



Oregon

Kate Brown, Governor

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MEMORANDUM

TO: Water Resources Commission

FROM: Alyssa Mucken, IWRS Program Coordinator 

SUBJECT: Agenda Item N, December 8, 2017
Water Resources Commission Meeting

Willamette Basin Review Feasibility Study Update

I. Introduction

During this agenda item, Commission members will hear an update on the Willamette Basin Review Feasibility Study. Ms. Laurie Nicholas, Project Manager for the U.S. Army Corps of Engineers (Corps), will join us for this agenda item.

II. Background

The Department signed a cost-share agreement with the Corps in August 2015, initiating a three-year study to examine the feasibility of allocating storage space to meet current and future water needs in the Willamette River Basin. The Corps owns and operates 13 dams in the basin, which can legally store 1.64 million acre-feet of water. As a result, the reservoirs are capable of providing multiple benefits: flood damage reduction, navigation, hydropower, irrigation, municipal and industrial water supply, flow augmentation for pollution abatement and improved conditions for fish and wildlife, and recreation.

Although the Willamette Valley Project reservoirs were federally authorized for multiple uses, the storage water rights only allow the use of storage for irrigation and supplemental irrigation purposes. Currently, municipal and industrial users are not able to access stored water from the projects, nor are there any instream water rights associated with storage from the reservoirs. The 2008 Willamette Biological Opinion also limits the future use of storage for irrigation to 95,000 acre-feet. Contracts for irrigation currently total 75,000 acre-feet.

The Feasibility Study began in 1996, but was put on hold in 2000 to allow for consultation under the Endangered Species Act. The National Marine Fisheries Service had listed Upper Willamette River spring Chinook salmon and winter steelhead as threatened the previous year.

Between 2013 and 2015, the Department and the Corps were able to secure state and federal funding to launch the Feasibility Study, with support from basin stakeholders. The Study's objectives also support implementation of the Integrated Water Resources Strategy by improving access to built storage for meeting future instream and out-of-stream needs (Recommended Action 10.B).

III. Estimating Current and Future Demands for Stored Water

Much of 2016 was spent developing methods and estimates of current and future water demands for irrigated agriculture, municipal, and industrial water uses. The Corps hired a contractor to complete much of this work, with assistance provided by the Oregon Department of Agriculture.

During this same time frame, a group of fisheries experts and scientists from state and federal agencies initiated a process to explore whether new data or science would support a change to the current Willamette biological flow objectives. The 2008 Willamette BiOp establishes instream flow objectives at Albany and Salem during the spring and summer months and also specifies minimum flow releases from the dams on the tributaries.

Draft demand estimates were shared with stakeholders during a meeting in March 2017. The peak demand estimates for the year 2070 total 2.077 million acre-feet, exceeding the physical storage capacity of 1.59 million acre-feet. The following table is a summary of peak season demands estimated for 2070.

Peak Season Demands for 2070

Allocation Use Category	Peak Demands (acre-feet)	Portion of Total (percent)
Fish & Wildlife	1,590,000	76.5
Municipal & Industrial	159,750	7.7
Agricultural Irrigation	327,650	15.8
Total	2,077,400	100.0

IV. Draft Integrated Report and Tentatively Selected Plan

Since March, the Corps has been analyzing various allocation scenarios using a modeling tool called ResSim, while also preparing a draft feasibility report and environmental assessment (“draft integrated report”) that includes requirements under the National Environmental Policy Act.

The Corps has opened up a 45-day comment opportunity, posting the draft integrated report and associated appendices at the following website: www.nwp.usace.army.mil/willamette/basin-review/. The public notice, released November 7, 2017, and an executive summary are attached to this staff report as Attachments 1 and 2

The Corps explored four alternatives to reduce the allocations to fit within the available supply, trying a proportional reduction approach, as well as prioritizing one use type over another. Alternative D was selected, which reduces allocation volumes across all sectors and reserves some of the storage space in joint use to retain operational flexibility in lean water years. Reserving a portion of the storage in joint use would also accommodate unforeseeable changes to demand trends, as well as changing climate conditions.

Alternative D allocation volumes are described in Attachment 2 on Page viii and are shown here:

Reallocation Alternative D

Fish and Wildlife	962,800 acre-feet
Municipal and Industrial	73,300 acre-feet
Agricultural Irrigation	253,950 acre-feet
Joint Use	299,950 acre-feet

The allocation volumes shown above will need to be managed to account for dry years. The Corps and the Department, as described in the draft integrated report, are exploring three water management strategies to account for how storage will be used when the reservoirs do not fill to capacity. Three different management plan scenarios were proposed:

1. Proportionally reduce water use across all sectors;
2. Prioritize storage supply for fish & wildlife first, providing any remaining storage supply to other uses in dry years; or,
3. Prioritize the storage supply for consumptive uses first, providing any remaining storage supply to fish and wildlife purposes.

Management Option 1 (proportional reduction during dry years) was selected as the preferred option. Together, the allocation volumes in Alternative D and Management Option 1 shown above make up the “Tentatively Selected Plan” that is described throughout the draft integrated report.

The appendices provide an extensive amount of supporting technical information that has been completed since the study started in 2015. These include:

- App. A – Municipal and industrial demand estimates
- App. B – Agricultural demand estimates
- App. C – Stored water volumes required to meet the 2008 BiOp
- App. D – Hydrology dataset used for the analysis
- App. E – Baseline model documentation for the analysis
- App. F – Summary of how diversions were treated in the modeling analysis
- App. G – Summary of modeling inputs and simulations for five conditions
- App. H – Summary of how the BiOp flow objectives perform under the Tentatively Selected Plan
- App. I – Summary of impacts and benefits to reservoir-related boating and recreation
- App. J – Impacts to hydropower
- App. K – Climate change analysis

V. Next Steps

This current public comment period is the first opportunity for stakeholders and the public to weigh in on the Tentatively Selected Plan. Public comments are due Friday, December 22, 2017.

Once the public comment period closes, the Corps will need to consider comments and make revisions, where needed.

The Corps will need to make an agency decision, a major milestone in the study schedule, in early 2018. That milestone was initially scheduled for January 2018, but may need to be adjusted to allow sufficient time to review comments and work through any outstanding issues.

Consultation under the Endangered Species Act will also need to occur, and that has been scheduled to start in early February, and may last for a period of 120 days.

Several stakeholder organizations have also posed a number of implementation-related questions and concerns. The Department anticipates engaging agency partners and stakeholders in discussions throughout 2018 in hopes of developing an allocation and management plan that has broad support.

The Study is officially scheduled to be completed by August 2018. At that time, the Corps will release a final Chief's Report, signaling completion of the study.

Attachments:

1. Public Notice from November 7, 2017
2. Executive Summary of the Willamette Basin Review Feasibility Study: Draft Integrated Feasibility Report and Environmental Assessment

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US Army Corps of Engineers
BUILDING STRONG®

Corps seeks public comments on draft feasibility report and environmental assessment for Willamette Basin Review feasibility study

Posted 11/6/2017

CENWP-PM-E-18-01

Issue Date: November 7, 2017

Expiration Date: December 22, 2017

The U.S. Army Corps of Engineers, Portland District (Corps), in cooperation with the Oregon Water Resources Department (OWRD), seeks comment on its draft Integrated Feasibility Report and Environmental Assessment (EA) and draft Finding of No Significant Impacts for the Willamette Basin Review feasibility study. This study will be used to formulate a recommendation to the Chief of Engineers on the potential allocation of storage in the Corps' Willamette Valley reservoirs, referred to collectively as the Willamette Valley Project.



Currently, the space in which water is stored in these reservoirs is allocated for joint uses: flood risk management, irrigation, navigation, hydropower production, water quality, recreation, supporting fish and wildlife, and municipal and industrial water supply. This feasibility study will evaluate the potential for reallocation of storage space from these reservoirs to respond to current and future water supply needs in the Willamette River basin. Although municipal and industrial (M&I) water supply, irrigation, and supporting fish and wildlife are among the uses of stored water, no specific allocation of reservoir space was made for these uses when the dams were first authorized by Congress.

The draft Feasibility Report and EA has been prepared for the proposed Federal action in accord with Corps Planning Requirements (Planning Guidance Notebook ER 1105-2-100), the National Environmental Policy Act (NEPA), the Council on Environmental Quality's NEPA regulations (40 C.F.R. parts 1500-1508)], and Corps NEPA regulations (33 C.F.R. part 230). At the end of the public comment period, the Corps will consider all comments received or post marked by the expiration date of this public notice and make a determination on the feasibility of the proposed action and of the significance of impacts resulting from the proposed action.

Additional Information and Comments: Questions or comments regarding the draft Feasibility Report and EA should be directed to wbr@usace.army.mil, or to the address below. Mailed comments on this notice must be postmarked by the above expiration date and sent to:

District Engineer

U.S. Army Corps of Engineer District, Portland

Attn: CENWP-PM-E/David Griffith

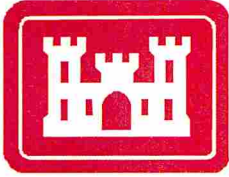
P.O. Box 2946

Portland, Oregon 97208-2946

In your response, please refer to the above public notice number (CENWP-PM-E-18-01), title (Draft Willamette Basin Review Integrated Feasibility Report and Environmental Assessment) and date. Should no response be received by the above closing date, a "no comment" response will be assumed.

Please note that the normal 30 day comment period has been extended to 45 days, in part, to account for the federal holidays during the comment period.

All comments received will become part of the administrative record and are subject to public release under the Freedom of Information Act, including any personally identifiable information such as name, phone numbers and addresses.



US Army Corps
of Engineers
Portland District

Willamette Basin Review Feasibility Study

DRAFT

Integrated Feasibility Report and Environmental Assessment

November 2017

Executive Summary

The Willamette River basin is located entirely within the state of Oregon, beginning south of Cottage Grove, and extending approximately 187 miles to the north where the Willamette River flows into the Columbia River. The basin is more than 11,200 square miles, averages 75 miles in width, and encompasses approximately 12 percent of the total area of the state (Figure ES-1). Within the watershed are most of the state's population (nearly 70 percent), larger cities, and major industries. The basin also contains some of Oregon's most productive agricultural lands and supports nationally and regionally important fish and wildlife species. Thirteen of Oregon's thirty-six counties intersect or lie within the boundary of the Willamette River basin.

Through a series of Flood Control Acts the U.S. Congress authorized the U.S. Army Corps of Engineers (Corps) to construct, operate, and maintain thirteen major dams¹ in the Willamette River basin. Collectively, these dams, reservoirs and associated infrastructure are known as the Willamette Valley Project (WVP). With a combined conservation storage capacity of approximately 1,590,000 acre-feet, the WVP is capable of providing important benefits for flood damage reduction, navigation, hydropower, irrigation, municipal and industrial water supply, flow augmentation for pollution abatement and improved conditions for fish and wildlife, and recreation.

Feasibility Study History

The Willamette Basin Review Feasibility Study began in 1996 to investigate future Willamette River basin water demand. In 1999, the U.S. Fish and Wildlife Service (USFWS) listed the bull trout as threatened under the Endangered Species Act (ESA). In 1999, the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) listed both the Upper Willamette River (UWR) spring Chinook salmon and the UWR winter-run steelhead as threatened species. The ongoing effects on these ESA-listed fish from the continued operation of the WVP were the subject of formal Section 7 consultation under the ESA. The feasibility study was put on hold in 2000 pending resolution of ESA consultation (detailed below).

The feasibility study was re-initiated in 2015 with the goal of reallocating WVP conservation storage for the benefit of ESA-listed fish (F&W), agricultural irrigation (AI), and municipal and industrial (M&I) water supply, while continuing to fulfill other project purposes. The study documented in this integrated Feasibility Report and Environmental Assessment analyzes current water uses in the basin for F&W, M&I, and AI, provides projections of water needs for these three project purposes, and develops a combined conservation storage reallocation and water management plan that would provide the most public benefit within the policies and regulations of the Corps and the state of Oregon. The non-federal sponsor for the feasibility study is the Oregon Water Resources Department (OWRD).

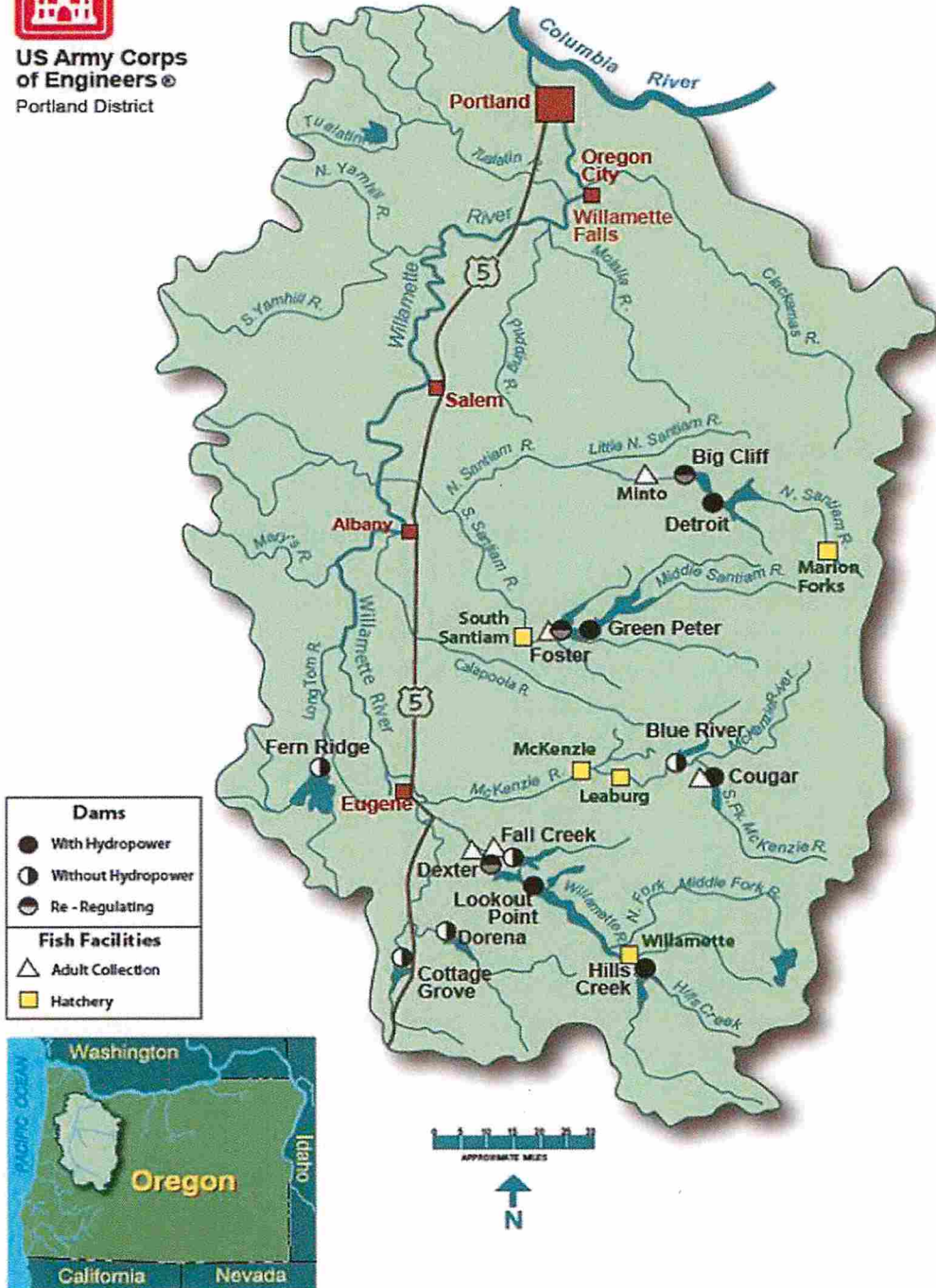
¹ Construction completion dates: Fern Ridge (1941), Cottage Grove (1942), Dorena (1949), Big Cliff (1953), Detroit (1953), Lookout Point (1954), Dexter (1954), Hills Creek (1961), Cougar (1963), Fall Creek (1966), Foster (1968), Green Peter (1968); Blue River (1969).

Figure ES-1
Willamette River Basin and Reservoir Projects

The Willamette River Basin



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Willamette Valley Project Stored Water

In the state of Oregon, water law distinguishes between diverting water for storage, and releasing water from storage for use; each requires a different water right. In Oregon, the right to store water conveys ownership of the stored water. Because national policy prohibits the Corps from holding state water rights, the U.S. Bureau of Reclamation (Reclamation) has held two Oregon water storage rights on behalf of the federal government for all WVP conservation storage since construction of the WVP was completed.

Importantly, Reclamation's state water rights that allow the federal government to store water in WVP reservoirs were designated exclusively for irrigation. Given this limitation, OWRD would not grant a secondary water right to use WVP stored water to other potential water use categories (e.g., M&I, F&W). In order for non-irrigation use categories (e.g., M&I, F&W) to realize benefits from the reallocation of WVP conservation storage, Reclamation's storage rights need to undergo a transfer review process to change the character of use to reflect uses other than irrigation. Of the 1,590,000 acre-feet of WVP conservation storage, approximately 75,000 acre-feet of stored water (roughly five percent of total WVP conservation storage) is currently contracted through Reclamation for irrigation. If Reclamation does not file a transfer application for a change in character of use, OWRD cannot grant secondary water rights for the use of WVP stored water for either F&W benefits or M&I peak season water supply.

Endangered Species Act Consultation

In 2000, the Portland District submitted a Biological Assessment (BA) to the NMFS and USFWS (i.e., "the Services") to assess the effects of ongoing operation and maintenance of the WVP on ESA-listed species. Because of their coordinated decision-making relative to WVP operation, the BA also identified Reclamation and Bonneville Power Administration (BPA) as Action Agencies. The BA evaluated the likely effects of the continued operation of the WVP on ESA-listed fish and their critical habitat. The proposed action contained in the 2000 BA was based on operation of the WVP prior to the ESA-listing of UWR spring Chinook salmon and winter-run steelhead in 1999.

The Action Agencies prepared a revision to the proposed action and a supplement to the 2000 BA, and submitted a Supplemental BA in May 2007. The Supplemental BA included a revised proposed action that would more accurately reflect then-current WVP operations, particularly mainstem and tributary flow modifications implemented after preparation of the 2000 BA. Importantly, the Supplemental BA identified new measures that the Action Agencies have the authority to implement, which include:

- Changes to WVP reservoir management implemented subsequent to the 2000 BA, including mainstem and tributary minimum flow objectives;
- Completion of the selective withdrawal tower at Cougar Dam and actions underway to address fish passage and related issues at Cougar and Blue River dams under the Willamette Temperature Control Project;
- Strategies for reform of fish hatchery operations and associated mitigation;
- Habitat restoration actions undertaken on project lands through natural resources stewardship responsibilities, as well as offsite under the Corps General Investigation Program and Continuing Authorities Program;

- Evaluation of the potential feasibility and effectiveness of proposed major structural modifications at WVP dams to address ESA issues, including improved fish passage and handling, temperature control, and hatchery facilities at WVP dams other than Blue River and Cougar;
- Strategies for integration of operational, structural, habitat, and hatchery measures across the basin that enhance their effectiveness and take advantage of synergies that may exist; and
- Update and accurately describe implementation of the ongoing research, monitoring, and evaluation program, including a comprehensive program plan that better meets ESA requirements.

The Services provided the Action Agencies with their final Biological Opinions (BiOps) in 2008, addressing the effects of WVP operation and maintenance on ESA-listed fish. The NMFS BiOp concluded that the proposed action described in the Supplemental BA caused jeopardy to the ESA-listed UWR Chinook and winter-run steelhead, and included a “*reasonable and prudent alternative*” (RPA). The USFWS BiOp concluded that the proposed action did not cause jeopardy to the ESA-listed bull trout as long as the RPA from the NMFS BiOp was implemented. Implementing the RPA would minimize possible adverse effects on ESA-listed fish and their critical habitat, and require monitoring and reporting to ensure compliance.

It was anticipated that the recommendations in the BiOp would include the use of WVP stored water to meet flow objectives for the Willamette River mainstem and its major tributaries. Since water year 2000, the Corps has adopted and implemented mainstem Willamette River flow objectives at Salem based on recommendations from NMFS and the Oregon Department of Fish and Wildlife.

From 2000 through 2003, the Corps worked with other federal and state agencies to develop a WVP flow management strategy. This strategy established a continuing framework for meeting both mainstem and tributary flow objectives that relies on monthly meetings and regular coordination teleconferences to provide updates on reservoir and flow conditions in the Willamette River and its tributaries. Implementation of the flow management strategy has resulted in the WVP being operated to meet tributary and mainstem flow objectives to the maximum extent possible for more than 15 years.

Purpose and Need for Corps Action

The purpose for Corps action is to reallocate the 1,590,000 acre-feet of WVP conservation storage from Joint Use to specific uses in order to fulfill the multi-purpose goals of the WVP. This FR/EA identifies three different needs that could utilize WVP stored water (water held in WVP conservation storage in any given year), and requires specific allocations of conservation storage to meet those needs.

1. Among the issues addressed in the RPA, the Action Agencies must coordinate with OWRD to facilitate conversion of a portion of WVP stored water to instream water rights (RPA 2.9). Although the Corps releases WVP stored water to support ESA-listed fish in tributary reaches, the Corps cannot guarantee that these flows would be maintained throughout the reach. While the Corps has been operating the WVP to meet flow objectives since the year 2000, releases of WVP stored water are not protected instream. This is because OWRD, not the Corps, has enforcement authority over water rights.

Reallocating a portion of WVP conservation storage specifically for F&W benefits would facilitate the legal protection of WVP stored water released for instream purposes, as described in RPA 2.9.

2. Of the 1,590,000 acre-feet of WVP conservation storage, approximately 75,000 acre-feet is currently under contract through Reclamation for AI. Reclamation may enter into irrigation contracts up to 95,000 acre-feet per year without the need to consult with the NMFS as established under the 2008 BiOp. WVP conservation storage in excess of 95,000 acre-feet per year would be needed to meet future demand for AI water supply. Although a specific allocation to AI is not necessary for Reclamation to continue to issue water supply contracts in excess of 95,000 acre-feet, a specific allocation would efficiently balance the reallocation of WVP conservation storage.
3. The state of Oregon has long identified the WVP as a potential source for future M&I peak season water supply needs in the basin. Despite the fact that Congress authorized the WVP for multiple purposes, including “*relatively low cost for domestic use when current facilities can no longer meet the demand,*” no portion of WVP conservation storage is specifically allocated to M&I. Without a specific quantity of WVP conservation storage allocated to M&I, Corps water supply policy does not allow water supply storage agreements to be executed.

No Action Alternative

Under the No Action Alternative (or future without-project conditions), there would be no Corps action to reallocate WVP conservation storage and no changes to the current operations to utilize WVP stored water to better meet the Congressionally-authorized multiple purposes. With respect to the No Action Alternative, the following assumptions can be made:

- The Corps would continue to operate the WVP to meet mainstem and tributary flow objectives as often as possible as described in the 2008 BiOp (NMFS, 2008);
- The Corps would continue to operate the WVP to assist Reclamation in meeting their irrigation water contract demands;
- Reclamation would continue to issue irrigation water contracts up to, and eventually exceeding, the 95,000 acre-feet per year as described in RPA 3 (NMFS, 2008). As of 2017, Reclamation had issued irrigation water supply contracts for approximately 75,000 acre-feet of water per year, leaving approximately 20,000 acre-feet per year of WVP conservation storage available for new contracts before triggering the analyses and consultation described in RPA 3. Based on the estimated rate of increase in demand for irrigation water, the need would be projected to exceed the 95,000 acre-feet per year limit after 2025;
- As described under RPA 3, Reclamation and the Corps would need to “*reevaluate the availability of water from conservation storage for the water marketing program*” when future irrigation demand exceeds 95,000 acre-feet per year. If Reclamation proposed to issue additional contracts above 95,000 acre-feet per year, re-initiation of ESA consultation would be necessary. Assuming demand for irrigation materializes as projected in this analysis, the consultation would be expected to occur in the early 2020s. It is noteworthy that beyond the required consultation described in RPA 3, there are no

other institutional barriers to restrict Reclamation from issuing irrigation water contracts in excess of 95,000 acre-feet per year in the future;

- Without a reallocation of WVP conservation storage, Reclamation would not apply to OWRD for a change in character of use for their storage rights in order to match a proposed reallocation of WVP conservation storage for uses other than irrigation;
- Without a change in character of use for Reclamation’s storage rights, a portion of WVP conservation storage would not be specifically allocated for F&W benefits. OWRD would not issue instream water rights for the use of WVP stored water as described in the 2008 BiOp (RPA 2.9). Thus, the Corps would not be able to facilitate OWRD’s conversion of WVP stored water releases for the benefit of ESA-listed fish to instream water rights as described in RPA 2.9;
- Without instream water rights for WVP stored water releases intended to benefit ESA-listed fish, releases would continue to be unprotected and continue to be available for use by existing water right holders per Oregon water law; and
- Without a change in character of use for Reclamation’s storage rights, future M&I peak season demands would be met through measures that do not include access to WVP stored water.

WVP Conservation Storage Reallocation Alternatives

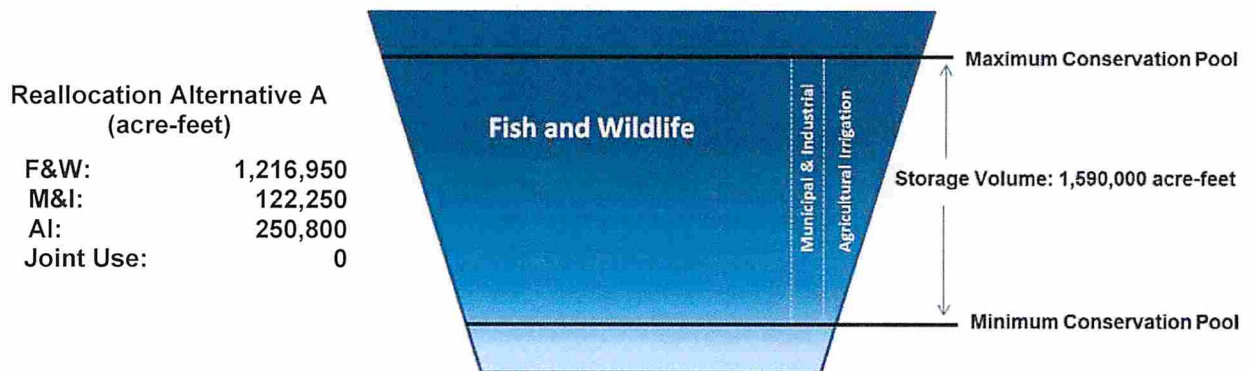
Table ES-1 shows peak demands for each of the three use categories. As shown in the table, the sum of the peak season demands (2,077,400 acre-feet) is greater than the amount of **total** WVP conservation storage (1,590,000 acre-feet). Therefore, a reallocation of WVP conservation storage for all uses at the volumes shown in Table ES-1 is infeasible. Nevertheless, peak season demands were used to develop four reallocation alternatives that would not exceed WVP conservation storage.

**Table ES-1
Peak Season Demands for WVP Stored Water
M&I and AI Stated at Year 2070 Levels**

Allocation Use Category	Peak Demands (acre-feet)	Portion of Total (percent)
Fish & Wildlife	1,590,000	76.5
Municipal & Industrial	159,750	7.7
Agricultural Irrigation	327,650	15.8
Total	2,077,400	100.0

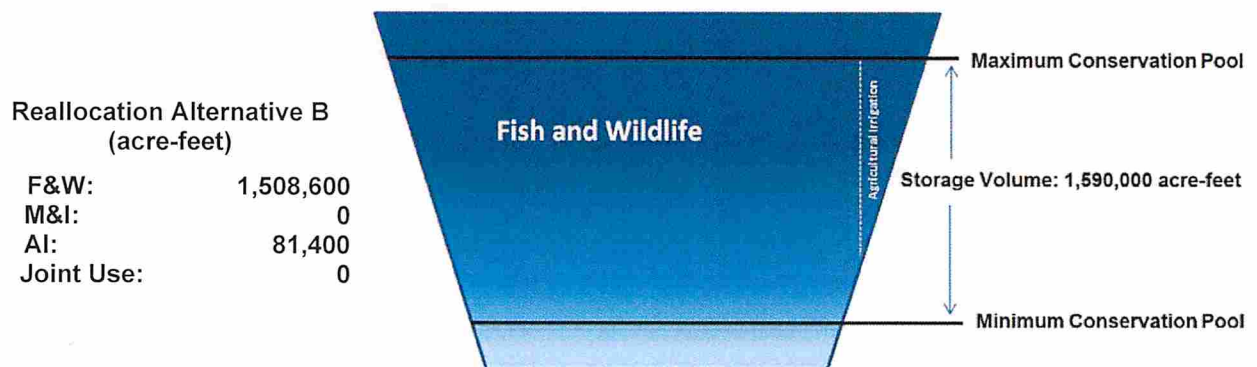
**Reallocation Alternative A:
Proportionate Reduction in Storage for all Use Categories**

Under Reallocation Alternative A, each of the three allocation categories is reduced proportionately from those shown in Table ES-1. Since 1,590,000 acre-feet equals 76.5 percent of 2,077,400 acre-feet (total peak season demand for all three use categories), the reallocation of conservation storage for each use category would proportionally reduced to 76.5 percent of peak season demand (2070 peak season demand levels for M&I and AI). The resulting allocations are shown below with no storage remaining in Joint Use.



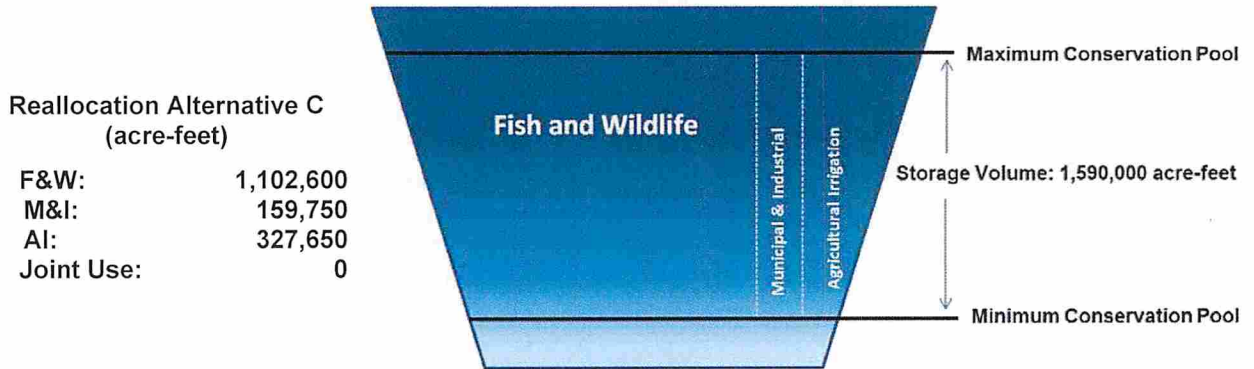
**Reallocation Alternative B:
Prioritize Fish and Wildlife Storage at Peak Level**

Under Reallocation Alternative B, 1,508,600 acre-feet of conservation storage would be allocated to F&W, with 81,400 acre-feet remaining for allocation to AI. While the F&W peak demand is the full 1,590,000 acre-feet of WVP conservation storage, an allocation of 81,400 acre-feet for AI must be made to accommodate the volume of Reclamation contracts expected to be in place by Year 2020 (the beginning of the period of analysis) in order for the reallocation alternative to be institutionally feasible as Reclamation cannot be precluded from fulfilling its expected contract obligations. Under this reallocation alternative there would be no allocation to M&I. The resulting allocations are shown below with no storage remaining in Joint Use.



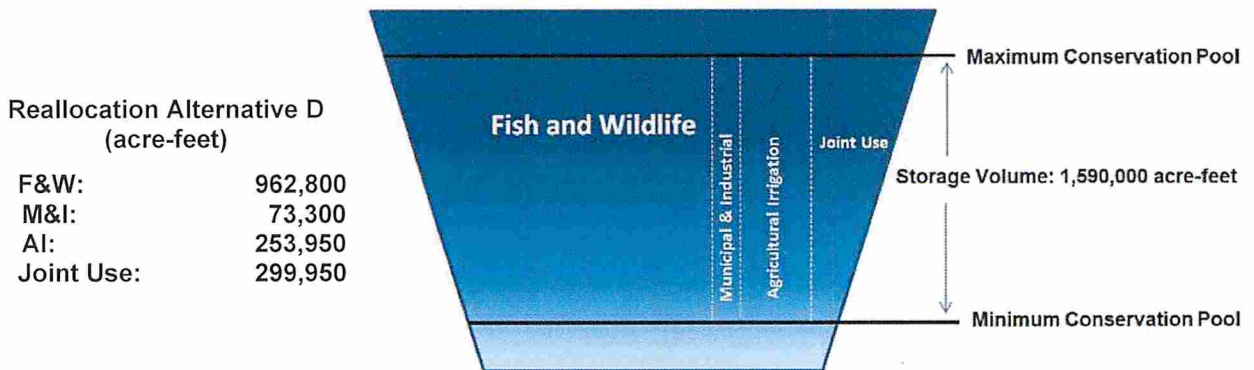
**Reallocation Alternative C:
Prioritize M&I and AI Storage at 2070 Peak Season Demand Levels**

Under Reallocation Alternative C, M&I would be allocated 159,750 acre-feet of conservation storage, and 327,650 acre-feet of conservation storage would be allocated to AI. The remaining 1,102,600 acre-feet of conservation storage would be allocated to F&W. The resulting allocations are shown below with no storage remaining in Joint Use.



**Reallocation Alternative D:
Reallocation at Reduced Peak Season Demand Levels with Joint Use Flexibility**

Reallocation Alternative D reflects an approach where a reduced volume of conservation storage is allocated to each use category and a substantial share of conservation storage remains allocated to Joint Use. Allocations by use category for this alternative are shown below.



As shown above, 299,950 acre-feet of conservation storage would remain allocated to Joint Use to provide future flexibility, as all use categories could claim Joint Use storage to accommodate future needs as their peak season demands for stored water materialize. Reserving a portion of storage in Joint Use could accommodate unforeseeable changes to demand trends for WVP stored water. For example, with 299,950 acre-feet of conservation storage remaining allocated to

Joint Use, the Corps would have additional flexibility to meet the demands under changing climate conditions.

Selection of Reallocation Alternative D

As detailed in Section 5, Reallocation Alternatives A, B and C were eliminated from consideration since they do not provide flexibility for future use, demand changes, and changes to reservoir operations related to BiOp implementation. Reallocation Alternative D provides the most flexibility to adapt to changing future conditions and was carried forward as the selected reallocation alternative.

Alternative Water Management Plans

Development of the TSP also requires the development of water management plans for years when the WVP does not refill to 1,590,000 acre-feet of stored water. Management of stored water during years when the reservoirs do not refill has a substantial effect on the reliability of the WVP to release stored water for authorized purposes.

Three alternative water management plans were developed to describe how water shortages would be handled, and are briefly outlined below.

- Alternative Management Plan 1: All uses are reduced proportionally during years when WVP conservation storage does not fill to the volume of the allocation for F&W, M&I and AI (1,290,050 acre-feet – total uses from Reallocation Alternative D above). Under this alternative management plan, releases of WVP stored water for the three dedicated use categories would be reduced only when the Joint Use portion of WVP conservation storage does not refill, and each use would be reduced by its proportional share, relative to contracted volumes, not allocated volumes.
- Alternative Management Plan 2: Stored water for F&W would be prioritized – up to the allocated amount. Any remaining stored water would be split between M&I and AI on a basis proportional to contracted volumes, not allocated volumes.
- Alternative Management Plan 3: Stored water for M&I and AI would be prioritized, up to the contracted amounts. Any remaining stored water would be used for F&W.

Only one of the alternative management plans, Management Plan 1, would provide water for all three use categories during most dry years. The other two alternative management plans result in years where one or more use categories would not have access to stored water. In addition, the combination of Reallocation Alternative D and Alternative Management Plan 1 results in allocations being met approximately 80 percent of the time.

Tentatively Selected Plan

The Tentatively Selected Plan (TSP) is Alternative 3D1, which includes allocations for specific use categories, Reallocation Alternative D, as well as guidelines for managing stored water releases when the conservation pools do not fill to 1,590,000 acre-feet, which is Alternative Management Plan 1. The remainder of this Executive Summary focuses on impacts of the TSP relative to the No Action Alternative.

TSP Impacts to ESA-Listed Fish

The NMFS 2008 BiOp establishes mainstem minimum flow objectives on the Willamette River at Salem and Albany, and tributary minimum flow objectives on Willamette River tributaries located downstream of Big Cliff, Blue River, Cougar, Dexter, Fall Creek, Foster, and Hills Creek dams, as depicted in Tables ES-2 and ES-3 below. Mainstem flow objectives at Albany and Salem vary depending on the volume of water stored in the WVP, which defines the classification of a water year. The four classifications are Abundant, Adequate, Insufficient, and Deficit. The water year classification is then used to determine mainstem flow objectives for April through October of that year.

**Table ES-2
Mainstem BiOp Flow Objectives at Salem and Albany (cfs)**

Period	Salem Flow Objectives (cfs)			Albany Flow Objectives (cfs)		
	Abundant & Adequate	Insufficient	Deficit	Abundant & Adequate	Insufficient	Deficit
Apr 1-30	* 17,800		* 15,000	--	--	--
May 1-31	* 15,000	Salem flow objectives are linearly interpolated between Adequate and Deficit flow objectives based on mid-May system storage	* 15,000	--	--	--
Jun 1-15	* 13,000		* 11,000	† 4,500	† 4,500	† 4,000
Jun 16-30	* 8,700		* 5,500	† 4,500	† 4,500	† 4,000
Jul 1-31	† 6,000		† 5,000	† 4,500	† 4,500	† 4,000
Aug 1-15	† 6,000		† 5,000	† 5,000	† 4,500	† 4,000
Aug 16-31	† 6,500		† 5,000	† 5,000	† 4,500	† 4,000
Sep 1-30	† 7,000		† 5,000	† 5,000	† 4,500	† 4,000
Oct 1-31	† 7,000		† 5,000	† 5,000	† 4,500	† 4,000

* Seven-day moving average minimum flow

† Instantaneous minimum flow

Table ES-3
Tributary BiOp Flow Objectives Downstream of WVP Reservoirs (cfs)

Period	Big Cliff	Blue River	Cougar	Dexter	Fall Creek	Foster	Hills Creek
Apr 1-30	1500	50	300	1200	80	1500	400
May 1-15	1500	50	300	1200	80	1500	400
May 16-31	1500	50	300	1200	80	1100	400
Jun 1-30	1200	50	400	1200	80	1100	400
Jul 1-15	1200	50	300	1200	80	800	400
Jul 16-31	1000	50	300	1200	80	800	400
Aug 1-31	1000	50	300	1200	80	800	400
Sep 1-30	1500	50	300	1200	200	1500	400
Oct 1-15	1500	50	300	1200	200	1500	400
Oct 16-31	1200	50	300	1200	50	1100	400

The Willamette River basin was modeled using the Hydrologic Engineering Center (HEC) Reservoir System Simulation Program (ResSim) to assess the performance of the No Action Alternative and the TSP in meeting BiOp flow objectives. Performance of the BiOp flow objectives was evaluated for the period April 1 through October 31 in each of 80 simulated years, which provides 214 simulated days over 80 simulated years – a total of 17,120 simulated days. Metrics were developed as a means of evaluating flow objective achievement under the No Action Alternative and the TSP:

1. Flow Objective Achievement on Each Simulated Day; and
2. Percent of Flow Objective Volume of Water Met

Table ES-4 below provides a summary performance comparison of the No Action Alternative and the TSP in meeting mainstem and tributary flow objectives under expected demand conditions for WVP stored water releases and permitted M&I live flow diversions. Performance comparisons are shown for the period of record and Abundant, Adequate, Insufficient, and Deficit water year types. The table shows percentages for each, with values for the No Action Alternative provided first. For example, in a comparison of the percent of days over which the flow objective is met, performance may be indicated as 97/96, which denotes that No Action Alternative meets flow objectives 97 percent of the days, and the TSP meets flow objectives on 96 percent of the days.

Also included on the table is a graphic indicator of ✓, ⬆, or ⬇, where:

- ✓ indicates that there is no notable difference between the No Action Alternative and the TSP;
- ⬆ indicates a difference of less than two percent between the No Action Alternative and TSP performance with TSP performance superior to the No Action Alternative performance; and
- ⬇ indicates a difference of less than two percent between the No Action Alternative and TSP performance with No Action Alternative performance superior to TSP performance.

**Table ES-4:
Summary of Modeled BiOp Flow Objective Performance Comparison:
No Action/TSP Expected WVP Releases and M&I Permitted Live Flow Diversions**

	Performance Metric	All Years	Abundant 44 Yrs	Adequate 14 Yrs	Insufficient 11 Yrs	Deficit 11 Yrs
Salem	Pct Days Flow Objective Met	✓ 90/90	✓ 98/98	↑ 87/88	✓ 78/78	✓ 72/72
Mainstem Flow Objective	Pct of Flow Objective Volume Met	✓ 99/99	✓ +99/+99	✓ 99/99	✓ 97/97	✓ 95/95
Albany	Pct Days Flow Objective Met	✓ 90/90	✓ 98/98	↑ 88/91	✓ 79/79	✓ 71/71
Mainstem Flow Objective	Pct of Flow Objective Volume Met	✓ 99/99	✓ +99/+99	✓ 99/99	↓ 97/96	✓ 94/94
Big Cliff	Pct Days Flow Objective Met	↓ 98/97	✓ +99/+99	✓ +99/+99	✓ 97/97	↓ 87/86
Tributary Flow Objective	Pct of Flow Objective Volume Met	✓ 99/99	✓ +99/+99	✓ +99/+99	✓ 99/99	✓ 95/95
Blue River	Pct Days Flow Objective Met	✓ +99/+99	✓ 100/100	✓ 100/100	✓ 100/100	↓ +99/99
Tributary Flow Objective	Pct of Flow Objective Volume Met	✓ +99/+99	✓ 100/100	✓ 100/100	✓ 100/100	↓ +99/99
Cougar	Pct Days Flow Objective Met	✓ 98/98	✓ 100/100	↑ 99/+99	✓ 97/97	↓ 89/88
Tributary Flow Objective	Pct of Flow Objective Volume Met	✓ 99/99	✓ 100/100	✓ +99/+99	✓ 99/99	✓ 94/94
Dexter	Pct Days Flow Objective Met	✓ 99/99	✓ 100/100	✓ 100/100	↓ 99/98	↓ 96/95
Tributary Flow Objective	Pct of Flow Objective Volume Met	✓ +99/+99	✓ 100/100	✓ 100/100	↓ +99/99	✓ 98/98
Fall Creek	Pct Days Flow Objective Met	✓ 98/98	✓ 99/99	↓ 98/97	↓ 98/96	↓ 96/94
Tributary Flow Objective	Pct of Flow Objective Volume Met	↓ 99/98	✓ 99/99	↓ 98/97	↓ 99/97	↓ 95/93
Foster	Pct Days Flow Objective Met	✓ 92/92	✓ 97/97	✓ 94/94	↓ 82/83	✓ 77/77
Tributary Flow Objective	Pct of Flow Objective Volume Met	✓ 97/97	↓ +99/99	✓ 99/99	↓ 94/93	↓ 91/90
Hills Creek	Pct Days Flow Objective Met	↓ +99/99	✓ 100/100	✓ 100/100	✓ 99/99	↓ 99/97
Tributary Flow Objective	Pct of Flow Objective Volume Met	✓ +99/+99	✓ 100/100	✓ 100/100	↓ +99/99	↓ +99/99

✓ - No notable difference between No Action and TSP performance

↑ - Less than two percent difference between No Action and TSP performance – TSP performance superior

↓ - Less than two percent difference between No Action and TSP performance – No Action performance superior

The following observations of the TSP's performance in meeting mainstem and tributary flow objectives can be made from Table ES-4:

Salem Mainstem: Flow objectives are never met at a 100 percent level, and the TSP out-performs the No Action Alternative in adequate water type years. When compared across all years, there is no notable difference between the No Action Alternative performance and the TSP performance.

Albany Mainstem: Flow objectives are never met at a 100 percent level, and the TSP out-performs the No Action Alternative in adequate water type years. When compared across all years, there is no notable difference between the No Action Alternative performance and the TSP performance.

Big Cliff Tributary: Flow objectives are never met at a 100 percent level, and the No Action Alternative out-performs the TSP in deficit water type years. When compared across all years, the No Action Alternative out-performs the TSP in terms of the percentage of days for which BiOp flow objectives are met.

Blue River Tributary: Flow objectives are met at a 100 percent level in abundant, adequate, and insufficient water type years. No Action Alternative out-performs the TSP in deficit water type years. When compared across all years, there is no notable difference between the No Action Alternative performance and the TSP performance.

Cougar Tributary: Flow objectives are met at a 100 percent level in abundant water type years. The TSP out-performs the No Action Alternative in adequate water year types, and the No Action Alternative out-performs the TSP in deficit water year types. When compared across all years, there is no notable difference between the No Action Alternative performance and the TSP performance.

Dexter Tributary: Flow objectives are met at a 100 percent level in abundant and adequate water type years. The No Action Alternative out-performs the TSP in insufficient and deficit water year types. When compared across all years, there is no notable difference between the No Action Alternative performance and the TSP performance.

Fall Creek Tributary: Flow objectives are never met at a 100 percent level, and the No Action Alternative out-performs the TSP in adequate, insufficient, and deficit water year types. When compared across all years, the No Action Alternative out-performs the TSP in terms of the percentage BiOp flow objective volume met.

Foster Tributary: Flow objectives are never met at a 100 percent level, and the No Action Alternative out-performs the TSP in insufficient water year types. When compared across all years, there is no notable difference between the No Action Alternative performance and the TSP performance.

Hills Creek Tributary: Flow objectives are met at a 100 percent level in abundant and adequate water year types, and the No Action Alternative out-performs the TSP in deficit water year types. When compared across all years, the No Action Alternative out-performs the TSP in terms of the percentage of days for which BiOp flow objectives are met.

TSP Effects on Other Authorized Project Purposes

Flood Risk Management would remain a primary purpose for the WVP in the future. The projects would continue to be operated as they are now without changes to the conservation or flood storage seasons, or the flood control, power, conservation, and full pool elevations specified by each project's water control diagram.

Hydropower Production under the TSP would yield an increase in revenues over the No Action Alternative of \$100,000 annually.

Agricultural Irrigation under the TSP would be essentially unchanged from that described under the No Action Alternative.

Municipal and Industrial Water Supply would have access to WVP stored water to cover anticipated peak season supply deficits and, through Joint Use storage, a source for providing system redundancy. Providing an allocation for M&I use would help to fulfill intent of the language included House Doc. 531, Volume 5. Paragraph 198 (*“Ample storage in individual reservoirs, therefore, would be available at relatively low cost for domestic use when current facilities can no longer meet the demand.”*).

Reservoir and Riverine Recreation would incur minor effects under the TSP. There are expected to be no impacts to riverine recreation, because there would be no reduction in WVP stored water releases that would impair downstream recreation. Reservoir recreation under the TSP would incur an average annual decrease of \$35,500 in boating-related recreation benefits (reduction measured from the No Action Alternative).

TSP Construction-Related Impacts

There are expected to be no indirect construction-related effects (i.e., occurring later in time or removed in distance) in the near-term (less than 10 years). Near term growth in M&I peak season demand is expected to be met by entities withdrawing more water from existing infrastructure (intakes that currently draw from the Willamette River or its tributaries) and not requiring construction of new intakes for the use of WVP stored water. There are currently no proposed actions by public or private entities (e.g., M&I suppliers or agricultural irrigators) to construct water intake infrastructure that would not occur, “but for” the Corps’ decision to reallocate storage in the WVP.

Longer-term (more than 10 years) projected growth in demand could eventually require infrastructure construction. However, in the absence of proposals for development from applicants, the construction effects of new intakes and distribution infrastructure would be too speculative to allow for meaningful analysis. The temporary and permanent environmental effects from ground disturbance, installation of conveyance pipe, and construction of associated support facilities for accessing water supply for irrigation or M&I are not assessed in detail within this document because the actions are not reasonably foreseeable and in the case of irrigation, are not caused by the TSP.