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Deschutes Basin-Scale Opportunity Assessment Post-Project Report

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DESCHUTES BASIN-SCALE OPPORTUNITY ASSESSMENT POST-PROJECT REPORT

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TABLE OF CONTENTS

Page

ACRONYMS

BSOA	Basin-Scale Opportunity Assessment
COID	Central Oregon Irrigation District
Corps	U.S. Army Corps of Engineers
DBBC	Deschutes Basin Board of Control
DOE	U.S. Department of Energy
DRC	Deschutes River Conservancy
ESA	Endangered Species Act
HCP	Habitat Conservation Process
MOU	Memorandum of Understanding
NUID	North Unit Irrigation District
ORNL	Oak Ridge National Laboratory
OWRD	Oregon Water Resources Department
PGE	Portland General Electric
PNNL	Pacific Northwest National Laboratory
Reclamation	U.S. Bureau of Reclamation
SMART	Specific, Measurable, Attainable, and Timely
USGS	U.S. Geological Survey

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1. INTRODUCTION, KEY FINDINGS, AND INITIAL RECOMMENDATIONS

Pacific Northwest National Laboratory (PNNL) and Oak Ridge National Laboratory (ORNL) piloted the Integrated Basin-Scale Opportunity Assessment (BSOA) Initiative in the Deschutes River Basin, Oregon, with funding from the U.S. Department of Energy (DOE).[1] The purpose of the BSOA was to identify and investigate potential opportunities to increase hydropower generation and environmental benefits while avoiding detrimental impacts to other water users. Once the results from the pilot were known, the goal was then to work in other river basins in the United States. One of the deliverables required by DOE for the overall BSOA initiative was this "Post-Project Report" to document lessons learned from the Deschutes Basin pilot project.

There are several key findings based on interviews with Deschutes Basin stakeholders involved in this project. First, there is an important divergence in views on the project. Local stakeholders were optimistic and hopeful in the beginning of this project because of the potential for new tools to be developed, especially a daily time-step for the RiverWare model. However, as the project continued over a 3-year period, many at the local level thought that it had stretched on too long and the final products were less than they were expecting. Several of these interviewees stated that they did not know what the final outcomes were, or the status of the final RiverWare model. In contrast, U.S. Bureau of Reclamation (Reclamation) staff have continued to work closely with PNNL modelers to complete the RiverWare model and are very optimistic that it can be used in future efforts in the basin efforts. This information is not widely known.

There are a variety of other findings and lessons learned documented below, but this critical disconnect needs to be addressed if the Initiative's contributions to the RiverWare model are to be known more broadly. The following recommendations should be accomplished by DOE as soon as possible to help alleviate this issue:

1) Work with Reclamation and PNNL modelers to craft a statement about where the RiverWare model stands, how it has been calibrated, and when it might be ready for use by Deschutes Basin stakeholders. The ability to use this model going forward makes a very big difference in whether stakeholders who invested significant time and effort view the project as successful or not. Because this model will be housed with Reclamation, Reclamation staff should work directly with basin stakeholders on questions related to access and use of the RiverWare model.

2) Re-circulate the April 2014 report *The Integrated Basin-Scale Opportunity Assessment Initiative: Pilot Assessment for the Deschutes River Basin* (PNNL, 2014) and solicit comments to ensure that there is an accurate summary of the project.

3) Make sure that all project documents and information are posted to the project website.

[1] The Basin-Scale Opportunity Assessment project website is http://basin.pnnl.gov/.

2. BACKGROUND

On March 24, 2010, DOE, Reclamation, and the U.S. Army Corps of Engineers (Corps, 2012) signed a *Memorandum (MOU) of Understanding for Hydropower* with the goal of developing "clean, reliable, cost-effective, and sustainable hydropower generation in the United States." This MOU included 13 high level goals and several specific action items, including the development of a "Basin Scale Opportunity Assessment." Later in 2010, DOE's Wind and Water Power Technologies Office provided funding to PNNL, ORNL, and Argonne National Laboratory "to develop an approach for assessing a river basin as an integrated system within the context of existing uses and environmental conditions to identify opportunities for sustainable hydropower development and environmental improvements" (PNNL, 2014). DOE, PNNL, and ORNL created a national Steering Committee, which in turn identified several potential basins to use as a pilot, including the Deschutes River Basin.

In 2011, the Steering Committee selected the Deschutes River Basin to be the pilot basin; an announcement was made at the National Hydropower Association meeting. Subsequent to the selection, PNNL and ORNL staff identified a smaller "Logistics Committee" within the Deschutes Basin to help guide work, and also worked more broadly with stakeholders within the basin to develop tools and scenarios and analyze opportunities. Early in 2011, a number of interested stakeholders convened in Seattle, Washington for a meeting. Between mid-2011 and 2012, PNNL and ORNL staff had monthly phone calls with the Logistics Committee; two site visits to the Deschutes Basin to meet with stakeholders and tour the basin; and a large stakeholder meeting in the basin. Between mid-2012 to mid-2013, this level of contact decreased to phone calls approximately every two months or as needed depending on the level and type of activity underway.

At the same time, focus and effort on modeling picked up. At the beginning of the process, PNNL and ORNL staff examined existing models within the Basin. PNNL staff eventually decided to develop a RiverWare-based model to investigate interactions among hydropower and environmental opportunities and existing water uses. After working on the RiverWare model, PNNL and ORNL staff held a workshop in the Deschutes Basin in February 2013 to update stakeholders on the modeling effort and to share preliminary results, answer questions, and identify next steps. In January 2014, PNNL reviewed the final results of the modeling via a webinar with basin stakeholders. PNNL released a modeling report for review in April 2014 (available online at http://basin.pnnl.gov/).

3. POST-PROJECT REPORT: PROCESS AND METHODOLOGY

For this Post-Project Report, Lara Fowler (an independent contractor who currently holds a joint position as a Senior Lecturer at Penn State Law and a Research Fellow for the Penn State Institutes of Energy and the Environment) worked with ORNL staff to develop a set of telephone interview questions to be asked of certain Deschutes BSOA participants and stakeholders after the draft modeling report was issued in April 2014. During the spring and summer of 2014, the participants and stakeholders were contacted via e-mail to schedule telephone interviews. These initial e-mails included a list of the questions to be asked (Appendix A), along with notification that the interview results would be confidential. Of the 15 participants/stakeholders identified as potential interviewees, 11 participants/stakeholders were eventually interviewed. The 11 participants included representatives of PNNL, Reclamation, the Oregon Water Resources Department (OWRD), Portland General Electric (PGE), the Deschutes River Conservancy (DRC), the Central Oregon Irrigation District (COID), and the North Unit Irrigation District (NUID).

4. DETAILED FINDINGS

Although each interviewee was asked the same questions, the answers often blended between questions. The information provided below generally follows the question format, but attempts to distill detailed findings out by topic as well.

4.1 QUESTION 1: BACKGROUND, EXPERIENCE, AND LEVEL OF INVOLVEMENT

The first question sought to establish what the interviewees' experiences were with the BSOA by asking about their professional role in general and with the BSOA; how involved they were; and whether their involvement changed over time.

4.1.1 Range of Organizations, Perspectives on the Deschutes River Basin

During the BSOA, all participants interviewed had a significant role within the Deschutes River Basin. PNNL staff led the Deschutes BSOA and the RiverWare modeling effort. Reclamation manages the federal water storage projects on both the Upper Deschutes and Crooked Rivers, and also does significant study work in the basin. OWRD is responsible for studying, distributing, and managing water within the Deschutes River Basin.

As a co-licensee for the Pelton-Round Butte Project, a significant hydroelectric facility in the Deschutes River Basin, PGE has been deeply involved with various planning and development processes in the basin. The DRC is a consensus-based, non-governmental organization that works with both public and private partners to address water quantity and quality concerns, with a focus on solving issues at the local level. Locally, several irrigation districts manage and deliver water to patrons within their districts, and work with each other through the Deschutes Basin Board of Control (DBBC). The COID already has an in-conduit hydropower project, and the NUID and other districts within the basin have been investigating opportunities for hydro generation within their systems.

At an individual level, interviewees have expertise ranging from engineering, hydrology and modeling and other science and technical backgrounds to policy and management. Collectively, they represent a significant amount of experience with water issues in the Deschutes River Basin, and significant involvement with a number of other on-going processes and water related groups, including local, state, regional, and national.

4.1.2 Roles within the Basin Scale Opportunity Assessment

The stakeholders interviewed also had a range of roles within the BSOA. These included members of the National Steering Committee that helped identify and select the Deschutes River Basin, project team members from PNNL, and members of the Logistics Committee that helped identify issues, coordinate scheduling, and provide local perspective. Other stakeholders provided technical information, model development, and/or reviewed information. A few

stakeholders participated mainly through the general public meetings but otherwise did not have more regular involvement.

4.1.3 Timing, Nature and Extent of Involvement with Basin Scale Opportunity Assessment

Some of the stakeholders interviewed were involved in the BSOA very early on, including those who helped identify and select the Deschutes River Basin for the pilot project. Others were involved only during the public meetings. A number of interviewees noted that the level of engagement was very intense at the beginning or around public meetings when PNNL and ORNL project staff sought to understand the basin's challenges. Some noted that except for these periods of intensity, there were long periods when they did not know what was happening or they did not feel engaged. A few people noted that they were greatly involved in the initial scoping and project development, but became less engaged as the technical modeling work absorbed more time. Others commented that they did not feel like they were effectively engaged at all, despite being interested and offering to help. Still others said they had very regular engagement with the project team, up to and including on-going efforts. The project team itself communicated internally on a fairly regular basis, according to interviewees.

4.2 QUESTION 2: EXTENT TO WHICH PILOT PROJECT WAS CONSIDERED TO HAVE BEEN "SUCCESSFUL"

The second question asked the extent to which Deschutes Basin stakeholders thought the BSOA had been a success; the answers were mixed. If interviewees focused on the federal level, some thought the BSOA was a successful "proof of concept" to research and analyze the opportunity for improving hydroelectric production while also addressing environmental issues. One person noted that this project was between "moderately and highly successful" because the objective was to "identify opportunities within the basin, and to bring technical opportunities to inform the discussion," though this individual also noted that the project did not "illuminate something that wasn't known." Another observed that this project allowed DOE to test and "operationalize" the basin scale concept so that someone sitting at a desk remote from the basin could do a high level analysis of hydrology, stream flow, and related opportunities. Others surmised that this project probably helped the national laboratories identify key lessons that could be applied elsewhere, and to build a framework on how to understand another basin. One person noted that although it was not successful in a way that they had hoped it to be, it was "successful in its development of a set of tools, a demonstration of how to move through a modeling exercise" and in "demonstrating what would be added to the process to make it more successful."

In contrast, reactions to whether the BSOA benefited the Deschutes Basin were more mixed, and may depend on the ultimate utilization of the newly developed RiverWare model. One person noted that this project served as a catalyst and helped bring national-level attention to the Deschutes Basin. Others noted that the development of a model with hourly time steps is a significant improvement and will be a significant asset into the future. In the words of one interviewee: "Yes, I would say it was successful. It furthered dialogue with basin parties about how to increase hydro without being detrimental to fish. Got folks discussing these issues and got more modeling work done." In contrast, some interviewees thought that it may have

detracted from other on-going discussions and/or did harm by providing erroneous information. One person, who observed that there was perhaps "limited success within the basin," had been "hoping that modeling activities could provide useful tools for future planning."

A number of interviewees remarked that they did not know what had ultimately happened with the model development. Several people commented that the ultimate success of this pilot locally will depend on whether the RiverWare model is usable for other purposes. As one person noted, "RiverWare found its way into the modelers' portfolio, but never got to a place where it could be used" in other on-going planning processes (discussed below). Some were unwilling to say whether this project was "successful" without knowing the outcome with the RiverWare model. The "hope [had been] that it would create a tool kit and a set of understandings that people could carry into a variety of other processes…. But it did none of those."

Several interviewees indicated that there is a lack of information on what is happening with the RiverWare model, including its stage of development, level of calibration, and future utility. More discussion of this model is below.

4.3 QUESTIONS 3 AND 4: WHAT WORKED WELL DURING THE BSOA PILOT PROJECT AND WHAT DID NOT?

Interviewee responses to what worked well and what did not often became combined. The findings below are separated by topic. The first topic is a discussion of initial and changing expectations. It is followed by a discussion of what worked well for the process used and products developed, and what did not.

4.3.1 Initial and Changing Expectations

Initial expectations varied. A number of people commented that their initial expectations were quite high, especially given the caliber of the staff involved, the initial level of engagement, and the opportunity to engage technical expertise in developing an hourly time-step model of the Deschutes Basin. Several people commented that they were pleased to be working with such "smart," "qualified," and "capable" people from the national laboratories and hoped that they could help develop new information and tools that could help other on-going basin processes. One person noted that their expectation was the development of "technical solutions to inform stakeholder discussions." Some specifically noted that, as a pilot project, the BSOA would have its share of challenges: they expected that it would be "somewhat useful, but would not be the 'be all, end all' project."

In contrast, a number of people said they had "cautious" or low expectations at the start. Several commented that they were surprised to learn that the Deschutes Basin had initially been chosen as the pilot. This surprise led to skepticism about the BSOA, its scope, and its likely level of effectiveness. One person commented that "we don't need national people coming in doing a real environmental assessment. [We were] concerned about a federal hit and run." This sentiment was compounded for several people given the number of already on-going processes in the Deschutes Basin, including discussions and federal legislation over Prineville Reservoir, the

Habitat Conservation Process (HCP), modeling work in the Upper Deschutes related to low wintertime flows, and multiple other processes. Others said that they hoped to learn how and/or whether this process could generate useful tools or information to assist with water planning. As one person commented, there had to be enough potential value for "people to be curious, to agree to play along. People don't want to [engage] unless they perceive that there is value." Another "thought it would be a good tool to get funding for hydro projects or projects where environmental restoration/instream flow would be garnered."

Most interviewees indicated that their expectations changed over time. On one hand, some noted that the intensive scoping effort and tour of the basin by project staff helped set expectations and led to productive interactions. For example, the initial and direct engagement of project staff reportedly helped ameliorate concerns certain stakeholders might have had at the beginning. Others noted that while they may have been skeptical, the interest and engagement shown during the initial in-basin meeting and tour was very positive. This initial engagement also allowed for a re-scoping of the project beyond just addressing hydroelectric and environmental needs to also including irrigation considerations. One person noted that expectations changed constantly, especially in trying to implement a federally driven study at a national level while meeting local needs.

Expectations also changed in a more negative direction. For some, the initially high promise of new tools that could help answer critical questions led to disappointment; one person noted that we "kept going from real utility to the example of a tool" where a tool was designed, but "without real functionality." Other factors also lowered or "scaled back" expectations over time. For example, some noted that staffing changes or having key people on leave adversely impacted the project. Uncertainty caused by the federal budget impasse in Congress, including the government shutdown in 2012, also greatly affected the project. Some noted that having project staff "disappear" for significant periods of time made it hard to know what was happening, especially as the project stretched over a 3-year period. Others commented that the shifting expectations made it hard to know what to expect: what information was available? Could the dynamics actually be modeled? Could a successful model, especially one that captured water system changes over time, actually be built? One person hoped for "fewer degrees of uncertainty in each step" and wanted to be able to "say more definitively" what would be seen with each scenario run. For others, their initial expectations were low, and remained so. One person noted that constant adjustment based on learning and feedback was helpful, but also a challenge due the time and attention needed.

By the end of the process, there was a very wide range of perspectives. Many interviewees expressed disappointment that time and funding ran out before the full promise of potential tools could be developed to help at a local level, or that they had not learned new information. As one person put it, "if expectations at the beginning had been that the national laboratories would just look at old data and regenerate information, then people wouldn't have been as interested." Others indicated that as funding ran out, national laboratory staff disengaged. For others, the level of frustration was high because the process seemed to end without complete or clear delivery of products they were hoping to be able to use in on-going and future processes. For some, the level of frustration was high enough that they did not feel like investing their time in reviewing documents and reports. In sharp contrast, some were very optimistic about the

RiverWare model and were very positive in how it could be used to advance future planning and decision making processes at both the national and local level.

4.3.2 A Number of Things Worked Well for the Process

Interviewees identified a number of things that worked well from a process perspective, including the initial stakeholder engagement and outreach; the basin tour and workshops; and for some, the level of engagement behind the scenes.

Several people said that the initial stakeholder engagement and outreach was a high point. As one person pointed out, the "best part was the first six months" where working closely with a big group of stakeholders increased "understanding of what was happening." One person noted that national laboratory staff willingness to "work collaboratively" helped ensure that initial efforts were "much better coordinated and participation was better" than if the original plan was followed. Another noted that this early involvement was critical, especially because there were already a number of organized efforts; if this kind of structure or organization did not exist, it might be harder to get started.

Interviewees also expressed appreciation for in-person engagement. Some noted that having the national laboratory staff visit and tour the basin while meeting with stakeholders both informally on the tour and formally in meetings also helped increase understanding and build relationships. Many noted that the in-basin tour was very helpful and a "high point," with a lot of "diverse" and "high level agency" people "on the ground." A couple of people noted that the public workshops were also highlights because they allowed national laboratory scientists to engage directly with local stakeholders. To these interviewees, the public workshops were worth the effort despite the amount of time they took to set up. As one person noted, the ability to "explain and convey how all of this works" in lay persons' terms was helpful; "modeling is not always understandable." Several interviewees found value in getting people together to think about issues of hydro, environment, and irrigation, and to raise concerns. Some noted that facilitation of these workshops made a difference in improving engagement, along with notes about the meetings. Another person noted that convening everyone in a large group then allowed for a smaller working group to carry on the work with more focus on critical technical efforts.

Interviewees discussed several processes that helped move things forward "behind the scenes." For example, the "Logistics Committee" made up of several local stakeholders helped the national laboratory staff identify issues, set up the tour and local meetings, and otherwise help troubleshoot issues. In addition, modelers from the national laboratories and Reclamation said they developed a good working relationship, with numerous phone calls, in-person meetings, and a significant exchange of information. Overall project management by national laboratory staff was seen as "well run and managed" by some interviewees, though problematic by others.

4.3.3 Challenges and/or A Number of Things Did Not Work Well for the Process

Interviewees identified a number of things that did not work well during this process. While some of these problems are referenced in the discussion about expectations above, this section provides a complete set of process-related issues.

Several people voiced concern about how the pilot project began. For example, interviewees indicated that the original announcement at the National Hydropower Association meeting was the first time a couple of key stakeholders knew about the project, and that the Deschutes Basin had been picked as the pilot. These key stakeholders were surprised and skeptical. Interviewees said that this skepticism faded for some, but not for others.

Multiple interviewees noted that the number of already on-going processes in the Deschutes Basin made embedding any new project a challenge, especially if it did not directly relate to on-going planning processes. Such efforts include regulatory processes like the Habitat Conservation Planning process under the Endangered Species Act (ESA), where a proposed mitigation plan is about to come out, or planning processes like the Deschutes Water Planning Initiative. Some interviewees indicated that the BSOA was a "distraction" and took time away, while others noted that basin stakeholders were so busy that it was hard to schedule calls and meetings. Some observed that local stakeholders may have been reluctant to accept new tools given the on-going processes. Others noted that having federal parties come into a basin where activities were well underway was hard, because the researchers coming from outside the basin did not fully understand all the local dynamics and were not necessarily "trusted" by basin stakeholders: it is hard to "insert the [national laboratories] into the local context." Some interviewees observed that although federal agencies are participants in basin processes, they generally do not run or manage the local water distribution system. Another interviewee observed that given limitations on available time and resources, it was better to focus on other "planning processes that are more locally driven, more local stakeholder support."

Several interviewees said that, once the BSOA process began, its scope and expectations needed to be defined "more concretely," both initially and throughout the project. For example, one person observed that the scope changed continually throughout the process, thus creating uncertainty and a lot of time and effort to manage: "these changing expectations are par for the course, but also exhausting." Another commented that expectations about what the pilot would do, and what the model could also accomplish, needed to better managed. Some interviewees observed that the "collection of parents" including DOE, Reclamation, and the Corps made it harder to identify priorities and then to communicate them effectively. One person, who said that the process was "perfectly reasonable," was not sure of the "outcome we were trying to get, or the expectations." This individual was "not sure the product was ever defined" but that time and money ran out before something of value could be finalized to benefit the local level. Another person noted that the inability to specify key metrics (i.e., specified stream flow targets with hard and fast numbers) hampered scenario runs, and decreased what could be accomplished with the project over time. Interviews indicated that questions about realistic levels of work, products, and deliverables were critical, especially given budget and time constraints; some interviewees thought that these areas lacked definition.

Another area of concern related to gathering baseline information and model development. A number of interviewees thought that basin information was missed by national laboratory staff, including published reports on groundwater/surface water interactions, water rights information, and other data that could have been used to calibrate models. Others indicated that the original modeling approach did not match the basin dynamics and that the modelers had a preconceived tool they wanted to use because they knew how to use it. Others noted national laboratory staff

"at different levels had different understandings of the basin, how to apply their tools and have them work here (technically). Staff who did well did great—some not so much." Some said that there was a "missed opportunity" by not engaging more directly with basin water managers, or by going off to develop a model without more direct engagement on the "softer social science side."

Communication and engagement constituted another problematic issue, according to interviewees. During the process itself, several interviewees said that the project staff "disappeared," engagement was "sporadic," or there were large "gaps in time." Interviews indicated that, while activity was intense leading up to and around the public tour and workshops, there were other time periods where it was hard to discern what, if anything, might be happening. Although interviewees noted that the "Logistics Committee" was somewhat helpful, they also said that more regular communications with a broader audience might have helped, as well as more one-on-one or smaller group discussions. As one person put it, you need to "eat a lot of tuna fish sandwiches" with people in the basin to build trust; lack of regular engagement increased skepticism. In addition, interviews revealed that the presence or absence of staff was compounded by uncertainties in federal budgets, staffing availability and people on leave, and the impact of other projects. Interviewees indicated that knowing about these issues would have helped them to understand what was happening versus feeling like they were out of the loop or that there was "radio silence." Otherwise, some interviewees expressed feeling like the initial stakeholder engagement was "a box to check" for collaboration. It "doesn't work well for national lab folks to appear once, then disappear until a year later. May have understood, but didn't build the trust for their tools to be effective." For those on the technical side, a broader understanding of the entire project would have been helpful, according to interviewees.

While some interviewees thought that stakeholder engagement was effective, others did not. Some stated that their knowledge, feedback, and questions were not listened to or fully addressed, or it was too late when solicited. For example, some interviewees noted that localized knowledge of water rights and basin water flows was not fully considered in the modeling effort and/or that their offers to help in the development of products were not followed up. Other interviewees indicated that they had "spent a lot of time talking about what happens when [the national laboratories] leave" and what would happen with the model, but without clear answers to questions like who would have the model, who could access it, how can people use it when the study is over, and how to address the relatively high cost of licensing the RiverWare software (~$10K/license).

A number of interviewees voiced considerable frustration because they still did not know the final outcome of the project. As one person noted "I don't know what happened with the tool, who has it, whether these agencies are talking, if someone is tinkering with it, I'm a key player—but don't know about this." Some indicated that, because of this outcome, their initial skepticism about the project was realized. As one person noted, this was a "classic project—lot of good intentions, energy on the front end, time, due diligence. Then as soon as it neared the end, agencies ran out of money, then they had to be gone. Weren't able to make it, give it a timeline and budget to… add a lot of value at the local level." Another noted that it is "great that they have done this work, but I still haven't seen the final report. I want to USE this model—[and

that there was] early identification of the need to be able to use this." Someone else observed a breakdown in relationships and trust near the end of the project.

Finally, several people commented about the project's duration. A few people noted that the process itself had gone on so long that they could not remember what had happened, or when it had occurred: "it felt like forever ago." For example, one person "hoped that we would have tighter/cleaner project in the beginning/ middle/end—the project went too long" and did not "want to get stuck in a 3-year process." Another noted that it would have been helpful to have had more time after the model was developed to iterate it; most of the project time was taken up with model development, with little time left to iterate through scenarios, work with stakeholders, and add more based on the scenario runs and feedback. One person commented that even this "lessons learned" evaluation was occurring so far after the process that he was struggling to answer.

4.3.4. What Worked Well for the Products Developed

Interviewees provided positive feedback on the products developed through this BSOA process, with comments focusing on the RiverWare Model, the draft scenarios, and the hydropower assessment. In general, some said that the process helped validate the work already on-going or accomplished in the basin.

4.3.4.1 RiverWare Model

For most of those interviewed, the opportunity to develop a model that could add a daily time step component was a critical element for this project. Interviewees recognized RiverWare as a powerful tool used throughout the western United States, although its licensing costs are expensive. They said that the RiverWare model allows for accounting, which is very much needed. As one person noted, "the reason to be involved was to help guide development of this tool to use in the future."

Because of the time and effort that went into model development, a few interviewees said the model would be useful for other processes in the future. "The RiverWare model is now 85%-90% complete" and calibration is being tested. The best outcome for this pilot project is "development of this model. We will be using it. Right now, we can only simulate the system at monthly time step. With this model, we can do daily simulations with accounting—important for minimum flow requirements, ESA listed species. This is a really a good tool to have in our back pocket." As noted below, however, this optimism was not shared by most interviewees, who simply were unsure what had happened with the model. One person noted that the "calibration appears to have been done correctly [but that it would be] more successful if we can use it going forward." In another person's words "if we can get access to it, it will be helpful. I am still hopeful that the tool they developed can be taken, and with careful consideration of operational constraints, that we'll be able to use tool."

4.3.4.2 Scenarios

Some interviewees noted that the preliminary scenarios and outcomes were useful, and looked as would be expected. Being able to look at flow, demands, and tradeoffs through scenarios in the Upper Deschutes would be useful going forward. Another noted that the scenarios were a good start, but would have benefited by additional iterations and more time to develop. These interviewees thought development would have been aided by more specific numbers to test rather than general assumptions.

4.3.4.3 Hydropower Assessment

Some highlighted the hydropower assessment as a useful tool, especially with the ability to evaluate different types of turbine alternatives for projects in conduit canals. One person noted that being able to "plug and play" with scenarios for hydropower would be very helpful if this model was made available. Another noted that identification of potential hydropower projects was helpful if the irrigation districts could do more projects and generate new revenue. One interviewee noted that this element "should be actively promoted on DOE, Reclamation's website—make it easy to find—people should know that it is there."

4.3.5 What Did Not Work Well for the Products Developed

Interviewees voiced a number of concerns related to the products developed.

4.3.5.1 General Feedback

As discussed above, many interviewees said that their initial expectations were high for product development, but that they were disappointed over time. Some stated that identifying products that had local value in the context of a national project would have been important. Others noted that "simple" products are better; while some scientific information is helpful, a lot of the process is actually "political" so that facilitation is more helpful than more complex products. Interviewees expressed a great deal of frustration due to the investment of time and resources, and what they saw as the lack of a workable model for the basin.

4.3.5.2 RiverWare Model

Interviewees raised several concerns about the RiverWare model. For some, the RiverWare model did not produce accurate results because it was not fully calibrated to include water rights or other baseline gage information from the basin. One person noted that by using data from 1980 to 2000, significant changes in the basin were missed; a lot of instream conservation work has been done from 2000 to 2014 but is not addressed in the model or the report. These interviewees indicated that they would have liked to see a "more in-depth study looking not just at information already there, but stretched it out to current real timeframe. All models neglect to catch this—we are still using ModSim that only runs to the year."

One person commented that he did not "know that it added much value" in the context of everything else going on; this interviewee was "hoping to produce real tools that we can use, and

that we can really advance ourselves in process/tools of available, didn't really do this." Another commented that if the RiverWare model is going to be used in the BSOA, it will be "valuable. If not, then it hasn't provided what we were looking for." Some interviewees expressed concern about a basin with "dueling models" that are in competition.

Another interviewee was "hoping to have a more interactive tool for looking at environmental benefits of the work, changes in flows. Didn't see this—wasn't able to see the flow benefits/outcomes in the work they were doing—if there were changes, how would affect the flows/reservoirs?"

Others interviewees raised concerns about where the model would "live" when the pilot project ended, who could run it, how it would be maintained, and who would pay for it. One person noted that it is challenging or "disconcerting" that the model and model results could not be made freely available; while this individual acknowledged the concern about potential "misuse," he thought there would be ways to be clear those issues up front, with the appropriate caveats, on how to use the data. For this interviewee, a more broadly accessible model rather than limited access would have been good, even though there "are acknowledged risks in doing so."

4.3.5.3 Scenarios

One interviewee said that it would be useful to test scenarios at a fine-tuning level, not just "big step" functions of 100 cubic feet/second. Being able to run fine-grain scenarios and test iterations would be important: "If we are redistributing water in the basin, we need to be able to have iterations of access to the model. These need to be specific, measurable, attainable, and timely (SMART)." Another interviewee noted that the visualization system would have worked better with more iterations of the model under different conditions; earlier completion of the model would have allowed for more scenario runs and helped improve the timing, ability to use the visualization system, and a way to address the lack of data depth.

One interviewee pointed out that slides used to present the scenarios during a workshop contained erroneous or inaccurate information. Even though the slides were presented with the caveat that they were for illustrative purposes, this interviewee said that showing information that local stakeholders knew to be inaccurate "made everyone a bit suspect" and could have "contaminated the reliability/confidence factor in [the national laboratories'] work." This individual advised to "be careful with demonstration to use reasonably accurate information, even if it is model output. This needs to be close to reality."

4.3.5.4 Web-Based Tools (Data Visualization Interface)

Some interviewees noted that the web-based tools were "kind of useful, but need to be used in the planning context." Another interviewee commented that there was not as much follow through on these products. Someone else noted that he didn't recall "the website being addressed or initiated—no link or any info about this. Thought this would have been helpful. Know that there was apprehension from the group playing with it, then calling about why can't do this, why can't do that." Another noted that these web-based tools could have been developed more if the model had been completed earlier in the project.

4.3.5.5 Hydropower Analysis

A couple of interviewees noted that identification of potential hydropower sites was useful, but this information was not new and was simply a distillation of prior reports. In one case, an interviewee said that the identified opportunity had already been studied and deemed infeasible, which was not reflected in the report. A number of interviewees expressed disappointment that they did not learn new information about previously unidentified sites. Some interviewees indicated that the summary of potential power produced would be a useful number, but that their doubt in various assumptions would cast suspicion on any number identified.

4.3.5.6 Reports

Some interviewees said that the "big reports" were not useful for local stakeholders, but helped meet the needs of the project. Others stated that the final draft report contained erroneous or inaccurate information, which could cause harm to the basin due to lack of "veracity." One interviewee who reviewed the April 2014 draft said "there was nothing in there that we didn't know." Others expressed their frustration that the final report was not yet out, or that they did not know if it had been released.

4.3.6 Potential Help Provided by the Basin Scale Opportunity Assessment

All of the stakeholders interviewed wanted this pilot project to be successful, regardless of frustrations they raised or issues they might have had. Many interviewees noted that the RiverWare model with its daily time step and accounting features is a needed improvement in the basin *if* it can be released and used for other planning processes.

In addition, interviewees said that it was helpful to use this pilot project as a learning opportunity to help develop methodology, create a broader dialogue, and engage with national level issues such as DOE's hydropower emphasis. In the words of one interviewee, the "policy push" is important to help frame the discussion and reach beyond just creating "technical tools:" this project provides "understanding while also overcoming barriers and identifying environmental win/wins… in 10 years, it will be helpful to have had this conservation at a national level."

4.4 QUESTION 5: RECOMMENDATIONS FOR OTHER BASINS

Interviewees offered a variety of recommendations for this kind of project in other river basins. These recommendations are summarized by category, below.

4.4.1 Getting Started Is a Critical Time Period

One interviewee noted that basin stakeholders have a lot of investment in their professional lives in this kind of work; they want to see their effort succeed.

Recommendations, paraphrased from interviewees' statements, include:

- Identifying major players and stakeholders is key.

- Consider using a competitive bid process for this kind of pilot project; for example, a river basin would apply to get the BSOA. This would help get people fully engaged and ensure that they are interested and involved.
- Think about how to announce the project to basin stakeholders. "Don't just announce that you are coming in and doing a pilot project. Are they going to be disruptive, cooperative? Involve local people?" Communicate with locals before. Identify key, diverse stakeholders in the basin; "work with them first, get buyoff but avoid one group vetoing a project, but at least work with people to establish a project. They help establish credibility. If you announce what you doing without engagement, it will be hard, or will be a waste."
- Early involvement is helpful, especially if there are already organized efforts. If there is not the kind of existing structure like that in the Deschutes Basin, it might be harder. In the Deschutes, there were already irrigation districts, municipalities, strong multi-year water organizations, and others with strong hydro interests. As one person observed "people can make each other's points—they are that familiar with each other. This would be an important aspect to consider elsewhere—are there strong basin organization(s) such as the Farm Bureau that can provide some level of forum, a place for interaction? If there is not a strong baseline, then it could create a lot of issues."
- Lots of planning options are out there, especially through Reclamation; tie a BSOA project into other processes. In the Walla Walla River Basin in Washington, for example, funding is through the Washington Department of Ecology and system optimization grants; this provides funding beyond individual irrigation districts. "Avoid rebuilding the wheel; use what is already working. A cookie cutter approach may not be the best approach." Make it competitive—a privilege—to ensure more stakeholder engagement and buy in.

4.4.2 Manage Expectations Carefully

Paraphrased recommendations include:

- Be very careful about getting involved in decisions, especially decadal decisions or more. Think about conversations and what people expect; in the Deschutes, it took 3 years but we "were only able to get to an initial set of scenarios." People enter these processes knowing about opportunities, but are waiting for the right timing and processes to move them forward. However, DOE doesn't fund decadal processes; there is pressure "to get in and out. Be careful about engaging in long-term processes without a long-term funding commitment."
- Expectations need to be clearer at the beginning. If the national laboratories "are walking into a basin with on-going regulatory processes, there needs to be clarity about how the BSOA is or is not going to interact with these processes. A project like the BSOA could serve as an important technical hub so that all the interlocking processes could use same tools, processes; this would be valuable."
- To the extent possible, be more predictable about the budget and work plan for the project. While this may be "largely out of control [of project managers] it is hard to have variation: it undercuts integrity, trust in the project."

4.4.3 Pick Tools Appropriate to the Basin

Paraphrased recommendations include:

- Examine carefully the chosen basin and existing tools, determine what is appropriate to use, and seek feedback on what has already been done in the basin. For example, basin stakeholders had just completed a large study looking at climate change flows in the Deschutes and determined that the VIC model did not work in the Deschutes. However, the feedback to avoid using this model was ignored in the beginning.
- Seek clarity about what value stakeholders might perceive about the RiverWare model: what promise does it offer, how can it be used, will basin modelers use it, and find it useful? Does it fit for the kinds of needs and issues in the particular basin? Can it be calibrated for the particular basin? How does it address climate, and what is the climate module: how does this work, what is the timing? Is it an appropriate tool for a particular basin? If a model like RiverWare (or some other "sophisticated mass balance model") already exists in a basin, it may move things forward faster and lead to more scenario runs and iterations.
- Be open to learning about the basin. For example, one person noted that they did not understand why there was not more in-conduit hydro in the basin; this seemed like "low hanging fruit" for the Deschutes Basin, especially given the opportunity for a new use, new revenue, and an incentive to keep water in the canals. However, as the stakeholders exchanged more information, it helped people realize that this is "more complicated" than it first seemed. The larger issue about integrating water and the environment is "a bigger question", and a challenge for DOE, which is focused on energy, not integrated water resource management.
- Think about or "process" the products that will be needed up front. Think about how to provide benefit at the local level: what benefit can be produced, and how can it be produced? Once the federal project is done, also think about having "a clear handoff in a timely way."

4.4.4 Use All Pertinent Sources of Information/Data

Paraphrased recommendations include:

- Exhaust all potential sources of data. In the Deschutes Basin, some gave an example of data missed: there were gages operated by the U.S. Geological Survey (USGS) that were discontinued in 1991; however, under a joint operating agreement, the OWRD kept running the gages. The only data gathered were those from the USGS prior to 1991, so the later data were not used.
- Conduct a complete literature search and review, not only from websites but peer-reviewed literature and studies as well. Cite to original studies, not others interpreting the data.
- Develop a technical working group, as well as a steering type committee, to ensure regular and systematic interaction with those who manage water in the basin and have access to critical information. In some places, a state agency may be a critical player, where in other basins, federal agencies may have a more critical role.

- Tap into questions and data that local stakeholders may have, and keep updating it as the project proceeds. Information is being developed in other processes and by other agencies; ensure that it is included (and recognize others' hard work).

4.4.5 Tailor the Process to the Basin

Paraphrased recommendations include:

- Ensure that questions being asked, and answers being developed, are both locally driven, using more of a consensus process. For example, "this is what we are trying to ask and what we're trying to answer. If we put hydro at this place or location, then make these changes, here are the results…"
- Different approaches may be work better depending on the underlying framework of the basin. For example, a BSOA approach may work better in non-prior appropriation doctrine stream—maybe in an east coast riparian based system or for tributaries to big river systems like the Willamette, Columbia, or Upper Colorado systems.
- As discussed above, if basins already have tools developed, the BSOA project would change based on this: i.e., expanding on a tool differs from building a new one.

4.4.6 Continuity and Communication

Paraphrased recommendations include:

- Focus on being "present" in whatever basin is chosen. Recognize the belief that "all river basins are somewhat parochial—always viewed as someone coming in from the outside."
- Communicate consistently throughout the whole process. Ensure policy is communicated to technical modelers, and that technical modeling work is communicated to policy makers (even simply that modeling work is taking place). Conduct regular meetings at the management level, and then use a technical sub-group that meets regularly and reports back. Keep the technical group more apprised of the big picture.
- Ensure consistent communication through the end of the project. Some noted feeling "removed from the process" and that they "didn't know what the ultimate goals, outcomes ended up being."
- Ensure communication takes place within agencies and entities—make sure that front line technical people are well connected with their policy people, and vice versa, so that everyone can stay posted.
- Think about the arc of a project:
  1) "Have a pretty focused beginning and end (don't get caught into too long a process). Use a simpler methodology, with lower expectations. Have realistic expectations, communicate up front."
  2) "Communicate the expectations."
  3) "Execute."
- Consider a simpler process such as:
  Phase 1: conduct a preliminary analysis with targeted stakeholder engagement.
  Phase 2: focused interaction, workshop to vet findings.
  Phase 3: iterate model.

Having targeted phases with a clear beginning and end point might help manage expectations, both nationally and locally. At the end, have a clear transition to local interests; transfer the technology to those who can apply it in the future.

REFERENCES

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(PNNL) Pacific Northwest National Laboratory. (2014). *The Integrated Basin-Scale Opportunity Assessment Initiative: Pilot Assessment for the Deschutes River Basin*. April. Available on-line at http://basin.pnnl.gov/Content/reports/Deschutes/PNNL-23197_Deschutes_final_report.pdf.

APPENDIX A. MEMO AND QUESTIONNAIRE SENT TO POTENTIAL INTERVIEWEES

APPENDIX A. TITLE

ATTACHMENT A- MEMO AND QUESTIONNAIRE SENT TO POTENTIAL INTERVIEWEES

To: **Deschutes River Basin Stakeholder**
From: **Lara Fowler, Stakeholder Assessment**
Re: **Deschutes Basin Scale Opportunity Assessment and Questions for Post Project Report**
Date: **June 3, 2014**

Background:
The Pacific Northwest National Laboratory (PNNL) and Oak Ridge National Laboratory (ORNL) have developed the Integrated Basin Scale Opportunity Assessment Initiative, through the support of the US Department of Energy (DOE). The purpose of this Initiative was to identify and investigate potential opportunities to increase hydropower generation and environmental benefits while avoiding detrimental impacts to other water users. A National Steering Committee selected Oregon's Upper Deschutes/Crooked River basin as an initial demonstration basin for the Initiative in 2011. PNNL and ORNL then worked with Deschutes Basin stakeholders to review existing models; develop a RiverWare based model to investigate interactions between hydropower and environmental opportunities and existing water uses in the basin; create tools and scenarios; and analyze potential opportunities.

PNNL and ORNL held a workshop on February 1, 2013 to bring basin stakeholders up to speed on these modeling efforts and to share preliminary results, answer questions, and identify next steps. On January 30, 2014, PNNL and ORNL reviewed the final results of this model via a webinar with basin stakeholders, and then released a final summary report in April 2014.

Post Project Report
DOE wants to apply lessons learned through this process to similar projects in other river basins. They have hired me to conduct interviews and evaluate the process from a variety of stakeholder perspectives, then draft a "post project report". These interviews will be confidential, and participants are encouraged to be frank. Although I will share a list of who was interviewed, no statements will be attributed in the report or any presentations associated with this project. Interviews are voluntary and participants may choose to end it at any time.

I am providing the list of interview topics to provide the opportunity to reflect prior to the interview. However, advanced preparation is not required.

Questions:

1. **What were your experiences with the Upper Deschutes/Crooked River Basin-Scale Opportunity Assessment demonstration effort?**
    a. What is your/your organization's role related to the Deschutes Basin?
    b. What is your/your organization's role related to the Deschutes Basin Scale Opportunity Assessment?
    c. When did you/your organization become involved?
        i. Any changes in nature (extent) of involvement over time?

ii. Frequency of interaction with people on the Basin Scale Opportunity Assessment team?

2. **Overall, to what extent would you consider this Basin Scale Opportunity to have been successful? In what way(s)?**

3. **What work well during this demonstration?**
    a. What were your/your organization's initial expectations?
    b. To what extent did your expectations change over time?
    c. What worked well with regard to the process used in the Basin Scale Opportunity Assessment?
    d. What worked well in terms of the products or outcomes of the assessment?
    e. To what extent did the Basin Scale Opportunity Assessment help you/your organization, or how might it help you?
        i. In what way(s)?

4. **What did not work well during this demonstration?**
    a. In relation to your initial expectations?
    b. In relation to the expectations you developed over time?
    c. In terms of the Basin Scale Opportunity Assessment process?
    d. In terms of products or outcomes of the assessment?

5. **What are your top three recommendations for conducting a similar Basin-Scale Opportunity Assessments in other basins?**
    a. For improving this kind of assessment process?
    b. For making the products or outcomes that result from the process more valuable to you/your organization?

6. **Do you have other comments to share about the Deschutes Basin Scale Opportunity Assessment demonstration? [please share]**