Chehalis Basin Strategy

Operations Plan for Flood Retention Facilities

Reducing Flood Damage and
Restoring Aquatic Species Habitat

Prepared by
Anchor QEA, LLC

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ACRONYMS AND ABBREVIATIONS LIST

cfs	cubic feet per second
CIG	Climate Impacts Group
FRFA	flood retention flow augmentation
FRO	flood retention only
GCM	Global Climate Model
I-5	Interstate 5
NOAA	National Oceanic and Atmospheric Administration
NGVD29	National Geodetic Vertical Datum of 1929
PHABSIM	Physical Habitat Simulation
RM	river mile
USGS	U.S. Geological Survey
WDFW	Washington Department of Fish and Wildlife
WUA	weighted usable area

EXECUTIVE SUMMARY

The purpose of this technical report is to present the Operations Plan for the flood retention only (FRO) and flood retention flow augmentation (FRFA) dams. The major considerations in developing an Operations Plan for the reservoirs are:

- Provide flood reduction in downstream areas
- Preserve geomorphic processes downstream
- Maintain slope stability in reservoir
- Keep rate of change in flow rates downstream within accepted limits
- Provide for debris management/removal in reservoir after floods
- Provide additional instream flows and cooler water during periods of low flow (FRFA only)

The FRO facility would retain river flows temporarily, only during floods that have a flow rate exceeding 38,800 cubic feet per second (cfs) at the Chehalis River at Grand Mound, Washington, gage operated by the U.S. Geological Survey. A flow rate of 38,800 cfs is equivalent to about a 7-year recurrence interval event at that gage (15% chance of occurrence in any year). After flooding diminishes, the reservoir contents would be discharged. In non-flood conditions the reservoir is empty and the Chehalis River flows through the reservoir footprint unimpeded. During the beginning stages of operations, flow and river stage changes in the Chehalis River downstream of the reservoir would be controlled to 2 inches per hour stage reduction to reduce the potential for fish stranding. When draining the reservoir after a flood, the discharge rate from the reservoir would be increased to about 5,000 to 6,500 cfs to help maintain downstream geomorphic processes. The rate of reservoir drawdown would be kept within safe operating rates (estimated to be 10 feet per day) for slope stability. Debris management would be accomplished during reservoir drawdown by slowing the rate of drawdown and collecting debris in one area for disposal or use elsewhere. The volume available for flood storage would be 65,000 acre-feet.

With FRO operations, flows above about 5,000 cfs at the dam site and at Doty gage are significantly reduced. Most flows (about 99%) are not significantly changed due to FRO operations. Significant flood reduction would occur in downstream areas; the peak flow at the Grand Mound gage was predicted to be reduced by 15% to 27% when three historical floods (occurring in 1996, 2007, and 2009) were analyzed with the FRO dam in operation.

The FRFA facility would operate under similar procedures as the FRO facility during major floods and would have similar flood reduction benefits. Additionally, the FRFA facility would include a conservation pool that would provide a 65,000-acre-foot supplemental volume of storage. The conservation pool would be used to provide instream flows and cooler water in the upper Chehalis River during periods of

low flow and high river temperatures, which can occur in late spring to early fall. The flood pool, located above the conservation pool, would also have 65,000 acre-feet of storage.

Operational analyses were performed for different FRFA operating scenarios using the HEC-ResSim model. The scenarios were also informed by water quality modeling of the reservoir (Anchor QEA 2016a) and the Chehalis River (PSU 2016) along with instream flow analyses (Anchor QEA 2012; Beecher 2015) performed for the Chehalis River. A balance between releases from the dam, reservoir water temperatures, and instream flow benefits was achieved through one operational scenario that is proposed for the FRFA reservoir. That scenario proposes releasing frequently occurring peak flows from the reservoir and maintaining a minimum level of flow in the Chehalis River when natural flows are not sufficient in the late spring to early fall. That time period also coincides with high Chehalis River temperatures, which affect aquatic species. Releases would be made at different levels in the reservoir to obtain cool water but maintain a sufficient pool so that cool water could be released until fall when atmospheric and river temperatures drop due to colder weather.

The weighted usable area (WUA), a measure of habitat available in the Chehalis River downstream of the dam, is predicted to substantially increase during summer months. A calculation for the rearing life stage of Chinook salmon for conditions experienced in July 2013 in the Chehalis River between Pe Ell and Elk Creek showed an increase of 400% in WUA due to the cool water and greater flow discharged from the FRFA facility.

With FRFA operations, flows are increased compared to existing conditions about one-half of the time. Flows above 8,000 cfs at the dam site and 10,000 cfs at the Doty gage are significantly reduced.

The operations of the dams under future climate change conditions was also reviewed. Peak flow changes were estimated by the Climate Impacts Group (CIG; Mauger et al. 2016) and Watershed Science and Engineering (Karpack 2016a). The future 100-year peak flow under climate change conditions is estimated to be 66% greater than existing conditions. Under those conditions, the entire reservoir volume would be utilized and water would be spilling 3 feet over the spillway crest. A large flood reduction benefit would still be realized in downstream areas, as the flow over the spillway would occur after the peak of the flood occurs, and the spillway flow would still be much less than the peak inflow. The peak flow reduction at the Grand Mound gage under climate change conditions is estimated to be 21%, slightly more than current conditions; however, the peak flow experienced (108,600 cfs) would be much higher than the peak flow under current conditions (75,100 cfs) for a 100-year flood.

1 INTRODUCTION

1.1 Purpose

The purpose of this technical report is to present the Operations Plan for the flood retention only (FRO) and flood retention flow augmentation (FRFA) dams. The Operations Plan refines the preliminary Operations Plan previously developed (Anchor QEA 2014) and uses data and information collected since that time, including water quality data, water quality modeling results, fisheries data and modeling, and additional flow data from gages.

2 FLOOD RETENTION ONLY OPERATIONS

2.1 Introduction

Located in the upper Chehalis Basin, the FRO facility would retain river flows during major floods. Major floods have a flow rate exceeding 38,800 cubic feet per second (cfs) at the Grand Mound, Washington, gage operated by the U.S. Geological Survey (USGS). A flow rate of 38,800 cfs is equivalent to about a 7-year recurrence interval event at that gage (15% chance of occurrence in any year). A description of a major flood is provided in Section 2.2. The FRO facility would not retain water during smaller floods. The major considerations in developing an Operations Plan for the FRO are:

- Provide flood reduction in downstream areas
- Preserve geomorphic processes downstream
- Maintain slope stability in reservoir
- Keep rate of change in flow rates downstream within accepted limits
- Provide for debris management/removal in reservoir after floods

The FRO facility would operate systematically. Flood flows would be predicted and outlet gates adjusted to retain major flood flows temporarily. After flooding diminishes, the reservoir contents would be discharged. In non-flood conditions the reservoir is empty and the Chehalis River flows through the reservoir footprint unimpeded. The different stages of operation are listed as follows and described in the following sections:

- Threshold for operations
- Operations prior to and during floods
- Initial drawdown after floods
- Debris management
- Drawdown after debris management
- Operations outside of flood storage periods

2.2 Stages of Operation

2.2.1 Threshold for Operations

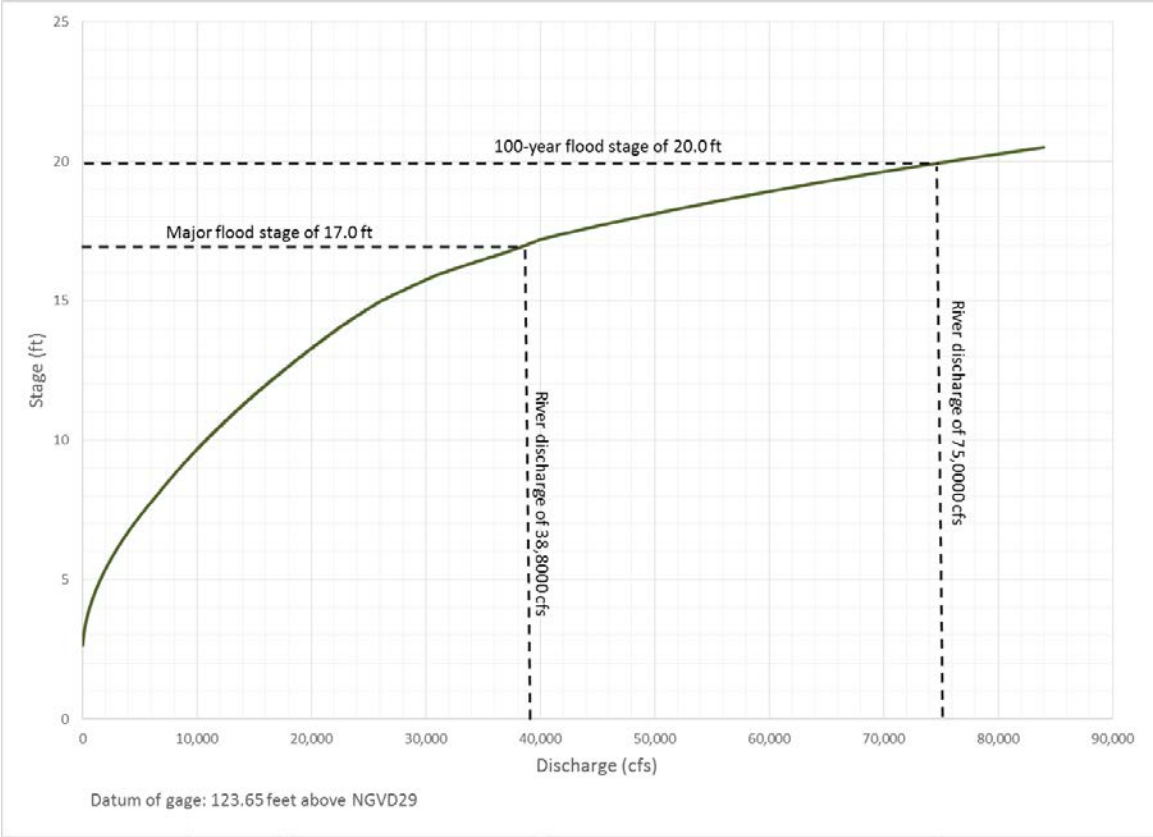
The threshold for operation of the FRO facility was determined by using information on flooding available from Thurston County and the National Oceanic and Atmospheric Administration (NOAA). Thurston County and NOAA define flood categories that describe the severity of flood impacts in the Chehalis River. Major flooding is a definition both agencies use. NOAA has defined major flooding as extensive inundation of structures and roads; significant evacuations of people and/or transfer of

property to higher elevations (Caldwell 2012). Major floods are defined by Thurston County Emergency Management as the Chehalis River in Thurston County will cause major flooding, inundating roads and farm lands in Independence Valley; deep and swift flood waters will cover State Route 12 and James, Independence, and Moon roads; flooding will occur all along the river including headwaters, tributaries, and other streams within and near the Chehalis Basin (Thurston County 2016). USGS develops rating curves at their gages that describe a stage-discharge relationship. This is done by translating a continuous record of stage to river discharge. The rating curve for the USGS gage site at Grand Mound is shown in Figure 2.1. For the Chehalis River near Grand Mound gage, a stage of 17.0 feet (datum of gage: 123.65 feet above National Geodetic Vertical Datum of 1929 [NGVD29]) is defined by Thurston County and NOAA as the threshold for a major flood. Extensive flooding would also occur upstream of Grand Mound in Lewis County during a major flood. The 100-year flood stage at the Grand Mound gage is 3 feet above the 38,800 cfs threshold for operation of the FRO.

Using the stage threshold for major flooding, a discharge prediction of 38,800 cfs at Grand Mound is the point at which flood retention is initiated. When the prediction exceeds 38,800 cfs, water retention would begin within 48 hours of the forecasted flood peak. A 48-hour time period gives a reasonable amount of time to predict flows with confidence while also providing enough time to reduce flow rates to designated minimum release rates before major flood flows occur. Flow conditions that trigger water retention (38,800 cfs) have a 15% probability of occurrence in any given year, which is approximately a 7-year flood.

The source of the forecast for major flooding would be the Northwest River Forecast Center operated by NOAA. The Northwest River Forecast Center uses the National Weather Service Community Hydrologic Prediction System to simulate soil, snow, and stream channel and reservoir conditions. Daily forecasts are made using observations of temperature and precipitation. Forecast of meteorological parameters are included in the river forecast model (NOAA 2016). It is anticipated that additional resources would be put into flood forecasting in the Chehalis Basin to improve the accuracy of the forecasts. Those resources may include additional meteorological stations and an updated hydrologic model.

Figure 2.1
Rating Curve – USGS Gage #12027500 – Chehalis River near Grand Mound, Washington

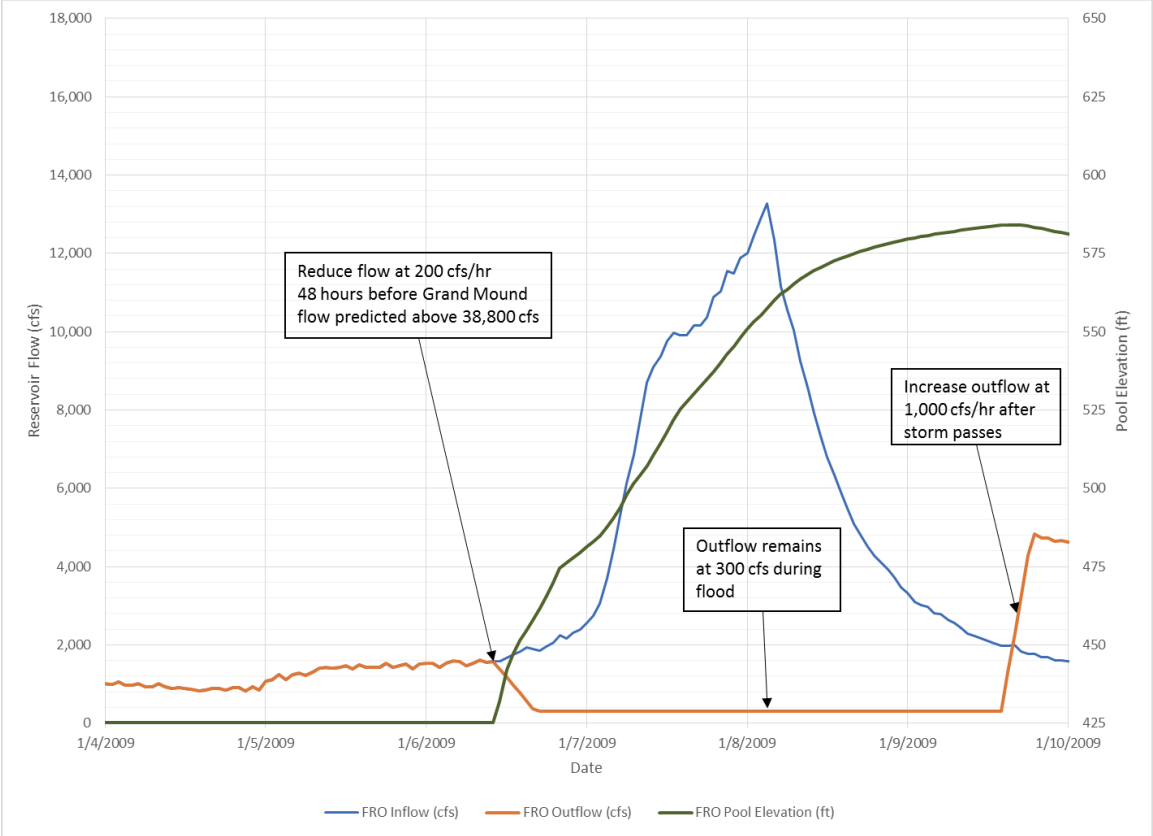


2.2.2 Operations Prior to and During Floods

Once flood operations are triggered, flow retention would begin by partially closing the reservoir outlet gates. Dam outflow would be reduced at a rate of 200 cfs per hour 2 days prior to when major flooding is predicted to occur. A maximum rate of change in reservoir outflow of 200 cfs per hour was selected for this period to minimize the potential for fish stranding downstream of the reservoir. Fish stranding is the separation of fish from flowing surface water as a result of declining river stage, which has been widely documented in Washington and Oregon downstream of hydropower operations. Salmonid fry are poor swimmers and settle along shallow river margins. By pacing the reduction of outflow, the salmonids have sufficient time to re-enter flowing sections of the river (Hunter 1992). The criteria for the rate of reduction in stage due to hydropower operations along rivers is 2 inches per hour (Hunter 1992). The 200 cfs per hour rate was determined by applying a 2-inch per hour decline in river stage downstream of the dam using the HEC-RAS model developed for the Chehalis Basin Strategy (WSE 2014a). The flow rate used for that calculation was 1,000 cfs, the median flow for November to March during which most floods occur. That rate of change would be adjustable and can be adaptively managed during operations.

Dam outflows would decrease at 200 cfs per hour until reaching 300 cfs, which is the minimum outflow during flood operations. A 300 cfs flow is also a low flow that typically occurs in winter. The 300 cfs outflow would exist for only a short distance downstream of the dam as tributary inflow entering the Chehalis River would increase flows. The 300 cfs outflow would continue until the peak of the flood passes Grand Mound, which is typically 48 to 72 hours. A typical example of FRO flood operations is presented in Figure 2.2.

Figure 2.2
FRO Example Flood Operations – Prior to and During January 2009 Flood



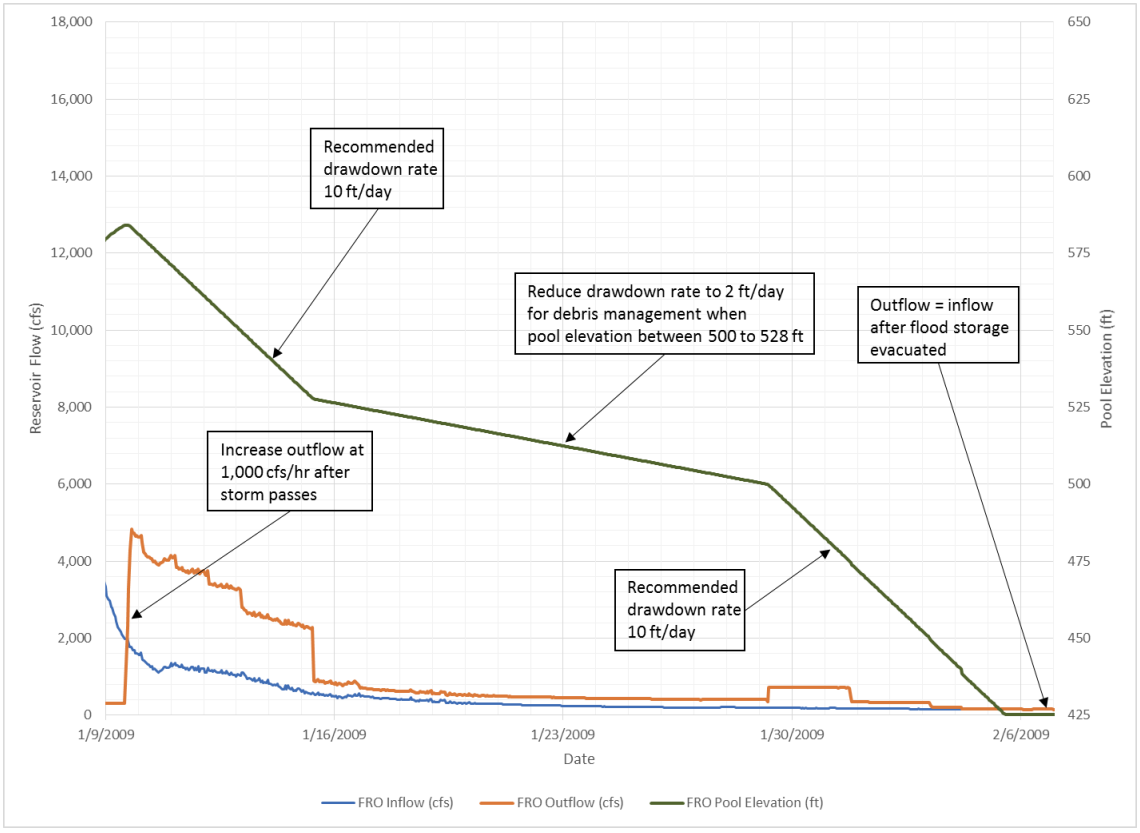
2.2.3 Initial Drawdown after Floods

In order to evacuate the reservoir, the reservoir gates would open and increase outflow by 1,000 cfs per hour, causing a drawdown of the reservoir from its peak water surface elevation. Drawdown rates would be limited to 10 feet per day (5 inches per hour) due to risks of landslides, which would limit the duration of the flow increases to about 5 hours (for the 2009 flood, as shown in Figure 2.2). A maximum outflow rate would be reached (4,830 cfs for the 2009 flood, as shown in Figures 2.2 and 2.3) in that time period and would decrease as the reservoir is drawn down because there is less storage volume per foot of drawdown as the reservoir level drops. The inflow to the reservoir during drawdown could also affect the discharge, as the greater the inflow, the greater the discharge from the reservoir.

Landslide risks come from a rapid drop in water level at a reservoir, also called rapid drawdown. External water pressure acting on the face of a slope provides a stabilizing effect. If the water level drops, the stabilizing influence is reduced, and the shear stresses within the soil increase. When this occurs rapidly, and the pore pressures within the slope do not decline at the same rate as the outside water level, the slope is made less stable. Rapid drawdown takes place when the water level outside a slope drops so quickly that soils within the slope do not have sufficient time to drain. This is a severe loading condition that can cause failure of slopes that are stable before drawdown (Duncan et al. 2014). A landslide evaluation was completed by Shannon & Wilson, Inc., to identify unstable slopes in the proposed reservoir area that could be affected by the rising and falling of reservoir water levels and assess the impacts the unstable slopes could have on the proposed reservoir. Shannon & Wilson determined that 10 feet per day is an effective drawdown rate that minimizes potential for mass slope failure (Shannon & Wilson 2014).

Figure 2.3 presents the initial drawdown rate and dam outflows, as well as the debris management operations, which is described in the next section.

Figure 2.3
FRO Example Flood Operations – Drawdown after January 2009 Flood

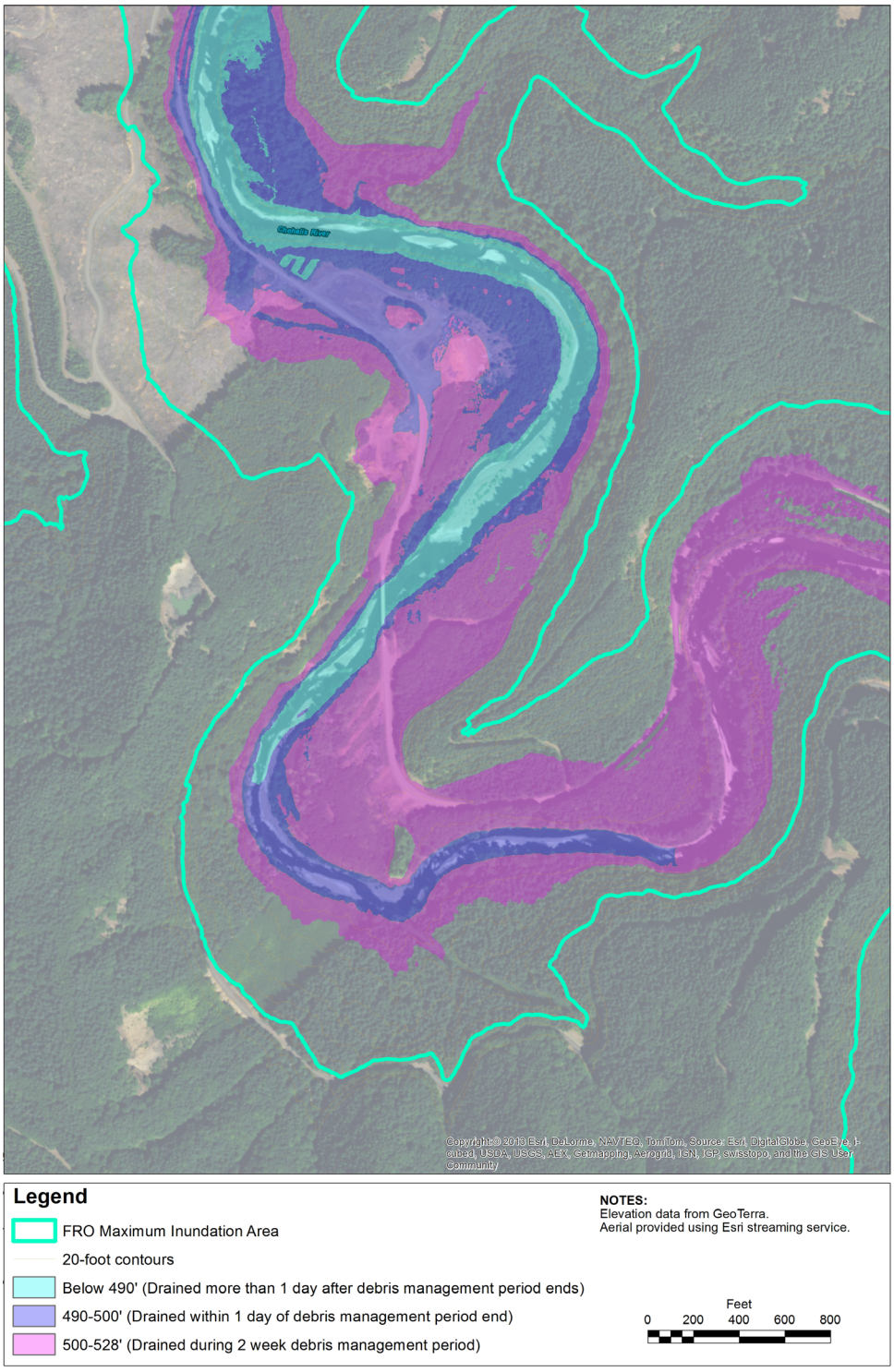


2.2.4 Debris Management

When major floods and reservoir operations occur, debris from tributaries and hillsides surrounding the reservoir would be transported into the reservoir. Estimates of debris loading were prepared (Watershed GeoDynamics and Anchor QEA 2014; Dubé 2016). The concern is that large wood debris could affect the operations of the dam by obstructing the outlets. Some debris can pass through the outlets (estimated to be sizes up to 3 feet in diameter and 15 feet in length) but large accumulations are expected during flood operations.

Debris management procedures are included in the Operations Plan so that large debris entering the reservoir during a flood can be moved to a location where they can be transported by truck away from the reservoir. The location identified is an old sorting yard for logs previously operated by Weyerhaeuser on the west bank of the Chehalis River between river mile (RM) 109.6 and 109.9. It was selected because of its relatively flat topography, ground elevation, and proximity to existing roadways. Figure 2.4 presents a map of the specified location.

Figure 2.4
Sorting Yard Location



The log sorting yard provides a favorable location for boats to manually move large debris for handling. To give boats time to move logs to the sorting yard location, drawdown rates would be slowed to 2 feet per day (1 inch per hour) for a 2-week period. The decrease in drawdown rate would occur when the storage pool elevation reaches approximately 528 feet. At a storage pool elevation of 528 feet, debris could be readily moved to the designated sorting yard. After corralling the debris onto the sorting yard location, drawdown would continue and the sorting yard would no longer be inundated. Debris can then be either cut-up and disposed of or wood suitable for habitat projects in the Chehalis Basin can be sorted and trucked out of the reservoir area. The removal of the wood debris can occur well after the reservoir is drained and when the ground dries out enough to allow heavy equipment onto the sorting yard. The operation of the reservoir (length of time water is retained) to manage debris accumulations would be adaptive and depend on the amount of wood accumulated and the ability of operations personnel to move wood to the sorting yard location. The length of time the reservoir holds water may be shorter or longer than described in this Operations Plan.

2.2.5 Drawdown after Debris Management

Drawdown rates would increase to 10 feet per day (5 inches per hour) when debris management operations have concluded and the storage pool elevation reaches 500 feet, the ground elevation of the sorting yard. Drawdown rates would continue at this rate until the storage pool is emptied (pool elevation of 425 feet). At this point, the reservoir would no longer be impounding water and the Chehalis River would return to a free-flowing state.

2.2.6 Operations Outside of Flood Storage Periods

FRO operations would be triggered by prediction of a major flood at the Grand Mound gage. Outside of that period, the inflow to the reservoir would be discharged through the dam without regulation for flows up to 15,000 cfs, which is the capacity of the tunnels at the top (crown) of the tunnel openings. A flow of 15,000 cfs has a recurrence interval of 13 years at the dam site. For flows greater than 15,000 cfs some ponding would occur at the entrance to the tunnels, causing a small reduction in peak flows as additional head (water surface elevation) is needed to discharge flows greater than 15,000 cfs through the tunnels. The outlet tunnel rating curves are contained in the *Draft Combined Dam and Fish Passage Conceptual Design Report* (HDR 2016).

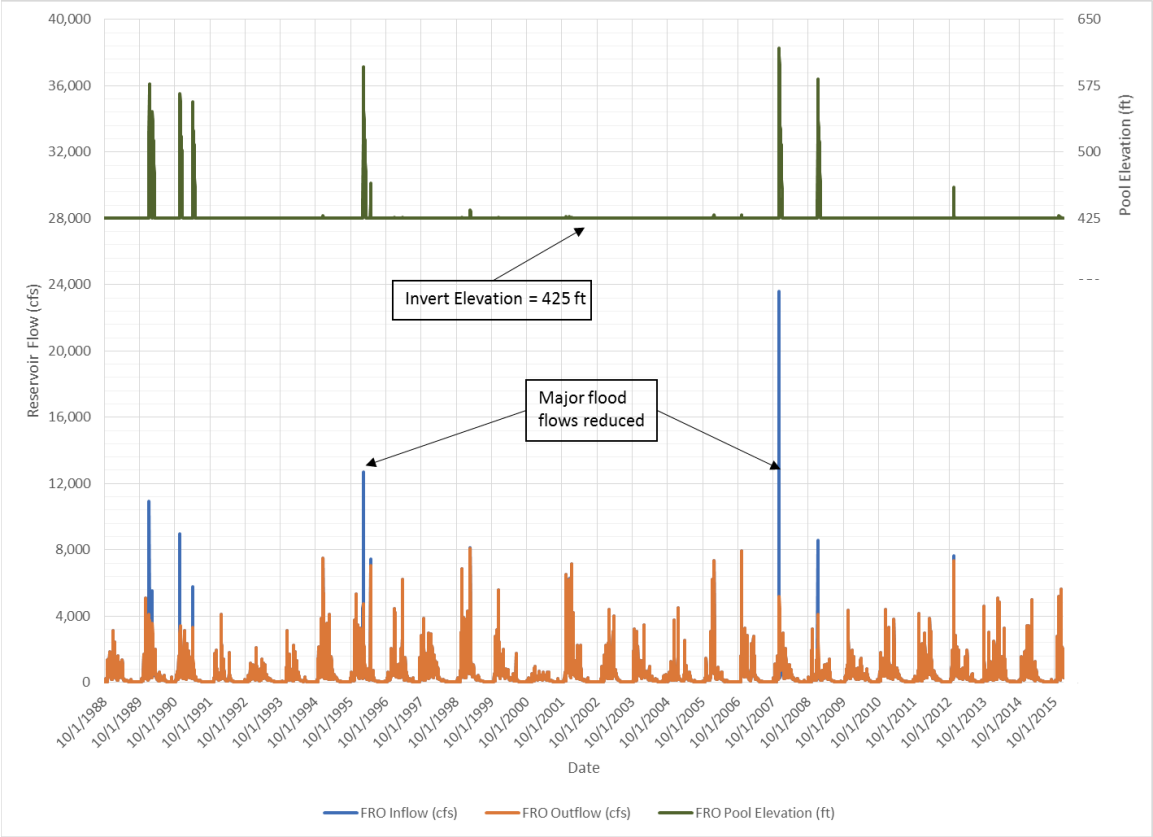
2.3 FRO Performance

The performance of the FRO facility was analyzed using HEC-ResSIM, a reservoir system simulation software program developed by the U.S. Army Corps of Engineers. The software is used to model reservoir operations at one or more reservoirs for a variety of operational goals and constraints (USACE 2013). Hydrologic data and the FRO facility Operations Plan were used to simulate reservoir operations during various historical conditions. Output results from the HEC-ResSIM model include inflow into reservoir, outflow out of reservoir, pool elevation, and storage volume.

2.3.1 Period of Record

The period of record for the historical data begins in October 1988 and extends into 2015. Chehalis River flow at the proposed dam (inflow) was estimated using the USGS gage at Doty flow record and multiplying by 66% (WSE 2014a; Anchor QEA 2016b). Reservoir outflow and pool elevation were estimated using the HEC-ResSIM model and operational rules described in previous sections and are plotted for the period of record in Figure 2.5.

Figure 2.5
FRO Operation Modeling – Water Years 1989 to 2015



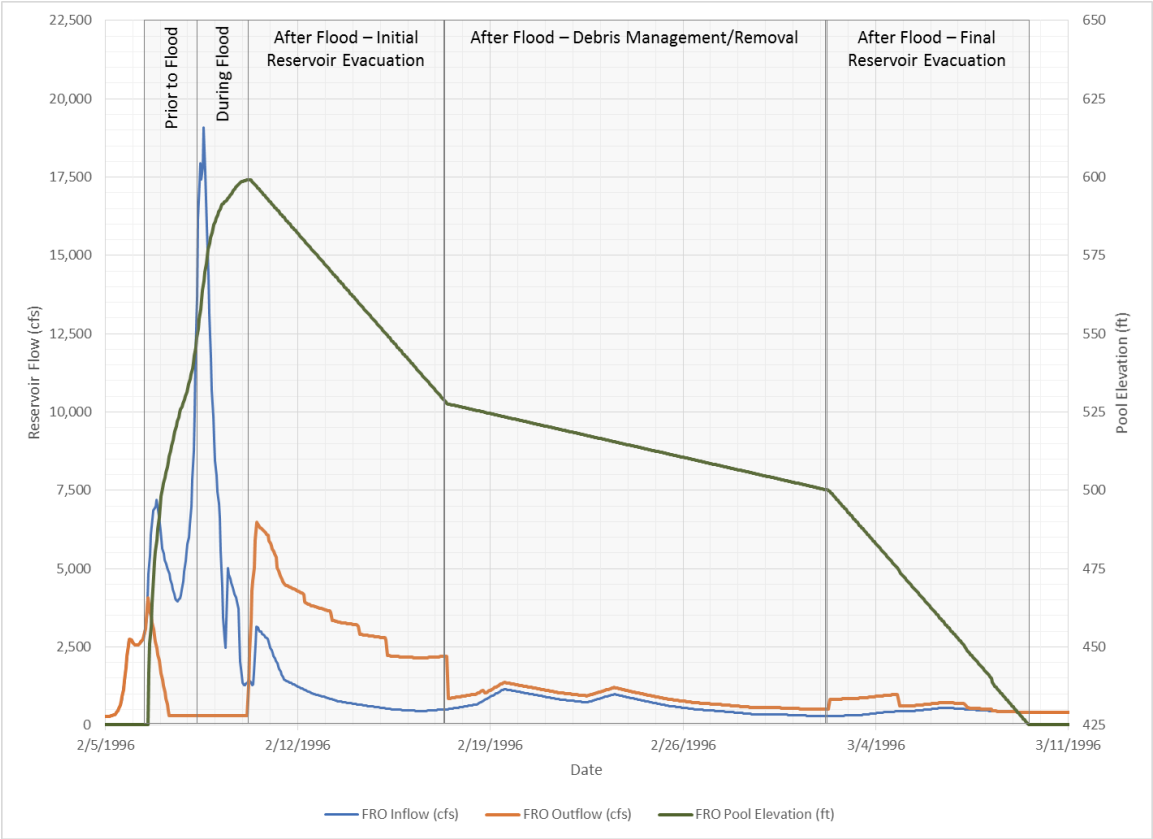
A description of the performance of the FRO facility under historical flood conditions is provided in the following sections. Three major floods are described: February 1996, December 2007, and January 2009.

2.3.1.1 1996 Flood

A 100-year flood occurred on the Chehalis River in February 1996. It was a large frontal storm with very broad rainfall distribution throughout the Chehalis River basin with 24-hour rainfall totals ranging from 10-plus to 100-plus-year recurrence. The resulting flood was the second largest in the historical record for gages at Grand Mound, Porter, and Doty (WSE 2014b). The storm caused massive flooding and closed Interstate 5 (I-5) for 4 days with peak flows in the Chehalis River at Doty reaching an estimated

28,900 cfs (Poor 2008). Figure 2.6 presents the estimated results of FRO operations during the flow conditions of the February 1996 flood.

Figure 2.6
FRO Operation Modeling – February 1996 Flood

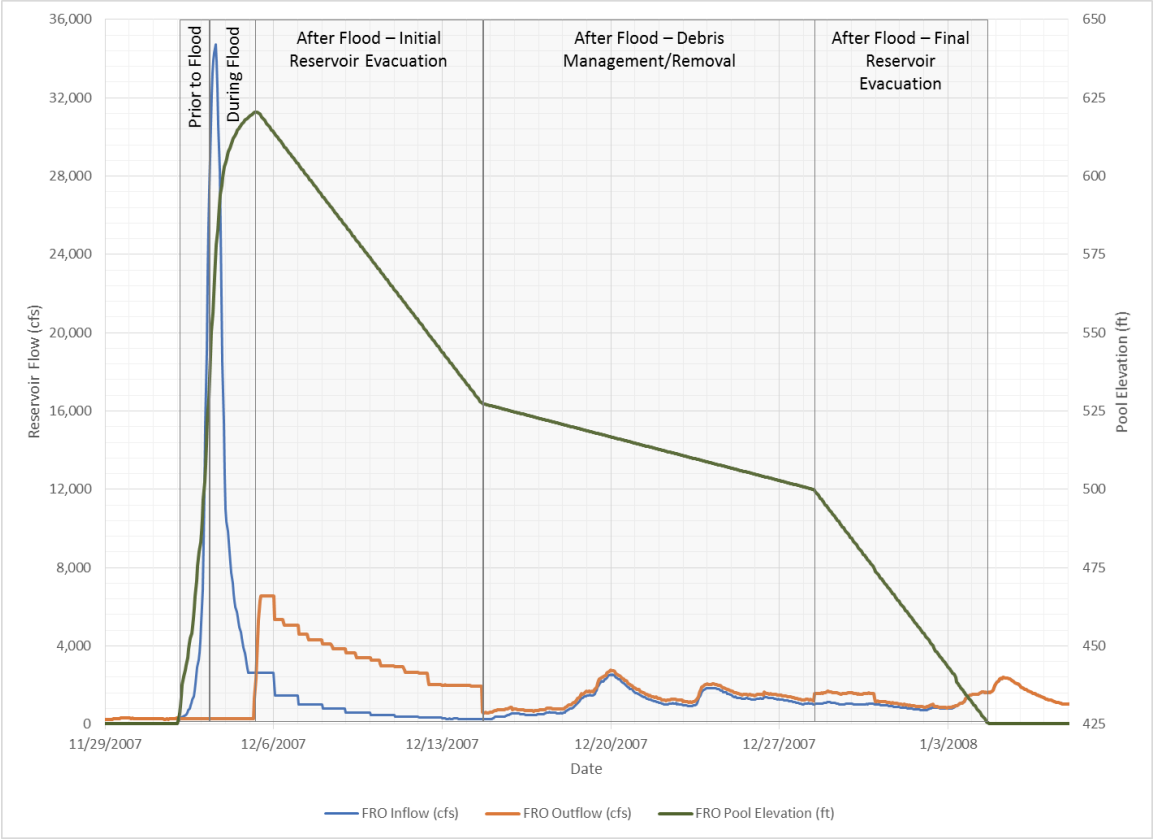


With the FRO facility, flood operations during the February 1996 flood would have lasted 30.7 days, or 736 hours. The reservoir would have been in use for just over 8.4% of 1996. The maximum reservoir flow release with FRO operations with this flood would have been about 6,500 cfs, compared to an estimated inflow at the dam of more than 19,000 cfs. That maximum flow would have been released after flood peaks occurred downstream and would not contribute to flooding. The purpose of maximizing the flow release after a flood would be to maintain geomorphic processes in the Chehalis River downstream of the dam. The FRO facility would have decreased peak flows at the dam area by more than 60%. The reservoir would have inundated 650 acres at peak storage, inundating almost 6 miles of the Chehalis River while storing a maximum volume of 44,500 acre-feet during the storm. Pool elevations during the storm would have ranged from 425 to 600 feet with a median pool elevation estimated at 515.7 feet. An analysis of peak flow reduction at Grand Mound was also completed with a HEC-RAS model. Preliminary results indicate that the FRO operations would reduce peak flows at Grand Mound by nearly 15% from 73,300 to 63,200 cfs (WSE 2014a; Karpack 2016b).

2.3.1.2 2007 Flood

Record rainfall in the upper Chehalis Basin caused significant flooding throughout the Chehalis River in December 2007. Flooding inundated I-5, closing it for several days (WSDOT 2014). The 2007 flood had a narrower path of rainfall than the broad Basin-wide rainfall experienced in 1996. The highest rainfall was concentrated in the Willapa Hills in the upper Chehalis Basin. The 2007 storm set records for 24-hour precipitation in the upper Chehalis Basin at gages in Grand Mound, Porter, Doty, and South Fork Chehalis. Peak discharges on the Chehalis River at Doty reached an estimated 52,600 cfs (nearly double the peak flows in the 1996 flood) and was approximately 50% greater than the current estimate of the 100-year flood (WSE 2014b). Figure 2.7 presents the predicted results of FRO operations during the 2007 flood.

Figure 2.7
FRO Operation Modeling – December 2007 Flood



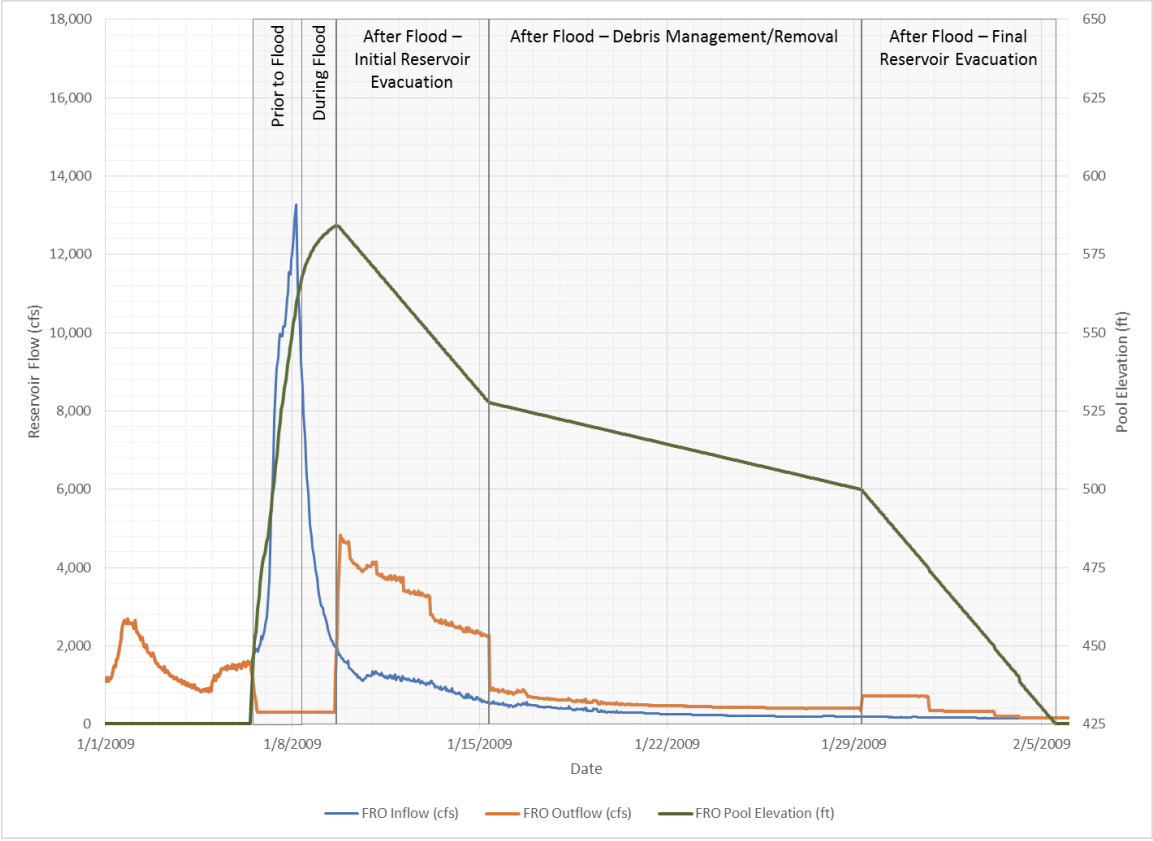
With FRO operations, flood operations during the December 2007 flood would have lasted 32.3 days, or 776 hours. The reservoir would have been in use for just over 8.8% of 2007. The maximum reservoir flow release would have been about 6,500 cfs, compared to an estimated inflow at the dam of more than 34,700 cfs. The maximum flow would be released after peak flows occur in downstream areas. The FRO facility would have decreased peak flows at the dam area by more than 80%. The reservoir would have inundated 778 acres at peak storage, inundating more than 6 miles of the Chehalis River while storing a

maximum volume of 60,253 acre-feet during the storm. Pool elevations during the storm would have ranged from 425 to 620 feet, with a median pool elevation estimated at 516.7 feet. An analysis of peak flow reduction at Grand Mound from FRO operations was also completed with a HEC-RAS model. Model results indicated that the FRO operations would have reduced peak flows at Grand Mound by more than 27% (from 71,100 to 52,100 cfs) during the 2007 flood (WSE 2014a).

2.3.1.3 2009 Flood

Heavy rainfall in the eastern and northern portions of the Chehalis Basin caused flooding in January 2009. A 20-mile stretch of I-5 was inundated under several feet of water and with mountain passes closed because of weather conditions; no formal detour information was available. Flooding of I-5 was caused by high flows on the Newaukum system, which peaked well in advance of the arrival of the peak Chehalis River flow from the upper Chehalis Basin. Many of the lower Chehalis Basin tributaries, such as the Satsop, Black, and Wynoochee rivers, experienced high flows with rainfall more concentrated in the northern portion of the Chehalis Basin than previous storms. Considering the high flows from lower tributaries, the January 2009 flood is estimated to be the second largest flood in the historical record downstream of Montesano (WSE 2014b). Figure 2.8 presents the predicted results of FRO operations during the flow conditions of the January 2009 flood.

Figure 2.8
FRO Operation Modeling – January 2009 Flood



With FRO operations, flood operations during the January 2009 flood would have lasted 28.7 days, or 690 hours. The reservoir would have been in use for just over 7.9% of 2007. The maximum reservoir flow release with FRO operations would have been about 4,800 cfs, compared to an estimated inflow at the dam of about 13,300 cfs. The maximum flow would be released after peak flows occur in downstream areas. The FRO facility would have decreased peak flows at the dam area by more than 64%. The reservoir would have inundated 576 acres at peak storage, inundating 5.4 miles of the Chehalis River while storing a maximum volume of 34,830 acre-feet during the storm. Pool elevations during the storm would have ranged from 425 to 584 feet, with a median pool elevation estimated at 513.5 feet. An analysis of peak flow reduction at Grand Mound was also completed with a HEC-RAS model. It is estimated that the FRO operations would have reduced peak flows on the Chehalis River at Grand Mound by more than 15% from 58,700 to 48,600 cfs.

2.4 Flow Exceedance Calculations

Flow exceedance curves were calculated for existing conditions and with the FRO facility in operations. The curves are shown in Figure 2.9. The curves are based upon hourly flows recorded at the Doty gage for the 27-year period of record that was used in the operations modeling. As described in the *Stream Gage Comparison for Reservoir Hydrologic Model* technical memorandum (Anchor QEA 2016b) the Doty gage flow record was multiplied by 66% to estimate flows at the proposed dam site. A newer USGS gage is located near the dam site (USGS Chehalis River at Mahaffey Creek, Site Number 12019310) but the period of record for that gage is short (2013-present) so the longer gage record from the Doty gage provides a better representation of changes in flow that would be caused by the proposed reservoir. The flow exceedance curves for existing conditions and with the FRO facility in operation at the Doty gage is presented in Figure 2.10.

With FRO operations, flows above about 5,000 cfs at the dam site and at Doty gage are reduced. Most flows (about 99%) are not significantly changed due to FRO operations.

Figure 2.9
Flow Exceedance Curve for FRO Facility at Dam Site

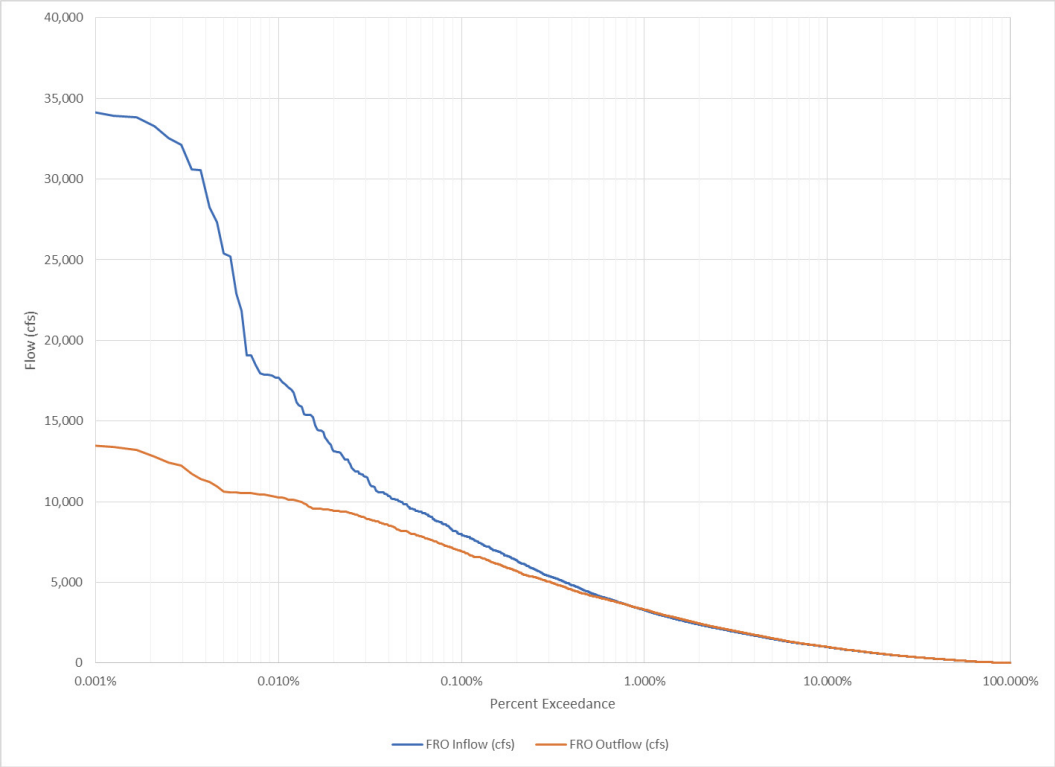
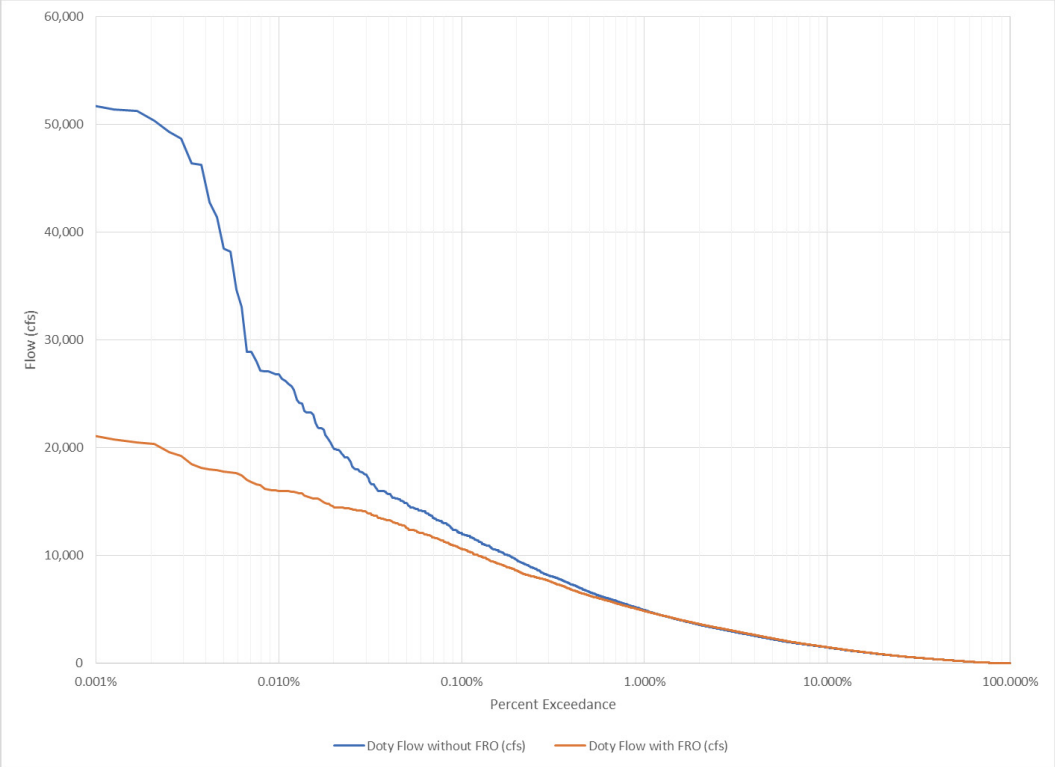


Figure 2.10
Flow Exceedance Curve for FRO Facility at Doty Gage



3 FLOOD RETENTION FLOW AUGMENTATION OPERATIONS

3.1 Introduction

The FRFA facility would operate under similar procedures as the FRO facility during major floods. Additionally, the FRFA facility would include a conservation pool that would provide a supplemental volume of storage. The conservation pool would be used to provide instream flows and cooler water in the upper Chehalis River during periods of low flow and high river temperatures, which can occur in late spring to early fall. The major considerations in developing an Operations Plan for the FRFA facility are:

- Provide flood reduction in downstream areas
- Preserve geomorphic processes downstream
- Maintain slope stability in reservoir
- Keep rate of change in flow rates downstream within accepted limits
- Provide additional instream flows and cooler water during periods of low flow

The three stages of operation are listed as follows and described in the following sections:

- Flood retention operations
- Non-flood operations and conservation pool filling
- Flow augmentation operations

3.2 Stages of Operation

3.2.1 Flood Retention Operations

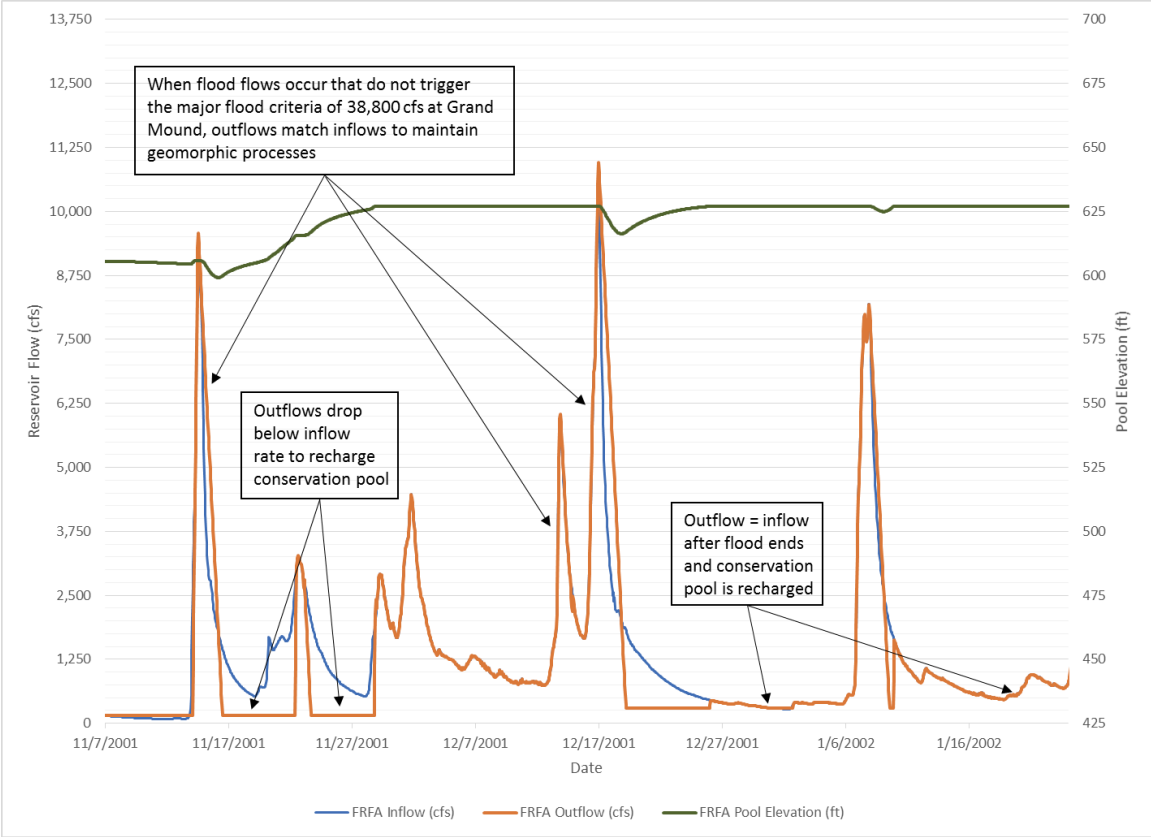
The FRFA facility would operate the same as the FRO facility during major floods, except the FRFA facility would not need to reduce the reservoir drawdown rate after a flood for debris management as a permanent pool would exist, allowing debris removal over a longer time period. The reservoir would typically be drawn down after a flood to the conservation pool level (elevation 628 feet) using a maximum drawdown rate of 10 feet per day. The reservoir operations after a flood would be managed adaptively to minimize environmental impacts. This could include releasing high flows to transport sediment or wood in the Chehalis River downstream of the dam and to maintain the current channel geomorphology.

3.2.2 Non-flood Operations and Conservation Pool Filling

The FRFA facility includes a conservation pool of 65,000 acre-feet and a flood storage pool with 65,000 acre-feet of capacity (same as the FRO facility). The conservation pool's primary purpose is storage for flow augmentation and temperature reduction in the Chehalis River downstream of the dam. Pool elevations in the conservation pool would range from 425 to 628 feet. The length of the conservation pool when it is full is 6.3 miles. Inflow into the FRFA facility would fill the conservation pool in late fall and winter. During filling operations, it would be desirable to release frequently occurring high flows to preserve geomorphic processes in the Chehalis River downstream of the dam. Operations analyses were performed assuming flows exceeding the annual flood would be released when annual floods or greater are experienced. The 1.01-year frequency peak flow (annual flood) at the Doty gage is 4,300 cfs (WSE 2014c). The expected flow rate at the dam would be 66% of that peak flow, or 2,800 cfs.

The operating rule used in reservoir operations modeling was to match peak flows for small floods (2,800 cfs and greater) except when the reservoir needs to retain water during major floods. After the peak of the small flood occurs, the outflow would be reduced at a rate not to exceed 200 cfs per hour until the minimum flow releases are reached. Those minimum flow releases are described in the following section. The minimum flows would be released until the next peak flow occurs or until the conservation pool is filled (elevation 628). When the conservation pool is full the inflow and outflow from the reservoir would be the same, unless a major flood is experienced. Figure 3.1 presents a graphical representation of the FRFA operations during frequently occurring floods.

Figure 3.1
FRFA Hourly Flows and Elevations – Frequent Flooding Operations



The FRFA facility would allow small flood peaks to pass through unregulated, then fill the conservation pool. This operation helps maintain natural geomorphic processes in the river while storing water needed for low-flow releases. The same forecasting tool described in Section 2.1 (Northwest River Forecast Center) would also be used to predict frequently occurring floods and operations could also respond to real-time data on reservoir inflows to match small flood peaks.

3.2.3 Flow Augmentation Operations

The purpose of retaining a conservation pool in the FRFA facility is to improve instream flow and reduce temperatures in the Chehalis River downstream of the dam location. The conservation pool is 65,000 acre-feet. The operational goal would be to have the conservation pool full in spring in order to meet flow demands that could start in late spring. Another operational goal is to have a sufficiently large (deep) conservation pool that would provide low temperature releases late into the summer. The flow releases in late spring to early fall need to be balanced with the volume remaining in the reservoir to ensure the most habitat benefit is realized with flow augmentation operations. Two scenarios for flow augmentation in late spring to early fall were reviewed and are described in the following sections.

3.2.3.1 Instream Flow Release Schedule

The primary purpose of setting minimum flow releases is to provide supplemental in-stream flow during periods of low flow (typically from late spring to early fall). During fall and winter when the conservation pool is filling, minimum flow releases may also occur; the minimum flow releases would also provide supplemental instream flow during periods of low flows in fall and winter.

An instream flow study was performed for this project in 2012 by Normandeau Associates (Anchor QEA 2012). The Physical Habitat Simulation (PHABSIM) process was used to develop a fish habitat index called weighted usable area (WUA) for various reaches in the Chehalis River from the dam site to Porter. WUA estimates the amount of habitat available to different life stages of fish at different river flows based on the fish's preferences for water depth, velocity, substrate, cover, and water temperature. WUA is reported as square feet of habitat available per 1,000 feet of river length. The process of developing PHABSIM and WUA was performed in conjunction with the Washington Department of Fish and Wildlife (WDFW) and Washington State Department of Ecology. Examples for some species and life stages are provided in Table 3.1.

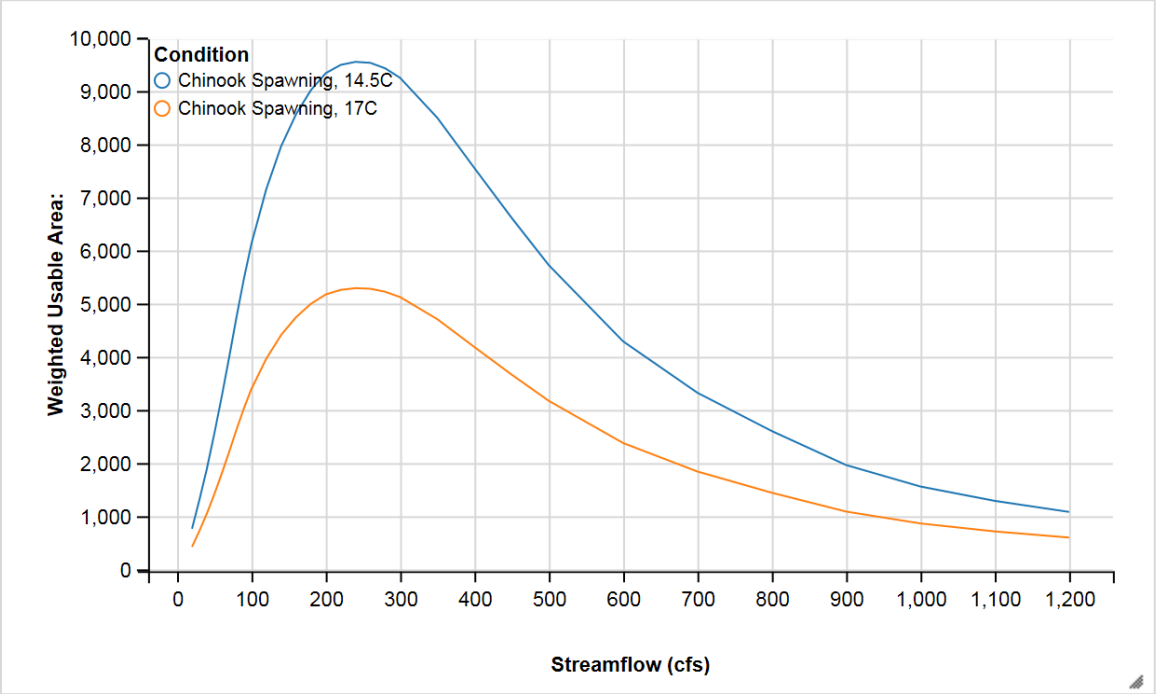
Table 3.1
Flow by Stream Reach and Life Stage Where Maximum Usable Habitat Occurs

	FLOW (cfs) AT MAXIMUM USABLE HABITAT (80% RANGE)[1]				
STUDY REACH	CHINOOK SPAWNING	CHINOOK JUVENILE	STEELHEAD SPAWNING	STEELHEAD JUVENILE	COHO SPAWNING
Dam Site to Pe Ell	160 (90 to 240)	130 (60 to 350)	190 (130 to 290)	170 (70 to 350)	220 (130 to 350)
Pe Ell to Elk Creek	260 (140 to 400)	240 (100 to 400)	300 (180 to 450)	240 (140 to 450)	350 (200 to 600)
Elk Creek to South Fork Chehalis	300 (125 to 490)	350 (150 to 650)	400 (200 to 600)	400 (200 to 750)	400 (275 to 650)
South Fork Chehalis to Newaukum R	350 (160 to 600)	450 (225 to 850)	400 (225 to 850)	550 (275 to 1,000)	500 (200 to 850)
Newaukum R to Skookumchuck R	3,200 (1,600 to 4,300)	1,800 (700 to 5,000+)	1,600 (850 to 3,000)	4,200 (1,100 -5,000+)	2,000 (700 to 3,000)
Skookumchuck R to Black R	2,200 (1,100 to 4,750)	1,000 (400 to 2,400)	700 (350 to 1,700)	1,600 (600 to 2,800)	800 (350 to 1,700)
Black R to Porter	2,000 (900 to 3,750)	800 (250 to 1,700)	600 (300 to 1,400)	900 (350 to 1,900)	600 (250 to 1,400)

Notes:
1. Range of usable habitat within 80% of the maximum in parentheses.
R = river

A shortcoming of the 2012 study was that the results were based upon a single, optimum temperature. River temperature has a large effect on the suitability of habitat. In 2015, WDFW adjusted the WUA relationships for temperature and also added species to the WUA relationships (Beecher 2015). Generally, WUA increases as water temperature decreases and streamflow increases (up to a certain limit). As an example, Figure 3.2 shows a flow to WUA relationship for two temperatures for the Chinook salmon spawning life stage in the reach between Pe Ell and Elk Creek. The WUA at 14.5°C is about 80% greater than at 17.5°C at a flow of 260 cfs (flow at which maximum usable habitat occurs; see Table 3.1).

Figure 3.2
WUA Data for Chinook Spawning in the Pe Ell to Elk Creek Study Reach



Instream flow recommendations were prepared in previous studies (Anchor QEA 2012) and carried forward in operations modeling to date. The instream flow recommendations that were used in operations modeling up to this study are shown in Table 3.2. Those recommendations did not account for temperature in the Chehalis River.

Table 3.2
Previous Recommended Instream Flows – FRFA

TIME PERIOD	FLOW
January to February	290 cfs
March to June 15	250 cfs
June 16 to August 15	190 cfs
August 16 to December 15	160 cfs
December 16 to 31	290 cfs

Temperature models for the reservoir and Chehalis River were prepared in conjunction with this report (Anchor QEA 2016a; PSU 2016). Preliminary water quality model runs completed for this Operations Plan provided the outflow temperatures for the flow rates described above. An issue found in the reservoir modeling with these flows was reservoir outflow temperatures may exceed water quality criteria in fall as the reservoir is drawn down. To improve temperature conditions in the reservoir, less water would need to be released during the low-flow season from late spring to early fall. Hydrologic analyses were conducted using HEC-ResSim to identify a flow release schedule that most closely provides the target flows given the amount of cool water available in the reservoir over the course of the year. The WUA relationships were reviewed for different release schedules (and temperatures) to improve the usable habitat downstream of the dam as much as possible. Table 3.3 presents the flow release schedule that maximizes fish habitat given the available cool water.

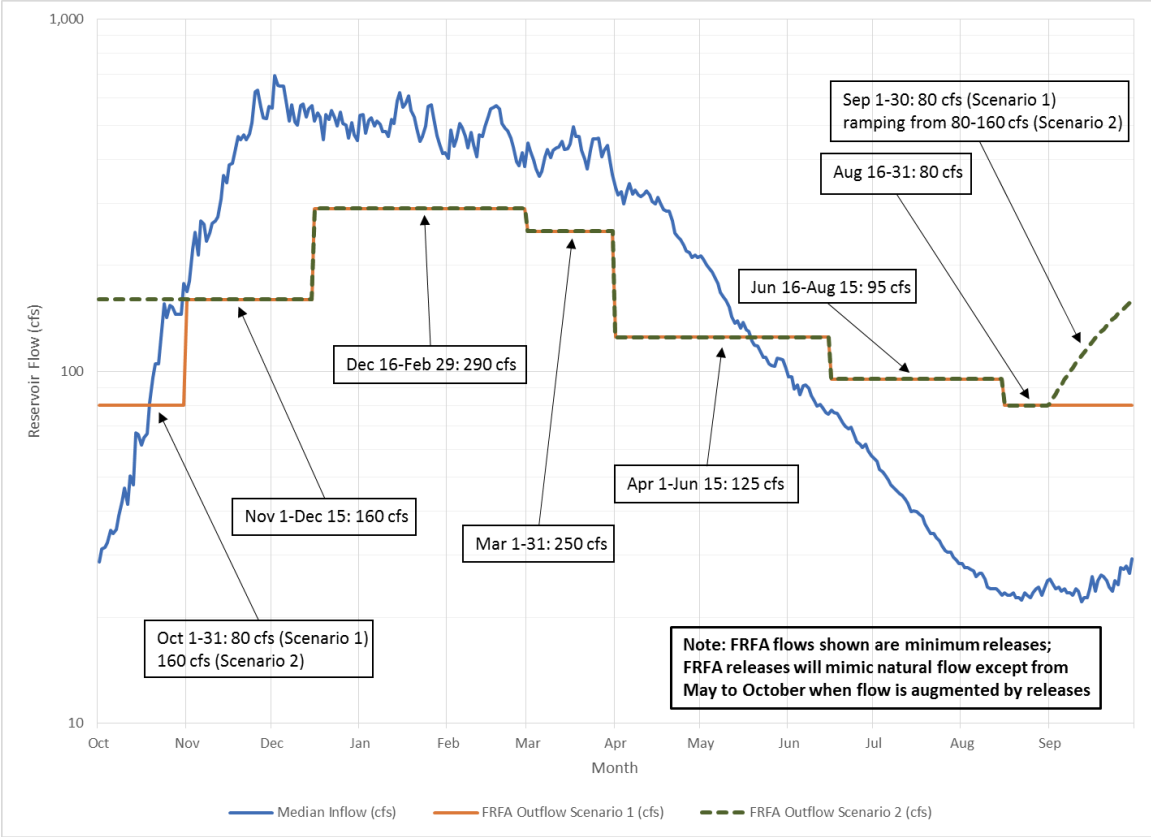
Table 3.3
Proposed Minimum Instream Flow Releases – FRFA

DATE	MINIMUM RELEASE (cfs)
January 1 to February 29	290
March 1 to 31	250
April 1 to June 15	125
June 16 to August 15	95
August 16 to 31	80
September 1 to 30	80 – 160[a]
October 1 to 31	160
November 1 to December 15	160
December 16 to 31	290

Note:
a. Flow releases ramp from 80 cfs on September 1 to 160 cfs on September 30 for Scenario 2.

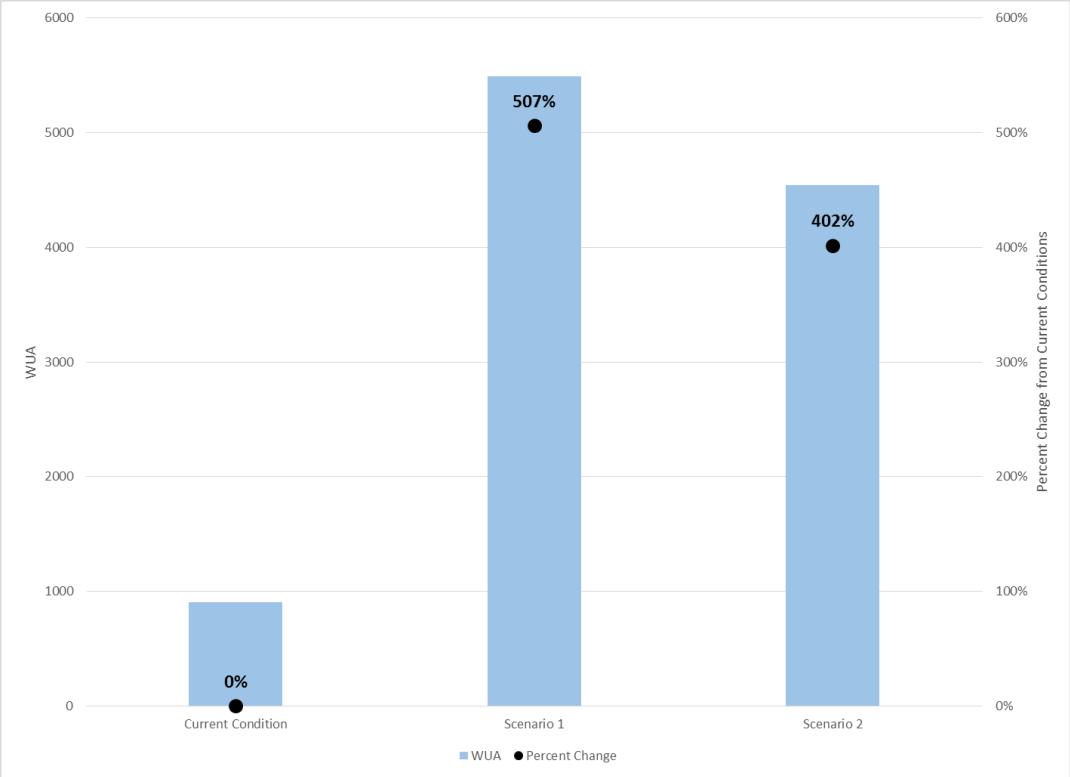
Figure 3.3 shows a comparison of median reservoir inflow to minimum instream flow releases listed in Table 3.3. The minimum flow releases shown are only the minimum to be released; the releases would often match the inflow as described in Section 3.2. The two operational scenarios are shown in Figure 3.3. They differ in that instream flows would be increased starting September 1 (for Scenario 2) to provide additional spawning habitat downstream of the dam (see Figure 3.3).

Figure 3.3
FRFA Example Flood Operations – Minimum Releases and Median Inflows



The effect of the releases on temperature in the Chehalis River are shown in Appendix A for 2013 and 2014, which were years modeled by PSU. Results are provided for Scenarios 1 and 2. A comparison of WUA for current and proposed conditions in the Chehalis River is provided in Appendix B for Scenarios 1 and 2. Figure 3.4 shows the results for one species, life stage, and reach—Chinook salmon rearing in July 2013 in the Pe Ell to Elk Creek Reach. The plot illustrates the large increase in WUA that would result from the FRFA facility downstream of the dam where temperatures are decreased significantly in late spring to early fall. Appendix B provides tables of changes in WUA for PHABSIM reaches and various species and life stages for 2013 and 2014 along the Chehalis River.

Figure 3.4
Change in WUA in Pe Ell to Elk Creek Reach for Chinook Salmon Rearing – July 2013



Based upon the flow, temperature, and WUA analyses, it is proposed that Scenario 2 be used for operations of the FRFA facility. However, the intent is to adaptively manage the operations based upon fisheries information, patterns of runoff, and temperature requirements in the Chehalis River. Scenario 2 should be viewed as a framework for operations at this stage of design for the project.

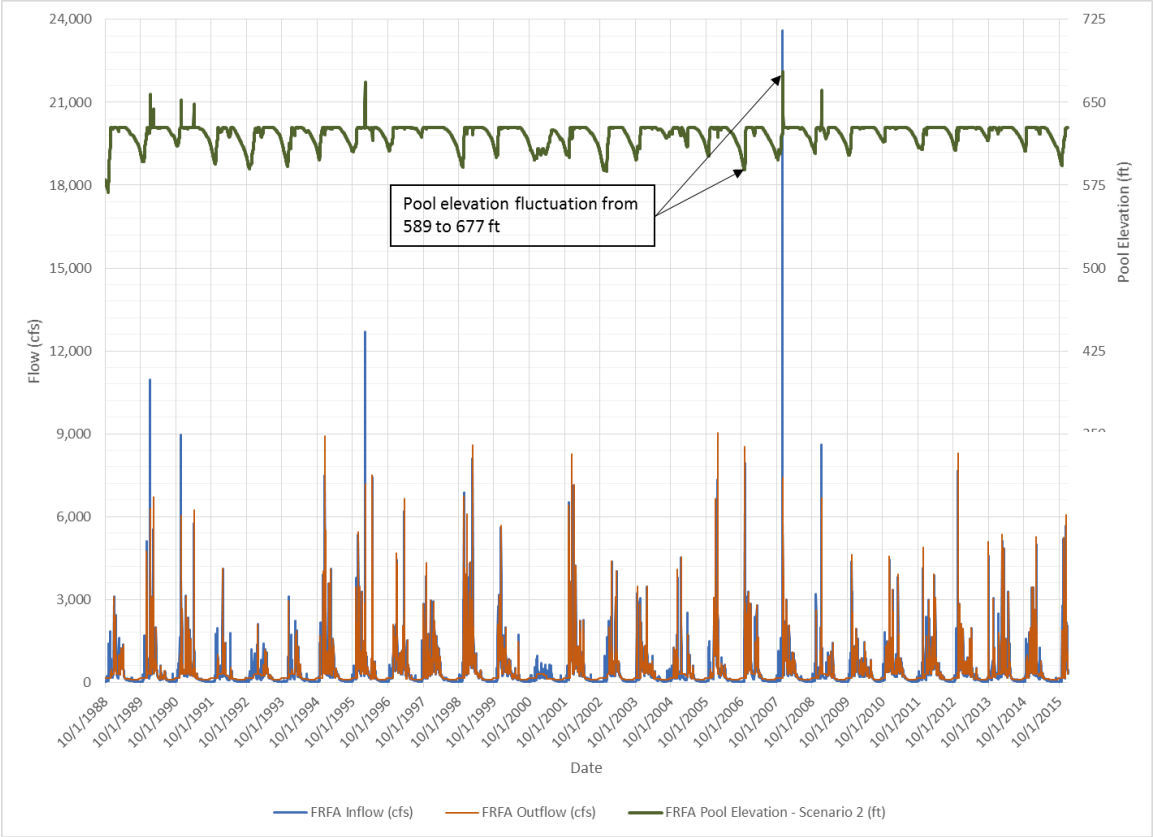
3.3 FRFA Performance

The performance of the FRFA facility operations was analyzed using the HEC-ResSIM model. Hydrologic data and the FRFA facility Operations Plan were used to simulate reservoir operations during historical hydrologic conditions. Output results from the HEC-ResSIM model include inflow into reservoir, outflow out of reservoir, pool elevation, and storage volume. Only Scenario 2 results are provided in this section, as it is the recommended operational scenario for the conservation pool.

3.3.1 Period of Record

The period of record for the historical data begins in October 1988 and extends into 2015. Modeled FRFA facility operational reservoir flows and pool elevation are plotted for the period of record in Figure 3.5.

Figure 3.5
FRFA Operations Modeling – Water Years 1989 to 2015



Storage in the FRFA reservoir would range from 36,800 to 121,700 acre-feet, with an annual minimum storage range from 36,800 to 58,800 acre-feet. The annual drawdown would range from 8 to 40 feet. The pool elevation during the period of record fluctuates between 589 to 677 feet. The full conservation pool elevation is 628 feet and the overflow (spillway) elevation is 687 feet. The pool elevation exceeds 628 feet during major floods while water is being retained. The highest pool elevation estimated during the period of record was 677 feet and occurred during the December 2007 flood. Within the 26-year period of record for the modeling analysis, seven major floods occurred that triggered flood operations. There is a 15% probability flood storage is utilized within any given year as described in Section 2.1.

3.3.1.1 Median Flows

The median flow during the period of record was computed using results of the HEC-ResSim model and the operational rules described in this section. Table 3.4 provides a comparison of existing flows in the Chehalis River below the dam to flows with the FRFA facility. The table presents the flow by month. The greatest increase would occur during the June to October time period when flow augmentation occurs. When the conservation pool is filling, flows are decreased between November and March. April and May flows are about the same for existing and with FRFA facility conditions.

Table 3.1
FRFA Median Flow – Scenario 2

MONTH	EXISTING CONDITIONS (cfs)	WITH FRFA – SCENARIO 2 (cfs)	DIFFERENCE (cfs)
January	554	485	-69
February	420	367	-53
March	442	419	-23
April	272	264	-8
May	145	134	-11
June	82	125	+43
July	40	95	+55
August	23	80	+57
September	20	120	+100
October	57	160	+103
November	371	160	-211
December	539	400	-139

During low flow years, the conservation pool storage is used to a greater extent. The large conservation pool volume ensures that even during periods of extreme low flow, the conservation pool can still provide enough water to meet instream flow needs. Table 3.5 presents a comparison of average model results to existing conditions in the Chehalis River during low flow years with a recurrence interval of 10 years.

Table 3.5
FRFA 90% (Low Flow) – Scenario 2

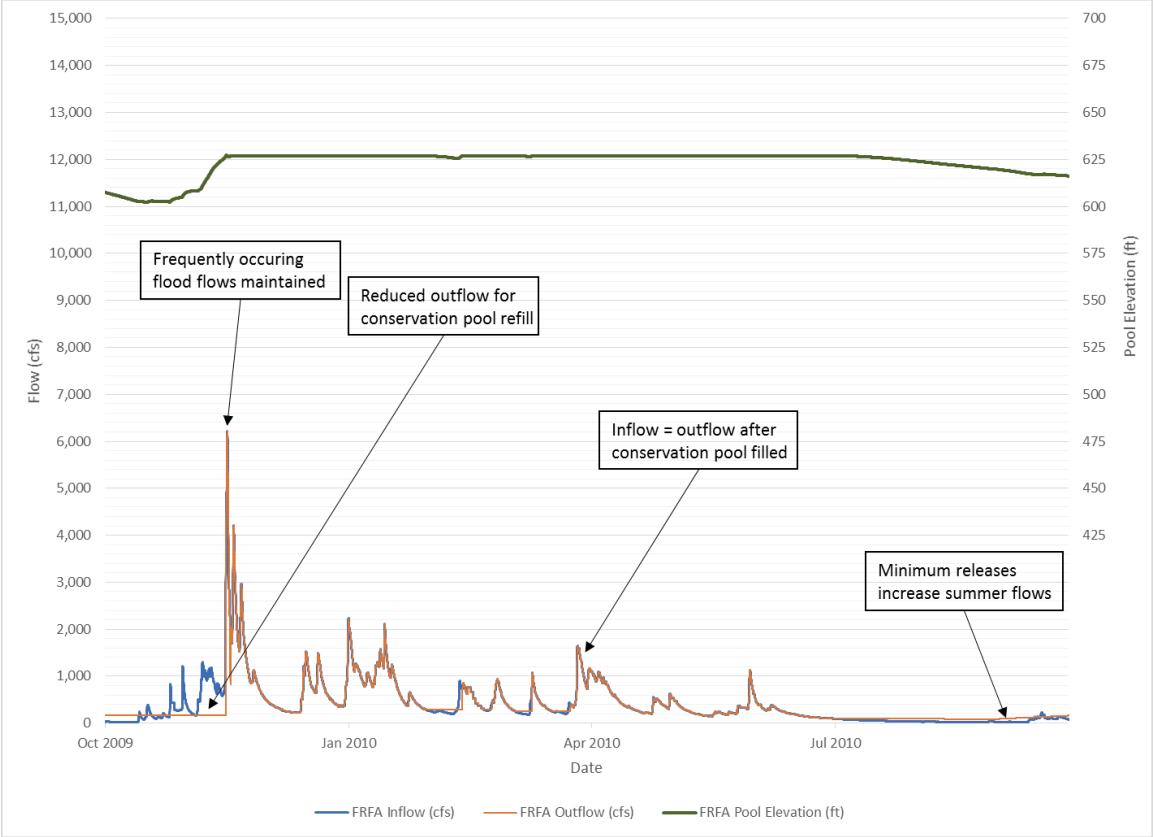
MONTH	EXISTING CONDITIONS (cfs)	WITH FRFA – SCENARIO 2 (cfs)	DIFFERENCE (cfs)
January	213	290	+77
February	153	290	+137
March	176	250	+74
April	150	125	-25
May	77	125	+48
June	46	95	+49
July	23	95	+72
August	16	80	+64
September	14	88	+74
October	16	160	+144
November	70	160	+90
December	164	160	-4

All months except for April and December would experience increases in outflow with FRFA operations to continuously keep minimum instream flows in the Chehalis River.

3.3.1.2 Non-major Flood Year (2010)

Figure 3.6 presents the model results for the water year 2010, a fairly typical non-major flood year. The conservation pool elevation varied between 600 and 628 feet. The figure illustrates that frequently occurring high flows (greater than 2,800 cfs) are preserved and how after the conservation pool is filled, the reservoir inflow equals outflow until needed for flow augmentation.

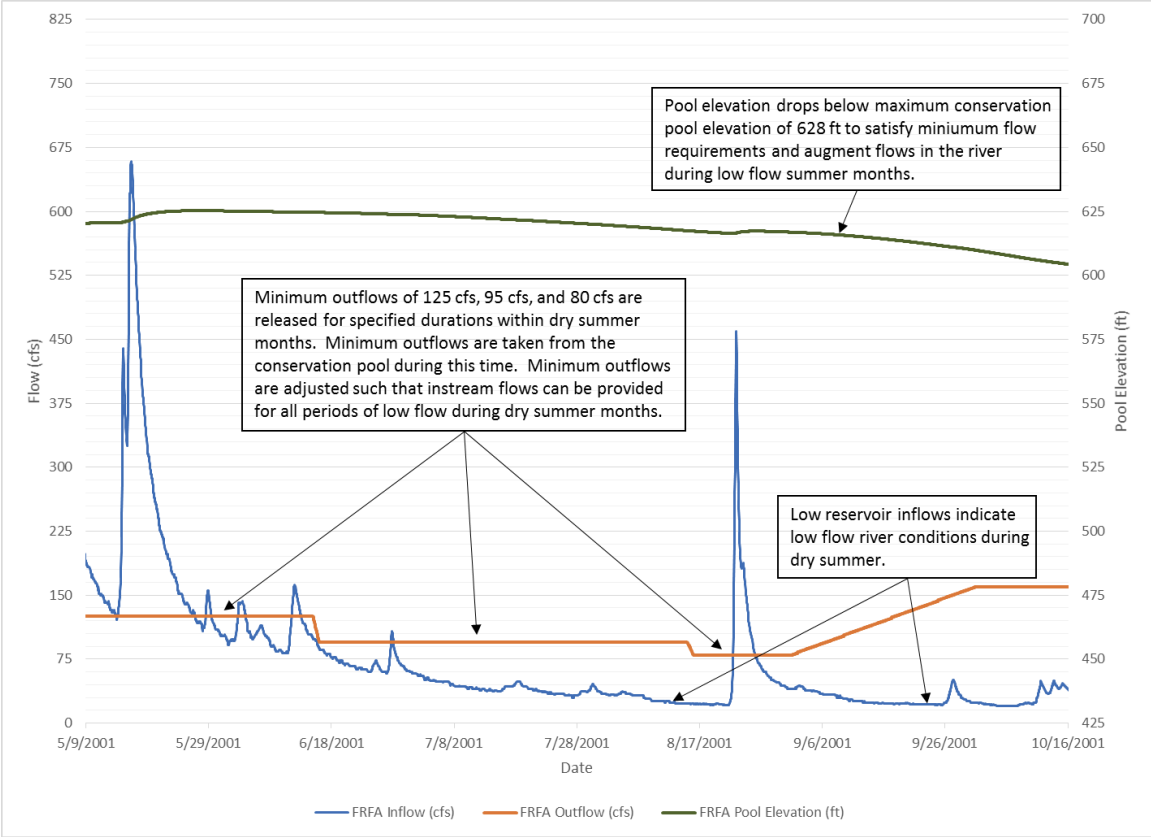
Figure 3.6
FRFA Operations Modeling – Water Year 2010



3.3.1.3 Dry Year (2001)

Winter 2001 was the worst drought in Washington since 1976. Salmon populations are affected by droughts from lower flows, creating smaller areas of rearing and spawning habitat, as well as less flow during outmigration periods and the potential for fish passage barriers due to low flow. The data from 2001 was modeled in FRFA operations to determine how flow conditions would change with FRFA flow augmentation operations. Figure 3.7 presents FRFA flows and pool elevations during a segment of 2001 when minimum flow operations are in place.

Figure 3.7
FRFA Operations Modeling – Minimum Flows During Summer 2001

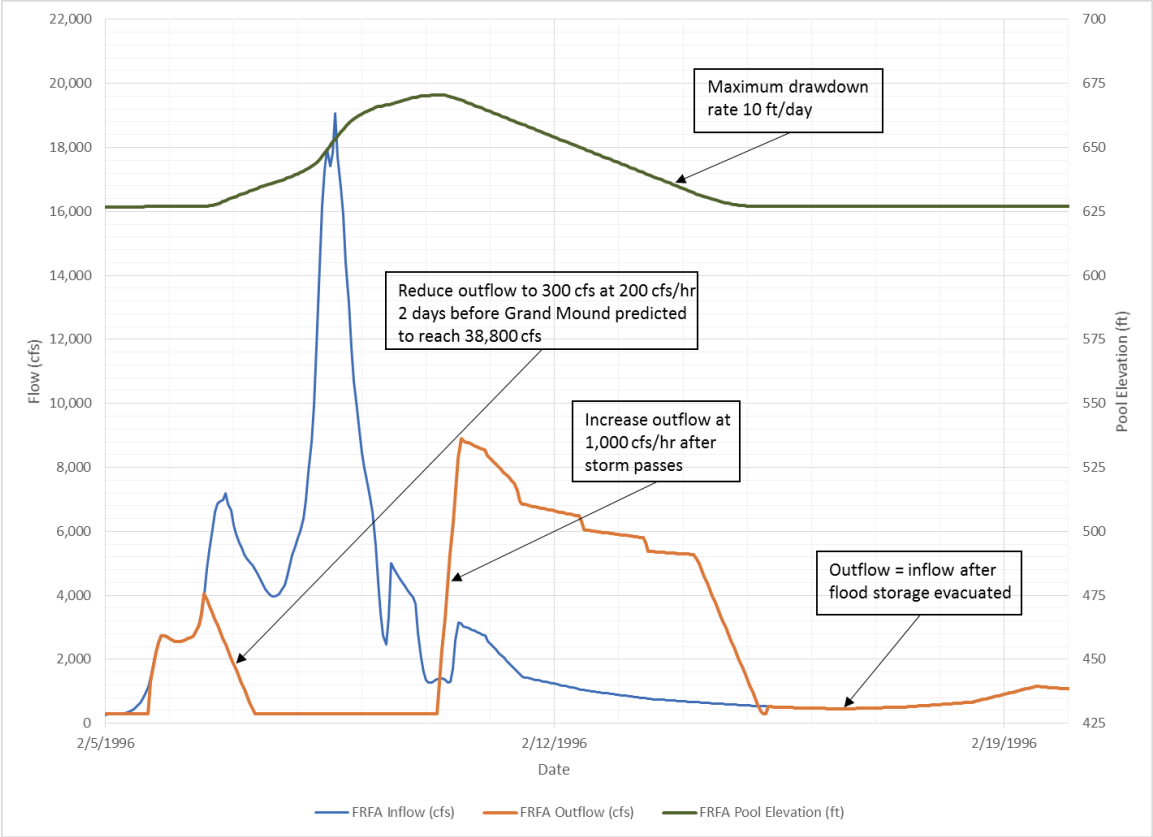


The instream flow releases during summer 2001 would have been 125 cfs from April 1 to June 15, 95 cfs from June 16 to August 15, and 80 cfs from August 16 to 31. Inflows into the reservoir from the end of May to September were historically low; therefore, water in the conservation pool would be used to supplement river flows and meet the minimum flow criteria. The pool elevation drops until a smaller flood (below major flood levels) can be used to recharge the conservation pool. Flows during summer 2001 would increase by as much as 70 to 80 cfs, increasing habitat for salmonids and other aquatic species.

3.3.1.4 1996 Flood

Figure 3.8 presents the estimated results of FRFA operations during the February 1996 flood.

Figure 3.8
FRFA Operations Modeling – February 1996 Flood

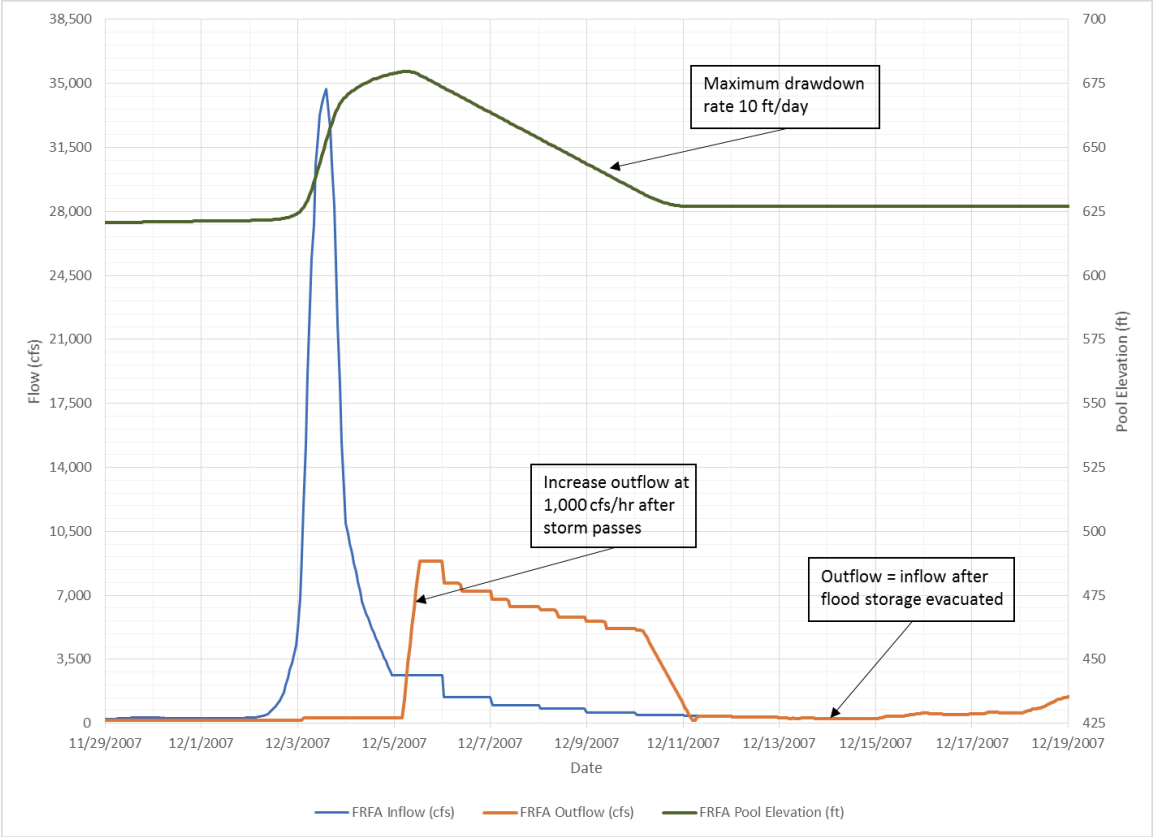


With FRFA operations, peak reservoir releases after storms would increase due to a greater amount of water available. Peak releases after the February 1996 flood would have been about 8,900 cfs for the FRFA facility, compared to 6,500 cfs for the FRO facility, which is a 38% difference. The higher releases after the flood could help maintain sediment transport conditions downstream of the dam. The peak flows would be released after the peak of the flood passes downstream areas most affected by major floods. The reservoir would inundate up to a maximum elevation of 670.5 feet, spanning a length of 7.3 miles. The reduction in peak flows downstream of the dam during this flood would be the same as presented for the FRO facility.

3.3.1.5 2007 Flood

Figure 3.9 presents the estimated results of FRFA operations during the December 2007 flood.

Figure 3.9
FRFA Operations Modeling – December 2007 Flood

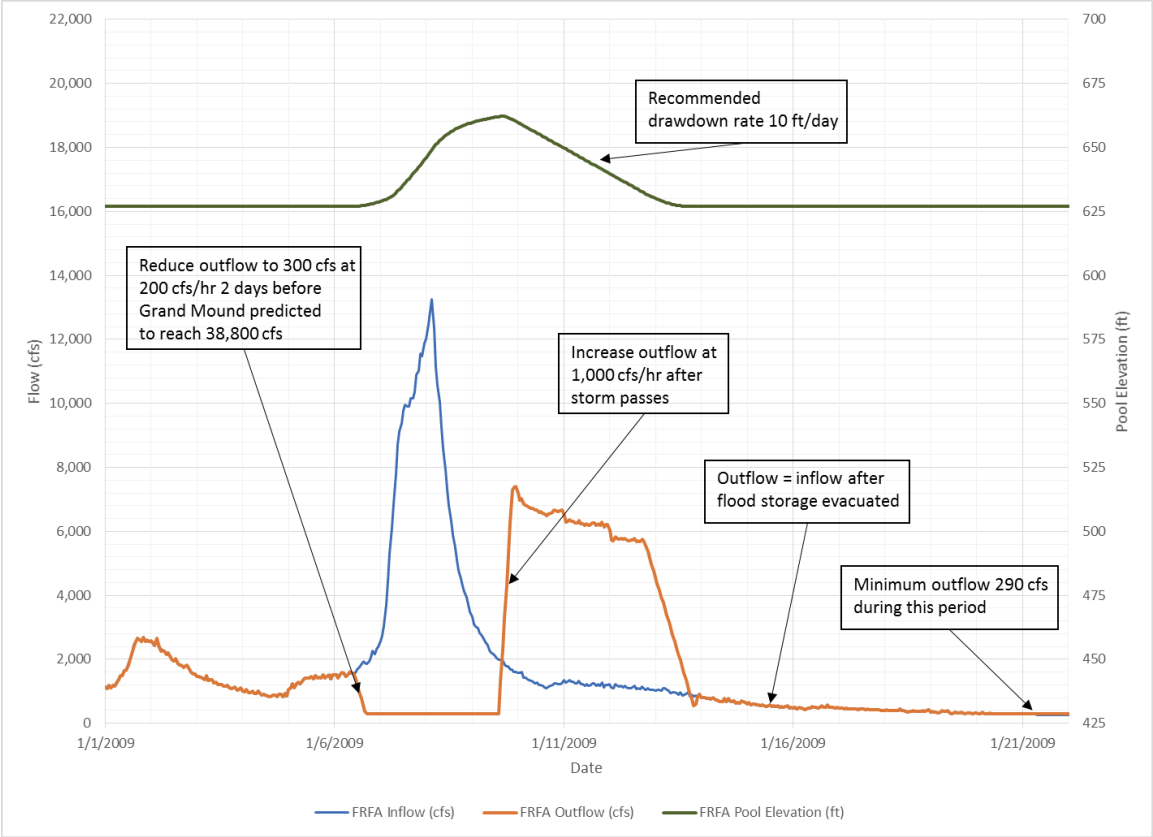


Peak releases after the December 2007 flood would have been about 8,900 cfs for the FRFA facility, compared to 6,500 cfs for the FRO facility, which is a 36% difference. The reservoir would inundate up to a maximum elevation of 683.1 feet, spanning a length of 7.6 miles. The reduction in peak flows downstream of the dam during this flood would be the same as presented for the FRO facility.

3.3.1.6 2009 Flood

Figure 3.10 presents the estimated results of FRFA operations during the January 2009 flood.

Figure 3.10
FRFA Operations Modeling –January 2009 Flood



Peak releases after the January 2009 flood would have been about 7,400 cfs for the FRFA facility, compared to 4,800 cfs for the FRO facility, which is a 53% difference. The reservoir would inundate up to a maximum elevation of 662.1 feet, spanning a length of 7.3 miles. The reduction in peak flows downstream of the dam during this flood would be the same as presented for the FRO facility.

3.4 Flow Exceedance Calculations

Flow exceedance curves were calculated for existing conditions and with the FRFA facility in operation. The curves are shown in Figure 3.11. The methodology to produce the curves was the same as described for the FRO facility. The flow exceedance curves for existing conditions and with the FRFA facility in operation at the Doty gage is presented in Figure 3.12.

With FRFA operations, about one-half of the time, flows are increased compared to existing conditions. Flows above 8,000 cfs at the dam site and 10,000 cfs at the Doty gage are significantly reduced.

Figure 3.11
Flow Exceedance Curve for FRFA Facility at Dam Site

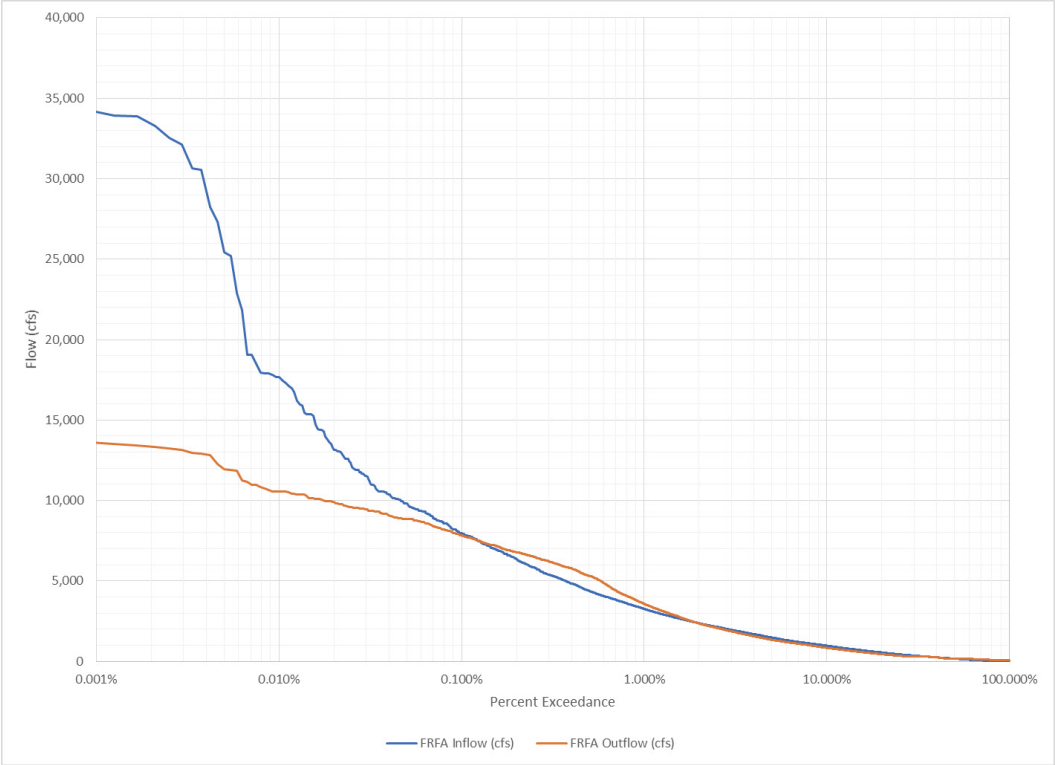
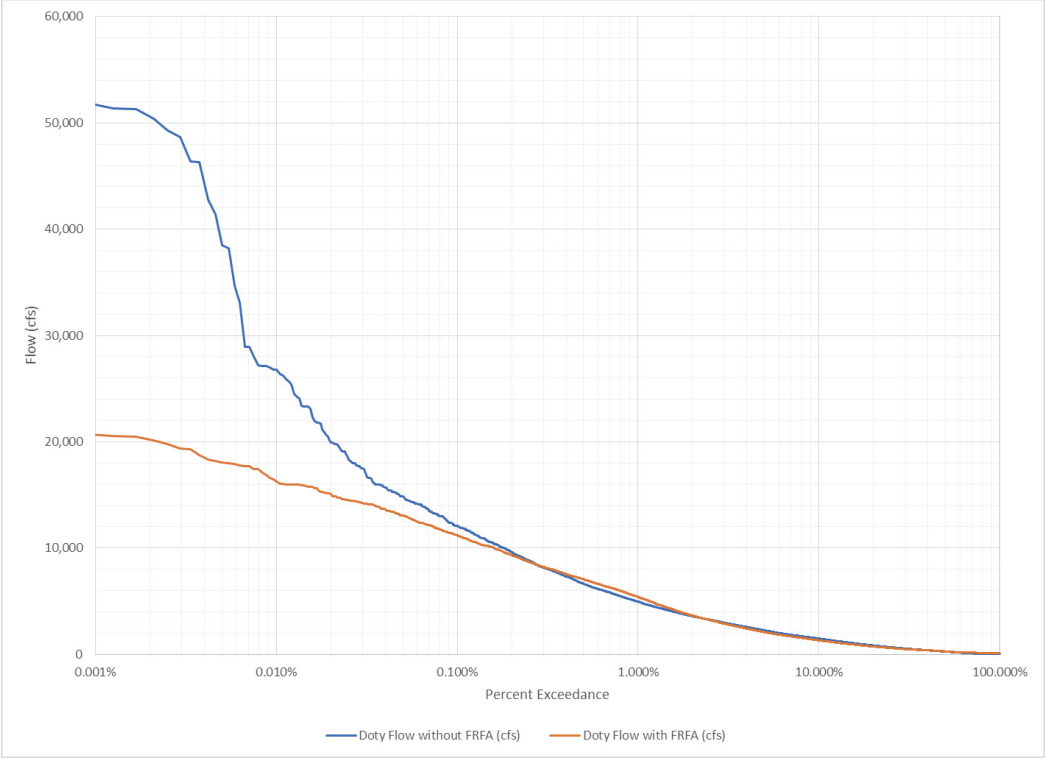


Figure 3.12
Flow Exceedance Curve for FRFA Facility at Doty Gage



4 CLIMATE CHANGE EFFECTS ON OPERATIONS

The effects of climate change on operations of the FRO and FRFA facilities were analyzed. The methodology used was to develop future inflows and run the HEC-ResSim operations model using the same operating scenarios described in previous sections. This analysis describes operations during floods for the FRO facility and annual operations for the FRFA facility. Though this analysis provides an assessment of potential impacts from climate change, we assume a flood retention facility would be operated adaptively and the operations described in previous sections may not reflect future operations.

4.1 Development of Streamflows Under Climate Change

The process for predicting future peak and non-peak stream flows was led by the Climate Impacts Group (CIG) at the University of Washington and involved assimilating and scaling data from existing forecasting models. These models included several hydrologic models and 12 different Global Climate Models (GCMs), several different future timeframes, and three different greenhouse gas emission scenarios—all of which were modified and applied to numerous sites in the Chehalis Basin (Mauger et al. 2016; Karpack 2016a). The results of the modeling produced a range of potential hydrologic responses to climate change. Discussions were held with CIG and the State and a recommendation to use a single set of hydrologic responses for purposes of the Operations Plan and related studies was agreed upon (Karpack 2016a). The approaches used by CIG in their climate change modeling are presented in Table 4.1.

Table 4.1
Methodologies Used in Climate Change Modeling

DATA	METHODOLOGY USED – PEAK FLOWS	METHODOLOGY USED – MONTHLY FLOWS
Hydrologic Model	Variable Infiltration Capacity (VIC) model	
Meteorological Inputs	Average of ten GCMs	
Downscaling	Multivariate Adaptive Constructed Analog (MACA) statistical downscaling	
Flow Bias Correction	Daily bias corrected flows	
Flow Locations	**Seven Key Sites** • Chehalis River at Doty • Chehalis River at Grand Mound • Chehalis River at Porter • Newaukum River near Chehalis • Skookumchuck River at Bucoda • Satsop River near Satsop • Wynoochee River above Black Creek	**Three Key Sites** • Chehalis River at Doty • Chehalis River at Grand Mound • Chehalis River at Porter
Historical Period	Simulations for 1951 to 2005	
Future Period	Simulations for 2040 to 2099	
Forecasted Change	Percent change in flood frequency flow	Percent change in monthly average flow

The recommended percentage increase for peak flows is presented in Table 4.2. The peak flow increases were applied to the existing peak inflows to the FRO reservoir to develop estimated future peak inflows, which are also summarized in Table 4.2.

Table 4.2
Peak Flows for Existing and Future Conditions for FRO

FLOOD OCCURRENCE	PERCENT INCREASE UNDER CLIMATE CHANGE	PEAK FLOWS (cfs)	
		EXISTING	FUTURE
2-year	16%	6,920	8,027
10-year	35%	13,061	17,633
20-year	45%	16,053	23,276
100-year	66%	24,223	40,211
500-year	94%	35,688	69,234

Multipliers for monthly flows were also derived from the CIG modeling to be used in modeling the FRFA reservoir. As with the peak flows, CIG provided a range of hydrologic responses to climate change. A recommendation to use a single set of multipliers was agreed to (Karpack 2016a). Table 4.3 lists the multipliers developed for period of record future flows at the dam site.

Table 4.3
Monthly Flow Changes under Climate Change Conditions for FRFA

MONTH	PERCENT CHANGE	MULTIPLIER
January	12.9%	1.129
February	8.5%	1.085
March	-0.6%	0.994
April	-6.2%	0.938
May	-11.1%	0.889
June	-14.9%	0.851
July	-18.3%	0.817
August	-21.5%	0.785
September	-18.7%	0.813
October	5.5%	1.055
November	5.8%	1.058
December	14.5%	1.145

4.2 Effects on FRO Operations

The 100-year floods for existing and future conditions were run through the HEC-ResSim model for the FRO facility using operations described in previous sections. Figure 4.1 shows FRO flows and elevations for the current 100-year flood, and Figure 4.2 shows FRO flows and elevations for a future 100-year flood.

Figure 4.1

FRO Flows and Elevations – Current 100-year Flood

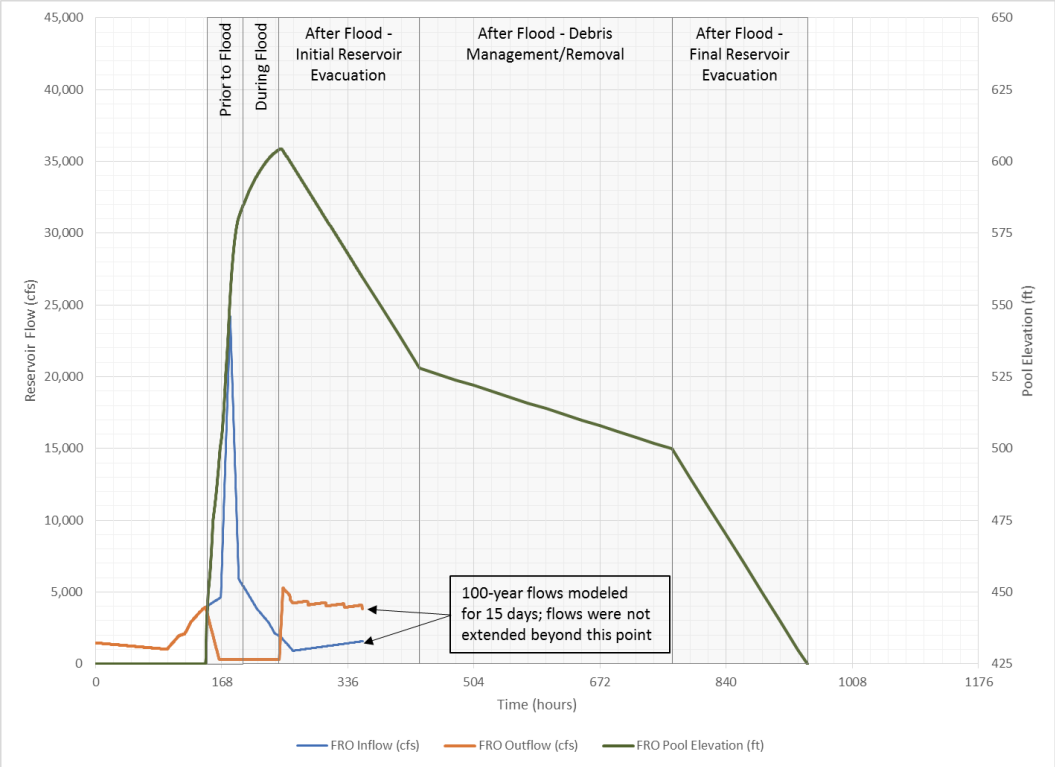
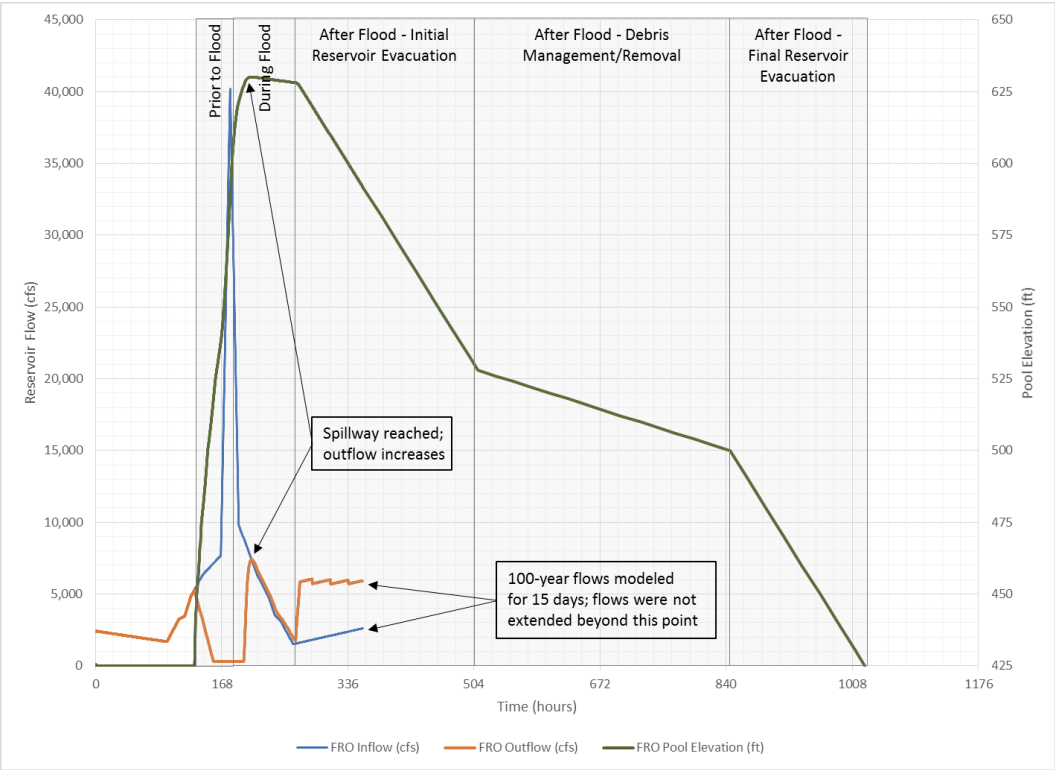


Figure 4.2

FRO Flows and Elevations – Future 100-Year Flood



The future 100-year flood under climate change conditions would cause the entire flood storage volume to be utilized. The peak stage in that flood would be 630 feet, which is 3 feet over the spillway crest. A large flood reduction benefit would still be realized, as the flow over the spillway would occur after the peak of the flood occurs and the spillway flow would still be much less than the peak inflow. Table 4.4 compares the difference in peak flows at the dam site, at Doty, and at Grand Mound for current and future conditions.

Table 4.4

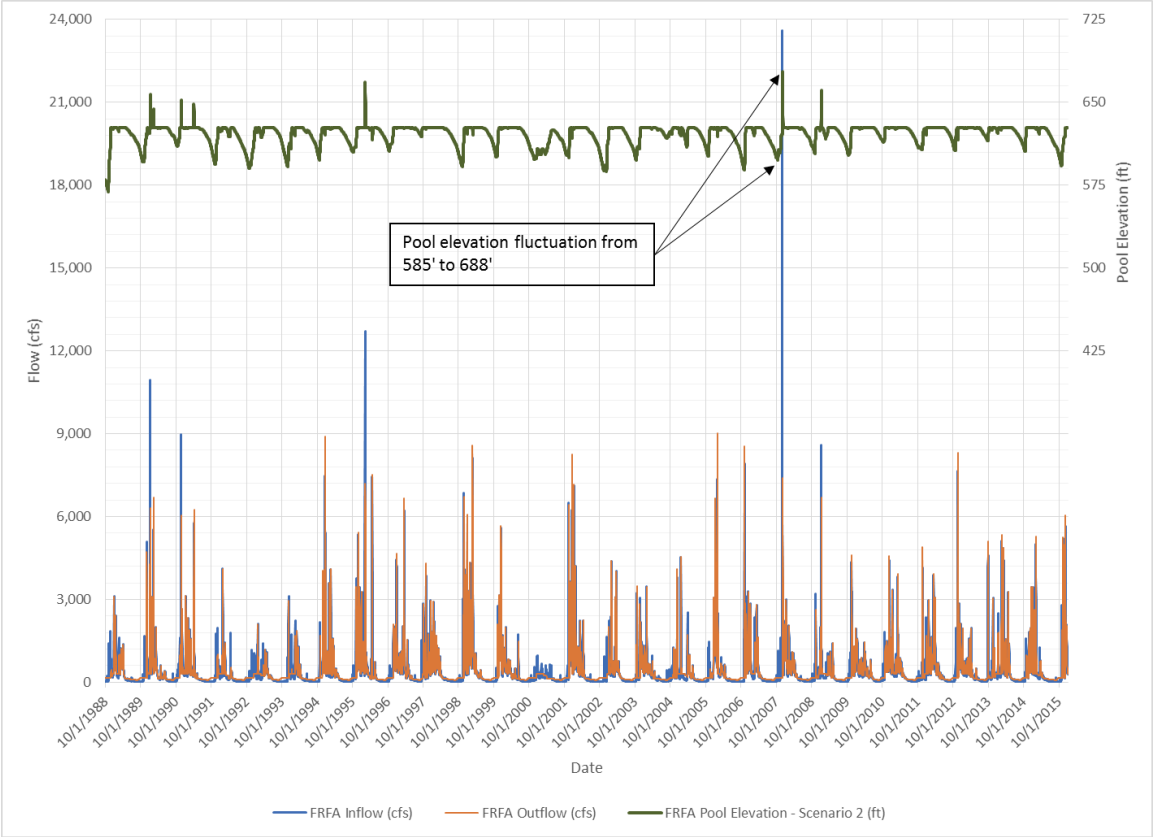
Current and Future 100-year Flood Peak Flows With and Without FRO Facility

LOCATION	ALTERNATIVE	EXISTING 100-YEAR PEAK FLOW (cfs)	100-YEAR PEAK FLOW WITH CLIMATE CHANGE (cfs)
At Dam	Without Dam	24,200	40,200
	With Dam	300	7,400
	% Difference	-99%	-82%
At Doty	Without Dam	36,700	60,900
	With Dam	12,800	21,000
	% Difference	-65%	-66%
At Grand Mound	Without Dam	75,100	137,900
	With Dam	62,900	108,600
	% Difference	-16%	-21%

4.3 Effects on FRFA Operations

FRFA operations for future conditions were simulated using the HEC-ResSim model with hourly period of record inflows adjusted using the monthly flow change multiplier described previously. Floods (such as those in 1990, 1991, 1996, 2007, and 2009) were not further modified. Modeled FRFA operational reservoir flows and pool elevation are plotted for the period of record with climate change in Figure 4.3.

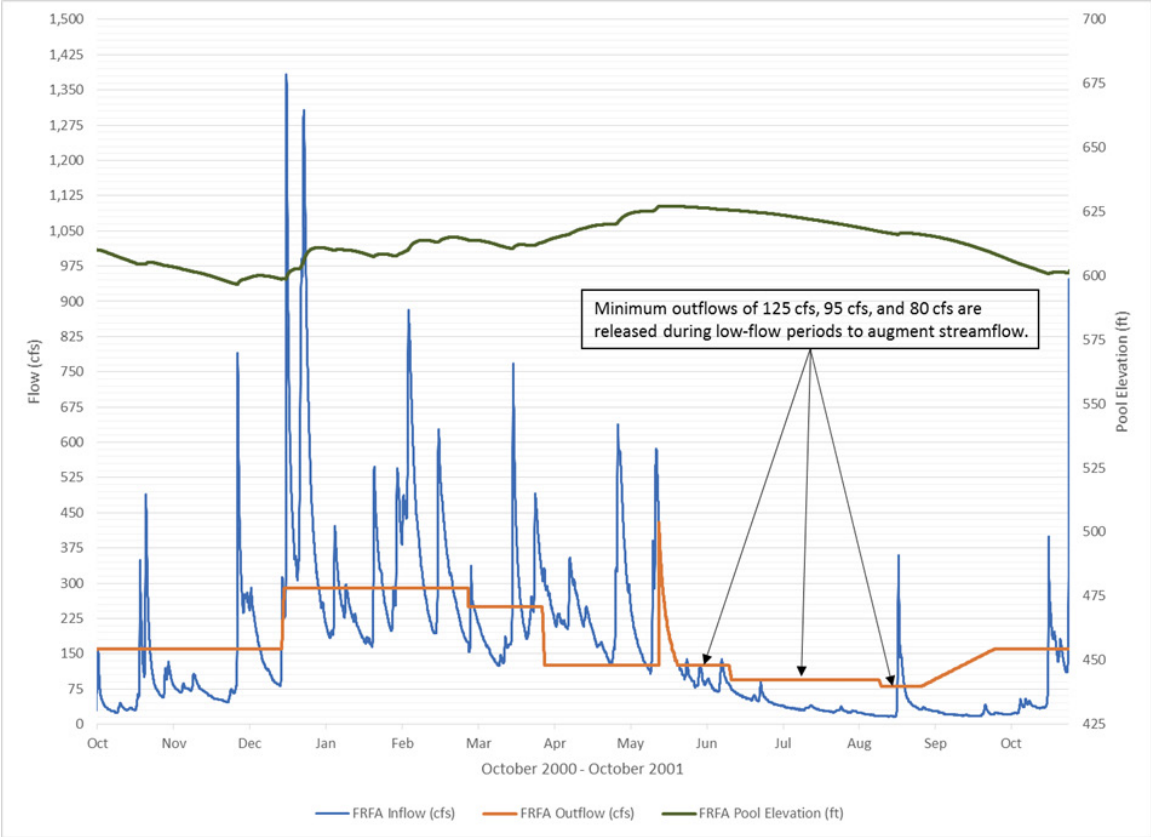
Figure 4.3
FRFA Operations Modeling – Water Years 1989 to 2015 (with Climate Change Conditions)



With climate change, the FRFA facility would drawdown to elevation 585 feet, or 4 feet lower than without climate change. The 2007 flood would have caused the pool elevation to rise enough that the spillway would be in use, which would not have been the case in existing climate conditions. Figure 4.4 shows operations during a drought year (2001 with climate change multipliers applied) illustrating that minimum outflows could be maintained through the May to October time period even with reduced inflow to the reservoir. Figure 4.4 can be compared to Figure 3.7, which shows operations during 2001 for existing climate conditions.

Figure 4.4

FRFA Operations Modeling During Drought Year (2001 with Climate Change Multipliers)



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Appendix A
Summary of Water Temperature Analyses

SUMMARY OF WATER TEMPERATURE ANALYSES PERFORMED BY PORTLAND STATE UNIVERSITY

The Washington State Department of Ecology contracted Portland State University (PSU) to develop a water quality model based on the CE-QUAL-W2 modeling framework to meet project objectives and to provide technical assistance in the use of the model. The CE-QUAL-W2 modeling framework is a water quality and hydrodynamic model in 2-D (longitudinal-vertical) for rivers, estuaries, lakes, reservoirs, and river basin systems. It models basic eutrophication processes, such as temperature-nutrient-algae-dissolved oxygen-organic matter and sediment relationships. For the Chehalis Basin project, PSU developed input data and calibrated a model for temperature (and dissolved oxygen) for the Chehalis River from the proposed retention structure site upstream of the town of Pe Ell to the downstream outlet of Water Resource Inventory Area (WRIA) 23 at the U.S. Geological Survey (USGS) gage in Porter, WA.

Preliminary results were obtained for river conditions in 2013 and 2014. PSU modeled conditions in 2013 and 2014 for existing conditions, flood retention flow augmentation (FRFA) Scenario 1, and FRFA Scenario 2 conditions. The results from the model were analyzed in order to compare water quality results between all three conditions. The data was averaged by month; Tables A.1 through A.4 presents these results. January, April, July, and October were selected as representative months for different times of the year. Cross-sections at RM 107, 90, 75.4, 67.5, 54.2, and 33.3 were selected as representative cross-sections for the analysis; other cross-sections were also modeled by PSU.

Table A.1

Monthly Averaged Water Temperatures – 2013

GAGE	RM	EXISTING				FRFA – SCENARIO 1				FRFA – SCENARIO 2			
		JAN	APR	JUL	OCT	JAN	APR	JUL	OCT	JAN	APR	JUL	OCT
Chehalis Upstream of Pe Ell	107	5.2	12.1	19.7	10.6	5.0	8.7	13.6	10.6	5.0	8.8	14.2	10.5
Chehalis Mainstem Upstream of South Fork	90	5.1	11.8	24.1	10.6	5.1	10.5	23.2	10.6	5.1	10.6	23.4	10.6
Chehalis Mainstem Upstream Newaukum	75.4	5.3	11.3	23.2	10.6	5.3	10.7	22.6	10.6	5.3	10.8	22.7	10.6
Chehalis Upstream of Skookumchuck	67.5	5.5	11.2	22.6	10.6	5.5	10.9	22.3	10.6	5.5	10.9	22.3	10.6
Chehalis Upstream of Black River	54.2	5.6	12.3	23.7	11.2	5.6	12.1	23.5	11.2	5.6	12.1	23.5	11.2
Near Porter, Washington	33.3	5.6	12.2	23.6	11.0	5.6	12.1	23.5	11.0	5.6	12.1	23.5	11.0

Table A.2

Monthly Averaged Water Temperatures – 2013 – Percent Change

GAGE	RM	EXISTING				FRFA – SCENARIO 1				FRFA – SCENARIO 2			
		JAN	APR	JUL	OCT	JAN	APR	JUL	OCT	JAN	APR	JUL	OCT
Chehalis Upstream of Pe Ell	107	-4.3%	-49.6%	-65.2%	-0.6%	-5.2%	-31.4%	-32.4%	-1.3%	-4.3%	-49.6%	-65.2%	-0.6%
Chehalis Mainstem Upstream of South Fork	90	-0.4%	-16.8%	-6.7%	0.0%	-0.7%	-11.0%	-2.9%	-0.4%	-0.4%	-16.8%	-6.7%	0.0%
Chehalis Mainstem Upstream Newaukum	75.4	0.2%	-6.8%	-3.8%	0.0%	0.0%	-4.6%	-1.9%	0.1%	0.2%	-6.8%	-3.8%	0.0%
Chehalis Upstream of Skookumchuck	67.5	0.1%	-4.4%	-2.7%	0.1%	0.0%	-3.0%	-1.3%	-0.2%	0.1%	-4.4%	-2.7%	0.1%
Chehalis Upstream of Black River	54.2	0.2%	-2.5%	-1.2%	0.0%	0.2%	-1.7%	-0.6%	0.0%	0.2%	-2.5%	-1.2%	0.0%
Near Porter, Washington	33.3	0.1%	-2.0%	-1.0%	-0.2%	0.1%	-1.3%	-0.5%	-0.2%	0.1%	-2.0%	-1.0%	-0.2%

Table A.3

Monthly Averaged Water Temperatures – 2014

GAGE	RM	EXISTING				FRFA – SCENARIO 1				FRFA – SCENARIO 2			
		JAN	APR	JUL	OCT	JAN	APR	JUL	OCT	JAN	APR	JUL	OCT
Chehalis Upstream of Pe Ell	107	5.5	11.4	20.1	12.0	5.1	8.5	13.2	11.0	5.0	8.5	13.9	10.9
Chehalis Mainstem Upstream of South Fork	90	5.3	11.5	23.5	11.8	5.2	10.3	23.1	12.0	5.1	10.3	23.4	11.7
Chehalis Mainstem Upstream Newaukum	75.4	5.5	11.2	23.1	11.7	5.4	10.7	22.5	11.7	5.4	10.7	22.6	11.7
Chehalis Upstream of Skookumchuck	67.5	5.6	11.2	22.6	11.9	5.5	10.9	22.2	11.8	5.5	10.9	22.3	11.8
Chehalis Upstream of Black River	54.2	5.7	12.2	23.6	12.6	5.7	12.0	23.5	12.6	5.7	12.0	23.5	12.5
Near Porter, Washington	33.3	5.7	12.2	23.5	12.4	5.6	12.1	23.4	12.3	5.6	12.1	23.4	12.3

Table A.4

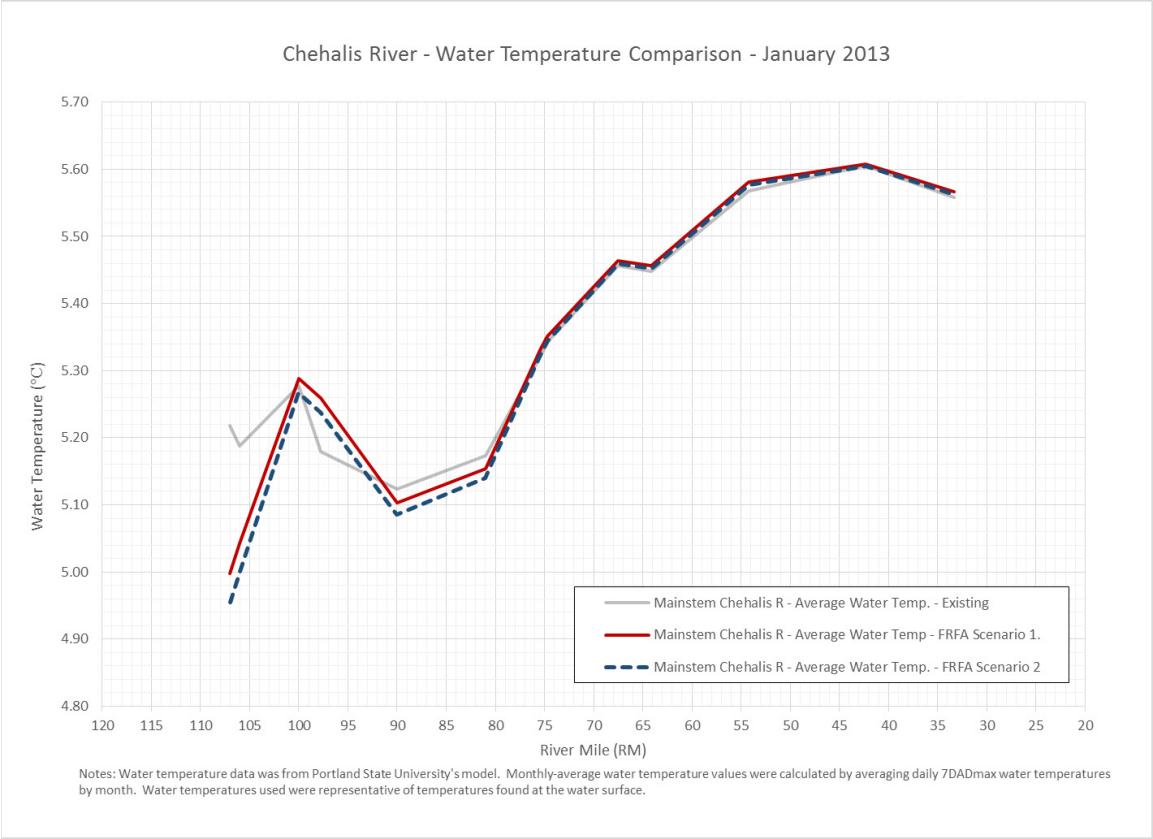
Monthly Averaged Water Temperatures – 2014 – Percent Change

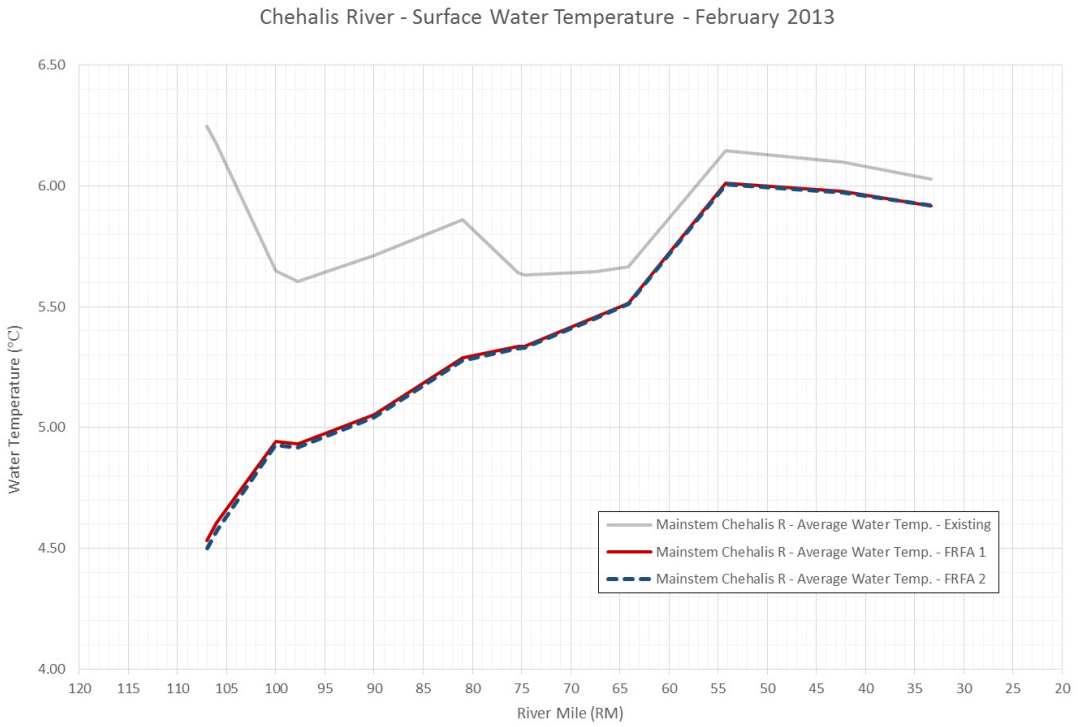
GAGE	RM	EXISTING				FRFA – SCENARIO 1				FRFA – SCENARIO 2			
		JAN	APR	JUL	OCT	JAN	APR	JUL	OCT	JAN	APR	JUL	OCT
Chehalis Upstream of Pe Ell	107	-7.1%	-42.4%	-75.0%	-12.3%	-9.5%	-29.4%	-36.7%	-9.4%	-7.1%	-42.4%	-75.0%	-12.3%
Chehalis Mainstem Upstream of South Fork	90	-1.7%	-15.1%	-2.7%	2.1%	-2.6%	-10.7%	-0.3%	-0.8%	-1.7%	-15.1%	-2.7%	2.1%
Chehalis Mainstem Upstream Newaukum	75.4	-1.3%	-5.9%	-4.7%	-0.4%	-1.6%	-4.3%	-2.3%	-0.5%	-1.3%	-5.9%	-4.7%	-0.4%
Chehalis Upstream of Skookumchuck	67.5	-0.9%	-3.8%	-3.0%	-0.9%	-1.1%	-2.8%	-1.5%	-0.9%	-0.9%	-3.8%	-3.0%	-0.9%
Chehalis Upstream of Black River	54.2	-0.5%	-2.5%	-0.9%	-0.7%	-0.7%	-1.8%	-0.4%	-0.9%	-0.5%	-2.5%	-0.9%	-0.7%
Near Porter, Washington	33.3	-0.5%	-1.8%	-0.7%	-0.2%	-0.6%	-1.3%	-0.4%	-0.3%	-0.5%	-1.8%	-0.7%	-0.2%

Generally, the FRFA model results show a decrease in water temperature in comparison to current conditions. Temperature decreases are highest in the upper reaches of the Chehalis River and the differences fade in a downstream direction. The months of April and July see the greatest differences however July temperatures are more critical because they affect the habitat suitability in the Chehalis River.

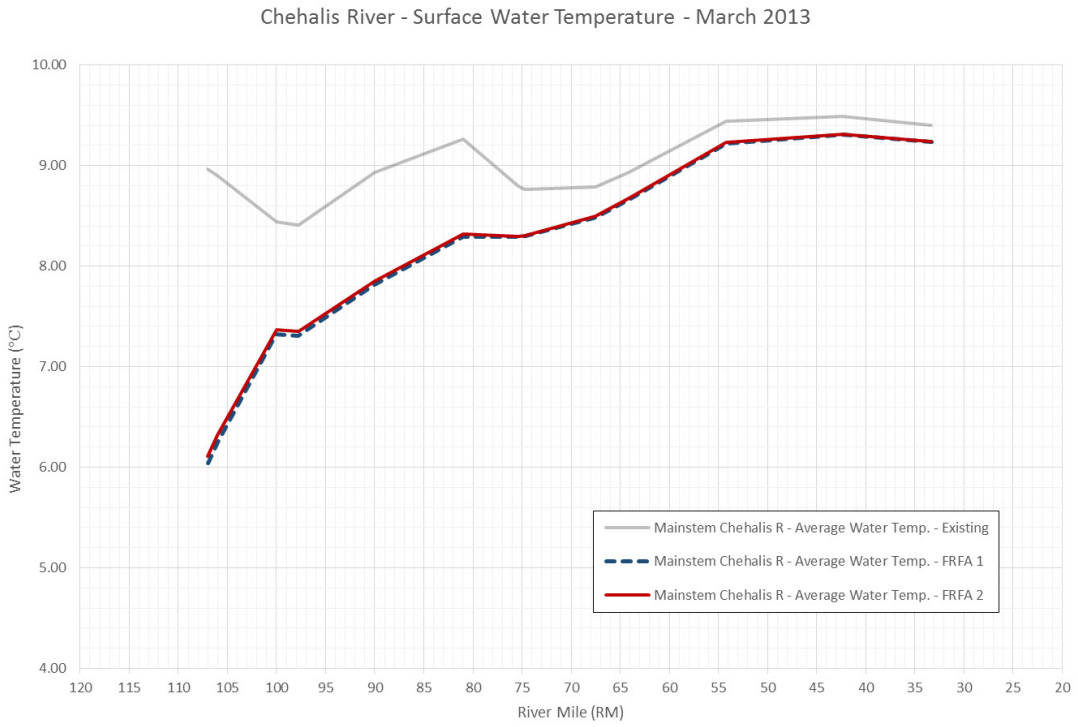
The following figures show monthly average temperatures in the Chehalis River for 2013 and 2014, as obtained from the PSU modeling results.

Figures





Notes: Water temperature data was from Portland State University's model. Monthly-average water temperature values were calculated by averaging daily 7DADmax water temperatures by month. Water temperatures used were representative of temperatures found at the water surface.



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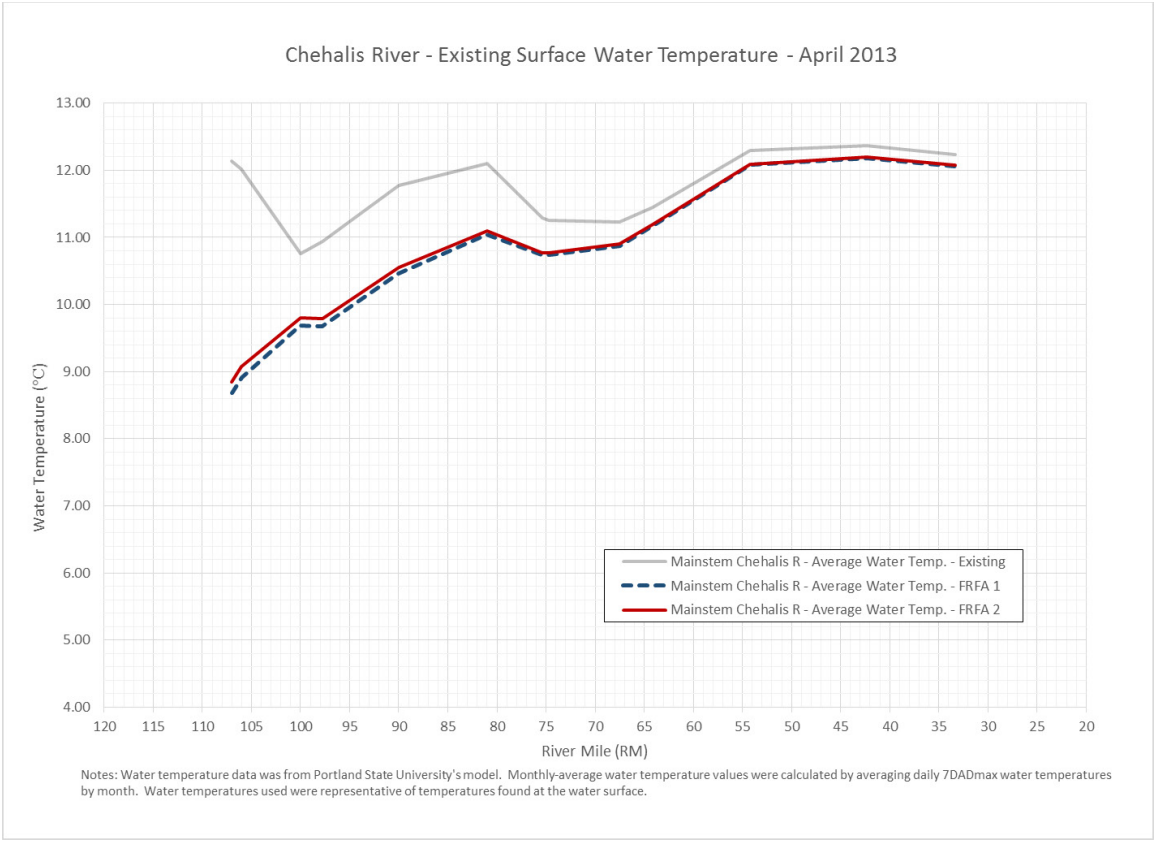

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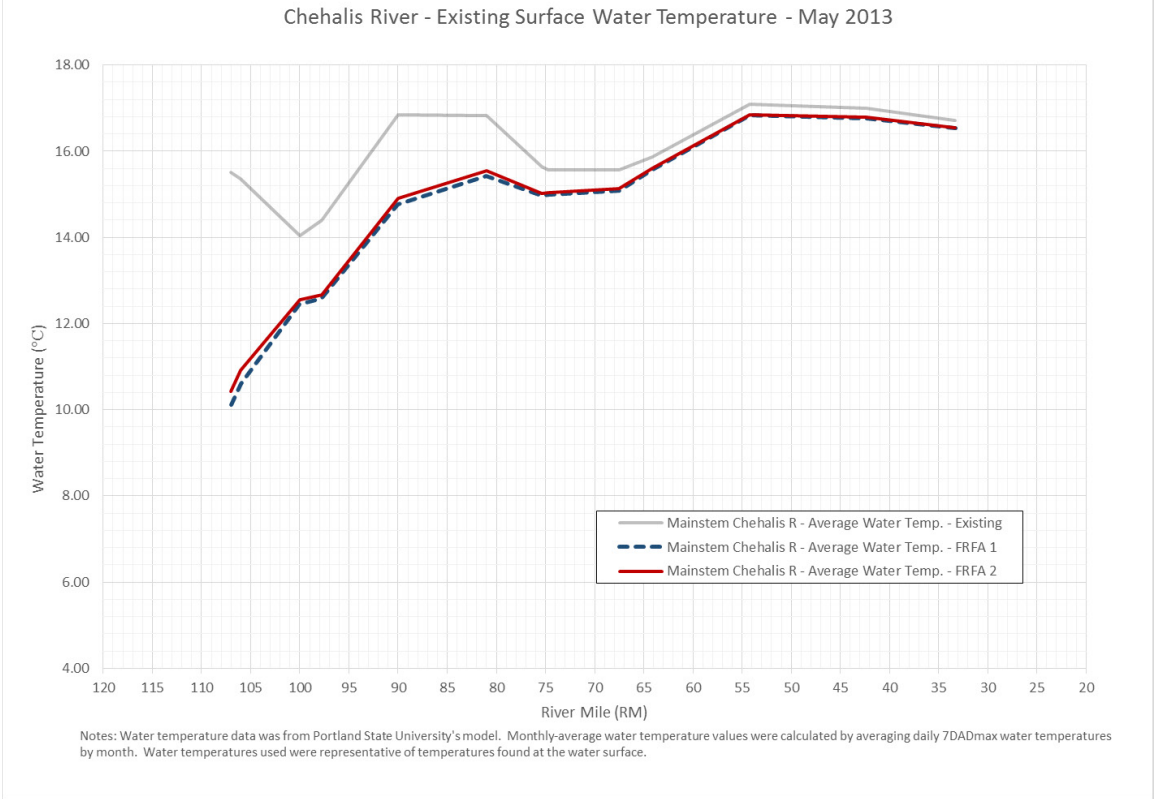

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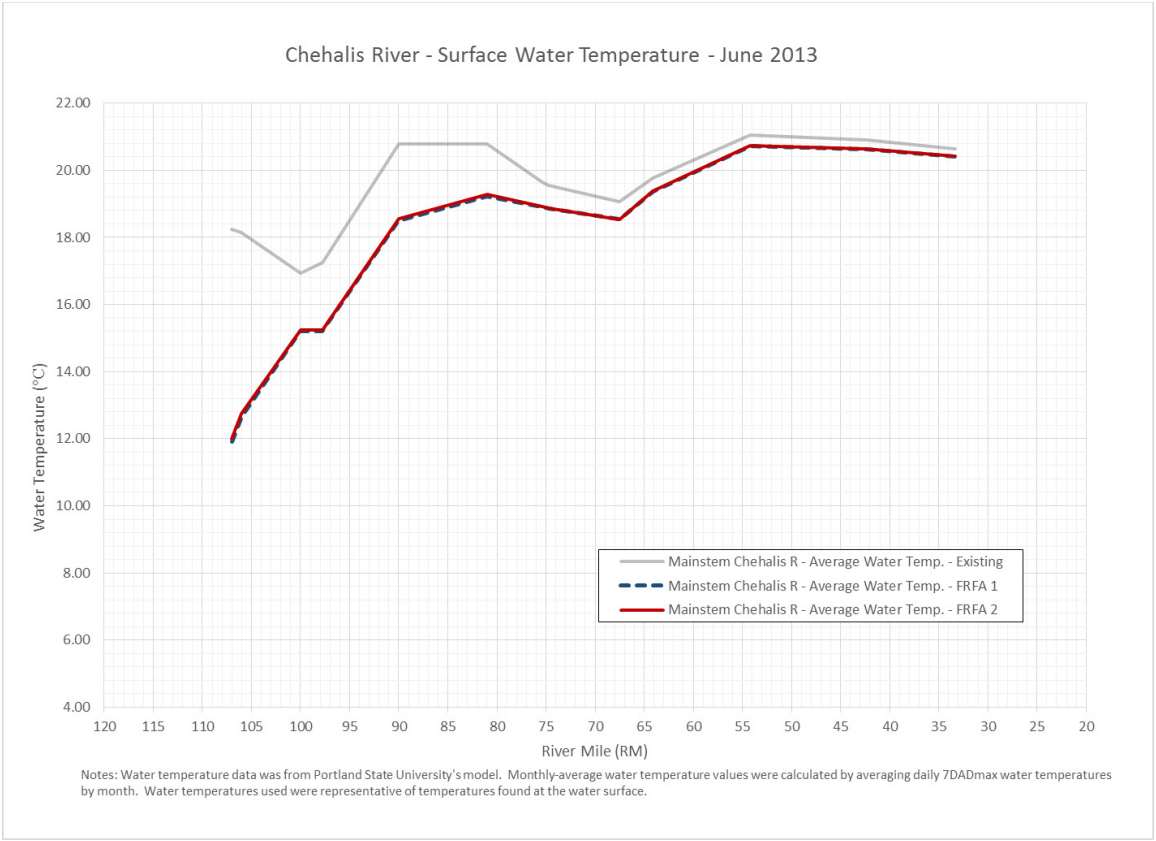

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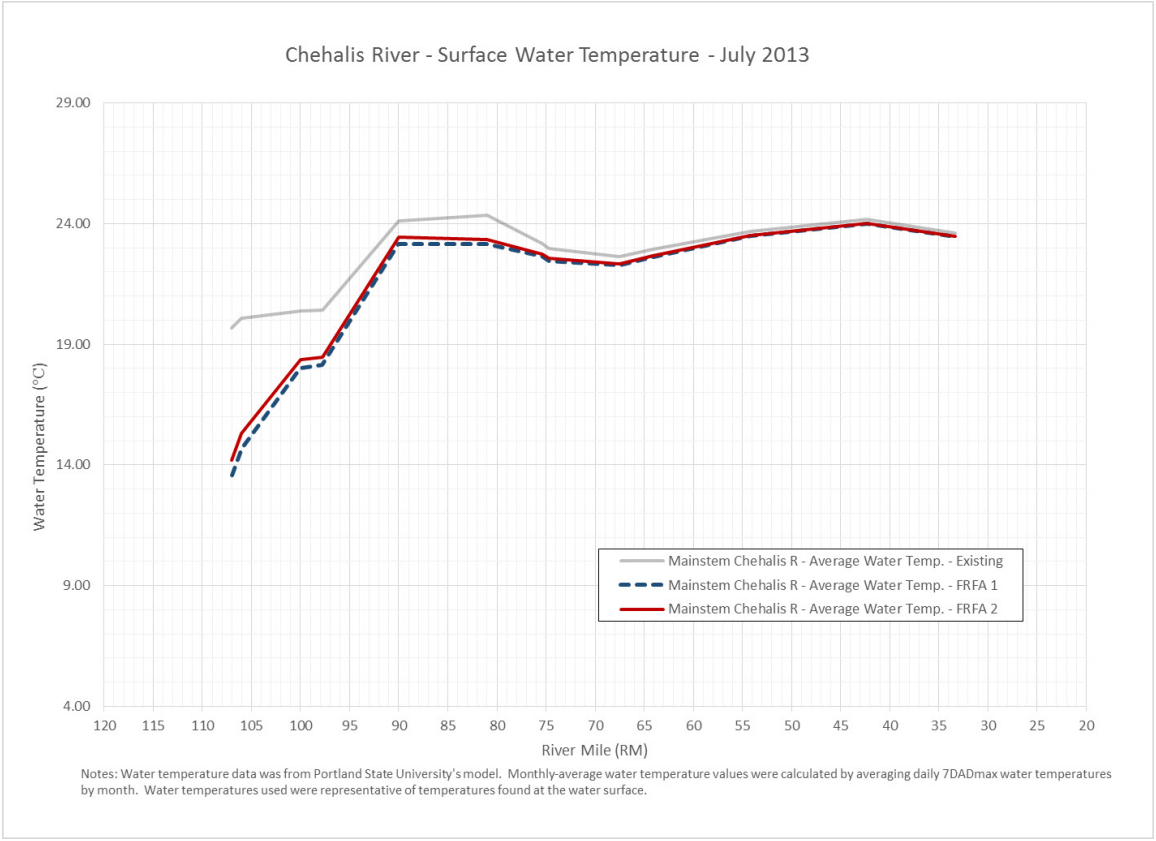

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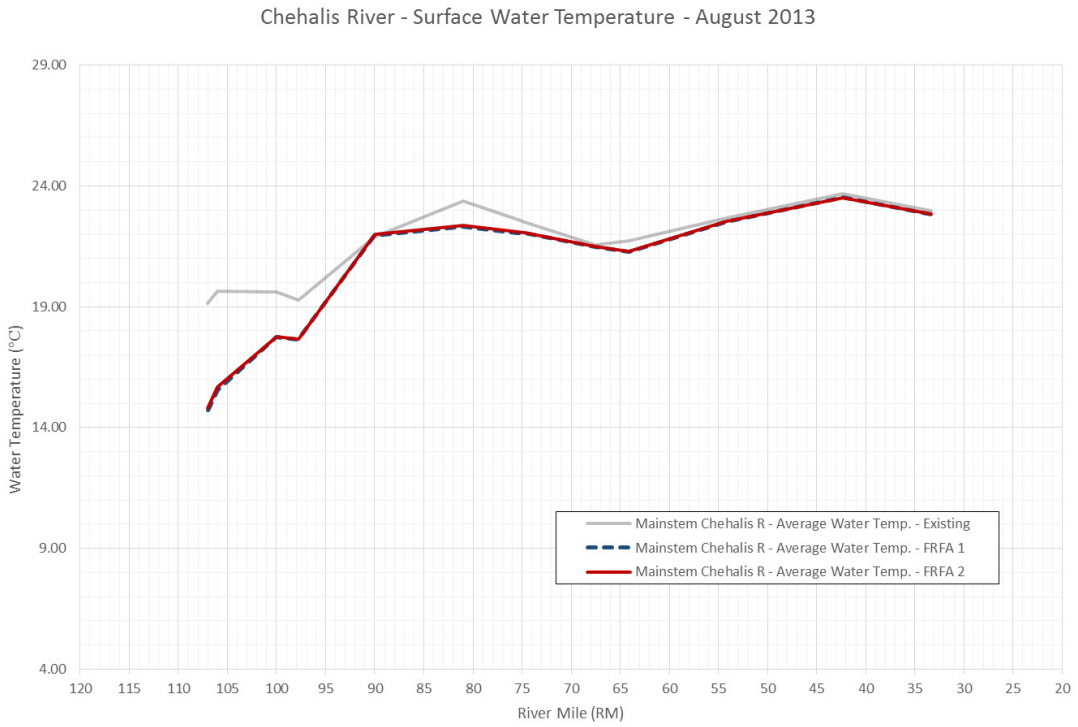

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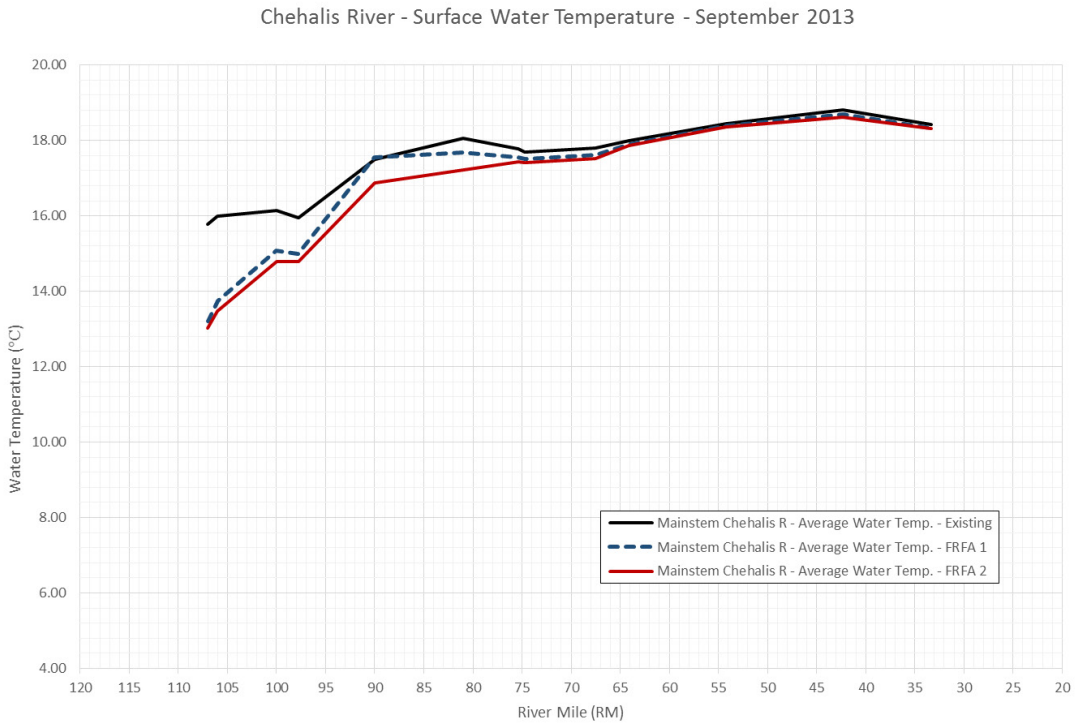

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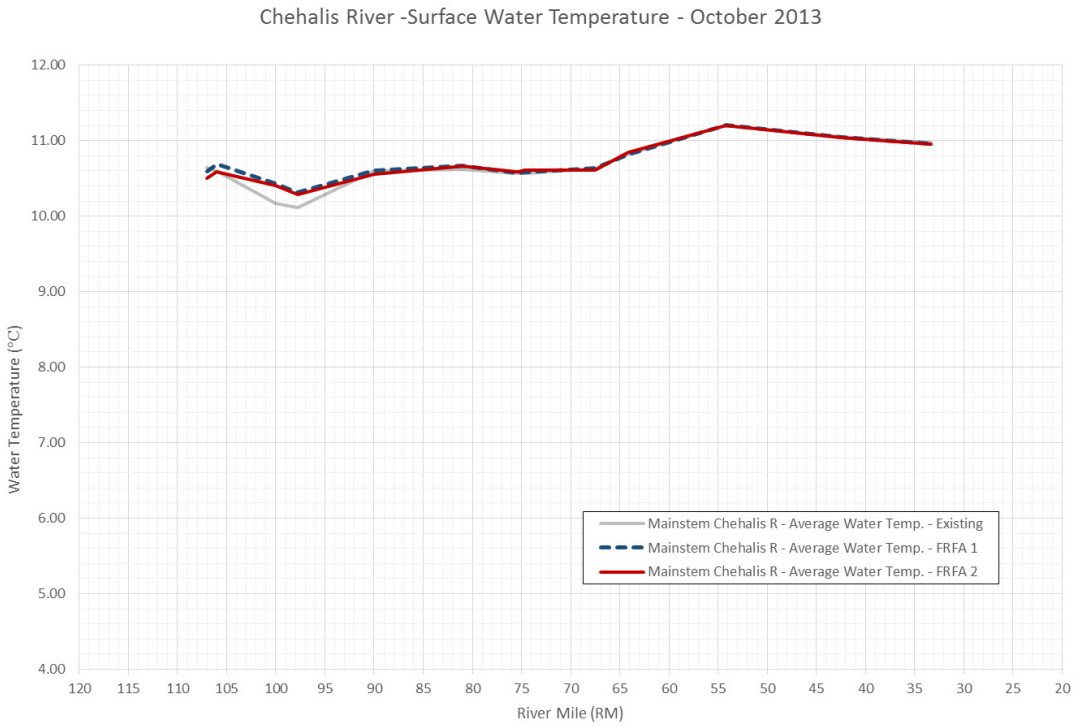

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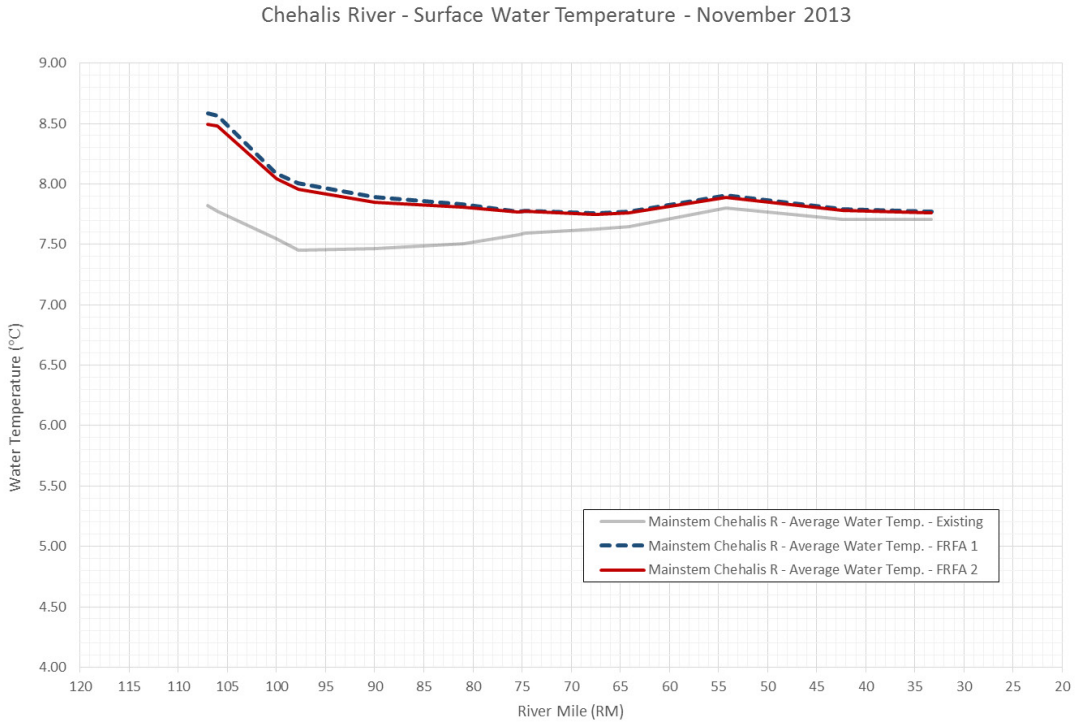

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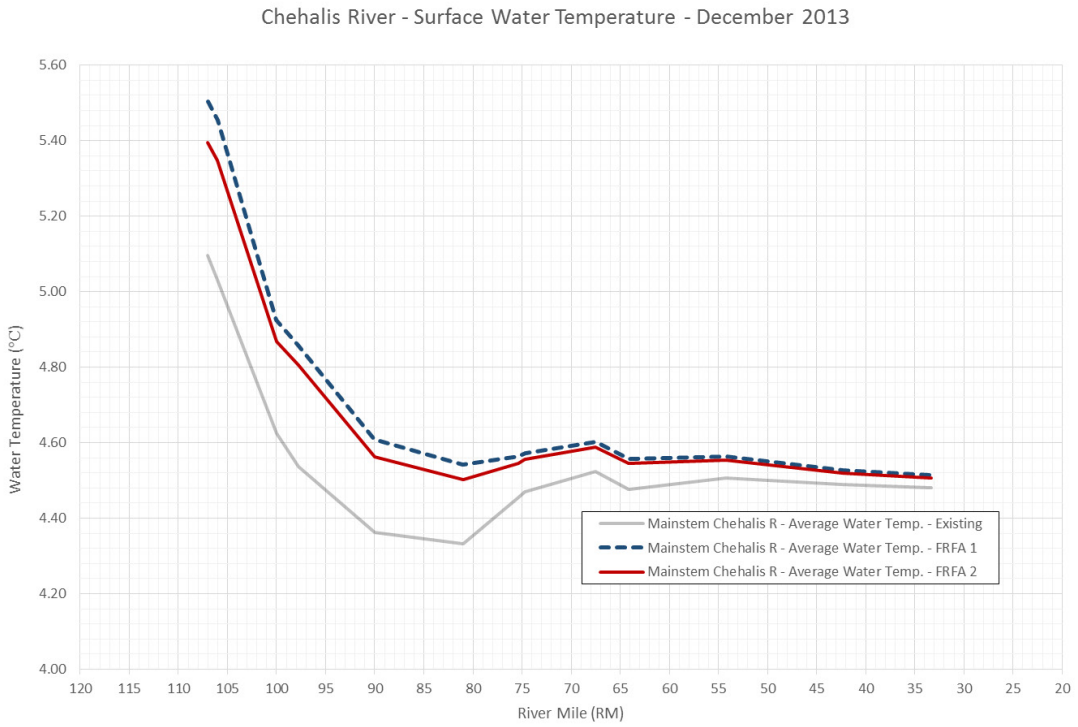

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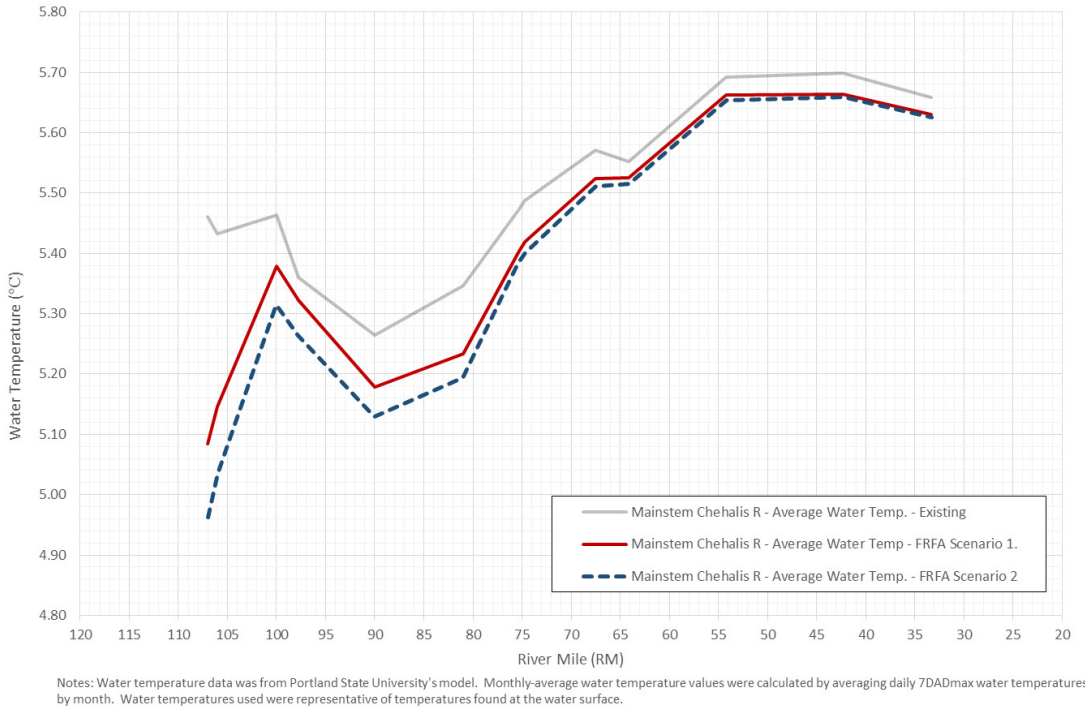

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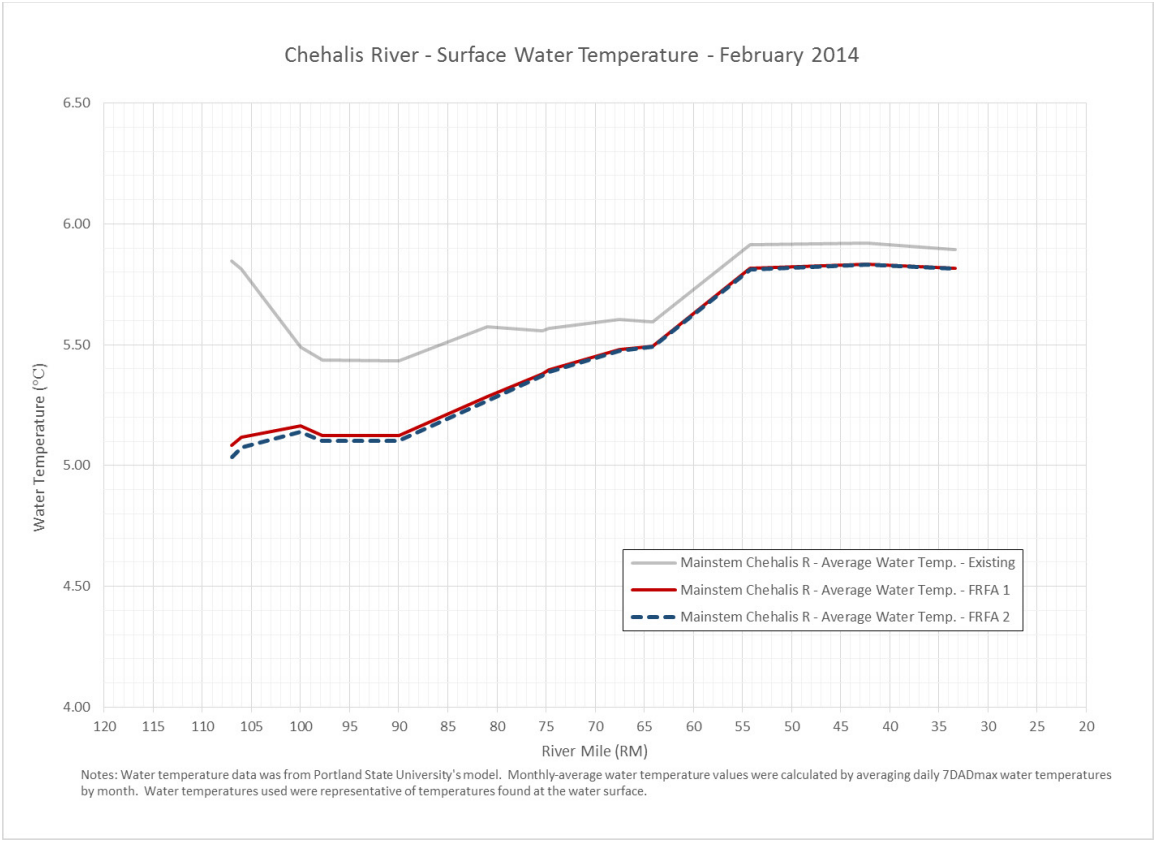

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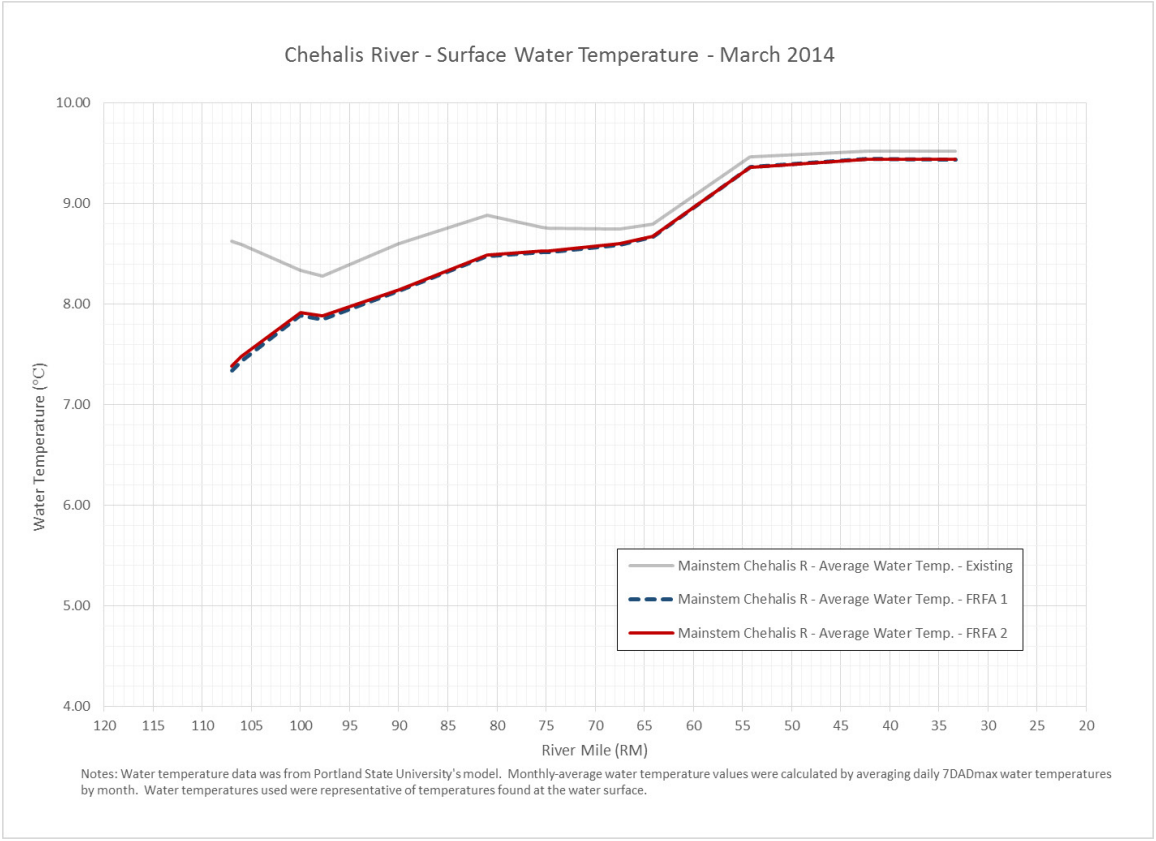

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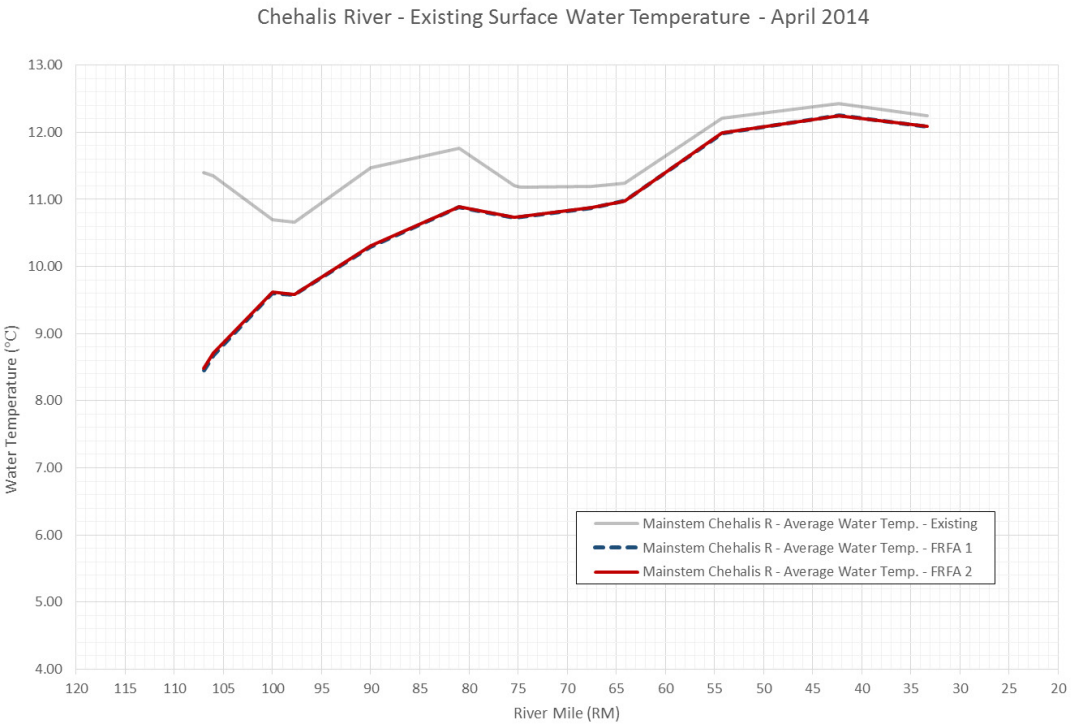

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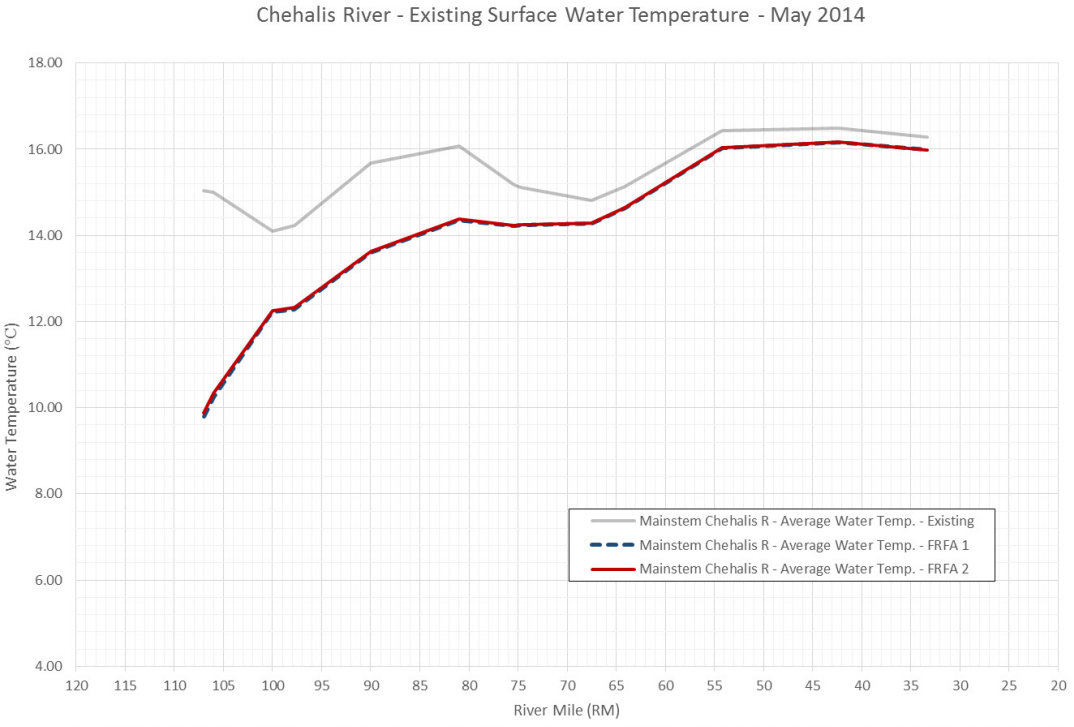

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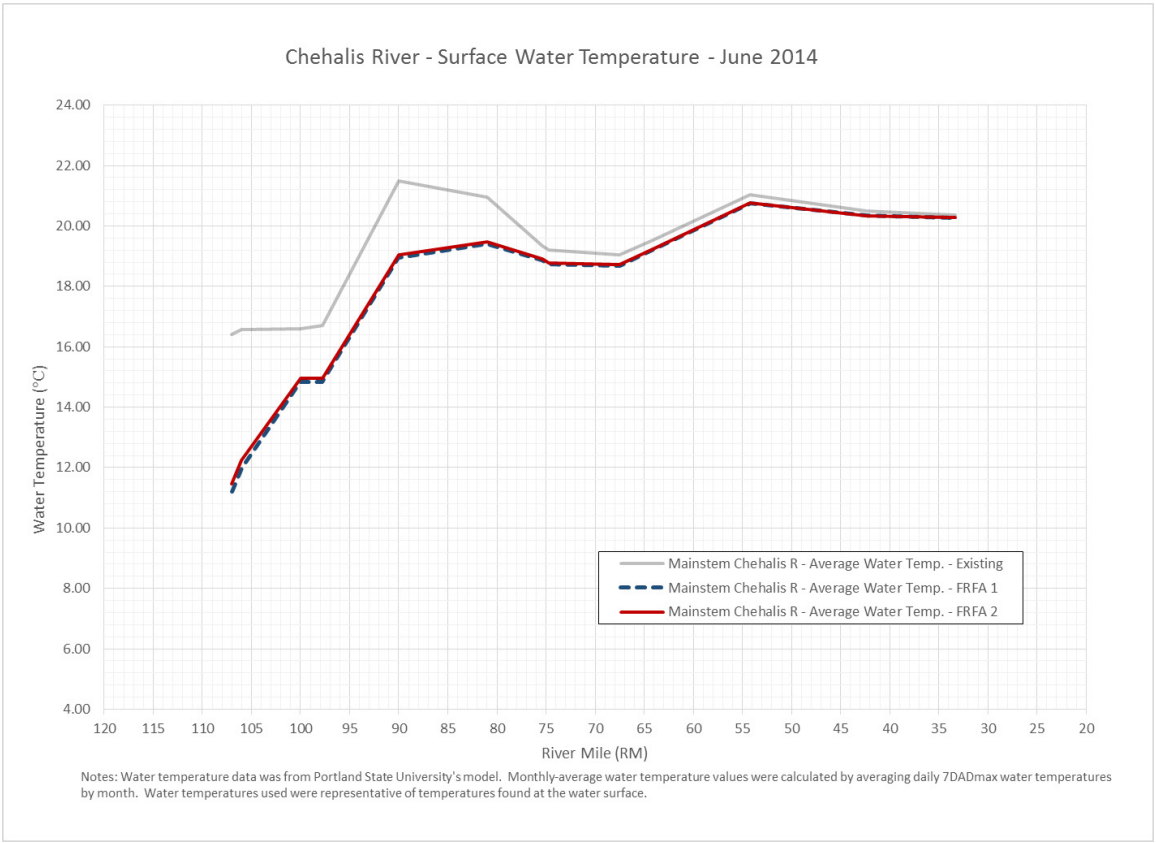

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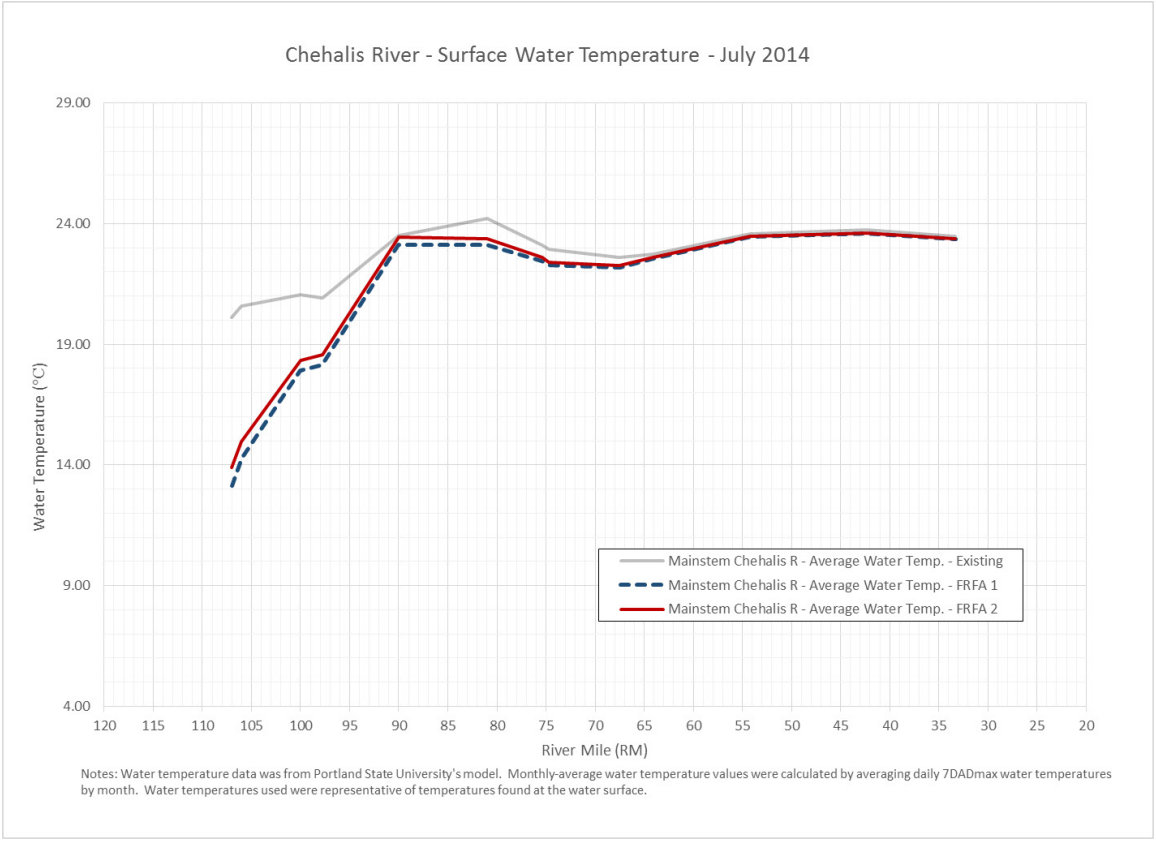

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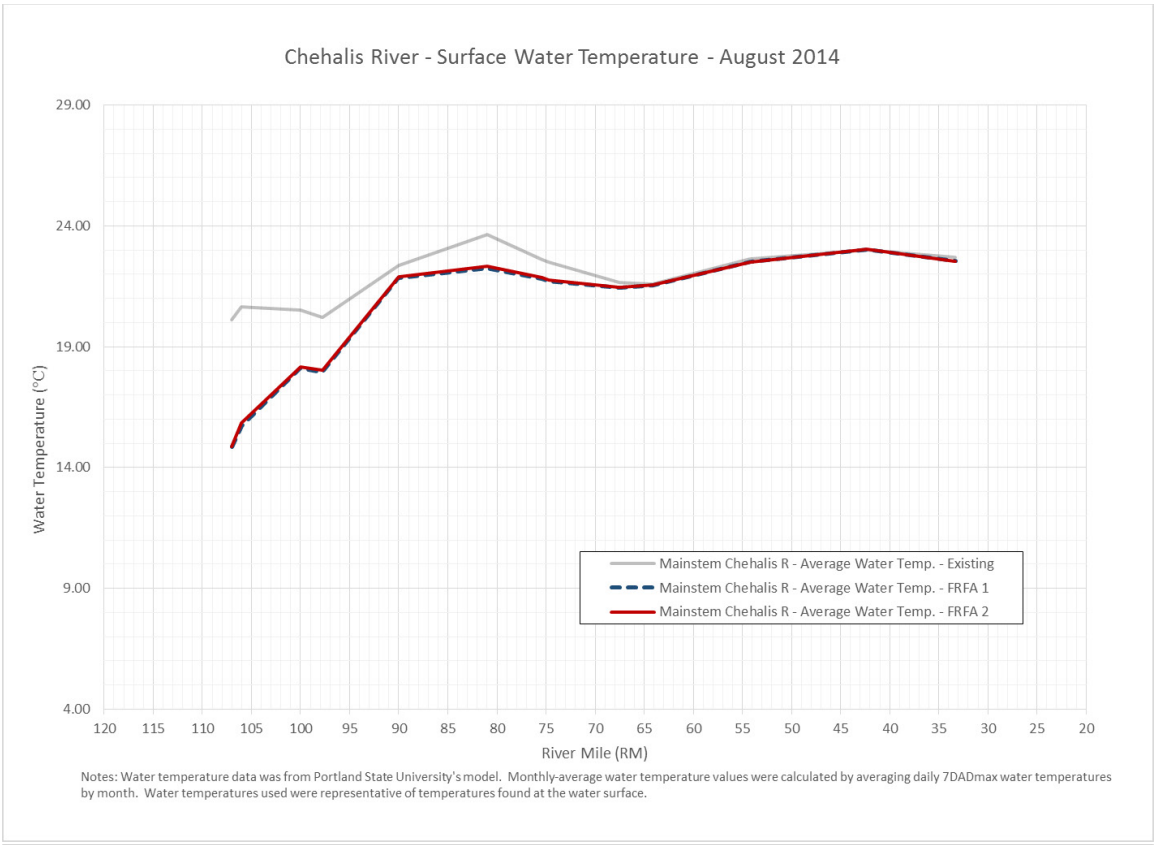

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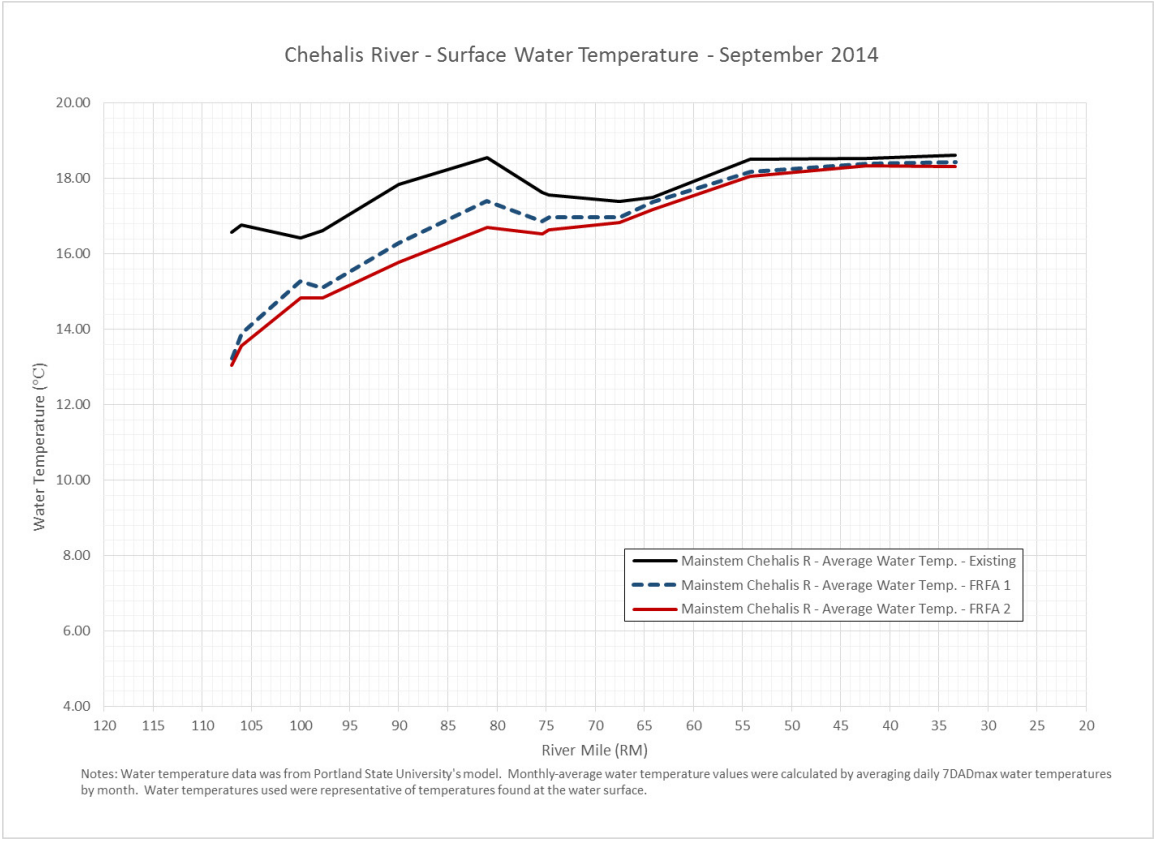

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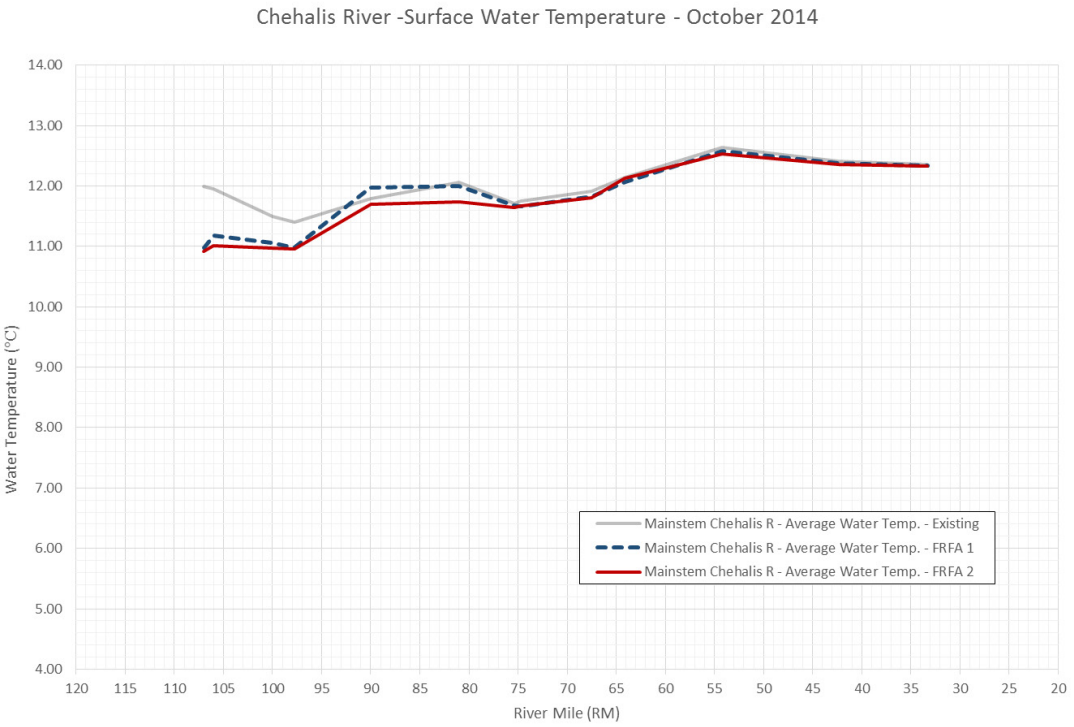

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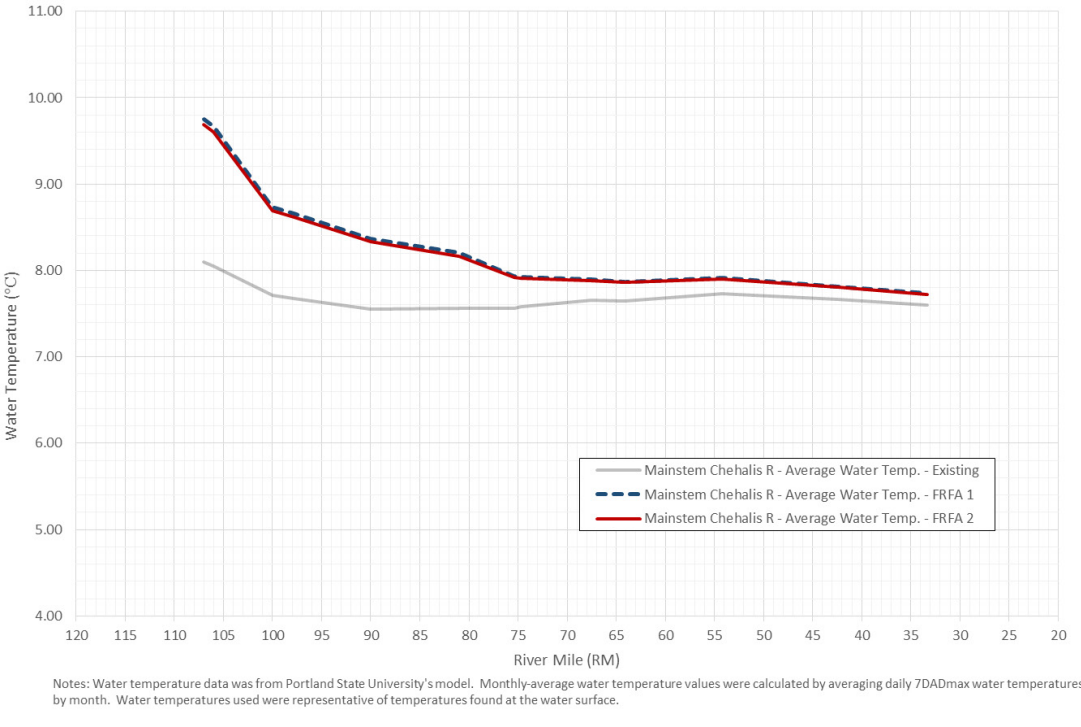

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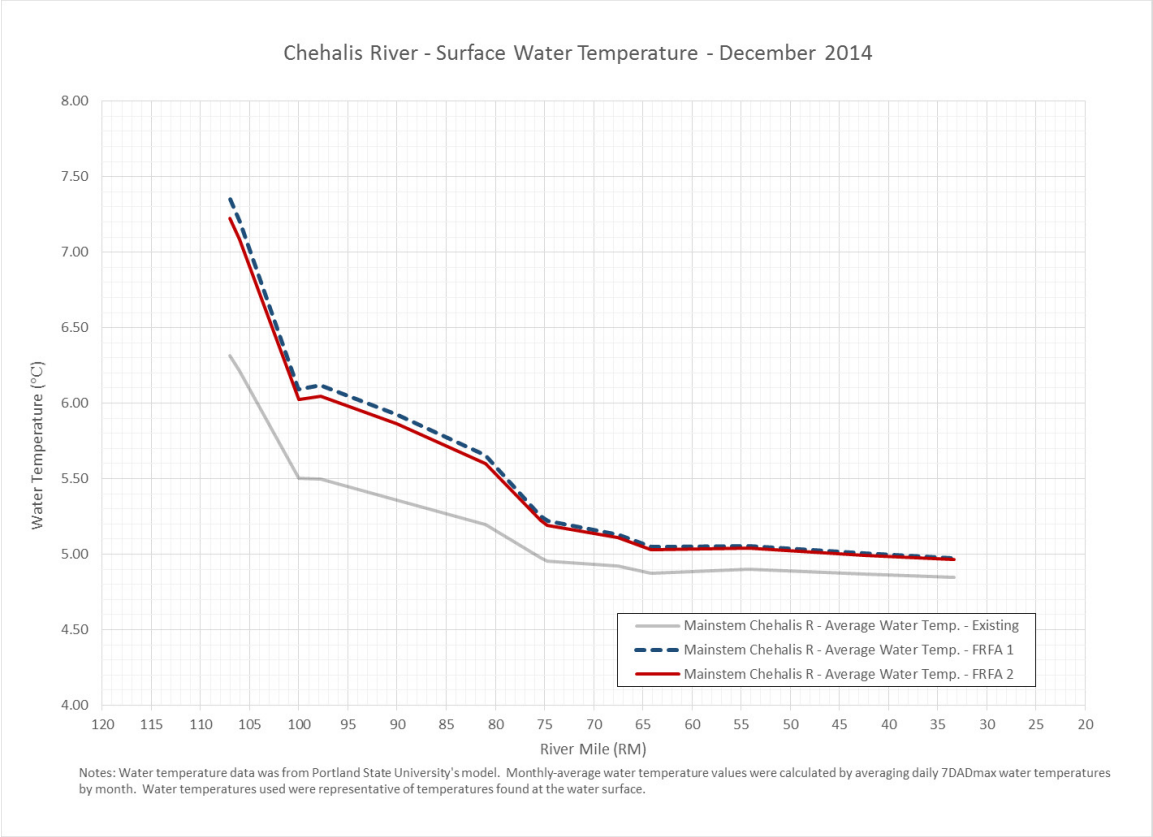

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Appendix B
Weighted Usable Area Comparison

Species	Chinook							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
Upper Chehalis	2013	Jan	Rearing	1,979	1,979	1,979	0%	0%
			Spawning	10,470	10,470	10,470	0%	0%
		Feb	Rearing	2,262	1,838	1,838	-19%	-19%
			Spawning	11,779	9,816	9,816	-17%	-17%
		Mar	Rearing	2,901	2,262	2,262	-22%	-22%
			Spawning	13,088	11,779	11,779	-10%	-10%
		Apr	Rearing	4,285	2,901	2,901	-32%	-32%
			Spawning	13,088	13,088	13,088	0%	0%
		May	Rearing	3,572	4,628	4,628	30%	30%
			Spawning	6,458	20,893	20,893	224%	224%
		Jun	Rearing	1,667	4,878	4,878	193%	193%
			Spawning	3,571	21,425	21,425	500%	500%
		Jul	Rearing	759	4,430	4,134	483%	444%
			Spawning	357	12,784	7,108	3481%	1891%
		Aug	Rearing	783	4,032	3,698	415%	372%
			Spawning	354	6,425	5,952	1716%	1582%
		Sep	Rearing	2,923	3,859	3,859	32%	32%
			Spawning	3,599	9,031	9,031	151%	151%
		Oct	Rearing	4,158	4,379	4,420	5%	6%
			Spawning	13,088	16,178	16,751	24%	28%
		Nov	Rearing	2,827	2,866	2,866	1%	1%
			Spawning	13,088	13,088	13,088	0%	0%
		Dec	Rearing	1,979	2,120	2,120	7%	7%
			Spawning	10,470	11,125	11,125	6%	6%
	2014	Jan	Rearing	2,120	1,979	1,979	-7%	-7%
			Spawning	11,125	10,470	10,470	-6%	-6%
		Feb	Rearing	2,262	1,979	1,979	-13%	-13%
			Spawning	11,779	10,470	10,470	-11%	-11%
		Mar	Rearing	2,866	2,686	2,686	-6%	-6%
			Spawning	13,088	13,088	13,088	0%	0%
		Apr	Rearing	4,212	2,866	2,866	-32%	-32%
			Spawning	13,088	13,088	13,088	0%	0%
		May	Rearing	3,480	4,184	4,184	20%	20%
			Spawning	4,221	13,088	13,088	210%	210%
		Jun	Rearing	2,967	5,111	5,200	72%	75%
			Spawning	5,550	23,245	23,245	319%	319%
		Jul	Rearing	611	4,412	4,260	622%	597%
			Spawning	179	12,263	9,541	6770%	5245%
		Aug	Rearing	522	3,698	3,698	608%	608%
			Spawning	118	5,952	5,952	4946%	4946%
		Sep	Rearing	1,864	4,471	4,683	140%	151%
			Spawning	2,359	13,748	16,039	483%	580%
		Oct	Rearing	4,285	4,262	4,394	-1%	3%
			Spawning	13,088	15,100	16,751	15%	28%
		Nov	Rearing	2,827	3,565	3,565	26%	26%
			Spawning	13,088	13,088	13,088	0%	0%
		Dec	Rearing	2,403	2,686	2,544	12%	6%
			Spawning	12,434	13,088	13,088	5%	5%
PeEll to Elk Cr	2013	Jan	Rearing	1,880	1,880	1,880	0%	0%
			Spawning	1,915	1,915	1,915	0%	0%
		Feb	Rearing	2,327	2,036	1,891	-13%	-19%
			Spawning	3,108	2,762	2,590	-11%	-17%
		Mar	Rearing	2,809	2,494	2,494	-11%	-11%
			Spawning	2,855	2,855	2,855	0%	0%
		Apr	Rearing	4,128	3,494	3,494	-15%	-15%
			Spawning	2,855	2,855	2,855	0%	0%
		May	Rearing	7,487	9,217	9,217	23%	23%
			Spawning	5,394	16,727	16,727	210%	210%
		Jun	Rearing	3,696	9,415	9,415	155%	155%
			Spawning	3,074	9,247	9,247	201%	201%
		Jul	Rearing	905	5,490	4,543	507%	402%
			Spawning	0	4,745	3,796	0%	0%
		Aug	Rearing	677	4,095	4,095	504%	504%
			Spawning	0	3,173	3,173	0%	0%
		Sep	Rearing	2,989	4,425	4,579	48%	53%
			Spawning	1,840	1,860	2,602	1%	41%
		Oct	Rearing	5,860	7,696	7,696	31%	31%
			Spawning	7,361	12,682	12,682	72%	72%
		Nov	Rearing	3,034	3,238	3,238	7%	7%
			Spawning	4,349	4,349	4,349	0%	0%
		Dec	Rearing	2,789	2,988	2,789	7%	0%
			Spawning	5,889	6,257	5,889	6%	0%
	2014	Jan	Rearing	2,078	1,940	1,940	-7%	-7%
			Spawning	2,427	2,284	2,284	-6%	-6%
		Feb	Rearing	2,014	1,880	1,880	-7%	-7%
			Spawning	2,035	1,915	1,915	-6%	-6%
		Mar	Rearing	2,722	2,551	2,686	-6%	-1%
			Spawning	2,394	2,394	2,394	0%	0%
		Apr	Rearing	3,926	3,386	3,386	-14%	-14%
			Spawning	2,394	2,394	2,394	0%	0%
		May	Rearing	4,425	5,355	5,355	21%	21%
			Spawning	1,860	5,767	5,767	210%	210%
		Jun	Rearing	5,653	10,137	10,137	79%	79%
			Spawning	4,997	12,200	12,200	144%	144%
		Jul	Rearing	553	5,490	4,543	893%	721%
			Spawning	0	4,745	3,796	0%	0%
		Aug	Rearing	349	3,298	3,298	845%	845%

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Species	Chinook							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
		Aug	Spawning	0	2,379	2,379	0%	0%
		Sep	Rearing	2,330	8,121	9,322	249%	300%
			Spawning	1,055	5,116	8,564	385%	712%
		Oct	Rearing	6,039	6,794	7,696	12%	27%
			Spawning	7,361	9,505	12,682	29%	72%
		Nov	Rearing	2,686	3,386	3,386	26%	26%
			Spawning	2,394	2,394	2,394	0%	0%
		Dec	Rearing	2,148	2,417	2,283	13%	6%
			Spawning	2,155	2,394	2,274	11%	6%
Elk Cr to S Fk	2013	Jan	Rearing	2,220	2,220	2,220	0%	0%
			Spawning	566	566	566	0%	0%
		Feb	Rearing	3,780	3,528	3,528	-7%	-7%
			Spawning	2,689	2,531	2,531	-6%	-6%
		Mar	Rearing	4,662	4,370	4,370	-6%	-6%
			Spawning	2,605	2,605	2,605	0%	0%
		Apr	Rearing	6,725	6,807	6,807	1%	1%
			Spawning	2,605	2,605	2,605	0%	0%
		May	Rearing	9,963	12,047	12,047	21%	21%
			Spawning	3,871	8,940	8,940	131%	131%
		Jun	Rearing	4,120	8,413	8,413	104%	104%
			Spawning	1,608	4,220	4,220	163%	163%
		Jul	Rearing	1,053	2,262	2,262	115%	115%
			Spawning	0	389	389	0%	0%
		Aug	Rearing	1,319	2,864	2,864	117%	117%
			Spawning	241	706	706	192%	192%
		Sep	Rearing	6,319	7,038	7,686	11%	22%
			Spawning	1,860	1,699	1,845	-9%	-1%
		Oct	Rearing	10,012	11,585	11,585	16%	16%
			Spawning	6,177	9,254	9,254	50%	50%
		Nov	Rearing	5,214	5,488	5,488	5%	5%
			Spawning	3,932	3,932	3,932	0%	0%
		Dec	Rearing	4,630	4,765	4,425	3%	-4%
			Spawning	5,313	4,942	4,633	-7%	-13%
	2014	Jan	Rearing	3,450	3,450	3,220	0%	-7%
			Spawning	2,214	2,214	2,084	0%	-6%
		Feb	Rearing	2,134	1,992	1,992	-7%	-7%
			Spawning	237	223	223	-6%	-6%
		Mar	Rearing	2,884	2,845	2,845	-1%	-1%
			Spawning	279	279	279	0%	0%
		Apr	Rearing	5,726	5,796	5,796	1%	1%
			Spawning	1,754	1,754	1,754	0%	0%
		May	Rearing	7,505	8,920	8,621	19%	15%
			Spawning	1,581	4,413	3,922	179%	148%
		Jun	Rearing	4,025	9,579	8,220	138%	104%
			Spawning	1,636	4,500	4,295	175%	163%
		Jul	Rearing	872	2,262	2,262	159%	159%
			Spawning	0	389	389	0%	0%
		Aug	Rearing	821	2,864	2,419	249%	195%
			Spawning	0	706	530	0%	0%
		Sep	Rearing	3,790	8,663	9,447	129%	149%
			Spawning	2,415	4,219	4,554	75%	89%
		Oct	Rearing	10,611	12,318	12,519	16%	18%
			Spawning	7,084	10,446	11,968	47%	69%
		Nov	Rearing	4,370	4,238	4,238	-3%	-3%
			Spawning	2,605	2,160	2,160	-17%	-17%
		Dec	Rearing	2,213	2,360	2,360	7%	7%
			Spawning	383	405	405	6%	6%
S Fk to Newaukum	2013	Jan	Rearing	2,224	2,224	2,224	0%	0%
			Spawning	307	307	307	0%	0%
		Feb	Rearing	2,933	2,567	2,567	-13%	-13%
			Spawning	505	449	449	-11%	-11%
		Mar	Rearing	3,763	3,667	3,667	-3%	-3%
			Spawning	561	561	561	0%	0%
		Apr	Rearing	5,557	5,361	5,361	-4%	-4%
			Spawning	561	561	561	0%	0%
		May	Rearing	5,703	8,583	8,583	50%	50%
			Spawning	803	959	959	20%	20%
		Jun	Rearing	1,490	3,422	3,422	130%	130%
			Spawning	0	241	241	0%	0%
		Jul	Rearing	152	488	488	222%	222%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	569	811	811	42%	42%
			Spawning	0	0	0	0%	0%
		Oct	Rearing	7,177	7,177	7,777	0%	8%
			Spawning	1,054	1,054	1,435	0%	36%
		Nov	Rearing	4,636	4,880	4,880	5%	5%
			Spawning	1,054	1,054	1,054	0%	0%
		Dec	Rearing	3,437	3,437	3,437	0%	0%
			Spawning	1,076	1,076	1,076	0%	0%
	2014	Jan	Rearing	2,750	2,567	2,567	-7%	-7%
			Spawning	477	449	449	-6%	-6%
		Feb	Rearing	2,264	2,264	2,113	0%	-7%
			Spawning	208	208	196	0%	-6%
		Mar	Rearing	3,098	3,060	3,060	-1%	-1%
			Spawning	245	245	245	0%	0%
		Apr	Rearing	5,011	5,361	5,361	7%	7%
			Spawning	470	561	561	19%	19%

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Species	Chinook							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
		May	Rearing	5,467	6,978	6,736	28%	23%
			Spawning	395	832	648	111%	64%
		Jun	Rearing	1,723	3,343	3,343	94%	94%
			Spawning	0	262	262	0%	0%
		Jul	Rearing	314	488	488	55%	55%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	365	736	736	102%	102%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	3,094	6,042	7,868	95%	154%
			Spawning	596	274	1,968	-54%	230%
		Oct	Rearing	10,142	11,522	11,951	14%	18%
			Spawning	2,476	3,211	3,464	30%	40%
		Nov	Rearing	3,483	3,667	3,667	5%	5%
			Spawning	561	561	561	0%	0%
		Dec	Rearing	2,113	2,264	2,264	7%	7%
			Spawning	196	208	208	6%	6%
Newaukum to Skookumchuck	2013	Jan	Rearing	3,954	3,954	3,954	0%	0%
			Spawning	4,680	4,680	4,680	0%	0%
		Feb	Rearing	4,086	4,086	4,086	0%	0%
			Spawning	6,664	6,664	6,664	0%	0%
		Mar	Rearing	5,434	5,434	5,434	0%	0%
			Spawning	6,715	6,715	6,715	0%	0%
		Apr	Rearing	7,887	7,887	7,887	0%	0%
			Spawning	7,330	7,330	7,330	0%	0%
		May	Rearing	6,441	7,023	7,023	9%	9%
			Spawning	2,038	2,200	2,200	8%	8%
		Jun	Rearing	2,033	2,366	2,366	16%	16%
			Spawning	276	551	551	100%	100%
		Jul	Rearing	379	379	379	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	441	552	552	25%	25%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	3,541	3,541	3,541	0%	0%
			Spawning	1,365	1,365	1,365	0%	0%
		Oct	Rearing	7,982	8,037	8,037	1%	1%
			Spawning	8,539	8,442	8,442	-1%	-1%
		Nov	Rearing	5,156	5,428	5,428	5%	5%
			Spawning	8,539	8,539	8,539	0%	0%
		Dec	Rearing	3,572	3,572	3,572	0%	0%
			Spawning	6,211	6,211	6,211	0%	0%
	2014	Jan	Rearing	4,109	4,109	4,109	0%	0%
			Spawning	7,018	7,018	7,018	0%	0%
		Feb	Rearing	3,908	3,908	3,908	0%	0%
			Spawning	4,205	4,205	4,205	0%	0%
		Mar	Rearing	5,281	5,281	5,281	0%	0%
			Spawning	4,947	4,947	4,947	0%	0%
		Apr	Rearing	7,837	7,837	7,837	0%	0%
			Spawning	6,715	6,715	6,715	0%	0%
		May	Rearing	6,728	6,961	6,961	3%	3%
			Spawning	2,723	3,809	3,809	40%	40%
		Jun	Rearing	1,843	2,145	2,145	16%	16%
			Spawning	203	406	406	100%	100%
		Jul	Rearing	379	471	379	24%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	441	552	552	25%	25%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	2,411	3,016	3,566	25%	48%
			Spawning	150	336	352	124%	135%
		Oct	Rearing	8,646	8,552	8,552	-1%	-1%
			Spawning	6,823	6,306	6,306	-8%	-8%
		Nov	Rearing	5,205	5,479	5,479	5%	5%
			Spawning	8,256	8,256	8,256	0%	0%
		Dec	Rearing	3,647	3,647	3,647	0%	0%
			Spawning	3,958	3,958	3,958	0%	0%
Skookumchuck to Black	2013	Jan	Rearing	5,437	5,437	5,437	0%	0%
			Spawning	30,527	30,527	30,527	0%	0%
		Feb	Rearing	8,241	8,241	8,241	0%	0%
			Spawning	49,329	49,329	49,329	0%	0%
		Mar	Rearing	10,182	8,287	8,287	-19%	-19%
			Spawning	42,251	42,251	42,251	0%	0%
		Apr	Rearing	13,729	13,494	13,729	-2%	0%
			Spawning	48,658	48,658	48,658	0%	0%
		May	Rearing	20,348	20,348	20,348	0%	0%
			Spawning	18,693	18,693	18,693	0%	0%
		Jun	Rearing	5,463	6,791	6,791	24%	24%
			Spawning	847	1,694	1,694	100%	100%
		Jul	Rearing	1,926	1,926	1,926	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	2,860	3,632	3,632	27%	27%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	13,002	13,002	13,002	0%	0%
			Spawning	10,166	10,166	10,166	0%	0%
		Oct	Rearing	19,348	19,348	19,348	0%	0%
			Spawning	64,292	64,292	64,292	0%	0%
		Nov	Rearing	12,572	13,234	13,234	5%	5%
			Spawning	64,292	64,292	64,292	0%	0%
		Dec	Rearing	10,048	10,048	10,048	0%	0%

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Species	Chinook							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
	2013	Dec	Spawning	50,205	50,205	50,205	0%	0%
	2014	Jan	Rearing	7,726	7,726	7,726	0%	0%
			Spawning	46,589	46,589	46,589	0%	0%
		Feb	Rearing	4,587	4,301	4,301	-6%	-6%
			Spawning	19,442	18,362	18,362	-6%	-6%
		Mar	Rearing	5,885	5,885	5,885	0%	0%
			Spawning	21,602	21,602	21,602	0%	0%
		Apr	Rearing	13,729	13,494	13,494	-2%	-2%
			Spawning	48,658	48,658	48,658	0%	0%
		May	Rearing	15,981	17,454	17,454	9%	9%
			Spawning	18,409	19,998	19,998	9%	9%
		Jun	Rearing	5,739	7,135	7,135	24%	24%
			Spawning	755	1,511	1,511	100%	100%
		Jul	Rearing	1,926	1,926	1,926	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	3,452	3,632	3,009	5%	-13%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	16,432	16,432	16,432	0%	0%
			Spawning	7,303	7,303	7,303	0%	0%
		Oct	Rearing	36,620	38,049	38,049	4%	4%
			Spawning	62,865	60,996	60,996	-3%	-3%
		Nov	Rearing	12,572	13,234	13,234	5%	5%
			Spawning	64,292	64,292	64,292	0%	0%
		Dec	Rearing	4,647	4,647	4,647	0%	0%
			Spawning	24,116	24,116	24,116	0%	0%
Black to Porter	2013	Jan	Rearing	4,403	4,403	4,403	0%	0%
			Spawning	10,904	10,904	10,904	0%	0%
		Feb	Rearing	4,500	4,500	4,500	0%	0%
			Spawning	16,450	16,450	16,450	0%	0%
		Mar	Rearing	7,248	7,248	7,248	0%	0%
			Spawning	15,089	15,089	15,089	0%	0%
		Apr	Rearing	8,411	8,712	8,712	4%	4%
			Spawning	13,580	15,089	15,089	11%	11%
		May	Rearing	5,133	6,070	6,070	18%	18%
			Spawning	12,408	13,029	13,029	5%	5%
		Jun	Rearing	1,284	1,661	1,661	29%	29%
			Spawning	0	632	632	0%	0%
		Jul	Rearing	334	334	334	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	519	521	521	1%	1%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	3,434	3,434	3,434	0%	0%
			Spawning	5,055	5,055	5,055	0%	0%
		Oct	Rearing	8,034	8,034	8,034	0%	0%
			Spawning	32,283	32,283	32,283	0%	0%
		Nov	Rearing	5,220	5,495	5,495	5%	5%
			Spawning	32,283	32,283	32,283	0%	0%
		Dec	Rearing	3,580	3,580	3,580	0%	0%
			Spawning	28,522	28,522	28,522	0%	0%
	2014	Jan	Rearing	4,219	4,219	4,219	0%	0%
			Spawning	15,536	15,536	15,536	0%	0%
		Feb	Rearing	4,890	4,890	4,890	0%	0%
			Spawning	9,324	9,324	9,324	0%	0%
		Mar	Rearing	7,707	7,707	7,707	0%	0%
			Spawning	10,360	10,360	10,360	0%	0%
		Apr	Rearing	8,231	8,527	8,527	4%	4%
			Spawning	16,450	18,278	18,278	11%	11%
		May	Rearing	4,885	5,693	5,693	17%	17%
			Spawning	9,983	10,458	10,458	5%	5%
		Jun	Rearing	2,017	2,017	2,017	0%	0%
			Spawning	579	579	579	0%	0%
		Jul	Rearing	521	519	519	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	716	716	716	0%	0%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	4,401	4,401	4,423	0%	1%
			Spawning	3,167	3,167	3,521	0%	11%
		Oct	Rearing	11,566	11,566	12,219	0%	6%
			Spawning	45,494	45,494	44,881	0%	-1%
		Nov	Rearing	5,237	5,513	5,513	5%	5%
			Spawning	26,829	26,829	26,829	0%	0%
		Dec	Rearing	4,278	4,278	4,278	0%	0%
			Spawning	8,288	8,288	8,288	0%	0%

Note: Values with green highlights denote an increase in WUA compared to Current Conditions.
Values with orange highlights denote a decrease in WUA compared to Current Conditions.

Species	Chum							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
Black to Porter	2013	Jan	Spawning	1,997	1,997	1,997	0%	0%
		Feb	Spawning	3,351	3,351	3,351	0%	0%
		Mar	Spawning	2,178	2,178	2,178	0%	0%
		Apr	Spawning	1,743	1,859	1,859	7%	7%
		May	Spawning	0	0	0	0%	0%
		Jun	Spawning	0	0	0	0%	0%
		Jul	Spawning	0	0	0	0%	0%
		Aug	Spawning	0	0	0	0%	0%
		Sep	Spawning	0	0	0	0%	0%
		Oct	Spawning	6,540	6,540	6,540	0%	0%
		Nov	Spawning	7,176	7,086	7,086	-1%	-1%
		Dec	Spawning	7,256	7,256	7,256	0%	0%
	2014	Jan	Spawning	3,351	3,351	3,351	0%	0%
		Feb	Spawning	2,030	2,030	2,030	0%	0%
		Mar	Spawning	1,903	1,903	1,903	0%	0%
		Apr	Spawning	2,513	2,681	2,681	7%	7%
		May	Spawning	0	0	0	0%	0%
		Jun	Spawning	0	0	0	0%	0%
		Jul	Spawning	0	0	0	0%	0%
		Aug	Spawning	0	0	0	0%	0%
		Sep	Spawning	0	0	0	0%	0%
		Oct	Spawning	12,342	12,342	12,891	0%	4%
		Nov	Spawning	6,849	6,762	6,762	-1%	-1%
		Dec	Spawning	2,030	2,030	2,030	0%	0%

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Values with orange highlights denote a decrease in WUA compared to Current Conditions.

Species	Coho							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
Upper Chehalis	2013	Jan	Spawning	18,619	18,619	18,619	0%	0%
		Feb	Spawning	18,619	17,455	17,455	-6%	-6%
		Mar	Spawning	18,619	18,619	18,619	0%	0%
		Apr	Spawning	12,102	18,619	18,619	54%	54%
		May	Spawning	2,683	17,194	17,194	541%	541%
		Jun	Spawning	501	9,012	9,012	1700%	1700%
		Jul	Spawning	0	3,158	2,368	0%	0%
		Aug	Spawning	47	2,046	1,705	4256%	3530%
		Sep	Spawning	1,862	4,189	4,189	125%	125%
		Oct	Spawning	14,895	16,379	16,574	10%	11%
		Nov	Spawning	18,619	18,619	18,619	0%	0%
		Dec	Spawning	18,619	18,619	18,619	0%	0%
	2014	Jan	Spawning	18,619	18,619	18,619	0%	0%
		Feb	Spawning	18,619	18,619	18,619	0%	0%
		Mar	Spawning	18,619	18,619	18,619	0%	0%
		Apr	Spawning	13,499	18,619	18,619	38%	38%
		May	Spawning	2,793	14,895	14,895	433%	433%
		Jun	Spawning	1,104	12,798	11,474	1059%	939%
		Jul	Spawning	0	2,945	2,577	0%	0%
		Aug	Spawning	0	1,705	1,705	0%	0%
		Sep	Spawning	376	3,068	3,972	717%	957%
		Oct	Spawning	12,102	15,943	16,574	32%	37%
		Nov	Spawning	18,619	16,757	16,757	-10%	-10%
		Dec	Spawning	18,619	18,619	18,619	0%	0%
PeEll to Elk Cr	2013	Jan	Spawning	6,816	6,816	6,816	0%	0%
		Feb	Spawning	8,924	8,924	8,366	0%	-6%
		Mar	Spawning	7,809	7,809	7,809	0%	0%
		Apr	Spawning	5,662	7,028	7,028	24%	24%
		May	Spawning	2,805	12,153	12,153	333%	333%
		Jun	Spawning	471	3,295	3,295	600%	600%
		Jul	Spawning	0	657	492	0%	0%
		Aug	Spawning	0	404	404	0%	0%
		Sep	Spawning	658	1,713	1,998	160%	204%
		Oct	Spawning	10,530	13,735	13,735	30%	30%
		Nov	Spawning	10,182	10,182	10,182	0%	0%
		Dec	Spawning	13,162	13,162	13,162	0%	0%
	2014	Jan	Spawning	7,809	7,809	7,809	0%	0%
		Feb	Spawning	6,816	6,816	6,816	0%	0%
		Mar	Spawning	6,816	6,816	6,816	0%	0%
		Apr	Spawning	5,453	6,134	6,134	13%	13%
		May	Spawning	1,713	8,279	8,279	383%	383%
		Jun	Spawning	711	3,239	3,239	355%	355%
		Jul	Spawning	0	657	492	0%	0%
		Aug	Spawning	0	269	269	0%	0%
		Sep	Spawning	149	1,615	2,298	984%	1443%
		Oct	Spawning	8,555	10,989	13,735	28%	61%
		Nov	Spawning	6,816	6,134	6,134	-10%	-10%
		Dec	Spawning	6,816	6,816	6,816	0%	0%
Elk Cr to S Fk	2013	Jan	Spawning	2,833	2,833	2,833	0%	0%
		Feb	Spawning	6,792	6,792	6,792	0%	0%
		Mar	Spawning	5,912	5,912	5,912	0%	0%
		Apr	Spawning	4,730	4,730	4,730	0%	0%
		May	Spawning	1,762	3,172	3,172	80%	80%
		Jun	Spawning	280	1,118	1,118	300%	300%
		Jul	Spawning	0	0	0	0%	0%
		Aug	Spawning	0	108	108	0%	0%
		Sep	Spawning	780	979	1,224	26%	57%
		Oct	Spawning	7,831	9,504	9,504	21%	21%
		Nov	Spawning	7,773	7,773	7,773	0%	0%
		Dec	Spawning	9,750	9,789	9,177	0%	-6%
	2014	Jan	Spawning	5,912	5,912	5,912	0%	0%
		Feb	Spawning	1,750	1,750	1,750	0%	0%
		Mar	Spawning	1,750	1,750	1,750	0%	0%
		Apr	Spawning	3,595	3,595	3,595	0%	0%
		May	Spawning	1,311	3,934	2,186	200%	67%
		Jun	Spawning	246	1,314	985	433%	300%
		Jul	Spawning	0	0	0	0%	0%
		Aug	Spawning	0	108	54	0%	0%
		Sep	Spawning	261	1,082	1,298	315%	398%
		Oct	Spawning	7,540	9,183	10,753	22%	43%
		Nov	Spawning	5,912	5,138	5,138	-13%	-13%
		Dec	Spawning	2,211	2,211	2,211	0%	0%
S Fk to Newaukum	2013	Jan	Spawning	1,446	1,446	1,446	0%	0%
		Feb	Spawning	1,953	1,953	1,953	0%	0%
		Mar	Spawning	1,953	1,953	1,953	0%	0%
		Apr	Spawning	1,269	1,562	1,562	23%	23%
		May	Spawning	279	697	697	150%	150%
		Jun	Spawning	0	89	89	0%	0%
		Jul	Spawning	0	0	0	0%	0%

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Species	Coho							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
	2013	Aug	Spawning	0	0	0	0%	0%
		Oct	Spawning	2,438	2,438	2,816	0%	15%
		Nov	Spawning	3,048	3,048	3,048	0%	0%
		Dec	Spawning	3,300	3,300	3,300	0%	0%
	2014	Jan	Spawning	1,953	1,953	1,953	0%	0%
		Feb	Spawning	1,093	1,093	1,093	0%	0%
		Mar	Spawning	1,093	1,093	1,093	0%	0%
		Apr	Spawning	1,218	1,562	1,562	28%	28%
		May	Spawning	352	704	616	100%	75%
		Jun	Spawning	0	51	51	0%	0%
		Jul	Spawning	0	0	0	0%	0%
		Aug	Spawning	0	0	0	0%	0%
		Sep	Spawning	109	328	533	201%	389%
		Oct	Spawning	3,073	3,626	3,819	18%	24%
		Nov	Spawning	1,953	1,953	1,953	0%	0%
		Dec	Spawning	1,093	1,093	1,093	0%	0%
Newaukum to Skookumchuck	2013	Jan	Spawning	497	497	497	0%	0%
		Feb	Spawning	682	682	682	0%	0%
		Mar	Spawning	574	574	574	0%	0%
		Apr	Spawning	501	501	501	0%	0%
		May	Spawning	151	181	181	20%	20%
		Jun	Spawning	14	21	21	50%	50%
		Jul	Spawning	0	0	0	0%	0%
		Aug	Spawning	0	0	0	0%	0%
		Sep	Spawning	45	45	45	0%	0%
		Oct	Spawning	842	898	898	7%	7%
		Nov	Spawning	1,053	1,053	1,053	0%	0%
		Dec	Spawning	1,102	1,102	1,102	0%	0%
	2014	Jan	Spawning	744	744	744	0%	0%
		Feb	Spawning	466	466	466	0%	0%
		Mar	Spawning	466	466	466	0%	0%
		Apr	Spawning	459	459	459	0%	0%
		May	Spawning	168	196	196	17%	17%
		Jun	Spawning	14	22	22	50%	50%
		Jul	Spawning	0	0	0	0%	0%
		Aug	Spawning	0	0	0	0%	0%
		Sep	Spawning	30	46	69	51%	126%
		Oct	Spawning	783	742	742	-5%	-5%
		Nov	Spawning	744	744	744	0%	0%
		Dec	Spawning	466	466	466	0%	0%
Skookumchuck to Black	2013	Jan	Spawning	8,896	8,896	8,896	0%	0%
		Feb	Spawning	12,000	12,000	12,000	0%	0%
		Mar	Spawning	8,705	9,672	9,672	11%	11%
		Apr	Spawning	6,956	7,758	6,956	12%	0%
		May	Spawning	1,494	1,494	1,494	0%	0%
		Jun	Spawning	0	0	0	0%	0%
		Jul	Spawning	0	0	0	0%	0%
		Aug	Spawning	0	0	0	0%	0%
		Sep	Spawning	558	558	558	0%	0%
		Oct	Spawning	12,249	12,249	12,249	0%	0%
		Nov	Spawning	15,311	15,311	15,311	0%	0%
		Dec	Spawning	15,998	15,998	15,998	0%	0%
	2014	Jan	Spawning	12,000	12,000	12,000	0%	0%
		Feb	Spawning	7,764	7,764	7,764	0%	0%
		Mar	Spawning	7,764	7,764	7,764	0%	0%
		Apr	Spawning	6,956	7,758	7,758	12%	12%
		May	Spawning	1,707	2,133	2,133	25%	25%
		Jun	Spawning	0	0	0	0%	0%
		Jul	Spawning	0	0	0	0%	0%
		Aug	Spawning	0	0	0	0%	0%
		Sep	Spawning	984	984	984	0%	0%
		Oct	Spawning	9,543	10,052	10,052	5%	5%
		Nov	Spawning	15,311	15,311	15,311	0%	0%
		Dec	Spawning	8,380	8,380	8,380	0%	0%
Black to Porter	2013	Jan	Spawning	1,953	1,953	1,953	0%	0%
		Feb	Spawning	2,648	2,648	2,648	0%	0%
		Mar	Spawning	1,995	1,995	1,995	0%	0%
		Apr	Spawning	998	1,441	1,441	44%	44%
		May	Spawning	463	695	695	50%	50%
		Jun	Spawning	0	0	0	0%	0%
		Jul	Spawning	0	0	0	0%	0%
		Aug	Spawning	0	0	0	0%	0%
		Sep	Spawning	195	195	195	0%	0%
		Oct	Spawning	4,446	4,446	4,446	0%	0%
		Nov	Spawning	5,558	5,558	5,558	0%	0%
		Dec	Spawning	6,694	6,694	6,694	0%	0%
	2014	Jan	Spawning	2,648	2,648	2,648	0%	0%
		Feb	Spawning	1,703	1,703	1,703	0%	0%
		Mar	Spawning	1,533	1,533	1,533	0%	0%

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Species	Coho							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
		Apr	Spawning	1,192	1,721	1,721	44%	44%
		May	Spawning	536	714	714	33%	33%
		Jun	Spawning	0	0	0	0%	0%
		Jul	Spawning	0	0	0	0%	0%
		Aug	Spawning	0	0	0	0%	0%
		Sep	Spawning	290	290	287	0%	-1%
		Oct	Spawning	4,685	4,685	5,011	0%	7%
		Nov	Spawning	4,236	4,236	4,236	0%	0%
		Dec	Spawning	1,703	1,703	1,703	0%	0%

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Species	Largemouth Bass							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
PeEll to Elk Cr	2013	Jan	Rearing	356	356	356	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	348	348	348	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	339	352	352	4%	4%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	965	475	475	-51%	-51%
			Spawning	24	0	0	-100%	-100%
		May	Rearing	1,322	930	930	-30%	-30%
			Spawning	437	52	52	-88%	-88%
		Jun	Rearing	1,363	1,254	1,254	-8%	-8%
			Spawning	1,665	312	312	-81%	-81%
		Jul	Rearing	1,331	1,425	1,416	7%	6%
			Spawning	1,766	1,927	1,927	9%	9%
		Aug	Rearing	1,778	1,537	1,537	-14%	-14%
			Spawning	1,876	1,859	1,859	-1%	-1%
		Sep	Rearing	1,469	1,421	1,365	-3%	-7%
			Spawning	1,748	439	329	-75%	-81%
		Oct	Rearing	678	741	741	9%	9%
			Spawning	0	0	0	0%	0%
		Nov	Rearing	340	328	328	-3%	-3%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	323	323	323	0%	0%
			Spawning	0	0	0	0%	0%
	2014	Jan	Rearing	352	352	352	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	356	356	356	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	344	356	356	4%	4%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	868	481	481	-45%	-45%
			Spawning	0	0	0	0%	0%
		May	Rearing	1,421	905	905	-36%	-36%
			Spawning	439	26	26	-94%	-94%
		Jun	Rearing	1,409	1,193	1,193	-15%	-15%
			Spawning	1,906	226	226	-88%	-88%
		Jul	Rearing	1,347	1,425	1,416	6%	5%
			Spawning	1,551	1,927	1,927	24%	24%
		Aug	Rearing	1,603	1,528	1,528	-5%	-5%
			Spawning	1,580	1,859	1,859	18%	18%
		Sep	Rearing	1,850	1,463	1,295	-21%	-30%
			Spawning	1,928	465	361	-76%	-81%
		Oct	Rearing	978	857	741	-12%	-24%
			Spawning	52	27	0	-49%	-100%
		Nov	Rearing	356	481	481	35%	35%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	356	356	356	0%	0%
			Spawning	0	0	0	0%	0%
Elk Cr to S Fk	2013	Jan	Rearing	337	337	337	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	411	411	411	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	384	398	398	4%	4%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	970	693	693	-29%	-29%
			Spawning	0	0	0	0%	0%
		May	Rearing	2,532	2,133	2,133	-16%	-16%
			Spawning	815	161	161	-80%	-80%
		Jun	Rearing	2,840	2,910	2,910	2%	2%
			Spawning	1,979	1,682	1,682	-15%	-15%
		Jul	Rearing	3,836	3,257	3,257	-15%	-15%
			Spawning	3,236	3,011	3,011	-7%	-7%
		Aug	Rearing	8,854	4,336	4,336	-51%	-51%
			Spawning	4,396	3,407	3,407	-23%	-23%
		Sep	Rearing	1,448	2,111	2,047	46%	41%
			Spawning	1,188	927	629	-22%	-47%
		Oct	Rearing	965	1,044	1,044	8%	8%
			Spawning	0	0	0	0%	0%
		Nov	Rearing	423	423	423	0%	0%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	317	459	459	45%	45%
			Spawning	0	0	0	0%	0%
	2014	Jan	Rearing	398	398	398	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	312	312	312	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	301	312	312	4%	4%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	911	651	651	-29%	-29%
			Spawning	0	0	0	0%	0%
		May	Rearing	1,912	1,461	1,569	-24%	-18%
			Spawning	298	55	75	-82%	-75%
		Jun	Rearing	3,010	3,097	3,083	3%	2%
			Spawning	2,564	1,795	2,180	-30%	-15%

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Species	Largemouth Bass							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
		Jul	Rearing	3,707	3,257	3,257	-12%	-12%
			Spawning	3,066	3,011	3,011	-2%	-2%
		Aug	Rearing	8,261	4,336	4,296	-48%	-48%
			Spawning	4,396	3,407	3,407	-23%	-23%
		Sep	Rearing	9,266	4,361	4,216	-53%	-55%
			Spawning	4,396	1,618	852	-63%	-81%
		Oct	Rearing	869	1,434	1,330	65%	53%
			Spawning	21	24	0	15%	-100%
		Nov	Rearing	398	373	373	-6%	-6%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	323	323	323	0%	0%
			Spawning	0	0	0	0%	0%
S Fk to Newaukum	2013	Jan	Rearing	598	598	598	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	576	576	576	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	538	576	576	7%	7%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	1,747	1,405	1,405	-20%	-20%
			Spawning	64	0	0	-100%	-100%
		May	Rearing	2,085	2,040	2,040	-2%	-2%
			Spawning	1,704	809	809	-53%	-53%
		Jun	Rearing	2,111	2,303	2,303	9%	9%
			Spawning	1,741	1,741	1,741	0%	0%
		Jul	Rearing	4,820	5,166	5,166	7%	7%
			Spawning	1,284	1,481	1,481	15%	15%
		Aug	Rearing	8,911	7,171	7,171	-20%	-20%
			Spawning	2,387	1,837	1,837	-23%	-23%
		Oct	Rearing	1,082	1,082	1,013	0%	-6%
			Spawning	0	0	0	0%	0%
		Nov	Rearing	515	515	515	0%	0%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	482	482	482	0%	0%
			Spawning	0	0	0	0%	0%
	2014	Jan	Rearing	576	576	576	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	634	634	634	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	591	612	612	3%	3%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	1,609	1,405	1,405	-13%	-13%
			Spawning	32	0	0	-100%	-100%
		May	Rearing	2,216	1,909	1,997	-14%	-10%
			Spawning	1,635	292	438	-82%	-73%
		Jun	Rearing	2,803	3,030	3,030	8%	8%
			Spawning	1,857	1,857	1,857	0%	0%
		Jul	Rearing	4,993	5,166	5,166	3%	3%
			Spawning	1,383	1,481	1,481	7%	7%
		Aug	Rearing	10,746	9,220	9,220	-14%	-14%
			Spawning	3,966	2,537	2,537	-36%	-36%
		Sep	Rearing	14,058	11,481	8,968	-18%	-36%
			Spawning	5,288	2,984	1,837	-44%	-65%
		Oct	Rearing	1,350	1,387	1,417	3%	5%
			Spawning	56	51	52	-9%	-8%
		Nov	Rearing	576	576	576	0%	0%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	634	634	634	0%	0%
			Spawning	0	0	0	0%	0%
Newaukum to Skookumchuck	2013	Jan	Rearing	3,589	3,589	3,589	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	3,841	3,841	3,841	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	3,585	3,585	3,585	0%	0%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	9,202	9,202	9,202	0%	0%
			Spawning	0	0	0	0%	0%
		May	Rearing	28,546	27,599	27,599	-3%	-3%
			Spawning	6,908	3,636	3,636	-47%	-47%
		Jun	Rearing	36,168	36,436	36,436	1%	1%
			Spawning	16,592	16,592	16,592	0%	0%
		Jul	Rearing	52,309	52,309	52,309	0%	0%
			Spawning	21,433	21,433	21,433	0%	0%
		Aug	Rearing	58,471	58,207	58,207	0%	0%
			Spawning	25,026	25,311	25,311	1%	1%
		Sep	Rearing	28,993	28,993	28,993	0%	0%
			Spawning	14,543	14,543	14,543	0%	0%
		Oct	Rearing	9,141	9,459	9,459	3%	3%
			Spawning	0	0	0	0%	0%
		Nov	Rearing	4,351	4,351	4,351	0%	0%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	4,678	4,678	4,678	0%	0%
			Spawning	0	0	0	0%	0%
	2014	Jan	Rearing	3,919	3,919	3,919	0%	0%
			Spawning	0	0	0	0%	0%

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Species	Largemouth Bass							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
	2014	Feb	Rearing	3,539	3,539	3,539	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	3,416	3,416	3,416	0%	0%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	9,049	9,049	9,049	0%	0%
			Spawning	0	0	0	0%	0%
		May	Rearing	19,400	18,638	18,638	-4%	-4%
			Spawning	2,788	2,091	2,091	-25%	-25%
		Jun	Rearing	46,988	47,337	47,337	1%	1%
			Spawning	19,444	19,444	19,444	0%	0%
		Jul	Rearing	52,309	54,186	52,309	4%	0%
			Spawning	21,433	22,694	21,433	6%	0%
		Aug	Rearing	58,471	58,207	58,207	0%	0%
			Spawning	25,026	25,311	25,311	1%	1%
		Sep	Rearing	69,847	67,627	67,912	-3%	-3%
			Spawning	27,807	26,643	22,646	-4%	-19%
		Oct	Rearing	19,416	21,582	21,582	11%	11%
			Spawning	436	465	465	7%	7%
		Nov	Rearing	3,919	3,919	3,919	0%	0%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	3,539	3,539	3,539	0%	0%
			Spawning	0	0	0	0%	0%
Skookumchuck to Black	2013	Jan	Rearing	3,649	3,649	3,649	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	3,841	3,841	3,841	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	5,017	3,465	3,465	-31%	-31%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	11,447	10,363	11,447	-9%	0%
			Spawning	261	130	261	-50%	0%
		May	Rearing	24,933	24,933	24,933	0%	0%
			Spawning	11,058	11,058	11,058	0%	0%
		Jun	Rearing	29,916	30,989	30,989	4%	4%
			Spawning	15,495	15,495	15,495	0%	0%
		Jul	Rearing	47,861	47,861	47,861	0%	0%
			Spawning	18,936	18,936	18,936	0%	0%
		Aug	Rearing	56,258	56,063	56,063	0%	0%
			Spawning	23,979	23,955	23,955	0%	0%
		Sep	Rearing	32,037	32,037	32,037	0%	0%
			Spawning	15,495	15,495	15,495	0%	0%
		Oct	Rearing	9,762	9,762	9,762	0%	0%
			Spawning	0	0	0	0%	0%
		Nov	Rearing	4,006	4,006	4,006	0%	0%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	4,215	4,215	4,215	0%	0%
			Spawning	0	0	0	0%	0%
	2014	Jan	Rearing	3,841	3,841	3,841	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	3,539	3,539	3,539	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	3,302	3,302	3,302	0%	0%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	11,447	10,363	10,363	-9%	-9%
			Spawning	261	130	130	-50%	-50%
		May	Rearing	19,366	18,785	18,785	-3%	-3%
			Spawning	7,379	5,007	5,007	-32%	-32%
		Jun	Rearing	40,660	42,119	42,119	4%	4%
			Spawning	18,136	18,136	18,136	0%	0%
		Jul	Rearing	47,861	47,861	47,861	0%	0%
			Spawning	18,936	18,936	18,936	0%	0%
		Aug	Rearing	58,207	56,063	54,186	-4%	-7%
			Spawning	25,311	23,955	22,694	-5%	-10%
		Sep	Rearing	64,729	64,729	64,729	0%	0%
			Spawning	25,216	25,216	25,216	0%	0%
		Oct	Rearing	21,087	23,439	23,439	11%	11%
			Spawning	673	717	717	7%	7%
		Nov	Rearing	4,006	4,006	4,006	0%	0%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	3,589	3,589	3,589	0%	0%
			Spawning	0	0	0	0%	0%
Black to Porter	2013	Jan	Rearing	1,362	1,362	1,362	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	1,146	1,146	1,146	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	1,710	1,710	1,710	0%	0%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	4,167	3,837	3,837	-8%	-8%
			Spawning	248	161	161	-35%	-35%
		May	Rearing	5,886	5,911	5,911	0%	0%
			Spawning	4,508	3,832	3,832	-15%	-15%
		Jun	Rearing	6,823	7,059	7,059	3%	3%
			Spawning	5,601	5,601	5,601	0%	0%
		Jul	Rearing	8,584	8,584	8,584	0%	0%
			Spawning	5,055	5,055	5,055	0%	0%

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Species	Largemouth Bass							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
Black to Porter	2013	Aug	Rearing	10,748	9,768	9,768	-9%	-9%
			Spawning	6,601	5,911	5,911	-10%	-10%
		Sep	Rearing	7,501	7,501	7,501	0%	0%
			Spawning	5,601	5,601	5,601	0%	0%
		Oct	Rearing	2,355	2,355	2,355	0%	0%
			Spawning	0	0	0	0%	0%
		Nov	Rearing	966	966	966	0%	0%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	975	975	975	0%	0%
			Spawning	0	0	0	0%	0%
	2014	Jan	Rearing	1,146	1,146	1,146	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	1,469	1,469	1,469	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	1,984	1,984	1,984	0%	0%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	3,773	3,474	3,474	-8%	-8%
			Spawning	230	149	149	-35%	-35%
		May	Rearing	4,461	4,481	4,481	0%	0%
			Spawning	3,513	2,893	2,893	-18%	-18%
		Jun	Rearing	8,476	8,476	8,476	0%	0%
			Spawning	6,184	6,184	6,184	0%	0%
		Jul	Rearing	9,768	8,882	8,882	-9%	-9%
			Spawning	5,911	5,416	5,416	-8%	-8%
		Aug	Rearing	11,134	11,134	11,134	0%	0%
			Spawning	7,041	7,041	7,041	0%	0%
		Sep	Rearing	14,060	14,060	12,778	0%	-9%
			Spawning	8,801	8,801	7,881	0%	-10%
		Oct	Rearing	5,531	5,531	5,841	0%	6%
			Spawning	259	259	268	0%	3%
		Nov	Rearing	968	968	968	0%	0%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	1,469	1,469	1,469	0%	0%
			Spawning	0	0	0	0%	0%

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Species	Largescale Sucker							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
PeEll to Elk Cr	2013	Jan	Rearing	6,328	6,328	6,328	0%	0%
			Spawning	278	278	278	0%	0%
		Feb	Rearing	6,562	6,152	5,947	-6%	-9%
			Spawning	560	280	140	-50%	-75%
		Mar	Rearing	7,403	7,046	7,046	-5%	-5%
			Spawning	2,974	1,101	1,101	-63%	-63%
		Apr	Rearing	6,500	7,280	7,280	12%	12%
			Spawning	4,075	3,635	3,635	-11%	-11%
		May	Rearing	5,510	6,784	6,784	23%	23%
			Spawning	14,072	13,369	13,369	-5%	-5%
		Jun	Rearing	3,275	4,172	4,172	27%	27%
			Spawning	2,763	22,107	22,107	700%	700%
		Jul	Rearing	5,226	6,965	6,724	33%	29%
			Spawning	0	8,386	6,289	0%	0%
		Aug	Rearing	6,575	8,113	8,113	23%	23%
			Spawning	0	6,416	6,416	0%	0%
		Sep	Rearing	4,367	5,041	5,215	15%	19%
			Spawning	1,393	4,891	4,891	251%	251%
		Oct	Rearing	6,848	6,959	6,959	2%	2%
			Spawning	4,875	8,397	8,397	72%	72%
		Nov	Rearing	7,165	7,312	7,312	2%	2%
			Spawning	1,843	3,110	3,110	69%	69%
		Dec	Rearing	6,111	6,315	6,111	3%	0%
			Spawning	348	522	348	50%	0%
	2014	Jan	Rearing	6,425	6,217	6,217	-3%	-3%
			Spawning	413	275	275	-33%	-33%
		Feb	Rearing	6,539	6,328	6,328	-3%	-3%
			Spawning	417	278	278	-33%	-33%
		Mar	Rearing	7,534	7,382	7,593	-2%	1%
			Spawning	3,005	1,781	2,448	-41%	-19%
		Apr	Rearing	6,853	7,409	7,409	8%	8%
			Spawning	4,006	3,673	3,673	-8%	-8%
		May	Rearing	5,041	6,421	6,421	27%	27%
			Spawning	4,891	4,524	4,524	-7%	-7%
		Jun	Rearing	6,486	7,207	7,207	11%	11%
			Spawning	8,120	29,517	29,517	264%	264%
		Jul	Rearing	4,782	6,965	6,724	46%	41%
			Spawning	0	8,386	6,289	0%	0%
		Aug	Rearing	4,883	7,841	7,841	61%	61%
			Spawning	0	4,277	4,277	0%	0%
		Sep	Rearing	9,221	9,654	8,278	5%	-10%
			Spawning	2,970	34,217	33,543	1052%	1030%
		Oct	Rearing	6,175	6,550	6,959	6%	13%
			Spawning	5,293	6,262	8,397	18%	59%
		Nov	Rearing	7,593	7,409	7,409	-2%	-2%
			Spawning	2,448	3,673	3,673	50%	50%
		Dec	Rearing	6,750	7,172	6,961	6%	3%
			Spawning	556	1,113	835	100%	50%
Elk Cr to S Fk	2013	Jan	Rearing	6,757	6,757	6,757	0%	0%
			Spawning	247	247	247	0%	0%
		Feb	Rearing	8,183	7,919	7,919	-3%	-3%
			Spawning	368	245	245	-33%	-33%
		Mar	Rearing	9,108	8,924	8,924	-2%	-2%
			Spawning	2,561	1,517	1,517	-41%	-41%
		Apr	Rearing	8,285	8,879	8,879	7%	7%
			Spawning	3,414	3,224	3,224	-6%	-6%
		May	Rearing	9,815	11,274	11,274	15%	15%
			Spawning	7,285	9,713	9,713	33%	33%
		Jun	Rearing	10,848	12,461	12,461	15%	15%
			Spawning	1,364	5,455	5,455	300%	300%
		Jul	Rearing	14,725	16,377	16,377	11%	11%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	21,493	20,613	20,613	-4%	-4%
			Spawning	0	1,365	1,365	0%	0%
		Sep	Rearing	7,011	6,998	7,240	0%	3%
			Spawning	2,128	2,612	3,918	23%	84%
		Oct	Rearing	10,239	11,661	11,661	14%	14%
			Spawning	4,571	6,033	6,033	32%	32%
		Nov	Rearing	9,624	9,899	9,899	3%	3%
			Spawning	1,694	2,330	2,330	38%	38%
		Dec	Rearing	9,168	9,138	8,833	0%	-4%
			Spawning	177	327	163	84%	-8%
	2014	Jan	Rearing	7,905	7,905	7,650	0%	-3%
			Spawning	356	356	237	0%	-33%
		Feb	Rearing	6,552	6,341	6,341	-3%	-3%
			Spawning	346	231	231	-33%	-33%
		Mar	Rearing	7,549	7,609	7,609	1%	1%
			Spawning	2,494	2,032	2,032	-19%	-19%
		Apr	Rearing	7,860	8,425	8,425	7%	7%
			Spawning	3,503	3,308	3,308	-6%	-6%
		May	Rearing	7,083	8,418	8,136	19%	15%
			Spawning	4,650	4,534	4,650	-3%	0%
		Jun	Rearing	15,273	18,174	17,544	19%	15%
			Spawning	1,751	9,337	7,003	433%	300%
		Jul	Rearing	13,394	16,377	16,377	22%	22%

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Species	Largescale Sucker							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
		Jul	Spawning	0	0	0	0%	0%
		Aug	Rearing	18,048	20,613	19,899	14%	10%
			Spawning	0	1,365	683	0%	0%
		Sep	Rearing	26,461	26,257	27,199	-1%	3%
			Spawning	5,030	16,383	21,844	226%	334%
		Oct	Rearing	9,915	11,430	12,499	15%	26%
			Spawning	5,249	7,095	7,746	35%	48%
		Nov	Rearing	8,924	8,888	8,888	0%	0%
			Spawning	1,517	2,570	2,570	69%	69%
		Dec	Rearing	6,784	7,003	7,003	3%	3%
			Spawning	360	479	479	33%	33%
S Fk to Newaukum	2013	Jan	Spawning	130	130	130	0%	0%
		Feb	Spawning	272	136	136	-50%	-50%
		Mar	Spawning	1,741	1,197	1,197	-31%	-31%
		Apr	Spawning	2,067	1,959	1,959	-5%	-5%
		May	Rearing	6,308	6,995	6,995	11%	11%
			Spawning	1,707	5,120	5,120	200%	200%
		Jun	Rearing	6,697	8,548	8,548	28%	28%
			Spawning	0	588	588	0%	0%
		Jul	Rearing	7,862	9,958	9,958	27%	27%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	13,558	13,706	13,706	1%	1%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	5,145	5,145	5,323	0%	3%
		Oct	Rearing	8,640	8,640	8,622	0%	0%
			Spawning	3,459	3,459	3,508	0%	1%
		Nov	Rearing	8,996	9,253	9,253	3%	3%
			Spawning	1,581	2,174	2,174	38%	38%
		Dec	Rearing	7,439	7,439	7,439	0%	0%
			Spawning	125	125	125	0%	0%
	2014	Jan	Spawning	204	136	136	-33%	-33%
		Feb	Spawning	210	210	140	0%	-33%
		Mar	Spawning	1,789	1,510	1,510	-16%	-16%
		Apr	Spawning	1,857	1,959	1,959	5%	5%
		May	Rearing	5,893	6,769	6,535	15%	11%
			Spawning	2,005	4,009	4,009	100%	100%
		Jun	Rearing	10,611	13,074	13,074	23%	23%
			Spawning	0	291	291	0%	0%
		Jul	Rearing	8,885	9,958	9,958	12%	12%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	13,281	15,029	15,029	13%	13%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	28,896	29,356	27,700	2%	-4%
			Spawning	1,012	2,703	3,971	167%	293%
		Oct	Rearing	7,953	8,921	10,296	12%	29%
			Spawning	4,335	6,486	7,300	50%	68%
		Nov	Spawning	870	1,197	1,197	38%	38%
		Dec	Spawning	140	210	210	50%	50%
Newaukum to Skookumchuck	2013	Jan	Rearing	44,733	44,733	44,733	0%	0%
			Spawning	26	26	26	0%	0%
		Feb	Rearing	50,099	50,099	50,099	0%	0%
			Spawning	21	21	21	0%	0%
		Mar	Rearing	54,325	54,325	54,325	0%	0%
			Spawning	154	154	154	0%	0%
		Apr	Rearing	50,863	50,863	50,863	0%	0%
			Spawning	196	196	196	0%	0%
		May	Rearing	79,705	82,565	82,565	4%	4%
			Spawning	101	135	135	33%	33%
		Jun	Rearing	71,139	73,604	73,604	3%	3%
			Spawning	10	15	15	50%	50%
		Jul	Rearing	46,867	46,867	46,867	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	52,308	57,205	57,205	9%	9%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	69,387	69,387	69,387	0%	0%
			Spawning	25	25	25	0%	0%
		Oct	Rearing	67,495	71,573	71,573	6%	6%
			Spawning	248	228	228	-8%	-8%
		Nov	Rearing	70,275	72,283	72,283	3%	3%
			Spawning	114	156	156	38%	38%
		Dec	Rearing	65,897	65,897	65,897	0%	0%
			Spawning	7	7	7	0%	0%
	2014	Jan	Rearing	51,947	51,947	51,947	0%	0%
			Spawning	22	22	22	0%	0%
		Feb	Rearing	43,776	43,776	43,776	0%	0%
			Spawning	29	29	29	0%	0%
		Mar	Rearing	50,439	50,439	50,439	0%	0%
			Spawning	209	209	209	0%	0%
		Apr	Rearing	49,416	49,416	49,416	0%	0%
			Spawning	206	206	206	0%	0%
		May	Rearing	52,426	54,242	54,242	3%	3%
			Spawning	261	261	261	0%	0%
		Jun	Rearing	76,549	79,201	79,201	3%	3%
			Spawning	19	29	29	50%	50%
		Jul	Rearing	46,867	51,786	46,867	10%	0%

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Species	Largescale Sucker							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
	2014	Jul	Spawning	0	0	0	0%	0%
		Aug	Rearing	52,308	57,205	57,205	9%	9%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	89,265	91,990	95,177	3%	7%
			Spawning	96	147	221	53%	129%
		Oct	Rearing	101,650	108,799	108,799	7%	7%
			Spawning	129	131	131	2%	2%
		Nov	Rearing	58,650	60,325	60,325	3%	3%
			Spawning	95	131	131	38%	38%
		Dec	Rearing	42,364	42,364	42,364	0%	0%
			Spawning	19	19	19	0%	0%
Skookumchuck to Black	2013	Jan	Rearing	45,888	45,888	45,888	0%	0%
			Spawning	23	23	23	0%	0%
		Feb	Rearing	51,715	51,715	51,715	0%	0%
			Spawning	27	27	27	0%	0%
		Mar	Rearing	53,427	53,925	53,925	1%	1%
			Spawning	189	183	183	-3%	-3%
		Apr	Rearing	47,457	49,101	47,457	3%	0%
			Spawning	207	202	207	-3%	0%
		May	Rearing	63,680	63,680	63,680	0%	0%
			Spawning	63	63	63	0%	0%
		Jun	Rearing	57,307	62,488	62,488	9%	9%
			Spawning	0	0	0	0%	0%
		Jul	Rearing	42,027	42,027	42,027	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	52,038	56,929	56,929	9%	9%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	71,780	71,780	71,780	0%	0%
			Spawning	17	17	17	0%	0%
		Oct	Rearing	56,572	56,572	56,572	0%	0%
			Spawning	239	239	239	0%	0%
		Nov	Rearing	60,942	62,683	62,683	3%	3%
			Spawning	106	146	146	38%	38%
		Dec	Rearing	55,309	55,309	55,309	0%	0%
			Spawning	9	9	9	0%	0%
	2014	Jan	Rearing	50,099	50,099	50,099	0%	0%
			Spawning	21	21	21	0%	0%
		Feb	Rearing	45,189	43,776	43,776	-3%	-3%
			Spawning	39	29	29	-25%	-25%
		Mar	Rearing	50,068	50,068	50,068	0%	0%
			Spawning	248	248	248	0%	0%
		Apr	Rearing	47,457	49,101	49,101	3%	3%
			Spawning	207	202	202	-3%	-3%
		May	Rearing	43,816	45,334	45,334	3%	3%
			Spawning	146	219	219	50%	50%
		Jun	Rearing	64,127	69,925	69,925	9%	9%
			Spawning	0	0	0	0%	0%
		Jul	Rearing	42,027	42,027	42,027	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	57,205	56,929	51,786	0%	-9%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	88,374	88,374	88,374	0%	0%
			Spawning	106	106	106	0%	0%
		Oct	Rearing	98,128	105,030	105,030	7%	7%
			Spawning	132	134	134	2%	2%
		Nov	Rearing	60,942	62,683	62,683	3%	3%
			Spawning	106	146	146	38%	38%
		Dec	Rearing	43,290	43,290	43,290	0%	0%
			Spawning	18	18	18	0%	0%
Black to Porter	2013	Jan	Rearing	17,529	17,529	17,529	0%	0%
			Spawning	152	152	152	0%	0%
		Feb	Rearing	17,032	17,032	17,032	0%	0%
			Spawning	325	325	325	0%	0%
		Mar	Rearing	19,231	19,231	19,231	0%	0%
			Spawning	1,436	1,436	1,436	0%	0%
		Apr	Rearing	16,021	16,596	16,596	4%	4%
			Spawning	1,698	1,654	1,654	-3%	-3%
		May	Rearing	24,074	24,908	24,908	3%	3%
			Spawning	1,190	1,785	1,785	50%	50%
		Jun	Rearing	22,902	25,012	25,012	9%	9%
			Spawning	0	0	0	0%	0%
		Jul	Rearing	16,802	16,802	16,802	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	20,730	19,818	19,818	-4%	-4%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	30,243	30,243	30,243	0%	0%
			Spawning	594	594	594	0%	0%
		Oct	Rearing	17,880	17,880	17,880	0%	0%
			Spawning	3,140	3,140	3,140	0%	0%
		Nov	Rearing	19,261	19,811	19,811	3%	3%
			Spawning	1,396	1,919	1,919	38%	38%
		Dec	Rearing	16,347	16,347	16,347	0%	0%
			Spawning	105	105	105	0%	0%
	2014	Jan	Rearing	16,500	16,500	16,500	0%	0%
			Spawning	244	244	244	0%	0%

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Species	Largescale Sucker							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
	2014	Feb	Rearing	19,013	19,013	19,013	0%	0%
			Spawning	233	233	233	0%	0%
		Mar	Rearing	20,872	20,872	20,872	0%	0%
			Spawning	1,538	1,538	1,538	0%	0%
		Apr	Rearing	15,576	16,135	16,135	4%	4%
			Spawning	2,539	2,474	2,474	-3%	-3%
		May	Rearing	12,502	12,950	12,950	4%	4%
			Spawning	1,263	1,684	1,684	33%	33%
		Jun	Rearing	28,982	28,982	28,982	0%	0%
			Spawning	0	0	0	0%	0%
		Jul	Rearing	19,818	18,832	18,832	-5%	-5%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	23,126	23,126	23,126	0%	0%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	45,103	45,103	43,119	0%	-4%
			Spawning	810	810	780	0%	-4%
		Oct	Rearing	45,840	45,840	48,156	0%	5%
			Spawning	6,177	6,177	6,474	0%	5%
		Nov	Rearing	18,900	19,440	19,440	3%	3%
			Spawning	1,429	1,964	1,964	38%	38%
		Dec	Rearing	17,825	17,825	17,825	0%	0%
			Spawning	117	117	117	0%	0%

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Species	Mountain Whitefish							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
PeEll to Elk Cr	2013	Jan	Rearing	7,026	7,026	7,026	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	8,533	8,031	7,780	-6%	-9%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	8,822	8,435	8,435	-4%	-4%
			Spawning	1,074	0	0	-100%	-100%
		Apr	Rearing	7,165	8,442	8,442	18%	18%
			Spawning	9,669	3,760	3,760	-61%	-61%
		May	Rearing	5,256	7,684	7,684	46%	46%
			Spawning	1,706	13,645	13,645	700%	700%
		Jun	Rearing	2,878	4,653	4,653	62%	62%
			Spawning	0	2,224	2,224	0%	0%
		Jul	Rearing	535	1,628	1,515	204%	183%
			Spawning	0	200	100	0%	0%
		Aug	Rearing	231	1,003	1,003	335%	335%
			Spawning	0	72	72	0%	0%
		Sep	Rearing	4,382	5,598	5,973	28%	36%
			Spawning	425	1,707	2,560	302%	503%
		Oct	Rearing	9,816	9,373	9,373	-5%	-5%
			Spawning	9,199	11,485	11,485	25%	25%
		Nov	Rearing	10,001	10,176	10,176	2%	2%
			Spawning	0	1,287	1,287	0%	0%
		Dec	Rearing	9,344	9,636	9,344	3%	0%
			Spawning	0	0	0	0%	0%
	2014	Jan	Rearing	7,732	7,498	7,498	-3%	-3%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	7,245	7,026	7,026	-3%	-3%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	8,266	8,124	8,343	-2%	1%
			Spawning	978	0	0	-100%	-100%
		Apr	Rearing	7,133	7,910	7,910	11%	11%
			Spawning	7,826	3,424	3,424	-56%	-56%
		May	Rearing	5,598	8,691	8,691	55%	55%
			Spawning	1,707	12,288	12,288	620%	620%
		Jun	Rearing	1,909	3,670	3,670	92%	92%
			Spawning	229	2,343	2,343	925%	925%
		Jul	Rearing	335	1,628	1,515	386%	352%
			Spawning	0	200	100	0%	0%
		Aug	Rearing	175	934	934	433%	433%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	463	1,415	2,280	206%	392%
			Spawning	0	596	1,252	0%	0%
		Oct	Rearing	8,410	8,990	9,373	7%	11%
			Spawning	14,152	12,964	11,485	-8%	-19%
		Nov	Rearing	8,343	7,910	7,910	-5%	-5%
			Spawning	0	3,424	3,424	0%	0%
		Dec	Rearing	7,465	7,904	7,685	6%	3%
			Spawning	0	0	0	0%	0%
Elk Cr to S Fk	2013	Jan	Rearing	10,574	10,574	10,574	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	16,459	15,960	15,960	-3%	-3%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	18,103	17,791	17,791	-2%	-2%
			Spawning	1,970	0	0	-100%	-100%
		Apr	Rearing	15,622	16,743	16,743	7%	7%
			Spawning	15,760	9,850	9,850	-38%	-38%
		May	Rearing	7,055	9,150	9,150	30%	30%
			Spawning	1,704	6,815	6,815	300%	300%
		Jun	Rearing	3,164	4,216	4,216	33%	33%
			Spawning	0	594	594	0%	0%
		Jul	Rearing	677	1,250	1,250	85%	85%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	394	1,018	1,018	159%	159%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	8,004	8,742	9,346	9%	17%
			Spawning	1,010	1,373	2,059	36%	104%
		Oct	Rearing	17,055	15,673	15,673	-8%	-8%
			Spawning	14,276	13,729	13,729	-4%	-4%
		Nov	Rearing	18,952	19,464	19,464	3%	3%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	15,431	16,235	15,728	5%	2%
			Spawning	0	0	0	0%	0%
	2014	Jan	Rearing	15,867	15,867	15,386	0%	-3%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	9,222	8,943	8,943	-3%	-3%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	10,521	10,619	10,619	1%	1%
			Spawning	1,209	0	0	-100%	-100%
		Apr	Rearing	14,025	15,031	15,031	7%	7%
			Spawning	14,526	9,079	9,079	-38%	-38%
		May	Rearing	10,169	13,974	13,141	37%	29%
			Spawning	2,722	16,334	10,890	500%	300%
		Jun	Rearing	2,129	3,040	2,837	43%	33%
			Spawning	0	551	408	0%	0%
		Jul	Rearing	620	1,250	1,250	102%	102%

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Species	Mountain Whitefish							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
		Jul	Spawning	0	0	0	0%	0%
		Aug	Rearing	334	1,018	942	205%	182%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	617	1,675	1,791	171%	190%
			Spawning	73	453	604	523%	731%
		Oct	Rearing	15,222	13,527	13,431	-11%	-12%
			Spawning	19,654	18,408	15,528	-6%	-21%
		Nov	Rearing	17,791	17,281	17,281	-3%	-3%
			Spawning	0	1,896	1,896	0%	0%
		Dec	Rearing	9,965	10,267	10,267	3%	3%
			Spawning	0	0	0	0%	0%
S Fk to Newaukum	2013	Jan	Rearing	8,360	8,360	8,360	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	10,859	10,220	10,220	-6%	-6%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	11,919	12,136	12,136	2%	2%
			Spawning	2,090	0	0	-100%	-100%
		Apr	Rearing	9,198	10,376	10,376	13%	13%
			Spawning	10,452	8,362	8,362	-20%	-20%
		May	Rearing	7,023	8,623	8,623	23%	23%
			Spawning	551	1,723	1,723	213%	213%
		Jun	Rearing	3,350	4,618	4,618	38%	38%
			Spawning	0	0	0	0%	0%
		Jul	Rearing	656	812	812	24%	24%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	488	751	751	54%	54%
			Spawning	0	0	0	0%	0%
		Oct	Rearing	14,865	14,865	15,731	0%	6%
			Spawning	10,404	10,404	11,400	0%	10%
		Nov	Rearing	16,361	16,803	16,803	3%	3%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	14,507	14,507	14,507	0%	0%
			Spawning	0	0	0	0%	0%
	2014	Jan	Rearing	10,539	10,220	10,220	-3%	-3%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	7,279	7,279	7,059	0%	-3%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	8,233	8,305	8,305	1%	1%
			Spawning	1,320	660	660	-50%	-50%
		Apr	Rearing	8,725	10,376	10,376	19%	19%
			Spawning	8,285	8,362	8,362	1%	1%
		May	Rearing	8,063	10,497	9,836	30%	22%
			Spawning	1,096	4,385	3,289	300%	200%
		Jun	Rearing	2,499	3,187	3,187	28%	28%
			Spawning	0	0	0	0%	0%
		Jul	Rearing	732	812	812	11%	11%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	299	536	536	79%	79%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	706	1,293	1,942	83%	175%
			Spawning	0	126	256	0%	0%
		Oct	Rearing	13,992	13,480	13,230	-4%	-5%
			Spawning	19,229	18,375	17,962	-4%	-7%
		Nov	Rearing	11,817	12,136	12,136	3%	3%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	7,059	7,279	7,279	3%	3%
			Spawning	0	0	0	0%	0%
Newaukum to Skookumchuck	2013	Jan	Rearing	4,781	4,781	4,781	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	4,597	4,597	4,597	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	5,432	5,432	5,432	0%	0%
			Spawning	153	153	153	0%	0%
		Apr	Rearing	4,619	4,619	4,619	0%	0%
			Spawning	1,271	1,271	1,271	0%	0%
		May	Rearing	2,075	2,219	2,219	7%	7%
			Spawning	241	321	321	33%	33%
		Jun	Rearing	993	1,071	1,071	8%	8%
			Spawning	0	0	0	0%	0%
		Jul	Rearing	196	196	196	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	134	192	192	43%	43%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	1,573	1,573	1,573	0%	0%
			Spawning	39	39	39	0%	0%
		Oct	Rearing	4,275	4,216	4,216	-1%	-1%
			Spawning	1,307	1,377	1,377	5%	5%
		Nov	Rearing	4,705	4,832	4,832	3%	3%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	3,835	3,835	3,835	0%	0%
			Spawning	0	0	0	0%	0%
	2014	Jan	Rearing	4,501	4,501	4,501	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	4,726	4,726	4,726	0%	0%
			Spawning	0	0	0	0%	0%

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Species	Mountain Whitefish							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
	2014	Mar	Rearing	5,392	5,392	5,392	0%	0%
			Spawning	132	132	132	0%	0%
		Apr	Rearing	4,688	4,688	4,688	0%	0%
			Spawning	1,224	1,224	1,224	0%	0%
		May	Rearing	2,471	2,636	2,636	7%	7%
			Spawning	265	397	397	50%	50%
		Jun	Rearing	634	683	683	8%	8%
			Spawning	0	0	0	0%	0%
		Jul	Rearing	196	215	196	10%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	134	192	192	43%	43%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	275	386	414	40%	50%
			Spawning	9	23	35	147%	281%
		Oct	Rearing	3,244	3,003	3,003	-7%	-7%
			Spawning	2,568	2,528	2,528	-2%	-2%
		Nov	Rearing	5,047	5,183	5,183	3%	3%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	4,583	4,583	4,583	0%	0%
			Spawning	0	0	0	0%	0%
Skookumchuck to Black	2013	Jan	Rearing	4,789	4,789	4,789	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	4,736	4,736	4,736	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	5,198	5,385	5,385	4%	4%
			Spawning	535	306	306	-43%	-43%
		Apr	Rearing	4,094	4,347	4,094	6%	0%
			Spawning	1,589	1,430	1,589	-10%	0%
		May	Rearing	1,926	1,926	1,926	0%	0%
			Spawning	119	119	119	0%	0%
		Jun	Rearing	920	999	999	9%	9%
			Spawning	0	0	0	0%	0%
		Jul	Rearing	211	211	211	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	176	235	235	34%	34%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	1,356	1,356	1,356	0%	0%
			Spawning	0	0	0	0%	0%
		Oct	Rearing	4,344	4,344	4,344	0%	0%
			Spawning	1,408	1,408	1,408	0%	0%
		Nov	Rearing	4,947	5,080	5,080	3%	3%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	3,999	3,999	3,999	0%	0%
			Spawning	0	0	0	0%	0%
	2014	Jan	Rearing	4,597	4,597	4,597	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	4,869	4,726	4,726	-3%	-3%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	5,345	5,345	5,345	0%	0%
			Spawning	263	263	263	0%	0%
		Apr	Rearing	4,094	4,347	4,347	6%	6%
			Spawning	1,589	1,430	1,430	-10%	-10%
		May	Rearing	2,223	2,376	2,376	7%	7%
			Spawning	119	179	179	50%	50%
		Jun	Rearing	588	638	638	9%	9%
			Spawning	0	0	0	0%	0%
		Jul	Rearing	211	211	211	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	192	235	215	23%	12%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	441	441	441	0%	0%
			Spawning	13	13	13	0%	0%
		Oct	Rearing	3,049	2,823	2,823	-7%	-7%
			Spawning	1,926	1,896	1,896	-2%	-2%
		Nov	Rearing	4,947	5,080	5,080	3%	3%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	4,636	4,636	4,636	0%	0%
			Spawning	0	0	0	0%	0%
Black to Porter	2013	Jan	Rearing	11,398	11,398	11,398	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	15,699	15,699	15,699	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	14,278	14,278	14,278	0%	0%
			Spawning	1,942	1,942	1,942	0%	0%
		Apr	Rearing	10,728	11,413	11,413	6%	6%
			Spawning	4,161	5,548	5,548	33%	33%
		May	Rearing	6,417	6,877	6,877	7%	7%
			Spawning	413	637	637	54%	54%
		Jun	Rearing	2,697	2,929	2,929	9%	9%
			Spawning	0	0	0	0%	0%
		Jul	Rearing	970	970	970	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	874	974	974	11%	11%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	4,006	4,006	4,006	0%	0%

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Species	Mountain Whitefish							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
	2013	Sep	Spawning	0	0	0	0%	0%
		Oct	Rearing	19,653	19,653	19,653	0%	0%
			Spawning	11,381	11,381	11,381	0%	0%
		Nov	Rearing	22,381	22,986	22,986	3%	3%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	18,824	18,824	18,824	0%	0%
			Spawning	0	0	0	0%	0%
	2014	Jan	Rearing	15,238	15,238	15,238	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	10,425	10,425	10,425	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	11,047	11,047	11,047	0%	0%
			Spawning	1,158	1,158	1,158	0%	0%
		Apr	Rearing	12,499	13,298	13,298	6%	6%
			Spawning	5,670	7,560	7,560	33%	33%
		May	Rearing	9,764	10,463	10,463	7%	7%
			Spawning	687	928	928	35%	35%
		Jun	Rearing	2,418	2,418	2,418	0%	0%
			Spawning	0	0	0	0%	0%
		Jul	Rearing	974	1,076	1,076	10%	10%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	966	966	966	0%	0%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	2,060	2,060	2,295	0%	11%
			Spawning	0	0	0	0%	0%
		Oct	Rearing	8,987	8,987	8,509	0%	-5%
			Spawning	8,727	8,727	8,363	0%	-4%
		Nov	Rearing	22,189	22,789	22,789	3%	3%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	9,812	9,812	9,812	0%	0%
			Spawning	0	0	0	0%	0%

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Species	Pacific Lamprey							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
PeEll to Elk Cr	2013	Jan	Rearing	1,055	1,055	1,055	0%	0%
			Spawning	17,630	17,630	17,630	0%	0%
		Feb	Rearing	1,429	1,144	1,001	-20%	-30%
			Spawning	23,193	19,327	17,394	-17%	-25%
		Mar	Rearing	1,995	1,653	1,653	-17%	-17%
			Spawning	31,401	25,859	25,859	-18%	-18%
		Apr	Rearing	2,161	2,110	2,110	-2%	-2%
			Spawning	36,942	35,095	35,095	-5%	-5%
		May	Rearing	1,485	1,828	1,828	23%	23%
			Spawning	40,844	40,844	40,844	0%	0%
		Jun	Rearing	1,219	1,634	1,634	34%	34%
			Spawning	29,786	37,233	37,233	25%	25%
		Jul	Rearing	693	1,313	1,236	89%	78%
			Spawning	7,898	23,346	22,049	196%	179%
		Aug	Rearing	907	1,372	1,372	51%	51%
			Spawning	5,265	17,901	17,901	240%	240%
		Sep	Rearing	1,326	1,658	1,716	25%	29%
			Spawning	38,751	41,870	41,870	8%	8%
		Oct	Rearing	1,975	1,847	1,847	-6%	-6%
			Spawning	43,056	42,820	42,820	-1%	-1%
		Nov	Rearing	1,867	2,079	2,079	11%	11%
			Spawning	30,227	34,258	34,258	13%	13%
		Dec	Rearing	990	1,113	990	13%	0%
			Spawning	21,528	23,681	21,528	10%	0%
	2014	Jan	Rearing	1,240	1,102	1,102	-11%	-11%
			Spawning	20,318	18,471	18,471	-9%	-9%
		Feb	Rearing	1,187	1,055	1,055	-11%	-11%
			Spawning	19,393	17,630	17,630	-9%	-9%
		Mar	Rearing	1,909	1,714	1,846	-10%	-3%
			Spawning	29,971	26,445	28,208	-12%	-6%
		Apr	Rearing	2,142	2,019	2,019	-6%	-6%
			Spawning	35,259	33,496	33,496	-5%	-5%
		May	Rearing	1,658	2,112	2,112	27%	27%
			Spawning	41,870	41,870	41,870	0%	0%
		Jun	Rearing	1,289	1,598	1,598	24%	24%
			Spawning	25,343	32,077	32,077	27%	27%
		Jul	Rearing	603	1,313	1,236	118%	105%
			Spawning	3,446	23,346	22,049	578%	540%
		Aug	Rearing	629	1,292	1,292	105%	105%
			Spawning	1,755	16,848	16,848	860%	860%
		Sep	Rearing	1,483	1,674	1,561	13%	5%
			Spawning	11,650	21,060	25,940	81%	123%
		Oct	Rearing	1,875	1,809	1,847	-4%	-1%
			Spawning	43,056	43,574	42,820	1%	-1%
		Nov	Rearing	1,846	2,019	2,019	9%	9%
			Spawning	28,208	33,496	33,496	19%	19%
		Dec	Rearing	1,318	1,582	1,450	20%	10%
			Spawning	21,156	24,682	22,919	17%	8%
Elk Cr to S Fk	2013	Jan	Rearing	842	842	842	0%	0%
			Spawning	16,335	16,335	16,335	0%	0%
		Feb	Rearing	1,323	1,176	1,176	-11%	-11%
			Spawning	21,819	19,835	19,835	-9%	-9%
		Mar	Rearing	1,926	1,729	1,729	-10%	-10%
			Spawning	33,040	29,153	29,153	-12%	-12%
		Apr	Rearing	2,161	2,085	2,085	-4%	-4%
			Spawning	38,871	38,871	38,871	0%	0%
		May	Rearing	2,244	2,578	2,578	15%	15%
			Spawning	39,829	39,829	39,829	0%	0%
		Jun	Rearing	1,886	2,343	2,343	24%	24%
			Spawning	26,913	34,089	34,089	27%	27%
		Jul	Rearing	1,888	1,921	1,921	2%	2%
			Spawning	8,868	16,533	16,533	86%	86%
		Aug	Rearing	4,575	3,110	3,110	-32%	-32%
			Spawning	10,060	16,553	16,553	65%	65%
		Sep	Rearing	1,833	1,848	1,912	1%	4%
			Spawning	39,163	41,124	41,124	5%	5%
		Oct	Rearing	2,569	2,701	2,701	5%	5%
			Spawning	41,124	41,107	41,107	0%	0%
		Nov	Rearing	1,961	2,112	2,112	8%	8%
			Spawning	30,221	32,235	32,235	7%	7%
		Dec	Rearing	1,157	1,287	1,126	11%	-3%
			Spawning	18,551	20,562	18,506	11%	0%
	2014	Jan	Rearing	1,197	1,197	1,064	0%	-11%
			Spawning	21,379	21,379	19,435	0%	-9%
		Feb	Rearing	767	681	681	-11%	-11%
			Spawning	15,827	14,388	14,388	-9%	-9%
		Mar	Rearing	1,233	1,193	1,193	-3%	-3%
			Spawning	24,459	23,021	23,021	-6%	-6%
		Apr	Rearing	2,100	2,026	2,026	-4%	-4%
			Spawning	36,935	36,935	36,935	0%	0%
		May	Rearing	1,867	2,219	2,145	19%	15%
			Spawning	40,781	40,781	40,781	0%	0%
		Jun	Rearing	2,116	2,722	2,627	29%	24%
			Spawning	23,184	30,912	29,366	33%	27%

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Species	Pacific Lamprey							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
		Jul	Rearing	1,684	1,921	1,921	14%	14%
			Spawning	5,912	16,533	16,533	180%	180%
		Aug	Rearing	3,735	3,110	2,835	-17%	-24%
			Spawning	8,383	16,553	15,371	97%	83%
		Sep	Rearing	7,040	4,402	4,560	-37%	-35%
			Spawning	15,090	23,647	23,647	57%	57%
		Oct	Rearing	2,592	2,684	2,889	4%	11%
			Spawning	41,225	40,829	40,424	-1%	-2%
		Nov	Rearing	1,729	1,884	1,884	9%	9%
			Spawning	29,153	32,243	32,243	11%	11%
		Dec	Rearing	894	993	993	11%	11%
			Spawning	16,887	18,422	18,422	9%	9%
S Fk to Newaukum	2013	Jan	Rearing	1,463	1,463	1,463	0%	0%
			Spawning	20,893	20,893	20,893	0%	0%
		Feb	Rearing	1,822	1,457	1,457	-20%	-20%
			Spawning	28,258	23,549	23,549	-17%	-17%
		Mar	Rearing	2,720	2,551	2,551	-6%	-6%
			Spawning	42,387	37,678	37,678	-11%	-11%
		Apr	Rearing	2,761	2,960	2,960	7%	7%
			Spawning	47,097	47,097	47,097	0%	0%
		May	Rearing	1,854	2,056	2,056	11%	11%
			Spawning	53,838	59,820	59,820	11%	11%
		Jun	Rearing	1,089	1,609	1,609	48%	48%
			Spawning	28,354	39,696	39,696	40%	40%
		Jul	Rearing	1,137	1,567	1,567	38%	38%
			Spawning	1,905	3,810	3,810	100%	100%
		Aug	Rearing	2,614	2,446	2,446	-6%	-6%
			Spawning	4,142	6,960	6,960	68%	68%
		Oct	Rearing	2,627	2,627	2,677	0%	2%
			Spawning	55,473	55,473	57,687	0%	4%
		Nov	Rearing	2,139	2,304	2,304	8%	8%
			Spawning	41,605	44,378	44,378	7%	7%
		Dec	Rearing	1,173	1,173	1,173	0%	0%
			Spawning	25,959	25,959	25,959	0%	0%
	2014	Jan	Rearing	1,640	1,457	1,457	-11%	-11%
			Spawning	25,903	23,549	23,549	-9%	-9%
		Feb	Rearing	1,684	1,684	1,497	0%	-11%
			Spawning	20,291	20,291	18,446	0%	-9%
		Mar	Rearing	2,793	2,709	2,709	-3%	-3%
			Spawning	33,203	31,358	31,358	-6%	-6%
		Apr	Rearing	2,933	2,960	2,960	1%	1%
			Spawning	44,408	47,097	47,097	6%	6%
		May	Rearing	1,925	2,212	2,135	15%	11%
			Spawning	57,687	57,687	57,687	0%	0%
		Jun	Rearing	1,517	2,043	2,043	35%	35%
			Spawning	25,047	32,561	32,561	30%	30%
		Jul	Rearing	1,346	1,567	1,567	16%	16%
			Spawning	2,540	3,810	3,810	50%	50%
		Aug	Rearing	2,774	2,975	2,975	7%	7%
			Spawning	2,681	6,213	6,213	132%	132%
		Sep	Rearing	8,063	7,925	6,740	-2%	-16%
			Spawning	21,451	29,822	35,264	39%	64%
		Oct	Rearing	2,558	2,622	2,602	2%	2%
			Spawning	60,324	59,820	59,470	-1%	-1%
		Nov	Rearing	2,368	2,551	2,551	8%	8%
			Spawning	35,323	37,678	37,678	7%	7%
		Dec	Rearing	1,497	1,684	1,684	13%	13%
			Spawning	18,446	20,291	20,291	10%	10%
Newaukum to Skookumchuck	2013	Jan	Rearing	7,778	7,778	7,778	0%	0%
			Spawning	15,331	15,331	15,331	0%	0%
		Feb	Rearing	8,183	8,183	8,183	0%	0%
			Spawning	15,348	15,348	15,348	0%	0%
		Mar	Rearing	12,672	12,672	12,672	0%	0%
			Spawning	23,746	23,746	23,746	0%	0%
		Apr	Rearing	14,494	14,494	14,494	0%	0%
			Spawning	27,948	27,948	27,948	0%	0%
		May	Rearing	19,614	20,318	20,318	4%	4%
			Spawning	23,846	23,846	23,846	0%	0%
		Jun	Rearing	17,478	18,586	18,586	6%	6%
			Spawning	15,566	16,678	16,678	7%	7%
		Jul	Rearing	12,782	12,782	12,782	0%	0%
			Spawning	3,257	3,257	3,257	0%	0%
		Aug	Rearing	14,901	16,401	16,401	10%	10%
			Spawning	3,792	6,126	6,126	62%	62%
		Sep	Rearing	16,648	16,648	16,648	0%	0%
			Spawning	20,270	20,270	20,270	0%	0%
		Oct	Rearing	16,669	17,368	17,368	4%	4%
			Spawning	27,014	26,664	26,664	-1%	-1%
		Nov	Rearing	13,572	14,616	14,616	8%	8%
			Spawning	20,261	21,611	21,611	7%	7%
		Dec	Rearing	7,929	7,929	7,929	0%	0%
			Spawning	11,815	11,815	11,815	0%	0%
	2014	Jan	Rearing	8,292	8,292	8,292	0%	0%
			Spawning	15,299	15,299	15,299	0%	0%

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Species	Pacific Lamprey							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
	2014	Feb	Rearing	7,706	7,706	7,706	0%	0%
			Spawning	15,299	15,299	15,299	0%	0%
		Mar	Rearing	12,398	12,398	12,398	0%	0%
			Spawning	23,644	23,644	23,644	0%	0%
		Apr	Rearing	14,216	14,216	14,216	0%	0%
			Spawning	27,937	27,937	27,937	0%	0%
		May	Rearing	13,391	13,855	13,855	3%	3%
			Spawning	26,664	26,664	26,664	0%	0%
		Jun	Rearing	22,161	23,566	23,566	6%	6%
			Spawning	14,337	15,361	15,361	7%	7%
		Jul	Rearing	12,782	14,444	12,782	13%	0%
			Spawning	3,257	4,343	3,257	33%	0%
		Aug	Rearing	14,901	16,401	16,401	10%	10%
			Spawning	3,792	6,126	6,126	62%	62%
		Sep	Rearing	33,057	34,489	35,684	4%	8%
			Spawning	12,893	14,703	15,520	14%	20%
		Oct	Rearing	25,014	27,860	27,860	11%	11%
			Spawning	23,846	23,132	23,132	-3%	-3%
		Nov	Rearing	11,978	12,899	12,899	8%	8%
			Spawning	20,862	22,253	22,253	7%	7%
		Dec	Rearing	6,850	6,850	6,850	0%	0%
			Spawning	13,908	13,908	13,908	0%	0%
Skookumchuck to Black	2013	Jan	Rearing	7,827	7,827	7,827	0%	0%
			Spawning	15,349	15,349	15,349	0%	0%
		Feb	Rearing	9,093	9,093	9,093	0%	0%
			Spawning	16,744	16,744	16,744	0%	0%
		Mar	Rearing	13,400	13,064	13,064	-3%	-3%
			Spawning	26,540	25,143	25,143	-5%	-5%
		Apr	Rearing	13,523	13,992	13,523	3%	0%
			Spawning	27,948	27,948	27,948	0%	0%
		May	Rearing	14,846	14,846	14,846	0%	0%
			Spawning	23,682	23,682	23,682	0%	0%
		Jun	Rearing	11,585	12,801	12,801	10%	10%
			Spawning	12,723	13,879	13,879	9%	9%
		Jul	Rearing	11,095	11,095	11,095	0%	0%
			Spawning	2,283	2,283	2,283	0%	0%
		Aug	Rearing	14,632	16,190	16,190	11%	11%
			Spawning	4,084	6,514	6,514	60%	60%
		Sep	Rearing	17,462	17,462	17,462	0%	0%
			Spawning	18,506	18,506	18,506	0%	0%
		Oct	Rearing	15,316	15,316	15,316	0%	0%
			Spawning	27,701	27,701	27,701	0%	0%
		Nov	Rearing	12,256	13,199	13,199	8%	8%
			Spawning	20,776	22,161	22,161	7%	7%
		Dec	Rearing	7,044	7,044	7,044	0%	0%
			Spawning	12,288	12,288	12,288	0%	0%
	2014	Jan	Rearing	8,183	8,183	8,183	0%	0%
			Spawning	15,348	15,348	15,348	0%	0%
		Feb	Rearing	8,562	7,706	7,706	-10%	-10%
			Spawning	16,690	15,299	15,299	-8%	-8%
		Mar	Rearing	12,782	12,782	12,782	0%	0%
			Spawning	25,035	25,035	25,035	0%	0%
		Apr	Rearing	13,523	13,992	13,992	3%	3%
			Spawning	27,948	27,948	27,948	0%	0%
		May	Rearing	11,560	11,960	11,960	3%	3%
			Spawning	27,306	27,306	27,306	0%	0%
		Jun	Rearing	15,561	17,195	17,195	10%	10%
			Spawning	11,613	12,669	12,669	9%	9%
		Jul	Rearing	11,095	11,095	11,095	0%	0%
			Spawning	2,283	2,283	2,283	0%	0%
		Aug	Rearing	16,401	16,190	14,444	-1%	-12%
			Spawning	6,126	6,514	4,343	6%	-29%
		Sep	Rearing	32,044	32,044	32,044	0%	0%
			Spawning	14,766	14,766	14,766	0%	0%
		Oct	Rearing	24,147	26,895	26,895	11%	11%
			Spawning	23,846	23,132	23,132	-3%	-3%
		Nov	Rearing	12,256	13,199	13,199	8%	8%
			Spawning	20,776	22,161	22,161	7%	7%
		Dec	Rearing	6,914	6,914	6,914	0%	0%
			Spawning	13,937	13,937	13,937	0%	0%
Black to Porter	2013	Jan	Rearing	3,256	3,256	3,256	0%	0%
			Spawning	18,877	18,877	18,877	0%	0%
		Feb	Rearing	3,167	3,167	3,167	0%	0%
			Spawning	24,047	24,047	24,047	0%	0%
		Mar	Rearing	5,282	5,282	5,282	0%	0%
			Spawning	35,167	35,167	35,167	0%	0%
		Apr	Rearing	5,047	5,229	5,229	4%	4%
			Spawning	37,018	37,018	37,018	0%	0%
		May	Rearing	4,067	4,208	4,208	3%	3%
			Spawning	38,149	40,268	40,268	6%	6%
		Jun	Rearing	2,893	3,207	3,207	11%	11%
			Spawning	19,354	21,290	21,290	10%	10%
		Jul	Rearing	1,856	1,856	1,856	0%	0%
			Spawning	2,060	2,060	2,060	0%	0%

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Species	Pacific Lamprey							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
Black to Porter	2013	Aug	Rearing	2,482	2,292	2,292	-8%	-8%
			Spawning	2,866	2,980	2,980	4%	4%
		Sep	Rearing	4,543	4,543	4,543	0%	0%
			Spawning	29,031	29,031	29,031	0%	0%
		Oct	Rearing	4,651	4,651	4,651	0%	0%
			Spawning	46,240	46,240	46,240	0%	0%
		Nov	Rearing	3,722	4,008	4,008	8%	8%
			Spawning	34,680	36,992	36,992	7%	7%
		Dec	Rearing	1,979	1,979	1,979	0%	0%
			Spawning	20,904	20,904	20,904	0%	0%
	2014	Jan	Rearing	2,850	2,850	2,850	0%	0%
			Spawning	22,043	22,043	22,043	0%	0%
		Feb	Rearing	3,785	3,785	3,785	0%	0%
			Spawning	19,408	19,408	19,408	0%	0%
		Mar	Rearing	5,795	5,795	5,795	0%	0%
			Spawning	30,729	30,729	30,729	0%	0%
		Apr	Rearing	4,634	4,800	4,800	4%	4%
			Spawning	40,078	40,078	40,078	0%	0%
		May	Rearing	3,135	3,247	3,247	4%	4%
			Spawning	44,130	46,453	46,453	5%	5%
		Jun	Rearing	3,817	3,817	3,817	0%	0%
			Spawning	19,869	19,869	19,869	0%	0%
		Jul	Rearing	2,292	2,161	2,161	-6%	-6%
			Spawning	2,980	3,090	3,090	4%	4%
		Aug	Rearing	2,857	2,857	2,857	0%	0%
			Spawning	3,821	3,821	3,821	0%	0%
		Sep	Rearing	7,215	7,215	6,663	0%	-8%
			Spawning	22,927	22,927	23,842	0%	4%
		Oct	Rearing	7,445	7,445	7,877	0%	6%
			Spawning	38,709	38,709	37,945	0%	-2%
		Nov	Rearing	3,801	4,094	4,094	8%	8%
			Spawning	34,457	36,754	36,754	7%	7%
		Dec	Rearing	3,028	3,028	3,028	0%	0%
			Spawning	16,173	16,173	16,173	0%	0%

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Species	Smallmouth Bass							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
PeEll to Elk Cr	2013	Jan	Rearing	438	438	438	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	493	394	394	-20%	-20%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	804	625	625	-22%	-22%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	939	891	891	-5%	-5%
			Spawning	573	0	0	-100%	-100%
		May	Rearing	683	673	673	-2%	-2%
			Spawning	981	657	657	-33%	-33%
		Jun	Rearing	634	651	651	3%	3%
			Spawning	1,352	1,352	1,352	0%	0%
		Jul	Rearing	811	768	764	-5%	-6%
			Spawning	0	3,750	3,750	0%	0%
		Aug	Rearing	1,262	936	936	-26%	-26%
			Spawning	0	4,468	4,468	0%	0%
		Sep	Rearing	797	839	839	5%	5%
			Spawning	920	969	969	5%	5%
		Oct	Rearing	772	699	699	-9%	-9%
			Spawning	152	290	290	91%	91%
		Nov	Rearing	612	727	727	19%	19%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	350	394	350	13%	0%
			Spawning	0	0	0	0%	0%
	2014	Jan	Rearing	469	417	417	-11%	-11%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	492	438	438	-11%	-11%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	845	711	766	-16%	-9%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	978	936	936	-4%	-4%
			Spawning	404	0	0	-100%	-100%
		May	Rearing	839	819	819	-2%	-2%
			Spawning	969	484	484	-50%	-50%
		Jun	Rearing	715	660	660	-8%	-8%
			Spawning	3,316	2,523	2,523	-24%	-24%
		Jul	Rearing	890	768	764	-14%	-14%
			Spawning	0	3,750	3,750	0%	0%
		Aug	Rearing	1,138	931	931	-18%	-18%
			Spawning	0	4,468	4,468	0%	0%
		Sep	Rearing	1,303	955	779	-27%	-40%
			Spawning	2,280	4,468	3,750	96%	64%
		Oct	Rearing	796	752	699	-6%	-12%
			Spawning	616	442	290	-28%	-53%
		Nov	Rearing	766	936	936	22%	22%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	547	657	602	20%	10%
			Spawning	0	0	0	0%	0%
Elk Cr to S Fk	2013	Jan	Rearing	375	375	375	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	420	373	373	-11%	-11%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	713	600	600	-16%	-16%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	825	804	804	-3%	-3%
			Spawning	485	0	0	-100%	-100%
		May	Rearing	1,067	1,068	1,068	0%	0%
			Spawning	3,913	3,913	3,913	0%	0%
		Jun	Rearing	1,368	1,401	1,401	2%	2%
			Spawning	2,503	5,005	5,005	100%	100%
		Jul	Rearing	2,512	2,251	2,251	-10%	-10%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	3,093	2,839	2,839	-8%	-8%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	923	913	916	-1%	-1%
			Spawning	2,604	2,423	2,423	-7%	-7%
		Oct	Rearing	877	921	921	5%	5%
			Spawning	400	500	500	25%	25%
		Nov	Rearing	619	667	667	8%	8%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	404	398	398	-1%	-1%
			Spawning	0	0	0	0%	0%
	2014	Jan	Rearing	415	415	369	0%	-11%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	2,239	1,990	1,990	-11%	-11%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	3,842	3,482	3,482	-9%	-9%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	826	805	805	-3%	-3%
			Spawning	384	0	0	-100%	-100%
		May	Rearing	899	891	895	-1%	0%
			Spawning	2,098	1,752	2,098	-17%	0%
		Jun	Rearing	1,908	1,963	1,954	3%	2%
			Spawning	2,830	5,659	5,659	100%	100%
		Jul	Rearing	2,428	2,251	2,251	-7%	-7%

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Species	Smallmouth Bass							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
		Jul	Spawning	0	0	0	0%	0%
		Aug	Rearing	2,939	2,839	2,787	-3%	-5%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	3,296	2,950	2,958	-10%	-10%
			Spawning	4,878	5,842	5,842	20%	20%
		Oct	Rearing	910	960	984	6%	8%
			Spawning	1,302	1,636	1,180	26%	-9%
		Nov	Rearing	600	714	714	19%	19%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	435	483	483	11%	11%
			Spawning	0	0	0	0%	0%
S Fk to Newaukum	2013	Jan	Rearing	908	908	908	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	1,009	808	808	-20%	-20%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	1,695	1,413	1,413	-17%	-17%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	1,836	1,804	1,804	-2%	-2%
			Spawning	344	170	170	-51%	-51%
		May	Rearing	868	878	878	1%	1%
			Spawning	1,460	1,460	1,460	0%	0%
		Jun	Rearing	880	960	960	9%	9%
			Spawning	0	0	0	0%	0%
		Jul	Rearing	2,070	2,219	2,219	7%	7%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	3,184	2,772	2,772	-13%	-13%
			Spawning	0	0	0	0%	0%
		Oct	Rearing	1,231	1,231	1,076	0%	-13%
			Spawning	128	128	142	0%	11%
		Nov	Rearing	907	977	977	8%	8%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	488	488	488	0%	0%
			Spawning	0	0	0	0%	0%
	2014	Jan	Rearing	908	808	808	-11%	-11%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	1,085	1,085	965	0%	-11%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	2,025	1,862	1,862	-8%	-8%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	1,960	1,804	1,804	-8%	-8%
			Spawning	220	170	170	-23%	-23%
		May	Rearing	1,120	1,126	1,126	1%	0%
			Spawning	862	862	862	0%	0%
		Jun	Rearing	1,508	1,616	1,616	7%	7%
			Spawning	0	0	0	0%	0%
		Jul	Rearing	2,144	2,219	2,219	3%	3%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	3,654	3,295	3,295	-10%	-10%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	4,780	4,103	3,466	-14%	-27%
			Spawning	3,258	6,095	5,734	87%	76%
		Oct	Rearing	874	867	871	-1%	0%
			Spawning	765	978	1,040	28%	36%
		Nov	Rearing	1,312	1,413	1,413	8%	8%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	965	1,085	1,085	13%	13%
			Spawning	0	0	0	0%	0%
Newaukum to Skookumchuck	2013	Jan	Rearing	4,083	4,083	4,083	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	4,297	4,297	4,297	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	7,168	7,168	7,168	0%	0%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	8,400	8,400	8,400	0%	0%
			Spawning	1,117	1,117	1,117	0%	0%
		May	Rearing	13,417	13,450	13,450	0%	0%
			Spawning	6,917	6,917	6,917	0%	0%
		Jun	Rearing	13,742	13,844	13,844	1%	1%
			Spawning	0	4,590	4,590	0%	0%
		Jul	Rearing	12,910	12,910	12,910	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	15,057	14,737	14,737	-2%	-2%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	13,187	13,187	13,187	0%	0%
			Spawning	6,917	6,917	6,917	0%	0%
		Oct	Rearing	9,399	9,760	9,760	4%	4%
			Spawning	719	740	740	3%	3%
		Nov	Rearing	6,924	7,456	7,456	8%	8%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	4,619	4,619	4,619	0%	0%
			Spawning	0	0	0	0%	0%
	2014	Jan	Rearing	4,372	4,372	4,372	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	4,047	4,047	4,047	0%	0%
			Spawning	0	0	0	0%	0%

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Species	Smallmouth Bass							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
	2014	Mar	Rearing	6,945	6,945	6,945	0%	0%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	8,293	8,293	8,293	0%	0%
			Spawning	1,050	1,050	1,050	0%	0%
		May	Rearing	10,212	10,214	10,214	0%	0%
			Spawning	4,486	4,486	4,486	0%	0%
		Jun	Rearing	14,205	14,310	14,310	1%	1%
			Spawning	0	5,185	5,185	0%	0%
		Jul	Rearing	12,910	13,373	12,910	4%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	15,057	14,737	14,737	-2%	-2%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	17,987	17,122	17,194	-5%	-4%
			Spawning	10,785	10,560	10,560	-2%	-2%
		Oct	Rearing	13,247	13,727	13,727	4%	4%
			Spawning	4,635	5,369	5,369	16%	16%
		Nov	Rearing	6,315	6,800	6,800	8%	8%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	3,597	3,597	3,597	0%	0%
			Spawning	0	0	0	0%	0%
Skookumchuck to Black	2013	Jan	Rearing	4,128	4,128	4,128	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	4,775	4,775	4,775	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	7,942	7,794	7,794	-2%	-2%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	8,550	8,478	8,550	-1%	0%
			Spawning	2,267	1,692	2,267	-25%	0%
		May	Rearing	12,117	12,117	12,117	0%	0%
			Spawning	5,525	5,525	5,525	0%	0%
		Jun	Rearing	12,572	12,906	12,906	3%	3%
			Spawning	0	0	0	0%	0%
		Jul	Rearing	11,786	11,786	11,786	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	14,244	13,836	13,836	-3%	-3%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	13,585	13,585	13,585	0%	0%
			Spawning	8,014	8,014	8,014	0%	0%
		Oct	Rearing	8,836	8,836	8,836	0%	0%
			Spawning	1,305	1,305	1,305	0%	0%
		Nov	Rearing	6,428	6,923	6,923	8%	8%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	4,133	4,133	4,133	0%	0%
			Spawning	0	0	0	0%	0%
	2014	Jan	Rearing	4,297	4,297	4,297	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	4,496	4,047	4,047	-10%	-10%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	7,551	7,551	7,551	0%	0%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	8,550	8,478	8,478	-1%	-1%
			Spawning	2,267	1,692	1,692	-25%	-25%
		May	Rearing	9,495	9,517	9,517	0%	0%
			Spawning	4,224	4,224	4,224	0%	0%
		Jun	Rearing	13,237	13,589	13,589	3%	3%
			Spawning	0	0	0	0%	0%
		Jul	Rearing	11,786	11,786	11,786	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	14,737	13,836	13,373	-6%	-9%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	15,975	15,975	15,975	0%	0%
			Spawning	10,494	10,494	10,494	0%	0%
		Oct	Rearing	13,321	13,804	13,804	4%	4%
			Spawning	5,776	6,692	6,692	16%	16%
		Nov	Rearing	6,428	6,923	6,923	8%	8%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	3,629	3,629	3,629	0%	0%
			Spawning	0	0	0	0%	0%
Black to Porter	2013	Jan	Rearing	2,690	2,690	2,690	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	2,492	2,492	2,492	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	4,658	4,658	4,658	0%	0%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	4,978	4,951	4,951	-1%	-1%
			Spawning	2,373	1,904	1,904	-20%	-20%
		May	Rearing	8,813	8,850	8,850	0%	0%
			Spawning	15,658	15,658	15,658	0%	0%
		Jun	Rearing	11,947	12,250	12,250	3%	3%
			Spawning	0	0	0	0%	0%
		Jul	Rearing	14,555	14,555	14,555	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	17,035	16,045	16,045	-6%	-6%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	13,134	13,134	13,134	0%	0%

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Species	Smallmouth Bass							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
	2013	Sep	Spawning	10,592	10,592	10,592	0%	0%
		Oct	Rearing	4,428	4,428	4,428	0%	0%
			Spawning	1,896	1,896	1,896	0%	0%
		Nov	Rearing	3,221	3,469	3,469	8%	8%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	2,021	2,021	2,021	0%	0%
			Spawning	0	0	0	0%	0%
	2014	Jan	Rearing	2,242	2,242	2,242	0%	0%
			Spawning	0	0	0	0%	0%
		Feb	Rearing	3,251	3,251	3,251	0%	0%
			Spawning	0	0	0	0%	0%
		Mar	Rearing	5,564	5,564	5,564	0%	0%
			Spawning	0	0	0	0%	0%
		Apr	Rearing	4,557	4,532	4,532	-1%	-1%
			Spawning	2,851	2,288	2,288	-20%	-20%
		May	Rearing	4,623	4,644	4,644	0%	0%
			Spawning	6,128	6,128	6,128	0%	0%
		Jun	Rearing	15,026	15,026	15,026	0%	0%
			Spawning	0	0	0	0%	0%
		Jul	Rearing	16,045	15,059	15,059	-6%	-6%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	17,647	17,647	17,647	0%	0%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	22,285	22,285	20,989	0%	-6%
			Spawning	14,552	14,552	14,075	0%	-3%
		Oct	Rearing	13,451	13,451	14,396	0%	7%
			Spawning	17,688	17,688	18,466	0%	4%
		Nov	Rearing	3,179	3,423	3,423	8%	8%
			Spawning	0	0	0	0%	0%
		Dec	Rearing	2,601	2,601	2,601	0%	0%
			Spawning	0	0	0	0%	0%

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Species	Speckled Dace							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
PeEll to Elk Cr	2013	Jan	Rearing	3,800	3,800	3,800	0%	0%
		Feb	Rearing	4,301	3,970	3,805	-8%	-12%
		Mar	Rearing	4,843	4,531	4,531	-6%	-6%
		Apr	Rearing	4,695	4,810	4,810	2%	2%
		May	Rearing	5,727	6,698	6,698	17%	17%
		Jun	Rearing	5,565	7,089	7,089	27%	27%
		Jul	Rearing	5,806	8,290	8,003	43%	38%
		Aug	Rearing	5,786	8,512	8,512	47%	47%
		Sep	Rearing	3,844	4,271	4,419	11%	15%
		Oct	Rearing	5,275	5,977	5,977	13%	13%
		Nov	Rearing	4,874	5,030	5,030	3%	3%
		Dec	Rearing	4,304	4,484	4,304	4%	0%
	2014	Jan	Rearing	4,046	3,884	3,884	-4%	-4%
		Feb	Rearing	3,958	3,800	3,800	-4%	-4%
		Mar	Rearing	4,738	4,591	4,750	-3%	0%
		Apr	Rearing	4,629	4,706	4,706	2%	2%
		May	Rearing	4,271	5,032	5,032	18%	18%
		Jun	Rearing	7,938	8,896	8,896	12%	12%
		Jul	Rearing	3,950	8,290	8,003	110%	103%
		Aug	Rearing	2,899	8,227	8,227	184%	184%
		Sep	Rearing	7,970	10,129	9,853	27%	24%
		Oct	Rearing	5,165	5,457	5,977	6%	16%
		Nov	Rearing	4,750	4,706	4,706	-1%	-1%
		Dec	Rearing	4,116	4,433	4,275	8%	4%
Elk Cr to S Fk	2013	Jan	Rearing	2,636	2,636	2,636	0%	0%
		Feb	Rearing	3,920	3,763	3,763	-4%	-4%
		Mar	Rearing	4,398	4,262	4,262	-3%	-3%
		Apr	Rearing	4,297	4,350	4,350	1%	1%
		May	Rearing	7,830	8,995	8,995	15%	15%
		Jun	Rearing	8,449	9,705	9,705	15%	15%
		Jul	Rearing	8,875	9,992	9,992	13%	13%
		Aug	Rearing	12,166	11,734	11,734	-4%	-4%
		Sep	Rearing	4,869	4,740	4,904	-3%	1%
		Oct	Rearing	6,068	7,472	7,472	23%	23%
		Nov	Rearing	4,907	5,076	5,076	3%	3%
		Dec	Rearing	5,050	4,951	4,745	-2%	-6%
	2014	Jan	Rearing	3,674	3,674	3,527	0%	-4%
		Feb	Rearing	2,422	2,326	2,326	-4%	-4%
		Mar	Rearing	2,900	2,907	2,907	0%	0%
		Apr	Rearing	3,794	3,840	3,840	1%	1%
		May	Rearing	4,568	5,293	5,247	16%	15%
		Jun	Rearing	10,136	12,061	11,644	19%	15%
		Jul	Rearing	7,625	9,992	9,992	31%	31%
		Aug	Rearing	11,351	11,734	11,327	3%	0%
		Sep	Rearing	14,978	14,946	15,483	0%	3%
		Oct	Rearing	6,370	7,993	8,790	25%	38%
		Nov	Rearing	4,262	4,107	4,107	-4%	-4%
		Dec	Rearing	2,582	2,685	2,685	4%	4%
S Fk to Newaukum	2013	Jan	Rearing	2,353	2,353	2,353	0%	0%
		Feb	Rearing	2,746	2,535	2,535	-8%	-8%
		Mar	Rearing	3,153	3,169	3,169	0%	0%
		Apr	Rearing	3,042	3,088	3,088	2%	2%
		May	Rearing	3,585	3,975	3,975	11%	11%
		Jun	Rearing	3,520	4,043	4,043	15%	15%
		Jul	Rearing	2,331	2,793	2,793	20%	20%
		Aug	Rearing	3,746	4,534	4,534	21%	21%
		Oct	Rearing	3,701	3,701	3,874	0%	5%
		Nov	Rearing	3,649	3,774	3,774	3%	3%
		Dec	Rearing	3,029	3,029	3,029	0%	0%
	2014	Jan	Rearing	2,640	2,535	2,535	-4%	-4%
		Feb	Rearing	2,296	2,296	2,204	0%	-4%
		Mar	Rearing	2,742	2,748	2,748	0%	0%
		Apr	Rearing	2,952	3,088	3,088	5%	5%
		May	Rearing	3,026	3,476	3,355	15%	11%
		Jun	Rearing	4,878	5,410	5,410	11%	11%
		Jul	Rearing	2,557	2,793	2,793	9%	9%
		Aug	Rearing	3,813	5,038	5,038	32%	32%
		Sep	Rearing	11,353	11,355	10,573	0%	-7%
		Oct	Rearing	4,224	4,816	5,042	14%	19%
		Nov	Rearing	3,063	3,169	3,169	3%	3%
		Dec	Rearing	2,204	2,296	2,296	4%	4%
Newaukum to Skookumchuck	2013	Jan	Rearing	2,466	2,466	2,466	0%	0%
		Feb	Rearing	2,560	2,560	2,560	0%	0%
		Mar	Rearing	2,983	2,983	2,983	0%	0%
		Apr	Rearing	2,940	2,940	2,940	0%	0%
		May	Rearing	4,941	5,119	5,119	4%	4%
		Jun	Rearing	4,425	4,578	4,578	3%	3%
		Jul	Rearing	2,638	2,638	2,638	0%	0%
		Aug	Rearing	3,146	3,881	3,881	23%	23%
		Sep	Rearing	4,302	4,302	4,302	0%	0%
		Oct	Rearing	3,744	3,916	3,916	5%	5%
		Nov	Rearing	3,691	3,818	3,818	3%	3%
		Dec	Rearing	3,216	3,216	3,216	0%	0%
	2014	Jan	Rearing	2,644	2,644	2,644	0%	0%

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Species	Speckled Dace							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
	2014	Feb	Rearing	2,450	2,450	2,450	0%	0%
		Mar	Rearing	2,932	2,932	2,932	0%	0%
		Apr	Rearing	2,915	2,915	2,915	0%	0%
		May	Rearing	3,278	3,392	3,392	3%	3%
		Jun	Rearing	4,756	4,921	4,921	3%	3%
		Jul	Rearing	2,638	3,363	2,638	27%	0%
		Aug	Rearing	3,146	3,881	3,881	23%	23%
		Sep	Rearing	5,369	5,895	6,099	10%	14%
		Oct	Rearing	5,987	6,434	6,434	7%	7%
		Nov	Rearing	3,067	3,173	3,173	3%	3%
		Dec	Rearing	2,352	2,352	2,352	0%	0%
Skookumchuck to Black	2013	Jan	Rearing	2,476	2,476	2,476	0%	0%
		Feb	Rearing	2,662	2,662	2,662	0%	0%
		Mar	Rearing	2,963	2,976	2,976	0%	0%
		Apr	Rearing	2,896	2,917	2,896	1%	0%
		May	Rearing	3,874	3,874	3,874	0%	0%
		Jun	Rearing	3,755	3,890	3,890	4%	4%
		Jul	Rearing	1,947	1,947	1,947	0%	0%
		Aug	Rearing	3,335	3,914	3,914	17%	17%
		Sep	Rearing	4,468	4,468	4,468	0%	0%
		Oct	Rearing	3,232	3,232	3,232	0%	0%
		Nov	Rearing	3,205	3,315	3,315	3%	3%
		Dec	Rearing	2,780	2,780	2,780	0%	0%
	2014	Jan	Rearing	2,560	2,560	2,560	0%	0%
		Feb	Rearing	2,548	2,450	2,450	-4%	-4%
		Mar	Rearing	2,925	2,925	2,925	0%	0%
		Apr	Rearing	2,896	2,917	2,917	1%	1%
		May	Rearing	2,776	2,873	2,873	3%	3%
		Jun	Rearing	4,177	4,327	4,327	4%	4%
		Jul	Rearing	1,947	1,947	1,947	0%	0%
		Aug	Rearing	3,881	3,914	3,363	1%	-13%
		Sep	Rearing	5,739	5,739	5,739	0%	0%
		Oct	Rearing	5,931	6,375	6,375	7%	7%
		Nov	Rearing	3,205	3,315	3,315	3%	3%
		Dec	Rearing	2,367	2,367	2,367	0%	0%
Black to Porter	2013	Jan	Rearing	4,426	4,426	4,426	0%	0%
		Feb	Rearing	4,732	4,732	4,732	0%	0%
		Mar	Rearing	5,180	5,180	5,180	0%	0%
		Apr	Rearing	4,972	5,019	5,019	1%	1%
		May	Rearing	6,504	6,730	6,730	3%	3%
		Jun	Rearing	6,288	6,506	6,506	3%	3%
		Jul	Rearing	2,948	2,948	2,948	0%	0%
		Aug	Rearing	3,595	3,404	3,404	-5%	-5%
		Sep	Rearing	7,473	7,473	7,473	0%	0%
		Oct	Rearing	5,764	5,764	5,764	0%	0%
		Nov	Rearing	5,717	5,914	5,914	3%	3%
		Dec	Rearing	4,643	4,643	4,643	0%	0%
	2014	Jan	Rearing	4,550	4,550	4,550	0%	0%
		Feb	Rearing	4,695	4,695	4,695	0%	0%
		Mar	Rearing	5,367	5,367	5,367	0%	0%
		Apr	Rearing	5,193	5,241	5,241	1%	1%
		May	Rearing	4,477	4,638	4,638	4%	4%
		Jun	Rearing	7,275	7,275	7,275	0%	0%
		Jul	Rearing	3,404	3,220	3,220	-5%	-5%
		Aug	Rearing	3,920	3,920	3,920	0%	0%
		Sep	Rearing	10,702	10,702	10,135	0%	-5%
		Oct	Rearing	11,044	11,044	11,461	0%	4%
		Nov	Rearing	5,590	5,782	5,782	3%	3%
		Dec	Rearing	4,333	4,333	4,333	0%	0%

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Species	Steelhead							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
Upper Chehalis	2013	Jan	Rearing	2,251	2,251	2,251	0%	0%
			Spawning	10,272	10,272	10,272	0%	0%
		Feb	Rearing	2,729	2,012	2,012	-26%	-26%
			Spawning	11,720	9,526	9,526	-19%	-19%
		Mar	Rearing	4,456	2,729	2,729	-39%	-39%
			Spawning	13,169	11,720	11,720	-11%	-11%
		Apr	Rearing	4,757	4,456	4,456	-6%	-6%
			Spawning	10,667	13,169	13,169	23%	23%
		May	Rearing	4,189	5,560	5,560	33%	33%
			Spawning	10,512	16,997	16,997	62%	62%
		Jun	Rearing	2,261	5,774	5,774	155%	155%
			Spawning	5,582	14,513	14,513	160%	160%
		Jul	Rearing	928	5,195	4,362	460%	370%
			Spawning	762	9,857	8,449	1194%	1009%
		Aug	Rearing	842	4,122	3,869	389%	359%
			Spawning	646	6,670	6,114	933%	847%
		Sep	Rearing	3,330	4,657	4,657	40%	40%
			Spawning	6,585	9,548	9,548	45%	45%
		Oct	Rearing	4,759	5,064	5,133	6%	8%
			Spawning	11,951	14,738	15,006	23%	26%
		Nov	Rearing	4,093	4,281	4,281	5%	5%
			Spawning	13,169	13,169	13,169	0%	0%
		Dec	Rearing	2,251	2,490	2,490	11%	11%
			Spawning	10,272	10,996	10,996	7%	7%
	2014	Jan	Rearing	2,490	2,251	2,251	-10%	-10%
			Spawning	10,996	10,272	10,272	-7%	-7%
		Feb	Rearing	2,729	2,251	2,251	-18%	-18%
			Spawning	11,720	10,272	10,272	-12%	-12%
		Mar	Rearing	4,281	3,752	3,752	-12%	-12%
			Spawning	13,169	13,169	13,169	0%	0%
		Apr	Rearing	4,761	4,281	4,281	-10%	-10%
			Spawning	11,095	13,169	13,169	19%	19%
		May	Rearing	3,779	4,751	4,751	26%	26%
			Spawning	7,901	12,379	12,379	57%	57%
		Jun	Rearing	3,404	5,661	5,656	66%	66%
			Spawning	5,635	13,597	13,073	141%	132%
		Jul	Rearing	768	5,064	4,644	559%	505%
			Spawning	381	8,765	8,139	2201%	2037%
		Aug	Rearing	589	3,869	3,869	556%	556%
			Spawning	215	6,114	6,114	2741%	2741%
		Sep	Rearing	1,879	5,079	5,537	170%	195%
			Spawning	1,722	8,059	11,701	368%	580%
		Oct	Rearing	4,757	4,944	5,141	4%	8%
			Spawning	10,667	13,479	14,469	26%	36%
		Nov	Rearing	4,093	4,608	4,608	13%	13%
			Spawning	13,169	12,774	12,774	-3%	-3%
		Dec	Rearing	3,070	3,752	3,411	22%	11%
			Spawning	12,445	13,169	13,169	6%	6%
PeEll to Elk Cr	2013	Jan	Rearing	1,929	1,929	1,929	0%	0%
			Spawning	2,590	2,590	2,590	0%	0%
		Feb	Rearing	2,651	2,187	1,955	-18%	-26%
			Spawning	3,839	3,365	3,120	-12%	-19%
		Mar	Rearing	3,890	3,100	3,100	-20%	-20%
			Spawning	3,739	3,739	3,739	0%	0%
		Apr	Rearing	4,326	4,188	4,188	-3%	-3%
			Spawning	3,150	3,627	3,627	15%	15%
		May	Rearing	7,711	9,704	9,704	26%	26%
			Spawning	11,245	15,180	15,180	35%	35%
		Jun	Rearing	4,325	9,515	9,515	120%	120%
			Spawning	6,076	13,164	13,164	117%	117%
		Jul	Rearing	1,082	5,856	4,900	441%	353%
			Spawning	0	5,693	4,982	0%	0%
		Aug	Rearing	709	4,126	4,126	482%	482%
			Spawning	0	3,554	3,554	0%	0%
		Sep	Rearing	3,666	4,504	4,919	23%	34%
			Spawning	3,828	4,514	4,891	18%	28%
		Oct	Rearing	6,362	8,364	8,364	31%	31%
			Spawning	8,686	13,457	13,457	55%	55%
		Nov	Rearing	3,962	4,520	4,520	14%	14%
			Spawning	5,381	5,381	5,381	0%	0%
		Dec	Rearing	3,010	3,329	3,010	11%	0%
			Spawning	7,465	7,992	7,465	7%	0%
	2014	Jan	Rearing	2,263	2,046	2,046	-10%	-10%
			Spawning	3,122	2,916	2,916	-7%	-7%
		Feb	Rearing	2,134	1,929	1,929	-10%	-10%
			Spawning	2,773	2,590	2,590	-7%	-7%
		Mar	Rearing	3,668	3,215	3,508	-12%	-4%
			Spawning	3,321	3,321	3,321	0%	0%
		Apr	Rearing	4,084	3,949	3,949	-3%	-3%
			Spawning	2,906	3,221	3,221	11%	11%

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Species	Steelhead							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
		May	Rearing	4,504	5,674	5,674	26%	26%
			Spawning	4,514	6,339	6,339	40%	40%
		Jun	Rearing	6,166	10,629	10,629	72%	72%
			Spawning	6,108	12,573	12,573	106%	106%
		Jul	Rearing	588	5,856	4,900	896%	733%
			Spawning	0	5,693	4,982	0%	0%
		Aug	Rearing	284	3,375	3,375	1087%	1087%
			Spawning	0	3,046	3,046	0%	0%
		Sep	Rearing	2,157	6,798	8,816	215%	309%
			Spawning	1,614	6,092	9,251	277%	473%
		Oct	Rearing	6,359	7,220	8,364	14%	32%
			Spawning	7,753	10,306	13,457	33%	74%
		Nov	Rearing	3,508	3,949	3,949	13%	13%
			Spawning	3,321	3,221	3,221	-3%	-3%
		Dec	Rearing	2,338	2,923	2,631	25%	13%
			Spawning	2,956	3,321	3,138	12%	6%
Elk Cr to S Fk	2013	Jan	Rearing	2,358	2,358	2,358	0%	0%
			Spawning	863	863	863	0%	0%
		Feb	Rearing	4,076	3,685	3,685	-10%	-10%
			Spawning	2,816	2,631	2,631	-7%	-7%
		Mar	Rearing	6,459	5,662	5,662	-12%	-12%
			Spawning	2,826	2,826	2,826	0%	0%
		Apr	Rearing	7,191	7,169	7,169	0%	0%
			Spawning	2,473	2,656	2,656	7%	7%
		May	Rearing	9,335	12,255	12,255	31%	31%
			Spawning	7,749	10,215	10,215	32%	32%
		Jun	Rearing	4,476	8,226	8,226	84%	84%
			Spawning	3,728	6,711	6,711	80%	80%
		Jul	Rearing	1,141	2,339	2,339	105%	105%
			Spawning	0	1,235	1,235	0%	0%
		Aug	Rearing	1,226	2,716	2,716	122%	122%
			Spawning	487	2,006	2,006	312%	312%
		Sep	Rearing	6,712	7,090	7,551	6%	13%
			Spawning	3,505	3,392	3,731	-3%	6%
		Oct	Rearing	10,130	11,343	11,343	12%	12%
			Spawning	6,156	9,505	9,505	54%	54%
		Nov	Rearing	6,700	7,309	7,309	9%	9%
			Spawning	4,250	4,250	4,250	0%	0%
		Dec	Rearing	4,464	4,793	4,284	7%	-4%
			Spawning	5,633	5,292	4,907	-6%	-13%
	2014	Jan	Rearing	3,757	3,757	3,397	0%	-10%
			Spawning	2,360	2,360	2,204	0%	-7%
		Feb	Rearing	2,294	2,074	2,074	-10%	-10%
			Spawning	569	531	531	-7%	-7%
		Mar	Rearing	3,944	3,771	3,771	-4%	-4%
			Spawning	681	681	681	0%	0%
		Apr	Rearing	6,217	6,198	6,198	0%	0%
			Spawning	1,858	1,996	1,996	7%	7%
		May	Rearing	7,376	9,351	9,414	27%	28%
			Spawning	3,229	4,198	4,037	30%	25%
		Jun	Rearing	4,118	8,330	7,568	102%	84%
			Spawning	3,446	6,891	6,202	100%	80%
		Jul	Rearing	981	2,339	2,339	139%	139%
			Spawning	0	1,235	1,235	0%	0%
		Aug	Rearing	817	2,716	2,331	232%	185%
			Spawning	0	2,006	1,505	0%	0%
		Sep	Rearing	3,235	6,728	7,168	108%	122%
			Spawning	1,947	5,518	6,019	183%	209%
		Oct	Rearing	10,560	11,742	12,164	11%	15%
			Spawning	6,561	9,851	11,372	50%	73%
		Nov	Rearing	5,662	5,984	5,984	6%	6%
			Spawning	2,826	2,403	2,403	-15%	-15%
		Dec	Rearing	2,430	2,663	2,663	10%	10%
			Spawning	653	696	696	7%	7%
S Fk to Newaukum	2013	Jan	Rearing	2,109	2,109	2,109	0%	0%
			Spawning	557	557	557	0%	0%
		Feb	Rearing	3,028	2,498	2,498	-18%	-18%
			Spawning	929	814	814	-12%	-12%
		Mar	Rearing	4,945	4,543	4,543	-8%	-8%
			Spawning	1,044	1,044	1,044	0%	0%
		Apr	Rearing	5,279	5,289	5,289	0%	0%
			Spawning	846	914	914	8%	8%
		May	Rearing	6,376	8,249	8,249	29%	29%
			Spawning	1,830	2,517	2,517	38%	38%
		Jun	Rearing	1,858	3,842	3,842	107%	107%
			Spawning	0	1,229	1,229	0%	0%
		Jul	Rearing	232	414	414	79%	79%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	451	802	802	78%	78%
			Spawning	0	0	0	0%	0%

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Species	Steelhead							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
	2013	Oct	Rearing	7,157	7,157	7,842	0%	10%
			Spawning	1,806	1,806	2,407	0%	33%
		Nov	Rearing	5,644	6,157	6,157	9%	9%
			Spawning	1,990	1,990	1,990	0%	0%
		Dec	Rearing	3,316	3,316	3,316	0%	0%
			Spawning	1,918	1,918	1,918	0%	0%
	2014	Jan	Rearing	2,763	2,498	2,498	-10%	-10%
			Spawning	872	814	814	-7%	-7%
		Feb	Rearing	2,158	2,158	1,951	0%	-10%
			Spawning	344	344	321	0%	-7%
		Mar	Rearing	3,862	3,710	3,710	-4%	-4%
			Spawning	412	412	412	0%	0%
		Apr	Rearing	4,810	5,289	5,289	10%	10%
			Spawning	761	914	914	20%	20%
		May	Rearing	5,488	7,417	6,802	35%	24%
			Spawning	1,326	1,856	1,724	40%	30%
		Jun	Rearing	1,948	3,457	3,457	77%	77%
			Spawning	0	1,044	1,044	0%	0%
		Jul	Rearing	267	414	414	55%	55%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	270	700	700	159%	159%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	2,547	5,124	6,481	101%	154%
			Spawning	1,001	2,151	2,667	115%	166%
		Oct	Rearing	9,720	11,062	11,415	14%	17%
			Spawning	3,003	3,707	3,973	23%	32%
		Nov	Rearing	4,164	4,543	4,543	9%	9%
			Spawning	1,044	1,044	1,044	0%	0%
		Dec	Rearing	1,951	2,158	2,158	11%	11%
			Spawning	321	344	344	7%	7%
Newaukum to Skookumchuck	2013	Jan	Rearing	2,730	2,730	2,730	0%	0%
			Spawning	403	403	403	0%	0%
		Feb	Rearing	2,746	2,746	2,746	0%	0%
			Spawning	630	630	630	0%	0%
		Mar	Rearing	4,731	4,731	4,731	0%	0%
			Spawning	535	535	535	0%	0%
		Apr	Rearing	5,270	5,270	5,270	0%	0%
			Spawning	551	551	551	0%	0%
		May	Rearing	3,397	3,619	3,619	7%	7%
			Spawning	963	1,050	1,050	9%	9%
		Jun	Rearing	1,296	1,490	1,490	15%	15%
			Spawning	337	421	421	25%	25%
		Jul	Rearing	229	229	229	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	254	333	333	31%	31%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	2,197	2,197	2,197	0%	0%
			Spawning	613	613	613	0%	0%
		Oct	Rearing	4,995	4,944	4,944	-1%	-1%
			Spawning	1,252	1,308	1,308	4%	4%
		Nov	Rearing	3,939	4,297	4,297	9%	9%
			Spawning	1,380	1,380	1,380	0%	0%
		Dec	Rearing	2,067	2,067	2,067	0%	0%
			Spawning	1,092	1,092	1,092	0%	0%
	2014	Jan	Rearing	2,732	2,732	2,732	0%	0%
			Spawning	767	767	767	0%	0%
		Feb	Rearing	2,712	2,712	2,712	0%	0%
			Spawning	372	372	372	0%	0%
		Mar	Rearing	4,662	4,662	4,662	0%	0%
			Spawning	446	446	446	0%	0%
		Apr	Rearing	5,267	5,267	5,267	0%	0%
			Spawning	468	468	468	0%	0%
		May	Rearing	3,927	4,289	4,289	9%	9%
			Spawning	865	937	937	8%	8%
		Jun	Rearing	1,164	1,338	1,338	15%	15%
			Spawning	305	381	381	25%	25%
		Jul	Rearing	229	316	229	38%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	254	333	333	31%	31%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	1,128	1,517	1,674	34%	48%
			Spawning	210	276	311	31%	48%
		Oct	Rearing	4,555	4,451	4,451	-2%	-2%
			Spawning	1,418	1,387	1,387	-2%	-2%
		Nov	Rearing	4,117	4,491	4,491	9%	9%
			Spawning	919	919	919	0%	0%
		Dec	Rearing	2,452	2,452	2,452	0%	0%
			Spawning	348	348	348	0%	0%
Skookumchuck to Black	2013	Jan	Rearing	5,699	5,699	5,699	0%	0%
			Spawning	4,303	4,303	4,303	0%	0%

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Species	Steelhead							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
Skookumchuck to Black	2013	Feb	Rearing	8,221	8,221	8,221	0%	0%
			Spawning	7,539	7,539	7,539	0%	0%
		Mar	Rearing	11,457	11,077	11,077	-3%	-3%
			Spawning	5,729	5,906	5,906	3%	3%
		Apr	Rearing	12,911	12,923	12,911	0%	0%
			Spawning	5,489	5,710	5,489	4%	0%
		May	Rearing	18,401	18,401	18,401	0%	0%
			Spawning	8,676	8,676	8,676	0%	0%
		Jun	Rearing	5,725	6,919	6,919	21%	21%
			Spawning	1,143	2,286	2,286	100%	100%
		Jul	Rearing	1,382	1,382	1,382	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	2,625	3,278	3,278	25%	25%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	12,489	12,489	12,489	0%	0%
			Spawning	6,857	6,857	6,857	0%	0%
		Oct	Rearing	18,193	18,193	18,193	0%	0%
			Spawning	11,677	11,677	11,677	0%	0%
		Nov	Rearing	14,325	15,627	15,627	9%	9%
			Spawning	13,345	13,345	13,345	0%	0%
		Dec	Rearing	8,796	8,796	8,796	0%	0%
			Spawning	11,100	11,100	11,100	0%	0%
	2014	Jan	Rearing	7,502	7,502	7,502	0%	0%
			Spawning	7,073	7,073	7,073	0%	0%
		Feb	Rearing	4,964	4,530	4,530	-9%	-9%
			Spawning	4,711	4,420	4,420	-6%	-6%
		Mar	Rearing	8,105	8,105	8,105	0%	0%
			Spawning	5,293	5,293	5,293	0%	0%
		Apr	Rearing	12,911	12,923	12,923	0%	0%
			Spawning	5,489	5,710	5,710	4%	4%
		May	Rearing	14,557	15,504	15,504	7%	7%
			Spawning	7,673	8,440	8,440	10%	10%
		Jun	Rearing	5,623	6,795	6,795	21%	21%
			Spawning	1,263	2,527	2,527	100%	100%
		Jul	Rearing	1,382	1,382	1,382	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	3,056	3,278	2,816	7%	-8%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	12,495	12,495	12,495	0%	0%
			Spawning	9,649	9,649	9,649	0%	0%
		Oct	Rearing	31,358	31,897	31,897	2%	2%
			Spawning	16,888	17,828	17,828	6%	6%
		Nov	Rearing	14,325	15,627	15,627	9%	9%
			Spawning	13,345	13,345	13,345	0%	0%
		Dec	Rearing	4,752	4,752	4,752	0%	0%
			Spawning	3,878	3,878	3,878	0%	0%
Black to Porter	2013	Jan	Rearing	3,287	3,287	3,287	0%	0%
			Spawning	1,257	1,257	1,257	0%	0%
		Feb	Rearing	3,590	3,590	3,590	0%	0%
			Spawning	1,490	1,490	1,490	0%	0%
		Mar	Rearing	6,026	6,026	6,026	0%	0%
			Spawning	11,174	11,174	11,174	0%	0%
		Apr	Rearing	6,266	6,220	6,220	-1%	-1%
			Spawning	8,986	9,331	9,331	4%	4%
		May	Rearing	4,977	5,492	5,492	10%	10%
			Spawning	3,413	3,839	3,839	13%	13%
		Jun	Rearing	1,479	1,836	1,836	24%	24%
			Spawning	0	543	543	0%	0%
		Jul	Rearing	291	291	291	0%	0%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	430	445	445	3%	3%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	3,516	3,516	3,516	0%	0%
			Spawning	2,716	2,716	2,716	0%	0%
		Oct	Rearing	6,616	6,616	6,616	0%	0%
			Spawning	3,497	3,497	3,497	0%	0%
		Nov	Rearing	5,209	5,683	5,683	9%	9%
			Spawning	3,996	3,996	3,996	0%	0%
		Dec	Rearing	2,857	2,857	2,857	0%	0%
			Spawning	3,865	3,865	3,865	0%	0%
	2014	Jan	Rearing	3,276	3,276	3,276	0%	0%
			Spawning	1,398	1,398	1,398	0%	0%
		Feb	Rearing	3,662	3,662	3,662	0%	0%
			Spawning	1,297	1,297	1,297	0%	0%
		Mar	Rearing	6,184	6,184	6,184	0%	0%
			Spawning	1,413	1,413	1,413	0%	0%
		Apr	Rearing	6,303	6,258	6,258	-1%	-1%
			Spawning	1,306	1,356	1,356	4%	4%
		May	Rearing	4,295	4,728	4,728	10%	10%
			Spawning	2,404	2,672	2,672	11%	11%

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Species	Steelhead							
Reach	Year	Month	Lifestage	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
		Jun	Rearing	2,137	2,137	2,137	0%	0%
			Spawning	738	738	738	0%	0%
		Jul	Rearing	445	452	452	2%	2%
			Spawning	0	0	0	0%	0%
		Aug	Rearing	594	594	594	0%	0%
			Spawning	0	0	0	0%	0%
		Sep	Rearing	4,055	4,055	4,194	0%	3%
			Spawning	4,231	4,231	4,169	0%	-1%
		Oct	Rearing	10,231	10,231	10,866	0%	6%
			Spawning	8,472	8,472	9,463	0%	12%
		Nov	Rearing	5,079	5,540	5,540	9%	9%
			Spawning	2,753	2,753	2,753	0%	0%
		Dec	Rearing	3,021	3,021	3,021	0%	0%
			Spawning	1,136	1,136	1,136	0%	0%

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Species	Western Toad						
Reach	Year	Month	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
PeEll to Elk Cr	2013	Jan	1,159	1,159	1,159	0%	0%
		Feb	1,411	1,210	1,109	-14%	-21%
		Mar	1,802	1,572	1,572	-13%	-13%
		Apr	1,926	1,858	1,858	-4%	-4%
		May	2,037	2,037	2,037	0%	0%
		Jun	2,067	2,147	2,147	4%	4%
		Jul	2,351	2,505	2,486	7%	6%
		Aug	2,919	2,869	2,869	-2%	-2%
		Sep	2,002	2,040	2,045	2%	2%
		Oct	2,005	1,985	1,985	-1%	-1%
		Nov	1,750	1,888	1,888	8%	8%
		Dec	1,245	1,349	1,245	8%	0%
	2014	Jan	1,277	1,179	1,179	-8%	-8%
		Feb	1,256	1,159	1,159	-8%	-8%
		Mar	1,772	1,642	1,739	-7%	-2%
		Apr	1,883	1,827	1,827	-3%	-3%
		May	2,040	2,030	2,030	0%	0%
		Jun	2,389	2,298	2,298	-4%	-4%
		Jul	2,240	2,505	2,486	12%	11%
		Aug	2,369	2,848	2,848	20%	20%
		Sep	3,299	2,953	2,564	-10%	-22%
		Oct	2,044	2,011	1,985	-2%	-3%
		Nov	1,739	1,827	1,827	5%	5%
		Dec	1,353	1,546	1,449	14%	7%
Elk Cr to S Fk	2013	Jan	826	826	826	0%	0%
		Feb	1,262	1,165	1,165	-8%	-8%
		Mar	1,636	1,517	1,517	-7%	-7%
		Apr	1,739	1,709	1,709	-2%	-2%
		May	2,281	2,303	2,303	1%	1%
		Jun	2,972	3,064	3,064	3%	3%
		Jul	3,646	3,512	3,512	-4%	-4%
		Aug	6,600	4,339	4,339	-34%	-34%
		Sep	2,163	2,132	2,141	-1%	-1%
		Oct	2,110	2,251	2,251	7%	7%
		Nov	1,748	1,851	1,851	6%	6%
		Dec	1,226	1,310	1,201	7%	-2%
	2014	Jan	1,160	1,160	1,071	0%	-8%
		Feb	790	729	729	-8%	-8%
		Mar	1,115	1,094	1,094	-2%	-2%
		Apr	1,532	1,505	1,505	-2%	-2%
		May	2,102	2,108	2,113	0%	1%
		Jun	3,484	3,614	3,592	4%	3%
		Jul	3,524	3,512	3,512	0%	0%
		Aug	6,158	4,339	4,188	-30%	-32%
		Sep	7,313	4,560	4,580	-38%	-37%
		Oct	2,185	2,359	2,417	8%	11%
		Nov	1,517	1,524	1,524	0%	0%
		Dec	830	894	894	8%	8%
S Fk to Newaukum	2013	Jan	1,802	1,802	1,802	0%	0%
		Feb	2,124	1,821	1,821	-14%	-14%
		Mar	2,832	2,731	2,731	-4%	-4%
		Apr	2,990	2,958	2,958	-1%	-1%
		May	2,410	2,449	2,449	2%	2%
		Jun	2,054	2,360	2,360	15%	15%
		Jul	2,002	2,432	2,432	21%	21%
		Aug	4,961	3,960	3,960	-20%	-20%
		Oct	2,825	2,825	2,857	0%	1%
		Nov	2,485	2,631	2,631	6%	6%
		Dec	1,626	1,626	1,626	0%	0%
	2014	Jan	1,973	1,821	1,821	-8%	-8%
		Feb	1,867	1,867	1,724	0%	-8%
		Mar	2,680	2,635	2,635	-2%	-2%
		Apr	2,987	2,958	2,958	-1%	-1%
		May	2,886	2,925	2,918	1%	1%
		Jun	2,380	2,640	2,640	11%	11%
		Jul	2,212	2,432	2,432	10%	10%
		Aug	6,040	5,418	5,418	-10%	-10%
		Sep	9,798	7,519	5,528	-23%	-44%
		Oct	2,728	2,461	2,418	-10%	-11%
		Nov	2,580	2,731	2,731	6%	6%
		Dec	1,724	1,867	1,867	8%	8%
Newaukum to Skookumchuck	2013	Jan	8,252	8,252	8,252	0%	0%
		Feb	8,772	8,772	8,772	0%	0%
		Mar	11,979	11,979	11,979	0%	0%
		Apr	12,935	12,935	12,935	0%	0%
		May	20,050	20,140	20,140	0%	0%
		Jun	23,139	23,342	23,342	1%	1%
		Jul	33,804	33,804	33,804	0%	0%

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Species	Western Toad						
Reach	Year	Month	Current Conditions	FRFA Scenario 1	FRFA Scenario 2	FRFA Scenario 1 Pct Change	FRFA Scenario 2 Pct Change
	2013	Aug	43,859	41,773	41,773	-5%	-5%
		Sep	19,570	19,570	19,570	0%	0%
		Oct	14,740	15,143	15,143	3%	3%
		Nov	12,964	13,727	13,727	6%	6%
		Dec	8,897	8,897	8,897	0%	0%
	2014	Jan	8,939	8,939	8,939	0%	0%
		Feb	8,125	8,125	8,125	0%	0%
		Mar	11,463	11,463	11,463	0%	0%
		Apr	12,732	12,732	12,732	0%	0%
		May	15,433	15,468	15,468	0%	0%
		Jun	29,040	29,295	29,295	1%	1%
		Jul	33,804	36,860	33,804	9%	0%
		Aug	43,859	41,773	41,773	-5%	-5%
		Sep	55,386	51,388	51,692	-7%	-7%
		Oct	20,146	21,941	21,941	9%	9%
		Nov	11,690	12,377	12,377	6%	6%
		Dec	7,500	7,500	7,500	0%	0%
Skookumchuck to Black	2013	Jan	8,369	8,369	8,369	0%	0%
		Feb	9,446	9,446	9,446	0%	0%
		Mar	12,354	12,188	12,188	-1%	-1%
		Apr	13,074	13,007	13,074	-1%	0%
		May	17,699	17,699	17,699	0%	0%
		Jun	18,716	19,387	19,387	4%	4%
		Jul	27,856	27,856	27,856	0%	0%
		Aug	40,374	38,137	38,137	-6%	-6%
		Sep	21,157	21,157	21,157	0%	0%
		Oct	13,724	13,724	13,724	0%	0%
		Nov	11,969	12,673	12,673	6%	6%
		Dec	8,160	8,160	8,160	0%	0%
	2014	Jan	8,772	8,772	8,772	0%	0%
		Feb	8,749	8,125	8,125	-7%	-7%
		Mar	11,662	11,662	11,662	0%	0%
		Apr	13,074	13,007	13,007	-1%	-1%
		May	14,485	14,546	14,546	0%	0%
		Jun	23,913	24,771	24,771	4%	4%
		Jul	27,856	27,856	27,856	0%	0%
		Aug	41,773	38,137	36,860	-9%	-12%
		Sep	46,548	46,548	46,548	0%	0%
		Oct	20,196	21,995	21,995	9%	9%
		Nov	11,969	12,673	12,673	6%	6%
		Dec	7,617	7,617	7,617	0%	0%
Black to Porter	2013	Jan	3,936	3,936	3,936	0%	0%
		Feb	3,640	3,640	3,640	0%	0%
		Mar	5,328	5,328	5,328	0%	0%
		Apr	5,564	5,550	5,550	0%	0%
		May	4,858	4,887	4,887	1%	1%
		Jun	4,827	4,994	4,994	3%	3%
		Jul	4,257	4,257	4,257	0%	0%
		Aug	5,498	5,047	5,047	-8%	-8%
		Sep	5,593	5,593	5,593	0%	0%
		Oct	4,314	4,314	4,314	0%	0%
		Nov	3,762	3,983	3,983	6%	6%
		Dec	2,401	2,401	2,401	0%	0%
	2014	Jan	3,380	3,380	3,380	0%	0%
		Feb	4,602	4,602	4,602	0%	0%
		Mar	6,218	6,218	6,218	0%	0%
		Apr	5,136	5,123	5,123	0%	0%
		May	4,236	4,262	4,262	1%	1%
		Jun	5,684	5,684	5,684	0%	0%
		Jul	5,047	4,680	4,680	-7%	-7%
		Aug	6,030	6,030	6,030	0%	0%
		Sep	8,918	8,918	8,188	0%	-8%
		Oct	5,869	5,869	6,085	0%	4%
		Nov	3,817	4,041	4,041	6%	6%
		Dec	3,945	3,945	3,945	0%	0%

Note: Values with green highlights denote an increase in WUA compared to Current Conditions.
Values with orange highlights denote a decrease in WUA compared to Current Conditions.