

MEMORANDUM FOR THE RECORD

COORDINATION TITLE - 16WVP06 Flow Targets for mainstem Willamette and North Santiam Rivers

DATE - 18 August 2016

PROJECT - Willamette Valley Projects

RESPONSE DATE - 01 September 2016

Description of the problem

To balance flow and temperature needs in the mainstem Willamette and its tributaries for migrating salmonids (juveniles and adults), flow targets are being adjusted adaptively as conditions change and as the latest forecasts become available. Further, flow changes were initiated to support a USGS flow study on the mainstem Willamette River.

Type of change/outage required

After discussions among the Action Agencies, the Services, Oregon Department of Fish and Wildlife, and others flow targets were adjusted and are listed below:

Willamette mainstem flow targets at Albany:

See Project Outflow Proposal 072016 below that highlights flow increases July 31 to aid augmentation of mainstem Willamette flows at Albany.

North Santiam (below Big Cliff): Flows will be maintained at 1,000 cfs until the reservoir level goes below spillway crest with occasional decreases below 1,000 cfs due to imprecision of outlet equipment. Thereafter, flows of approximately 1,050 cfs will be maintained. Flows will increase to BiOp criteria (1,500 cfs) for spawning spring Chinook salmon on September 1. See correspondence on July 14 below for additional context.

Fall Creek: Flows will be decreased from approximately 390 cfs to a target outflow between 150-175 cfs to support a study being done by the U.S. Geological Survey on the mainstem Willamette. A flow for the Willamette mainstem at Albany of approximately 3,800 cfs is being targeted beginning August 22. See correspondence below from Norm Buccola (USGS) for additional information.

Impact on facility operation

This will conserve storage at Willamette Valley Projects.

Dates of impacts/repairs

Various, see section 'Type of change/outage required' above

Length of time for changes/impacts/repairs

Various, see section 'Type of change/outage required' above

Expected impacts on fish

The purpose of this effort is to balance flow and temperature needs in the mainstem Willamette and its tributaries for migrating salmonids (juveniles and adults) and other fish while considering water conservation for future needs. Further, flow changes were initiated to support a USGS flow study.

Comments from agencies

Correspondence from Norm Buccola (USGS):

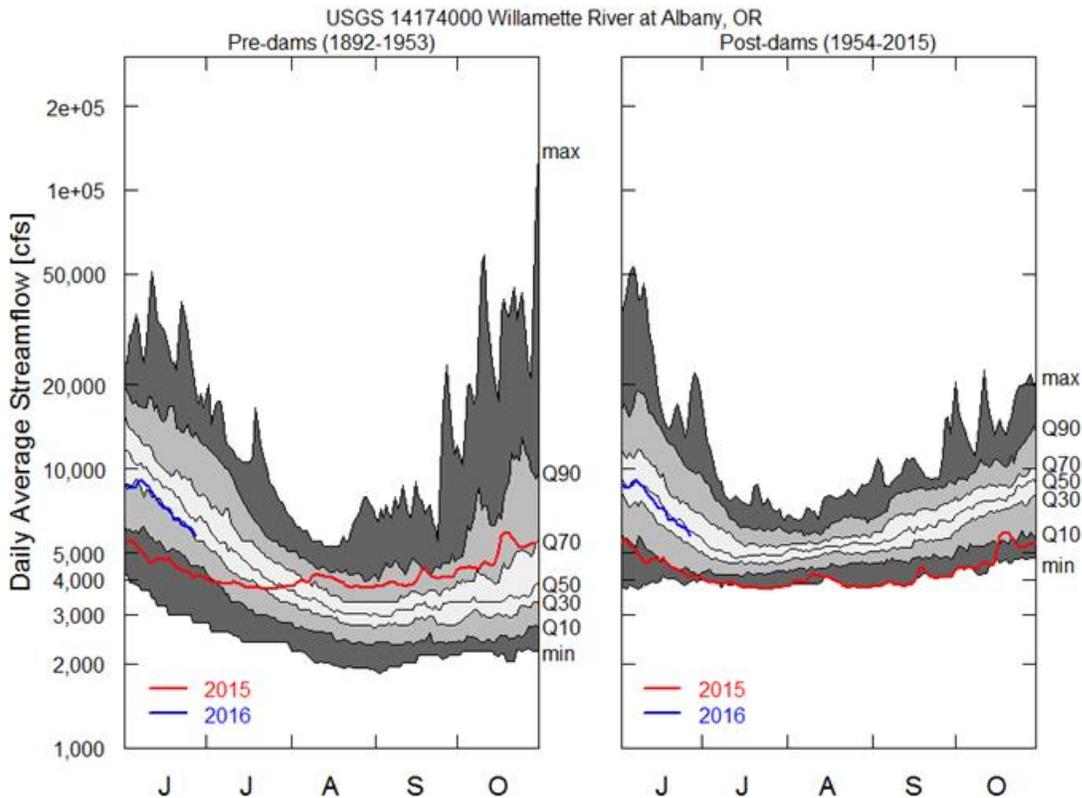
How does mainstem Willamette River streamflow affect off-channel habitat during summer/fall? At what flow levels do side-channels become quiescent alcoves and what is the resulting water temperature?

To answer these questions, USGS has been monitoring off-channel water quality at a range of Willamette streamflows during the summers of 2015 and 2016. Thus far, monitoring data over a considerable range in streamflows has shown some off-channel sites to be cooler than the main channel during lower mainstem streamflow.

However, further insights to this relationship could be gained, and value added to the overall study if flow managers were to consider a short-term low-flow experiment this summer, 2016. Should streamflows measured at Albany, OR fall to 3000-3700 cfs during summer 2016, important data and value would be added to the USGS study. While these flows may sound drastic to some, they are above the 50th percentile measurements during the pre-dam era (1892-1953) (see attached table and figure).

Table below shows minimum streamflows, in cubic feet per second, for various percentiles at Albany, OR in the pre and post dam eras (1892-1953 and 1954-2015).

	minimum	10%	30%	50%	70%	90%	maximum
Streamflow at USGS14174000 (1892-1953)	1860	2340	2680	2950	3320	3940	5270
Streamflow at USGS14174000 (1954-2015)	2570	4140	4523	4805	5241	5766	6540



Further info/clarification: Any low-flow experiment would need to be well coordinated so that USGS could make the most of the "experimental" conditions. Also, the flows would need to be maintained at the experimental level for at least several days after reaching those conditions in the river at Albany, to give us a chance to get field work done. Field work would include on-site measurements of water temperature and water levels, as well as observations and depth measurements to see which side-channels turn into alcoves.

Thanks for offering to introduce this idea to the flow-group. I'd be happy to be on the call to answer any questions.

Norm
503-251-3245

-----Original Message-----

From: Scullion, Mary K NWP
 Sent: Thursday, August 18, 2016 11:44 AM
 To: MCCORD Mike L <mike.l.mccord@state.or.us>; 'Anne Mullan - NOAA Federal' <anne.mullan@noaa.gov>; Walker, Christopher NWP <Christopher.E.Walker@usace.army.mil>; Taylor, Gregory A NWP <Gregory.A.Taylor@usace.army.mil>
 Cc: KELLEY Elise X <elise.x.kelley@state.or.us>; GRAMLICH Nancy (Gramlich.Nancy@deq.state.or.us) <nancy.h.gramlich@state.or.us>
 Subject: RE: Willamette Flow Discussion

Hi Mike, thanks for your nice write-up of the implications of this low flow study.

At this time we are only scheduling a reduction at Fall Creek, and the flow at EUGO is forecast to stay slightly above 2000 cfs. We made the change today so that we have time over the weekend to see it "show up" at the downstream gages and further adjust.

We see in the forecast that with this small change we can meet both objectives; flow at EUGO >2000 cfs and flow at ALBO ~3700-3800 cfs.

We'll see how well the forecast pans out and how much more water withdrawal occurs with this hot weather.

Thanks! Mary Karen

From: MCCORD Mike L [mailto:mike.l.mccord@state.or.us]
Sent: Thursday, August 18, 2016 11:27 AM
To: Scullion, Mary K NWP <Mary.K.Scullion@usace.army.mil>
Cc: KELLEY Elise X <elise.x.kelley@state.or.us>; GRAMLICH Nancy (Gramlich.Nancy@deq.state.or.us) <nancy.h.gramlich@state.or.us>
Subject: [EXTERNAL] FW: Willamette Flow Discussion

Good morning Mary Karen, I have discussed the NMFS low flow proposal to support the USGS study with Elise Kelley and Nancy Gramlich. The state is concerned that the proposed flows could impact the instream water right that is maintained in the Willamette River below the confluence of the Coast Fork and Middle Fork to the confluence with the McKenzie River. The flows associated with the instream water recorded as Certificate 59549 are:

Oct. 1 through Oct. 31 - 2000 cfs
Nov.1 through May 31 - 2500 cfs
Jun. 1 through Sep. 30 - 2000 cfs

The instream water right has a priority date of November 3, 1983 and is for the purpose of supporting aquatic life and minimizing pollution. We understand the desire to collect data but do not think flows should be altered to a point that causes the instream right not to be met. We are supportive of the study but do not believe that the instream right should be intentionally affected for the sake of the study. If minimum flow releases from reservoirs above the Eugene gage do not negatively affect the instream water right we are supportive of that. We would like to see something built in to this process that allows for additional releases if the flow at the Eugene gage drops below 2000 cfs. OWRD has not measured the Willamette at the instream water right location this year but will be doing so soon. We can share that measurement information if it is desired by anyone.

Thanks,

Mike McCord
NW Region Manager
OWRD
503 986-0893

-----Original Message-----

From: Anne Mullan - NOAA Federal [mailto:anne.mullan@noaa.gov]
Sent: Wednesday, August 17, 2016 3:21 PM
To: Walker, Christopher NWP <Christopher.E.Walker@usace.army.mil>
Subject: Re: [EXTERNAL] Re: Willamette Flow Discussion (smaller group)

Hi Chris,

It appears that the Corps would need to begin soon with lower flows if dropping by 100 cfs/ day -- to get from the current ~4200 at Albany to 3800 by Sunday, or 3700 by Monday. The heat will really be rough on juveniles. If you will be above 3800 until Monday, we can live with that.

thanks, Anne

Anne Mullan
Ph.D

Endangered Species Biologist
National Marine Fisheries Service
West Coast Region, OR/WA Coastal Office
1201 NE Lloyd Blvd, Suite 1100
Portland OR 97232
503.231.6267

On Wed, Aug 17, 2016 at 2:23 PM, Walker, Christopher NWP wrote:

My understanding is they will gain more insight/data when flows reach 3,700-3,800 cfs at Albany. We would try to hold this flow level.

Chris Walker
U.S. Army Corps of Engineers
Operations Division
Fish Biologist
Willamette Fish Operations Coordinatoor
w: 503-808-4316 <tel:503-808-4316>
c: 503-887-6452 <tel:503-887-6452>

-----Original Message-----

From: Anne Mullan - NOAA Federal [mailto:anne.mullan@noaa.gov
<mailto:anne.mullan@noaa.gov>]
Sent: Wednesday, August 17, 2016 2:15 PM
To: Walker, Christopher NWP <Christopher.E.Walker@usace.army.mil
<mailto:Christopher.E.Walker@usace.army.mil> >
Subject: Re: [EXTERNAL] Re: Willamette Flow Discussion (smaller group)

Sunday Sunny, with a high near 92.

That's the Albany forecast at NWS. Can the USGS see some of the changes as it drops before getting to the lowest point?

best, Anne

Anne Mullan

Ph.D

Endangered Species Biologist
National Marine Fisheries Service
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On Wed, Aug 17, 2016 at 1:46 PM, Walker, Christopher NWP wrote:

Highs temperatures are forecast to be near 100 Thursday, Friday, and Saturday, Sunday will be in the upper 80s.

Where do you think flows should be at Albany considering fish risks come Monday AM? In other words, what flow do you think we should target for Monday. The forecast high for Monday is in the lower 80s.

Chris Walker
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Operations Division
Fish Biologist
Willamette Fish Operations Coordinatoor
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-----Original Message-----

From: Anne Mullan - NOAA Federal
Subject: Re: [EXTERNAL] Re: Willamette Flow Discussion (smaller group)

Yes, it's possible to begin before Monday, but I'd prefer it not to get to the lowest earlier than Monday as it's so hot all over this weekend... we do think there are fish that may find their way into off channel habitat (OCH), and with the gradual (100 cfs/day) drop, they have a better chance. We don't know which OCH is actually cooler though, so starting before air temps drop to highs in the 80s would be unwise. Thankfully nights are still cool, so we should see that hyporheic delay if the flows move through gravels when available.

Best, Anne

Anne Mullan
Ph.D

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On Wed, Aug 17, 2016 at 11:31 AM, Walker, Christopher NWP wrote:

Hi Anne,

Thanks for sending the proposal.

USGS will be on the ground Monday and we wondering if we could time the flow decreases so that we observe a reduced flow at Albany by Monday? This would entail decreasing flows before the suggested Aug 22, but flow changes at Albany in the mainstem would be observed by Aug 22.

Chris Walker
U.S. Army Corps of Engineers
Operations Division
Fish Biologist
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w: 503-808-4316

-----Original Message-----

From: Anne Mullan - NOAA Federal
Sent: Tuesday, August 16, 2016 6:18 PM
To: Walker, Christopher NWP
Subject: [EXTERNAL] Re: Willamette Flow Discussion (smaller group)

Hello Christopher,
Based on the Corps presentations August 10, 2016, and the Willamette flows spreadsheet tool provided August 9, 2016, regarding lowered Willamette reservoir levels under different scenarios, NMFS recommends the following changes. During the coming weeks, mainstem Willamette River flows at Albany and Salem will continue to be lower than those in Table 9-2.1 due to these actions:

Beginning no sooner than Monday August 22, reduce outflows to minimum targets for the Middle Fork and McKenzie River reservoirs (RPA Table 9.2-2). When these combined with local flows result in levels below 4000 cfs at Albany, reduce at a rate of less than 100 cfs/day, when possible. If it appears the flow will go below 3500 cfs, please notify us. Once at minimum flows, hold for up to 10 days during which time we will review any concerns from observed conditions, and may request efforts to return to 4000 cfs or above.

For the Santiam basin, continue to hold to RPA Table 9.2-2 August levels through September 6. On September 7, increase to spawning target flows of 1500 cfs in the North Santiam, and to the reduced levels of 1200 cfs in the South Santiam. We would like to see the South Santiam maintain this level through September, and prior to September 30, review and discuss the next step based on how much spawning has occurred and any revised projections for reservoirs approaching minimum conservation pool elevations based on any changes in precipitation levels.

We are concerned about the forecasted high temperatures prior to August 22, and hope that cooler temperatures arrive next week. Recognizing there were lower flows historically, we also consider that there were better conditions for hyporheic flow, more riparian vegetation, and more large wood to provide rearing habitat.

Please continue to provide notification to NMFS, USFWS, USGS, ODFW, and ODEQ staff planning to monitor side channel connectivity and river conditions prior to lowering mainstem flows.

Thank you for your consideration of this request.

Anne Mullan
Ph.D

Endangered Species Biologist
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-----Original Message-----

From: Anne Mullan - NOAA Federal [mailto:anne.mullan@noaa.gov]
Sent: Thursday, July 21, 2016 8:40 PM
To: Walker, Christopher NWP <Christopher.E.Walker@usace.army.mil>
Cc: Teed, Tina J NWP <Tina.J.Teed@usace.army.mil>; Stephanie Burchfield
- NOAA Federal (stephanie.burchfield@noaa.gov)
<stephanie.burchfield@noaa.gov>; Kim Hatfield <Kim.Hatfield@noaa.gov>;
Domingue, Rich <Richard.domingue@noaa.gov>; Tom Friesen
<tom.friesen@oregonstate.edu>; Bernadette Graham-Hudson
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<elise.x.kelley@state.or.us>; Allen, Chris <chris_allen@fws.gov>;
Michael Hudson <michael_hudson@fws.gov>; Ann Gray <Ann_E_Gray@fws.gov>
Subject: [EXTERNAL] Re: August, Willamette mainstem flow proposal
(Albany)

We agree to these changes through the end of July, and into August, to increase outflow from reservoirs above Albany and more closely approach the Congressionally authorized minimum flows shown in RPA 9.2, Table 9.2.1. We would also encourage the Corps to consider deeper drawdowns in Lookout Point to provide more water below Dexter, and at Albany, as as more than 2000 Chinook spawners have passed Willamette Falls this month, a significant fraction of the run this year. Any increased flows in the mainstem (and lower Middle Fork) could improve migration during the hotter days, if they increase connectivity to possible cooler areas, with shade or off channel areas fed by hyporheic flows. These benefits can extend to rearing juveniles by improving water quality. Other benefits of drawing LOP down further would be

- * reduced predator populations in LOP; and
- * useful data for the active tag study on how Chinook behave in the reservoir and in passing the dam, RO and turbines at low elevations.

We look forward to discussing this again on August 3rd. If you could, please provide CHPS results, showing higher outflows from LOP/Dexter with Albany flows at 4500 cfs or above and Salem to 6000 cfs after 8/14, it would be useful for discussion, and especially if received the day before. Please provide a key to help us recall what the different estimates (blue, red, green and gray lines) indicate.

Many thanks, Anne

Anne Mullan
Ph.D

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On Thu, Jul 21, 2016 at 10:54 AM, Walker, Christopher NWP
<Christopher.E.Walker@usace.army.mil
<mailto:Christopher.E.Walker@usace.army.mil> > wrote:

Hello Elise, Anne, Jeff and others,

Per our discussion during yesterday's Flow Management Water Quality Team meeting, please see the attached items.

The word document first provides a screen shot of the NOAA River Forecast Center's CHPS model results. The model assumes releasing the outflows listed in the table that follows the screen shots (red line in graphs). Highlighted yellow are the flow changes proposed as we transition to the first of August. These proposed increases would aid augmentation at Albany and exhaust the remaining volume of conservation season storage come November. **Note the need to confirm the Fall Creek proposed increase with Greg Taylor regarding potential impacts to the adult fish facility's water supply.

Also attached are the Corps model graphs previously provided. Please utilize the final graph to compare the Salem and Albany forecast from the Corps model to the CHPS model.

In summary, here are the differences between the two models:

Albany forecast flow come August 15
CHPS = 4,000 cfs
Corps = 4,800 cfs

Salem forecast flow come August 15
CHPS = 5,400 cfs
Corps = 6,500 cfs

The Corps requests to provide the outflows listed on the attached table (see word document) and to allow the flow at Albany to fall below the

BiOp target through August 15. Further, the Corps proposes to reconvene on August 10 to reassess flow conditions and updated forecast model results to collectively decide on flow requirements for August 15-31.

Please feel free to contact us for clarification or additional information.

Chris Walker
U.S. Army Corps of Engineers
Operations Division
Fish Biologist
w: 503-808-4316
c: 503-887-6452

-----Original Message-----

From: Anne Mullan - NOAA Federal [mailto:anne.mullan@noaa.gov]
Sent: Thursday, July 14, 2016 4:22 PM
To: Teed, Tina J NWP <Tina.J.Teed@usace.army.mil>
Cc: Walker, Christopher NWP <Christopher.E.Walker@usace.army.mil>; Taylor, Gregory A NWP <Gregory.A.Taylor@usace.army.mil>; Elise Kelly <elise.x.kelley@state.or.us>; Bernadette Graham-Hudson <bernadette.n.graham-hudson@state.or.us>; Stephanie Burchfield - NOAA Federal <stephanie.burchfield@noaa.gov>
Subject: [EXTERNAL] Re: temporary non-violation agreement at DET/BCL

Hello Tina

We agree that this adjustment will provide benefits with minimal effects and so agree that short duration dips below 1000 cfs in the next 2 weeks is acceptable, in return for continuing temperature reduction operations, awhile longer.

Thanks for any updated information, including diagrams and spreadsheets if available, prior to our meeting next week if any long term projections suggest necessary adjustments.

best, Anne

Anne Mullan
Ph.D

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On Thu, Jul 14, 2016 at 4:11 PM, Teed, Tina J NWP <Tina.J.Teed@usace.army.mil <mailto:Tina.J.Teed@usace.army.mil> > wrote:

Hello Anne,

Thank you for taking time to have a conversation regarding BCL outflow targets. The Corps proposes to target more closely a 1,000 cfs flow at BCL0 versus our present method of releasing approximately 50 cfs more to ensure no less than 1,000 cfs. Due to imprecision with outlet equipment, this would likely result in occasionally dropping below 1,000 cfs and needing to make frequent adjustments to return back to 1,000 cfs.

The purpose of this proposal is to conserve as much stored water as possible in the near term with the benefit of extending the date the Detroit Reservoir reaches elevation 1544 ft (beneficial to recreation) and elevation 1541 ft (beneficial for temperature control operation). The extension is on the order of approximately 1 day (for example, potentially reaching elevation 1544 ft on July 24th rather than 23rd).

Once the Detroit Reservoir reaches elevation 1541 ft, which ends temperature control operations (reach spillway crest), the Corps would return to the routine method of releasing approximately 1,050 cfs to ensure no less than 1,000 cfs is measured at the BCL0 gage.

At your earliest convenience, please consider the proposed temporary non-violation for short duration dips below 1,000 cfs until the reservoir reaches elevation 1541 feet.

Thank you,
Tina

Tina Teed, PWS
Reservoir Regulator
Water Quality and Reservoir Regulation Section
U.S. Army Corps of Engineers
503-808-4960 (office)
503-819-9823 (blackberry)
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Project Outflow Proposal 072016

	BLU	CGR	FAL	DEX	COT	DOR	FRN	BCL	FOS	HCR
15-Jul-16	53	273	218	1620	51	100	31	1090	823	453
16-Jul-16	301	273	215	1640	51	207	36	1040	823	457
17-Jul-16	304	273	218	1630	51	207	56	1020	823	457
18-Jul-16	301	268	215	1640	51	207	56	1010	814	448
19-Jul-16	301	273	218	1650	51	203	37	1010	814	453
20-Jul-16	301	273	215	1630	51	203	37	1020	823	448
21-Jul-16	300	270	215	1600	50	200	40	1000	800	400
22-Jul-16	300	270	215	1600	50	200	40	1000	800	400
23-Jul-16	300	270	215	1600	50	200	40	1000	800	400
24-Jul-16	300	270	215	1600	50	200	40	1000	800	400

25-Jul-16	300	270	215	1600	50	200	40	1000	800	400
26-Jul-16	300	270	215	1600	50	200	40	1000	800	400
27-Jul-16	300	270	215	1600	50	200	40	1000	800	400
28-Jul-16	300	270	215	1600	50	200	40	1000	800	400
29-Jul-16	300	270	215	1600	50	200	40	1000	800	400
30-Jul-16	300	270	215	1600	50	200	40	1000	800	400
31-Jul-16	300	270	450	1600	150	350	40	1000	800	400
1-Aug-16	300	270	450	1600	150	350	40	1000	800	400
2-Aug-16	300	270	450	1600	150	350	40	1000	800	400
3-Aug-16	300	270	450	1600	150	350	40	1000	800	400
4-Aug-16	300	270	450	1600	150	350	40	1000	800	400
5-Aug-16	300	270	450	1600	150	350	40	1000	800	400
6-Aug-16	300	270	450	1600	150	350	40	1000	800	400
7-Aug-16	300	270	450	1600	150	350	40	1000	800	400
8-Aug-16	300	270	450	1600	150	350	40	1000	800	400
9-Aug-16	300	270	450	1600	150	350	40	1000	800	400
10-Aug-16	300	270	450	1600	150	350	40	1000	800	400
11-Aug-16	300	270	450	1600	150	350	40	1000	800	400
12-Aug-16	300	270	450	1600	150	350	40	1000	800	400
13-Aug-16	300	270	450	1600	150	350	40	1000	800	400
14-Aug-16	300	270	450	1600	150	350	40	1000	800	400
15-Aug-16	300	270	450	1600	150	350	40	1000	800	400
16-Aug-16	300	270	450	1600	150	350	40	1000	800	400
17-Aug-16	300	270	450	1600	150	350	40	1000	800	400
18-Aug-16	300	270	450	1600	150	350	40	1000	800	400
19-Aug-16	300	270	450	1600	150	350	40	1000	800	400
20-Aug-16	300	270	450	1600	150	350	40	1000	800	400
21-Aug-16	300	270	450	1600	150	350	40	1000	800	400
22-Aug-16	300	270	450	1500	150	350	40	1000	800	400
23-Aug-16	300	270	450	1500	150	350	40	1000	800	400
24-Aug-16	300	270	450	1500	150	350	40	1000	800	400

16										
25-Aug-16	300	270	450	1500	150	350	40	1000	800	400
26-Aug-16	300	270	450	1500	150	350	40	1000	800	400
27-Aug-16	300	270	450	1500	150	350	40	1000	800	400
28-Aug-16	300	270	450	1500	150	350	40	1000	800	400
29-Aug-16	300	270	450	1500	150	350	40	1000	800	400
30-Aug-16	300	270	450	1500	150	350	40	1000	800	400
31-Aug-16	300	270	450	1500	150	350	40	1000	800	400

Final results

Flow changes are being implemented as coordinated.

Please email or call with questions or concerns.

Thank you,

Chris Walker
 NWP Operations Division Fishery Section
 503.808.4316
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