Water Availability Model Update

Project Charter

December 2024

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Business Case Statement

Oregon Water Resources Department (OWRD; the Department) developed the Water Availability Reporting System (WARS; herein referred to as the Water Availability Model) in the early 1990s as a systematic method to provide estimates of the amount of surface water available for appropriation. Estimates of water availability utilize a statistical approach that is dependent upon a 30-year period of record intended to capture changing patterns of streamflow as a result of climatic variability and represent near-term conditions.

Currently, WARS relies on hydrologic and climatological data from 1958-1987 (i.e., base period) as the fundamental information for deriving components of the water availability equation (natural streamflow minus expected demands). The Department recognizes that climate change, natural variation in conditions, hydraulic connection to aquifers, and increased demand on surface water and groundwater have caused streamflow patterns to shift since that time period. A transition to a more recent base period (e.g., 1991-2020) will better represent current conditions, avoid further overallocation, and support planning and basin study efforts.

Policy Option Package #111

Policy Option Package #111 submitted by the Department as part of the 2023-2025 Agency Request Budget identified several items that would lead to a successful update of the water availability model:

1. Provide updated estimates of natural streamflow state-wide.
2. Incorporate modern technology (i.e., satellite-based data) to more accurately account for water use in estimating water availability.
3. Provide updated information for the public and communities to better understand their water resources.
4. Maintain and expand network of gaging stations that monitor natural streamflow.
5. More timely processing and publication of streamflow data.
6. Develop computer programs and overall system for more efficient updates to natural streamflow and water availability in the future.
7. Expand coverage of AgriMet stations to fill gaps in weather data network.

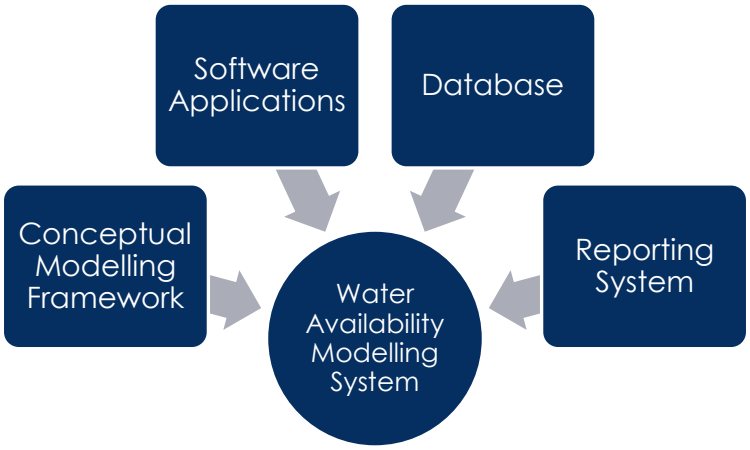
Problem Statements

1. Current estimates of natural streamflow (i.e., 50% and 80% exceedance flows), the foundational value from which water availability is derived, are representative of the period from 1958 to 1987.
2. Information used to calculate the consumptive component of water use has been superseded by modern research and technologies.

3. Place-based and other water planning efforts rely upon information in the water availability database to plan for future water management and development efforts.
4. There is a limited amount of data available to support improvements to the Water Availability Model because many of the gages in the state gaging network is intended for management purposes, such as regulation of water users.
5. Processing and publication of streamflow data collected at gaging stations is an understaffed effort and there is currently a backlog of streamflow records beginning in the mid-2000s, in addition to more recent records, that need to be published prior to updating the water availability model.
6. The current software applications used to maintain the water availability database would require significant improvements to become functional for performing computations to update the database.
7. The Department is at risk of overallocating surface water by relying on outdated data and is subject to further litigation.
8. The Department remains vulnerable to contested case hearings due to a lack of traceability of the processes and methods for deriving natural streamflow and water availability.
9. The scale at which current water availability information is made available (i.e., Water Availability Basins or WABs) limits decision making both at the Department and other agencies (e.g., Oregon Department of Fish and Wildlife).
10. The water availability model does not currently allow for the insertion of new WABs into the model framework which complicates evaluation of water availability on small tributaries that are located in larger WABs, such as small streams that are tributary to the mainstem Willamette River.

Goal Statement

The Water Availability Model Update Project will include phased work that will ultimately lead to a modelling system that will be used to calculate water availability for Oregon surface waters and implement the new information into Department operations by January 1, 2030. The modelling system (see figure below) will consist of a conceptual modelling framework, software applications to run the model, a database to house data and information produced by the model, and a reporting system to make information available to support decision making. The phased work includes project planning and scope development, creation and implementation of a communication plan, analysis of current policy and evaluation of necessary changes or development of new policies, development of a computing system, and hydrologic analysis to inform the modelling framework (i.e., data, computations, etc.). Although this work will be phased with varying start dates, various components of each phase can be done concurrently. Project management will occur throughout the life of the project.



Phase One: Initiation

Estimated timeline: Q3 2023 – Q4 2024

Purpose**:** Establish the purpose and overall deliverables and secure buy-in from Department management and administration. Begin creation of project planning artifacts and acquire necessary resources for the project.

Objectives:

1. Conduct interviews and hiring process to fill project roles with current and new positions.
2. Create onboarding plan to generally introduce Project Team to Water Availability Model and purpose of model update.
3. Define overall project scope and boundaries, roles and responsibilities of Project Team members, and general project timeline.
4. Establish streamflow publication plan to ensure data will be published in a timely manner.
5. Establish gage network expansion plan to install new streamgages intended to support development of the Water Availability Model.

Phase Two: Outreach and Engagement

Estimated timeline: Q1 2025 – Q4 2029

Purpose: Carry out and manage the communication plan that will establish buy-in and set expectations for outcomes of the project for interested parties.

Objectives:

1. Create a communication plan that details the scope and schedule for communications and messaging with interested parties.
2. Establish Interagency work group to establish expectations and acquire feedback from State and Federal partner agencies.

3. Establish a Technical Consultation Group with subject matter experts to establish buy-in from the scientific and technical community.
4. Conduct communication plan to establish expectations for outcomes of the project and gather feedback from interested parties.

Phase Three: Inception

Estimated timeline: Q1 2025 – Q3 2025

Purpose: Begin understanding the requirements of the Water Availability Model modelling framework and overall modelling system and begin outlining the Project Plan (e.g., schedule, work items, etc.) at a high level. Scope hydrologic analyses and policy review to inform work to be performed during Elaboration.

Objectives:

1. Identify decision points that will inform requirements of the modelling framework.
2. Scope hydrologic analyses that will help inform decision making.
3. Describe essential needs and features of the modelling software and reporting tool at a high level and begin outlining requirements.
4. Scope policy assessment and review to determine implications of the model update and the need for policy development or change.
5. Form Technical Consultation Group and present scope of work for hydrologic analysis.
6. Identify at least one possible solution for the modelling software and database architecture.
7. Outline overall project schedule.

Phase Four: Elaboration

Estimated timeline: Q4 2025 – Q2 2027

Purpose: Further detail the critical requirements of the Water Availability Model workflow to provide a stable basis for the bulk of development during the Construction phase. More Detailing requirements and work items lead to better understanding of Project Plan details.

Objectives:

1. Conduct hydrologic analyses and document decisions that further elaborate water availability model requirements (e.g., data, methods, etc.).
2. Conduct policy assessment.
3. Design, develop, and test an executable modelling framework for calculating water availability.
4. Design software for user control of modelling framework.
5. Design reporting tool that makes water availability information available for decision making.

6. Produce more detailed and accurate project schedule.

Phase Five: Construction

Estimated timeline: Q3 2027 – Q2 2028

Purpose: Develop an operational version of the Water Availability Modelling System that will then be used to compute water availability and populate the database.

Objectives:

1. Describe remaining requirements and design details and implement into system.
2. Construct reporting tool.
3. Construct software.
4. Test the modelling system.
5. Develop policy recommendations.

Phase Six: Transition

Estimated timeline: Q3 2028 – Q2 2029

Purpose: Use the modelling framework and software to compute water availability and populate the database for use in Department operations.

Objectives:

1. Use the Water Availability Modelling System to calculate water availability.
2. Perform quality assurance and quality control.
3. Populate Water Availability Database with published values of water availability and associated information

Phase Seven: Closeout

Estimated timeline: Q3 2029 – Q4 2029

Purpose: Implement new water availability information into Department programs and operations. Perform retrospective that includes reflecting on lessons learned and publishing the Water Availability Model for reference.

Objectives:

1. Identify improvements for future maintenance, upgrades, and overall project lifecycle, and document lessons learned.
2. Publish Water Availability Model methods in Open File Report.
3. Document user guide for modelling framework and software.
4. Integrate Water Availability Database and reporting tool with Department programs and operations.

Scope Overview and Deliverables

Minimum Viable Product (Must-Have)

The minimum viable product addresses the items outlined in POP #111 (see above) that describe how the project will achieve its intended purpose.

Project Plan: Project planning will consist of staffing, project scoping, identification of requirements, creation of a work breakdown structure, and project scheduling, as well as creation of artifacts to manage files, data, communications, scope, and change requests.

Staffing: Funds for new positions were provided to support this project. These positions have been or will be filled.

- Assistant Surface Water Section Manager (filled)
- Software Engineer (filled)
- Research Hydrologist (filled)
- Data Developer (filled)
- Operations and Policy Analyst (filled)
- Administrative Specialist (filled)
- Hydrographer (2) (vacant)

Gage Network Expansion: The water availability model relies on information from gages that monitor or measure streamflow that is minimally impacted by human activities, such as diversion or regulation. POP #111 allocated funds to support this portion of the streamgage network operated by the Department. The project team will evaluate the network of gages operated not only by OWRD, but also the US Geological Survey and other entities to determine where there are gaps in information that could be filled by installing new gages. New gages (approximately 10) will then be installed to support model development and maintenance, though it remains to be determined how long the new gages must be collecting data before being included in model development.

Expanded Weather Station Network: A total of 30 new AgriMet stations were installed in a cooperative effort between the Department and Oregon State University. The stations will support ground-truthing of information produced by the Statewide ET project.

Streamflow Record Processing and Publication: Model development and resulting water availability information relies on published streamflow records. A streamflow record prioritization and publication plan will be developed to ensure records are published in a timely fashion. There is a backlog of streamflow records that need to be published from past years – this plan intends to address both the backlog and incoming data from current and newly established streamgages. Current and new hydrographer positions will be responsible for carrying out the plan.

Updated Water Availability Model: The Department's Water Availability Model will be evaluated to identify data needs, computational upgrades, and decision points that will

be informed by hydrologic analysis and ultimately lead to an updated modelling framework to calculate water availability and associated information.

Software System and Database: A software system will be developed that will provide the user interface for performing much of the computational work to calculate water availability. A dynamic database will be created that will be populated by the software system and house water availability information. The modelling system will produce traceable values that will identify all data and processes involved in producing published values.

Consumptive Use (i.e., Water Use) Information: As part of this project, different methods for computing consumptive use will be evaluated, including the newly developed OpenET software and information produced by the Statewide ET project. This project is anticipated to leverage information from both the Statewide ET project and the Water Rights Information System to quantify water use. In addition, new AgriMet stations, which were supported by funds through POP #111, have been installed to fill gaps in the weather station network throughout Oregon and ground-truth information produced by the Statewide ET project.

Reporting Tool (i.e., Decision Support): A reporting tool (i.e., water availability data tables) that makes water availability information available to support decision making (e.g., water right evaluation) by interested parties will be created.

Policy Review and Recommendation: Internal policy (i.e., guidance not written in rule and/or statute) will be reviewed to assist with identifying requirements and guide project development. Additionally, policy pertaining to the use and sharing of water availability information to support Department programs and operations will be developed.

Communication Plan: A communication plan will be created and carried out to notify interested parties, including partner and other external agencies, interest groups, and the general public of progress and establish expectations of this project.

Technical Consultation Group: Formation of a Technical Consultation Group that reviews the proposed scope of work to inform decision points and provides feedback regarding the modelling framework will mitigate the risk of requiring major revisions after significant work has been performed.

Documentation (ex. Open File Report(s), user guidance, maintenance): The overall Water Availability Modelling framework will be published in an Open File Report and appropriate usability and maintenance of the modelling system will be documented.

Nice But Not Critical (Could-Have with Additional Scoping and/or Resources)

Scenario Analysis: The addition of a scenario analysis tool that would allow for hypothetical manipulation to the water availability database would be beneficial for decision making. The current system does not support this function and workarounds to

perform the work are time intensive. While this tool would be beneficial, it is not required to perform work. The feasibility of developing this tool is dependent upon the exact requirements and features, such as whether it is intended to support evaluation of individual water right applications, contested case settlement, or otherwise.

Online Data Delivery Interface: The delivery and accessibility of newly created information from this project was identified as an item to consider during scoping. At a minimum, the current system could simply reflect the changes in the database while maintaining the same functionality in terms of delivery and accessibility. However, there is the potential for conducting outreach and developing use cases with planning groups who regularly use and depend on the information in the water availability database to determine what improvements would benefit their programs.

Exclusions (Won't-Have)

Physical Water Availability Model: One identified challenge relates to quantifying water availability for the purpose of responsible allocation of surface waters as opposed to quantifying physically available water for the purpose of real-time management or operational decision making of water resources. A requirement of the current iteration of the water availability database was to calculate water availability in order to responsibly and consistently allocate surface waters to ensure water right holders can access water a reasonable amount of time. Many fundamental assumptions were made in the development of the system and its calculation of water availability to meet this requirement. An alternative version that considers diversions as opposed to consumptive use necessarily results in a different product that is unlikely to fit within the scope and timeline of the project due to data limitations, such as insufficient monitoring networks for water metering and gaged diversions. More intimate knowledge of on-the-ground operations gained through basin studies, which will not be completed during this project's lifetime, may also support this alternative product at some point in the future.

Climate Change Impacts on Water Availability: This project will not evaluate the impacts of future climate change scenarios on water availability information. It is understood that this is of great interest to interested parties (e.g., sister agencies, planning groups, etc.); however, there are no guiding policies, rules, or statutes, that require this effort nor describe how the information should be incorporated into decision making at the Department. Additionally, this effort is better suited for physical hydrologic modelling which is fundamentally different than the statistical nature of the water availability model that will be relied on for this project.

Rulemaking: This project does not intend to make changes to or create new rule or statute.

Assumptions, Constraints, and Risks

Assumptions

- The outstanding backlog of unpublished streamflow records to be used in the water availability model update will be published prior to producing official values of water availability and its component parts.
- Evapotranspiration (ET) data will be acquired through the Statewide ET project and an in-house database will be developed to assist with the calculation of consumptive use.
- Groundwater staff will be available to research and/or develop methodology for incorporating impacts of groundwater withdrawal on water availability.
- Results from Department basin studies will not be fully realized throughout the lifetime of the project.

Constraints

- Standards established by the World Meteorological Organization recommend updating databases and/or systems that rely on a base period at the end of every decade in years ending in 0, meaning by the project deadline date of 2030 it will be recommended to update the base data the model relies upon. It will likely take upwards of one to two years to incorporate changes in the base data.
- The 2030 deadline currently imposed by House Bill 3368 constrains the potential methods for calculating water availability. It is likely that the project will rely on similar methodology that the water availability model currently relies on (i.e., statistical methods – regional regression equations).
- Development of software applications precludes water availability data publication.
- Communication plan must be developed prior to active outreach and messaging.
- Staff turnover will create barriers to consistent development of software applications and technical work and potentially result in late delivery of final products.
- Results from on-going and future basin studies will be difficult to incorporate, including findings regarding groundwater-surface water interactions in particular.
- Integration of the Water Rights Information System and Water Availability Reporting System remains incompatible, complicating tracking of water rights transactions, such as transfers, cancellations, etc.

Risks

- Staff turnover will create barriers to consistent development of software applications and technical work and potentially result in late delivery of final products.
- If previous natural flow estimates and information are not preserved (i.e., archived), OWRD is at risk of negative outcomes during protested cases for instream water rights.

- Changes to natural streamflow estimates may complicate regulation and water management scenarios for minimum flows and instream water rights.
- Impacts to water availability are not well-received by interested parties, including water users and public interest groups.
- Project development may rely on unpublished streamflow records due to time and resource requirements, resulting in sub-par data quality and unquantifiable errors in computation (i.e., uncertainty).
- Data from newly installed streamgages may not be available or used for this iteration.
- The Department is at risk of further overallocating water resources by relying on outdated data and information.
- The Department remains vulnerable to contested case hearings due to a lack of traceability of the processes and methods for deriving natural streamflow and water availability.
- Information in the water availability database does not align with other databases (i.e., WRIS).
- Maintenance of the water availability database becomes impossible due to changes in information systems.
- Planning groups remain vulnerable in planning for their water future by relying on outdated information.
- There is limited utility of the water availability system and database as surface and groundwater resources become fully appropriated.
- The water availability database cannot assist with the future of transfers, instream leases, and mitigation programs as water supplies become more limited.

Success Criteria

- Natural streamflow and water availability are calculated to represent today's climate.
- Software applications are maintainable by Department staff and capable of incorporating new data to perform computations and regularly update estimates of water availability and natural streamflow.
- Process for computing water availability information is replicable from input data to final values.
- All relevant water availability information to support decision making is made available through reporting tool.
- Water availability modelling framework is peer-reviewed by subject matter experts.
- Program analysis develops and incorporates recommendations for process improvements and change or development of policies.

- Interested parties are made aware of the impacts and timing of project implementations.

Internal and External Partner Engagement

The Water Availability Model Update project will likely have far-reaching impacts within the Department among various sections, programs, and end-users. Department programs that utilize or depend upon data and information maintained in the Water Availability database, including drought permitting, Deschutes Mitigation, Scenic Waterways, Place-Based Planning initiatives, and others, will need to be evaluated to understand the potential for significant program impacts requiring consideration of policy change or development.

In addition, the updated quantities of water availability will result in changes to the amount of surface water available for appropriation, impacting prospective water users' ability to obtain a surface water right, as well as having direct implications on limiting groundwater appropriations. There will also be impacts to partner agencies, such as Oregon Department of Fish and Wildlife's instream flow program, that will require outreach to inform of the potential impacts.

Finally, given the complexity of the water availability model and its use as a decision support tool, review of the overall methodology by local and regional subject matter experts would help ensure a technically sound product. An Open File Report that documents the Water Availability Model will be reviewed as part of the closeout phase.

This will be accomplished through:

- *Internal OWRD Engagement*: Includes personnel who will be impacted by the project work or outcomes. Affected individuals, program areas, and other dependencies will be incorporated into project plans.
- *Interagency Communications*: Agencies including Department of Fish and Wildlife, Department of Environmental Quality, Health Authority, Department of Energy, Oregon Tribes, and Department of Agriculture will be incorporated in project messaging and communications planning to be kept aware of project status and implications.
- *Technical Consultation Group*: To be composed of external subject matter experts to provide feedback regarding development of the modelling framework throughout much of the project.
- *Public Messaging Plan*: To include development of a unified overall message and creation of a messaging schedule and channels of communication.

Roles, Teams, and Membership

Positional Roles

Senior Hydrologist: Manage the project and provide technical direction for scoping, developing, and executing the water availability model framework.

Assistant Surface Water Manager: Provide support and leadership, acquire commitments from management, and commission resources from other Department sections and program areas.

Application Development Manager: Define overall software system and database resources and make key technical decisions regarding design and implementation.

Software Engineer: Lead software development life cycle(s).

Research Hydrologist: Scope and perform hydrologic analyses to inform decision-making regarding modelling framework.

Data Developer: Scope, develop, and manage water availability modelling framework.

Program Analyst: Represent agency and stakeholder concerns as it relates to project outcomes and coordinate communication and messaging plan.

Hydrologist: Provide technical support for hydrologic analyses.

Hydrographer(s): Publish streamflow records and maintain gaging network.

Teams and Membership

Project Management Team: Manage project, acquire and coordinate resources, facilitate work, make final decisions.

- Executive Sponsor: Annette Liebe
- Project Sponsor(s): Jordan Beamer, Rachel LovellFord
- Project Manager: Ryan Andrews

Core Team: Develop project scope, perform technical work, make recommendations to Project Management Team, and execute the project.

- Senior Hydrologist: Ryan Andrews
- Assistant Surface Water Section Manager: Jordan Beamer
- Application Development Manager: Michael Smith
- Software Engineer: Paul Post
- Program Analyst: Laura Tesler
- Research Hydrologist: Cortney Cameron
- Data Developer: Cheng-Wei Huang
- Hydrologist (Water Availability Analyst): Vacant

Technical Assistance: Assist with scoping, executing work, and implementation into programmatic work as needed.

- Hydrologist (ET and Water Use): Aaron Fellows
- Senior Hydrographer(s): Rich Marvin, Kara Morris
- Database Administrator: Greg Dubenko
- Hydrogeologist(s): Ben Scandella
- Senior Applications Developer: Kathy Boles
- GIS Coordinator: Bob Harmon
- Water Rights Analyst: Amanda Mather
- Senior Hydrologist (Field): Jon LaMarche
- Assistant Watermaster(s): Multiple
- Communications Specialist: Alyssa Rash
- Community Engagement Coordinator: Sue Parrish

Internal Working Group: Champion project, allocate resources, and consider policy needs.

- Director: Ivan Gall
- Deputy Director: Racquel Rancier
- Deputy Director (Water Management): Doug Woodcock
- Field Services Administrator: Kim Fritz-Ogren
- Chief Information Officer: Amit Dass
- Groundwater Manager: Justin Iverson
- Water Rights Manager: Katie Ratcliffe
- Planning, Collaborations, and Investments Manager: Vacant
- Policy Manager: Danielle Gonzalez

Signatures

Executive Sponsor
Annette Liebe 12/6/24

Chief Information Officer
Amit Dass 12/06/2024

Policy Section Manager
Danielle Hongslo 12/12/2024

Project Sponsor
Jordan Beamer Rachel LovellFord 12/13/2024

Project Manager
Ryan Andrews 12/13/2024