



**US Army Corps  
of Engineers**®  
Portland District

**CENWP-PM-E**

**MEMORANDUM FOR THE RECORD**

**SUBJECT: RECORD OF ENVIRONMENTAL CONSIDERATION FOR ENVIRONMENTAL FLOWS UNDER  
THE SUSTAINABLE RIVERS PROJECT**

**DATE PREPARED: 2 June 2015**

**PROJECT HISTORY AND AUTHORITY**

In 2006, the U.S. Army Corps of Engineers, Portland District (Corps) entered into a partnership with The Nature Conservancy (TNC) to implement the Sustainable Rivers Project (SRP) in the Willamette Valley Basin, specifically in the Middle Fork Willamette, McKenzie, and the North and South Santiam Rivers. Nationally, the SRP aims to improve water quality, provide flood protection, and benefit wildlife and provide recreational opportunities throughout the nation's waterways. In the Willamette Valley, the Corps and TNC have worked collaboratively to manage water resources in a manner that meets human needs, while also protecting priority species, biological communities, and their habitats. In addition, the local SRP partnership has worked to identify environmentally beneficial flows for fish and wildlife and adopt flow targets into the Corps' guidance documents, the Water Control Manuals, which are used by regulators at the Corps' dams throughout the Willamette Valley. Educating regulators about the beneficial effects of flows helps to more-effectively operate the dams and reservoirs to benefit fish and wildlife while simultaneously meeting the Corps' mission(s) to minimize downstream flood risk.

The Corps' authorization, construction, and management of the Willamette Valley dams are governed in part by the Flood Control Acts of 1938.<sup>1</sup> These Acts established and authorized a basin-wide flood control and multi-purpose water development and management plan for the Columbia River Basin, which encompasses the Willamette River basin. The Flood Control Acts of 1950 and 1960 expanded the authorization to construct additional dams and complete what is now referred to as the Willamette Valley Project, a collective system of 13 dams and reservoirs throughout the Willamette Basin. The Willamette Valley Project, as described in House Document 531, dated October 1, 1948, was authorized for the primary purpose of controlling floods and drainage issues in the Willamette Valley during the flood season. After the flood season, the dams are authorized to store and release water for secondary purposes, including navigation, hydropower generation, irrigation, water supply, recreation, and fish and wildlife habitat throughout the basin. Section 306 of the Water Resources Development Act of 1990 added environmental protection as "one of the primary missions of the Corps" in operating and maintaining water resources projects.

The Corps' dams in the Willamette Valley are operated as a coordinated system to meet flow targets for the mainstem Willamette River at Albany and Salem. The Corps has a high degree of operational flexibility among the 13 projects in determining how to meet the authorized purposes at each dam/reservoir and for the system as a whole. The well-defined limits of the flood season (November through January) and the planned use of stored water outside of the flood season allows for the impoundment of spring runoff beginning in February. The reservoirs are filled to their maximum pool elevations at the end of April and stored water is retained in the reservoirs through the summer months (May through September) for recreational purposes. Some water is released throughout the year to maintain minimum flows for downstream purposes (fish and wildlife, irrigation, and water quality, etc.).

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<sup>1</sup> Public Laws 75-761, 81-5196, and 86-645

Following Labor Day, water is released from the reservoirs during September and October to lower the reservoir to the minimum pool elevations in order to accommodate storage capacity for the winter flood season. Between November and February, the reservoirs are used primarily for flood storage.

In tandem with operating the dams for the purpose of flood risk reduction, the Corps' dams in the Willamette Valley are operated in accordance with the *Endangered Species Act Section 7(a)(2) Consultation Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the Willamette River Basin Flood Control Project* (NMFS BiOp) and *Endangered Species Act Section 7 Consultation Biological Opinion on the Continued Operation and Maintenance of the Willamette River Basin Project and Effects to Oregon Chub, Bull Trout, and Bull Trout Critical Habitat Designated Under the Endangered Species Act* (USFWS BiOp), cumulatively referred to as Willamette BiOps. The Willamette BiOps were issued in July 2008 and included flow requirements for fish, as well as a requirement to identify opportunities to improve flow conditions for ESA-listed salmonids throughout the mainstem Willamette River and its tributaries.

Reasonable and Prudent Alternative 2.7 in the Willamette BiOps requires the Corps to modify flow releases from the Corps' dams to "improve channel morphology in a manner that would create and sustain new, and improve existing, fish habitat through changes in project operations". These flow releases include bankfull flows in the fall, winter, and spring to mimic the natural hydrograph. Ecologically, seasonal flow variations are a critical factor influencing channel shape and stability, which in turn influences a suite of biological elements in an ecosystem. Historically, seasonal variations in flows were influenced by heavy precipitation in the fall and winter and the spring runoff from a melting snowpack high in the Cascade mountains. High flows resulting from these discharges functioned to scour river beds and modify channel features, flushing sediments downstream where they were deposited to create new habitats. Following construction of the dams, peak flows were moderated to increase flood protection and the loss of high seasonal flows degraded overall habitat quality throughout the Willamette Valley. Floodplain and off-channel habitats were disconnected from the mainstem river and the recruitment, movement and placement of large wood and gravel in the stream channel was functionally lost.

## **ENVIRONMENTAL FLOWS**

Reservoir releases which benefit downstream ecosystem processes are termed environmental flows, or "e-flows". E-flows refer to the full range of pulses or high flows which maintain and create aquatic and riparian habitats through ecological processes via the movement and distribution of sediments, channel-forming processes, floodplain reconnection, and access to seasonal or off-channel habitats. Flooding and bankfull flows are natural processes revitalizing aquatic, riparian and terrestrial habitats by supporting the food web, nutrient cycles and primary production. Low flows in the summer and early fall provide crucial water to support reproduction (spawning, incubation, rearing and out-migration) of native fish and wildlife, which have adapted to variable flow conditions. High flows in the winter and spring flush nutrient-rich sediments and materials from upstream sources into the lower reaches of the floodplain, increasing overall habitat quality and complexity. Minimum flow requirements maintain summer low flows to benefit fish and wildlife.

Beginning in 2008, the Corps implemented a pilot project in the Middle Fork Willamette River to evaluate e-flows and researchers at the University of Oregon monitored the corresponding physical effects. Monitoring results are summarized in a final report, *Willamette Sustainable River Project Phase 2: Development of a Monitoring Plan for Environment Flow Recommendation on the Middle Fork Willamette River, Oregon, June 22, 2013*<sup>2</sup>. The monitoring showed that e-flows resulted in changes to the

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<sup>2</sup> McDowell, Patricia F. and James Dietrich. Willamette Sustainable River Project Phase 2: Development of a Monitoring Plan for Environment Flow Recommendation on the Middle Fork Willamette River, Oregon, Final Report. June 22, 2013. University of Oregon Research Cooperative Agreement W912HZ-10-2-0044.

geomorphic character of the Middle Fork, wherein large amounts of bed material and large wood were mobilized, which aligned with the objectives of the pilot project.

Subsequent to the work in the Middle Fork, the Corps identified opportunities to implement e-flows in the McKenzie and the North and South Santiam Rivers to improve ecosystem health and resiliency by modifying the timing and magnitude of planned outflows to benefit the environment. E-flow targets were developed through a process of collecting and synthesizing relevant hydrologic and ecological information using expert knowledge to develop recommendations which could be adopted into the Corps' Water Control Manuals for implementation at each of the dams in these watersheds. The e-flow recommendations were thoroughly vetted through the local SRP team and modeled by the Corps (via a forecast uncertainty analysis) to confirm the e-flows are within the bounds of the Corps' authorities given the uncertainty of weather forecasting. In order to strategize minimum and maximum flows to benefit fish and wildlife, the Corps developed a model to evaluate e-flows in the fall (October and November), winter (November through January) and spring (March through July).

The Corps' analysis of reservoir operations across the Willamette River basin, summarized in the 2013 report *Evaluation of E-Flow Implementation and Effects in the Willamette Basin using ResSim Modeling*, evaluated the effects of increased flood risk and other potentially adverse impacts resulting from changes to operations accommodating e-flows. The model evaluated two alternatives in how the dams are operated: (1) release water in advance of a forecasted weather event to maintain storage capacity in the reservoir and provide sustained outflows during the flood season and (2) increase the stored water in the reservoirs during the flood season to provide sustained outflows throughout the flood season. Modeled e-flows were constrained by the requirement that all e-flow releases occur within the framework of the existing Water Control Manuals. Operating within this framework ensures there are no adverse impacts to the Corps' authorized purposes and no additional adverse impacts to fish and wildlife.

As summarized in the 2013 report, the "release more" scenario increased the number of e-flow events while having minimal impacts to flood risk, water quality, hydropower generation and downstream flow targets. In fact, the "release more" scenario increased flood storage availability during the flood season whereas the "store more" scenario increased flood risk by reducing storage availability during the winter months. The reservoirs are currently operated to release water in advance of a storm event to maintain storage capacity during the flood season. Unforecasted storm events can disrupt planned releases resulting in the need to release greater volumes of water over a short time period, thus increasing the potential to flood downstream reaches. If water is stored in the reservoir in advance of a storm event, an unforecasted storm can force regulators to release more water than planned, increasing the downstream flood risk. As a result, the 2013 report concluded the "release more" scenario maximized the number of practicable discharges, maintained storage capacity flood protection, and provided the greatest environmental benefit to improve ecosystem health. Furthermore, the "release more" scenario was consistent with the current water management rules and regulations in the existing Water Control Manuals.

The Corps' model also evaluated the rate at which reservoirs are evacuated to increase storage capacity to determine if implementing e-flows would exceed the existing ramp rates. The rate at which water is released from a reservoir can have substantial impacts on water quality, downstream habitat and flow conditions. If ramp rates are excessive, increased scouring and erosion may result in detrimental impacts to fish and wildlife, increasing sedimentation in sensitive habitats and degrading overall water quality. The "release more" and "store more" scenarios showed that e-flows could be implemented under normal operations without violating the existing ramp rate allowances outlined in the Water Control Manuals.

Under normal operations, the Willamette basin dams can produce excessive total dissolved gas (TDG) and implementing e-flows may increase TDG concentrations directly downstream of Corps dams. Oregon's water quality standards are described in Oregon Administrative Rules (OAR) 340, Division 41. The standards relevant to TDG are provided in OAR 340-041-0031(2), which state that concentrations of

TDG shall not exceed 110 percent of saturation “[e]xcept when stream flow exceeds the ten-year, seven-day average flood[.]” The ten-year, seven-day average flow or “7-Q-10 flow” is the average peak annual flow for seven consecutive days with a ten year recurrence interval.<sup>3</sup> Flow conditions exceeding 7-Q-10 flow conditions can occur in any given wet season (winter or spring), resulting in TDG concentrations above 110 percent saturation. In addition to degrading water quality, a high concentration of TDG has been shown to injure newly hatched fry in laboratory settings. These effects were previously consulted on in the 2008 BiOp and the 2006 Willamette TMDL.<sup>4</sup> As a result, no additional consultation is necessary and because e-flow releases will coincide with stream flows which exceed 7-Q-10 flows, implementing e-flows is compliant with water quality standards for the State of Oregon.

Opportunities for e-flow releases will be routinely evaluated and included in internal communications regarding weather and river updates. The Corps would regularly coordinate with external stakeholders, specifically the point of contact for TNC, and notify interested parties that e-flow operations are pending. Both internal and external partners would participate in monitoring downstream conditions in advance of and following an e-flow operation to identify beneficial or potentially adverse impacts.

Fluvial characteristics important to fish and wildlife include seasonal variation and the magnitude, duration, and rate of change of a flow event relative to the annual hydrograph. For example, the transition from the summer low flow season into the fall where pulse events follow the onset of the rainy season is important for many fish and aquatic organisms. The transition from fall into a more sustained bankfull paradigm during the winter is accompanied by higher spring flows which overtop banks and reconnect the river to its floodplain. The resulting e-flow recommendations consider a number of factors affecting flows and ecological benefits, including:

- duration and frequency of a flow event;
- the number of events per year;
- and the magnitude of each event.

#### **IMPLEMENTATION OF E-FLOWS**

The release of water for e-flows is dependent upon the availability of stored water (originating from rain or snowmelt) which could then be released once downstream gages have peaked following a storm event. Consequently, e-flows are not prescriptive and because they are based on hydrologic conditions, they cannot be guaranteed. The release of water is dependent upon the flood season and forecasted weather events throughout the Willamette Valley and is based on best professional judgment of individual dam operators/regulators. E-flow releases are intended (and required) to operate below the flood stage and within bankfull constraints. Some naturally occurring high flow events exceed the flood stage and these instances are not planned as part of the e-flow operations. Errors and uncertainty in weather forecasts can

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<sup>3</sup> The recurrence interval represents the statistical probability that a given flow event will occur in any given year, and it can be calculated as the inverse of the expected number of occurrences. For example, a 2 year flow event has a 1 in 2 chance of occurring (or 50% probability) in any given year; a 10 year flow event has 10% chance of occurring and a 100 year flow event has a 1% probability of occurring in any one year. The recurrence interval does not imply that a 10 year flow event will occur regularly or only once every 10 years, but rather the probability of recurrence is 10%.

<sup>4</sup> The total maximum daily load is the maximum amount of a pollutant that a waterbody can receive from both point and non-point sources and still meet water quality standards. Where TMDLs are developed, there is also an allocation of load among various entities contributing that pollutant to the waterbody.

In 2006, the Oregon Department of Environmental Quality released a TMDL for the Willamette basin, developed under Section 303(d) of the Clean Water Act, and was approved for implementation by the U.S. Environmental Protection Agency on September 29, 2006. The Willamette TMDL set pollutant limits in the Willamette River and many of its major tributary sub-basins and watersheds.

result in unintentional downstream flooding when a storm event overlaps with a large release of water to support e-flows. It should be noted that the modeled e-flow operations did not result in a greater frequency of exceeding flood stage relative to current operations.

The recommended e-flows for each river system are presented in Tables 1 – 3. Water management regulators have flexibility when operating under the Water Control Manuals, and the recommended e-flows are also flexible and listed as the minimum and maximum flows which should be targeted to achieve the desired environmental benefits while minimizing adverse effects. In addition, the recommended e-flows are presented in a manner where the magnitude and duration of an event varies by season. It is recommended that winter flows be higher than spring flows, and within each season, some flows of higher magnitude are shorter in duration than lower flows of longer duration. Overall the e-flow benefits expected from the recommended e-flow operations increase number of winter events compared to spring events, which are expected to be minimally impacted.

**Table 1. Middle Fork Willamette at Jasper, Maximum Flow and Duration E-Flow Objectives below Projects**

<b>Middle Fork Willamette River at Jasper USGS 14152000</b>		
<b>Winter E-Flow Target 1</b>		
<b>(15-Nov through 15-Feb)</b>		<b>Operational Considerations</b>
Flow Above (cfs)	17,000	Releases from Fall Creek and Dexter may be combined to achieve these flows at Jasper.
Duration (days)	1	
<b>Winter E-Flow Target 2:</b>		
Min Flow (cfs)	15,000	
Max Flow (cfs)	17,000	
Duration (days)	3	
<b>Winter E-Flow Target 3:</b>		
Min Flow (cfs)	12,000	
Max Flow (cfs)	15,000	
Duration (days)	4	
<b>Spring E-Flow Target A</b>		
<b>(15-Mar through 30 June)</b>		<b>Operational Considerations</b>
Flow Above (cfs)	15,000	Releases from Fall Creek and Dexter may be combined to achieve these flows at Jasper.
Duration (days)	1	
<b>Spring E-Flow Target B</b>		
Min Flow (cfs)	12,000	
Max Flow (cfs)	15,000	
Duration (days)	3	
<b>Spring E-Flow Target C</b>		
Min Flow (cfs)	10,000	
Max Flow (cfs)	12,000	
Duration (days)	4	

**Table 2. South Fork McKenzie at Cougar Dam, Maximum Flow and Duration E-Flow Objectives below Projects**

South Fork McKenzie River below Cougar Dam USGS 14159500		
<b>Winter E-Flow Target 1</b>		<p style="text-align: center;"><b>Operational Considerations</b></p> <p>Outflow above 5,000 cfs will inundate the adult fish collection facility's facility water system (FWS) intake structure which includes electrical gear and air burst system equipment.</p> <p>Outflow above 5,000 cfs may scour redds (October – January).</p>
<b>(15-Nov through 15-Feb)</b>		
Flow Above (cfs)	6,000	
Duration (days)	1	
<b>Winter E-Flow Target 2:</b>		
Min Flow (cfs)	4,000	
Max Flow (cfs)	6,000	
Duration (days)	3	
<b>Winter E-Flow Target 3:</b>		
Min Flow (cfs)	3,000	
Max Flow (cfs)	4,000	
Duration (days)	4	
<b>Spring E-Flow Target A</b>		<p style="text-align: center;"><b>Operational Considerations</b></p>
<b>(15-Mar through 30 June)</b>		
Flow Above (cfs)	4,000	
Duration (days)	1	
<b>Spring E-Flow Target B</b>		
Min Flow (cfs)	2,500	
Max Flow (cfs)	4,000	
Duration (days)	3	
<b>Spring E-Flow Target C</b>		
Min Flow (cfs)	1,500	
Max Flow (cfs)	2,500	
Duration (days)	4	

**Table 3. North Santiam at Mehama, Maximum Flow and Duration E-Flow Objectives below Projects**

North Santiam River at Mehama USGS 14183000		
<b>Winter E-Flow Target 1</b>		<p><b>Operational Considerations</b></p> <p>Fishermen’s Bend resident owners should be notified by the shift operator via phone when Big Cliff (BCL) outflow will exceed 10,000 cfs.</p> <p>E-flow operations necessitating releases at BCL greater than 10,000 cfs should not be undertaken because this MAY cause adverse flooding downstream at Fishermen’s Bend. It should be noted that BCL outflow may exceed 10,000 cfs as part of normal flood operations.</p> <p>Operational Considerations for Fishermen’s Bend may be amended pending future analyses to quantify potential impacts.</p> <p>High flows may impact the Minto Facility. Notify ODFW prior to increasing outflow.</p>
<b>(15-Nov through 15-Feb)</b>		
Flow Above (cfs)	15,000	
Duration (days)	1	
<b>Winter E-Flow Target 2:</b>		
Min Flow (cfs)	12,000	
Max Flow (cfs)	15,000	
Duration (days)	3	
<b>Winter E-Flow Target 3:</b>		
Min Flow (cfs)	10,000	
Max Flow (cfs)	12,000	
Duration (days)	4	
<b>Spring E-Flow Target A</b>		
<b>(15-Mar through 30 June)</b>		
Flow Above (cfs)	12,000	
Duration (days)	1	
<b>Spring E-Flow Target B</b>		
Min Flow (cfs)	10,000	
Max Flow (cfs)	12,000	
Duration (days)	3	
<b>Spring E-Flow Target C</b>		
Min Flow (cfs)	8,000	
Max Flow (cfs)	10,000	
Duration (days)	4	

The implementation of e-flows listed in the Tables above would follow normal coordination and communication practices, outlined in the Corps’ *Standard Procedures for Regulation of the Willamette Basin Projects*. E-flow operations would be initiated when reservoirs pools are at the minimum flood control elevation. After a storm event has passed and downstream gages have peaked and are receding below bankfull levels, regulators could increase outflows from the dams to implement e-flow operations. Regulators would use inflow data and attempt to shape the outflow to mimic the hydrograph of the storm event. It is assumed that outflows may be updated due to changing weather forecasts and river conditions. Opportunities for e-flow releases will be routinely evaluated and included in internal communications regarding weather and river updates. The Corps would regularly coordinate with external stakeholders, specifically the point of contact for TNC, and notify interested parties that e-flow operations are pending. Both internal and external partners would participate in monitoring downstream conditions in advance of and following an e-flow operation to identify beneficial or potentially adverse impacts.

All e-flow operations would operate below bankfull constraints and flood stages. The Middle Fork Willamette River (at Jasper) reaches bankfull at 20,000 cubic feet per second (cfs) and flood stage at 23,000 cfs. The McKenzie River (at Cougar) reaches bankfull at 14,500 cfs and flood stage at 35,000 cfs. Outflow above 5,000 cfs may scour redds if occurring between October and January. Because e-flows would be executed within the constraints of existing operations and maintain the minimum and maximum flow requirements for fish and wildlife, the effect is consistent with what was consulted on in the 2008 BiOp. The majority of redds found in the South Fork McKenzie River are located in off-channel habitats where less impact from e-flows and scouring is found than in the channel (personal comm. David Griffith), resulting in negligible impacts on redd survival. The North Santiam River (at Mehama) reaches bankfull at 17,000 cfs and flood stage at 32,400 cfs. Shift operators will notify Fishermen's Bend residences if outflow will exceed 10,000 cfs at Big Cliff. E-flow releases greater than 10,000 cfs at the Mehama control point should not be carried out because adverse flooding downstream at Fishermen's Bend *may* occur. This restriction pertains only to e-flow releases; outflow from Big Cliff may exceed 10,000 cfs as a part of normal flood operations and residences are currently being notified when this occurs.

Maximizing e-flows is important to effectively manage aquatic habitat and the human environment. The higher flows provide the mechanism for creating and managing fish spawning/incubation and other aquatic habitat needs over time. Salmon populations and other aquatic organisms are adapted to these variable flow conditions. Active management by fisheries and other technical experts should be part of the protocol. In summary, e-flows can be implemented under a "release more" scenario falling within the range of flood reduction operations outlined in the Water Control Manuals. The local SRP team is developing a monitoring plan for the Willamette Basin that focuses on geomorphic and vegetative responses to the implementation of e-flows. An adaptive management plan is also under development to refine e-flow targets as monitoring results inform a greater understanding of how the Corps can best meet project goals and objectives.

Contact information for Christine Budai, Portland District Project Manager, redacted.

#### **LOCATION OF THE PROPOSED ACTION**

For the purpose of this evaluation, the primary area of interest includes the Middle Fork Willamette, McKenzie, and Santiam Rivers in the southern portion of the Willamette River valley (see Figure 1). The Middle Fork Willamette River drains an area approximately 1,185 square miles, with elevations ranging between 700 and 8,800 feet and an average annual precipitation of 60 inches per year. The Corps maintains and operates four dams and reservoirs on the Middle Fork: Hills Creek, Lookout Point, Dexter (re-regulating), and Fall Creek. The McKenzie River drains an area approximately 1,300 square miles, with elevations ranging between 1,100 and 6,650 feet and an average annual precipitation of 70 inches. The Corps maintains and operates two dams on the McKenzie: Blue River and Cougar. The North, South and mainstem Santiam Rivers drain a collective area of approximately 1,830 square miles, with elevations ranging between 200 and 5,100 feet.

The U.S. Geological Survey uses a hierarchical system of hydrologic unit codes (HUC) to categorize and delineate regions, sub-regions, basins, sub-basins, watersheds and sub-watersheds. The 4<sup>th</sup> HUC (watershed) for the Middle Fork Willamette, McKenzie and the North and South Santiam rivers are #17090001, #17090004, #17090005 and #17090006 respectively.



resources include: soils; groundwater; water quality (including temperature and turbidity); air quality; fish, wildlife and plants; cultural or historic resources.

The Corps' 1980 Environmental Impact Statement (EIS), *An Environmental Impact Statement on Operations and Maintenance of the Willamette Reservoir System, Final Edition* includes a discussion of the anticipated effects from operating and maintaining the reservoir system according to the Water Control Manuals, which are the guidance documents used for the current operations and maintenance actions throughout the basin. The EIS analyzed the environmental effects of the current operations on the project purposes, including flood control, irrigation, navigation, hydropower, fish and wildlife habitat, and recreational opportunities. The effects were evaluated relative to hydrology (the release and storage of water during the flood season); urban and rural areas and associated land uses; aquatic, riparian, and terrestrial vegetation; fish and wildlife habitats; local and regional economics; cultural resources; and water quality (specifically turbidity, temperature, nutrient load, and contaminants).

The Corps' 1980 EIS summarized that operation of the Willamette Valley Project resulted in both direct and indirect positive and adverse impacts on the environment, including the conversion of aquatic and riparian habitats into alternate land uses (agriculture, industrial and residential development). Temperature regimes below the dams degraded overall water quality and downstream reaches are sediment-starved because the dams have eliminated sediment transport. Construction and operation of the reservoirs fundamentally altered upstream riverine processes, wherein habitats were lost and seasonal pool fluctuations resulted in increased shoreline erosion. Implementation of e-flows in the Middle Fork Willamette, McKenzie, and the North and South Santiam Rivers will not result in effects which differ from those analyzed in the EIS. Instead, e-flow operations strategize the timing and magnitude of outflows under current operations to maximize environmental benefits across the Willamette River basin to improve overall ecosystem health.

### ENVIRONMENTAL COMPLIANCE

The following discussions demonstrate compliance with environmental laws for all operation and maintenance activities at Corps Civil Works projects, associated lands, and out-grants.

**National Environmental Policy Act (NEPA) of 1969:** NEPA (42 U.S.C. 4321 *et seq.*) requires federal agencies to identify significant environmental resources likely to be affected by proposed activities as well as make an assessment of the impacts to those resources and consider a full range of alternative actions. Environmental considerations are fully integrated into the decision-making process.

Finding: After review of the e-flow recommendations, and in consideration of the laws and Executive Orders described herein, I have determined that the action qualifies as a ***categorical exclusion*** as described by NEPA and 33 Code of Federal Regulations (CFR) part 230.

The applicable categorical exclusion is 33 CFR 230.9 (e), *All Operations and Maintenance grants, general plans, agreements, etc., necessary to carry out land use, development and other measures proposed in project authorization documents, project design memoranda, master plans, or reflected in the project NEPA documents.* The release and storage of water from Willamette Valley Project dams and reservoirs is authorized for multiple purposes in the authorizing documents (per House Document 531). The current operations and maintenance of the Willamette Valley Project was discussed in previous NEPA documents (the 1980 EIS) and the effects of current operations were evaluated for all project purposes. The 1980 EIS was reviewed by the public and local, state, and federal government agencies, the comments of which are summarized as the final chapter.

E-flow operations are functionally identical to the current operation of the Willamette Valley Project and fall within the existing constraints of the Water Control Manuals. The Corps' Water Control Manuals are guiding documents specifying how the dams and reservoirs are operated to

meet congressionally authorized and mandated project purposes. E-flow operations will strategize the timing and duration of winter outflows to maximize environmental benefits. The identification and adoption of e-flow targets (see Table 1) into the Water Control Manuals allows water management regulators the operational flexibility to meet all project purposes. For these reasons, the adoption of e-flow targets into the Water Control Manuals and implementation of e-flows is consistent with the authorized project purposes at Corps projects and the action is supported by the authorizing documents.

**Clean Water Act (CWA) of 1972:** The CWA (33 U.S.C. 1251 *et seq.*) established the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The basis of the CWA was enacted in 1948 and was called the Federal Water Pollution Control Act, but the Act was significantly reorganized and expanded in 1972. "Clean Water Act" became the Act's common name with amendments in 1977. The CWA made it unlawful to discharge any pollutant into navigable waters, unless a permit was obtained.

*Section 401(a)(2)*– Requires certification from the state that a discharge to waters of the U.S. in that state will not violate the states' water quality standards. The EPA retains jurisdiction in limited cases. The Corps seeks a state Water Quality Certification per 33 Code of Federal Regulations (CFR) 336.1 (a)(1) when its activities result in a discharge.

*Section 402(a)(1)* – Authorizes the EPA, or states to which the EPA has delegated authority, to permit the discharge of pollutants under the National Pollutant Discharge Elimination System program for all land disturbances over an acre in size.

*Section 404* – Authorizes the Secretary of the Army to permit the discharge of dredged or fill material into waters of the United States at specified disposal sites based on section 404(b)(1) guidelines. The Corps is not subject to this authorization but complies with all applicable substantive legal requirements including application of section 404(b)(1) guidelines.

Finding: The proposed implementation of e-flows will not result in a discharge dredged or fill material or pollutants into waters of the U.S. and will not violate the state's water quality standards. The Oregon Department of Environmental Quality reports water quality standards in Chapter 340, Division 41 of the OAR. As discussed above, the proposed action may result in elevated concentrations of total dissolved gases during high flow events. However, OAR-340-041-0031(2) states that total dissolved gas may exceed 110 percent saturation when stream flow exceeds the ten-year, seven-day average flood flow, which coincides with high flow events when e-flows would be implemented. Given these considerations, the proposed action is in compliance with the CWA.

**Endangered Species Act (ESA) of 1973:** The ESA (16 U.S.C. 1531 *et seq.*) was enacted to protect and conserve endangered and threatened species and critical habitat. Requirements established in 16 U.S.C. 1531 ensure activities authorized, funded, and carried out by federal agencies are not likely to jeopardize the continued existence of any listed species or result in adverse impacts to designated critical habitat of a listed species. The U.S. Fish & Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) share responsibility for the administration of the ESA.

The following species and critical habitats are known to occur, or may occur, across the project area in the Middle Fork Willamette, McKenzie, and the North and South Santiam River watersheds, which fall within Marion, Linn, and Lane counties, Oregon:

***National Marine Fisheries Service (NMFS)*<sup>5</sup>:**

The Corps has previously consulted with the NMFS between 2000 and 2008 on the continued operation of the Willamette Valley Project, wherein the effects to numerous species were analyzed

<sup>5</sup> <http://www.nmfs.noaa.gov/gis/data/critical.htm#nw>; <http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm>

and determined the proposed action **may affect and would likely adversely affect** species or their designated critical habitats. The NMFS' biological opinion, *Endangered Species Act Section 7(a)(2) Consultation Biological Opinion and Magnuson-Stevens Fisheries Conservation and Management Act Essential Fish Habitat Consultation for the Willamette River Basin Flood Control Project* was issued in July 2008, concluding the proposed action would jeopardize the continued existence of several salmonids listed as threatened or endangered under the Endangered Species Act (ESA) of 1973, as amended (16 USC §1531 *et seq.*) in the Willamette River basin, including:

- Upper Willamette River Chinook salmon (*Oncorhynchus tshawytscha*)
- Upper Willamette River steelhead (*O. mykiss*)

Consequently, NMFS' 2008 biological opinion included a Reasonable and Prudent Alternative (RPA) measure which requires the Corps to implement e-flows (via RPA 2.7), among a suite of other actions, to recover salmonid populations and restore critical habitat throughout the basin.

NMFS Species Finding:

As discussed above, implementing e-flows in the Middle Fork Willamette, McKenzie, and the North and South Santiam Rivers will have immeasurable impacts above the existing conditions in these watersheds. The implementation of e-flows will not alter or change the physical, chemical, or biological conditions of the river(s) or watershed(s), resulting in no effects to Chinook or steelhead, or their habitats. E-flows will have no measurable impacts on the parameters associated with water quality (temperature, pH, dissolved oxygen, turbidity, etc.) in the reservoirs or the rivers downstream of the dams. The overall release of water relative to the magnitude, timing, and duration of outflows will be optimized to mimic the natural hydrograph and natural storm events. The Corps' operations at dams and reservoirs throughout the basin will not change from existing operations.

For these reasons, e-flow operations in the Willamette River basin will continue to meet minimum and maximum flow requirements for fish and wildlife. E-flows will therefore have *no effect* greater than what was previously consulted on during the 2008 consultation process for ESA-listed species under NMFS' jurisdiction, namely Upper Willamette River Chinook salmon and steelhead.

U.S. Fish and Wildlife Service (USFWS)<sup>6</sup>:

The Corps has previously consulted with the USFWS between 2000 and 2008 on the continued operation of the Willamette Valley Project, wherein effects to numerous species under the jurisdiction of the USFWS were analyzed. In the USFWS' 2008 biological opinion, *Biological Opinion on the Continued Operations and Maintenance of the Willamette River Basin Project and Effects to Oregon Chub, Bull Trout and Bull Trout Critical Habitat Designated Under the Endangered Species Act*, the USFWS concurred with the Corps' determinations that the continued operation of the dams and reservoirs **may affect but is not likely to adversely affect** the following species, or their designated critical habitats:

- Northern spotted owl (*Strix occidentalis caurina*)
- Fender's blue butterfly (*Icaricia icarioides fenderii*)
- Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*)
- Bradshaw's lomatium (*Lomatium bradshawii*)
- Willamette daisy (*Erigeron decumbens* var. *decumbens*)
- Nelson's checkermallow (*Sidalcea nelsoniana*)
- Water howellia (*Howellia aquatilis*)
- Columbian white-tailed deer (*Odocoileus virginianus leucurus*)

<sup>6</sup> <http://www.fws.gov/oregonfwo/Species/Lists/Documents/County/LANE%20COUNTY.pdf>

Species present in the action area which are *likely to be adversely affected* by the Corps continued operation of the Willamette Valley Project, for which the Corps previously consulted the USFWS during the 2000-2008 consultation process include:

- Oregon chub (*Oregonichthys crameri*)
- Bull trout (*Salvelinus confluentus*)

Other species which may be present in the action area, but which the continued operation of the dams and reservoirs would have *no effect*, including:

- Marbled murrelet (*Brachyramphus marmoratus*)
- Streaked horned lark (*Eremophila alpestris strigata*)

USFWS Species Finding:

While suitable habitat for the northern spotted owl is found adjacent to many of the reservoirs in the Willamette River basin and owls are known to occur in the area, Corps lands are managed to protect the species by avoiding and minimizing potential disturbance. Effects to spotted owls from the operation and maintenance of the dams and other hydrological elements of the Willamette Valley Project were expected to be insignificant and discountable, as the species is not dependent upon, or require, aquatic, wetland, or riparian habitats. Similarly, the Corps also determined that potentially adverse effects to one species of butterfly and five plant species resulting from the current operations of the Willamette Valley Project were unlikely or discountable, as management of the dams and reservoirs results in discountable effects to the terrestrial prairie habitats occupied by these species.

According to the USFWS BiOp, average monthly flows from the Willamette River provide three to five percent of the total inflow to the Columbia River, as measured at Vancouver, Washington. Consequently, the continued operation of the Willamette Valley Project results in an insignificant effect, at most, to water levels in the lower Willamette River and therefore has no effect to Columbian white-tailed deer occupying the lower Columbia River. While streaked horned larks and marbled murrelets are known to occupy parts of the Willamette River basin, these habitats are not immediately adjacent to Corps lands. Horned larks occupy agricultural fields through the river bottom while murrelets breed in old-growth forests found in the forested headwaters. Neither species is dependent upon, or requires, aquatic, wetland, or riparian habitats; therefore, there would be no effects to horned larks or murrelets from the continued operation of the Willamette Valley Project.

Oregon chub are endemic to the Willamette River and inhabit slow-moving, backwater habitats. Current populations are limited to naturally occurring and reintroduced populations in the Santiam, McKenzie, Middle Fork Willamette, and Coast Fork Willamette Rivers. The Willamette River Recovery Unit for the Columbia River population of bull trout encompasses an area of approximately 19,312 square miles and includes the Upper Willamette River area and the Clackamas River. Currently, bull trout are only found in the upper portion of the Willamette basin, in the McKenzie and Middle Fork Willamette River basins and historically were found in the Santiam and Clackamas Rivers. The 2008 biological opinion included minimum flow requirements for fish, and the USFWS concluded that Oregon chub and bull trout populations would not be jeopardized by the continued operation of the Willamette Valley Project, provided the NMFS RPA were implemented as described in NMFS' 2008 biological opinion.

Implementing of the NMFS RPA includes e-flow operations in the Middle Fork Willamette, McKenzie, and the North and South Santiam Rivers and these actions will have immeasurable impacts above the existing conditions in these watersheds. E-flows will have no measurable impacts on habitat characteristics crucial to the species listed above. E-flow operations will optimize outflows to mimic the natural hydrograph and natural storm events and the Corps' operations at dams and reservoirs throughout the basin will not change from existing operations. For these reasons, e-flow

operations in the Willamette River basin will continue to meet minimum and maximum flow requirements for fish, wildlife, and plants. Implementing e-flows throughout the Willamette River basin will not result in effects greater than those previously evaluated and consulted on during the 2000-2008 consultation process for ESA-listed species under USFWS' jurisdiction.

ESA-Finding: Implementing e-flows in the Middle Fork Willamette, McKenzie, and the North and South Santiam Rivers will not alter current operating procedures for the Willamette Valley Project, which was previously consulted on with both the NMFS and USFWS. The proposed action will not disturb physical, chemical, or biological resources in the project area. Furthermore, minimum and maximum flows for ESA-listed fish are required components of the 2008 biological opinions from NMFS and USFWS which evaluated the continued existence and recovery of the species discussed above. As a result, the action will have *no effect* on any ESA-listed species present in the project area which were not previously evaluated during the consultation process for the continued operations and maintenance. Therefore, the proposed action is in compliance with the ESA.

**Magnuson-Stevens Fishery Conservation and Management Act (MSA) of 1976:** The MSA (U.S.C. 1801 *et seq.*) is designed to actively conserve and manage fishery resources found off the coasts of the United States to support international fishery agreements for the conservation and management of highly migratory species. The MSA established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for fisheries regulated under a federal fisheries management plan. Essential Fish Habitat is defined as "...those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Federal agencies must consult with the NMFS on all proposed actions authorized, funded or carried out by the agency which may adversely affect EFH.

Relevant fisheries in the states of Oregon and Washington include Chinook and coho salmon, coastal pelagic species and groundfish. The following types of EFH may occur at the project site:

Finding: As with the above determination for ESA, the effects of the proposed action will not affect ESA-listed fish or their designated critical habitats to an extent greater than what was previously consulted on in NMFS' 2008 biological opinion. Therefore, the action will have "*no adverse effect*" on EFH.

**National Historic Preservation Act (Section 106) (NHPA), 1966:** This Act is designed to protect and conserve cultural resources and ensure that development does not harm or degrade them. Section 106 of the NHPA requires all Federal agencies to consider the potential effects of their projects and undertakings on historic properties eligible for or currently listed on the National Register of Historic Places (National Register): <http://www.cr.nps.gov/nr/>. Historic properties are archaeological sites or historic structures or the remnants of sites or structures. To determine the potential effect of the project on known or unknown historic properties: the nature of the proposed activity and its effect on the landscape is evaluated; the likelihood that historic properties are present within a project area is assessed; an assessment is made as to whether the ground is disturbed by previous land use activities and the extent of the disturbance; and there is a review of listings of known archeological or historic site locations, including site data bases and areas previously surveyed or listings of sites on the National Register of Historic Places.

Finding: On 18 August 2014, the Portland District Archaeologist, Michael Flowers, determined that the proposed undertaking will result in a determination of "*no potential to affect*" and that Section 106 coordination with the Oregon State Historic Preservation Office (SHPO) and Native American Tribes is not required. A *Memorandum for the Record* is included as Appendix A.

A records search of the Oregon state cultural resources databases by Corps archeologists was determined unnecessary. While reservoir operations and maintenance currently have, and will continue to have, adverse effects to known and unknown cultural resources, Section 106 compliance for these standard operations are being managed through the development of a Programmatic Agreement (PA) with the SHPO. Implementation of e-flows in the Willamette River basin will not differentiate between current conditions and those being analyzed for inclusion within the proposed PA. The determination of “no potential to affect” is ultimately dependent upon the future and timely completion of the PA which takes into account the necessity for future development of Areas of Potential Effect, completion of historic property identification efforts, determinations of effect, and resolution of adverse effects at all 13 Corps managed Willamette Basin Projects.

**Wild and Scenic Rivers Act, 1968:** This Act applies only to rivers designated by Congress as “wild and scenic” in order to safeguard the special character of these rivers. Under this Act, Federal agencies may not assist the construction of a water resources project that would have a direct and adverse effect on the free-flowing, scenic, and natural values of a Federally designated wild or scenic river.

Finding: Portions of the North Fork Middle Fork Willamette River and the McKenzie River are designated as a Wild and Scenic Rivers. The McKenzie River is designated from Clear Creek to Scott Creek, not including Carmen and Trail Bridge Reservoir Dams. The North Fork Middle Fork Willamette River is designated between Waldo Lake to one mile (1.6 km) upstream from Westfir, Oregon. However, implementing e-flows in the Middle Fork Willamette and McKenzie Rivers does not involve the construction of a new water resource project and will not change how existing water resource projects in these watersheds are operated. Consequently, there will be no adverse effect on the free-flowing, scenic, and/or natural values in reaches of the North Fork Middle Fork Willamette River or McKenzie River designated as wild and scenic and the proposed action is therefore in compliance with this Act.

#### **Other Laws and Executive Orders**

*As described above, the implementation of e-flows does not differ from the current operations and maintenance of the Willamette Valley Project, the effects of which were evaluated in previous NEPA documents. E-flows operations do not involve a new water resource project, nor will they impact farmlands, cultural or natural resources (including fish and wildlife, as well as wetland and floodplain habitats). E-flow operations will not alter or degrade the physical, chemical, or biological components in the Willamette River basin, including air and water quality. No birds will be negatively impacted by e-flow releases, and no nesting habitat will be destroyed or adversely modified. The Middle Fork Willamette, McKenzie, and the North and South Santiam Rivers are outside of the coastal zone and inaccessible to marine mammals. No tribal, cultural, or historic resources, communities or environmental justice populations will be impacted by the proposed action, and no designated Superfund sites will be impacted by the implementation of e-flows in the Willamette River basin. Implementing e-flows does not change the energetic or economic performance of how the Willamette Valley Project dams are operated relative to current procedures. For these reasons, the following laws do not require further review for compliance:*

- Farmlands Protection Policy Act, 1994
- Clean Air Act, 1970
- Fish and Wildlife Coordination Act, 1958
- Coastal Zone Management Act, 1972
- Marine Protection, Research and Sanctuaries Act (Section 103), 1972
- Marine Mammal Protection Act, 1972

- Bald and Golden Eagle Protection Act, 1940
- Migratory Bird Treaty Act, 1918
- Native American Graves Protection and Repatriation Act, 1990
- Executive Order 11593, Protection and Enhancement of the Cultural Environment, May 1971
- Executive Order 11988, Flood Plain Management, 24 May 1977
- Executive Order 11990, Protection of Wetlands, 24 May 1977
- Comprehensive Environmental Response, Compensation and Liability Act, 1980
- Executive Order 12898, Environmental Justice, 11 February 1994
- Executive Order 13186, Migratory Birds, 10 January 2001
- Executive Order 13514, Federal Leadership in Environmental, Energy, and Economic Performance, 5 October 2009

Signatures redacted

Prepared by: Kris Lightner, Environmental Resource Specialist; signed 02Jun2015

Reviewed by: David Griffith, Environmental Planning Section Chief; signed 02Jun2015

Authorized by: Joyce Casey, Environmental Resources Branch Chief; signed 03Jun2015



**US Army Corps  
of Engineers** ®  
Portland District

**CENWP-PM-E**

**MEMORANDUM FOR THE RECORD**

**SUBJECT:** The Portland District Corps is proposing to implement the Sustainable Rivers Project (SRP) in the Willamette Valley Basin, specifically in the Middle Fork Willamette, McKenzie, and the North and South Santiam Rivers.

**DATE PREPARED:** 18 August 2014

1. This memorandum for record (MFR) documents why the proposed project does not have the potential to cause effects in accordance with Section 106 of the National Historic Preservation Act (NHPA). This MFR addresses the issue as indicated in 36 CFR 800.3(a)(1).
2. The U.S. Army Corps of Engineers (Corps) is requesting clearance to implement environmental flows (e-flows) in the Middle Fork Willamette, McKenzie, and the North and South Santiam Rivers. E-flows are reservoir releases which benefit downstream ecosystem processes. This includes the full range of pulses or high flows which maintain and create aquatic and riparian habitats through ecological processes via the movement and distribution of sediments, channel-forming processes, floodplain reconnection, and access to seasonal or off-channel habitats. This activity will not include overtopping of river banks or inundation of previously non-inundated land.
3. This project was reviewed by District Archeologist Michael Flowers on 18 August 2014. A records search of the Oregon state cultural resources databases by District staff archeologists was determined unnecessary. While reservoir operations and maintenance currently have, and will continue to have, adverse effects to known and unknown cultural resources, Section 106 compliance for these operations are being managed through the development of a Programmatic Agreement (PA) with the Oregon State Historic Preservation Office.

Implementation of e-flows at Willamette Basin reservoirs will not differentiate between current conditions and those being analyzed for inclusion within the proposed PA. This activity has been determined as a No Potential to Effect. However, this determination is ultimately dependent upon the future and timely completion of a PA which takes into account the necessity for future development of Areas of Potential Effect, completion of historic property identification efforts, determinations of effect, and resolution of adverse effects at all 13 Corps managed Willamette Basin Projects.

4. In the very unlikely event that prehistoric cultural resources are encountered during any aspect of the undertaking, work in that immediate area would be required to stop until the procedures outlined in 36 CFR 800.13 are complied with.

Signature redacted

Prepared by: Michael Flowers, Portland District Archeologist; signed 19Aug2014

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