City of Seattle
Seattle Public Utilities

July 27, 2016

Dear Cedar River Watershed HCP Oversight Committee Members:

On behalf of Seattle Public Utilities please accept my gratitude for your substantial investment of time in conducting the 15-Year review of the HCP, and for your and unmistakable dedication to oversight of the Cedar River Habitat Conservation Plan. The HCP Implementation Agreement provided for the establishment of the Oversight Committee because the Parties to that agreement recognized the invaluable benefit of independent, routine oversight and review. With this review, the Oversight Committee confirms that external oversight improves accountability and objectivity in implementing the HCP.

The clear theme of this review is climate change. SPU agrees with the Oversight Committee about the importance of this issue, particularly as it relates to drinking water supply and conservation of species and habitats in the Cedar River Watershed. SPU is dedicated to confronting this challenge in close collaboration with the Oversight Committee for the remaining 34 years of the HCP. Below I have described how SPU will respond to your very thoughtful recommendations.

Watershed Management

Recommendations for Watershed Management Conservation Measures

1. **Review in context of climate change:** The OC recommends that SPU evaluate all watershed management measures to make sure that, in the face of climate change, the goals of each program are still appropriate. If that is not so, then discussions with the Services may be warranted. In addition, the OC recommends that the strategic plans be reviewed and revised by SPU staff to address the potential effects of climate change. This could possibly be done as addenda to the plans, and could key off recommendations from the OC Climate Change Subcommittee, if appropriate. The OC also recommends that SPU open a dialog with the OC about potential adaptive strategies in the municipal watershed, sharing any documents developed by SPU staff, in keeping with the request we made in the Year-8 review.

   SPU Response: SPU is committed to reviewing all Watershed Management Conservation Measures in the context of climate change and describing the nexus between HCP conservation objectives, high quality water supply and resilience to climate change. This review will include an evaluation of the assumptions made in the HCP and 2008

Ray Hoffman, Director
Seattle Public Utilities
700 5th Avenue, Suite 4900
PO Box 34018
Seattle, WA 98124-4018

Tel (206) 684-5851
Fax (206) 684-4631
TDD (206) 233-7241
ray.hoffman@seattle.gov

http://www.seattle.gov/util

Restoration Strategic plans, and will result in addenda to the pertinent strategic plans. This recommendation was also made in the 2016 HCP Monitoring and Research Review. The timing and level of effort for this review will be determined by staff resources.

SPU welcomes the participation of the OC in helping to articulate near-term and long-term strategies for adaptively managing the watershed in the face of climate change, including the definition of ecological thresholds that would trigger management responses (e.g., monitoring, research, and/or adaptive conservation measures). SPU made efforts to articulate watershed management strategies to improve resilience to climate change in past years (2010) and conduct a vulnerability assessment (2012), but due to staffing reductions and other priority work did not advance those proposals. This effort will revitalize past efforts, update them with current knowledge, and culminate in a document describing watershed adaptive management strategies to improve resilience to projected climate impacts. This effort will include the forest restoration, aquatic restoration and road system management elements that are described further in this section, and will also include refreshed directions in the watershed monitoring and research arena that is discussed in the next section.

2. **Forest treatment programs:** The OC suggests that SPU reconsider how the Ecological Thinning Program and other forest restoration programs are being conducted and shift the focus to projects that would both accelerate the development of old-growth conditions and increase forest resiliency in the face of climate change. For example, instead of thinning projects of several hundred acres in one location, a large number of small openings could be created in appropriate, low-diversity or stressed areas that would facilitate planting tree species expected to be better adapted to future climate conditions. These "seed populations" would provide propagules as conditions in the forest changes. This is just one possibility, and other strategies could be more appropriate.

SPU Response: The evaluation of forest treatment programs will be included as part of the overall review of Conservation Measures described in Recommendation 1. SPU recognizes that the objectives of the Ecological Thinning Program, riparian forest restoration programs and watershed forest management in general, need to better incorporate forest disturbances and resilience in order to continue meeting the overarching watershed management objectives of ecosystem service provision - high quality drinking water supply and habitat for a suite of fish and wildlife species, among other vital ecosystem services.

SPU also recognizes that there is more overlap than disconnect between forest restoration to increase habitat complexity and forest management to increase resilience. Both overarching objectives include elements of habitat connectivity, landscape heterogeneity, and species diversity. The differences arise in the specific objectives and forest locations where they may be applied; for example, a key objective

in facilitating late-seral habitat development is increasing structural heterogeneity while a key objective in resilience management is increasing species diversity. Adaptive strategies in forest resilience management include resistance, resilience and response options (Millar et al. 2007). Resilience management strategies may focus more on interactions with disturbance processes, either proactively by increasing resistance to disturbance by maintaining tree vigor through growing space allocation (i.e., thinning) or increasing resilience after disturbance by increasing the suite of species through planting that can help the ecosystem bounce back, or reactively after disturbance by facilitating ecosystem response or transition through planting to meet desired ecological functions.

Staff are currently conducting an assessment of the Ecological Thinning Program, which describes the projects that have been implemented since 2000, the ecological objectives, any monitoring conducted and results summaries, lessons learned and recommendations for continued program implementation. The recommendations from this assessment will draw from best available science regarding forest habitat restoration and resilience management and can help frame an approach for watershed forest management into the future. Additionally management options, cost/benefit and risk analyses will be included to fully evaluate how and whether to continue active forest interventions to meet these objectives. A similar assessment and refocusing is needed for riparian restoration programs.

SPU completed a synthesis of accomplishments from the 13-year Restoration Thinning Program and recognizes that this program has had a significant effect on forest development at a landscape scale in the watershed. SPU acknowledges that in the re-cap of the Year-8 Review, "the OC urges SPU to reconsider treating more acres as a resilience strategy." Limited acres of eligible forest remain for restoration thinning, which employed a cut-and-leave approach, since the majority of the young, second growth forest has grown beyond this stage and a large slash loading would result. However, there are approximately 20,000 acres of "in-between" forest stands that currently support very dense forest with continuous overstory canopy and generally depauperate understory. Possible treatments as suggested in this recommendation could add both heterogeneity and diversity to these forests, and may in turn increase the resilience of these forests to projected climate impacts, but would need to be thoroughly vetted by SPU before proceeding.

Staff have been grappling with strategies and recommendations on how to manage for resilience in watershed forests, given the projected climate effects on forest growth, disturbance, mortality, and consequent ecosystem changes. Staff recognize that managing for resilience will be an iterative approach, including both proactive and reactive strategies, that requires a strong adaptive management framework. Improved climate projection models and climate impacts research will continue to emerge that

will provide updated information on response strategies that SPU may consider utilizing. Elements that need definition include acceptable scales and rates of change, meaningful ecological thresholds and triggers for management action, and appropriate response strategies to disturbances. Regional research is currently being conducted on the proposed strategy to plant trees from different seed zones and conduct assisted migration of tree species not currently represented in watershed forests. All of these topics require communication and collaboration with research scientists, climate scientists and other forest land managers. SPU is considering a workshop or series of workshops that focuses on these issues and assists SPU and other land managers with putting current science into action; this item is discussed under the Watershed Monitoring and Research Recommendation 1.

3. **Road decommissioning and improvements:** The OC is pleased with SPU's success in focusing on roads that have a high risk of failure or that produce more sediment loading to streams through erosional processes, and urges SPU to continue that focus for the remainder of the Road Decommissioning and Improvement Program. This is particularly important, given the risk of more severe winter storms in the future that might place more stress on road infrastructure.

   SPU Response: SPU concurs, will provide the five-year Road Decommissioning and Improvement Plan through 2021 as background information for the OC, and will continue to keep the OC informed about progress on this program.

4. **Road crossings:** SPU has installed new culverts and bridges or removed roads as a way of improving the passage of fish, peak flows and sediment. It seems that these efforts have been successful, though it may be valuable to inventory past projects to evaluate their effectiveness during large storm events. The OC suggest that SPU reevaluate the peak flow criteria being used to make sure that the rate of failure will note exceed what is desired, given the potential for more extreme winter flows. This will be a challenge until reliable projections are in hand, but would be worth the effort.

   SPU Response: SPU is currently assembling complete documentation of fish passage and peak flow projects that have been implemented since 2000 and is evaluating additional fish passage and peak flow project needs in the watershed. Recently completed fish passage surveys will elucidate remaining fish passage project needs. The peak flow culvert analysis is incorporating criteria to identify potential problems with flow capacity in existing structures, allow for clear decision-making, and ensure an acceptable level of risk during extreme precipitation and stream flow events. This analysis is incorporating climate change projections using the best available information. Both of these analyses will inform SPU on priority work through 2021.

5. **Large Woody Debris:** SPU has a large remaining commitment to replacing large woody debris (LWD) in watershed streams. This activity is an example where SPU can apply lessons learned

from past projects to assure that new LWD is replaced efficiently for greatest ecological effect. Given the widespread use of LWD for habitat restoration in the Pacific Northwest, it may be of value to make sure projects reflect the current state of knowledge about LWD and its ecological value, and to consider whether projections of more extreme flow events in winter could alter the design of LWD projects, especially in mainstem reaches.

SPU Response: The evaluation of the LWD Replacement in Streams Program will be included as part of the overall review of Conservation Measures described in Recommendation 1. The overall review will look at the latest approaches and leverage lessons learned from other entities' restoration monitoring efforts, focusing in particular on current restoration standards, monitoring approaches, and effectiveness in large stream systems, while incorporating information from current field assessments and lessons learned from past projects. This will be done within the constraints of being a water supply watershed and the need to protect critical infrastructure. Therefore the review will include an evaluation of costs/benefits and risks, and will frame the basis for continuation of this restoration program. The program review will be similar to the Ecological Thinning Program Assessment that is mentioned under Recommendation 2.

Recommendations for Watershed Monitoring and Research

The recommendations described below are a combination of conclusions from this review and issues highlighted from the review of watershed monitoring and research by Ralph and Booth.

1. **Forest resilience and wildfire risk**: The OC urges SPU to hold workshops on forest resilience and wildfire risk and response soon, as recommended by the OC Climate Change Subcommittee. At this stage of problem definition, the focus need be less on adaptive strategies than on potential risks, appropriate forest monitoring, and identification of important thresholds. After these risks are more clearly identified, the focus can shift to potential adaptive strategies, which could lead eventually to changes in conservation measures, although some conservation measures, such as planting species or genotypes more adapted to future climatic conditions, can be safely pursued now.

   SPU Response: A workshop will be held in Fall 2016 to examine wildfire risk in the municipal watersheds in an ongoing effort to evaluate current risk management strategies and address existing gaps in wildfire prevention, suppression and response. This workshop will be part of the ongoing Wildfire Risk Management Strategy effort in which SPU is currently engaged. SPU will also draft an adaptive management strategy to address projected climate impacts.

   Regarding forest resilience to a variety of disturbances, SPU understands the importance of defining potential risks, proposing appropriate monitoring, identifying ecological thresholds and proposing adaptive management strategies. This recommendation suggests a phased discussion: phase 1 focusing on risk, monitoring and thresholds; and phase 2 focusing on potential adaptive strategies. SPU concurs that risk identification should be the first step,

although monitoring can itself be an adaptive response strategy and the suite of HCP watershed monitoring efforts is currently being refocused on generally anticipated risks. However, when discussing appropriate monitoring for forest disturbances and resilience, a question that often arises is "what will we do about it?" If forest mortality exceeds a pre-defined threshold, for example, what management response would SPU take to meet its management objectives? Given the tight interplay between risk identification, monitoring and potential response options, it can be difficult to fully separate these discussions. Efforts to identify ecological thresholds and better describe strategies for resilience management would help guide SPU's forest monitoring and management programs. At the same time, other land managers and climate scientists are undergoing similar efforts, and SPU can collaborate with them to leverage their information and expertise. Standards and templates are available to support SPU in conducting a vulnerability assessment (phase 1) to identify risks for the municipal watershed ecosystems and coupling that with development of adaptive strategies (phase 2) to address the greatest risks.

The HCP articulates specific applications of adaptive management for "changed circumstances" that are defined by disturbance type in Chapter 4.5. To date, SPU has not proposed adaptive management strategies in response to changed circumstances. However, the ecological thresholds based on spatial extent of disturbance are clear (e.g., 300-2000 acres of forest cover removed by fire within any sub-basin), and should provide the basis for further definition of risk, thresholds and response strategies, including monitoring and active interventions. Relevant questions revolve around late-seral habitat development and the explicit HCP recognition of the benefits of small- to moderate-scale disturbances versus the potential negative effects of large-scale (or catastrophic) disturbances on forest development and water quality. Climate change may necessitate a review of previously stated thresholds for changed circumstances and confirmation that current forest management strategies under the HCP (i.e., passive restoration to late-seral forest, salvage only after catastrophic disturbance) address potential impacts.

Moving forward with planting species and genotypes that may be better adapted to future climatic conditions is an area that also requires coordination among agencies and land managers, such that adaptive management can be practiced at a larger spatial scale. SPU has conducted a resilience planting trial to evaluate the short- and long-term efficacy of planting different species and genotypes, but operational application of this strategy warrants thoughtful consideration.

2. **Forest pests**: Given the level of threat that exists, the OC believes that more emphasis should be given to the tracking of forest pests, and the OC urges SPU to develop a more extensive program that includes not only aerial surveys but also ground surveys over time to get a clear picture of changes that might be of concern for forest health and resiliency.

SPU Response: SPU first needs to clarify what is meant by "forest pests" in this recommendation and addresses this recommendation with the understanding that

"pests" refer to insects and diseases, both native and non-native, which cause or facilitate forest disturbances.

SPU is currently developing a comprehensive forest disturbance monitoring approach in response to the HCP Monitoring and Research review, and will be proposing to re-map funds from lower priority monitoring activities to address this work. As stated previously (under Watershed Management Measures, Recommendation 2), this monitoring needs to be clearly linked to management objectives (i.e., water quality, habitat provision), meaningful ecological thresholds and potential management responses. The monitoring approach will incorporate GIS spatial data (LiDAR and orthophotography), State and Federal Aerial Detection Survey (ADS) results, field validation of ADS data, and both extensive and intensive field sampling, depending on the disturbance type. Extensive field sampling refers to basic forest sampling over a large area (several hundred acres) while intensive sampling refers to repeated sampling at specific plot locations that allow for analysis of trends over time. Key questions of the forest health monitoring will include (1) extent of disturbance, (2) severity of disturbance, (3) causal factors and processes, (4) forest response to/recovery from the disturbance event(s), and (5) potential options for management response.

Again, there will continue to be interplay between monitoring forest disturbances and developing management actions to appropriately respond to them. SPU recognizes that disturbances will happen and some may support the achievement of SPU's long-term watershed management objectives while others may negatively impact it. Climate change adds an element of uncertainty and unpredictability, as disturbance dynamics are projected to change, facilitated by increasing temperatures and frequency and magnitude of extreme events, including both prolonged warm, dry periods and record wet seasons. Depending on the extent or severity of disturbance, where it occurs, and the vulnerability of the forest type to disturbance, appropriate response strategies will differ. Improving the forest disturbance monitoring and linking it with ecological thresholds will give SPU the basis for increased flexibility to respond within an adaptive management context. It will also enable SPU to track cumulative disturbances and climate-related impacts over time and explain potential divergences from HCP assumptions of late-seral habitat development along expected, historical trajectories.

3. **Bull trout, reservoir food web and common loon research**: The OC supports SPU's current effort to perform a comprehensive review and summary of bull trout research and monitoring to date and to develop a refocused program of monitoring and research that is designed to address potential issues related to climate change and potential changes in reservoir operations.

- The review should include an assessment of whether work to date has accomplished the stated objectives. For example, did the redd inundation study produce clear results, or should it be continued until a clearer idea of effects is gained. Are there still questions about bull trout passage into tributaries in the fall during a period of drought?

- Future monitoring and research should address two linked issues: direct effects of climate change on bull trout, or species that bull trout depend on, as a result of reduced summer streamflows and increased stream and lake temperatures; and effects of potential changes in reservoir operations.
- Annual spawning surveys have been concluded, but should be considered as a straightforward way to assess overall health of the bull trout population - unless a better approach is developed. If restarted, spawning surveys should be done annually, as missing years would substantially reduce SPU's ability to detect trends in populations over time, a key issue as climate change continues to unfold.
- Conduct evaluation to assess effects of new pump plants in CML on food web dynamics
- The OC also recommends a similar evaluation of common loon nesting and feeding as it might be affected by changes in reservoir operations.

SPU Response: This effort to synthesize bull trout research conducted thus far and address most of the questions posed in this recommendation, and will commence under contract with West Fork Environmental in July 2016. SPU will report back to the OC once the comprehensive summary and monitoring recommendations are written, likely by the middle of 2017. There may be additional elements that require evaluation, such as the effects of the new pump plants on food web dynamics. That evaluation should be done within the context of climate change projections and anticipated reservoir management adaptive strategies, which is beyond the scope of the current contract.

An evaluation of common loon nesting, breeding and feeding is not included in the current synthesis effort on bull trout. Only nesting and breeding behavior and success have been investigated. The question regarding the effects of reservoir operations on common loon nesting and breeding may require additional effort. There has been no SPU research on loon feeding to date.

4. **Documenting accomplishments before retirements**: The OC suggests that SPU complete a similar summary, as described above, of work managed by staff who may retire in the near future to minimize loss of important information, such as work on invasive species.

SPU Response: There are no known plans for additional staff to retire in the next five years. Regardless, clear documentation and periodic summaries are critical to enable transparency, accountability, collaboration, and the continuation of long-term efforts. The HCP Monitoring and Research Review called for better documentation of several program areas, and this work is a priority in the next two years. Prior to any planned retirements and/or resignations, a focused transfer of knowledge along with a comprehensive synthesis is optimal. This transfer of knowledge has happened with recent staff resignations and retirements (2012 and 2013), but the reduction of staffing in the past several years and lack of strategic reprioritization of work has impacted integration among program areas as well as project analysis and documentation.

Regarding the invasive species program specifically, the documentation of annual work completed in that program is highly organized and accessible by watershed staff. Annual briefings have been provided to the Seattle City Council regarding herbicide use on knotweed. Annual accomplishments are captured on the HCP website along with other HCP performance accomplishments.

5. **Annual summaries and reviews**: The OC urges SPU to produce annual summaries and reviews of the prior season's work, including research and monitoring, with results made available for analysis to staff and review by the Services and OC. These summaries should be done in the context of adaptive management, with periodic reviews of progress that can identify program changes that might be needed.

SPU Response: The HCP Monitoring and Research Review called for a clearer reporting and adaptive management framework, to serve the purposes of documenting work such that current and future efforts can align with it and carry it forward, as well as to support the goals of transparency, accountability and adaptive management. SPU is committed to developing and operating within a reasonable adaptive management framework that provides both transparency and accountability as well as solid evaluation, integration of findings, and adjusted management approaches.

Several long-term monitoring projects, such as the long-term aquatic monitoring and the forest permanent sample plots, that characterize ecosystem change over time, are conducted over multi-year time frames and require intensive QA/QC and data analysis. Annual QA/QC is a time consuming yet necessary annual effort that has been occurring, but comprehensive data analysis is more appropriate at the end of the sampling period. Of course, preliminary data analysis to ensure that sufficient statistical power exists with the sampling methodology and number of data points to answer the key questions should be, and has been, done in the initial stages of long-term sampling. Some of those preliminary reports can and have been made available. Going forward, SPU will ensure that protocols are established requiring regular and routine preliminary and conclusive data analysis and documentation. To improve transparency and accessibility of information, SPU has already initiated efforts to improve the organization of and access to documents, reports, and maps, including HCP web site re-design and the use Sharepoint and other technology to improve information sharing. More appropriate than providing data analysis and results on an annual basis, especially in the midst of a long term sampling program, is providing annual accomplishment summaries of work completed. This type of reporting has been done on an annual basis in the Watershed Annual Reports. Nevertheless, the clear reporting framework and schedule will be developed and will align with the sampling timeframes in an appropriate manner to provide accessible results and summaries in a timely manner.

Annual reviews to elucidate lessons learned among ecosystem science staff – in effect, real time adaptive management - were conducted through early 2013, but fell off as a priority due to staffing reductions.

6. **New focus on watershed resiliency**: The OC urges SPU to consider shifting the focus of long-term stream and forest monitoring to include not only restoration and recovery but also tracking resiliency to climate change impacts. The OC recognizes that this shift could be challenging to design, so a cautious and careful approach is recommended, but questionable basic assumptions in the HCP about the stability of environmental conditions suggests that the effort would be worthwhile.

   SPU Response: SPU is incorporating recommendations from the HCP Monitoring and Research review, which provides similar recommendations to refocus long-term aquatic and terrestrial monitoring on resilience and climate-related impacts detection. SPU staff are in the process of developing proposals to respond to these recommendations and welcomes OC involvement in this effort. SPU intends to report to the OC in December on these proposals and a refreshed, integrated monitoring program that supports HCP intents and resilience.

7. **Reprogramming HCP funds**: Some of the HCP's current research and monitoring might be less useful in the future, and funding could be reprogrammed to greater effectiveness.

   - For example, given that the factors that control spotted owl and marbled murrelet populations are regional in nature, some of the funding for these activities could be reprogrammed to focus more on climate change and watershed resiliency issues.
   - As the level of some activities ramps down, project monitoring for the purpose of adjusting future decisions becomes less useful, especially where it takes a decade or more to achieve any meaningful results. In such cases, consideration should be given to reprogramming some of that funding to focus more on climate change and watershed resiliency issues. The OC would be pleased to help with that effort.

   SPU Response: SPU is incorporating recommendations from the HCP Monitoring and Research review to this effect and intends to report to the HCP OC in December. SPU welcomes involvement from the OC in this effort. However, this recommendation is intimately linked with recommendation 8, below. SPU is cognizant that the marbled murrelet monitoring may provide direct evidence of a key listed species using the watershed; while species presence and use is not required to document SPU's HCP compliance, this information remains a vital element supporting the story of HCP success.

8. **Federal Services role**: The OC suggest that SPU begin a dialog with the Services regarding what might be required to demonstrate the effectiveness of the HCP over its term, especially in view of the challenge of climate change and other changes in conditions, to help clarify what changes

to research and monitoring might be might most appropriate. The OC would be pleased to help with that effort.

SPU Response: SPU is incorporating recommendations from the HCP Monitoring and Research review to this effect and will be clarifying with the Services on their expectations for demonstration of HCP effectiveness over the 50-year term. This clarification will certainly help focus the monitoring efforts over time. SPU welcomes involvement from the OC in this effort.

9. **Continued vigilance to controlling invasive species.** *(Included in the Instream Flows OC recommendations.)* There will be ongoing need for controlling terrestrial, riparian and aquatic invasive species in the watershed and downstream. SPU should continue to treat this activity as a high priority.

SPU Response: SPU intends to continue addressing the threat of invasive species both within the municipal watershed and in the lower river below Landsburg as part of the Downstream Habitat Protection and Restoration program. As part of SPU's response to the Monitoring and Research Evaluation recommendations, SPU is considering including monitoring for invasive species in the watershed as part of the HCP M&R program.

Citation:

Millar, C.L., N. L. Stephenson, and S. L. Stephens. 2007. Climate change and forest for the future: managing in the face of uncertainty. Ecological applications 17(8): 2145-2151.

Landsburg Mitigation

1. **Reporting fish-use data:** Reestablishing upstream fish passage at the Landsburg Diversion Dam was an important long-term mitigation measure under the Landsburg Mitigation portion of the HCP. Evaluating the long-term performance of this fish passage facility by reporting the number and type of anadromous fish that pass upstream throughout the year demonstrates the utility of this facility. It will be beneficial to provide fish passage data summary information from the Landsburg diversion dam fish camera that reports species, abundance, and run timing throughout the year. This information would be best reported on the HCP website.

SPU Response: SPU is working to improve the availability of fish passage information, especially that which occurs post-sorting mode each season. We are currently collaborating with UW Fisheries and Aquatic Sciences Capstone students to review the backlog of photos. SPU will provide annual reporting to the OC and other stakeholders in the future. The fish camera was replaced with a new, more functional unit in 2015.

The new camera takes color videos of the fish that pass, and SPU believes this will improve the speed with which data can be provided in the future.

2. **Passing sockeye at Landsburg:** Water quality monitoring studies have demonstrated that small numbers of anadromous salmonids spawning in the Cedar River upstream of the Landsburg diversion dam do not have a detrimental impact on water quality. Sockeye salmon are currently removed at the Landsburg sorting facility and not allowed to pass upstream, as large numbers of these fish spawning in the upper watershed may affect water quality. To support the LMA objective of contributing to healthy and harvestable runs of salmon, the OC recommends that SPU explore the idea of not operating the fish sorting facility at Landsburg and allowing all anadromous fish species (sockeye included) to pass upstream of the diversion dam. The idea of passing sockeye upstream at Landsburg would need extensive review including its effects on sockeye hatchery broodstock collection needs.

   SPU Response: SPU agrees that this idea should be further investigated. The benefits of passing sockeye at Landsburg include a reduction in the handling of ESA-listed species and access for sockeye to the exceptional habitat above the dam for anadromous fish. Counting sockeye that pass the dam would be necessary, and, in years that return numbers may impact water quality, SPU would consider sorting again. Further, an environmental review would be necessary in order to make this change.

   While sockeye collected at the Landsburg Fish Ladder currently are provided to the Cedar River Hatchery as additional broodstock, the ladder is not operated as a broodstock collection facility, and should not be viewed as such. Any impacts to broodstock collection through this action would be mediated by the broodstock collection facility in Renton, scheduled to be built in 2020. Passing of sockeye above Landsburg would not negate the requirement for the sockeye hatchery as part of the Landsburg Mitigation or Muckleshoot Settlement Agreements.

   The timing and level of effort for this investigation will be determined by staff resources.

3. **Focus of the sockeye hatchery program:** Sockeye returns to the Cedar River have steadily declined during the 15-year review period with several record low sockeye returns occurring during the past five years. The low returns are likely due to poor survival of sockeye fry during their rearing period in Lake Washington, but poor marine survival may contribute to this problem in some years. Monitoring has addressed many of the key uncertainties associated with the sockeye fry production program and provided evidence that the program does not have detrimental effects on the ecology of Lake Washington or other anadromous fish species in the watershed. To more effectively work toward the LMA objective of providing healthy and harvestable runs of sockeye salmon in the Cedar River, SPU should consider modifying the AMP to allow for supplementation techniques that help maximize fry-to-adult survival through a combination of rearing and release timing, or perhaps make other changes to the AMP. This would require extensive review.

SPU Response: The City is deeply concerned the Cedar River is not seeing healthy, harvestable runs of sockeye, coho or Chinook salmon or steelhead. As the OC noted, helping recover these runs is one over-arching objective of the Landsburg Mitigation Agreement (LMA). That objective is one of six in the LMA, and these objectives apply to the LMA as a whole, including fish passage at Landsburg, and land acquisition and habitat improvements in the Cedar River, each of which helps improve conditions for salmon.

Many salmon populations are currently returning to natal streams in numbers much lower than those historically achieved. This includes those populations in the Lake Washington Basin, which is impacted by numerous factors that cannot be fully remedied simply through hatchery operational adjustments or changes in policy direction. Poor survival of sockeye in the Lake Washington Basin appear to be the result of a combination of poor marine conditions, disease, high water temperatures, predators and passage concerns in the lower basin.

We appreciate the OC's interest in and suggestions related to hatchery operations, even though the hatchery and its operations were excluded from coverage under the City's Incidental Take Permit for the HCP in an amendment issued by the National Marine Fisheries Service in 2007. SPU intends to continue discussions with the LMA Parties, the Muckleshoot Indian Tribe and the hatchery Adaptive Management Work Group (AMWG) regarding biologically-sound actions that can be taken in the basin to improve the sockeye run in the Cedar River, recognizing that there are clearly defined roles for SPU in that endeavor.

4. **Monitoring prioritization:** Monitoring activities to evaluate the sockeye hatchery program are an important part of the LMA, and SPU has invested considerable resources into monitoring. Monitoring expenditures, both past and projected, appear to be greater than estimated in the HCP and LMA. It will be important to carefully prioritize monitoring activities moving forward, establishing a meaningful monitoring program that can be implemented throughout the life of the HCP.

SPU Response: SPU agrees. This matter is currently being discussed among the hatchery AMWG. A monitoring and evaluation plan, and prioritized monitoring activities were drafted by the hatchery Technical Work Group and presented to the hatchery AMWG in May, 2016. This document will be modified per AMWG comments and eventually finalized, with spending recommendations included. This prioritization will be finalized in 2017.

5. **Monitoring at the new broodstock collection facility:** An updated broodstock collection facility for the sockeye hatchery program is currently in the design and planning phase. The new facility will allow the hatchery to reach its annual egg take goals and more fully achieve its full performance potential. Inclusion of a camera or other fish counting device into the design of

this new collection facility would allow SPU to assess the abundance of each year's adult return, providing valuable information on fry-to-adult return rates and allow the city to better evaluate the performance of its fry production program in future years.

SPU Response: SPU agrees that counting the anadromous fish at the new broodstock collection facility will be helpful to the entire basin. SPU will explore cost-sharing for the purchase, installation and data processing of such a device during the period in which the new broodstock collection facility is being designed. This is not part of the City's mitigation agreements or financial commitments, so a partnership to fund this improvement, and resources required to process the data, will be necessary.

Instream Flow Management

1. **Assessing impacts of changing reservoir management.** Reservoir management was not addressed in the Year-8 review. When the new emergency pumping facilities are completed (expected in 2017), SPU should be positioned to assess different scenarios for reservoir levels in view of climate change projections both within the constraints of the HCP and other options which could trigger the need for an amendment. The impacts of and potential changes in reservoir management on bull trout populations and groundwater flow into the Cedar River (moraine seepage) should be reevaluated, and mitigation of any impacts incorporated into water management. Issues regarding bull trout, which use both CML and its tributaries, were discussed above under Watershed Management, and Watershed Management Recommendation #3 addresses these issues. In addition, the coincidence of low reservoir levels at the end of a dry, hot summer could impact downstream temperatures if moraine seepage is reduced by the low reservoir levels. This potential impact should be evaluated to the extent that "dead storage" is likely to be used to maintain system reliability. In particular, this impact could increase the value of the fall instream flows for fish and may require reconsideration of how water is allocated seasonally for fish. The OC further acknowledges that any routine use of dead storage in Chester Morse Reservoir (below pool elevation 1532) would require extensive review and is subject to the terms of the settlement agreement between the Muckleshoot Indian Tribe and the City.

SPU Response: The primary objective of the Morse Lake Pump Plant Project is to improve the capability to transfer up to 240 MGD of water from Chester Morse Lake (CML) to Masonry Pool between elevations 1538' and 1532', restoring access to that storage volume lost when the channel between the lake and pool filled in over recent years. The HCP defined the natural outlet of the CML channel to be at elevation 1532. This storage volume

is assumed in HCP and MIT commitments and is included in the basis of SPU's firm yield calculation. Access to water below elevation 1532' (dead storage) would address severe drought and non-drought emergencies. When the new pump plant is completed in 2017 the project will provide capability to meet municipal water system demands and in-stream flows in the Cedar River during drought conditions.

Modeling completed by the University of Washington (Climate Impacts Group, 2009) indicated that the likelihood of reaching 1541' or lower in CML in October would increase from 1% based on historic hydrology to an average of 4-8% in the 2010-2039 timeframe, depending on the different scenarios used. SPU is updating this analysis with more recent global climate models with the goal of developing adaptation strategies (operational and potential capital projects) to meet future water supply needs for people and fish. Adaptation strategies will be evaluated for potential impacts to fish, both in the CML and in the Cedar River. The adaptation strategies will be shared with the Instream Flow Commission and the HCP Oversight Committee.

2. **Distinguishing normal and critical flow years.** As noted above, SPU has not relied on critical flow requirements in any year from 2001 to 2015 (providing flows below low normal flows only in one year), including years when such a designation could be justified. Recent climate projections should be used to consider whether critical flows are more likely to be declared during the remaining term of the HCP. It may be important to consider whether additional criteria should be used before relying on critical flows, for example, avoiding a series of critical flow years.

   SPU Response: SPU acknowledges that climate change impacts may result in more frequent excursions into critical flows on the Cedar River and this condition may not have been fully examined during the development of the Instream Flow Agreement. The IFA prescribes a clear decision-making process that balances the risks with the benefits for different flow regimes in the Cedar River. The IFA is a foundational agreement to the HCP and any proposed changes to criteria allowing for critical flows must be carefully considered. SPU will bring this concern to the attention of the Instream Flow Commission (IFC).

3. **Revisit the Supplemental Studies.** The Supplemental Studies (also known as "Chinook Studies") is an instream flows research and monitoring HCP activity. This activity was established under the HCP and Instream Flow Agreement to obtain "enhanced information on chinook salmon and the relationships between stream flow and fish habitat." Shortly after its inception, the Instream Flow Commission (IFC) developed a monitoring program under the Supplemental Studies, identifying a number of monitoring activities to be conducted. Some of these activities have been conducted while others have not. Since the program was established the original monitoring recommendations have not been revisited. Since that time a great deal of new information has been obtained about the effects of climate change on stream flows and water supply. Therefore, the OC recommends that the City and the IFC conduct an evaluation of the Supplemental Studies monitoring program and make recommendations for modifications similar to the effort recently conducted for the Watershed Monitoring and Research Program (e.g., examining rearing capacity for juvenile Chinook). (comment: not sure what this means – please clarify if this means that the IFC should review the supplemental studies task list and budget and consider reprograming funds).

SPU Response: The IFC also identified the need to reevaluate the Supplemental Studies that were developed under the HCP. The reevaluation will be part of the 2017 work plan for the IFC.

Overall HCP management recommendations

1. **Communications:** Continue the open communications with the OC that have characterized the first 15 years of implementation of the HCP.

   SPU Response: SPU values the support and guidance it receives from the OC and is committed to continuing its collaboration.

2. **HCP website:** Continue improving the website by including more information for OC meetings, such a PowerPoints and other information provided, and by adding new metrics for HCP performance as they are developed.

   SPU Response: SPU has already initiated redesign project for the HCP web site focused on improving how we communicate progress and effectiveness of individual HCP activities by providing a structure where documents and summaries for each activity are clearly displayed in a format that supports an understanding of activity progress and effectiveness over time (e.g., chronological). SPU will seek guidance from the OC throughout the web site design process.

3. The OC recommends that the City issue a press release to highlight the accomplishments of the HCP.

   SPU Response: We agree that broadly communicating accomplishments under the HCP is important and we commit to getting the word out to our stakeholders using appropriate venues.

Sincerely,

Ray Hoffman, Director
Seattle Public Utilities