Oregon
Kate Brown, Governor

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MEMORANDUM

TO: Water Resources Commission

FROM: Dwight French, Water Right Services Administrator DF
Lisa Jaramillo, Transfer and Conservation Section Manager
Sarah Henderson, Flow Restoration Program Coordinator SH

DATE: Agenda Item F, November 15, 2018
Water Resources Commission Meeting

Deschutes Basin Groundwater Mitigation Program 2017 Annual Review and Five-Year Administrative Evaluation (Div. 505)

I. Introduction

During this informational report, staff will present the combined 2017 Annual Evaluation of the Deschutes Basin Groundwater Mitigation Rules, and Mitigation Bank and Credit Rules, as well as the Five-Year Evaluation of the Deschutes Basin Groundwater Mitigation Program.

II. Background

On September 13, 2002, the Commission adopted the Deschutes Ground Water Mitigation Rules and the Deschutes Basin Mitigation Bank and Mitigation Credit Rules. These rules implement Senate Bill 1033 (1995), House Bill 2184 (2001), House Bill 3494 (2005), and HB 3623 (2011). The rules provide for mitigation of impacts to scenic waterway flows and senior water rights, while allowing additional appropriations of groundwater in the Deschutes Groundwater Study Area (Appendix 1 in Attachment 1). The mitigation program rules allow an additional 200 cubic feet per second (cfs) of new groundwater use, referred to as the allocation cap.

The three objectives of the Deschutes Basin Mitigation Program are to:

- Maintain flows for Scenic Waterways and senior water rights, including instream water rights;
- Facilitate restoration of flows in the middle reach of the Deschutes River and related tributaries; and
- Sustain existing water uses and accommodate growth through new groundwater development.

The Deschutes Groundwater Mitigation Rules (Oregon Administrative Rule (OAR) Chapter 690, Division 505) provide options for groundwater users to provide mitigation by completing an

individual mitigation project, or acquisition of mitigation credits awarded by the Department based on the completion of a mitigation project. One mitigation credit equals one acre-foot of mitigation water.

The Deschutes Basin Mitigation Bank and Mitigation Credit Rules (OAR Chapter 690, Division 521) provide for the establishment of a mitigation credit system and mitigation banks to help facilitate transactions among holders of mitigation credits and persons interested in acquiring mitigation credits.

The Department is required to provide annual evaluations of the Deschutes Groundwater Mitigation Program. The annual evaluation is done in coordination with the Oregon Departments of Fish and Wildlife, Environmental Quality, State Lands, and Parks and Recreation. The Department is also required to provide evaluations of the mitigation program every five years. The annual and five-year evaluations are included in a combined report in Attachment 1. The primary goal of these evaluations is to identify how streamflows are responding to additional groundwater use and implementation of the mitigation program.

III. Discussion

During the review process, comments were received from Oregon Department of Fish and Wildlife and the Oregon Department of Environmental Quality (see Attachment 1).

The annual and five-year evaluation includes reviews new groundwater appropriations, streamflow monitoring, and mitigation activity. The evaluation also examines whether scenic waterway flows and instream water right flows in the Deschutes Basin continue to be met on at least an equivalent or more frequent basis (after the mitigation activities) as compared to long-term representative base period flows established by the Department (pre-mitigation activities). Representative base period flows are 1966 to 1995.

To limit the amount of impact on surface water flows, the mitigation program also includes a 200 (cfs) cap on the amount of water that may be allocated to new groundwater use. This allocation cap restriction may be lifted by the Commission only if the Department's evaluation of the mitigation program demonstrates that scenic waterway and instream water right flows continue to be met on at least an equivalent or more frequent basis.

Program Highlights

- 127 active permits and certificates have been issued under the Deschutes Groundwater Mitigation Program.
- As of the end of 2017, approximately 151.04 cfs of water had been allocated for new permits and approved final orders. This leaves 48.96 cfs that can still be approved under the 200 cfs allocation cap. At the end of 2017, there was an additional 17.34 cfs in pending applications that, if approved, would leave approximately 31.62 cfs available under the allocation cap.
- The majority of mitigation is from permanent mitigation projects (instream transfers used to establish mitigation).

- Model results through 2017 indicate that the long-term, net annual effect of the mitigation program on instream flows continues to be nearly zero. On a seasonal basis, flows continue to improve during the irrigation season, while decreasing slightly during the non-irrigation season at almost all of the evaluation sites.

IV. Conclusion

The Department continues to work to effectively implement the Deschutes Groundwater Mitigation Program. Groundwater permit applications and mitigation projects are moving through the required processes.

Overall, the program continues to produce positive benefits as more mitigation water has been approved and protected instream than is required for the active groundwater permits and certificates issued.

Attachment:

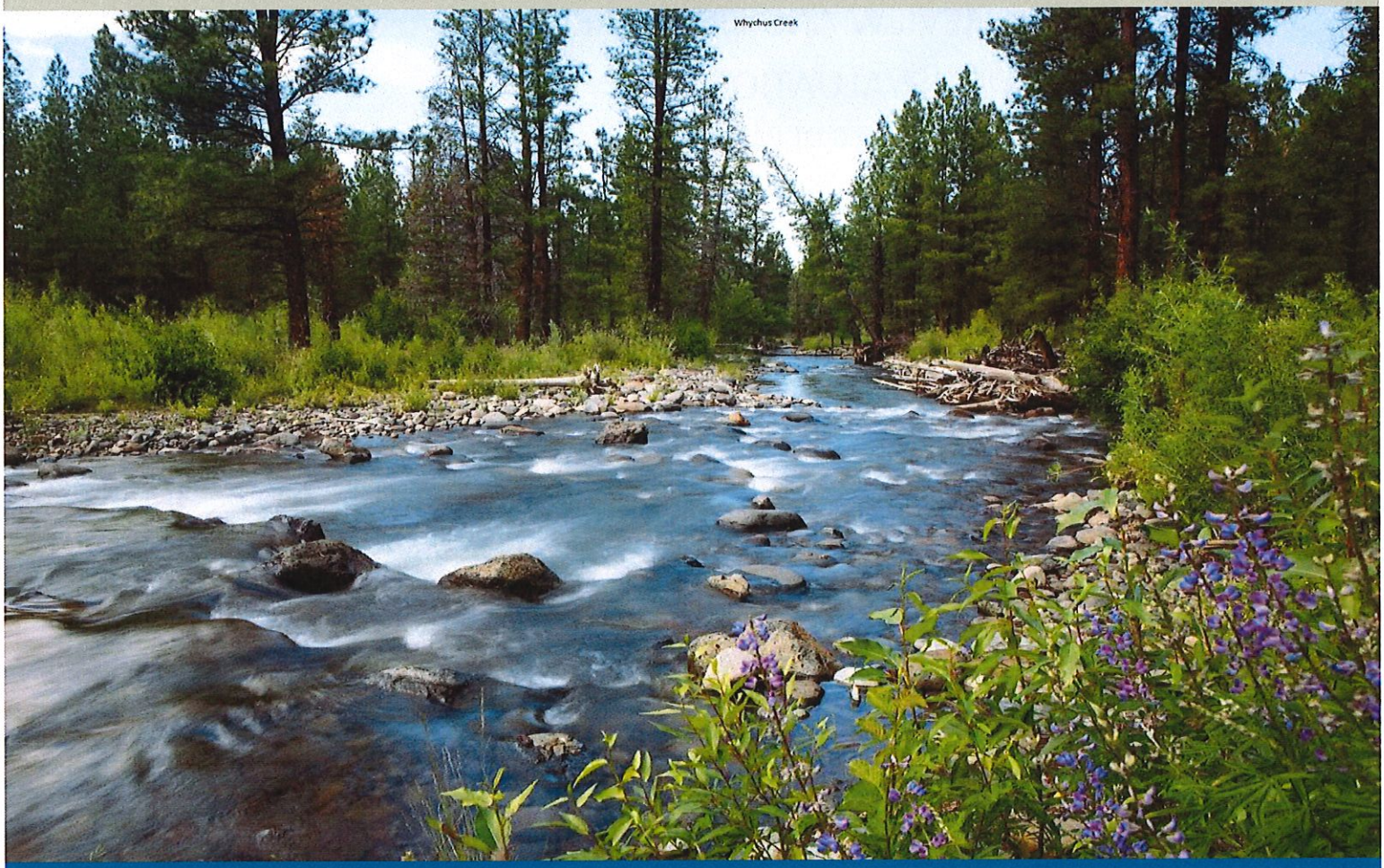
1. 2017 Deschutes Mitigation Program Annual Review and Five-Year Administrative Evaluation

Dwight French
503-986-0819

Lisa Jaramillo
503-986-0880

Sarah Henderson
503-986-0884

DESCHUTES BASIN GROUNDWATER MITIGATION PROGRAM



OREGON
WATER RESOURCES
DEPARTMENT

2017 ANNUAL REVIEW AND FIVE-YEAR ADMINISTRATIVE EVALUATION

BY SARAH HENDERSON

OREGON WATER RESOURCES DEPARTMENT

DESCHUTES BASIN GROUNDWATER MITIGATION PROGRAM

2017 ANNUAL REVIEW AND FIVE-YEAR ADMINISTRATIVE EVALUATION

OREGON WATER RESOURCES DEPARTMENT

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DEPARTMENT

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Introduction

Annual Review and Five-Year Administrative Evaluation

The attached combined report provides the 2017 Annual Evaluation of the Deschutes Basin Groundwater Mitigation Rules (Oregon Administrative Rule (OAR) Chapter 690, Division 505) and the Deschutes Basin Mitigation Bank and Mitigation Credit Rules (OAR Chapter 690, Division 521), as well as the Five-Year Evaluation of the Deschutes Basin Groundwater Mitigation Program (OAR Chapter 690, Division 505).

Background

On September 13, 2002, the Commission adopted the Deschutes Basin Groundwater Mitigation Rules and the Deschutes Basin Mitigation Bank and Mitigation Credit Rules. These rules implement Senate Bill 1033 (1995), HB 2184 (2001) HB 3494 (2005), and HB 3623 (2011). The rules provide for mitigation of impacts to scenic waterway flows and senior water rights including instream water rights, while allowing additional appropriations of groundwater in the Deschutes Basin Groundwater Study Area (Appendix 1). The mitigation program, by rule, allows an additional 200 cubic feet per second (cfs) of new groundwater use, referred to as the allocation cap.

Evaluation Requirements

Annual Review

Under OAR 690-505-0500(3) of the Deschutes Basin Groundwater Mitigation Rules, the Department is required to annually evaluate and report on the Deschutes Groundwater Mitigation Program, including the implementation and management of mitigation credits allocated through existing mitigation banks. This annual evaluation and report is to include information on new groundwater appropriations, streamflow monitoring, and mitigation activity to determine whether scenic waterway flows and instream water right flows in the Deschutes Basin continue to be met on at least an equivalent or more frequent basis as compared to long-term, representative base period flows (1966 to 1995).

Required Annual Review Elements

The annual review must address the following topics:

- New groundwater appropriations
- Mitigation activity
- Mitigation bank activity
- Streamflow monitoring
- Consultation with the Oregon Department of Fish and Wildlife, Oregon Parks and Recreation Department, Oregon Department of Environmental Quality, and Oregon Department of State Lands
- Determination of whether the scenic waterways and instream water right flows in the Deschutes Basin continue to be met on at least an equivalent or more frequent basis

Five-Year Evaluation Review (Division 505)

Under OAR 690-505-0500(2), the Commission is required to evaluate the mitigation program every five years. This report contains the third, five-year evaluation, which addresses the years 2013 through 2017. The rule requires an evaluation of the Deschutes Basin Groundwater Mitigation Rules and associated mitigation to determine whether the 200 cfs allocation cap restriction should be modified through subsequent public rulemaking. It is also required to evaluate the

effectiveness of mitigation projects and mitigation credits that involve time-limited instream transfers, instream leases and allocations of conserved water from canal lining and piping projects, as well as the general zones of impact identified by the Department.

Required Five-Year Review Elements

The OAR 690-505 five-year review must address the following topics:

- Allocation cap status and whether the 200 cfs restriction should be modified
- Mitigation activity
- Zones of impact
- Streamflow monitoring
- Effectiveness of mitigation projects and mitigation credits

Future Five-Year Reviews

The Department is required to develop a report on the Deschutes Mitigation Program annually under ORS 537.746 and OAR 690-505-0500(3) and to the Legislative Assembly every five years under ORS 540.155. In addition, the Department's OAR 690-505-0500(2) rules require reporting every five years. To improve reporting efficiency, the Department will be combining the OAR 690-505 and Legislative 540.155 five-year reports in the year 2021.

Report Contents and Agency Comments

Annual Review and Five-Year Administrative Evaluation

This report incorporates all of the required elements outlined for the annual report and five-year evaluation required in OAR 690-505-500(2) and (3). The Department provided a draft of the combined report for review by the agencies listed above on October 12, 2018. Comments were provided by ODFW and DEQ (see Appendix 2) and are summarized below.

Issues of concern raised by ODFW include:

- Impacts of increased groundwater use under the Mitigation Program to local springs, which are an important source of cold water inputs to streams by providing cold water refugia and other habitat benefits for fish.
- Reduction of seepage and loss of cold water recharge for springs resulting from conversion of area irrigation canals to piped delivery systems.
- The effect of the Mitigation Program on streamflows outside of the irrigation season.
- Potential impacts of the Mitigation Program on the ESA-listed Oregon Spotted Frog.

Issues of concern raised by DEQ include:

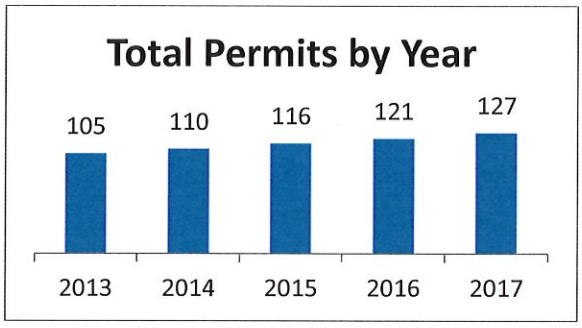
- The decrease in non-irrigation streamflow may have many different causes, including upstream storage, climate impacts, and exempt groundwater withdrawals.
- It is important to determine the relative proportion of streamflow coming from reservoir releases versus groundwater.
- If the reduction of streamflow is due to a reduction in groundwater inputs, then the Deschutes Groundwater Mitigation Program should be revised to prevent additional groundwater input depletion.
- Groundwater inputs generally consist of cold, high-quality water. A reduction in groundwater inputs could negatively impact water quality, such as increased incidence of harmful algal blooms and reduced habitat quality for resident fish and other aquatic life.

Combined Review Evaluation

New Groundwater appropriations and Mitigation Activities

A. Permits Issued:

- 127 permits issued
  - 6 issued in 2017
  - 22 issued between 2013-2017



- 116 non-cancelled permits
- 11 permits have been cancelled
- Of the 127 permits, 18 have been issued certificates

B. Current Applications Pending with No Final Order:

- 27 applications, totaling 17.34 cfs

C. Allocation cap summary as of end of 2017 (Figure 1):

- 151.04 cfs – total cfs allocated under cap (permits and FO's)
- 17.34 cfs – pending applications not yet deducted from 200 cfs cap
- 31.62 cfs – remaining cfs if all applications were approved

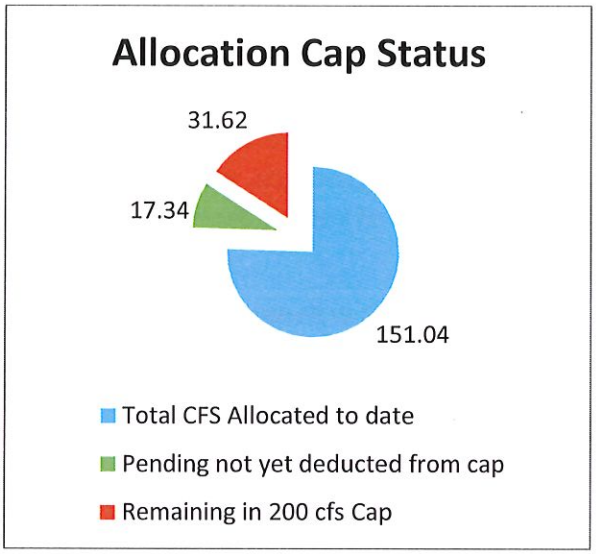


Figure 1 Allocation Cap Status

D. **Incremental Development Plans:** By rule, the Department may allow a municipal or quasi-municipal applicant to satisfy their mitigation obligation incrementally as the water use is developed, rather than requiring that mitigation be provided before the permit is issued. These applicants must report annually to the Department on the volume of water used and the source of mitigation. There are 17 permits that have incremental development plans.

A summary of water use for municipal and quasi-municipal permit holders with incremental development plans is provided in Figure 2. This figure is a comparison between the amount that these water users are authorized to use at full development, the amount of water they could use based on how much mitigation they have provided through 2017, and the amount of water they actually used during 2017. Overall, in 2017, more mitigation was provided by entities with incremental development plans than was needed.

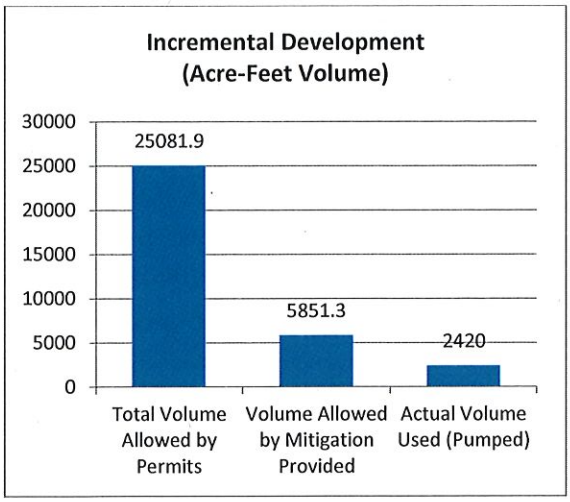


Figure 2 Incremental Development

E. **Mitigation Activity:** Mitigation for active groundwater permits and certificates issued by the Department under the Mitigation Program is provided through permanent instream transfers and temporary instream leases. The majority of mitigation continues to be primarily from instream transfers (Figure 3). Mitigation credits established by a Mitigation Project are considered used when assigned to a groundwater application or permit.

- Figure 4 shows the number of active mitigation projects, while Figure 5 shows the amount of water in active mitigation projects. These figures show both permanent and temporary mitigation, through the years 2013-2017.
- There were 67 total active mitigation projects in 2017, including:
    - 45 permanent instream transfer projects, and
    - 22 temporary instream lease projects.
- Figure 6 shows the mitigation established separated by zone of impact.

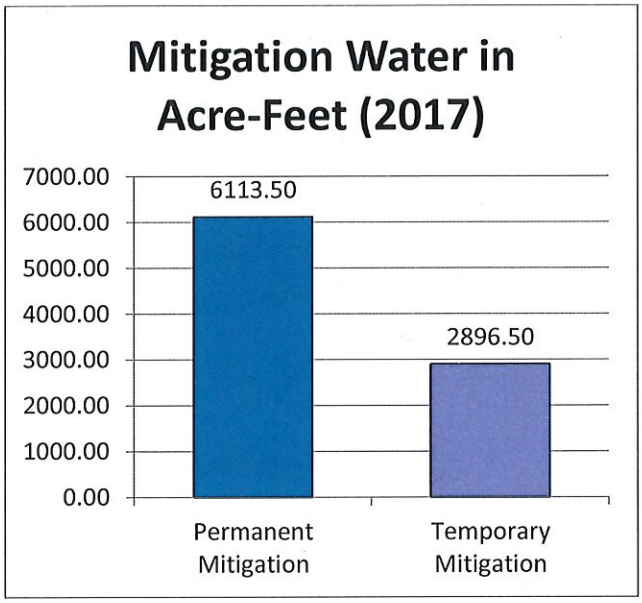


Figure 3 Mitigation Water

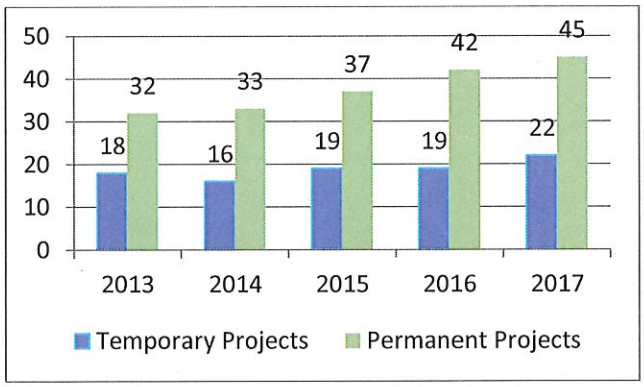


Figure 4 Mitigation Projects by Year

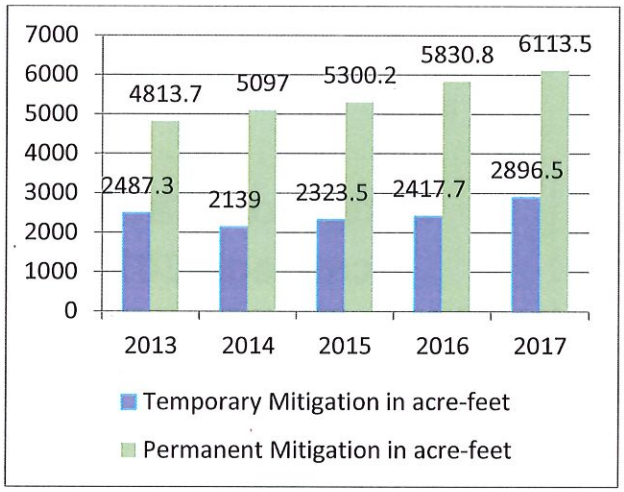


Figure 5 Mitigation Water by Year

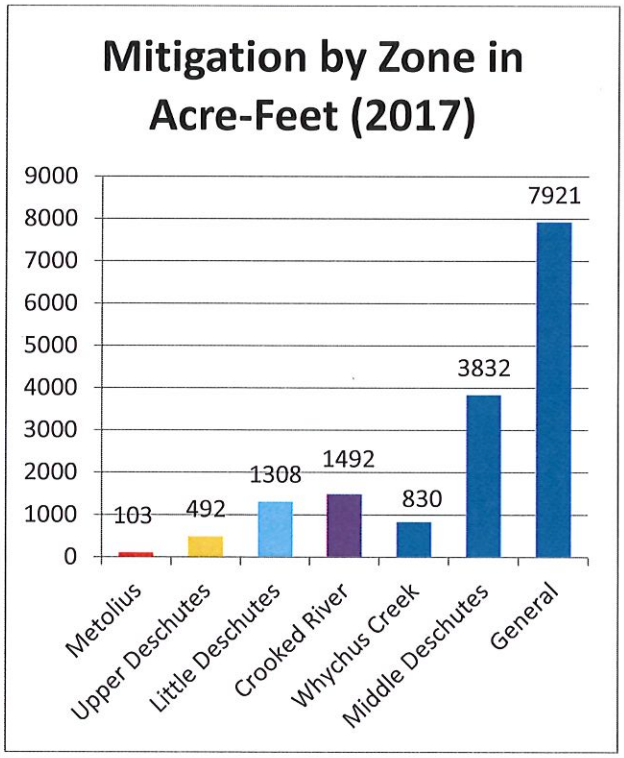


Figure 6 Mitigation by Zone

F. **Mitigation Banks:** Mitigation banks must submit an annual report detailing all of the credit transactions and activities for the preceding calendar year. To date, there are two:
   - Deschutes River Conservancy Mitigation Bank (DRCMB), and
   - Deschutes Irrigation, LLC.

G. **Mitigation Bank Activity:**

DRCMB

- Filed the required report in January 2018 for the 2017 period.
- Submitted 22 instream leases in 2017
- Figure 7 shows the instream leases submitted in the years 2013-2017.
- Has maintained sufficient "reserve" credits to cover temporary mitigation credits used by groundwater permit holders in each zone of impact. (For each temporary mitigation credit used to satisfy all or part of the mitigation obligation of a groundwater permit, the Mitigation Bank is required to keep a matching credit in reserve.)

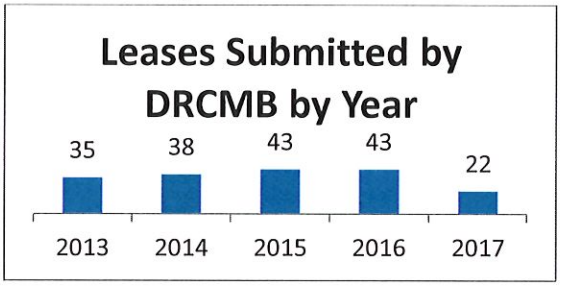


Figure 7 Instream Leases by Year

Deschutes Irrigation LLC

- No activity to date

Mitigation and Streamflow Monitoring

To monitor the impact of new groundwater permits and mitigation on scenic waterway flows and instream water right flows, the Department developed a streamflow modeling program. The model was constructed using a base-period of flows from 1966 to 1995 at selected gaging stations around the basin. This base-period represents streamflows during a period of

time after the dams in the basin were constructed and before the Scenic Waterway Act was amended to include consideration of groundwater impacts. The model then applies the effect of the estimated hydrologic impact of mitigation credits and debits to this historical flow data. It should be noted that the model is designed to reflect the theoretical, steady-state response of streamflow to mitigation-related activities only. In some cases, the actual hydrologic response to mitigation activities, such as new groundwater pumping, may take years or decades to be reflected as changes in actual streamflow. In addition, climate variability and the resulting natural response in streamflow generally mask the actual streamflow response to mitigation activities at most locations. This does not reflect other activities affecting streamflow outside of the mitigation program, such as other canal piping/lining (conserved water projects) instream transfers, riparian enhancement activities completed for restoration purposes only, or water management changes such as those related to higher winter releases designed to protect the ESA-listed spotted frog.

Analysis of the 2017 data demonstrates that, on an annual basis, the change in percent of time the instream flow requirements are met at the evaluation points ranges from -1.10% to +1.16% . Similarly, the overall annual change in streamflow ranges from +19.0 cfs to -0.722 cfs (see Appendix 3).

Consistent with previous evaluations of the mitigation program, the absolute change in streamflow on a seasonal basis continues to be negative at all evaluation points during the non-irrigation season and positive at all evaluation points during the summer except for the Metolius River. This is expected given the timing difference between the effects of new groundwater withdrawals (debits) and mitigation projects (credits; instream transfers and leases of irrigation rights) on streamflow. New groundwater uses produce a decrease in streamflow that is uniformly distributed over the year, while mitigation projects generally increase streamflow only during the irrigation season (see Appendix 3), benefitting instream flows during the seasonal, low-flow period.

The seasonal changes in percent of time the instream flow requirements (ISFR) are met at each evaluation site follows the seasonal impacts in terms of absolute streamflow. During the non-irrigation season, the impact to the percent of time the ISFR is met is generally negative, while the percent of the impact during the irrigation season is predominantly positive. The relative change in percent of time the ISFR is met varies by month and site, depending on how close the historical flows were to the ISFR prior to the mitigation program. If the historical flows were close to the ISFR for a given evaluation site, then a small change in flows can relate to a relatively large change in percent of time the ISFR is met (see summer flows for the Deschutes River at Lower Bridge, Appendix 3). The opposite is true if the historical flows differed greatly from the ISFR (see summer flows for the Deschutes River at Lake Billy Chinook, Appendix 3).

The Department has also noted small negative changes in streamflow on an annual basis at certain evaluation points (see Appendix 3). For example, for the Deschutes River at Benham Falls and Little Deschutes River at the mouth, there appears to have been an annual reduction in streamflows of -0.722 cfs and -0.69 cfs respectively, (0.05 and 0.35 percent of the mean annual streamflow). This is in part due to the resolution of the model. The baseline

condition of streams in the model is determined from streamflows measured during water years 1966 to 1995. The only model inputs are the groundwater permit debits and mitigation credits. Because the model relies on a base period and not current streamflows, the only changes reflected in the model are from those debit and credit inputs, not current reservoir operations or other conditions such as climate change.

Another consideration is related to how groundwater permits and mitigation projects are entered into the streamflow model. The model assumes full use by groundwater permit holders. However, not all permit holders are required to provide their full amount of mitigation before the permit is issued. In the case of municipal and quasi-municipal permit holders, they have the option of providing mitigation incrementally to match the development of the permit over time. The amount of mitigation provided and entered into the streamflow model is currently less than what all permits issued under the mitigation program will need at full use levels. However, these users are providing more mitigation than required at current use levels.

Over time, as municipal and quasi-municipal permits with incremental mitigation plans and their mitigation are developed and added to the streamflow model, the Department anticipates that the annual change will move towards a more accurate reflection of the changes to streamflow. The Department will continue to evaluate streamflow model results on an annual basis to determine whether streamflows continue to be met on an equivalent or more frequent basis.

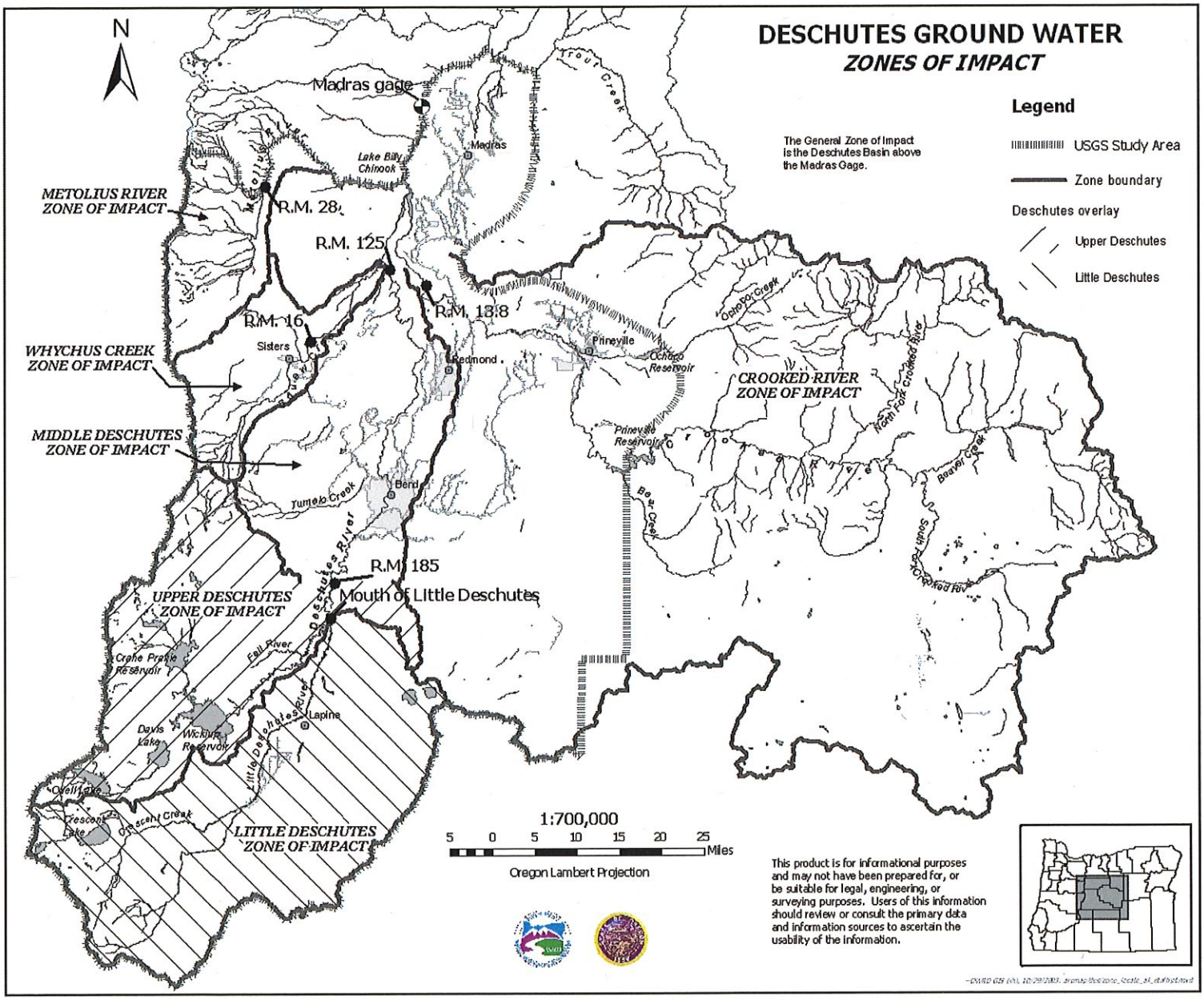
Summary

The Department continues working to effectively implement the Deschutes Groundwater Mitigation Program. Groundwater permit applications and mitigation projects are moving through the required processes. Overall, the program continues to produce positive benefits as more mitigation water has been approved and protected instream than is required for active groundwater permits and certificates.

The Department does not believe that modifying the allocation cap is necessary at this time. There is water available under the cap, and it will be evaluated annually.

Appendices

1. Deschutes Basin Groundwater Study Area Zone of Impact Map
2. Comments from ODFW and DEQ
3. Summary of Modeled Streamflow for Water Year Ending September 2017


DESCHUTES GROUND WATER
ZONES OF IMPACT
N
Legend
USGS Study Area
Zone boundary
Deschutes overlay
Upper Deschutes
Little Deschutes
The General Zone of Impact is the Deschutes Basin above the Madras Gage.
Madras gage
METOLIUS RIVER ZONE OF IMPACT
R.M. 28
R.M. 125
R.M. 13.8
R.M. 16
WHYCHUS CREEK ZONE OF IMPACT
MIDDLE DESCHUTES ZONE OF IMPACT
CROOKED RIVER ZONE OF IMPACT
R.M. 185
Mouth of Little Deschutes
UPPER DESCHUTES ZONE OF IMPACT
LITTLE DESCHUTES ZONE OF IMPACT
Madras
Lake Billy Chinook
Sisters
Redmond
Prineville
Ochoco Reservoir
Prineville Reservoir
Bend
Tumalo Creek
Crane Prairie Reservoir
Fall River
Lapine
Davis Lake
Wickiup Reservoir
Crescent Lake
Crescent Creek
Trout Creek
Ochoco Creek
North Fork Crooked River
Beaver Creek
South Fork Crooked River
Bear Creek
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Oregon Lambert Projection
This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

Oregon
Kate Brown, Governor

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October 17, 2018

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Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem, OR 97301-1271

RE: Deschutes Groundwater Mitigation Program Combined Report for 2017 and the Five-Year Administrative Evaluation

Dear Ms. Henderson,

The Oregon Department of Fish and Wildlife (ODFW) appreciates the opportunity to comment on the Deschutes Groundwater Mitigation Program Combined Report for 2017 and the Five-Year Administrative Evaluation. Overall, ODFW agrees that the program has been successful in maintaining and improving flows in the Middle and Lower Deschutes River during the irrigation season, but we have continued concerns about the impacts to springs and decreases in flow during the non-irrigation season. Although ODFW has consistently submitted comments for many years that address ongoing concerns with the Program, we were pleased to begin discussions with the Oregon Water Resources Department (WRD) regarding these concerns late last year and remain hopeful a Work Group will be convened to revisit the rules and strengthen the efficacy of the Program (an action listed in the 2016 review).

As this Work Group has not yet been convened and no progress has been made to date, ODFW will again reiterate our concerns here. Many of these concerns are now pressing, as impacts continue and water users are currently moving ahead with innovative means to secure future mitigation credits that may not fully meet the needs of fish and wildlife in the basin (e.g., proposed winter reservoir releases with unclear mitigation intent). Specifically, ODFW continues to request tangible improvements to the Program in the following areas:

Impacts to Springs

ODFW continues to express concerns with the localized impacts of groundwater pumping on local springs. Springs provide very important cold water inputs to streams by providing cold water refugia and other habitat benefits for fish and by helping cool stream

temperatures during the summer in streams with depleted flows. Over time, ODFW assumes that continued and increased groundwater withdrawal for agricultural, residential, and municipal needs will further affect springs when there is a surface/groundwater connection. Impacts to springs from current and future groundwater withdrawals are exacerbated by the increasing trend to convert area irrigation canals to piped delivery systems. While this is positive in that it generates conserved water that results in improved instream flows in the middle Deschutes River, it also eliminates seepage, which recharges the aquifer and contributes to spring recharge of cold water. The result is an exchange (loss) of cold spring water for warmer water upstream. The fisheries impacts of this inconsistency is likely to become more pronounced in future years as climate change continues to be increasingly more influential. Cold water refugia could likely become critical to long term persistence of many fish species and populations.

As noted as an action in the 2016 Annual Report and topic for the proposed 2018 Work Group (neither of which has been referenced in this 2017 report and 5-year review), ODFW requests that OWRD consider implementing a program to monitor key springs/spring complexes in the basin to determine ecological impacts to spring flow, including temperature and nutrient changes resulting from groundwater pumping. The current update to the groundwater flow model by the U.S. Geological Survey should include information to address this concern, where appropriate. ODFW is willing to work with other agencies to seek funding, coordinate efforts for research, and develop and implement a strategy to address these concerns.

Impacts During the Non-Irrigation Season

As currently designed, the Deschutes Groundwater Mitigation Program mitigates year-round groundwater withdrawals with irrigation season water and reports changes to streamflow on an annual basis. This type of mitigation does provide for more instream water during the irrigation season, as reported in these current reviews, but is also reported to reduce flows in the lower river during the non-irrigation season. Critical fish life history components occur outside of the irrigation season, particularly during "shoulder months" at the beginning and end of the irrigation season (March/April and October/November).

In addition, current implementation of the Mitigation Program poses potential impacts to the ESA-listed Oregon Spotted Frog (OSF) outside of the irrigation season. Improving winter flows on the upper Deschutes River below Wickiup Reservoir and on Crescent Creek is essential to the survival of the OSF, and freshwater spring habitats in the upper Deschutes Basin have been identified as critical to overwinter survival.

The continual detrimental impact to streamflow during the non-irrigation season is now a greater concern for more than just the "shoulder months." Most stakeholders recognize that non-irrigation flow concerns still need to be addressed for the Deschutes basin as a whole.

ODFW Comments 10/17/18

In the past, WRD recognized this concern as well. One option, which is currently being sought by water users in the basin, would be to release stored water in Wickiup, Crane Prairie, Crescent and other reservoirs instream during the winter and shoulder months. ODFW recognizes the release of stored water during the non-irrigation season as a valuable tool for supplementing the existing mitigation credits that are currently limited to the irrigation season. Winter releases would aide in offsetting impacts of groundwater withdrawal on a true 1:1 basis, but only if utilized as mitigation during the winter months and not applied to the irrigation season. ODFW would like OWRD and program partners to work with us to seek clear options for year-round mitigation to offset year-round impacts.

Thank you for the chance to comment. We look forward to pursuing solutions to our concerns and encourage WRD to schedule dates for the Work Group once planned for 2018 as soon as possible so we can revisit the streamflow model and rule language and plan for Program updates. If you have any questions in the meantime, please contact me (503-947-6092) in Salem or Brett Hodgson (541-388-6363) in Bend.

Sincerely,

Danette Faucera

Danette Faucera
Water Policy Coordinator

Brett Hodgson

Brett Hodgson
Deschutes District Fish Biologist

HENDERSON Sarah A * WRD

From: MEHTA Smita <Smita.Mehta@state.or.us>
Sent: Wednesday, October 17, 2018 3:34 PM
To: HENDERSON Sarah A * WRD
Subject: RE: Your review/comment requested: Draft Deschutes Mitigaiton Report for 2017 and 5yr Admin Eval

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: Important, REPORT COMMENTS

Hi Sarah,

DEQ appreciates the opportunity to comment.

- On p. 6, the report states that "the absolute change in streamflow on a seasonal basis continues to be negative at all evaluation points during the non-irrigation season and positive at all evaluation points during the summer" and that this change is expected "given the timing difference between the effects of new groundwater withdrawals (debits) and mitigation projects".

The positive impact of mitigation on summer streamflows is straightforward because flows increase when surface water rights are transferred instream. But, the decrease in non-irrigation streamflow may have many different causes, including upstream storage, climate impacts, and exempt groundwater withdrawals.

- p. 6. How is the annual reduction in streamflow of the Upper Deschutes and Little Deschutes due to the resolution of the model? How does the model tease out the impacts of upstream reservoir management from the impacts of groundwater withdrawals in this part of the basin?

- It is important to determine the relative proportion of streamflow coming from reservoir releases vs. the proportion coming from groundwater inputs. If the reduction of streamflow is due to a reduction in groundwater inputs, then the Deschutes Groundwater Mitigation Program should be revised to prevent additional groundwater input depletion. Groundwater inputs generally consist of cold, high quality water. A reduction in groundwater inputs could cause significant negative impacts to water quality, such as increased incidence of harmful algal blooms and reduced habitat quality for resident fish and other aquatic life.

Please let me know if you have any questions.

Sincerely,
Smita

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Streamflow Model Data

The data presented in the following tables are from the Department's Deschutes Mitigation model. The "before mitigation" or baseline condition of streams in the Deschutes Basin has been determined from streamflows measured during water years 1966 to 1995. The model has been developed to mathematically estimate the change in streamflow expected due to mitigation (credits) and groundwater allocation (debits). The model is designed to reflect the theoretical, steady-state response of streamflow to mitigation-related activities only. In some cases, the actual hydrologic response to mitigation activities, such as new groundwater pumping, may take years or decades to be reflected as changes in streamflow.

CHANGE IN PERCENT OF TIME INSTREAM REQUIREMENTS ARE MET
IN THE DESCHUTES BASIN AS A RESULT OF MITIGATED GROUNDWATER USE

Effective Date: 9/30/2017

Deschutes River at Mouth

Month	Base Line %	Mitigated %	Change in Percentage %	Percent Change %
JAN	93.20	92.90	-0.32	-0.35
FEB	90.80	90.20	-0.59	-0.65
MAR	95.30	95.10	-0.22	-0.23
APR	99.90	99.90	0.00	0.00
MAY	99.10	99.50	0.32	0.32
JUN	98.00	98.80	0.78	0.79
JUL	91.00	92.70	1.72	1.86
AUG	100.00	100.00	0.00	0.00
SEP	98.10	98.10	0.00	0.00
OCT	97.40	97.40	0.00	0.00
NOV	99.90	99.80	-0.11	-0.11
DEC	91.70	91.10	-0.64	-0.71
ANNUAL	96.20	96.30	0.08	0.09

CHANGE IN MEAN STREAM FLOW (CFS)
IN THE DESCHUTES BASIN AS A RESULT OF MITIGATED GROUNDWATER USE

Effective Date: 9/30/2017

Deschutes River at Mouth

Month	Base Line cfs	Mitigated cfs	Change in cfs cfs	Percent Change %
JAN	6910.0	6890.0	-26.0	-0.38
FEB	7080.0	7050.0	-26.0	-0.37
MAR	7250.0	7220.0	-25.9	-0.36
APR	6640.0	6630.0	-2.57	-0.04
MAY	5800.0	5820.0	15.7	0.27
JUN	5200.0	5230.0	29.1	0.56
JUL	4590.0	4620.0	34.9	0.75
AUG	4380.0	4410.0	33.3	0.75
SEP	4430.0	4460.0	22.7	0.51
OCT	4710.0	4710.0	5.03	0.11
NOV	5390.0	5370.0	-25.6	-0.48
DEC	6190.0	6160.0	-26.0	-0.42
ANNUAL	5710.0	5710.0	0.866	0.02

CHANGE IN PERCENT OF TIME INSTREAM REQUIREMENTS ARE MET
IN THE DESCHUTES BASIN AS A RESULT OF MITIGATED GROUNDWATER USE

Effective Date: 9/30/2017

Deschutes River below Pelton Dam

Month	Base Line %	Mitigated %	Change in Percentage %	Percent Change %
JAN	64.70	63.90	-0.86	-1.35
FEB	63.00	61.50	-1.53	-2.50
MAR	67.80	66.70	-1.18	-1.77
APR	71.40	71.40	0.00	0.00
MAY	58.80	63.00	4.19	6.66
JUN	55.60	59.60	4.00	6.72
JUL	41.00	44.00	3.01	6.85
AUG	98.20	99.20	1.08	1.08
SEP	66.80	68.40	1.67	2.44
OCT	81.10	81.10	0.00	0.00
NOV	97.20	97.20	0.00	0.00
DEC	66.10	65.40	-0.75	-1.15
ANNUAL	69.30	70.10	0.81	1.16

CHANGE IN MEAN STREAM FLOW (CFS)
IN THE DESCHUTES BASIN AS A RESULT OF MITIGATED GROUNDWATER USE

Effective Date: 9/30/2017

Deschutes River below Pelton Dam

Month	Base Line cfs	Mitigated cfs	Change in cfs cfs	Percent Change %
JAN	5240.0	5220.0	-26.0	-0.50
FEB	5190.0	5170.0	-26.0	-0.50
MAR	5520.0	5500.0	-25.9	-0.47
APR	5130.0	5130.0	-2.57	-0.05
MAY	4420.0	4440.0	15.7	0.35
JUN	4230.0	4260.0	29.1	0.68
JUL	4020.0	4050.0	34.9	0.86
AUG	3940.0	3970.0	33.3	0.84
SEP	3980.0	4000.0	22.7	0.57
OCT	4190.0	4200.0	5.03	0.12
NOV	4680.0	4660.0	-25.6	-0.55
DEC	5030.0	5010.0	-26.0	-0.52
ANNUAL	4630.0	4630.0	0.867	0.02

CHANGE IN PERCENT OF TIME INSTREAM REQUIREMENTS ARE MET
IN THE DESCHUTES BASIN AS A RESULT OF MITIGATED GROUNDWATER USE

Effective Date: 9/30/2017

Metolius River at Lake Billy Chinook

Month	Base Line %	Mitigated %	Change in Percentage %	Percent Change %
JAN	97.70	97.70	0.00	0.00
FEB	99.20	99.20	0.00	0.00
MAR	99.80	99.80	0.00	0.00
APR	100.00	100.00	0.00	0.00
MAY	100.00	100.00	0.00	0.00
JUN	100.00	100.00	0.00	0.00
JUL	100.00	100.00	0.00	0.00
AUG	100.00	100.00	0.00	0.00
SEP	100.00	100.00	0.00	0.00
OCT	100.00	100.00	0.00	0.00
NOV	100.00	100.00	0.00	0.00
DEC	100.00	100.00	0.00	0.00
ANNUAL	99.70	99.70	0.00	0.00

CHANGE IN MEAN STREAM FLOW (CFS)
IN THE DESCHUTES BASIN AS A RESULT OF MITIGATED GROUNDWATER USE

Effective Date: 9/30/2017

Metolius River at Lake Billy Chinook

Month	Base Line cfs	Mitigated cfs	Change in cfs cfs	Percent Change %
JAN	1510.0	1510.0	-0.044	0.00
FEB	1560.0	1560.0	-0.044	0.00
MAR	1560.0	1560.0	-0.044	0.00
APR	1520.0	1520.0	-0.044	0.00
MAY	1560.0	1560.0	0.056	0.00
JUN	1590.0	1590.0	0.056	0.00
JUL	1490.0	1490.0	0.056	0.00
AUG	1400.0	1400.0	0.056	0.00
SEP	1350.0	1350.0	0.006	0.00
OCT	1330.0	1330.0	-0.044	0.00
NOV	1370.0	1370.0	-0.044	0.00
DEC	1450.0	1450.0	-0.044	0.00
ANNUAL	1470.0	1470.0	-0.006	0.00

CHANGE IN PERCENT OF TIME INSTREAM REQUIREMENTS ARE MET
IN THE DESCHUTES BASIN AS A RESULT OF MITIGATED GROUNDWATER USE

Effective Date: 9/30/2017

Deschutes River at Lake Billy Chinook

Month	Base Line %	Mitigated %	Change in Percentage %	Percent Change %
JAN	100.00	100.00	0.00	0.00
FEB	100.00	100.00	0.00	0.00
MAR	100.00	100.00	0.00	0.00
APR	97.10	99.90	2.78	2.78
MAY	100.00	100.00	0.00	0.00
JUN	100.00	100.00	0.00	0.00
JUL	100.00	100.00	0.00	0.00
AUG	100.00	100.00	0.00	0.00
SEP	100.00	100.00	0.00	0.00
OCT	94.40	99.10	4.73	4.77
NOV	100.00	100.00	0.00	0.00
DEC	100.00	100.00	0.00	0.00
ANNUAL	99.30	99.90	0.63	0.63

CHANGE IN MEAN STREAM FLOW (CFS)
IN THE DESCHUTES BASIN AS A RESULT OF MITIGATED GROUNDWATER USE

Effective Date: 9/30/2017

Deschutes River at Lake Billy Chinook

Month	Base Line cfs	Mitigated cfs	Change in cfs cfs	Percent Change %
JAN	1300.0	1290.0	-9.67	-0.75
FEB	1320.0	1310.0	-9.67	-0.74
MAR	1300.0	1290.0	-9.52	-0.74
APR	843.0	857.0	13.8	1.61
MAY	552.0	584.0	31.5	5.39
JUN	606.0	649.0	42.3	6.52
JUL	550.0	593.0	43.6	7.35
AUG	519.0	561.0	42.0	7.49
SEP	537.0	569.0	31.4	5.52
OCT	725.0	739.0	13.8	1.86
NOV	1130.0	1120.0	-9.67	-0.87
DEC	1220.0	1210.0	-9.67	-0.80
ANNUAL	881.0	895.0	14.3	1.60

CHANGE IN PERCENT OF TIME INSTREAM REQUIREMENTS ARE MET
IN THE DESCHUTES BASIN AS A RESULT OF MITIGATED GROUNDWATER USE

Effective Date: 9/30/2017

Deschutes River at Lower Bridge

Month	Base Line %	Mitigated %	Change in Percentage %	Percent Change %
JAN	60.50	58.80	-1.72	-2.93
FEB	63.80	62.20	-1.53	-2.47
MAR	68.30	67.70	-0.54	-0.79
APR	23.60	24.30	0.78	3.20
MAY	1.29	1.40	0.11	7.69
JUN	2.11	3.22	1.11	34.50
JUL	0.11	0.64	0.54	83.30
AUG	0.86	1.40	0.54	38.50
SEP	3.67	4.11	0.44	10.80
OCT	13.00	14.10	1.08	7.63
NOV	52.20	50.60	-1.67	-3.30
DEC	56.30	54.60	-1.72	-3.15
ANNUAL	28.60	28.40	-0.21	-0.74

CHANGE IN MEAN STREAM FLOW (CFS)
IN THE DESCHUTES BASIN AS A RESULT OF MITIGATED GROUNDWATER USE

Effective Date: 9/30/2017

Deschutes River at Lower Bridge

Month	Base Line cfs	Mitigated cfs	Change in cfs cfs	Percent Change %
JAN	683.0	680.0	-2.73	-0.40
FEB	705.0	702.0	-2.73	-0.39
MAR	714.0	711.0	-2.73	-0.38
APR	299.0	315.0	16.4	5.22
MAY	51.2	84.6	33.4	39.50
JUN	50.5	94.2	43.7	46.40
JUL	42.6	88.9	46.4	52.10
AUG	46.2	91.9	45.8	49.80
SEP	61.0	96.4	35.4	36.70
OCT	222.0	241.0	19.1	7.94
NOV	551.0	548.0	-2.73	-0.50
DEC	614.0	611.0	-2.73	-0.45
ANNUAL	335.0	354.0	19.0	5.37

CHANGE IN PERCENT OF TIME INSTREAM REQUIREMENTS ARE MET
IN THE DESCHUTES BASIN AS A RESULT OF MITIGATED GROUNDWATER USE

Effective Date: 9/30/2017

Deschutes River above Diversion Dam at Bend

Month	Base Line %	Mitigated %	Change in Percentage %	Percent Change %
JAN	37.30	37.10	-0.22	-0.58
FEB	40.00	39.30	-0.71	-1.80
MAR	42.90	42.20	-0.75	-1.79
APR	73.20	73.20	0.00	0.00
MAY	97.00	97.00	0.00	0.00
JUN	100.00	100.00	0.00	0.00
JUL	100.00	100.00	0.00	0.00
AUG	100.00	100.00	0.00	0.00
SEP	97.00	97.40	0.44	0.46
OCT	54.60	55.20	0.54	0.98
NOV	29.00	28.70	-0.33	-1.16
DEC	35.70	35.40	-0.32	-0.91
ANNUAL	67.40	67.20	-0.11	-0.16

CHANGE IN MEAN STREAM FLOW (CFS)
IN THE DESCHUTES BASIN AS A RESULT OF MITIGATED GROUNDWATER USE

Effective Date: 9/30/2017

Deschutes River above Diversion Dam at Bend

Month	Base Line cfs	Mitigated cfs	Change in cfs cfs	Percent Change %
JAN	712.0	710.0	-2.70	-0.38
FEB	738.0	735.0	-2.70	-0.37
MAR	781.0	778.0	-2.70	-0.35
APR	877.0	876.0	-0.274	-0.03
MAY	1180.0	1180.0	1.63	0.14
JUN	1360.0	1360.0	2.96	0.22
JUL	1440.0	1440.0	5.73	0.40
AUG	1290.0	1290.0	5.18	0.40
SEP	1090.0	1090.0	4.04	0.37
OCT	721.0	724.0	2.84	0.39
NOV	590.0	587.0	-2.70	-0.46
DEC	650.0	647.0	-2.70	-0.42
ANNUAL	953.0	954.0	0.742	0.08

CHANGE IN PERCENT OF TIME INSTREAM REQUIREMENTS ARE MET
IN THE DESCHUTES BASIN AS A RESULT OF MITIGATED GROUNDWATER USE

Effective Date: 9/30/2017

Deschutes River at Benham Falls

Month	Base Line %	Mitigated %	Change in Percentage %	Percent Change %
JAN	43.40	42.80	-0.64	-1.51
FEB	54.50	54.00	-0.59	-1.09
MAR	32.50	31.40	-1.08	-3.42
APR	69.60	69.30	-0.22	-0.32
MAY	78.10	78.10	0.00	0.00
JUN	92.60	92.60	0.00	0.00
JUL	96.80	96.80	0.00	0.00
AUG	94.50	94.60	0.11	0.11
SEP	67.80	67.90	0.11	0.16
OCT	54.00	54.00	0.00	0.00
NOV	35.90	35.20	-0.67	-1.89
DEC	44.60	44.40	-0.22	-0.48
ANNUAL	63.70	63.50	-0.26	-0.42

CHANGE IN MEAN STREAM FLOW (CFS)
IN THE DESCHUTES BASIN AS A RESULT OF MITIGATED GROUNDWATER USE

Effective Date: 9/30/2017

Deschutes River at Benham Falls

Month	Base Line cfs	Mitigated cfs	Change in cfs cfs	Percent Change %
JAN	814.0	811.0	-2.68	-0.33
FEB	845.0	843.0	-2.68	-0.32
MAR	901.0	898.0	-2.68	-0.30
APR	1240.0	1240.0	-1.76	-0.14
MAY	1850.0	1850.0	-0.914	-0.05
JUN	2100.0	2100.0	-0.223	-0.01
JUL	2200.0	2200.0	2.55	0.12
AUG	2040.0	2040.0	1.99	0.10
SEP	1730.0	1730.0	1.51	0.09
OCT	1000.0	1010.0	1.38	0.14
NOV	685.0	682.0	-2.68	-0.39
DEC	752.0	749.0	-2.68	-0.36
ANNUAL	1350.0	1350.0	-0.722	-0.05

CHANGE IN PERCENT OF TIME INSTREAM REQUIREMENTS ARE MET
IN THE DESCHUTES BASIN AS A RESULT OF MITIGATED GROUNDWATER USE

Effective Date: 9/30/2017

Little Deschutes River at mouth

Month	Base Line %	Mitigated %	Change in Percentage %	Percent Change %
JAN	22.90	20.50	-2.37	-11.50
FEB	37.30	33.80	-3.54	-10.50
MAR	27.40	27.00	-0.43	-1.59
APR	45.20	44.90	-0.33	-0.74
MAY	55.90	55.50	-0.43	-0.77
JUN	56.60	56.60	0.00	0.00
JUL	85.10	85.70	0.64	0.75
AUG	93.90	94.20	0.32	0.34
SEP	72.00	72.60	0.56	0.77
OCT	11.60	12.50	0.86	6.90
NOV	14.70	14.00	-0.67	-4.76
DEC	20.30	19.60	-0.75	-3.85
ANNUAL	45.30	44.80	-0.49	-1.10

CHANGE IN MEAN STREAM FLOW (CFS)
IN THE DESCHUTES BASIN AS A RESULT OF MITIGATED GROUNDWATER USE

Effective Date: 9/30/2017

Little Deschutes River at mouth

Month	Base Line cfs	Mitigated cfs	Change in cfs cfs	Percent Change %
JAN	162.0	159.0	-2.65	-1.66
FEB	183.0	181.0	-2.65	-1.47
MAR	219.0	217.0	-2.65	-1.22
APR	262.0	260.0	-1.73	-0.67
MAY	329.0	328.0	-0.884	-0.27
JUN	298.0	298.0	-0.192	-0.06
JUL	230.0	233.0	2.58	1.11
AUG	200.0	202.0	2.03	1.00
SEP	144.0	145.0	1.55	1.07
OCT	76.7	78.1	1.42	1.81
NOV	108.0	106.0	-2.65	-2.51
DEC	142.0	140.0	-2.65	-1.89
ANNUAL	196.0	196.0	-0.690	-0.35

CHANGE IN PERCENT OF TIME INSTREAM REQUIREMENTS ARE MET
IN THE DESCHUTES BASIN AS A RESULT OF MITIGATED GROUNDWATER USE

Effective Date: 9/30/2017

Deschutes River above Little Deschutes River

Month	Base Line %	Mitigated %	Change in Percentage %	Percent Change %
JAN	29.70	29.70	0.00	0.00
FEB	30.10	30.10	0.00	0.00
MAR	33.50	33.50	0.00	0.00
APR	68.40	68.40	0.00	0.00
MAY	97.80	97.80	0.00	0.00
JUN	98.80	98.80	0.00	0.00
JUL	100.00	100.00	0.00	0.00
AUG	100.00	100.00	0.00	0.00
SEP	99.80	99.80	0.00	0.00
OCT	56.80	56.80	0.00	0.00
NOV	20.90	20.90	0.00	0.00
DEC	24.70	24.70	0.00	0.00
ANNUAL	63.50	63.50	0.00	0.00

CHANGE IN MEAN STREAM FLOW (CFS)
IN THE DESCHUTES BASIN AS A RESULT OF MITIGATED GROUNDWATER USE

Effective Date: 9/30/2017

Deschutes River above Little Deschutes River

Month	Base Line cfs	Mitigated cfs	Change in cfs cfs	Percent Change %
JAN	329.0	329.0	0.000	0.00
FEB	331.0	331.0	0.000	0.00
MAR	319.0	319.0	0.000	0.00
APR	654.0	654.0	0.000	0.00
MAY	1220.0	1220.0	0.000	0.00
JUN	1500.0	1500.0	0.000	0.00
JUL	1690.0	1690.0	0.000	0.00
AUG	1530.0	1530.0	0.000	0.00
SEP	1260.0	1260.0	0.000	0.00
OCT	561.0	561.0	0.000	0.00
NOV	246.0	246.0	0.000	0.00
DEC	280.0	280.0	0.000	0.00
ANNUAL	829.0	829.0	0.000	0.00