422322

Number of Means	**2**	**3**
Critical Range	1.341063	1.6101482

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	7.5780	24	Day 1 (With Withdrawals)
A			
A	7.3452	24	Day 2 (Without Withdrawal)
A			
A	6.3147	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ4 Continuous Recorder - River Kilometer 21.9
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	5.422322
Critical Value of t	2.45375
Minimum Significant Difference	1.6494

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	7.5780	24	Day 1 (With Withdrawals)
A			
A	7.3452	24	Day 2 (Without Withdrawal)
A			
A	6.3147	24	Day 3 (With Withdrawals)

Appendix C

Results from analysis of variance MZ3 (RK 23.4)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	2.039256
F Value	2.44
Critical Value of t	2.19486
Minimum Significant Difference	0.9048

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	4.9236	24	Day 3 (With Withdrawals)
A			
A	4.1625	24	Day 1 (With Withdrawals)
A			
A	4.1091	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.039256

Number of Means	**2**	**3**
Critical Range	0.8224176	0.9874362

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	4.9236	24	Day 3 (With Withdrawals)
A			
A	4.1625	24	Day 1 (With Withdrawals)
A			
A	4.1091	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.039256
Critical Value of t	2.45375
Minimum Significant Difference	1.0115

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	4.9236	24	Day 3 (With Withdrawals)
A			
A	4.1625	24	Day 1 (With Withdrawals)
A			
A	4.1091	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	4.454608
F Value	2.63
Critical Value of t	2.17334
Minimum Significant Difference	1.3242

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	5.2224	24	Day 1 (With Withdrawals)
A			
A	4.1076	24	Day 3 (With Withdrawals)
A			
A	3.9357	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.454608

Number of Means	**2**	**3**
Critical Range	1.2155176	1.459412

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	5.2224	24	Day 1 (With Withdrawals)
A			
A	4.1076	24	Day 3 (With Withdrawals)
A			
A	3.9357	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.454608
Critical Value of t	2.45375
Minimum Significant Difference	1.495

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	5.2224	24	Day 1 (With Withdrawals)
A			
A	4.1076	24	Day 3 (With Withdrawals)
A			
A	3.9357	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.800925
F Value	33.41
Critical Value of t	1.78802
Minimum Significant Difference	1.0063

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	6.5372	24	Day 2 (Without Withdrawal)
B	5.5003	24	Day 1 (With Withdrawals)
C	2.1369	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.800925

Number of Means	2	3
Critical Range	1.1227968	1.3480867

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	6.5372	24	Day 2 (Without Withdrawal)
A			
A	5.5003	24	Day 1 (With Withdrawals)
B	2.1369	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.800925
Critical Value of t	2.45375
Minimum Significant Difference	1.381

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	6.5372	24	Day 2 (Without Withdrawal)
A			
A	5.5003	24	Day 1 (With Withdrawals)
B	2.1369	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.428021
F Value	3.06
Critical Value of t	2.12885
Minimum Significant Difference	0.4021

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	1.0681	24	Day 3 (With Withdrawals)
	A			
B	A	0.7052	24	Day 1 (With Withdrawals)
B				
B		0.6322	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Duncan's Multiple Range Test for Salinity

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.428021

Number of Means	**2**	**3**
Critical Range	.3768	.3964

Means with the same letter are not significantly different.				
Duncan Grouping		**Mean**	**N**	**DAY**
	A	1.0681	24	Day 3 (With Withdrawals)
	A			
B	A	0.7052	24	Day 1 (With Withdrawals)
B				
B		0.6322	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.428021

Number of Means	**2**	**3**
Critical Range	0.3767813	0.4523827

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	1.0681	24	Day 3 (With Withdrawals)
A			
A	0.7052	24	Day 1 (With Withdrawals)
A			
A	0.6322	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.428021
Critical Value of t	2.45375
Minimum Significant Difference	0.4634

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	1.0681	24	Day 3 (With Withdrawals)
A			
A	0.7052	24	Day 1 (With Withdrawals)
A			
A	0.6322	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.287077
F Value	4.12
Critical Value of t	2.04364
Minimum Significant Difference	0.3161

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	0.9277	24	Day 3 (With Withdrawals)
	A			
B	A	0.6969	24	Day 2 (Without Withdrawal)
B				
B		0.4839	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.287077

Number of Means	**2**	**3**
Critical Range	0.3085716	0.3704867

Means with the same letter are not significantly different.				
REGWQ Grouping		**Mean**	**N**	**DAY**
	A	0.9277	24	Day 3 (With Withdrawals)
	A			
B	A	0.6969	24	Day 2 (Without Withdrawal)
B				
B		0.4839	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.287077
Critical Value of t	2.45375
Minimum Significant Difference	0.3795

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	0.9277	24	Day 3 (With Withdrawals)
	A			
B	A	0.6969	24	Day 2 (Without Withdrawal)
B				
B		0.4839	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	1.382451
F Value	3.55
Critical Value of t	2.08543
Minimum Significant Difference	0.7078

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	2.4172	24	Day 3 (With Withdrawals)
	A			
B	A	2.0124	24	Day 2 (Without Withdrawal)
B				
B		1.5146	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.382451

Number of Means	**2**	**3**
Critical Range	0.6771446	0.8130142

Means with the same letter are not significantly different.				
REGWQ Grouping		**Mean**	**N**	**DAY**
	A	2.4172	24	Day 3 (With Withdrawals)
	A			
B	A	2.0124	24	Day 2 (Without Withdrawal)
B				
B		1.5146	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.382451
Critical Value of t	2.45375
Minimum Significant Difference	0.8328

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	2.4172	24	Day 3 (With Withdrawals)
	A			
B	A	2.0124	24	Day 2 (Without Withdrawal)
B				
B		1.5146	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.949345
F Value	13.94
Critical Value of t	1.83313
Minimum Significant Difference	0.5156

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	2.6094	24	Day 1 (With Withdrawals)
B	1.8269	24	Day 2 (Without Withdrawal)
C	1.1252	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.949345

Number of Means	**2**	**3**
Critical Range	0.5611366	0.673729

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	2.6094	24	Day 1 (With Withdrawals)
B	1.8269	24	Day 2 (Without Withdrawal)
C	1.1252	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	1.643868
F Value	8.47
Critical Value of t	1.88938
Minimum Significant Difference	0.6993

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	2.6105	24	Day 1 (With Withdrawals)
B	1.5210	24	Day 3 (With Withdrawals)
B			
B	1.1435	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.643868

Number of Means	**2**	**3**
Critical Range	0.7383972	0.886557

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	2.6105	24	Day 1 (With Withdrawals)
B	1.5210	24	Day 3 (With Withdrawals)
B			
B	1.1435	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.643868
Critical Value of t	2.45375
Minimum Significant Difference	0.9082

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	2.6105	24	Day 1 (With Withdrawals)
B	1.5210	24	Day 3 (With Withdrawals)
B			
B	1.1435	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	2.513138
F Value	16.98
Critical Value of t	1.81864
Minimum Significant Difference	0.8323

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	3.0388	24	Day 3 (With Withdrawals)
B	0.7391	24	Day 1 (With Withdrawals)
B			
B	0.7193	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.513138

Number of Means	**2**	**3**
Critical Range	0.9129871	1.0961786

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	3.0388	24	Day 3 (With Withdrawals)
B	0.7391	24	Day 1 (With Withdrawals)
B			
B	0.7193	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.513138
Critical Value of t	2.45375
Minimum Significant Difference	1.1229

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	3.0388	24	Day 3 (With Withdrawals)
B	0.7391	24	Day 1 (With Withdrawals)
B			
B	0.7193	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	1.72514
F Value	2.19
Critical Value of t	2.22696
Minimum Significant Difference	0.8444

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	2.1135	24	Day 2 (Without Withdrawal)
A			
A	1.6925	24	Day 3 (With Withdrawals)
A			
A	1.3209	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.72514

Number of Means	**2**	**3**
Critical Range	0.7564299	0.9082081

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	2.1135	24	Day 2 (Without Withdrawal)
A			
A	1.6925	24	Day 3 (With Withdrawals)
A			
A	1.3209	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.724187
F Value	7.67
Critical Value of t	1.90519
Minimum Significant Difference	0.468

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	1.3760	24	Day 3 (With Withdrawals)
A			
A	1.3422	24	Day 2 (Without Withdrawal)
B	0.5266	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.724187

Number of Means	**2**	**3**
Critical Range	0.4900967	0.588435

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	1.3760	24	Day 3 (With Withdrawals)
A			
A	1.3422	24	Day 2 (Without Withdrawal)
B	0.5266	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.724187
Critical Value of t	2.45375
Minimum Significant Difference	0.6028

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	1.3760	24	Day 3 (With Withdrawals)
A			
A	1.3422	24	Day 2 (Without Withdrawal)
B	0.5266	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.453946
F Value	4.20
Critical Value of t	2.03870
Minimum Significant Difference	1.0938

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	3.7438	24	Day 3 (With Withdrawals)
	A			
B	A	2.7565	24	Day 2 (Without Withdrawal)
B				
B		2.2107	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.453946

Number of Means	**2**	**3**
Critical Range	1.0703217	1.2850824

Means with the same letter are not significantly different.				
REGWQ Grouping		**Mean**	**N**	**DAY**
	A	3.7438	24	Day 3 (With Withdrawals)
	A			
B	A	2.7565	24	Day 2 (Without Withdrawal)
B				
B		2.2107	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.453946
Critical Value of t	2.45375
Minimum Significant Difference	1.3164

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	3.7438	24	Day 3 (With Withdrawals)
	A			
B	A	2.7565	24	Day 2 (Without Withdrawal)
B				
B		2.2107	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	4.308832
F Value	3.82
Critical Value of t	2.06455
Minimum Significant Difference	1.2371

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	6.0281	24	Day 3 (With Withdrawals)
	A			
B	A	5.0792	24	Day 2 (Without Withdrawal)
B				
B		4.3781	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.308832

Number of Means	**2**	**3**
Critical Range	1.1954635	1.435334

Means with the same letter are not significantly different.				
REGWQ Grouping		**Mean**	**N**	**DAY**
	A	6.0281	24	Day 3 (With Withdrawals)
	A			
B	A	5.0792	24	Day 2 (Without Withdrawal)
B				
B		4.3781	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.308832
Critical Value of t	2.45375
Minimum Significant Difference	1.4703

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	6.0281	24	Day 3 (With Withdrawals)
	A			
B	A	5.0792	24	Day 2 (Without Withdrawal)
B				
B		4.3781	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	4.570004
F Value	0.63
Critical Value of t	2.49781
Minimum Significant Difference	1.5414

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	8.1586	24	Day 3 (With Withdrawals)
A			
A	7.6473	24	Day 1 (With Withdrawals)
A			
A	7.5011	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.570004

Number of Means	**2**	**3**
Critical Range	1.2311608	1.4781941

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	8.1586	24	Day 3 (With Withdrawals)
A			
A	7.6473	24	Day 1 (With Withdrawals)
A			
A	7.5011	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.570004
Critical Value of t	2.45375
Minimum Significant Difference	1.5142

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	8.1586	24	Day 3 (With Withdrawals)
A			
A	7.6473	24	Day 1 (With Withdrawals)
A			
A	7.5011	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	4.27383
F Value	66.90
Critical Value of t	1.77317
Minimum Significant Difference	1.0582

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	10.0120	24	Day 2 (Without Withdrawal)
B	7.0211	24	Day 1 (With Withdrawals)
C	3.1284	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.27383

Number of Means	**2**	**3**
Critical Range	1.190598	1.4294922

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	10.0120	24	Day 2 (Without Withdrawal)
B	7.0211	24	Day 1 (With Withdrawals)
C	3.1284	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.27383
Critical Value of t	2.45375
Minimum Significant Difference	1.4644

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	10.0120	24	Day 2 (Without Withdrawal)
B	7.0211	24	Day 1 (With Withdrawals)
C	3.1284	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	4.844606
F Value	2.30
Critical Value of t	2.21221
Minimum Significant Difference	1.4056

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	5.6777	24	Day 1 (With Withdrawals)
A			
A	5.0184	24	Day 2 (Without Withdrawal)
A			
A	4.3145	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.844606

Number of Means	**2**	**3**
Critical Range	1.2676103	1.5219571

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	5.6777	24	Day 1 (With Withdrawals)
A			
A	5.0184	24	Day 2 (Without Withdrawal)
A			
A	4.3145	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ3 Continuous Recorder - River Kilometer 23.4
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.844606
Critical Value of t	2.45375
Minimum Significant Difference	1.5591

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	5.6777	24	Day 1 (With Withdrawals)
A			
A	5.0184	24	Day 2 (Without Withdrawal)
A			
A	4.3145	24	Day 3 (With Withdrawals)

Appendix D

Results from analysis of variance MZ2 (RK 24.5)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	1.687827
F Value	1.75
Critical Value of t	2.28901
Minimum Significant Difference	0.8585

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	3.8955	24	Day 3 (With Withdrawals)
A			
A	3.3438	24	Day 1 (With Withdrawals)
A			
A	3.2442	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.687827

Number of Means	**2**	**3**
Critical Range	0.7482049	0.8983327

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	3.8955	24	Day 3 (With Withdrawals)
A			
A	3.3438	24	Day 1 (With Withdrawals)
A			
A	3.2442	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.687827
Critical Value of t	2.45375
Minimum Significant Difference	0.9202

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	3.8955	24	Day 3 (With Withdrawals)
A			
A	3.3438	24	Day 1 (With Withdrawals)
A			
A	3.2442	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.799565
F Value	0.81
Critical Value of t	2.45876
Minimum Significant Difference	1.3835

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	3.7618	24	Day 1 (With Withdrawals)
A			
A	3.2502	24	Day 3 (With Withdrawals)
A			
A	3.0732	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.799565

Number of Means	**2**	**3**
Critical Range	1.122596	1.3478456

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	3.7618	24	Day 1 (With Withdrawals)
A			
A	3.2502	24	Day 3 (With Withdrawals)
A			
A	3.0732	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.799565
Critical Value of t	2.45375
Minimum Significant Difference	1.3807

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	3.7618	24	Day 1 (With Withdrawals)
A			
A	3.2502	24	Day 3 (With Withdrawals)
A			
A	3.0732	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.164032
F Value	26.76
Critical Value of t	1.79564
Minimum Significant Difference	0.922

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	4.9339	24	Day 2 (Without Withdrawal)
A			
A	4.2499	24	Day 1 (With Withdrawals)
B	1.3932	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.164032

Number of Means	**2**	**3**
Critical Range	1.0244175	1.2299675

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	4.9339	24	Day 2 (Without Withdrawal)
A			
A	4.2499	24	Day 1 (With Withdrawals)
B	1.3932	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.164032
Critical Value of t	2.45375
Minimum Significant Difference	1.26

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	4.9339	24	Day 2 (Without Withdrawal)
A			
A	4.2499	24	Day 1 (With Withdrawals)
B	1.3932	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.182874
F Value	3.83
Critical Value of t	2.06412
Minimum Significant Difference	0.2548

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.7460	24	Day 3 (With Withdrawals)
B	0.4614	24	Day 1 (With Withdrawals)
B			
B	0.4404	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.182874

Number of Means	**2**	**3**
Critical Range	0.2462822	0.2956988

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.7460	24	Day 3 (With Withdrawals)
B	0.4614	24	Day 1 (With Withdrawals)
B			
B	0.4404	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.182874
Critical Value of t	2.45375
Minimum Significant Difference	0.3029

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	0.7460	24	Day 3 (With Withdrawals)
	A			
B	A	0.4614	24	Day 1 (With Withdrawals)
B				
B		0.4404	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.117507
F Value	4.80
Critical Value of t	2.00349
Minimum Significant Difference	0.1983

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.67271	24	Day 3 (With Withdrawals)
B	0.46802	24	Day 2 (Without Withdrawal)
B			
B	0.37260	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.117507

Number of Means	**2**	**3**
Critical Range	0.1974187	0.2370309

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.67271	24	Day 3 (With Withdrawals)
B	0.46802	24	Day 2 (Without Withdrawal)
B			
B	0.37260	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.117507
Critical Value of t	2.45375
Minimum Significant Difference	0.2428

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	0.67271	24	Day 3 (With Withdrawals)
	A			
B	A	0.46802	24	Day 2 (Without Withdrawal)
B				
B		0.37260	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.605975
F Value	4.64
Critical Value of t	2.01216
Minimum Significant Difference	0.4522

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	1.5451	24	Day 3 (With Withdrawals)
	A			
B	A	1.1027	24	Day 2 (Without Withdrawal)
B				
B		0.8715	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.605975

Number of Means	**2**	**3**
Critical Range	0.4483155	0.5382703

Means with the same letter are not significantly different.				
REGWQ Grouping		**Mean**	**N**	**DAY**
	A	1.5451	24	Day 3 (With Withdrawals)
	A			
B	A	1.1027	24	Day 2 (Without Withdrawal)
B				
B		0.8715	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.605975
Critical Value of t	2.45375
Minimum Significant Difference	0.5514

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	1.5451	24	Day 3 (With Withdrawals)
	A			
B	A	1.1027	24	Day 2 (Without Withdrawal)
B				
B		0.8715	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.475858
F Value	7.86
Critical Value of t	1.90101
Minimum Significant Difference	0.3786

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	1.6417	24	Day 1 (With Withdrawals)
B	1.1935	24	Day 2 (Without Withdrawal)
B			
B	0.8545	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.475858

Number of Means	**2**	**3**
Critical Range	0.3972784	0.4769926

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	1.6417	24	Day 1 (With Withdrawals)
B	1.1935	24	Day 2 (Without Withdrawal)
B			
B	0.8545	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.475858
Critical Value of t	2.45375
Minimum Significant Difference	0.4886

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	1.6417	24	Day 1 (With Withdrawals)
	A			
B	A	1.1935	24	Day 2 (Without Withdrawal)
B				
B		0.8545	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.7886
F Value	6.61
Critical Value of t	1.93207
Minimum Significant Difference	0.4953

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	1.7103	24	Day 1 (With Withdrawals)
B	1.0774	24	Day 3 (With Withdrawals)
B			
B	0.8015	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.7886

Number of Means	**2**	**3**
Critical Range	0.5114285	0.614047

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	1.7103	24	Day 1 (With Withdrawals)
B	1.0774	24	Day 3 (With Withdrawals)
B			
B	0.8015	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.7886
Critical Value of t	2.45375
Minimum Significant Difference	0.629

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	1.7103	24	Day 1 (With Withdrawals)
B	1.0774	24	Day 3 (With Withdrawals)
B			
B	0.8015	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.645143
F Value	12.20
Critical Value of t	1.84505
Minimum Significant Difference	0.4278

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	1.5622	24	Day 3 (With Withdrawals)
B	0.6073	24	Day 2 (Without Withdrawal)
B			
B	0.5373	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.645143

Number of Means	**2**	**3**
Critical Range	0.4625776	0.555394

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	1.5622	24	Day 3 (With Withdrawals)
B	0.6073	24	Day 2 (Without Withdrawal)
B			
B	0.5373	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.645143
Critical Value of t	2.45375
Minimum Significant Difference	0.5689

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	1.5622	24	Day 3 (With Withdrawals)
B	0.6073	24	Day 2 (Without Withdrawal)
B			
B	0.5373	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.543164
F Value	0.89
Critical Value of t	2.44124
Minimum Significant Difference	0.5194

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	1.1560	24	Day 2 (Without Withdrawal)
A			
A	1.0081	24	Day 3 (With Withdrawals)
A			
A	0.8719	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Dependent Variable: Salinity Surface Salinity

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.96955278	0.48477639	0.89	0.4143
Error	69	37.47833021	0.54316421		
Corrected Total	71	38.44788299			

R-Square	Coeff Var	Root MSE	Salinity Mean
0.025217	72.82477	0.736997	1.012014

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DAY	2	0.96955278	0.48477639	0.89	0.4143

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DAY	2	0.96955278	0.48477639	0.89	0.4143

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.543164
Critical Value of t	2.45375
Minimum Significant Difference	0.522

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	1.1560	24	Day 2 (Without Withdrawal)
A			
A	1.0081	24	Day 3 (With Withdrawals)
A			
A	0.8719	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.267806
F Value	5.79
Critical Value of t	1.95939
Minimum Significant Difference	0.2927

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.8343	24	Day 3 (With Withdrawals)
A			
A	0.7973	24	Day 2 (Without Withdrawal)
B	0.3767	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.267806

Number of Means	**2**	**3**
Critical Range	0.2980347	0.3578355

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.8343	24	Day 3 (With Withdrawals)
A			
A	0.7973	24	Day 2 (Without Withdrawal)
B	0.3767	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.267806
Critical Value of t	2.45375
Minimum Significant Difference	0.3666

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.8343	24	Day 3 (With Withdrawals)
A			
A	0.7973	24	Day 2 (Without Withdrawal)
B	0.3767	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	2.321037
F Value	2.79
Critical Value of t	2.15607
Minimum Significant Difference	0.9482

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	2.6894	24	Day 3 (With Withdrawals)
	A			
B	A	1.9846	24	Day 2 (Without Withdrawal)
B				
B		1.6766	24	Day 1 (With Withdrawals)

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.321037

Number of Means	**2**	**3**
Critical Range	0.8773999	1.0534507

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	2.6894	24	Day 3 (With Withdrawals)
A			
A	1.9846	24	Day 2 (Without Withdrawal)
A			
A	1.6766	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.321037
Critical Value of t	2.45375
Minimum Significant Difference	1.0791

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	2.6894	24	Day 3 (With Withdrawals)
A			
A	1.9846	24	Day 2 (Without Withdrawal)
A			
A	1.6766	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.380807
F Value	3.23
Critical Value of t	2.11261
Minimum Significant Difference	1.1213

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	4.6420	24	Day 3 (With Withdrawals)
	A			
B	A	4.0489	24	Day 2 (Without Withdrawal)
B				
B		3.2959	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.380807

Number of Means	**2**	**3**
Critical Range	1.0589286	1.2714034

Means with the same letter are not significantly different.				
REGWQ Grouping		**Mean**	**N**	**DAY**
	A	4.6420	24	Day 3 (With Withdrawals)
	A			
B	A	4.0489	24	Day 2 (Without Withdrawal)
B				
B		3.2959	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.380807
Critical Value of t	2.45375
Minimum Significant Difference	1.3024

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	4.6420	24	Day 3 (With Withdrawals)
	A			
B	A	4.0489	24	Day 2 (Without Withdrawal)
B				
B		3.2959	24	Day 1 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	4.361709
F Value	0.48
Critical Value of t	2.53041
Minimum Significant Difference	1.5256

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	6.6484	24	Day 3 (With Withdrawals)
A			
A	6.2281	24	Day 1 (With Withdrawals)
A			
A	6.0776	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.361709

Number of Means	**2**	**3**
Critical Range	1.2027763	1.4441142

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	6.6484	24	Day 3 (With Withdrawals)
A			
A	6.2281	24	Day 1 (With Withdrawals)
A			
A	6.0776	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.361709
Critical Value of t	2.45375
Minimum Significant Difference	1.4793

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	6.6484	24	Day 3 (With Withdrawals)
A			
A	6.2281	24	Day 1 (With Withdrawals)
A			
A	6.0776	24	Day 2 (Without Withdrawal)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.911109
F Value	47.92
Critical Value of t	1.77896
Minimum Significant Difference	1.0156

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	7.7819	24	Day 2 (Without Withdrawal)
B	5.3981	24	Day 1 (With Withdrawals)
C	2.2119	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Duncan's Multiple Range Test for Salinity

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.911109

Number of Means	**2**	**3**
Critical Range	1.139	1.198

Means with the same letter are not significantly different.			
Duncan Grouping	**Mean**	**N**	**DAY**
A	7.7819	24	Day 2 (Without Withdrawal)
B	5.3981	24	Day 1 (With Withdrawals)
C	2.2119	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.911109

Number of Means	**2**	**3**
Critical Range	1.1389548	1.3674868

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	7.7819	24	Day 2 (Without Withdrawal)
B	5.3981	24	Day 1 (With Withdrawals)
C	2.2119	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.911109
Critical Value of t	2.45375
Minimum Significant Difference	1.4008

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	7.7819	24	Day 2 (Without Withdrawal)
B	5.3981	24	Day 1 (With Withdrawals)
C	2.2119	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Waller-Duncan K-ratio t Test for Salinity

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.841189
F Value	1.43
Critical Value of t	2.34124
Minimum Significant Difference	1.3246

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	4.1278	24	Day 1 (With Withdrawals)
A			
A	3.8228	24	Day 2 (Without Withdrawal)
A			
A	3.1906	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for Salinity

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.841189

Number of Means	**2**	**3**
Critical Range	1.1287281	1.3552081

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	4.1278	24	Day 1 (With Withdrawals)
A			
A	3.8228	24	Day 2 (Without Withdrawal)
A			
A	3.1906	24	Day 3 (With Withdrawals)

HBMP Peace River at MZ2 Continuous Recorder - River Kilometer 24.5
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Bonferroni (Dunn) t Tests for Salinity

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.841189
Critical Value of t	2.45375
Minimum Significant Difference	1.3883

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	4.1278	24	Day 1 (With Withdrawals)
A			
A	3.8228	24	Day 2 (Without Withdrawal)
A			
A	3.1906	24	Day 3 (With Withdrawals)

Appendix E

Results from analysis of variance Peace Rive Heights (RK 26.7)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	1.014129
F Value	0.78
Critical Value of t	2.46473
Minimum Significant Difference	0.7165

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	1.5359	24	Day 3 (With Withdrawals)
A			
A	1.3734	24	Day 1 (With Withdrawals)
A			
A	1.1737	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.014129

Number of Means	2	3
Critical Range	0.5799668	0.6963375

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	1.5359	24	Day 3 (With Withdrawals)
A			
A	1.3734	24	Day 1 (With Withdrawals)
A			
A	1.1737	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.014129
Critical Value of t	2.45375
Minimum Significant Difference	0.7133

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	1.5359	24	Day 3 (With Withdrawals)
A			
A	1.3734	24	Day 1 (With Withdrawals)
A			
A	1.1737	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	1.245307
F Value	0.93
Critical Value of t	2.43273
Minimum Significant Difference	0.7837

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	1.6788	24	Day 1 (With Withdrawals)
A			
A	1.3198	24	Day 3 (With Withdrawals)
A			
A	1.2783	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.245307

Number of Means	**2**	**3**
Critical Range	0.6426799	0.771634

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	1.6788	24	Day 1 (With Withdrawals)
A			
A	1.3198	24	Day 3 (With Withdrawals)
A			
A	1.2783	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.245307
Critical Value of t	2.45375
Minimum Significant Difference	0.7905

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	1.6788	24	Day 1 (With Withdrawals)
A			
A	1.3198	24	Day 3 (With Withdrawals)
A			
A	1.2783	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	1.535331
F Value	14.70
Critical Value of t	1.82889
Minimum Significant Difference	0.6542

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	2.1458	24	Day 2 (Without Withdrawal)
A			
A	1.9582	24	Day 1 (With Withdrawals)
B	0.3804	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.535331

Number of Means	**2**	**3**
Critical Range	0.7136044	0.8567896

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	2.1458	24	Day 2 (Without Withdrawal)
A			
A	1.9582	24	Day 1 (With Withdrawals)
B	0.3804	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.535331
Critical Value of t	2.45375
Minimum Significant Difference	0.8777

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	2.1458	24	Day 2 (Without Withdrawal)
A			
A	1.9582	24	Day 1 (With Withdrawals)
B	0.3804	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.000812
F Value	22.60
Critical Value of t	1.80283
Minimum Significant Difference	0.0148

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.316184	24	Day 3 (With Withdrawals)
B	0.275417	24	Day 2 (Without Withdrawal)
B			
B	0.263454	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.000812

Number of Means	**2**	**3**
Critical Range	0.0164076	0.0196998

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.316184	24	Day 3 (With Withdrawals)
B	0.275417	24	Day 2 (Without Withdrawal)
B			
B	0.263454	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.000812
Critical Value of t	2.45375
Minimum Significant Difference	0.0202

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.316184	24	Day 3 (With Withdrawals)
B	0.275417	24	Day 2 (Without Withdrawal)
B			
B	0.263454	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.000786
F Value	4.98
Critical Value of t	1.99455
Minimum Significant Difference	0.0161

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.337068	24	Day 3 (With Withdrawals)
B	0.316158	24	Day 2 (Without Withdrawal)
B			
B	0.313927	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.000786

Number of Means	**2**	**3**
Critical Range	0.0161424	0.0193813

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.337068	24	Day 3 (With Withdrawals)
B	0.316158	24	Day 2 (Without Withdrawal)
B			
B	0.313927	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.000786
Critical Value of t	2.45375
Minimum Significant Difference	0.0199

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.337068	24	Day 3 (With Withdrawals)
B	0.316158	24	Day 2 (Without Withdrawal)
B			
B	0.313927	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.043995
F Value	5.97
Critical Value of t	1.95279
Minimum Significant Difference	0.1182

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.58554	24	Day 3 (With Withdrawals)
A			
A	0.49711	24	Day 2 (Without Withdrawal)
B	0.37711	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.043995

Number of Means	**2**	**3**
Critical Range	0.1207969	0.1450349

Means with the same letter are not significantly different.				
REGWQ Grouping		**Mean**	**N**	**DAY**
	A	0.58554	24	Day 3 (With Withdrawals)
	A			
B	A	0.49711	24	Day 2 (Without Withdrawal)
B				
B		0.37711	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.043995
Critical Value of t	2.45375
Minimum Significant Difference	0.1486

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	0.58554	24	Day 3 (With Withdrawals)
	A			
B	A	0.49711	24	Day 2 (Without Withdrawal)
B				
B		0.37711	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.033303
F Value	9.16
Critical Value of t	1.87825
Minimum Significant Difference	0.0989

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.58241	24	Day 1 (With Withdrawals)
B	0.42646	24	Day 2 (Without Withdrawal)
B			
B	0.36346	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.033303

Number of Means	**2**	**3**
Critical Range	0.1050982	0.1261862

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.58241	24	Day 1 (With Withdrawals)
B	0.42646	24	Day 2 (Without Withdrawal)
B			
B	0.36346	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.033303
Critical Value of t	2.45375
Minimum Significant Difference	0.1293

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.58241	24	Day 1 (With Withdrawals)
B	0.42646	24	Day 2 (Without Withdrawal)
B			
B	0.36346	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.195133
F Value	2.94
Critical Value of t	2.14016
Minimum Significant Difference	0.2729

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	0.6618	24	Day 1 (With Withdrawals)
	A			
B	A	0.4231	24	Day 3 (With Withdrawals)
B				
B		0.3721	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.195133

Number of Means	**2**	**3**
Critical Range	0.2544028	0.3054489

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.6618	24	Day 1 (With Withdrawals)
A			
A	0.4231	24	Day 3 (With Withdrawals)
A			
A	0.3721	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.195133
Critical Value of t	2.45375
Minimum Significant Difference	0.3129

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.6618	24	Day 1 (With Withdrawals)
A			
A	0.4231	24	Day 3 (With Withdrawals)
A			
A	0.3721	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.011607
F Value	12.56
Critical Value of t	1.84226
Minimum Significant Difference	0.0573

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.39647	24	Day 3 (With Withdrawals)
B	0.26296	24	Day 1 (With Withdrawals)
B			
B	0.26006	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.011607

Number of Means	**2**	**3**
Critical Range	0.062046	0.0744956

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.39647	24	Day 3 (With Withdrawals)
B	0.26296	24	Day 1 (With Withdrawals)
B			
B	0.26006	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.011607
Critical Value of t	2.45375
Minimum Significant Difference	0.0763

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.39647	24	Day 3 (With Withdrawals)
B	0.26296	24	Day 1 (With Withdrawals)
B			
B	0.26006	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.00374
F Value	1.18
Critical Value of t	2.38511
Minimum Significant Difference	0.0421

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.33169	24	Day 2 (Without Withdrawal)
A			
A	0.32547	24	Day 3 (With Withdrawals)
A			
A	0.30571	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.00374

Number of Means	**2**	**3**
Critical Range	0.0352179	0.0422844

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.33169	24	Day 2 (Without Withdrawal)
A			
A	0.32547	24	Day 3 (With Withdrawals)
A			
A	0.30571	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.00374
Critical Value of t	2.45375
Minimum Significant Difference	0.0433

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.33169	24	Day 2 (Without Withdrawal)
A			
A	0.32547	24	Day 3 (With Withdrawals)
A			
A	0.30571	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.00905
F Value	3.13
Critical Value of t	2.12182
Minimum Significant Difference	0.0583

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	0.36575	24	Day 3 (With Withdrawals)
	A			
B	A	0.34662	24	Day 2 (Without Withdrawal)
B				
B		0.29903	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.00905

Number of Means	**2**	**3**
Critical Range	0.0547883	0.0657816

Means with the same letter are not significantly different.				
REGWQ Grouping		**Mean**	**N**	**DAY**
	A	0.36575	24	Day 3 (With Withdrawals)
	A			
B	A	0.34662	24	Day 2 (Without Withdrawal)
B				
B		0.29903	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.00905
Critical Value of t	2.45375
Minimum Significant Difference	0.0674

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.36575	24	Day 3 (With Withdrawals)
A			
A	0.34662	24	Day 2 (Without Withdrawal)
A			
A	0.29903	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.336469
F Value	3.80
Critical Value of t	2.06613
Minimum Significant Difference	0.346

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	1.0470	24	Day 3 (With Withdrawals)
	A			
B	A	0.7378	24	Day 2 (Without Withdrawal)
B				
B		0.5957	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.336469

Number of Means	**2**	**3**
Critical Range	0.3340637	0.4010938

Means with the same letter are not significantly different.				
REGWQ Grouping		**Mean**	**N**	**DAY**
	A	1.0470	24	Day 3 (With Withdrawals)
	A			
B	A	0.7378	24	Day 2 (Without Withdrawal)
B				
B		0.5957	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.336469
Critical Value of t	2.45375
Minimum Significant Difference	0.4109

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	1.0470	24	Day 3 (With Withdrawals)
	A			
B	A	0.7378	24	Day 2 (Without Withdrawal)
B				
B		0.5957	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	1.651948
F Value	3.13
Critical Value of t	2.12176
Minimum Significant Difference	0.7872

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	2.3067	24	Day 3 (With Withdrawals)
	A			
B	A	1.9108	24	Day 2 (Without Withdrawal)
B				
B		1.3814	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.651948

Number of Means	**2**	**3**
Critical Range	0.7402095	0.888733

Means with the same letter are not significantly different.				
REGWQ Grouping		**Mean**	**N**	**DAY**
	A	2.3067	24	Day 3 (With Withdrawals)
	A			
B	A	1.9108	24	Day 2 (Without Withdrawal)
B				
B		1.3814	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.651948
Critical Value of t	2.45375
Minimum Significant Difference	0.9104

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	2.3067	24	Day 3 (With Withdrawals)
	A			
B	A	1.9108	24	Day 2 (Without Withdrawal)
B				
B		1.3814	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	3.856857
F Value	1.16
Critical Value of t	2.38959
Minimum Significant Difference	1.3547

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	3.7198	24	Day 3 (With Withdrawals)
A			
A	3.0043	24	Day 1 (With Withdrawals)
A			
A	2.9449	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.856857

Number of Means	**2**	**3**
Critical Range	1.1310278	1.3579693

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	3.7198	24	Day 3 (With Withdrawals)
A			
A	3.0043	24	Day 1 (With Withdrawals)
A			
A	2.9449	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	3.856857
Critical Value of t	2.45375
Minimum Significant Difference	1.3911

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	3.7198	24	Day 3 (With Withdrawals)
A			
A	3.0043	24	Day 1 (With Withdrawals)
A			
A	2.9449	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	2.488148
F Value	39.13
Critical Value of t	1.78361
Minimum Significant Difference	0.8122

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	4.7980	24	Day 2 (Without Withdrawal)
B	2.7810	24	Day 1 (With Withdrawals)
C	0.7696	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.488148

Number of Means	**2**	**3**
Critical Range	0.9084366	1.0907151

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	4.7980	24	Day 2 (Without Withdrawal)
B	2.7810	24	Day 1 (With Withdrawals)
C	0.7696	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.488148
Critical Value of t	2.45375
Minimum Significant Difference	1.1173

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	4.7980	24	Day 2 (Without Withdrawal)
B	2.7810	24	Day 1 (With Withdrawals)
C	0.7696	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_SURF

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	1.883084
F Value	1.20
Critical Value of t	2.38241
Minimum Significant Difference	0.9438

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	2.0719	24	Day 1 (With Withdrawals)
A			
A	1.6488	24	Day 2 (Without Withdrawal)
A			
A	1.4766	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_SURF

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.883084

Number of Means	**2**	**3**
Critical Range	0.7902988	0.9488728

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	2.0719	24	Day 1 (With Withdrawals)
A			
A	1.6488	24	Day 2 (Without Withdrawal)
A			
A	1.4766	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_SURF

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.883084
Critical Value of t	2.45375
Minimum Significant Difference	0.972

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	2.0719	24	Day 1 (With Withdrawals)
A			
A	1.6488	24	Day 2 (Without Withdrawal)
A			
A	1.4766	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	1.034715
F Value	0.81
Critical Value of t	2.45800
Minimum Significant Difference	0.7218

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	1.5630	24	Day 3 (With Withdrawals)
A			
A	1.3862	24	Day 1 (With Withdrawals)
A			
A	1.1891	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.034715

Number of Means	**2**	**3**
Critical Range	0.5858238	0.7033697

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	1.5630	24	Day 3 (With Withdrawals)
A			
A	1.3862	24	Day 1 (With Withdrawals)
A			
A	1.1891	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.034715
Critical Value of t	2.45375
Minimum Significant Difference	0.7205

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	1.5630	24	Day 3 (With Withdrawals)
A			
A	1.3862	24	Day 1 (With Withdrawals)
A			
A	1.1891	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	1.253972
F Value	0.98
Critical Value of t	2.42287
Minimum Significant Difference	0.7832

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	1.7267	24	Day 1 (With Withdrawals)
A			
A	1.3407	24	Day 2 (Without Withdrawal)
A			
A	1.3275	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.253972

Number of Means	**2**	**3**
Critical Range	0.644912	0.774314

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	1.7267	24	Day 1 (With Withdrawals)
A			
A	1.3407	24	Day 2 (Without Withdrawal)
A			
A	1.3275	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.253972
Critical Value of t	2.45375
Minimum Significant Difference	0.7932

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	1.7267	24	Day 1 (With Withdrawals)
A			
A	1.3407	24	Day 2 (Without Withdrawal)
A			
A	1.3275	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	1.54063
F Value	14.90
Critical Value of t	1.82786
Minimum Significant Difference	0.6549

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	2.1690	24	Day 2 (Without Withdrawal)
A			
A	1.9851	24	Day 1 (With Withdrawals)
B	0.3908	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.54063

Number of Means	**2**	**3**
Critical Range	0.7148348	0.8582668

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	2.1690	24	Day 2 (Without Withdrawal)
A			
A	1.9851	24	Day 1 (With Withdrawals)
B	0.3908	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.54063
Critical Value of t	2.45375
Minimum Significant Difference	0.8792

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	2.1690	24	Day 2 (Without Withdrawal)
A			
A	1.9851	24	Day 1 (With Withdrawals)
B	0.3908	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.000906
F Value	20.66
Critical Value of t	1.80723
Minimum Significant Difference	0.0157

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.322660	24	Day 3 (With Withdrawals)
B	0.279833	24	Day 2 (Without Withdrawal)
B			
B	0.270172	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.000906

Number of Means	**2**	**3**
Critical Range	0.0173386	0.0208176

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.322660	24	Day 3 (With Withdrawals)
B	0.279833	24	Day 2 (Without Withdrawal)
B			
B	0.270172	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.000906
Critical Value of t	2.45375
Minimum Significant Difference	0.0213

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.322660	24	Day 3 (With Withdrawals)
B	0.279833	24	Day 2 (Without Withdrawal)
B			
B	0.270172	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.000799
F Value	4.94
Critical Value of t	1.99642
Minimum Significant Difference	0.0163

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.343161	24	Day 3 (With Withdrawals)
B	0.322148	24	Day 2 (Without Withdrawal)
B			
B	0.319908	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.000799

Number of Means	**2**	**3**
Critical Range	0.0162823	0.0195494

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.343161	24	Day 3 (With Withdrawals)
B	0.322148	24	Day 2 (Without Withdrawal)
B			
B	0.319908	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.000799
Critical Value of t	2.45375
Minimum Significant Difference	0.02

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.343161	24	Day 3 (With Withdrawals)
B	0.322148	24	Day 2 (Without Withdrawal)
B			
B	0.319908	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.048327
F Value	5.64
Critical Value of t	1.96527
Minimum Significant Difference	0.1247

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.59558	24	Day 3 (With Withdrawals)
A			
A	0.51691	24	Day 2 (Without Withdrawal)
B	0.38471	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.048327

Number of Means	**2**	**3**
Critical Range	0.1266054	0.1520088

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.59558	24	Day 3 (With Withdrawals)
A			
A	0.51691	24	Day 2 (Without Withdrawal)
B	0.38471	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.048327
Critical Value of t	2.45375
Minimum Significant Difference	0.1557

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	0.59558	24	Day 3 (With Withdrawals)
	A			
B	A	0.51691	24	Day 2 (Without Withdrawal)
B				
B		0.38471	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.033651
F Value	9.02
Critical Value of t	1.88039
Minimum Significant Difference	0.0996

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.58784	24	Day 1 (With Withdrawals)
B	0.43294	24	Day 2 (Without Withdrawal)
B			
B	0.36923	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.033651

Number of Means	**2**	**3**
Critical Range	0.1056464	0.1268444

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.58784	24	Day 1 (With Withdrawals)
B	0.43294	24	Day 2 (Without Withdrawal)
B			
B	0.36923	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.033651
Critical Value of t	2.45375
Minimum Significant Difference	0.1299

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.58784	24	Day 1 (With Withdrawals)
B	0.43294	24	Day 2 (Without Withdrawal)
B			
B	0.36923	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.19848
F Value	2.91
Critical Value of t	2.14303
Minimum Significant Difference	0.2756

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	0.6691	24	Day 1 (With Withdrawals)
	A			
B	A	0.4303	24	Day 3 (With Withdrawals)
B				
B		0.3780	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.19848

Number of Means	**2**	**3**
Critical Range	0.2565751	0.308057

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.6691	24	Day 1 (With Withdrawals)
A			
A	0.4303	24	Day 3 (With Withdrawals)
A			
A	0.3780	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.19848
Critical Value of t	2.45375
Minimum Significant Difference	0.3156

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.6691	24	Day 1 (With Withdrawals)
A			
A	0.4303	24	Day 3 (With Withdrawals)
A			
A	0.3780	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.012453
F Value	12.49
Critical Value of t	1.84278
Minimum Significant Difference	0.0594

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.40649	24	Day 3 (With Withdrawals)
B	0.26867	24	Day 1 (With Withdrawals)
B			
B	0.26549	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.012453

Number of Means	**2**	**3**
Critical Range	0.0642677	0.0771631

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.40649	24	Day 3 (With Withdrawals)
B	0.26867	24	Day 1 (With Withdrawals)
B			
B	0.26549	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.012453
Critical Value of t	2.45375
Minimum Significant Difference	0.079

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.40649	24	Day 3 (With Withdrawals)
B	0.26867	24	Day 1 (With Withdrawals)
B			
B	0.26549	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.00387
F Value	1.12
Critical Value of t	2.39594
Minimum Significant Difference	0.043

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.33749	24	Day 2 (Without Withdrawal)
A			
A	0.33223	24	Day 3 (With Withdrawals)
A			
A	0.31200	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.00387

Number of Means	**2**	**3**
Critical Range	0.0358274	0.0430161

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.33749	24	Day 2 (Without Withdrawal)
A			
A	0.33223	24	Day 3 (With Withdrawals)
A			
A	0.31200	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.00387
Critical Value of t	2.45375
Minimum Significant Difference	0.0441

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.33749	24	Day 2 (Without Withdrawal)
A			
A	0.33223	24	Day 3 (With Withdrawals)
A			
A	0.31200	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.009295
F Value	3.10
Critical Value of t	2.12507
Minimum Significant Difference	0.0591

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	0.37103	24	Day 3 (With Withdrawals)
	A			
B	A	0.35351	24	Day 2 (Without Withdrawal)
B				
B		0.30424	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.009295

Number of Means	**2**	**3**
Critical Range	0.0555244	0.0666654

Means with the same letter are not significantly different.				
REGWQ Grouping		**Mean**	**N**	**DAY**
	A	0.37103	24	Day 3 (With Withdrawals)
	A			
B	A	0.35351	24	Day 2 (Without Withdrawal)
B				
B		0.30424	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.009295
Critical Value of t	2.45375
Minimum Significant Difference	0.0683

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.37103	24	Day 3 (With Withdrawals)
A			
A	0.35351	24	Day 2 (Without Withdrawal)
A			
A	0.30424	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.338841
F Value	3.85
Critical Value of t	2.06209
Minimum Significant Difference	0.3465

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	1.0621	24	Day 3 (With Withdrawals)
	A			
B	A	0.7581	24	Day 2 (Without Withdrawal)
B				
B		0.6037	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.338841

Number of Means	**2**	**3**
Critical Range	0.3352392	0.4025051

Means with the same letter are not significantly different.				
REGWQ Grouping		**Mean**	**N**	**DAY**
	A	1.0621	24	Day 3 (With Withdrawals)
	A			
B	A	0.7581	24	Day 2 (Without Withdrawal)
B				
B		0.6037	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.338841
Critical Value of t	2.45375
Minimum Significant Difference	0.4123

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	1.0621	24	Day 3 (With Withdrawals)
	A			
B	A	0.7581	24	Day 2 (Without Withdrawal)
B				
B		0.6037	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	1.908884
F Value	3.98
Critical Value of t	2.05337
Minimum Significant Difference	0.819

Means with the same letter are not significantly different.				
Waller Grouping		**Mean**	**N**	**DAY**
	A	2.5462	24	Day 3 (With Withdrawals)
	A			
B	A	1.9896	24	Day 2 (Without Withdrawal)
B				
B		1.4215	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.908884

Number of Means	**2**	**3**
Critical Range	0.7956943	0.9553509

Means with the same letter are not significantly different.				
REGWQ Grouping		**Mean**	**N**	**DAY**
	A	2.5462	24	Day 3 (With Withdrawals)
	A			
B	A	1.9896	24	Day 2 (Without Withdrawal)
B				
B		1.4215	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.908884
Critical Value of t	2.45375
Minimum Significant Difference	0.9787

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	2.5462	24	Day 3 (With Withdrawals)
	A			
B	A	1.9896	24	Day 2 (Without Withdrawal)
B				
B		1.4215	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	4.006141
F Value	0.94
Critical Value of t	2.43087
Minimum Significant Difference	1.4045

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	3.7332	24	Day 3 (With Withdrawals)
A			
A	3.1517	24	Day 1 (With Withdrawals)
A			
A	2.9744	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.006141

Number of Means	**2**	**3**
Critical Range	1.1527088	1.3840006

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	3.7332	24	Day 3 (With Withdrawals)
A			
A	3.1517	24	Day 1 (With Withdrawals)
A			
A	2.9744	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	4.006141
Critical Value of t	2.45375
Minimum Significant Difference	1.4178

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	3.7332	24	Day 3 (With Withdrawals)
A			
A	3.1517	24	Day 1 (With Withdrawals)
A			
A	2.9744	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	2.413455
F Value	39.34
Critical Value of t	1.78348
Minimum Significant Difference	0.7998

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	4.7583	24	Day 2 (Without Withdrawal)
B	2.8067	24	Day 1 (With Withdrawals)
C	0.7808	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.413455

Number of Means	**2**	**3**
Critical Range	0.8946973	1.0742189

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	4.7583	24	Day 2 (Without Withdrawal)
B	2.8067	24	Day 1 (With Withdrawals)
C	0.7808	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	2.413455
Critical Value of t	2.45375
Minimum Significant Difference	1.1004

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	4.7583	24	Day 2 (Without Withdrawal)
B	2.8067	24	Day 1 (With Withdrawals)
C	0.7808	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Waller-Duncan K-ratio t Test for SAL_BOT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	1.93336
F Value	1.19
Critical Value of t	2.38300
Minimum Significant Difference	0.9565

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	2.0934	24	Day 1 (With Withdrawals)
A			
A	1.6731	24	Day 2 (Without Withdrawal)
A			
A	1.4886	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for SAL_BOT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.93336

Number of Means	**2**	**3**
Critical Range	0.8007794	0.9614564

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	2.0934	24	Day 1 (With Withdrawals)
A			
A	1.6731	24	Day 2 (Without Withdrawal)
A			
A	1.4886	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Bonferroni (Dunn) t Tests for SAL_BOT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	1.93336
Critical Value of t	2.45375
Minimum Significant Difference	0.9849

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	2.0934	24	Day 1 (With Withdrawals)
A			
A	1.6731	24	Day 2 (Without Withdrawal)
A			
A	1.4886	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.275982
F Value	2.46
Critical Value of t	2.19232
Minimum Significant Difference	0.3325

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.5176	24	Day 3 (With Withdrawals)
A			
A	0.2286	24	Day 2 (Without Withdrawal)
A			
A	0.2234	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.275982

Number of Means	**2**	**3**
Critical Range	0.3025501	0.3632569

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.5176	24	Day 3 (With Withdrawals)
A			
A	0.2286	24	Day 2 (Without Withdrawal)
A			
A	0.2234	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.275982
Critical Value of t	2.45375
Minimum Significant Difference	0.3721

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.5176	24	Day 3 (With Withdrawals)
A			
A	0.2286	24	Day 2 (Without Withdrawal)
A			
A	0.2234	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.714294
F Value	0.72
Critical Value of t	2.47766
Minimum Significant Difference	0.6045

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.4792	24	Day 1 (With Withdrawals)
A			
A	0.2485	24	Day 3 (With Withdrawals)
A			
A	0.2081	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.714294

Number of Means	**2**	**3**
Critical Range	0.4867377	0.584402

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.4792	24	Day 1 (With Withdrawals)
A			
A	0.2485	24	Day 3 (With Withdrawals)
A			
A	0.2081	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 18th to 20th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.714294
Critical Value of t	2.45375
Minimum Significant Difference	0.5987

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.4792	24	Day 1 (With Withdrawals)
A			
A	0.2485	24	Day 3 (With Withdrawals)
A			
A	0.2081	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.310586
F Value	12.04
Critical Value of t	1.84634
Minimum Significant Difference	0.297

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	1.4398	24	Day 2 (Without Withdrawal)
B	0.8413	24	Day 1 (With Withdrawals)
B			
B	0.6949	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.310586

Number of Means	2	3
Critical Range	0.3209572	0.3853575

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	1.4398	24	Day 2 (Without Withdrawal)
B	0.8413	24	Day 1 (With Withdrawals)
B			
B	0.6949	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 24th to 26th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.310586
Critical Value of t	2.45375
Minimum Significant Difference	0.3948

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	1.4398	24	Day 2 (Without Withdrawal)
B	0.8413	24	Day 1 (With Withdrawals)
B			
B	0.6949	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.550772
F Value	1.07
Critical Value of t	2.40645
Minimum Significant Difference	0.5156

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.5742	24	Day 3 (With Withdrawals)
A			
A	0.4381	24	Day 2 (Without Withdrawal)
A			
A	0.2619	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Dependent Variable: GHEIGHT Gage Height

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	1.17677986	0.58838993	1.07	0.3492
Error	69	38.00330208	0.55077249		
Corrected Total	71	39.18008194			

R-Square	Coeff Var	Root MSE	GHEIGHT Mean
0.030035	174.7355	0.742140	0.424722

Source	DF	Type I SS	Mean Square	F Value	Pr > F
DAY	2	1.17677986	0.58838993	1.07	0.3492

Source	DF	Type III SS	Mean Square	F Value	Pr > F
DAY	2	1.17677986	0.58838993	1.07	0.3492

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.550772

Number of Means	**2**	**3**
Critical Range	0.427408	0.5131677

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.5742	24	Day 3 (With Withdrawals)
A			
A	0.4381	24	Day 2 (Without Withdrawal)
A			
A	0.2619	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
December 28th to 30th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.550772
Critical Value of t	2.45375
Minimum Significant Difference	0.5257

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.5742	24	Day 3 (With Withdrawals)
A			
A	0.4381	24	Day 2 (Without Withdrawal)
A			
A	0.2619	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.446051
F Value	5.17
Critical Value of t	1.98557
Minimum Significant Difference	0.3828

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.3607	24	Day 3 (With Withdrawals)
A			
A	0.3032	24	Day 2 (Without Withdrawal)
B	-0.2024	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.446051

Number of Means	**2**	**3**
Critical Range	0.384635	0.4618122

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.3607	24	Day 3 (With Withdrawals)
A			
A	0.3032	24	Day 2 (Without Withdrawal)
B	-0.2024	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.446051
Critical Value of t	2.45375
Minimum Significant Difference	0.4731

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.3607	24	Day 3 (With Withdrawals)
A			
A	0.3032	24	Day 2 (Without Withdrawal)
B	-0.2024	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.644341
F Value	0.18
Critical Value of t	2.60352
Minimum Significant Difference	0.6033

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.6227	24	Day 2 (Without Withdrawal)
A			
A	0.5376	24	Day 3 (With Withdrawals)
A			
A	0.4856	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.644341

Number of Means	**2**	**3**
Critical Range	0.4622897	0.5550485

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.6227	24	Day 2 (Without Withdrawal)
A			
A	0.5376	24	Day 3 (With Withdrawals)
A			
A	0.4856	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 14th to 16th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.644341
Critical Value of t	2.45375
Minimum Significant Difference	0.5686

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.6227	24	Day 2 (Without Withdrawal)
A			
A	0.5376	24	Day 3 (With Withdrawals)
A			
A	0.4856	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.252095
F Value	10.42
Critical Value of t	1.86190
Minimum Significant Difference	0.2699

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.6715	24	Day 1 (With Withdrawals)
A			
A	0.4617	24	Day 2 (Without Withdrawal)
B	0.0232	24	Day 3 (With Withdrawals)

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.252095

Number of Means	**2**	**3**
Critical Range	0.2891604	0.3471807

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.6715	24	Day 1 (With Withdrawals)
A			
A	0.4617	24	Day 2 (Without Withdrawal)
B	0.0232	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 23th to 25th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.252095
Critical Value of t	2.45375
Minimum Significant Difference	0.3556

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.6715	24	Day 1 (With Withdrawals)
A			
A	0.4617	24	Day 2 (Without Withdrawal)
B	0.0232	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.540898
F Value	9.06
Critical Value of t	1.87971
Minimum Significant Difference	0.3991

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.8368	24	Day 1 (With Withdrawals)
B	0.2751	24	Day 3 (With Withdrawals)
B			
B	-0.0572	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.540898

Number of Means	**2**	**3**
Critical Range	0.4235593	0.5085468

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.8368	24	Day 1 (With Withdrawals)
B	0.2751	24	Day 3 (With Withdrawals)
B			
B	-0.0572	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
January 28th to 30th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.540898
Critical Value of t	2.45375
Minimum Significant Difference	0.521

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.8368	24	Day 1 (With Withdrawals)
B	0.2751	24	Day 3 (With Withdrawals)
B			
B	-0.0572	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.580625
F Value	6.09
Critical Value of t	1.94860
Minimum Significant Difference	0.4286

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.4198	24	Day 3 (With Withdrawals)
B	-0.0369	24	Day 1 (With Withdrawals)
B			
B	-0.3429	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.580625

Number of Means	**2**	**3**
Critical Range	0.4388381	0.5268913

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.4198	24	Day 3 (With Withdrawals)
B	-0.0369	24	Day 1 (With Withdrawals)
B			
B	-0.3429	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 11th to 13th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.580625
Critical Value of t	2.45375
Minimum Significant Difference	0.5397

Means with the same letter are not significantly different.				
Bon Grouping		**Mean**	**N**	**DAY**
	A	0.4198	24	Day 3 (With Withdrawals)
	A			
B	A	-0.0369	24	Day 1 (With Withdrawals)
B				
B		-0.3429	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.695723
F Value	1.91
Critical Value of t	2.26589
Minimum Significant Difference	0.5456

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.8232	24	Day 2 (Without Withdrawal)
A			
A	0.7540	24	Day 3 (With Withdrawals)
A			
A	0.3859	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.695723

Number of Means	**2**	**3**
Critical Range	0.4803686	0.5767549

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.8232	24	Day 2 (Without Withdrawal)
A			
A	0.7540	24	Day 3 (With Withdrawals)
A			
A	0.3859	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
February 24th to 26th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.695723
Critical Value of t	2.45375
Minimum Significant Difference	0.5908

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.8232	24	Day 2 (Without Withdrawal)
A			
A	0.7540	24	Day 3 (With Withdrawals)
A			
A	0.3859	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.348237
F Value	15.85
Critical Value of t	1.82330
Minimum Significant Difference	0.3106

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.3447	24	Day 3 (With Withdrawals)
A			
A	0.3142	24	Day 2 (Without Withdrawal)
B	-0.5008	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.348237

Number of Means	**2**	**3**
Critical Range	0.339855	0.4080471

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.3447	24	Day 3 (With Withdrawals)
A			
A	0.3142	24	Day 2 (Without Withdrawal)
B	-0.5008	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 6th to 8th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.348237
Critical Value of t	2.45375
Minimum Significant Difference	0.418

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.3447	24	Day 3 (With Withdrawals)
A			
A	0.3142	24	Day 2 (Without Withdrawal)
B	-0.5008	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.632371
F Value	0.52
Critical Value of t	2.52156
Minimum Significant Difference	0.5788

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.4284	24	Day 3 (With Withdrawals)
A			
A	0.2525	24	Day 2 (Without Withdrawal)
A			
A	0.2067	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.632371

Number of Means	**2**	**3**
Critical Range	0.4579757	0.5498688

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.4284	24	Day 3 (With Withdrawals)
A			
A	0.2525	24	Day 2 (Without Withdrawal)
A			
A	0.2067	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 12th to 14th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.632371
Critical Value of t	2.45375
Minimum Significant Difference	0.5633

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.4284	24	Day 3 (With Withdrawals)
A			
A	0.2525	24	Day 2 (Without Withdrawal)
A			
A	0.2067	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.48307
F Value	0.94
Critical Value of t	2.43176
Minimum Significant Difference	0.4879

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.3854	24	Day 3 (With Withdrawals)
A			
A	0.2759	24	Day 2 (Without Withdrawal)
A			
A	0.1122	24	Day 1 (With Withdrawals)

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.48307

Number of Means	**2**	**3**
Critical Range	0.4002778	0.4805938

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.3854	24	Day 3 (With Withdrawals)
A			
A	0.2759	24	Day 2 (Without Withdrawal)
A			
A	0.1122	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
March 26th to 28th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.48307
Critical Value of t	2.45375
Minimum Significant Difference	0.4923

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.3854	24	Day 3 (With Withdrawals)
A			
A	0.2759	24	Day 2 (Without Withdrawal)
A			
A	0.1122	24	Day 1 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.349273
F Value	0.69
Critical Value of t	2.48327
Minimum Significant Difference	0.4237

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.7134	24	Day 3 (With Withdrawals)
A			
A	0.5749	24	Day 1 (With Withdrawals)
A			
A	0.5183	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.349273

Number of Means	**2**	**3**
Critical Range	0.3403605	0.408654

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.7134	24	Day 3 (With Withdrawals)
A			
A	0.5749	24	Day 1 (With Withdrawals)
A			
A	0.5183	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 3rd to 5th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.349273
Critical Value of t	2.45375
Minimum Significant Difference	0.4186

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.7134	24	Day 3 (With Withdrawals)
A			
A	0.5749	24	Day 1 (With Withdrawals)
A			
A	0.5183	24	Day 2 (Without Withdrawal)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.364143
F Value	39.52
Critical Value of t	1.78337
Minimum Significant Difference	0.3107

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	1.5367	24	Day 2 (Without Withdrawal)
B	0.6514	24	Day 1 (With Withdrawals)
C	-0.0065	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.364143

Number of Means	**2**	**3**
Critical Range	0.3475303	0.4172624

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	1.5367	24	Day 2 (Without Withdrawal)
B	0.6514	24	Day 1 (With Withdrawals)
C	-0.0065	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 14th to 16th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.364143
Critical Value of t	2.45375
Minimum Significant Difference	0.4274

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	1.5367	24	Day 2 (Without Withdrawal)
B	0.6514	24	Day 1 (With Withdrawals)
C	-0.0065	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Waller-Duncan K-ratio t Test for GHEIGHT

Note: This test minimizes the Bayes risk under additive loss and certain other assumptions.

Kratio	100
Error Degrees of Freedom	69
Error Mean Square	0.506599
F Value	0.89
Critical Value of t	2.44130
Minimum Significant Difference	0.5016

Means with the same letter are not significantly different.			
Waller Grouping	**Mean**	**N**	**DAY**
A	0.8333	24	Day 2 (Without Withdrawal)
A			
A	0.7631	24	Day 1 (With Withdrawals)
A			
A	0.5684	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for GHEIGHT

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.506599

Number of Means	**2**	**3**
Critical Range	0.4099103	0.4921591

Means with the same letter are not significantly different.			
REGWQ Grouping	**Mean**	**N**	**DAY**
A	0.8333	24	Day 2 (Without Withdrawal)
A			
A	0.7631	24	Day 1 (With Withdrawals)
A			
A	0.5684	24	Day 3 (With Withdrawals)

USGS Peace River at Peace River Heights Continuous Recorder - River Kilometer 26.7
COMPARIOSNS OF MEANS USING THREE DIFFERING STATISTICAL MULTIPLE RANGE METHODS
1: Waller-Duncan K-ratio t Test 2: Ryan-Einot-Gabriel-Welsch Multiple Range Test 3: Bonferroni (Dunn) t Tests
April 18th to 20th

The GLM Procedure

Bonferroni (Dunn) t Tests for GHEIGHT

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than REGWQ.

Alpha	0.05
Error Degrees of Freedom	69
Error Mean Square	0.506599
Critical Value of t	2.45375
Minimum Significant Difference	0.5042

Means with the same letter are not significantly different.			
Bon Grouping	**Mean**	**N**	**DAY**
A	0.8333	24	Day 2 (Without Withdrawal)
A			
A	0.7631	24	Day 1 (With Withdrawals)
A			
A	0.5684	24	Day 3 (With Withdrawals)