January 19, 2017

Scott A. Spellmon, Brigadier General
Army Corps of Engineers
Northwestern Division
1201 NE Lloyd Blvd., Suite 400
Portland, OR 97232

Elliot E. Mainzer, Administrator
Bonneville Power Administration
PO Box 3621
Portland, OR 97232

Lorri J. Lee, Regional Director
Pacific Northwest Region
Bureau of Reclamation
1150 North Curtis Road
Boise, ID 83706

Dear Brigadier General Spellmon, Administrator Mainzer, and Regional Director Lee:

The U.S. Environmental Protection Agency has reviewed the September 30, 2016 Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) on the system operation and maintenance of fourteen Federal multiple purpose dams and related facilities located throughout the Columbia River basin. The NOI was jointly issued by the U.S. Army Corps of Engineers, Bureau of Reclamation, and the Bonneville Power Administration (collectively referred to as the Action Agencies). Our review of the NOI was conducted in accordance with our responsibilities under the National Environmental Policy Act and Section 309 of the Clean Air Act (EPA Region 10 Project Number 16-0059-COE).

The proposed EIS, referred to as the Columbia River System Operations (CRSO) EIS, will assess and update the approach for long-term system operations and configuration of federal facilities in the Columbia River basin. We commend the Action Agencies for the extensive outreach conducted during the scoping phase of this project. We encourage you to continue to engage with your many stakeholders, and we anticipate that the purpose and need statement developed to frame the analysis and alternatives will be reflective of an inclusive process.

Our attached comments detail issues we believe warrant consideration and analysis during the development of the EIS. Of importance to the EPA is the intersection between river management and water quality/aquatic habitat, particularly in the context of a changing climate. The EPA is working on projects throughout the basin, looking at various aspects of water quality and aquatic habitat, including, but not limited to, temperature, toxics reduction, cold water refugia, and reservoir dynamics affecting methylmercury concentration. We are pleased to have been invited to cooperate in the development of this DEIS, and we look forward to working with the Action Agencies on this important analysis.
We also appreciate the opportunity to provide scoping comments at this early phase in the process. Questions about our comments can be directed to me at 206-553-1841 or nogi.jill@epa.gov, or Teresa Kubo of my staff at 503-326-2859 or kubo.teresa@epa.gov.

Sincerely,

[Signature]

Jill A. Nogi, Manager
Environmental Review and Sediment Management Unit

Enclosure:

1. Detailed EPA Region 10 Scoping Comments on the September 30, 2016 Notice of Intent to prepare an Environmental Impact Statement for Columbia River System Operations

cc: CRSO EIS
    P.O. Box 2870
    Portland, OR 97208-2870
U.S. EPA Region 10 Scoping Comments on the
NOI to Prepare an EIS for Columbia River System Operations
January 19, 2017

Purpose and Need
The EIS should include a clear statement of the underlying purpose and need for the proposed project, consistent with the implementing regulations for NEPA (see 40 CFR 1502.13). In presenting the purpose and need for the project, the EIS should reflect not only the Action Agencies’ purpose, but also the broader public interest and need. We recommend this statement be framed broadly to ensure a robust analysis of alternatives.

The September 30, 2016 scoping letter on the CRSO EIS,\(^1\) states that potential alternatives will be identified to meet the Action Agencies’ authorized purposes. The public meeting materials\(^2\) define those authorized purposes as relating to operations and management; flood risk management; hydropower; irrigation; navigation; fish and wildlife; and recreation.

Because the purpose and need statement is essential to establishing a basis for the development of the range of reasonable alternatives, we recommend that the statement of purpose and need not be confined to authorized purposes. We recommend the development of a broader statement that includes needs outlined by public stakeholders and the Columbia River basin tribes. We also believe the project purpose should be informed by ongoing Columbia River Treaty negotiations. In line with those negotiations, we recommend that one of the purposes of the project be to manage the Columbia River for ecosystem-based function. We further recommend working closely with the Cooperating Agencies on the development and vetting of the broader purpose and need statement.

Water Quality
The goal of the Clean Water Act (CWA) is to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters and, where attainable, to achieve water quality that provides for the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water.\(^3\)

This provision, found at Section 101(a)(2), is sometimes referred to as the "fishable/swimmable" goal of the CWA. In order to meet this goal, states and tribes designate uses for their surface waters, criteria to protect those uses, and establish an antidegradation policy for protecting and maintaining water quality and designated uses into the future. These components of a state or tribe’s water quality program are collectively known as the surface water quality standards (WQS). Designating the uses of each water body over which the state or tribe has jurisdiction is done through promulgating regulations, and typical designated uses include water use for drinking water supply, contact recreation, and aquatic life protection, among others. Narrative provisions are developed and numeric water quality criteria are derived by the state or tribe, and approved by the EPA, in order to ensure that the beneficial uses of each water body are attained and maintained pursuant to the CWA.

The CWA requires the EPA-approved water quality standards protect aquatic life, including endangered or threatened species.\(^4\) In the context of the Columbia River System Operations EIS, the EPA is seeking a robust analysis of the potential effects of current and proposed system operation/modification on water

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\(^1\) [http://www.crso.info/Library/CRSOEISScapingLetter.pdf](http://www.crso.info/Library/CRSOEISScapingLetter.pdf)

\(^2\) [http://www.crso.info/eis.html](http://www.crso.info/eis.html)

\(^3\) CWA section 101(a)(2)

quality, including temperature; total dissolved gas; sediment quantity (considering sediment transport throughout the basin); sediment quality; and the potential for the introduction of toxics such as polychlorinated biphenyls (PCBs). Federal actions taken must not only meet the requirements of the CWA, but also the requirements of the Endangered Species Act (ESA). The EPA is aware that thirteen Columbia River Basin salmonid and steelhead population stocks are currently listed under the ESA as threatened or endangered.

**Water Temperature**

There are multiple reaches of the Columbia and Snake Rivers on the federal CWA Section 303(d) list due to water temperature exceeding state water quality standards. Water temperature significantly affects the distribution, health, and survival of native salmonids in the Columbia Basin. Because salmonids are ectothermic, their survival is dependent on external water temperatures, and they will experience adverse health effects when exposed to temperatures outside their optimal range.\(^5\) Salmonids have evolved and thrived under the water temperature patterns that historically existed (i.e., prior to significant anthropogenic impacts that altered temperature patterns) in Pacific Northwest streams and rivers. Although evidence suggests that historical water temperatures exceeded optimal conditions for salmonids at times during the summer months on some rivers, the temperature diversity in these unaltered rivers provided enough cold water during the summer to allow salmonid populations as a whole to thrive.\(^6\)

We recommend that the EIS analyze the effects of current system operation on temperature regimes, and craft alternatives that will allow for the exploration of different dam configuration and operation scenarios and their effects on water temperature in the basin. In the early 2000s, as part of the development of the Biological Opinion for the Federal Columbia River Power System, the Action Agencies, as well as EPA and a number of other federal agencies, a tribal consortium, and affected states, identified twenty potential actions to reduce temperatures. Those twenty actions, along with the Army Corps of Engineers’ description of their feasibility and status, are contained in the January 2009 Water Quality Plan issued by the Army Corps. We recommend that the EIS include a re-examination of the actions in the Water Quality Plan to identify potential actions that can reduce warm temperatures during time periods critical to fish migration.

Consistent with the Notice of Intent (NOI), as well as several of the actions contained in the Water Quality Plan, the range of alternatives should include the breaching or removal of one or more dams on the lower Snake River. In order to provide a full range of alternatives consistent with 40 CFR 1505.1(e), we recommend that one of the alternatives consider the breaching or removal of all four dams on the lower Snake River coupled with cold water releases from Dworshak Reservoir.

Within this analysis, it will be important to recognize that dams and their reservoirs can affect thermal patterns in a number of ways:

- Dams can increase maximum temperatures by holding waters in reservoirs to warm, especially in shallow areas near shore.
- Reservoirs, due to their increased volume of water, are more resistant to temperature change which results in reduced diurnal temperature variation and prolonged periods of warm water. In


this way, dams reduce temperature variation from summertime cold fronts and delay the natural cooling that takes place in the late summer-early fall, thereby harming summer and late summer-fall migration runs.

- Reservoirs inundate alluvial river segments, thereby diminishing the groundwater exchange between the river and the riverbed (i.e., hyporheic flow) that cools the river and provides cold water refugia during the summer.
- Dams can significantly reduce the river flow rate, thereby causing juvenile migrants to be exposed to high temperatures for a much longer time than they would under a natural flow regime.

Consistent with the NOI, models should be developed and deployed to estimate future Columbia and Snake River mainstem temperatures as impacted by climate change. Temperature reduction alternatives should not only be assessed relative to current temperatures, but also relative to predicted future temperatures (see climate change section below).

The EPA is committed to working closely with the Action Agencies in both selecting and analyzing alternatives to reduce water temperatures to meet water quality standards.

The EPA has also developed a methodology to identify cold-water refugia within riverine landscapes. Pursuant to a Reasonable and Prudent Alternative within the 2015 Biological Opinion on EPA’s proposed approval of certain Oregon water quality standards (including temperature), we are utilizing that methodology to characterize (1) The current spatial and temporal distribution of cold water refugia (CWR) in the Columbia River; (2) the current use of CWR by multiple runs of ESA-listed fish within the Snake and Columbia River Basin; and (3) potential locations for restoration or enhancement of CWR. Once that characterization is complete, we will assess the extent to which the narrative criterion for CWR is being met. If we conclude that the CWR criterion is not being met, we will characterize, to the maximum extent possible the extent of additional CWR needed to attain the criterion, and identify and prioritize potential actions needed to protect, restore or enhance CWR. This work will be ongoing concurrent with the development of the CRSO EIS, and we are committed to sharing information and resources that will be relevant to the development of the EIS.

Total Dissolved Gas
Oregon and Washington have listed multiple reaches of the Columbia and Snake Rivers on their federal CWA Section 303(d) lists due to total dissolved gas (TDG) levels exceeding state water quality standards. Elevated levels of TDG are primarily caused by spilling water at hydroelectric dams on the Columbia and Snake Rivers. Water plunging from a spill can entrain TDG at high levels. Oregon and Washington are currently implementing Total Maximum Daily Loads (TMDLs) to address TDG on the Columbia and Snake Rivers. Through the adaptive management process associated with those TMDLs, we are developing a better understanding of the potential tradeoffs between total dissolved gas concentrations and additional spill for fish passage. The best available science based on results from gas bubble trauma (GBT) monitoring indicates that spill levels resulting in tailrace TDG levels that are less than or equal to 120% are generally safe for juvenile salmon and steelhead, whereas there is increased incidence of GBT symptoms where TDG levels exceed 121%. The benefits of spill are related in part to decreasing salmon and steelhead exposure to adverse conditions from elevated water temperatures in the Columbia and Snake Rivers. We view spill as an important mitigation strategy where it can be safely utilized. With projected increasing temperatures due to climate change and the

7Torgersen et al. 2012. Primer for Identifying Cold-Water Refuges to Protect and Restore Thermal Diversity in Riverine Landscapes. EPA 910-C-12-001
likelihood of more low flow/high temperature years similar to 2015 in the future, we encourage the CRSO Action Agencies to carefully analyze the extent to which increased spill and other strategies can be employed to minimize risks to salmon and steelhead while maintaining water quality standards.

Specifically, we recommend the most recent information from the Comparative Survival Study (CSS) Workgroup be reviewed to assess increasing spill up to the gas caps for the lower Columbia and Snake River dams. Recent analysis by the CSS indicates significant improvement in smolt-to-adult survival may be achievable by spilling up to allowable TDG water quality standards.

**Sediment**

Sediment quantity and quality is an issue throughout the Columbia and Snake River basins. In the Snake River Basin, sediment accumulation is a pressing issue. About 80 million cubic yards of sediment has accumulated in the reservoir behind Lower Granite dam since the dam was constructed in 1974. Sediment accumulates at an average rate of approximately 2.2 million cubic yards per year. Sediment inflows into Lower Granite Reservoir have not decreased since the 1970s and based on recent sediment load measurements may be increasing in the Snake River. This sediment poses risks for navigation safety and increases the risk of overtopping the levees at Lewiston, Idaho during extreme flood events.\(^8\)

In the Lower Columbia River, the disruption in the hydrologic regime by dam operations has contributed to a loss of shallow-water habitat. Sediment transport from the interior basin to the Columbia River estuary has decreased between 60 to 70 percent. This loss of sediment influx has caused the subsidence of wetlands which changes their ecosystem service from an emergent marsh to subtidal habitat. ESA-listed salmonids rely on emergent marshes for protection from predators and large storm events, and for prey. Specifically, the loss of tidal swamps and other forested and vegetated wetlands represents a loss of habitat that juvenile ESA-listed salmonids use while in the estuary.\(^9\)

Further down the river, sediment depletion in the nearshore ocean to the north and south of the Mouth of the Columbia River has been an issue because of the construction of the dams and jetties. To the North of the Columbia River at Benson Beach, the shoreline has retreated by 600 meters (1939-2002). In more recent years (1997 to 2006) the shoreline has retreated 8 meters per year.\(^10\) As noted in a 2002 report by the Oregon Department of Geology and Mineral Industries,\(^11\) the Columbia River Littoral Cell has been extensively modified in response to the construction of dams and jetties. The dams have reduced the supply of sand to Oregon and Washington coastal beaches. In addition, the reduction in peak flows from the operation of the dams have reduced the river's ability to transport sediment out of the lower

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Due to these changes, concerns have been raised about the future viability of the coastal environment in terms of fisheries, recreation, and coastal resilience to climate change.

These concerns include:

- The nearshore and mid-shelf sand regions dissipate wave energy prior to reaching the beach. These natural buffers are eroding, due in part to the lack of sediment flowing down the Columbia River because of the dams. The loss of these nearshore features north and south of the Mouth of the Columbia River are causing increased erosion of the beaches which will affect coastal development, and the ability of coastal communities to mitigate against effects of more severe winter storms and increasing sea level rise, which are both influenced by climate change.

- Increased shoreline erosion results in loss of access to beaches for recreational fishing, surfing, wildlife viewing, etc. The loss of available beaches translates into a loss of revenue for local coastal communities.

- The potential for a breach of Clatsop Spit which would undermine the root of the South Jetty and have significant ramifications for the stability of the lower Columbia River estuary, including impacts to commercial shipping.

Sediment quality is also an issue. The 1995 Columbia River System Operation Review EIS found that chemical contaminants may have accumulated in sediments behind the dams on the Lower Snake River, including heavy metals and DDT. PCBs (see Toxics section below) are also of concern for sediment quality. PCBs have limited solubility in water, but do adhere to organic matter and sediment particles, so they have a high potential to be transported when sediment is transported (such as during storms and floods) and then accumulate in pools or reservoirs.\(^\text{13}\)

We encourage the CRSEO EIS Action Agencies to take a holistic view of the role the Columbia Basin dams play in terms of impacting sediment quality and quantity. We also encourage the Action Agencies to broadly consider recent science around dam removal regarding patterns and rates of sediment transport. Monitoring and analysis from the removals of the Marmot Dam on the Sandy River in Oregon and the Elwha and Glines Canyon dams on the Elwha River in Washington may provide helpful context and validation for modeling sediment transport under a dam removal scenario.

**Toxics**

Common toxic contaminants found in the Columbia River system include pollutants like PCBs, polycyclic aromatic hydrocarbons (PAHs), polybrominated diphenyl ethers (PBDEs, or flame retardants), DDT and other legacy pesticides, mercury, current use pesticides, pharmaceuticals and personal care products, and trace elements. These contaminants can impair water quality, affect aquatic organisms like insects and salmon and resident fish, and impair environmental and human health.

In the context of the CRSEO EIS, we would encourage the Action Agencies to consider the management risks and opportunities related to the use of oil and other lubricants within the dams. Of primary concern is the presence of PCB-laden oil within some of the dams. This oil is used for "in-water" equipment, including wicket gates for the hydropower turbines, navigation locks, and certain fishway equipment.


PCBs are problematic because they do not degrade readily or dissolve in water. Instead, they tend to accumulate in sediments and the body fat of living organisms. Over time, PCBs biomagnify up the food chain to top predators, including humans.

PCBs have been found in river water samples and in the tissue and stomach contents of juvenile salmon at sites throughout the Columbia River estuary. Exposure to PCBs can kill salmon outright. Sublethal effects include immune suppression (which increases disease-related mortality), hormone disruption, and disrupted reproduction. PCB concentrations in some juvenile salmon in the estuary are at or above the threshold level (2,400 nanograms per gram lipid) for health effects such as delayed mortality, biochemical alterations, and immune dysfunction.

Pursuant to a 2014 Settlement Agreement,¹⁴ the U.S. Army Corps of Engineers is actively working to address the presence of PCB-laden oil in eight Corps managed projects in the Columbia Basin. The CRSO EIS provides the opportunity look at the remaining projects within the basin where risk reduction measures could be taken to address the presence of PCBs.

We also note that hydroelectric dams utilize varying amounts of non-PCB turbine oil, to cool and lubricate electrical generation systems, such as Kaplan runners (turbines), wicket gates, and other equipment. Due to the large quantities of oil handled within the dams, the facilities are required to prepare and implement Spill Prevention Control and Countermeasure (SPCC) plans under EPA’s Oil Pollution Prevention regulations found at 40 CFR Part 112 (authorized under CWA Section 311(j)).

In conducting SPCC inspections at dams over the past several years, EPA has found that while there is variation among the dams in terms of SPCC compliance, most facilities are not in full compliance with SPCC requirements. Violations include inadequate SPCC plans; record keeping; and implementation of the rule requirements in the field (i.e. problems with physical measures such as secondary containment or implementing tank integrity standards).

We recognize and acknowledge that the U.S. Army Corps of Engineers has in recent years made tremendous strides toward updating several dams’ SPCC plans and equipment. We believe the CRSO EIS provides the opportunity to further these efforts to prevent oil spills. We recommend the CRSO EIS incorporate the following design criteria/BMPs related to the management of oil:

- Conduct an assessment of whether it is technically feasible to switch from using lubricants containing PCBs on “in-water” equipment, to using one or more Environmentally Acceptable Lubricants.
- Establish Oil Accountability Plans (as defined in the 2014 Settlement Agreement) at each of the dams under analysis.
- Conduct a review of all written SPCC plans and update them as appropriate.
- Conduct a review/inventory of the existing spill prevention measures and equipment, and ensure consistency with the plant’s SPCC plan. This might include looking at actual secondary containment features around tanks, oil piping runs, governors, etc.
- Analyze physical measures, procedures, and best management practices that could be implemented in the future for prevention of oil spills. Such measures might include better oil inventory tracking, and the addition of equipment upstream of dam sumps such as oil/water separators.

¹⁴ No. 2:13-md-2494-LRS
- Implement required tank integrity standard requirements for oil storage tanks.
- Emphasize the immediate repair and cleanup small oil spills as they occur.
- Foster spill prevention culture among facility employees. This would include a system-wide approach to improve coordination, education, and culture among the dams operated by the Action Agencies.

Finally, we note that data collected within the Hells Canyon Complex (HCC) hydroelectric project, which spans about 90 miles of the Snake River along the Oregon and Idaho Border, indicate elevated concentrations of mercury and methylmercury in the water column, bottom sediments, and biota.\footnote{15} As a result, Brownlee and Hells Canyon Reservoirs are listed as impaired for mercury by the State of Idaho, and the Snake River from the Oregon and Idaho border through the HCC downstream to the Oregon and Washington border is listed as impaired for mercury by the State of Oregon. As the CRSO EIS is developed, we encourage the Action Agencies to consider the extent to which inorganic and methyl mercury may be present within the planning area, and the extent to which system operations influence the methylation and/or transport of mercury (for example through seasonal stratification). The DEIS should also consider how reservoir operations might be altered to potentially reduce methylmercury production (for example through selective water withdrawal). The EPA is embarking on a project that will look at the potential to use selective water withdrawal technology as a way to help reduce methylmercury production in the HCC reservoir. We will share information with the Action Agencies as it becomes available. Finally, the DEIS should consider the potential for any mercury that has accumulated in reservoir sediments to be mobilized downstream under a dam removal scenario. The U.S. Geological Survey, in conjunction with the Idaho Power Company and the Idaho Department of Environmental Quality is actively studying mercury dynamics within the Snake River system. We encourage the Action Agencies to engage USGS on this question as the DEIS is developed.

**Aquatic resources, Wetlands and Riparian Areas**

Some alternatives analyzed under the CRSO EIS, such as those exploring dam removal, may require a CWA Section 404 permit. The CWA Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material require that impacts to aquatic resources be avoided, minimized, and mitigated, in that sequence.\footnote{16}

In order to effectively coordinate the NEPA process and the CWA Section 404 permitting process, we recommend that the EIS include information that demonstrates compliance with these Guidelines. Potential impacts or effects to fluvial processes, water quality, fisheries, wildlife, vegetation, water supplies and recreational areas should be examined for each alternative. For unavoidable impacts, compensatory mitigation should be consistent with the Compensatory Mitigation for Losses of Aquatic Resources: 2008 Final Rule.\footnote{17} The EIS should include a discussion of all mitigation options, including on-site mitigation. For unavoidable losses to aquatic resources, compensatory mitigation should be implemented in advance of the impacts to avoid temporal habitat losses.

To the extent possible, the following information from a draft mitigation plan should be included in the EIS:

- A description of the resource type and amount that will be provided, the method of compensation, and the manner in which the resource functions of the compensatory mitigation

\footnote{15}https://pubs.usgs.gov/fs/2016/3051/fs20163051.pdf
\footnote{16}40 CFR Part 230
\footnote{17}33 CFR Parts 325 and 332, and 40 CFR Part 230
project will address the needs of the ecoregion, physiographic province, or other geographic area of interest.  

- A description of the factors considered during the compensatory mitigation project site selection process.  
- A description of ecological performance standards that will be used to assess whether the project is achieving its objectives.  
- A description of parameters to be monitored in order to determine if the compensatory mitigation project is on track to meet performance standards and if adaptive management is needed.  
- Descriptions of the long-term management plan, adaptive management plan, and financial assurances.  

Socioeconomics
The Columbia Basin power system is deeply connected to the socioeconomic landscape throughout the region. The dams provide a variety of economic goods and services, including electric power, flood control, water supply (domestic and irrigation), reservoir recreation, and navigational services. They also affect riverine ecosystems and the many benefits and resources (both market and non-market) that are derived from a healthy river system. These include but are not limited to fish and wildlife habitat, river recreation, and social and cultural resource values. Since the issuance of the FEIS for the Lower Snake River Juvenile Salmon Migration Report in 2002, the question of how to effectively evaluate the costs and benefits associated with power system operation has received significant attention. In particular, effort has been devoted to establishing a framework for estimating the costs and benefits of dam removal.

As the DEIS is developed, we encourage the Action Agencies to consider this body of literature. We offer the following citations for your consideration:


18 40 CFR 230.94 (c)(2)  
19 40 CFR 230.94 (c)(3)  
20 40 CFR 230.95  
21 40 CFR 230.94 (c)(10)  
22 40 CFR 230.94 (c)(11-13)


Climate Change
The EPA notes the NOI commits to address the impacts to resources in light of anticipated climate change impacts, such as warmer water temperatures, diminished snow-pack, and altered flows. Consistent with CEQ Guidance, and the principles of NEPA, we recommend that the DEIS estimate the direct and indirect emissions caused by CRSO EIS alternatives, and consider practicable mitigation measures to reduce those emissions. There are several climate change impacts of particular concern in the Pacific Northwest including rising stream temperatures; shifts to the hydrograph and overall water supply; changes in the quantity, form, and timing of precipitation; changes to upland sources of sediment related to wildfire; changes to invasive species populations and extent; and impacts to coastal resources that should be discussed in the EIS.

The following resources should be beneficial to the assessment: Columbia River Basin Climate Impact Assessment, the SECURE Water Act Section 9503(c) - Reclamation Climate Change and Water 2016, the River Management Joint Operating Committee (RMJOC) work, Columbia Basin Climate Change Scenarios Project (CBCCSP), the Integrated Scenarios of the Future Northwest Environment, and related products.

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24 40 CFR 1502.16(h)
26 https://www.usbr.gov/climate/secure/
28 http://warm.atmos.washington.edu/2860/report/
29 http://climate.nkn.uidaho.edu/integratedScenarios/
We also recommend that the analysis include consideration of future climate scenarios, such as those provided by the National Climate Assessment (see http://nca2014.globalchange.gov/). Where projected climate changes could exacerbate environmental impacts of the project, these likely changes should be considered as part of the NEPA analysis of the impacts of the project. A recent report by the Bureau of Reclamation provides an overview of different adaptation strategies for managing water resources in response to climate change. Please note that we also offer some potential emissions reduction measures within the Air Quality section in this letter.

Air Quality
The CRSO intersects with air quality in a number of different ways. For each alternative, the CRSO EIS should consider:

- Air quality implications from power production. Each alternative will fit differently into the energy production portfolio of the Northwest. The EIS should consider the emissions associated with the various configurations, and clearly articulate assumptions about how and from where power would be sourced in the absence of hydropower production.
- Air quality implications from transportation. Some alternatives may impact how goods are moved through the Columbia Basin. The EIS should consider emissions associated with each transportation scenario, and clearly articulate assumptions about how the various types of goods would be moved through the Basin in the absence of barge transportation along the Lower Snake River.
- Air emissions associated with maintenance dredging operations at the dams.
- Air emissions associated with internal combustion engines used in conjunction with operation and maintenance of the Columbia River System projects.
- Air emissions associated with construction/deconstruction where dam breaching or removal is under analysis. This would include emissions from internal combustion engines and fugitive dust from vehicle travel and site disturbing activities; and
- Air quality implications associated with reservoir drawdown and attendant fugitive dust. Where reservoir-bottom sediment is exposed and allowed to dry, it can become a source for wind-blown dust. Trace elements may be present in the fine-grained bed sediments along the length of the reservoirs on the Lower Snake River. These could serve as sources for wind-blown dust in the event of drawdown, dam breaching, or removal. As noted above (see water quality – sediment) it will be important to understand the potential sediment constituents within these reservoirs.

The EPA supports incorporating mitigation strategies to minimize fugitive dust and toxic emissions, as well as emission controls for particulate matter (PM) and ozone precursors for construction-related activity. We recommend that best management practices, all applicable requirements under local or State rules, and the following additional measures be incorporated into the EIS, a Construction Emissions Mitigation Plan, and ultimately the Record of Decision. See EPA’s Clean Construction USA website for additional information.\footnote{http://www.epa.gov/cleanconstruction/sector-programs/construct-overview.htm}

Fugitive Dust Source Controls:
- Stabilize open storage piles and disturbed areas by covering and/or applying water or chemical/organic dust palliative where appropriate. This applies to both inactive and active sites, during workdays, weekends, holidays, and windy conditions.

- Install wind fencing, and phase grading operations, where appropriate, and operate water trucks for stabilization of surfaces under windy conditions.
- When hauling material and operating non-earthmoving equipment, prevent spillage, and limit speeds to 15 miles per hour (mph). Limit speed of earth-moving equipment to 10 mph.
- Replant any permanently exposed lakebed with native plantings. This would serve to control dust while minimizing the colonization of invasive species and restoring natural ecosystem processes.

**Mobile and Stationary Source Controls:**
- Reduce use, trips, and unnecessary idling of heavy equipment.
- Maintain and tune engines per manufacturer's specifications to perform EPA certification levels, where applicable, and to perform at verified standards applicable to retrofit technologies. Employ periodic, unscheduled inspections to limit unnecessary idling and to ensure that construction equipment is properly maintained, tuned, and modified consistent with established specifications.
- Prohibit any tampering with engines and require continuing adherence to manufacturer's recommendations.
- If practicable, lease new, clean equipment meeting the most stringent of applicable Federal or State Standards.
- Utilize EPA-registered particulate traps and other appropriate controls where suitable, to reduce emissions of diesel particulate matter and other pollutants at the construction site.
- Limit vehicle speeds on unpaved roads to 15 mph.

**Administrative Controls:**
- Identify all commitments to reduce construction emissions and incorporate these reductions into the air quality analysis to reflect additional air quality improvements that would result from adopting specific air quality measures.
- Identify where implementation of mitigation measures is deemed to be not implementable due to economic infeasibility and provide comparable determinations for other similar projects as justification for this decision.
- Prepare an inventory of all equipment prior to construction, and identify the suitability of add-on emission controls for each piece of equipment before groundbreaking. (Suitability of control devices is based on: whether there is reduced normal availability of the construction equipment due to increased downtime and/or power output, whether there may be significant damage caused to the construction equipment engine, or whether there may be a significant risk to nearby workers or the public.)
- Meet EPA diesel fuel requirement for off-road and on-highway (i.e., 15 ppm), and where appropriate use alternative fuels such as natural gas and electric.
- Develop construction traffic and parking management plan that minimizes traffic interference and maintains traffic flow.
- Identify sensitive receptors in the project area, such as children, elderly, and infirm, and specify the means by which you will minimize impacts to these populations. For example, locate construction equipment and staging zones away from sensitive receptors and fresh air intakes to buildings and air conditioners.
Ecosystem Services
In accord with the Administration’s October 7, 2015 Memorandum for Executive Departments and Agencies on Incorporating Ecosystem Services into Federal Decision Making, the effects of the proposed CRSO alternatives on ecosystem services, both positive and negative, should be considered and - to the extent possible - analyzed and disclosed in the NEPA document.

Of key importance in this context is the role of salmon as a provisioning species. Salmon produce highly valued food products harvested in various commercial, subsistence, and personal-use fisheries across the North Pacific. Salmon are also a principle focus of the spiritual and cultural lives of diverse native communities throughout the planning area.

Salmon and steelhead also provide many ecosystem supporting services. Salmon are the principal food item of many terrestrial and marine species and a source of marine-derived nutrients to lakes and streams. They also act as watershed engineers that structure streambed habitats and alter sediment composition during spawning. We recommend that these services be acknowledged, accounted for using quantitative (where feasible) or qualitative means, and fully considered in decision making.

The Memo directs that the assessment and integration of ecosystem services into agency decision making include the following elements, which are basic tenets of the NEPA process:

- Describe the Federal action;
- Identify and classify key ecosystem services in the location of interest, i.e., the affected environment;
- Assess the impact of the Federal action on ecosystem services relative to baseline;
- Assess the effect of the changes in ecosystem services associated with the Federal action; and
- Integrate ecosystem services analyses into decision making.

Mitigation
The DEIS must include a discussion of the “means to mitigate adverse environmental impacts.” Of particular interest to the EPA are habitat mitigation measures that have been undertaken through programs such as the BPA Fish and Wildlife Program. The EIS should examine these existing fish and wildlife mitigation programs, and the extent to which they have provided successful mitigation for the impact of dam operations on fish and wildlife species. The EIS should also explore the extent to which these programs should be continued, modified, and/or expanded under the Action Alternatives. These

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38 A forthcoming appendix to the Administration’s Memo will provide implementation guidance to suggest best practices for ecosystem services assessment. In the interim, there are existing tools, such as those provided by EPA’s Office of Research and Development (http://www2.epa.gov/eco-research/ecosystems-services) and other reputable sources that may be helpful for integrating ecosystem service trade-offs into the NEPA analysis.
39 40 CFR 1502.16 (h)

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programs have been fundamental to the mitigation efforts of the Action Agencies, and should receive careful consideration as future mitigation strategies are developed. This includes an analysis of the costs and benefits of these habitat mitigation programs relative to the costs and benefits of Columbia River System Operations under each of the alternatives.

Mitigation Monitoring
CEQ's January 14, 2011 guidance on the Appropriate Use of Mitigation and Monitoring addresses the establishment, implementation, and monitoring mitigation commitments made during the NEPA process.40

Key concepts include:
- Ensuring that mitigation commitments are implemented;
- Monitoring the effectiveness of mitigation commitments;
- Remedy failed mitigation; and
- Involving the public in mitigation planning.

Section II of the guidance includes information on "Monitoring Mitigation Implementation" and "Monitoring the Effectiveness of Mitigation." A successful monitoring program will track the implementation of mitigation commitments to determine whether they are performed as described, and the success of mitigation efforts in achieving expected outcomes and environmental effects. The monitoring program, and the responsibility for that monitoring program should be clearly described in the EIS.

Environmental Justice
Executive Order 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations requires each Federal agency to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations, low-income populations, and Native American tribes.41

To address potential environmental justice concerns, a useful resource is CEQ's 1997 "Environmental Justice Guidance under the National Environmental Policy Act."42 We would emphasize addressing the following:
- Demographic Analysis: Gather geographic and demographic data about the area affected by the proposed action to determine where minority populations, low-income populations, or Indian tribes43 are present, and if so whether there may be disproportionately high and adverse human health or environmental effects on these populations.
- Establish baseline conditions: Consult relevant public health data and industry data to establish the potential for multiple or cumulative exposure to human health or environmental hazards in

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41 Executive Order 12898, 3 CFR Part 859 (1994)
43 Includes tribal subsistence and cultural resources/resource usage
the affected population and historical patterns of exposure to environmental hazards, to the extent such information is reasonably available.44

- Characterize/describe the direct, indirect, and cumulative effects of the proposed action within this context: Recognize the interrelated cultural, social, occupational, historical, or economic factors that may amplify the natural and physical environmental effects of the proposed agency action. These factors should include the physical sensitivity of the community or population to particular impacts; the effect of any disruption on the community structure associated with the proposed action; and the nature and degree of impact on the physical and social structure of the community.

- Develop effective public participation strategies: As appropriate, acknowledge and seek to overcome linguistic, cultural, institutional, geographic, and other barriers to meaningful participation, and incorporate active outreach to affected groups. Strategies include: using notices, mailings, fact sheets, briefings, presentations, exhibits, tours, news releases, translations, newsletters, reports, community interviews, surveys, canvassing, telephone hotlines, question and answer sessions, stakeholder meetings, and on-scene information.45

- Meaningful community representation: Seek to have complete representation of the community as a whole.46 Recognize that community participation should occur as early as possible if it is to be meaningful. The EIS should describe what was done to inform the communities about the project and the potential impacts it will have on their communities, what input was received from the communities, and how that input was utilized in the decisions that were made regarding the project.

- Tribal representation: Seek tribal representation in the process in a manner that is consistent with the government-to-government relationship between the United States and tribal governments, the federal government’s trust responsibility to federally-recognized tribes, and any treaty rights.

We would also emphasize CEQ’s framework for determining whether environmental effects are disproportionately high and adverse. Consider:

- whether environmental effects are or may be having an adverse impact on minority populations, low-income populations, or Indian tribes that appreciably exceeds or is likely to appreciably exceed those on the general population or other appropriate comparison group; and

- whether the disproportionate impacts occur or would occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards.47

With regard to mitigation, measures for avoidance or minimization of impacts should be considered first. Where avoidance or minimization is not possible, mitigation measures should be proposed. Mitigation measures should be developed with input from the affected population.

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44 Ensure that the resolution of the data used is appropriate for the action. For example, some health disparities may not be visualized at the county level, whereas health planning area, census tract, and/or block group level data may be necessary. Analysis should include data at the highest resolution that still provides statistically significant and valid intercomparisons.

45 Media and outreach should be conducted in a culturally-appropriate manner. Multiple media will likely be needed if diverse and/or multi-generational communities are affected.

46 For example, diversity of those who participate in meetings should reflect the diversity of the community.

Consider including a summary conclusion for the environmental justice analysis, sometimes referred to as an “environmental justice determination.” This determination/summary can summarize identified environmental justice concerns and express whether and how impacts have been appropriately avoided, minimized or mitigated.

Environmental Justice References and Resources
EPA’s website Environmental Justice Considerations in the NEPA Process, which includes agency guidance, best practices, methodologies, and online tools such as EJ View and NEPAAssist.48

EPA models and tools
- Risk Assessment portal49
- Community-Focused Exposure and Risk Screening Tool50
- Community Cumulative Assessment Tool51
- Office of Pollution Prevention and Toxics Exposure Assessment Tools and Models52
- Environmental Benefits Mapping and Analysis Program53

Data resources
- EPA
  - Report on the Environment54
  - America’s Children and the Environment Report55
  - National Air Toxics Assessments56
  - Technology Transfer Network Air Quality System57
  - Superfund Site Information58
  - Resource Conservation and Recovery Act Information (RCRAInfo)59
- Centers for Disease Control and Prevention
  - State and Local Tracking Portals60
  - environmental public health indicators and data61
  - CDC Health Disparities and Inequalities Report62
- Federal Geographic Data Committee - Geospatial Platform63
- U.S. Census Bureau - American Fact Finder64

60 CDC, State and Local Tracking Portals, http://ephitracking.cdc.gov/showStateTracking.action.
61 CDC, Indicators and Data, http://ephitracking.cdc.gov/showIndicatorsData.action.
64 U.S. Census Bureau, American Fact Finder, http://factfinder2.census.gov/.
- State or county public health and environmental databases
- State databases for state-regulated facilities
- Robert Wood Johnson Foundation and University of Wisconsin - County Health Ranking and Roadmaps

**Columbia River Treaty**
The Columbia River Treaty is an international agreement between Canada and the United States for the cooperative development and operation of the water resources of the Columbia River Basin for the benefit of both countries. The current treaty will expire in 2024.

In 2013, the U.S. Entity worked in collaboration and consultation with the region’s four states, federally recognized tribes and a variety of federal agencies, including the EPA, to develop a “Regional Recommendation for the Future of the Columbia River Treaty After 2024.” The final recommendation, which will inform U.S. State Department negotiations on the Treaty, finds that the Pacific Northwest and the nation would benefit from “modernization” of the treaty post-2024. It begins by identifying regional goals for the future of the Treaty post-2024. It includes general principles underlying this recommendation, followed by more specific recommendations related to several Treaty elements.

The final U.S. Entity recommendation supports a modernized treaty that would simultaneously:

- better address the region’s interest in a reliable and economically sustainable hydropower system and reflect a more reasonable assessment of the value of coordinated power operations with Canada;
- continue to provide a similar level of flood risk management to protect public safety and the region’s economy;
- include ecosystem-based function as one of the primary purposes of the treaty; and
- create flexibility within the treaty to respond to climate change, changing water supply needs and other potential future changes in system operations while continuing to meet authorized purposes such as navigation and irrigation.

The Columbia River System Operations will be critical to the success of a modernized treaty. The CRSO EIS should consider how well the Action Alternatives align with the identified priorities in the Recommendation of the U.S. Entity and the U.S. State Department. Of particular interest to the EPA is seeing the Alternatives fully support ecosystem function. From our perspective, this entails managing the Columbia River Basin as a watershed system. The whole biological and human system should be considered, including water quality, fish and wildlife, cultural needs and economic sustainability. We also emphasize the U.S. government’s trust responsibilities. Serious consideration should be given to the Columbia River Basin tribes’ cultural and natural resources and their reliance upon a healthy ecosystem. We support increased opportunities for the tribes to provide their views on developing and implementing a modern Columbia River Treaty, and the implementing infrastructure including the CRSO EIS (see Coordination with Tribal Governments).

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66 Administrator of the Bonneville Power Administration (chair) and the Northwestern Division Engineer (member) of the U.S. Army Corps of Engineers.
Consultation and Coordination with Tribal Governments
Columbia River System Operations will affect tribal natural and cultural resources, including historical or traditional cultural places of importance to the area's Native American communities. In identifying historic resources, and assuring treaty rights and privileges are addressed appropriately, we trust the Action Agencies will conduct government-to-government consultation with affected tribes. Documentation of these consultations should be included in the EIS consistent with Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments) to address issues concerning Indian tribal self-government, trust resources, and Indian tribal treaty or other rights. The EIS should document how tribal input was considered in the proposed action to ensure that Tribes are involved in the EIS's identification of historic cultural properties, its evaluation of alternatives, and its assessment of whether impacts can be mitigated.

Public Involvement
The EIS should show evidence that the basic steps for effective public involvement have each been taken.

- Plan and budget for public involvement activities;
- Identify the interested and affected public;
- Consider providing technical or financial assistance to the public to facilitate involvement;
- Provide information and outreach to the public;
- Conduct public consultation and involvement activities;
- Review and use input and provide feedback to the public; and
- Evaluate public involvement activities.

For more information, we recommend resources from the International Association for Public Participation.67

Cumulative Impacts
Cumulative impacts result when the effects of an action are added to other effects on a resource in a particular place and within a particular time. It is the combination of these effects, and any resulting environmental degradation, that should be the focus of cumulative impact analysis. While impacts can be differentiated by direct, indirect, and cumulative, the concept of cumulative impacts takes into account all relevant disturbances since cumulative impacts result from compounding the effects of all actions over time. The cumulative impacts of an action can be viewed as the total effects on a resource, ecosystem, or human community of that action and all other activities affecting the resource.

In analyzing the CRSO alternatives, we recommend that the EIS characterize resources, ecosystems and communities in terms of their response to change and capacity to withstand stresses. The EIS should focus on resources that are "at risk" or have the potential to be significantly impacted under the various alternatives.

The EIS should also delineate and explain the reasoning behind geographic boundary decisions; using natural ecological boundaries to the extent possible. For example, for cumulative wetland impacts, a natural boundary such as a watershed or sub-watershed could be identified for the spatial scope, although an analysis at multiple geographic scales may also be appropriate. The EIS should also include a determination and explanation for the analyses' temporal scope.

67 http://www.iap2.org/