

North Umpqua Hydroelectric Project
FERC Project No. 1927

Flow Monitoring Plan
for
Bypass Reaches
and
Other Compliance-related Gages

(Satisfies FERC License Article 403 and SA Section 5.5)

**Prepared by PacifiCorp
and the
Flow and Ramping Technical Work Group**

November 2007

As required by the SA, Section 5.5:

"PacifiCorp shall develop, in consultation with USDA-FS, NMFS, USFWS, ODFW, ODEQ, and OWRD, a coordinated gage installation and data reporting plan. The agencies shall review and approve the plan..."

The signatures below indicate approval of this plan dated November, 2007:

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US Fish and Wildlife Service Date

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1.0 INTRODUCTION

This is the first revision of the Flow Monitoring Plan originally approved by the Agencies and FERC in 2004. Revisions were warranted to reflect knowledge gained since 2004, changes and upgrades to gage locations and equipment systems, and to add detail regarding calculation and reporting methods developed to assess and report flow and ramping compliance. This revised plan will be implemented upon approval, during water year (WY) 2008.

Modifications to this plan may be suggested at any time by any of the signatories. If consultation by all signatory parties concludes that modification is warranted, written modifications will be issued in the form of addenda or revisions (depending on the nature and magnitude of the change) and will specify the schedule upon which they take effect.

2.0 BACKGROUND

In June of 2001, the Parties¹ signed the *North Umpqua Hydroelectric Project Settlement Agreement* (SA) that has the overall objective of implementing measures for the protection of ecological resources affected by the North Umpqua Project while providing for other beneficial uses, including hydropower generation and recreation. Section 5.5 of the SA contains the following requirements for in-stream flow monitoring and the preparation of a gaging plan:

“PacifiCorp shall install and maintain gage stations by the date the New License becomes final or by 2002, whichever occurs earliest, at the head of the bypass reaches or elsewhere as required by OWRD to monitor compliance with the in-stream flow regimes identified in Appendix C, Tables 1 and 2. The installation of the gage stations and the data acquisition shall conform to applicable United States Geological Survey (USGS) standards in existence upon the Effective Date. PacifiCorp shall develop, in consultation with USDA-FS, NMFS, USFWS, ODFW, ODEQ, and OWRD, a coordinated gage installation and data-reporting plan. The agencies shall review and approve the plan prior to installation of gage stations.”

In addition, Section 6.6(e) of the SA specifies:

“The ramping regime outlined in Section 6.6d above will be monitored through the gaging plan required under Section 5.5 above and may be modified upon written agreement by PacifiCorp, ODFW, NMFS, ODEQ, USFWS, and USDA-FS.”

Further, the Clean Water Act Section 401 Certification Conditions for the North Umpqua Hydroelectric Project state in Section 3b:

“(1) PacifiCorp shall develop a coordinated gage installation and data reporting plan in accordance with the North Umpqua Settlement Agreement Section 5.5. PacifiCorp

¹ USDA-FS, ODFW, NOAA Fisheries (NMFS), OWRD, ODEQ, USFWS, BLM and PacifiCorp

shall install and maintain gage stations as established by the approved gage installation and data reporting plan.”

“(2) By December 31 of each year, PacifiCorp shall submit to the ODEQ-Western Region an annual report with average hourly flows passed and diverted at the Project developments for the previous water year (October 1 to September 30).”

and Section 401 Certification Conditions Section 3d:

“PacifiCorp shall implement ramping restrictions and measures in accordance with the North Umpqua Settlement Agreement Section 6.”

This Plan, developed by PacifiCorp in consultation with, and approved by, the Oregon Water Resource Department (OWRD), Oregon Department of Fish and Wildlife (ODFW), NOAA Fisheries (NMFS), Oregon Department of Environmental Quality (ODEQ), U.S. Fish and Wildlife Service (USFWS), and U.S. Department of Agriculture Forest Service (USDA-FS) describes the gage locations, operations, and the data reporting requirements. These agencies are referred to in this plan as “the agencies”, and are represented along with PacifiCorp and USGS on the Flow and Ramping Technical Workgroup (F&R TWG). The USGS has been consulted extensively throughout this program regarding gage locations, installation, and standards for operation, maintenance, and reporting.

Finally, Article 403 of the New License Order issued by the FERC on Nov 18, 2003, requires PacifiCorp to consult with AW (American Whitewater), and to submit this plan to the FERC. Consultation with AW occurred in January 2004 and September 2007. FERC approved the original FMP on August 25, 2004.

3.0 BYPASS REACH GAGES

Instream flow monitoring for bypass reaches is described below, and summarized in Table 2. It is the intent of PacifiCorp and the agencies that gage installations, operation, and records meet existing and future USGS requirements to the extent practical considering the site-specific constraints imposed by locating these gages to emphasize compliance with minimum flows and ramp rates. These sites were not located or intended to be typical full-flow gage stations, but will nevertheless be managed to provide the widest range of flow information practical.

3.1 STATION LOCATIONS

The SA section 5.5 requires gaging stations in the following eight bypass reaches: Lemolo 1, Lemolo 2, Toketee, Slide Creek, Soda Springs, Clearwater 1, Clearwater 2, and Fish Creek (see Appendix A). New gaging stations were purposefully located as far upstream in each bypass reach as possible given site-specific hydrologic, access, and facility constraints and opportunities. The gage locations are the official compliance points for minimum

instream flows and ramping rates. All seepage, accretion, and other inflow that occurs between the diversion dams and the gage sites are considered part of the instream flow.

Prior to 2002, recording gaging stations existed in the Clearwater 1, Lemolo 1, and Fish Creek bypass reaches (operated by USGS) and in the Soda Springs bypass reach (operated by PacifiCorp). Other bypass reaches had only non-recording staff gages for daily checks of minimum flow compliance.

During 2002 and 2003, PacifiCorp and the Agencies participated in several site visits to agree upon gage station locations in all bypass reaches. Most new gage stations were built in 2002 and became operable during 2003. All sites except Fish Creek have AC power. Modifications to some gage station locations have occurred since 2003, as documented below. Gage locations and characteristics for each bypass reach are summarized below and mapped in Appendix A.

Lemolo 1: The original USGS-operated gage station (14313500) location was considered inappropriate for compliance gaging because it is downstream of White Mule Creek, a significant seasonal tributary. In 2002, an ultrasonic flow meter was installed on the instream flow outlet pipe from Lemolo dam, but was later deemed insufficient for monitoring flow compliance during maintenance events and was abandoned in favor of a new in-river location. In June 2003, the agencies approved a site approximately 900 ft downstream of Lemolo 1 dam (but upstream of White Mule Creek) for the new in-river gage station. The new station was built in November 2003.

Lemolo 2: A new gage station was built in 2002 approximately 1,200 ft downstream of the diversion dam.

Toketee: A new gage station was built in 2002 approximately 500 ft downstream of the dam. A pre-existing concrete weir forms the hydraulic control on the gage pool.

Slide Creek: A new gage station was built in 2002 within the pool immediately below the dam. It was upgraded with a stilling well in 2007 during modifications to the dam. This station is subject to variable stage relationships depending upon spill patterns at the dam.

Soda Springs: The agencies approved the existing gaging station locations. However, the Soda Springs bypass reach gage was moved 200 ft upstream in August 2004 during construction of the SA 8.3 spawning habitat project, to make room for the expanded spawning habitat. The rating at this site is subject to periodic change caused by maintenance of the spawning habitat (e.g. addition of gravel), fish spawning activity, and high flow scour events.

Clearwater 1: The original USGS-operated gage station was accepted as the best compliance gaging location in this reach. The stilling well and gage house were retained and equipment upgraded.

Clearwater 2: A new gage station was installed in 2002 approximately 300 ft downstream of the dam.

Fish Creek: The original USGS-operated gaging station (14316000) was unacceptable for compliance because of two significant tributaries between the diversion dam and the gaging station. A new gage station was installed in 2002 approximately 400 feet downstream from the diversion dam. Because this location is a relatively shallow riffle and exposed to temperature extremes, this site is prone to periodic backwatering by snow and ice in winter.

Should any additional relocations of any gage station be warranted, a new location would be selected in consultation with the USGS, the F&R TWG, and with the approval of the agencies.

3.2 STATION INSTALLATION

The installation of the new gaging stations and the upgrade of the existing Clearwater 1 and Soda Springs stations began on October 15, 2002, and were completed by the end of 2002 (except Lemolo 1, where the new in-river site was completed in fall 2003). The general contractor for the work was Sutron Corp., a company specializing in the measurement and reporting of environmental data. The contract specifications required that the work conform to USGS standard practices as defined in USGS Water Supply Paper 2175 (Measurement and Computation of Streamflow: Volume 1, Measurement of Stage and Discharge).

The agencies and USGS representatives visited all gage installations during April 2003, and found them to be built within USGS specifications except for not having high-flow staff gages and crest stage gages. The latter were installed during 2004. New cableways or high-flow rating facilities were not installed, and were not required as part of this program. Installations and equipment were improved as necessary during 2003 to respond to technical problems as they were realized during various flow, operational, and natural events. By the end of 2003, most equipment-related troubleshooting had been accomplished. Since that time, equipment has been upgraded as necessary by PacifiCorp with USGS concurrence and assistance. During 2005, all gage stations were fitted with telemetry equipment to provide real-time public access to provisional records via the USGS website.

3.3 DATA ACQUISITION AND RATING TABLES

Stage Measurement and Data Logging

The stations at the Lemolo 1, Lemolo 2, Clearwater 2, Toketee, Slide Creek, Fish Creek, and Soda Springs bypass reaches use a bubbler system for stage measurement. The bubblers were originally installed with self contained tank and compressor units. Due to heavy maintenance loads for the compressors, the sites have been switched over to standard site-feed and nitrogen tank systems. The existing Clearwater 1 station uses a stilling well with a float system. Each station was originally equipped with a Sutron 8210 data logger. These have since been upgraded to Sutron 9210 Xlite units. Each is a complete data acquisition and storage unit. Each logger is programmed to record stage at 15-minute intervals. Stage records are used to document, evaluate, and report compliance with ramping rates over a full range of flows.

Real-time stage readings are telemetered from all bypass gaging locations via the GOES satellite system. This information is also published by the USGS on a public web page (<http://waterdata.usgs.gov/or/nwis/rt>).

Rating Tables

Rating tables are maintained per USGS standards for each gage to accurately describe compliance with required minimum flows and provide reasonable estimates of higher flows, within site constraints. Bypass reach gages were sited as close as feasible to each diversion dam to emphasize compliance with minimum flows and ramp rates, and isolate accretion and inflow. As a conscious compromise, the new gage locations are generally not ideal sites for measuring high flow. In fact, the turbulent and remote nature of most bypass reaches means that few good sites exist for high flow measurements. However, ratings have been and will be extended to the highest flow safely wadeable at each site (Table 1). Ratings will be extended beyond the safely wadeable flow range as practical with existing infrastructure and the most appropriate methods and technologies to address the challenges and opportunities at each site (Table 1). If maintenance of ratings requires measurement of flows less than the required minimum flow, PacifiCorp will consult with the OWRD, ODEQ, ODFW, and USDA-FS before reducing flows for such measurements.

High flow measurement and rating methods and technologies may include:

- existing cableway (at Lemolo 1, possibly Fish Creek)
- acoustic Doppler current profiler (ADCP)
- boat and rope or cable systems
- temporary bank-operated cableways
- indirect calculation via operational information (e.g. canal and penstock shutdowns)
- indirect calculation of floods via channel surveys

Real-time ratings are available to the public via the USGS webpage Rating Depot feature.

3.4 STATION MAINTENANCE

Maintenance of gaging stations will meet USGS standards, and will also meet PacifiCorp's need for real-time access to data and timely maintenance of equipment. PacifiCorp may perform some duties, while qualified contractors, such as the USGS or experienced private consultants, may perform others for PacifiCorp.

PacifiCorp North Umpqua Operations personnel are responsible for maintenance of instrumentation and spare parts inventory. This arrangement was requested by Operations because it avoids any overlap in responsibility. Equipment maintenance will be assigned to a Communications Technician, with a back-up person similarly trained. Only designated personnel and the assigned contractors (e.g. USGS) will be allowed to alter station settings. Loggers will remain on a Pacific Standard Time stamp to avoid problems with annual Daylight Savings Time changes.

Stations will be serviced at approximately 2-month intervals. Service will include inspection of the facilities, equipment, staff gage, and general condition of the channel in the

vicinity of the station (e.g. integrity of the hydraulic control). The staff gage will be read and compared with the recorded stage. Data will be downloaded and compiled into a running database for each station (unless already acquired and stored via telemetry). This maintenance may be performed by PacifiCorp or qualified contractors.

Table 1. Selected characteristics of bypass reach gage site rating potential and status of ratings as of 2007.

Site name	Highest potentially required minimum flow release (cfs)	Estimated highest flow safely wadeable (cfs)*	Best higher flow measurement and rating methods	High flow concerns and constraints	Rating range as of 2007
Lemolo 1 14313200	80	200	Cableway at old gage site	Subtract White Mule Creek	20 – 1,230 CFS
Lemolo 2 14313700	80	200	ADCP, indirect calculation via canal shutdown	Turbulence, brush, lack of crossing structure, boat safety	16 – 1,500 CFS
Toketee 14315500	80	200	ADCP , indirect calculation	Turbulence, lack of crossing structure, safety	15 – 12,000 CFS
Slide Creek 14315700	240	250	Boat upstream of diversion during canal shutdown	Turbulence, eddies at bridge	48 – 3,000 CFS
Soda Springs 14316455	275	800	ADCP, indirect via downstream gages and penstock	Turbulence at bridge, entrained air in pool	50 – 7,150 CFS
Clearwater 1 14314500	60	200	Wade, ADCP	None likely	1.5 – 850 CFS
Clearwater 2 14314700	60	200	ADCP, indirect calculation via canal shutdown, temporary bank operated cableway	Turbulence, brush, lack of crossing structure, safety	4 – 600 CFS
Fish Creek 14315950	130	300	Boat, ADCP, cableway at Gage 14316000	Turbulence, brush, lack of crossing structure, safety, accretion at old site could be measured and subtracted	10 – 3,300 CFS

3.5 DATA MANAGEMENT, PUBLICATION, and REPORTING

Data will be managed by PacifiCorp and qualified contractors as outlined below and in Table 2. Any deficiencies discovered during the review and publication process (e.g. rating table shifts, stage off-sets) will be addressed to produce the most accurate record possible, per USGS standards. PacifiCorp will reimburse the USGS annually to review and verify rating tables and gage records, perform streamflow measurements necessary to verify rating tables, and publish the record. If rating tables or gage records within the range of minimum flow compliance do not meet USGS standards required for data publication, PacifiCorp will remedy the situation or shall reimburse USGS or a qualified contractor to correct deficient records to the extent possible. PacifiCorp's obligation shall not be greater than the cost required for USGS to review, correct, and publish data for each required stream gage or for USGS to assume total operation of any gage in the following year. If data deficiencies at any station are abnormally chronic or frequently result in a streamflow record that does not meet USGS standards, PacifiCorp will consult with the agencies to correct the deficiencies.

A complete system that automates the collection, processing, and reporting of provisional "real-time" bypass reach stage and flow data is in service for all bypass sites, using the GOES satellite system. An additional telemetry link brings data to operators at the Toketee Control Center, and select PacifiCorp personnel. This further meets the needs of compliance monitoring and also provides "real-time" data to PacifiCorp Operations. The provisional bypass reach stage and flow data are available on a web page for public access, which the USGS provides via their webserver.

Annual Reports: All recorded data will be reviewed by the USGS prior to their Annual Report publication; the USGS will publish mean daily flow values for all bypass reaches, only to the extent of the rating tables meeting USGS standards. The USGS will issue PacifiCorp a "record" for each site consisting of 15-minute stage and flow values, as well as supplementary information pertaining to measurement and rating history and methods of records maintenance. PacifiCorp reporting will consist of an Annual Report contained on a CD describing the preceding water year (October 1 – September 30). The PacifiCorp Annual Report will include: final-record 15-minute stage and flow values provided by the USGS, computed hourly stage and flow values, a summary of mean, maximum and minimum hourly flows for each day, a summary of maximum hourly stage change for each day, rating tables used by the USGS, and a summary and explanation of minimum flow and stage change events not meeting compliance thresholds, as described in Section 5 (Appendix G and H). This Annual Report will be distributed to the OWRD, ODEQ, and USDA-FS (and other agencies signatory to this Plan upon request) within 90 days from receiving USGS-published records for all sites.

(Prior to the implementation of the current telemetry system for bypass gaging during 2005, data management and reporting differed from the current operations. During WY 2003-05, PacifiCorp lacked real-time access to most gage data and instead managed them with daily checks by Operators and manual data downloads bimonthly, and whenever flow or stage change events were suspected. PacifiCorp provided a manual stage reading for each bypass reaches to OWRD daily, provisional data to the cooperating agencies upon request, and provisional data and field discharge measurements to the USGS on approximately a bi-monthly interval.)

3.6 SCHEDULE

All bypass gages were reporting flows in the range sufficient to evaluate minimum flow compliance to OWRD by WY 2004 (with a partial record provided for WY 2003). This includes full-flow rating at the Clearwater 1 bypass reach, and also at the “old” gages in Lemolo 1 (14313500) and Fish Creek (14316000) bypass reaches, which PacifiCorp funded through WY 2004.

Beginning in WY 2004, ratings began to be expanded through the range of safely measurable and wadeable flows, and beyond as practical at each site. Operation of the gage stations (except for equipment maintenance and upgrades) was contracted to USGS in mid-2004, and has continued annually to the present time.

PacifiCorp implemented automation and real-time delivery of gage data as rapidly as possible given site constraints, infrastructure limitations, and schedules for major project upgrades and modifications. Besides using the GOES system to provide public access, PacifiCorp has a communications infrastructure in place to acquire real-time data from all bypass reach gages, thus helping maintain compliance with flow and ramping requirements.

Annual flow reporting by this protocol began with WY 2004.

4 OTHER GAGES (non bypass reach)

The SA, Section 401 Water Quality Certification, and Agreement with OWRD require additional gages not included in SA Section 5.5. These gages are typically governed by arrangements other than those stipulated in SA 5.5 and, in some cases, are subject to different standards of operation. These gage sites are listed here and in Table 2 to provide a more complete description of project-related streamgaging.

4.1 LONG-TERM GAGES

1. North Umpqua River above Copeland Creek USGS Gage No. 14316500 (as required by Settlement Agreement Section 6.4 for ramping compliance). PacifiCorp will continue to operate this gage for a full range of flows per USGS standards, including review and publication of flows by the USGS, and will provide public access to the real-time, provisional data via the USGS or PacifiCorp website. This published record will be provided within the same report and schedule as Section 2.5 of this plan, including a summary and explanation of flow and stage change events. PacifiCorp reserves the right to replace this gage with a different compliance gage closer to the hydroelectric project, upon approval of the agencies as allowed in SA 6.4.4, which states:

“6.4.4 Record of Stage Changes. PacifiCorp shall measure and record stage changes resulting from its operational regimes. These records will be made available to the agencies upon request. Measurements will be taken at USGS Gauge 14316500, located near Copeland Creek. If the Parties agree in writing, a different gauge location may serve as the compliance point for the Wild and Scenic River flows.”

2. Boulder Creek, USGS Gage No. 14316495. Per the FERC license Article 403, PacifiCorp will support the operation of this gage for a full range of flows per USGS standards, including review and publication of flows by the USGS, and will provide public access to the data via the USGS or PacifiCorp website. PacifiCorp notes that this tributary basin is a USDA-FS Wilderness Area, and is unaffected by project operations. PacifiCorp reserves the right to reduce or cease support of this gage if the establishment of a new compliance gage as described above renders this one unnecessary for compliance purposes, and with agency approval.
3. Lemolo Lake near Toketee Falls USGS Gage No. 14313000 (as required by Settlement Agreement Section 9.3, and to define the reservoir drafting period for SA Section 6.4). PacifiCorp will fund USGS review and publication of daily high and low reservoir water levels, to document compliance with daily drawdown limits and minimum pool elevations. This water level gage is required by SA section 9.3.3:
“9.3.3 Lemolo Reservoir Fluctuations. Commencing by the first anniversary of the New License, PacifiCorp will restrict water level fluctuations of Lemolo Reservoir due to drawdowns to not more than 0.5 feet per day measured at the staff gauge on the outlet structure of Lemolo Dam.”
4. Waterway gages on Lemolo 1, Lemolo 2, Clearwater 1, Clearwater 2, Toketee, Slide, Fish Creek and Soda Springs diversion canals and penstocks (as required by OWRD, and Section 401 Certification Conditions Section 3b). These gages are governed by agreement with OWRD to ensure compliance with water rights, and PacifiCorp will operate them per USGS standards for these types of special installations (canals and penstocks). Daily “snapshot” flows will be reported daily to OWRD (currently via a secure PacifiCorp ftp site: <ftp://nurflowr:NoU5+f10@ftp.pacificorp.com/>). Annual flow summaries will be provided to OWRD and ODEQ, per the water rights agreement and 401 Certification, Section 3b. This information may be combined with the Annual Report (Section 5). PacifiCorp will provide access to the same daily and annual flow information to the USFS, and other agencies signatory to this Plan upon request. OWRD may provide annual mean daily flow data to the public upon request.
5. PacifiCorp may also operate additional gaging sites within the river system to serve as natural flow indices and/or assist with operations and flow management. Such sites will be used to help characterize flow events as to the extent of natural causes versus project induced causes. Such sites are not directly related to compliance and are not governed by this plan.

4.2 SHORT-TERM GAGES

Several sections of the SA require studies related to flows or ramping that may require temporary installation of gages in other locations. For instance, a temporary staff gage or water level recorder may be useful in the Slide Creek full-flow reach to monitor aquatic impacts per studies referenced in SA Sections 6.2 and 8.2. Such temporary monitoring and gaging needs, will be determined on a case-by-case basis in the course of developing study plans in consultation with the relevant agencies, and will not be governed by this plan.

5 REPORTING FLOW AND RAMPING EVENTS

5.1 EXCURSIONS FROM FLOW AND RAMPING RESTRICTIONS

Oftentimes, extreme flow conditions are experienced on the North Umpqua River due to naturally occurring events. High levels of precipitation, rapid snow melt, or both can bring about rapidly changing conditions exclusive of project operations. As might be expected, flows in various North Umpqua bypass reaches can vary considerably in response to such a natural event. Such conditions are well beyond the capability of project operations to make any meaningful impact. Since the definition of "ramping" is based on project operations, natural events that cause severe flow changes in bypasses do not meet this criteria, and are therefore not subject to being reported as "ramping events". However, events caused entirely or largely by project operations will be evaluated against compliance thresholds and reported as described below.

When flows at gage sites are discovered to be less than required minimum flows, or ramping occurs that exceeds the compliance limits, project personnel will correct these conditions as rapidly and prudently as possible. All such events will be captured in the Annual Report, but Event Reports will be limited to those events that are likely to result in resource damage and consequently warrant agency notification.

5.1.1 Event Reporting

The purpose of event reporting is to alert the agencies of events capable of causing resource damage as rapidly as possible so they can respond if necessary. These events will be reported to the OWRD, ODEQ, USDA-FS, and ODFW within five business days, with a target of reporting within one business day and as soon as the relevant facts are known. Event reports will be distributed via email or phone, and will describe the location, time, duration, magnitude, and cause of the event; what immediate corrective actions were taken; and any long-term plans to prevent repetition (Appendix F). These event reports will be based on provisional data, and will not necessarily equate to a lack of compliance or FERC violation. Comprehensive reports may be requested by the agencies in individual circumstances.

Thresholds triggering Event Reports are:

Bypass reaches:

- Any unit flow value flow <50% of the minimum instream flow requirement;
- Any unit stage value >1 ft different from the previous unit value (large stage increase or decrease).

N. Umpqua River downstream of Soda Springs powerhouse:

- If the range of any consecutive 5 unit values (75 minutes) differs by more than 1.0 ft.

5.1.2 Annual Reporting

Annual reports serve as a long-term record of compliance, where the entire official WY record is analyzed against compliance thresholds in relation to other basin-wide events. Methods for calculating compliance with minimum flow, ramping, and drawdown thresholds are detailed in Appendix E. For each WY, the Annual Report will include a WY summary (Appendix G) and for each gage station will include a Station Analysis and summary table and figure of top-of-hour average values (Appendix H) and comparison with pertinent compliance thresholds.

The following events will be summarized within Annual Reports, relative to the thresholds set forth in the referenced agreements:

Bypass reaches (per SA Sections 5 and 6, 401 Certification):

- Average hourly (top-of-hour) flow less than the minimum instream flow requirement;
- Average hourly (top-of-hour) stage change greater than the effective ramping limits.
- For reporting purposes, a practical threshold of 0.2 feet/hour will be used as a threshold for evaluating events related to the “eliminate all ramping” restriction. This does not substitute for ramping limits as defined in the SA for planned ramping.

N. Umpqua River downstream of Soda Springs powerhouse (per SA section 6):

- Average hourly (top-of-hour) stage change greater than the effective ramping limits.

Lemolo Lake (per SA section 9.3 and 17.12, and the Lemolo Reservoir Management Plan):

- Daily average water level that exceeds the drawdown limit (>0.5 ft/day);
- Water level lower than the specified seasonal limit.

Overall reporting requirements are summarized for all gage sites in Table 2.

5.2 PLANNED HIGH FLOW EVENTS FOR PROJECT MAINTENANCE

Some maintenance activities require dewatering a waterway and commensurately increasing flow in the adjacent bypass reach. PacifiCorp will notify the agencies at least two weeks in advance of such planned flow changes per SA section 9.5. PacifiCorp will also provide public access to planned maintenance schedules on its website. It must be recognized that maintenance plans frequently change, even within 2 weeks of planning, due to various factors including availability of parts and personnel, conflict with other activities, and response to natural and unforeseen events. Consequently, PacifiCorp cannot guarantee that flow changes will occur as planned. Conversely, emergency events (e.g. a canal break) may require dewatering waterways with no advance notice.

Ramping limits for maintenance events are outlined in section 6.6d of the Settlement Agreement. Events which exceed these limits will be reported as described above.

Table 2. Gage sites operated by PacifiCorp that are related to flow and ramping compliance on the North Umpqua Hydroelectric Project

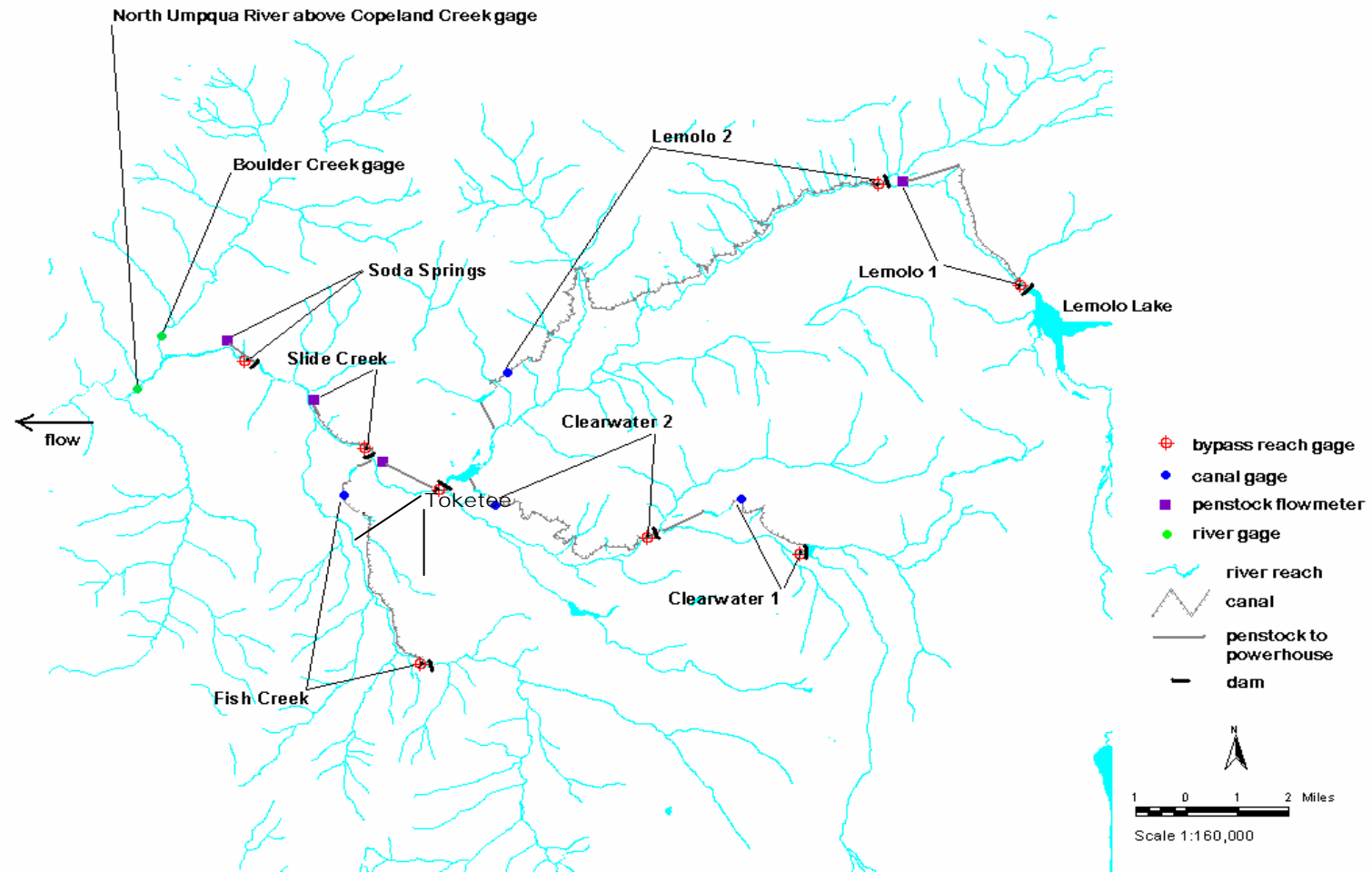
Reach type	Site name	Existing USGS gage number*	New site install date	Data published annually by USGS (Yes/No)	Data reported annually to	Provisional data available to agencies	Provisional data available to the public	Required by**	Primary purpose	Notes
Bypass Reaches (recording compliance gages are near upstream ends of reaches)										
	Lemolo 1 (old site)	14313500	see below	Only for rating new site	NA	Via USGS	Via USGS	NA	Use cableway to measure high flows for new gage site	After WY 04, maintain cableway only at this site; abandon rest in favor of new site
	Lemolo 1	14313200	Nov. 2003	Yes	OWRD, ODEQ, USDA-FS	Via OWRD and website	Via USGS website	SA 5.5, 6.6; 401	instream flows, ramping	Use cableway (old USGS site) for high flows
	Lemolo 2	14313700	Nov. 2002	Yes	OWRD, ODEQ, USDA-FS	Via OWRD and website	Via USGS website	SA 5.5, 6.6; 401	instream flows, ramping	
	Toketee	14315500	Nov 2002	Yes	OWRD, ODEQ, USDA-FS	Via OWRD and website	Via USGS website	SA 5.5, 6.6; 401	instream flows, ramping	
	Slide Creek	14315700	Nov 2002	Yes	OWRD, ODEQ, USDA-FS	Via OWRD and website	Via USGS website	SA 5.5, 6.6; 401	instream flows, ramping	
	Soda Springs	14316455	Nov 2002	Yes	OWRD, ODEQ, USDA-FS	Via OWRD and website	Via USGS website	SA 5.5, 6.6; 401	instream flows, ramping	Cableway may be installed during WY2008
	Clearwater 1	14314500	None needed	Yes	OWRD, ODEQ, USDA-FS	Via OWRD and website	Via USGS website	SA 5.5, 6.6; 401	instream flows, ramping	Wadeable at high flows
	Clearwater 2	14314700	Nov 2002	Yes	OWRD, ODEQ, USDA-FS	Via OWRD and website	Via USGS website	SA 5.5, 6.6; 401	instream flows, ramping	
	Fish Creek (old site)	14316000	see below	Yes	NA	Via USGS	Via USGS website	NA	One year of data overlap with new site	PacifiCorp funds thru WY 2004 only; then abandon in favor of new site
	Fish Creek	14315950	Nov	Yes	OWRD, ODEQ,	Via OWRD	Via USGS	SA 5.5,	instream	

Reach type	Site name	Existing USGS gage number*	New site install date	Data published annually by USGS (Yes/No)	Data reported annually to	Provisional data available to agencies	Provisional data available to the public	Required by**	Primary purpose	Notes
			2002		USDA-FS	and website	website	6.6; 401	flows, ramping	
Undiverted Reaches										
	N. Umpqua above Copeland Cr.	14316500	no	Yes	OWRD, ODEQ, ODFW, USDA-FS	Via USGS	via USGS website	SA 6.4	ramping, flow	
	Boulder Cr.	14316495	no	yes	USDA-FS	Via USGS	via USGS website	FERC License Article 403	subtract natural flows from project-induced	watershed is unaffected by NUHP, possible cost-share
	Lemolo Lake	14313000	no	yes	ODFW, USDA-USFS	Via PacifiCorp	Via USGS website	SA 6.4, 9.3	storage, ramping, recreation	
Diversion Canals/Penstocks (recording compliance gages are near downstream ends of waterways)										
	Lemolo 1 (penstock)	NA	2001	no	OWRD, ODEQ	Via OWRD	no	OWRD, 401	water rights	Also staff gage at upstream end of canal
	Lemolo 2 (canal)	NA	2001	no	OWRD, ODEQ	Via OWRD	no	OWRD, 401	water rights	Also staff gage at upstream end of canal
	Toketee (penstocks)	NA	2001	no	OWRD, ODEQ	Via OWRD	no	OWRD, 401	water rights	
	Slide Creek (penstock)	NA	2001	no	OWRD, ODEQ	Via OWRD	no	OWRD, 401	water rights	
	Soda Springs (penstock)	NA	2001	no	OWRD, ODEQ	Via OWRD	no	OWRD, 401	water rights	
	Clearwater 1 (canal)	NA	2001	no	OWRD, ODEQ	Via OWRD	no	OWRD, 401	water rights	Also staff gage at upstream end of canal
	Clearwater 2 (canal)	NA	2001	no	OWRD, ODEQ	Via OWRD	no	OWRD, 401	water rights	Also staff gage at upstream end of canal
	Fish Creek (canal)	NA	2001	no	OWRD, ODEQ	Via OWRD	no	OWRD, 401	water rights	Also staff gage at upstream end of canal

* NA = not applicable; ** SA = Settlement Agreement, 401 = Clean Water Act 401 Water Quality Certification

APPENDIX A

GAGE LOCATION MAP



APPENDIX B

FUTURE INSTREAM FLOW REQUIREMENTS FOR BYPASS REACHES

Current and future minimum instream flows for bypass reaches of the North Umpqua Hydroelectric Project required by the Settlement Agreement and/or the 401 Water Quality Certification (revised June 2005).

Reach:	Lemolo 1	Lemolo 2	Clearwater 1	Clearwater 2	Toketee	Slide Creek		Fish Creek		Soda Springs	Deer Creek
Start Date:	12/31/05	12/31/05	12/31/05	12/31/05	12/31/05	12/31/05	10/18/12	12/31/05	10/18/12	9/1/05	10/18/06
January	50	50	40	40	60	50	240	50	130	275	all*
February	50	50	40	40	60	50	240	50	130	275	all*
March	50	50	40	40	60	50	240	50	130	275	all*
April	60	60	60	60	60	50	240	50	130	275	all*
May	70	70	60	60	60	80*	240*	50*	130*	275	all*
June	80	70	60	60	80	80*	240*	80*	130*	275	all*
July	80	80	40	40	80	80*	240*	80*	130*	275	all*
August	80	80	40	40	80	80*	240*	80*	130*	275	all*
September	80	80	40	40	80	80*	240*	80*	130*	275	all*
October	80	80	40	40	80	80	240	80	130	275	all*
November	50	50	40	40	60	50	240	50	130	275	all*
December	50	50	40	40	60	50	240	50	130	275	all*

* required by 401 WQ Certification

APPENDIX C

SETTLEMENT AGREEMENT TEXT RELATED TO FLOW AND RAMPING REQUIREMENTS (EMBEDDED REFERENCES REFER TO THE SA, NOT THIS PLAN)

SECTION 5
SECTIONS 6.4-6.9
SECTION 9.3
SECTION 17.12

SECTION 5. IN-STREAM FLOWS FOR FISH AND OTHER AQUATIC SPECIES

5.1 In-Stream Flow Implementation. PacifiCorp shall implement the minimum in-stream flow regimes for the North Umpqua River reaches as set forth in **Tables 1 and 2** in attached **Appendix C**. PacifiCorp shall implement **Table 1** flows by the first anniversary of the New License or by 2005, whichever is earlier. PacifiCorp shall implement **Table 2** flows

by the seventh anniversary of the New License. PacifiCorp shall implement **Table 1** flows for Soda Springs bypass reach in 2003, upon completion of the Soda Springs bypass alluvial restoration project in accordance with Section 8.3 of this Agreement.

5.2 In-Stream Flow Reevaluation. Results from the USDA-FS's Spatial Niche Analysis pertaining to the Clearwater 2 bypass reach will be reevaluated prior to implementation of flows listed in **Appendix C, Tables 1 and 2**. PacifiCorp, USDA-FS, USFWS, and ODFW shall agree on a draft study plan to reevaluate the results of the USDA-FS's Spatial Niche Analysis for the identified reach and will provide the study plan to FERC for consideration in its NEPA process. The agencies shall approve a final study plan before implementation of the plan.

5.3 Modifications to In-Stream Flows. Prior to the New License becoming final or by 2004, whichever is earlier, the Parties shall reconsider in-stream flows and may make adjustments to **Appendix C, Tables 1 and 2**. In the event PacifiCorp, USDA-FS, ODFW, and USFWS agree in writing to modifications in in-stream flow levels for the Clearwater 2 bypass reach contained in **Appendix C, Tables 1 and 2**, such modifications will become effective in lieu of in-stream flow levels previously contained in these tables.

5.4 Lemolo 2 Reach. PacifiCorp shall reroute the discharge from Lemolo 2 powerhouse to Toketee Reservoir by the sixth anniversary of the New License. The Lemolo 2 full-flow reach will then become an extension of the Lemolo 2 bypass reach. The in-stream flow regime in the newly extended bypass reach will be the in-stream flow regime identified for Lemolo 2 bypass reach on **Appendix C, Tables 1 and 2**. The flow regime identified in **Appendix C, Tables 1 and 2** for the Lemolo 2 bypass reach is in addition to natural accretion flows and flows from newly reconnected tributaries.

5.5 In-Stream Flow Monitoring. PacifiCorp shall install and maintain gauge stations by the date the New License becomes final or by 2002, whichever occurs earliest, at the head of the bypass reaches or elsewhere as required by OWRD to monitor compliance with the in-stream flow regimes identified in **Appendix C, Tables 1 and 2**. The installation of the gauge stations and the data acquisition shall conform to applicable United States Geological Survey ("USGS") standards in existence upon the Effective Date. PacifiCorp shall develop, in consultation with USDA-FS, NMFS, USFWS, ODFW, ODEQ, and OWRD, a coordinated gauge installation and data reporting plan. The agencies shall review and approve the plan prior to installation of gauge stations.

5.6 ODFW Holding Ponds. PacifiCorp shall continue to divert up to eight cubic feet per second (cfs) from the Soda Springs penstock tap for use by the ODFW salmon-holding ponds adjacent to the Soda Springs bypass reach for the duration of the New License while the holding ponds are in use.

5.7 Fish Passage. In-stream flows contained in **Appendix C, Tables 1 and 2** for Soda Springs, Fish Creek, and Lemolo 2 bypass reaches include flows necessary for proper operation and maintenance of fish passage facilities at the respective dams. No additional in-stream flows shall be required for these purposes.

5.8 Soda Springs Dam. PacifiCorp shall design the fish passage facilities at Soda Springs Dam such that flows

discharging from fish passage facilities enter the Soda Springs bypass reach upstream of the restored alluvial reach.

5.9 Toketee Bypass Reach. PacifiCorp shall use flows from the Clearwater 2 bypass reach that are flowing from the Clearwater River through the new reconnection constructed in accordance with Section 10.3 of this Agreement to supplement the in-stream flow regime for the Toketee bypass reach identified in **Appendix C, Tables 1 and 2.**

6.4 Wild and Scenic River Reach Below Soda Springs Powerhouse. PacifiCorp shall implement the following measures relating to the Wild and Scenic River reach below Soda Springs powerhouse upon submission of this Agreement to FERC. All flow measurements shall be as measured at the gauge described in Section 6.4.4 below.

6.4.1 Flows Below 1,600 cfs. At flows below 1,600 cfs, PacifiCorp shall operate the Project in such a way as to prevent ramping in the Wild and Scenic River reach, unless studies described under Section 6.4.3 below show that a proposed additional fluctuation would not adversely affect aquatic resources. Such ramping limitations are subject to a 5 percent or less variation in base flow which is attributable to equipment limitations at Soda Springs powerhouse. The potential resource impacts of such variation will be evaluated as part of the studies described in Section 6.4.3 below.

6.4.2 Flows Above 1,600 cfs. At flows above 1,600 cfs, and up to a point where natural flow results in spilling at Soda Springs Dam, PacifiCorp shall limit ramping in the Wild and Scenic River reach to 0.1 foot per hour and 6 inches per day, unless studies described in Section 6.4.3 below show that a proposed additional fluctuation would not adversely affect aquatic resources.

6.4.3 Ramping Study. PacifiCorp shall complete a draft study plan for evaluating whether agency resource goals for the Wild and Scenic River reach can be achieved under a more flexible ramping regime, for review by technical representatives of ODFW, ODEQ, BLM, USDA-FS, NMFS, and USFWS, by July 6, 2001 and shall send a copy to Oregon Parks and Recreation Department for its information and comment. Technical representatives of the Parties will review and provide comments on the draft study plan by July 20, 2001. Technical representatives will finalize the study plan by August 2001 and will provide the study plan to FERC. ODEQ, ODFW, BLM, USDA-FS, NMFS, and USFWS shall agree in writing on the study results and recommendations prior to any deviation from the operational regime identified in Sections 6.4.1 and 6.4.2 above. No changes to such operational regime shall be implemented without the express written consent of all Parties. If changes to this operational regime are implemented, PacifiCorp shall consult with the agencies annually to ensure that identified resource goals are met. If the agencies determine that such goals are not being met, the Project will revert to the operational regime identified in Sections 6.4.1 and 6.4.2 above until such time as the agencies agree to an alternative.

6.4.4 Record of Stage Changes. PacifiCorp shall measure and record stage changes resulting from its operational regimes. These records will be made available to the agencies upon request. Measurements will be taken at USGS Gauge 14316500, located near Copeland Creek. If the Parties agree in writing, a different gauge location may serve as the compliance point for the Wild and Scenic River flows.

6.4.5 Management of Natural Flow Events and Lemolo Draft or Refill. To follow anticipated natural flow events in the watershed when Soda Springs Dam is not spilling water, PacifiCorp shall use all reasonable efforts to limit flow changes in the Wild and Scenic River reach below Soda Springs powerhouse to 5 percent change per hour from then current base conditions, with a goal not to exceed 0.1 feet per hour, as many times a day as necessary to follow the anticipated natural flow event. During draft or refill of Lemolo 2 *[sic]* Reservoir, as provided in Section 9.3 below, PacifiCorp shall use all reasonable efforts to limit flow changes in the Wild and Scenic River reach below Soda Springs powerhouse to 5 percent change per day from then current base flows, but shall not exceed 0.1 feet per day.

6.5 Ramping in Bypass Reaches. Commencing on the Effective Date and continuing until the first anniversary of the New License, PacifiCorp shall make all reasonable efforts, with existing project facilities and operation capabilities, to limit ramping in the Soda Springs bypass reach to a target of 0.2 feet per hour and in all other bypass reaches to a target of 0.5 feet per hour. PacifiCorp shall also consider a ramp rate of 0.2 feet per hour in the bypass reaches other than Soda Springs, subject to existing project facilities and operation capabilities, between June and October, for added protection of rainbow fry. If the ramping limitation is exceeded, PacifiCorp shall provide a written explanation for the variance to USDA-FS, NMFS, USFWS, and ODFW. After the first anniversary of the New License, PacifiCorp shall eliminate all ramping in the eight bypass reaches, except during planned Project maintenance and emergency shutdowns. In the event the Lemolo 2 waterway is dewatered, ramping restrictions for Deer Creek shall be in accordance with Section 6.6.d below commencing by the first anniversary of the New License. PacifiCorp shall make all reasonable efforts to schedule maintenance activities within the preferred periods identified in Appendix D to this Agreement.

6.6 Project Maintenance. Commencing no later than the first anniversary of the New License, during planned

Project maintenance, PacifiCorp shall minimize impacts in bypass reaches by:

- a. Taking into consideration the time of year and length of shutdown;
- b. Planning Project maintenance using the guidelines in **Appendix D** to this Agreement so that resulting high flows will, as much as is feasible, coincide with the high-flow period of the natural hydrograph, with priority given to performing maintenance on Lemolo 2 to coincide with the high-flow period for Lemolo 2 bypass reach;
- c. Planning Project maintenance so as to prevent water-quality standard violations;
- d. Adhering to the following ramping regime:
 - i. If salmon fry less than or equal to 60 mm in length are present (approximately March 1 through June 30), no ramping shall occur during daylight hours (one hour before sunrise to one hour after sunset) and ramping shall not exceed 0.2 feet per hour during night hours.
 - ii. If salmon fry are not present, but fry of resident trout or steelhead are present (approximately May 1 through August 31 for steelhead and June 1 through September 30 for trout), ramping shall not exceed 0.2 feet per hour during daylight hours and 0.2 feet per hour during night hours.
 - iii. If neither fry of salmon, resident trout, or steelhead are present (approximately October 1 through February 28), down-ramping shall not exceed 0.2 feet per hour and up-ramping shall not exceed 0.5 feet per hour.
- e. The ramping regime outlined in Section 6.6.d above will be monitored through the gauging plan required under Section 5.5 above and may be modified upon written agreement by PacifiCorp, ODFW, NMFS, ODEQ, USFWS, and USDA-FS.

6.7 Restrictions on Flow Fluctuations Set for Emergency Shutdowns. Commencing on the first anniversary of the New License, in the event of emergency shutdowns, PacifiCorp shall adhere to the ramping restrictions identified in Section 6.6.d above to the extent possible in view of potential risks to employee safety and environmental risks such as

dewatering the Wild and Scenic River reach and creating erosion problems from canal overspill. This ramping regime may be temporarily modified, however, if required by operating emergencies beyond the control of PacifiCorp, and for short periods upon agreement among PacifiCorp, ODFW, ODEQ, USFWS, USDA-FS, and NMFS.

6.8 Emergency Bypass Valves. PacifiCorp shall ensure that ramping criteria established in accordance with Section 6.4 above for the Wild and Scenic River reach are maintained during emergency shutdowns. PacifiCorp shall implement necessary measures to achieve this requirement, including, but not limited to, installing a new bypass valve or improving the existing bypass valve at the Soda Springs powerhouse by the date the New License becomes final or 2004, whichever is earlier.

6.9 Slide Creek Bypass Valve. Upon the first anniversary of the New License, PacifiCorp shall evaluate, in consultation with the Parties, whether the current bypass flow configuration at Slide Creek powerhouse is sufficient to prevent adverse impacts to aquatic resources during emergency shutdowns. The Parties will determine, based upon the results

of this evaluation, whether additional measures are warranted at Slide Creek powerhouse to prevent potential adverse impacts during emergency shutdowns. If adverse impacts are occurring, PacifiCorp shall install a new emergency bypass valve at Slide Creek powerhouse, or other Project facilities modifications that PacifiCorp may propose that would equally mitigate the adverse effects.

9.3 Management of Lemolo Reservoir. Commencing on the Effective Date and continuing until the New License becomes final, PacifiCorp shall maintain Lemolo Lake elevation at or near full pool between Memorial Day and Labor Day, except during energy emergencies as provided in this Section 9.3. PacifiCorp may draw Lemolo Lake down by up to 3.5 feet from full pool, which is defined to be at an elevation of 4,148.5 feet, during the period from Memorial Day to Labor Day. PacifiCorp shall make reasonable efforts to allow boater access to the lake by the fourth Saturday in April each year before the New License becomes final, to coincide with the opening of fishing season. PacifiCorp shall make reasonable efforts to limit total annual drawdown of Lemolo Lake to 25 feet below an approximate elevation of 4,148.5 feet, to a maximum drawdown elevation of 4,123.5 feet after Labor Day and before the next Memorial Day. PacifiCorp shall consult with ODFW, ODEQ, and other interested Parties to determine appropriate augmentation of base flows below Soda Springs powerhouse (as measured at Copeland Gauge) for spawning Chinook salmon.

Notwithstanding the above limitations, commencing on the Effective Date and continuing until the New License becomes final, PacifiCorp may draw Lemolo Lake down to approximately 4,142 feet elevation between Memorial Day and Labor Day during any regional energy Alert 2 applicable to the state of Oregon, as declared by the system coordinator of the Northwest Power Pool. The term "Alert 2" is defined in the North American Electric Reliability Council's Compliance and Enforcement Program, Operating Policy and Standards Status, Appendix 9B—Energy

Emergency Alerts. During such alerts, PacifiCorp shall consult with ODFW, ODEQ, and USDA-FS prior to drawing down Lemolo Lake to discuss actions that minimize adverse impacts to resources, and PacifiCorp shall implement such actions as are feasible while responding to the Alert 2.

Commencing upon the New License becoming final, and thereafter during the term of the New License, except as provided in Section 9.3.1.1 below, PacifiCorp shall limit annual drawdown of Lemolo Reservoir to 25 feet below an approximate elevation of 4,148.5 feet, to a maximum drawdown elevation of 4,123.5 feet. PacifiCorp shall have the right to establish

the timing and quantity of water discharged during the first 10 feet of drawdown, subject to daily fluctuation limits set forth in Section 9.3.3 below.

9.3.1 ODFW and USDA-FS Management. ODFW and USDA-FS will jointly manage drawdowns from 10 to 25 feet, provided that Lemolo Reservoir shall be drawn down at least 25 feet by December 31 each year (to an elevation of 4,123.5 feet). ODFW and USDA-FS may permit PacifiCorp to draw down Lemolo Reservoir by greater than 25 feet, in consultation with the other Governmental Parties, to meet ODFW and Umpqua National Forest Plan objectives related to the factors in Section 9.3.1.1 below.

9.3.1.1 Management Plan. ODFW and USDA-FS, in consultation with the other Parties, shall develop an annual or multiyear joint management plan to govern drawdowns of Lemolo Reservoir between 10 and 25 feet, in consultation with the other Parties. The following factors may be considered as potential limitations on PacifiCorp's ability to draw down the reservoir for power production purposes:

- a. Wild and Scenic River values, including stable flows for anadromous fish and anadromous fish habitat.
- b. Fisheries production in Lemolo Reservoir.
- c. Consistency with the following fish management plans:
 - i. Lemolo Reservoir Fish Management Plan
 - ii. North Umpqua River Fish Management Plan (below Soda Springs Dam)
 - iii. Oregon Plan
 - iv. Statewide Trout Plan
 - v. Any future fish management plans (*e.g.*, above Soda Springs Dam).
- d. Recreation at Lemolo Reservoir.
- e. Meeting ACS objectives.
- f. Meeting water quality standards.

9.3.1.2 Response to Request for Drawdown. PacifiCorp shall contact ODFW with any request for drawdown of Lemolo Reservoir between 10 and 25 feet. If the request is within the parameters of the management plan developed under Section 9.3.1.1, ODFW may approve the request without consulting with USDA-FS. If the request is not within the parameters of the management plan, the ODFW regional director and Umpqua National Forest Supervisor shall consult. If they cannot agree, the dispute will be resolved consistent with the mechanism defined in the Memorandum of Understanding that both agencies have signed dated July 1, 1985.

9.3.2 Lemolo Boat Ramp. Commencing on the Effective Date, PacifiCorp will ensure that the Lemolo Reservoir boat ramp is accessible by opening day of fishing season (the fourth Saturday in April), barring any unusual natural hydrological events.

9.3.3 Lemolo Reservoir Fluctuations. Commencing by the first anniversary of the New License, PacifiCorp will restrict water level fluctuations of Lemolo Reservoir due to drawdowns to not more than 0.5 feet per day measured at the staff gauge on the outlet structure of Lemolo Dam.

17.12 Reservoir Elevation. Except as provided in Section 9.3, PacifiCorp shall maintain Lemolo Lake at or near full pool (elevation 4,148.5 feet) throughout the peak recreation season of Memorial Day through Labor Day.

End of Appendix C

APPENDIX D

Chronology of Meetings, Reviews, and Actions

Date	Action (TWG = interagency technical work group)
May 6, 2002	PacifiCorp's "first draft" gaging plan distributed to agencies
May 9, 2002	site inspections pre-construction
October 7, 2002	site inspections pre-construction
Fall 2002	construction completed on all bypass reach gage sites
January 27, 2003	PacifiCorp's "Final Draft Version" of gaging plan distributed to agencies
February 19, 2003	TWG meeting
March 11, 2003	TWG meeting
April 15, 2003	site inspections
April 16, 2003	"TWG Draft" gaging plan distributed to TWG
June 6, 2003	Lemolo 1 bypass reach gage relocation inspection
June 23, 2003	agency comment letter and "Agency Draft" gaging plan distributed
August 7, 2003	USFS / PacifiCorp consultation
September 16, 2003	TWG meeting (matrix table discussion)
October 17, 2003	TWG conference call
October 28, 2003	TWG meeting
November 5, 2003	Revised "TWG Draft" gaging plan distributed to TWG
November 2003	construction completed on relocated Lemolo 1 gage site
November 24, 2003	TWG conference call
December 1, 2003	TWG meeting
December 7, 2003	"TWG Final" gage plan distributed
January 6, 2004	TWG conference call
January 28, 2004	Revised "TWG final" gage plan distributed
February 25, 2004	TWG/Agency meeting, final revisions and approval signatures
August 2004	FERC approves original Flow Monitoring Plan (FMP), Soda Springs bypass gage relocated
2005	Several TWG meetings, bypass gage sites telemetered for public access, flows increased in all bypass reaches per SA by end of year
September 6, 2006	TWG review of draft WY 04, 05 annual reports
March 27, 2007	TWG review and approval of WY 04, 05 Annual Report content and format
July 3, 2007	TWG meeting to review AHTAS status and calculation methods
November 2, 2007	TWG/Agency meeting, review and approve revisions to FMP
November 29, 2007	RCC approves revised FMP dated November 2007

APPENDIX E**METHODS FOR CALCULATING MINIMUM FLOW AND STAGE CHANGE EVENTS**

Minimum flow and ramping events in the bypass reaches shall be calculated based on top-of-hour hourly average flows from provisional data. Although the requirement for each bypass is no ramping, a reporting threshold of 0.2 feet per hour will be used as a practical implementation of this language. For scheduled maintenance events where agencies are notified in advance, the reporting thresholds shall be as defined in Section 6.6d of the SA. Minimum flows shall also be based on hourly average calculations.

Calculations shall be as follows:

- Determine average hourly flow for hour one.
- Determine average hourly flow for hour two.
- Obtain the difference of the two average hourly flows.
- Verify that difference is below compliance level for ramping.
- Repeat for all hours continuously.
- Average hourly flow is based on four 15 minute readings, occurring at 15, 30 ,45 and 60 minute recording intervals for in-stream gages, for each hour (Top of Hour Averaging). For example, flow in the 1100 hour is calculated by taking the average of the readings at 1015, 1030, 1045 and 1100 hour..
- Compliance for minimum flow is based on the same top-of-hour average calculation.
- Flow calculations within the Wild & Scenic reach will employ the same top-of-hour calculation method. See further explanation for this reach below.

Time	Discharge	Hour	Hourly Average Discharge
10:15	1000		
10:30	1000		
10:45	1002		
11:00	1002	11:00	1001
11:15	1004		
11:30	1004		
11:45	1006		
12:00	1006	12:00	1005

Wild and Scenic Reach – North Umpqua River above Copeland Creek

Tier I Calculation Method and Flow Event Designation

As long as the 24-hour average discharge and present hourly average discharge remains below 1600 cfs, Tier I conditions apply to assess compliance. Hourly average flow is used to calculate the average flow during every running 24-hour period. Percent flow variation is determined by dividing the present hourly average value by the average flow over the immediately previous 24-hour period. An example is shown below:

Date/Time Period	Hourly Average Discharge	24-hour Average Discharge	Percent Difference in Flow
Dec 15, 000 hours – 2300 hours		1000	
Dec 16, 000 hours	1100		+10
Jan 1, 000 hours – 2300 hours		1005	
Jan 2, 000 hours	1000		-0.5

Any hourly period for which the difference in the present hourly average flow exceeds 5% of the previous 24-hour average constitutes a flow event, listed as percent positive for flow increase or percent negative for flow decrease. In the example above, the +10% change in flow on Dec 16, 000 hours would constitute a flow event.

Tier II Calculation Method and Flow Event Designation

As long as the present hourly average discharge remains above 1599 cfs and the Soda Springs project is not spilling, Tier II conditions apply to assess hourly compliance. The difference in adjacent top of the hour, hourly average gage height values is calculated to determine whether hourly stage changes are within the 0.1 ft/hr compliance limit.

Tier III Calculation Method and Flow Event Designation

As long as the 24-hour average discharge and present hourly average discharge remain above 1599 cfs and the Soda Springs project is not spilling, Tier III conditions apply to assess daily compliance. The present hourly average gage height value is compared with the *maximum* and *minimum* values over the previous 24 hours. If the difference between the present value and either the maximum or minimum exceeds the 0.50 ft/day limit, a stage change event is listed.

Lemolo Lake Drawdown Rate

Average hourly water surface elevation (WSE) is computed by averaging the four 15-minute unit values for the top of each hour (as with stream gages). Average DAILY WSE is the average of these hourly averages for each 24-hour period ending at 2400 hours for that calendar day. Daily drawdown rate is the average DAILY WSE for the day in question minus the average DAILY WSE for the previous day. Consequently, the maximum and minimum WSE within each day may differ by more than 0.5 ft.

APPENDIX F

SAMPLE COMPLIANCE EVENT NOTIFICATION

North Umpqua Hydroelectric Project
Compliance Incident Report
Reporting Date: 7-20-07

Contacts:

Rich Grost (NUHP aquatics) – 541-498-2617, rich.grost@pacificorp.com

Diane Barr (NU-Environmental Analyst) – 541- 776-5433, Diane.Barr@PacifiCorp.com

Note: this report does not necessarily indicate a FERC compliance violation.

REPORTED BY:	R. Grost
DATE + TIME OF INCIDENT	7/19/07
INCIDENT LOCATION(S)	North Umpqua River, Slide Creek bypass reach
INCIDENT TYPE (circle or highlight those that apply)	Minimum Streamflow / Ramping / Water Right; Emergency Shutdown / Erosion / Water Quality / Accident / Other
MAGNITUDE (e.g. lowest flow, or highest ramp rate recorded)	Average hourly stage change increased faster than 0.2 ft hr; maximum stage increase was 0.34 ft/hr
DURATION (How long did the incident occur before correction?)	Several minutes
INCIDENT DESCRIPTION <ul style="list-style-type: none"> • what happened? • cause • contributing factors (e.g. weather) • unusual occurrences before incident • immediate actions taken • long-term corrections • damage + injuries • other relevant information 	<p>The new instream flow gate and system at Slide Creek diversion dam was tested and put into service this week, and had functioned well until this event. Between 2015 and 2030 hours, the gate unexpectedly went full open and allowed flow to increase from 97 cfs to 240 cfs, and stage to increase more than 0.2 ft. The cause appears to be a mechanical malfunction of the gate operating system. Operators recognized the problem and gradually ramped flows back down over several hours, staying within 0.2 ft/hr.</p> <p>The new gate is being taken out of service pending investigation and correction of the gate malfunction.</p>
IMAGES ATTACHED?	No
ADDITIONAL COMMENTS	This report is based on provisional data.

APPENDIX G

SAMPLE ANNUAL REPORT SUMMARY

**North Umpqua Hydroelectric Project
Flow Monitoring Annual Report Summary**

WY 2005 (Oct 1, 2004 --Sep 30, 2005)

**Authors: R. Grost, R Owre, R. Reynolds; PacifiCorp
Submitted xx/xx/xx**

This report and attached files supplement previously available provisional records and published USGS records to describe flows recorded at PacifiCorp's stream gages related to flow and ramping compliance for the water year, per the Flow Monitoring Plan (February 2004). This includes gages in river reaches and canals, and flowmeters on penstocks. Gages in river reaches are used to monitor compliance with minimum flows and ramp rates. Gages in canals and flowmeters in penstocks are used to monitor compliance with water rights.

Excel files for each gage site include unit values, average hourly values, and annual summaries of average hourly flow and stage relative to applicable limits. Events during which limits were not met are listed and categorized as to cause. In some cases, indicated by "alternative" in the file name, these records differ from those published by USGS because PacifiCorp used additional information and/or applied additional analyses to complete the record, in cooperation with USGS.

This summary describes overall changes to the gage system, peak natural flow events, major project events, compliance analysis methods, and applicable flow and ramping limits. An event summary lists the number of events for which flow and ramping limits were not met.

Gage System

During this period, most gages were maintained by PacifiCorp and operated by USGS (ratings, field checks, surveys, data management). USGS managed all aspects of the Copeland and Boulder Creek gages. System upgrades included adding satellite transmission capability to all bypass reach gages such that they became publicly accessible via the USGS website, generally with a 1-hour lag time.

Peak Natural Flow Events

The highest flows of this period at most sites generally occurred during a winter storm on Dec 8-10, 2004. Flows changed rapidly at many projects during this period, and possibly during other storms, due to natural flow changes and storm-related issues.

Major Project Events

An emergency shutdown of most powerhouses occurred August 25, 2005 as a result of an equipment failure at Slide powerhouse. Slide powerhouse was shutdown for an extended period as a result of this event.

Compliance Analysis Methods

Compliance is evaluated based on averaging unit values within each hour, per the Flow Monitoring Plan. In most cases compliance was based on differences between hourly average values (stage or flow), although a running 24-hour period applied to some compliance calculations (e.g. Wild and Scenic reach). Calculations are detailed in Appendix 1.

For days when compliance limits were not met during one or more hours, these events were described in terms of magnitude and duration. Events were then reviewed to explain the influences that caused them. First, events were compared with provisional data to determine whether compliance was actually achieved based on the best available information available at the time of the event. Next, USGS records from unmanaged rivers and NRCS and NOAA records from weather stations were reviewed to determine if events were within the range of expected flow or stage changes due to natural influences (rain, snowmelt, freezing, etc.). If natural influences failed to adequately explain the event, project information such as operation logs, operations data, and discussions with staff were used to determine any influence of the hydro project. Based on these reviews, events were classified as:

- E -- emergency events or equipment failure (e.g. powerhouse trips, gate problems);
- N -- natural influences (rain, storms, freezing, etc.);
- R -- ramping related to planned operations or maintenance;
- P -- in compliance with provisional data, but not retroactively adjusted data;
- U -- unknown - no discernable explanation.

In some cases a combination of categories was applicable. Categorization is based largely on the professional judgment of PacifiCorp hydrology staff. Improved methods for event reviews will be developed as the period of record increases for all these gage sites.

Flow and Ramping Limits during this Period

Minimum Flow (cfs) or Pool Elevation (ft MSL) Requirements

Project Name	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Toketee	25											
Slide Creek	25											
Soda Springs	95 (higher target flows from 150 to 225 cfs applied October 15-August 31; and 275 cfs applied in September)											
Fish Creek	10 cfs (day after Labor Day through March 31)			20 cfs (April 1 through first Monday in Sept.)					10 cfs (day after Labor Day through March 31)			
Clearwater No. 1	5											
Clearwater No. 2	5											
Lemolo No. 1	25											
Lemolo No. 2	25											
Lemolo Lake (minimum pool, WSE MSL)	4123.5 (target, not a limit)											

Ramping Requirements – North Umpqua W & S Reach (Main River Downstream of Soda Springs Powerhouse)

Project Name	Reference	Conditions	Ramp Rate
Wild and Scenic reach below Soda Springs ¹	SA 6.4.1	Flows below 1,600 cfs (At USGS Gage in N. Umpqua River above Copeland Creek), and in the absence of substantial natural flow changes	No ramping allowed (5% or less variation allowed for equipment limitations)
	SA 6.4.2	Flows above 1,600 cfs up to the point where natural flows result in spilling at Soda Springs Dam	Limit ramping in the Wild and Scenic reach to 0.1 foot per hour and 0.5 foot per day
	SA 6.4.5	Natural flow events (snowmelt, rain, etc.)	5% or 0.1 foot/hour as necessary to follow natural flow changes
	SA 6.4.5	Lemolo Lake draft	5% or up to 0.1 foot/day
		Emergency shutdowns	Same restrictions as above, to the extent possible

Ramping in Bypass Reaches

Project Name	Reference	Conditions	Ramp Rate
Soda Springs Bypass Reach ¹	SA 6.5	Daily ramping and annual maintenance	0.2 foot/hour
		Emergency shutdowns	No limit
All other bypass reaches	SA 6.5	Daily and annual maintenance	0.5 foot/hour (consider 0.2 foot/hour June - October)

Event Summary

The number of events during which the above limits were not met, and stage changes were judged to be partially due to ramping, are summarized below. For event details and descriptions see individual gage station summary files. Note that these events do not necessarily constitute “compliance incidents”, as some events may be caused partially or entirely by natural events rather than hydropower project operations.

Number of days with minimum flow (MF), water right (WR), minimum pool (MP) or probable ramping events by gage site for the water year. “Na” means not applicable. For details see site-specific files.

Site	Code	Data capture (%)	# days with MF, WR, or MP events	# days with probable ramping events	Notes
Clearwater 1 bypass	CW1B	99.9	0	1	
Clearwater 1 canal	CW1C	100	0	Na	
Clearwater 2 bypass	CW2B	94.6	0	0	
Clearwater 2 canal	CW2C	99.9	0	Na	
Fish Creek bypass	FSCB	96.4	0	0	
Fish Creek canal	FSCC	100	34*	Na	* but 0 based on provisional records
Lemolo 1 bypass	LE1B	99.7	0	0	
Lemolo 1 penstock	LE1P	100	4	Na	
Lemolo 2 bypass	LE2B	99.4	2	3	
Lemolo 2 canal	LE2C	55.8	14*	Na	* but 0 based on provisional records
Lemolo Lake	LEMO	99.8	Na	Na	targets only, not limits
Slide bypass	SLDB	86.1	5	7	
Slide penstock	SLDP	100	1	Na	
Soda Springs bypass	SODB	96.5	30*	1	* but 0 based on provisional records
Soda Springs penstock	SODP	99.9	2	Na	
Toketee bypass	TOKB	97.6	0	0	
Toketee penstock	TOKP	80.5	0	Na	
North Umpqua above Copeland Cr	COPEG	100	Na	15*	* most had some natural influence also

* Provisional records are based on the best available gage ratings on a real-time basis, and hence drive real-time compliance. Events based on retroactive adjustments to ratings and records do not constitute real-time compliance events.

All sites were within compliance limits during the vast majority of the year. Events listed above were usually of small magnitude and short duration. Improvements in gaging systems and flow control systems are expected to improve this record in the future.

APPENDIX H

SAMPLE ANNUAL REPORT STATION ANALYSES
(SODA SPRINGS BYPASS REACH AND NUR ABOVE COPELAND CR)

2005 WY PacifiCorp Analysis Soda Springs Bypass (SODB) USGS 14316455**Gage Height / Discharge Record**

- Data capture efficiency for 2005 Water Year was 96.5%
- 2005 Water Year Record contains the following period of missing gage height and discharge data due to equipment failure:
 - Dec 20 (1445) - Dec 31 (2345)
 - Mar 14 (1300)
 - May 25 (0900) - May 26 (0045)
 - Jun 20 (0015 - 0115)
- 2005 Water Year Record contains the following period of missing discharge data for recorded gage height data due to rating limitation:
 - Dec 8 (1445) - Dec 9 (1245)
- Major project events affecting flows at this site during the 2005 Water Year include:
 - Dec 20 - Dec 31 Soda Springs Plant relayed off-line; disrupts flow meter sensors.
 - Mar 14 - 31 Planned shutdown of Soda Springs Plant for maintenance.

Flow Events

MINIMUM FLOW EVENTS - Based on hourly average of 15-minute unit flow values.

Period	Threshold (cfs)	Date	Value [◇] (cfs)	Duration (hrs)	Explanation*
10/1/04 - 8/31/05	95	None			
9/1/05 - 9/30/05	275	9/1/2005	273	10	P
		9/2/2005	273	10	P
		9/3/2005	272	11	P
		9/4/2005	272	13	P
		9/5/2005	270	16	P
		9/6/2005	262	21	P
		9/7/2005	266	24	P
		9/8/2005	269	24	P
		9/9/2005	267	24	P
		9/10/2005	266	24	P
		9/11/2005	265	24	P
		9/12/2005	266	24	P
		9/13/2005	264	24	P
		9/14/2005	265	24	P
		9/15/2005	262	24	P
		9/16/2005	261	24	P
		9/17/2005	261	24	P
		9/18/2005	260	24	P
		9/19/2005	261	24	P
		9/20/2005	257	24	P
		9/21/2005	257	24	P
		9/22/2005	254	24	P
		9/23/2005	256	24	P
		9/24/2005	252	24	P
		9/25/2005	254	24	P
		9/26/2005	253	24	P
		9/27/2005	249	24	P
		9/28/2005	252	24	P
		9/29/2005	253	24	P
		9/30/2005	251	24	P

STAGE CHANGE EVENTS - Based on hourly average of 15-minute unit stage values.

Period	Threshold (ft/hr)	Date	Value [◇] (ft/hr)	Duration (hrs)	Explanation*
10/1/04 - 9/30/05	+/- 0.20	12/8/2004	+0.84	3	N
		12/9/2004	+0.55	5	N
		12/10/2004	-0.31	7	N, R
		3/27/2005	+0.34	1	N, E

[◇] Minimum/Maximum calculated value for day.

* **E** emergency events or equipment failure; **N** natural influences (rain, freezing, etc.); **R** ramping related to planned operations or maintenance; **P** in compliance with provisional data, not retroactive/adjusted data; **U** unknown - no discernable reason. In some cases a combination of categories is applicable. USGS unregulated stream gage sites and daily precipitation and snowmelt data from NRCS and NOAA stations were used to discern natural influences; operation records were used to discern project causes.

SODA SPRINGS BYPASS (SODB) / USGS 14316455

DAILY DISCHARGE COMPUTED FROM MEAN HOURLY VALUES OF 15-MINUTE RECORDINGS, CUBIC FEET PER SECOND, WATER YEAR OCTOBER, 2004 - SEPTEMBER, 2005

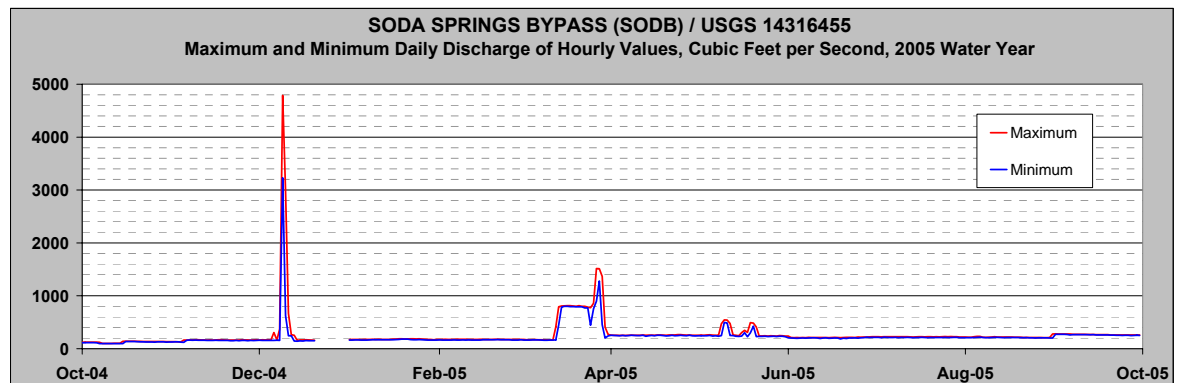
Day	OCTOBER			NOVEMBER			DECEMBER			JANUARY			FEBRUARY			MARCH			APRIL			MAY			JUNE			JULY			AUGUST			SEPTEMBER		
	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min
1	118	122	113	131	133	127	163	166	160	168	173	164	172	178	167	174	177	170	256	258	254	249	253	244	232	240	206	222	227	216	216	220	210	276	282	273
2	119	126	115	131	134	129	163	168	159	170	177	164	171	177	165	170	175	164	253	255	252	250	257	245	206	211	203	222	227	215	213	217	208	275	280	273
3	120	125	116	130	132	130	162	167	159	172	178	167	173	179	164	167	171	163	251	253	249	251	255	248	205	210	199	215	225	208	213	219	207	275	279	272
4	120	125	116	126	131	125	162	168	158	172	177	167	172	178	165	168	172	162	250	252	248	252	259	244	205	211	199	222	227	218	217	226	212	274	278	272
5	119	123	116	143	165	121	162	166	159	170	173	165	174	178	166	169	174	167	252	253	251	258	263	252	205	209	201	220	226	215	222	234	216	273	280	270
6	118	123	113	163	166	161	171	307	158	170	175	164	173	178	167	169	173	167	248	252	246	248	258	239	207	212	203	219	227	212	222	234	217	271	279	262
7	108	121	99	164	166	163	164	166	161	171	174	166	172	179	165	168	171	167	252	256	249	247	254	244	205	210	200	219	227	211	214	219	213	269	272	266
8	98	101	96	163	166	161	184	371	159	172	177	167	172	179	165	167	169	165	255	257	253	247	255	236	208	214	204	221	226	216	214	217	210	270	273	269
9	99	102	96	166	169	162	4074	4785	3230	174	179	171	173	179	166	166	170	162	253	255	251	309	471	250	208	212	205	217	226	208	213	219	210	269	272	267
10	99	102	97	165	168	161	1594	2975	628	173	177	169	173	179	165	164	167	160	250	253	249	538	546	496	209	213	205	221	226	217	215	221	213	269	272	266
11	100	102	98	164	167	161	413	669	248	174	179	169	173	178	167	165	166	165	251	254	249	504	541	488	206	211	202	219	226	212	219	227	214	268	271	265
12	100	103	98	163	166	161	250	263	246	174	178	170	172	178	165	166	167	165	255	259	253	315	479	252	204	211	197	220	226	217	216	220	214	268	269	266
13	101	102	99	163	166	160	224	255	147	174	178	170	172	178	164	206	413	166	245	253	238	254	259	249	207	212	202	217	224	211	217	221	211	266	270	264
14	100	103	98	162	166	159	153	157	145	172	178	168	170	175	166	730	793	450	251	257	244	244	254	238	208	213	206	215	222	210	215	222	209	267	271	265
15	121	141	98	162	165	160	155	166	149	174	178	169	172	179	165	795	808	787	255	258	251	240	245	235	205	210	199	217	225	212	217	221	213	265	268	262
16	139	142	135	162	166	160	157	167	146	174	184	169	175	178	170	809	812	804	251	256	247	251	306	241	207	213	199	220	227	213	216	221	211	264	267	261
17	139	142	137	163	170	158	160	169	155	179	184	174	174	178	169	806	814	802	257	261	253	320	348	303	211	215	205	219	226	214	214	220	211	264	267	261
18	139	142	136	162	170	158	158	167	151	184	189	177	175	178	171	804	814	796	258	259	256	247	308	226	208	212	203	216	225	211	215	219	212	263	267	260
19	139	143	135	161	166	157	158	164	153	185	187	184	175	178	171	802	808	796	254	258	250	416	491	300	201	210	185	216	226	207	214	218	213	263	267	261
20	138	140	133	161	166	156	155	161	151	185	186	184	174	179	169	796	802	792	249	256	243	471	486	428	205	211	199	219	229	211	212	217	210	259	262	257
21	136	140	131	160	164	153	MD	MD	MD	183	185	182	175	179	173	798	814	793	253	261	245	277	411	232	205	214	197	217	224	212	211	213	208	259	261	257
22	135	138	130	160	166	153	MD	MD	MD	180	187	172	175	178	172	798	804	793	258	262	254	238	244	233	209	214	204	218	227	213	210	214	207	259	262	254
23	132	137	128	161	164	158	MD	MD	MD	178	187	171	175	177	170	785	801	771	253	261	244	239	244	234	208	214	204	216	225	212	209	213	206	258	261	256
24	132	137	129	159	165	153	MD	MD	MD	180	186	171	173	176	169	777	786	771	257	266	249	241	244	238	210	213	206	217	228	212	208	212	205	256	259	252
25	131	137	127	163	170	159	MD	MD	MD	181	188	172	173	177	169	672	776	446	257	265	253	235	241	232	210	220	199	220	230	214	208	213	202	256	260	254
26	132	137	126	162	167	157	MD	MD	MD	174	183	170	170	174	163	786	858	758	253	259	249	242	248	234	213	219	207	221	229	212	208	212	206	256	260	253
27	135	138	131	161	167	153	MD	MD	MD	174	179	167	170	175	164	1131	1515	899	251	257	245	240	244	237	215	222	208	220	230	211	207	213	206	254	260	249
28	134	137	131	161	165	157	MD	MD	MD	173	177	165	172	177	165	1376	1513	1280	256	260	254	236	241	232	220	222	219	220	227	214	208	210	207	256	260	252
29	134	136	131	161	166	154	MD	MD	MD	171	176	165				1081	1368	455	252	256	248	244	249	237	219	225	212	221	229	217	207	210	206	256	259	253
30	130	135	126	162	168	158	MD	MD	MD	167	171	163				247	408	202	247	253	243	240	247	237	220	227	216	213	222	208	207	212	203	254	259	251
31	130	133	128				MD	MD	MD	171	177	164				257	269	243				234	241	228				216	220	210	252	280	204			
Month	122	143	96	157	170	121	449	4785	145	175	189	163	173	179	163	531	1515	160	253	266	238	283	546	226	209	240	185	219	230	207	215	280	202	264	282	249

MD = Missing Data.

Incomplete data for day.

WATER YEAR DISCHARGE SUMMARY

MEAN	MAXIMUM	DATE	MINIMUM	DATE
249	4785	12/9/2004	96	10/8/2004 10/9/2004



SODA SPRINGS BYPASS (SODB) / USGS 14316455

DAILY VALUES OF MAXIMUM HOURLY CHANGE IN STAGE COMPUTED FROM MEAN HOURLY VALUES, FEET, WATER YEAR OCTOBER, 2004 - SEPTEMBER, 2005

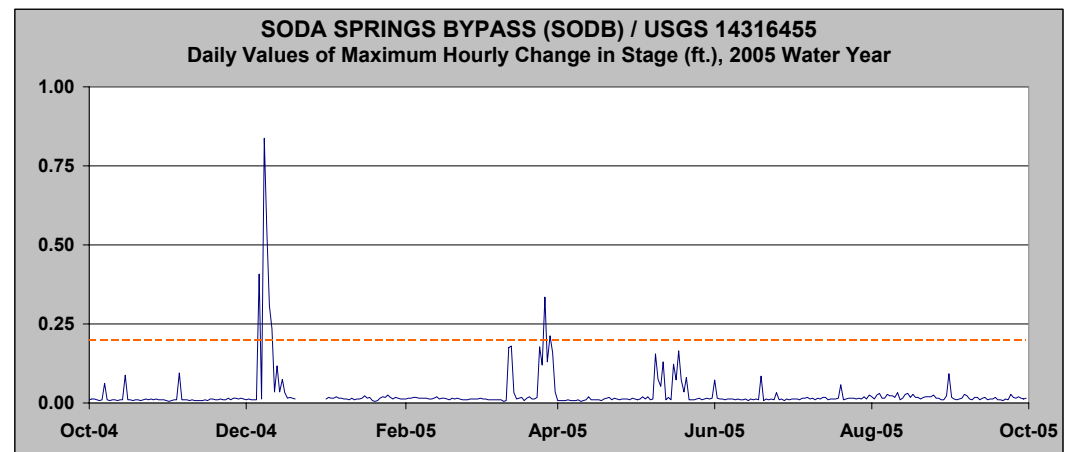
Day	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
1	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.07	0.01	0.02	0.02
2	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.01	0.01
3	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01
4	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.02	0.01	0.01	0.03	0.01
5	0.01	0.09	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.01
6	0.01	0.01	0.41	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.03
7	0.06	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.03	0.02
8	0.01	0.01	0.84	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01
9	0.01	0.01	0.55	0.01	0.02	0.01	0.01	0.16	0.01	0.02	0.02	0.01
10	0.01	0.01	0.31	0.01	0.01	0.01	0.00	0.07	0.01	0.01	0.02	0.02
11	0.01	0.01	0.24	0.02	0.01	0.00	0.01	0.05	0.01	0.02	0.03	0.02
12	0.01	0.01	0.04	0.01	0.02	0.01	0.01	0.13	0.01	0.01	0.01	0.01
13	0.01	0.01	0.12	0.01	0.02	0.18	0.02	0.01	0.01	0.02	0.02	0.01
14	0.01	0.01	0.04	0.01	0.01	0.18	0.01	0.02	0.01	0.02	0.03	0.02
15	0.09	0.01	0.07	0.02	0.01	0.03	0.01	0.01	0.01	0.01	0.03	0.01
16	0.01	0.01	0.03	0.02	0.02	0.01	0.01	0.12	0.01	0.01	0.02	0.01
17	0.01	0.01	0.02	0.02	0.01	0.02	0.01	0.07	0.01	0.01	0.03	0.01
18	0.01	0.01	0.02	0.02	0.01	0.02	0.01	0.17	0.01	0.01	0.02	0.02
19	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.07	0.09	0.02	0.02	0.01
20	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.04	0.01	0.06	0.01	0.01
21	0.01	0.01	MD	0.01	0.02	0.02	0.02	0.08	0.01	0.01	0.02	0.01
22	0.01	0.01	MD	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01
23	0.01	0.01	MD	0.02	0.01	0.01	0.02	0.01	0.01	0.02	0.02	0.01
24	0.01	0.02	MD	0.02	0.01	0.02	0.01	0.01	0.01	0.02	0.02	0.03
25	0.01	0.01	MD	0.02	0.01	0.18	0.01	0.01	0.03	0.02	0.02	0.02
26	0.01	0.02	MD	0.02	0.01	0.12	0.01	0.02	0.01	0.01	0.02	0.02
27	0.01	0.02	MD	0.01	0.01	0.34	0.01	0.01	0.01	0.02	0.01	0.02
28	0.01	0.01	MD	0.02	0.01	0.13	0.01	0.01	0.01	0.01	0.01	0.02
29	0.01	0.01	MD	0.02		0.21	0.01	0.02	0.01	0.02	0.01	0.01
30	0.01	0.01	MD	0.01		0.16	0.02	0.01	0.01	0.01	0.02	0.01
31	0.01		MD	0.01		0.04		0.02		0.02	0.09	
Month	0.09	0.09	0.84	0.02	0.02	0.34	0.02	0.02	0.09	0.06	0.09	0.03

MD = Missing Data.

Incomplete data for day.

WATER YEAR SUMMARY
MAXIMUM HOURLY CHANGE IN STAGE

MEAN	MAXIMUM	DATE	MINIMUM	DATE
0.03	0.84	12/8/2004	0.00	Several



2005 WY PacifiCorp Analysis North Umpqua River Above Copeland Creek USGS 14316500

Gage Height / Discharge Record

- Data capture efficiency for 2005 Water Year was 100%

Flow Events

TIER 1: Hourly average streamflow exceeded mean of prior 24-hour streamflow over a revolving 24-hour period by 5 percent; hourly average streamflow < 1600 cfs.

Event Start Time	Event End Time	Value [◇] (%)	Duration (hours)	Explanation*	Event Start Time	Event End Time	Value [◇] (%)	Duration (hours)	Explanation*
10/17/04 21:00	10/17/04 22:00	5.6	2	N	3/30/05 6:00	3/31/05 11:00	-31.2	30	N
10/18/04 0:00	10/18/04 1:00	5.2	2	N	3/31/05 13:00	4/1/05 12:00	20.3	24	N
10/22/04 21:00	10/23/04 18:00	52.4	22	N	4/7/05 15:00	4/8/05 10:00	16.9	20	R
10/24/04 0:00	10/25/04 19:00	-18.1	44	N	4/9/05 22:00	4/10/05 0:00	-5.5	3	N
11/3/04 1:00	11/3/04 18:00	9.1	18	N	4/10/05 15:00	4/10/05 21:00	-6.5	7	N
11/3/04 23:00	11/3/04 23:00	6.1	1	N	4/11/05 19:00	4/12/05 0:00	6.5	6	R, N
11/5/04 4:00	11/5/04 13:00	-6.9	10	N, R	4/12/05 12:00	4/12/05 15:00	7.0	4	R
11/5/04 17:00	11/5/04 22:00	-7.6	6	R	4/16/05 22:00	4/17/05 2:00	11.7	5	N
11/25/04 17:00	11/26/04 6:00	11.1	14	N	4/21/05 1:00	4/21/05 3:00	-5.2	3	N, R
12/6/04 18:00	12/7/04 16:00	41.3	23	N	4/28/05 14:00	4/28/05 15:00	6.2	2	R, N
12/8/04 6:00	12/8/04 10:00	46.8	5	N	5/5/05 11:00	5/5/05 14:00	9.7	4	R
12/17/04 4:00	12/17/04 10:00	-5.6	7	N, R	5/25/05 20:00	5/25/05 23:00	-5.9	4	N
12/17/04 12:00	12/17/04 22:00	-5.3	11	N, R	5/29/05 12:00	5/29/05 14:00	7.8	3	N
12/18/04 0:00	12/18/04 1:00	-5.4	2	N, R	5/31/05 8:00	6/1/05 1:00	-10.7	18	N, R
12/18/04 3:00	12/18/04 7:00	-5.7	5	N, R	6/6/05 5:00	6/7/05 4:00	11.8	24	N

12/18/04 10:00	12/18/04 16:00	-6.2	7	N, R	6/7/05 15:00	6/7/05 17:00	-5.8	3	N
1/16/05 19:00	1/17/05 1:00	6.3	7	N	6/9/05 18:00	6/10/05 9:00	-8.3	16	N
1/17/05 21:00	1/19/05 3:00	16.0	31	N	6/10/05 13:00	6/10/05 13:00	-5.3	1	N
3/26/05 21:00	3/27/05 20:00	42.2	24	N	6/17/05 17:00	6/17/05 22:00	6.3	6	R
3/28/05 16:00	3/28/05 16:00	-5.8	1	N	6/19/05 23:00	6/20/05 17:00	-9.9	19	N, R, E
3/29/05 0:00	3/29/05 2:00	-6.1	3	N					

TIER II: Hourly stage change events based on hourly average of 30-minute unit stage values;
hourly average streamflow > 1599 cfs, project not in 'spill mode' for hourly average period.

Period	Threshold (ft/hr)	Date	Value [◇] (ft/hr)	Duration (hrs)	Explanation*
10/1/2004 - 9/30/2005	+/- 0.10	12/8/2004	+0.22	6	N
		12/16/2004	+0.14	1	N, R

TIER III: Hourly average stage compared with maximum and minimum of prior 24-hr hourly average stage;
24-hr revolving average streamflow > 1599 cfs, project not in 'spill mode' for 24-hr period.

Period	Threshold (ft/day)	Date	Value [◇] (ft/day)	Duration (hrs)	Explanation*
10/1/2004 - 9/30/2005	+/- 0.50	5/9/2005	+0.53	1	N

[◇] Maximum calculated value for event.

* **E** emergency events or equipment failure; **N** natural influences (rain, freezing, etc.); **R** ramping related to planned operations or maintenance; **U** unknown - no discernable reason. In some cases a combination of categories is applicable. USGS unregulated stream gage sites and daily precipitation and snowmelt data from NRCS and NOAA stations were used to discern natural influences, and operation records were used to discern project causes.

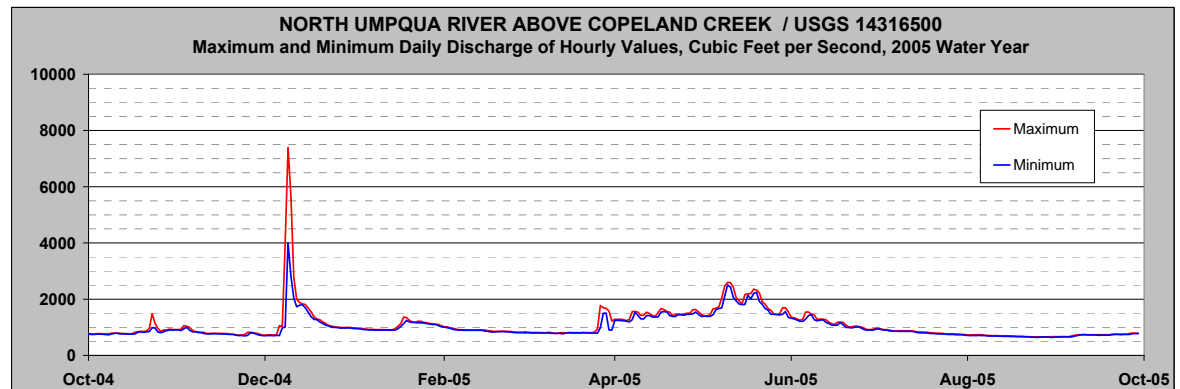
NORTH UMPQUA RIVER ABOVE COPELAND CREEK / USGS 14316500

DAILY DISCHARGE COMPUTED FROM MEAN HOURLY VALUES OF 15-MINUTE RECORDINGS, CUBIC FEET PER SECOND, WATER YEAR OCTOBER, 2004 - SEPTEMBER, 2005

Day	OCTOBER			NOVEMBER			DECEMBER			JANUARY			FEBRUARY			MARCH			APRIL			MAY			JUNE			JULY			AUGUST			SEPTEMBER		
	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min
1	773	781	764	912	917	910	712	721	700	966	979	954	1018	1020	1010	821	827	810	1275	1290	1250	1412	1450	1385	1341	1355	1330	955	966	947	719	726	716	660	669	654
2	755	762	748	899	926	883	716	732	705	960	966	954	1005	1020	985	816	827	810	1264	1280	1245	1406	1415	1395	1324	1340	1300	938	947	923	717	726	710	660	669	654
3	751	759	746	1010	1060	954	716	726	705	955	966	941	973	989	966	808	815	798	1262	1285	1240	1394	1410	1390	1279	1300	1260	907	920	898	715	732	710	665	674	659
4	766	773	759	1022	1040	1001	715	726	703	938	954	923	947	970	929	807	815	798	1253	1270	1230	1414	1455	1390	1224	1255	1210	903	917	898	720	737	710	663	669	659
5	762	773	757	928	992	889	724	735	716	923	932	917	922	941	910	806	815	798	1228	1240	1220	1559	1665	1450	1236	1290	1210	879	898	874	724	732	716	660	669	654
6	762	770	754	857	886	839	776	1060	710	915	923	904	904	917	898	805	815	798	1220	1270	1190	1646	1675	1630	1434	1545	1295	872	880	862	718	732	710	678	695	662
7	754	767	738	840	844	839	999	1020	979	915	929	904	903	914	898	804	810	798	1359	1560	1270	1720	1740	1670	1475	1545	1420	871	880	862	706	713	705	699	716	689
8	755	770	735	827	839	815	2154	3980	1010	908	917	898	901	910	892	802	804	798	1547	1565	1535	1823	2050	1690	1451	1460	1445	871	880	862	698	705	695	727	737	710
9	778	793	764	813	818	810	6045	7385	4000	908	917	898	900	910	892	813	827	798	1493	1535	1420	2240	2465	2100	1378	1440	1270	868	880	856	695	705	689	734	737	729
10	790	793	784	797	819	773	3941	5665	2830	905	917	898	899	907	892	796	810	787	1364	1420	1300	2561	2595	2505	1261	1275	1230	870	880	862	696	700	689	736	743	732
11	788	793	784	773	776	770	2401	2785	2040	906	917	898	899	907	892	787	787	787	1370	1435	1300	2503	2590	2430	1278	1295	1255	867	880	856	696	705	689	735	737	732
12	776	787	765	771	781	764	1775	1990	1730	903	910	898	899	910	892	787	787	787	1479	1535	1420	2185	2420	2060	1272	1285	1270	868	880	862	691	698	689	731	737	726
13	771	776	770	778	787	773	1839	1885	1790	902	910	898	903	910	892	790	801	787	1459	1490	1420	1981	2050	1940	1228	1270	1175	859	868	856	686	695	679	732	737	724
14	766	776	759	776	787	770	1821	1835	1800	901	910	892	899	904	892	791	810	770	1381	1420	1365	1881	1945	1825	1159	1180	1135	835	856	827	687	698	677	732	737	726
15	762	767	759	775	781	770	1751	1810	1690	917	954	898	887	904	868	795	804	790	1369	1390	1360	1817	1825	1805	1094	1125	1080	817	833	810	687	698	677	730	737	721
16	764	770	757	773	779	764	1600	1685	1535	990	1040	954	874	880	862	806	813	804	1404	1525	1375	1931	2170	1815	1083	1100	1070	822	833	804	683	695	674	727	737	719
17	780	818	762	769	779	762	1446	1540	1375	1059	1130	1040	848	877	839	805	810	804	1641	1670	1540	2169	2190	2150	1126	1180	1080	818	827	804	661	667	659	752	759	724
18	825	842	821	761	776	754	1313	1370	1280	1246	1365	1130	843	856	833	803	810	798	1582	1630	1560	2104	2195	2005	1173	1185	1170	808	827	798	672	679	669	728	732	721
19	845	856	842	750	757	743	1280	1300	1270	1289	1345	1250	850	856	844	804	807	804	1544	1565	1540	2288	2355	2210	1156	1170	1085	795	807	781	673	679	667	731	737	724
20	841	856	821	747	751	743	1222	1270	1190	1220	1245	1190	855	862	844	801	804	798	1482	1530	1420	2295	2320	2240	1019	1075	995	795	804	781	670	677	669	746	759	737
21	851	862	836	729	737	721	1160	1190	1130	1180	1190	1170	856	862	850	805	821	801	1394	1405	1385	2070	2220	1920	1000	1010	992	778	793	770	662	669	659	753	759	746
22	874	970	850	714	721	710	1113	1140	1080	1174	1185	1165	852	862	844	805	810	804	1420	1460	1390	1847	1905	1815	996	1020	979	776	793	764	661	667	659	752	759	743
23	1228	1480	993	716	732	708	1061	1070	1050	1189	1220	1160	846	856	839	807	810	798	1460	1465	1450	1751	1820	1670	1025	1045	1005	771	787	764	653	659	648	751	759	737
24	1068	1140	973	716	738	698	1021	1045	1005	1192	1215	1160	841	850	833	805	810	798	1452	1460	1440	1626	1670	1610	1034	1040	1020	763	776	759	653	659	648	750	757	743
25	850	957	833	756	821	713	1010	1020	999	1162	1175	1150	826	836	813	803	833	793	1458	1475	1430	1543	1605	1465	1007	1020	985	756	770	748	651	659	641	749	754	743
26	826	850	810	816	821	810	999	1010	992	1150	1160	1135	819	827	810	824	939	790	1473	1500	1460	1464	1470	1460	952	982	929	757	770	743	655	664	648	766	781	748
27	864	904	842	800	810	793	985	995	973	1121	1130	1115	819	827	810	1260	1775	985	1480	1495	1460	1456	1460	1450	909	929	898	752	767	743	651	659	648	784	793	773
28	898	907	883	772	793	759	981	992	973	1114	1120	1100	820	827	810	1589	1695	1495	1554	1630	1480	1454	1485	1440	905	910	904	743	757	735	655	659	654	786	793	776
29	923	932	907	743	764	724	985	998	973	1105	1115	1100				1566	1675	1500	1595	1630	1540	1571	1700	1460	908	929	892	743	759	737	655	659	654	786	793	776
30	914	923	901	717	729	705	986	995	979	1083	1100	1060				1285	1575	904	1482	1540	1450	1640	1690	1560	933	954	923	735	743	732	657	669	637	783	810	776
31	917	920	914				978	989	966	1038	1060	1020				1050	1220	898				1422	1555	1350				729	743	719	658	669	648			
Month	832	1480	735	802	1060	698	1459	7385	700	1037	1365	892	886	1020	810	892	1775	770	1425	1670	1190	1812	2595	1350	1155	1545	892	823	966	719	682	737	637	729	810	654

WATER YEAR DISCHARGE SUMMARY

MEAN	MAXIMUM	DATE	MINIMUM	DATE
1046	7385	12/9/2004	637	8/30/2005



NORTH UMPQUA RIVER ABOVE COPELAND CREEK / USGS 14316500

DAILY VALUES OF MAXIMUM HOURLY CHANGE IN STAGE COMPUTED FROM MEAN HOURLY VALUES, FEET, WATER YEAR OCTOBER, 2004 - SEPTEMBER, 2005

Day	OCTOBER	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
1	0.01	0.00	0.01	0.02	0.01	0.01	0.04	0.02	0.03	0.01	0.01	0.01
2	0.02	0.03	0.03	0.01	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.01
3	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01
4	0.02	0.03	0.01	0.02	0.02	0.01	0.01	0.02	0.02	0.01	0.02	0.01
5	0.01	0.03	0.02	0.01	0.01	0.01	0.01	0.05	0.02	0.01	0.01	0.01
6	0.02	0.02	0.22	0.02	0.02	0.01	0.03	0.01	0.04	0.01	0.02	0.02
7	0.02	0.01	0.02	0.01	0.02	0.01	0.04	0.02	0.03	0.01	0.00	0.02
8	0.03	0.01	0.35	0.01	0.01	0.01	0.01	0.05	0.01	0.01	0.01	0.01
9	0.03	0.01	0.29	0.01	0.01	0.02	0.03	0.06	0.03	0.01	0.02	0.01
10	0.01	0.04	0.23	0.01	0.01	0.02	0.03	0.04	0.05	0.01	0.01	0.01
11	0.01	0.01	0.11	0.02	0.01	0.00	0.03	0.02	0.01	0.01	0.01	0.00
12	0.02	0.02	0.24	0.01	0.01	0.00	0.03	0.08	0.01	0.01	0.01	0.01
13	0.00	0.01	0.04	0.01	0.01	0.02	0.02	0.03	0.02	0.01	0.01	0.01
14	0.02	0.02	0.02	0.01	0.01	0.04	0.02	0.03	0.02	0.02	0.02	0.01
15	0.01	0.01	0.04	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.01
16	0.03	0.02	0.14	0.05	0.01	0.01	0.04	0.05	0.01	0.02	0.01	0.01
17	0.03	0.01	0.02	0.04	0.02	0.01	0.04	0.02	0.02	0.01	0.03	0.00
18	0.03	0.02	0.03	0.08	0.01	0.01	0.04	0.04	0.01	0.01	0.01	0.01
19	0.03	0.02	0.01	0.02	0.00	0.00	0.01	0.03	0.03	0.02	0.01	0.01
20	0.02	0.01	0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.04	0.00	0.01
21	0.04	0.02	0.02	0.02	0.01	0.03	0.02	0.03	0.01	0.01	0.01	0.01
22	0.04	0.02	0.02	0.01	0.01	0.01	0.04	0.03	0.02	0.01	0.01	0.02
23	0.18	0.03	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01
24	0.04	0.02	0.02	0.04	0.02	0.01	0.01	0.03	0.01	0.01	0.01	0.02
25	0.07	0.04	0.01	0.02	0.03	0.06	0.03	0.02	0.01	0.01	0.02	0.01
26	0.02	0.01	0.01	0.02	0.01	0.06	0.02	0.01	0.02	0.01	0.01	0.02
27	0.02	0.01	0.01	0.01	0.02	0.27	0.02	0.01	0.02	0.01	0.01	0.01
28	0.02	0.01	0.01	0.01	0.02	0.10	0.03	0.01	0.01	0.01	0.01	0.01
29	0.04	0.02	0.02	0.01		0.11	0.03	0.04	0.02	0.02	0.01	0.01
30	0.01	0.01	0.01	0.03		0.07	0.03	0.02	0.01	0.02	0.05	0.06
31	0.00		0.01	0.02		0.10		0.03		0.03	0.02	
Month	0.18	0.05	0.35	0.08	0.03	0.27	0.04	0.08	0.05	0.04	0.05	0.06

WATER YEAR SUMMARY
MAXIMUM HOURLY CHANGE IN STAGE

MEAN	MAXIMUM	DATE	MINIMUM	DATE
0.02	0.35	12/8/2004	0.00	Several

NORTH UMPQUA RIVER ABOVE COPELAND CREEK / USGS 14316500
Daily Values of Maximum Hourly Change in Stage (ft.), 2005 Water Year