



## Harney Groundwater RAC: Discussion Group Materials Examples of Adaptive Management

Prepared for: Harney RAC Discussion Group

Prepared by: Harmony Burrig, High Desert Partnership and Bobby Cochran, Oregon Consensus

Last updated: 12/12/2024

Prepared for Discussion Purposes Only

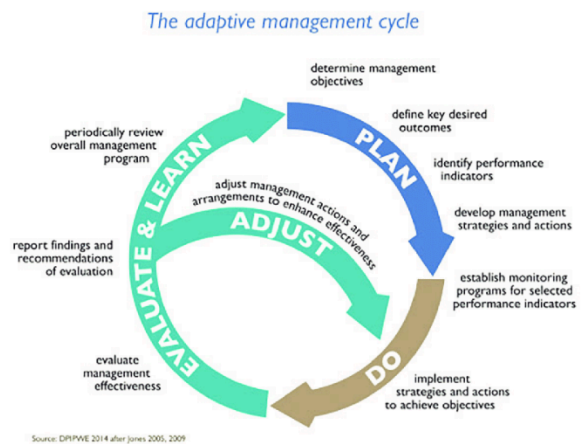
This document was developed in response to Discussion Group requests to research adaptive management approaches of other state agencies, the federal government, and in other states. Since the first meeting of the Division 512 Rulemaking Advisory Committee (RAC), RAC members have encouraged the Oregon Water Resources Department to consider options for adaptive management of groundwater reductions in the Harney Basin. This is the first time that the Oregon Water Resources Department is implementing the updated statute and rules to designate a critical groundwater area in Oregon. This presents both opportunities and challenges. Given the past success of collaborative and adaptive management approaches for other natural resources related challenges in the Harney Basin, members of the RAC have encouraged the Department to use this as an opportunity to try new approaches that might prove successful in the Harney Basin and elsewhere. Adaptive management is also encouraged in the Harney Community-Based Integrated Water Resources Plan (Attachment A).

### Definitions

A working definition of adaptive management is as follows: “adaptive management is a systematic and iterative approach for improving resource management by emphasizing learning from management outcomes” ([Dallmeier et al, 2013](#); adapted from [Holling, 1978](#)).

The place-based integrated water resources plan for groundwater in the Harney Basin describes adaptive management as follows: “Adaptive management is the process of learning while doing. It is dependent on monitoring outcomes of interventions (implemented strategies) and is based on a planning process that produces strategies that have expected outcomes. As specific strategies are implemented the expected outcome should be identified and the timeframe to accomplish those outcomes should be identified.”

In a National Academies of Sciences paper on adaptive management in water project planning indicates that: “Adaptive management promotes



flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a 'trial and error' process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals, increases scientific knowledge, and reduces tensions among stakeholders" ([National Academies of Sciences, 2004](#)).

Figure 1 depicts an adaptive management cycle and process that involves adjusting management based on changing information, evaluation, and learning.

### Elements of Adaptive Management

The following elements of adaptive management have been previously discussed in the RAC and discussion group:

- Indicators and metrics of success
- Monitoring, analysis, and reporting
- Key milestones
- Evaluation of effectiveness
- Adjustment of management actions
- Process considerations
- Public participation

### Examples of Adaptive Management

Table 1 includes a brief overview of several examples of adaptive management employed by Oregon state agencies, the federal government and also agencies in other states. Other examples may be added over time. Review of these adaptive management approaches along with feedback provided by members and the RAC and discussion group resulted in identification of several potential mechanisms for adaptive management:

- **Monitoring and reporting** at regular intervals.
- **Incorporation of a plan or other planning documents by rule and/or by internal policy.** which could include details not appropriate for rule (e.g., monitoring plan, management plan, implementation plan, adaptive management considerations, etc).
- **Phased approaches to implementation** documented in rule with specific milestones, measures of success or triggers for action considered at key intervals or when certain conditions are met.
- **Creation of an advisory group or committee to advise** on adaptive management or other implementation considerations.
- **Establishment of a formal or informal adaptive management program or process.**

### Additional Adaptive Management Questions and Considerations

The Department is currently considering whether and how it could support adaptive management. The following questions and considerations, which have been previously raised in RAC meetings or discussion group meetings, might help inform whether and how groundwater can be adaptively managed in the Harney Basin:

- Through a review of other rules that deploy adaptive management in Oregon, there oftentimes is not clear statutory direction for adaptive management but agencies use their broad discretion to employ adaptive management approaches. A mix of mechanisms are used in Oregon and beyond.
- How can the rules be structured to allow for different indicators or metrics of success and management approaches in different parts of the basin?
- At what intervals should certain analyses be performed to inform management decisions? What should the communication and public involvement be at those intervals?
- Can rules include criteria or triggers specifying when the Department would initiate certain actions (e.g. a contested case process, curtailment/regulation, etc)?
- What elements of implementation can or should be phased in over time? What are the benefits and drawbacks of a phased approach?
- Is a phased implementation only possible under a voluntary approach or is it also possible under a regulatory approach?
- Once a contested case process is initiated how does that affect opportunities for adaptive management?
- If significant curtailments are needed in a particular area is adaptive management even possible?
- How can the broader community support adaptive management considerations and actions that are beyond the purview of the Water Resources Department (e.g., upland management, additional non-Department led monitoring efforts or actions, etc)?
- Given that future water needs for community and economic development are not currently known, is there a way that the rules can create a pathway for future development that would not further deplete the resource, such as an “offset” or “mitigation” approach?
- As groundwater irrigated lands are transitioned back to native or non-irrigated vegetation, how can this best be facilitated to address some of the concerns related to unmanaged or fallow land?
- Is there a process and criteria for lifting a critical groundwater area designation if groundwater management goals are achieved?

Table 1. Examples of Adaptive Management in Oregon and Beyond

Entity	Overview	Statutory Authority	Rule Reference	Statutory/Rule Language
Oregon Water Resources Department	Creation of a Groundwater Study Advisory Group to advise on the Groundwater Study as it develops. Rulemaking process triggered after one year of publication of the Groundwater Study. Opportunity for voluntary cancellations to support development. Annual reporting to Commission and opportunity to adjust basin program rules based on monitoring results.	<a href="#">ORS 536.300</a>	<a href="#">OAR-690-512-0020</a>	<p>(4) Voluntary Cancellations for Groundwater Availability. (9) The Department shall report annually on the implementation of these rules to the Water Resources Commission early each calendar year beginning in 2017. The Commission may amend these rules to adjust the boundaries of the GHVGAC, or amend or repeal these rules.</p> <p>(11) The Department shall plan and conduct the study in coordination with a local Groundwater Study Advisory Committee (SAC) to be jointly appointed by the Department and the Harney County Court. [...] The Department shall provide the SAC a draft of the groundwater study report for review and comment prior to publishing the final report.</p> <p>(12) Within 1 year after the Groundwater Study discussed in subsection 11 has been published by the Department, the Department will convene a Rules Advisory Committee to explore whether there is a need for updates or changes to these rules. Members of the Groundwater Study Advisory Committee will be invited to participate on the Rules Advisory Committee.</p>
Oregon Water Resources Department	Opportunity to adjust sustainable annual yield value over time and adjust subarea boundaries in the Umatilla Basin critical groundwater areas (rules encourage adaptive management but require rulemaking to make adjustments).	<a href="#">ORS 537.515, 537.525, 537.545 &amp; 537.730 - 537.745</a>	<a href="#">OAR 690-507-0650, 690-507-0660, OAR 690-507-0680</a> <a href="#">Umatilla Basin Program</a>	<p>(1) Each of the eight subareas in the Butter Creek Critical Groundwater Area shall be managed according to the sustainable annual yield within that subarea. The Department shall refine the sustainable annual yield value over time through the use of pumpage data and the response of groundwater levels.</p> <p><b>Butter Creek CGWA: Method for Determining the Sustainable Annual Yield Butter Creek (CGWA)</b></p> <p><b>Butter Creek CGWA: Distribution of Sustainable Annual Yield</b></p> <p><b>Butter Creek CGWA: Process of Periodic Review of Sustainable Annual Yield</b></p> <p><b>Butter Creek (CGWA) Annual Reporting</b></p> <p><b>Stage Gulch CGWA: Sustainable Annual Yield</b></p>

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				<p><b>Stage Gulch CGWA: Method for Determining the Sustainable Annual Yield</b></p> <p><b>Stage Gulch CGWA: Distribution of Sustainable Annual Yield</b></p> <p><b>Stage Gulch CGWA: Process of Periodic Review of Sustainable Annual Yield</b></p> <p><b>Stage Gulch CGWA: Annual Reporting</b></p>
Oregon Water Resources Department	Rules for the Deschutes Basin mitigation program that allows for additional groundwater development if mitigation credits can be acquired to offset potential impacts to the state scenic waterway.	<a href="#">ORS 537.746</a> , <a href="#">ORS 540.155</a>	<a href="#">OAR 690-521</a> and <a href="#">OAR 690-522</a> and <a href="#">OAR 690-505-0050 – 690-5050630</a>	Set of rules setting up a complex program whereby mitigation projects are completed for the development of credits that are then used to allow additional groundwater development. Requires ongoing monitoring and reporting to determine program adjustments.
Oregon Department of State Lands	Use of leasehold management plans and annual operating plans to adaptively manage leases in accordance with rules.	<a href="#">ORS 273.805 to ORS 273.825</a>	<a href="#">OAR 141-110-005 (18)</a> and <a href="#">141-110-0100</a>	<p>(18) “Leasehold Management Plan” or “LMP” is a multi-year plan to guide the livestock grazing activities on a specific leasehold in relationship to other uses and resources, such as recreation uses, cultural resources, watershed resources, vegetation resources, and fish and wildlife habitat.</p> <p>(4) “Annual Operating Plan” or “AOP” is a plan developed every year by the Department following consultation by Department staff with a lessee to guide the grazing of livestock on a particular leasehold for a grazing year to meet the objectives outlined in an approved Leasehold Management Plan (“LMP”).</p>
Oregon Department of State Lands	Adoption of management plans by reference (e.g. Lower Willamette River Management Plan) that is then used for ongoing management.	ORS 273.045	<a href="#">OAR 141-080-0105</a>	The <a href="#">1992 Lower Willamette River Management Plan</a> as promulgated by the State Land Board and the Division of State Lands is hereby adopted by reference. Part F is the Implementation Plan.
Oregon Department of Environmental Quality	Rules governing the development and implementation of Total Maximum Daily Loads (TMDLs), which includes a Water Quality	<a href="#">ORS 468B.020</a>	<a href="#">OAR 340-042</a>	(15) “Total Maximum Daily Load (TMDL)” means a written quantitative plan and analysis for attaining and maintaining water quality standards and includes the elements described in OAR 340-042-0040. These elements include a daily load calculation of the maximum amount of a

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	Management Plan (WMQP) that contains specific standards, strategies and actions, milestones, timelines for attainment of standards as well as monitoring considerations. TMDLs and their associated plans are adopted by rule.			pollutant that a waterbody can receive and still meet state water quality standards, allocations of portions of that amount to the pollutant sources or sectors, and a Water Quality Management Plan to achieve water quality standards. <b>Establishing Total Maximum Daily Loads (TMDLs) Total Maximum Daily Loads and Water Quality Management Plans</b>
Oregon Department of Fish and Wildlife	The <a href="#">Oregon Wolf Conservation and Management Plan</a> is incorporated by reference as rule. The plan is reviewed at least once every five years to determine revisions. The plan includes multiple phases, Phase I, II, and III that are triggered by different criteria.	<a href="#">ORS 496.012</a> , <a href="#">ORS 498.012</a>	<a href="#">OAR 690-635-110</a>	The rules specify different actions for different phases. The plan describes in greater detail the different management phases and when the management objectives are achieved for each phase.
Oregon Department of Forestry	Adoption of Adaptive Management Program rules that provide regulatory certainty by establishing a transparent mechanism for scientific testing of rules, and then changing them if needed.	<a href="#">ORS 527.710</a> 36(7), chapter 33, Oregon Laws 2022	<a href="#">OAR 629-603</a>	(1) The purpose of the adaptive management program rules is to provide science-based recommendations and technical information to assist the Board of Forestry in determining when it is necessary or advisable to adjust rules, guidance, and training programs to achieve the biological goals and objectives. <b>Adaptive Management Program Committee</b>
Broad State Policy	State agencies are encouraged to adopt and incorporate adaptive management mechanisms in their programs in order to support the maintenance, restoration, and enhancement of ecosystem services.	<a href="#">ORS 468.581</a> – <a href="#">ORS 468.587</a>	na	na
Oregon Department of Fish and Wildlife	Sets forth rules for implementation of the Greater Sage-Grouse Conservation	ORS 498.500 – ORS 498.504	<a href="#">OAR 635-140</a>	These administrative rules establish the policy of the Commission for the protection and enhancement of Greater Sage-Grouse in Oregon. These rules incorporate

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	Assessment and Strategy for Oregon			and supplement portions of the "Greater Sage-Grouse Conservation Assessment and Strategy for Oregon" (2011) ("the Strategy").
Oregon Watershed Enhancement Board	OWEB prepared a guide to inform adaptive management of restoration initiatives.	NA	NA	As a funder, OWEB is interested in helping grantees and other restoration partnerships apply the elements of an adaptive management framework to better understand and improve the impact of their investments. Adaptive management is an encouraged practice for restoration initiatives as detailed in this <a href="#">guide</a> .
Bureau of Land Management	The <a href="#">Approved Resource Management Plan</a> for the Oregon Greater Sage Grouse, including an Adaptive Management Strategy with hard and soft triggers.	Federal Land Policy and Management Act (FLPMA; 43 United States Code [USC], Section 1701 et seq.)	BLM planning regulations (43 Code of Federal Regulations [CFR] Part 1600)	BLM reports annually on <a href="#">Adaptive Management Triggers</a> and pursuant actions in accordance with an Adaptive Management Strategy (first adopted in 2015 and updated in 2020) that outlines the process the BLM Oregon/Washington (OR/WA) used in cooperation with the ODFW and the U.S. Fish and Wildlife Service (FWS) to determine the annual status of sage-grouse adaptive management triggers.
Arizona Department of Water Resources	Douglas Active Management Area includes an adopted management goal and the 1 <sup>st</sup> management plan, which specifies actions for the first 10 years of active management. Active management areas generally follow guidelines for five management periods specified in statute. Active Management Areas also include the creation of a groundwater users advisory council.	<a href="#">ARS 45-420</a> , <a href="#">ARS 45-421</a> , <a href="#">ARS 45-569</a>	na	Statutory Language: B. Not later than two years after the designation of a subsequent active management area, the director shall promulgate an initial management plan for the active management area and may provide for subsequent management plans to be promulgated during the time set for achieving the management goal. The <a href="#">1<sup>st</sup> Management Plan</a> for the Douglas AMA includes reductions to be achieved in the first 10 years.

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Army Corps of Engineers	An <a href="#">adaptive management program</a> was formed to monitor and assess downstream impacts of Glen Canyon Dam. The program included creation of a <a href="#">federal advisory committee</a> to advise on adaptive management ( <a href="#">charter</a> ).	In compliance with the Grand Canyon Protection Act of 1992 (Public Law 102-575), the EIS for Glen Canyon Dam proposed a process of "adaptive management."	na	Section 1802 of the Act directed the Secretary to establish and implement long-term monitoring programs and activities to ensure the Glen Canyon Dam is operated "... in such a manner as to protect, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established, including, but not limited to natural and cultural resources and visitor use."  In order to comply with the consultation requirement of the Act, Section 1805 of the Act, the EIS recommended formation of a federal advisory committee.
Florida Department of Environmental Protection	<a href="#">Basin Management Action Plans</a> use an adaptive management approach that allows for incremental load reductions through the implementation of projects and management strategies, while simultaneously monitoring and conducting studies to better understand the water quality and hydrologic dynamics. Progress is tracked by assessing project implementation and water quality analyses. Adjustments are made to continue to make progress towards achieving water quality goals.	<a href="#">Clean Waterways Act of 2020</a>	Plans and revisions to plans are adopted by by DEP through Secretarial Order	1. Such plan must integrate the appropriate management strategies available to the state through existing water quality protection programs to achieve the total maximum daily loads and may provide for phased implementation of these management strategies to promote timely, cost-effective actions as provided for in s. 403.151. The plan must establish a schedule implementing the management strategies, establish a basis for evaluating the plan's effectiveness, and identify feasible funding strategies for implementing the plan's management strategies.  6. The basin management action plan must include milestones for implementation and water quality improvement, and an associated water quality monitoring component sufficient to evaluate whether reasonable progress in pollutant load reductions is being achieved over time. An assessment of progress toward these milestones shall be conducted every 5 years, and revisions to the plan shall be made as appropriate. Revisions to the basin management action plan shall be made by the department in cooperation with basin stakeholders.
Army Corps of Engineers	The <a href="#">Comprehensive Everglades Restoration Plan (CERP)</a> includes provisions for adaptive management, including the creation of a multiagency team, and development of an	<a href="#">Section 601(h)(3) of Water Resources Development Act (WRDA) 2000</a> defines the requirement for	na	(h)(C)(3)(i)CONTENT OF REGULATIONS.— (i) IN GENERAL.—Programmatic regulations promulgated under this paragraph shall establish a process— (l) for the development of project implementation reports, project cooperation agreements, and operating manuals



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	adaptive management plan to guide activities at multiple scales.	Programmatic Regulations, including adaptive management.		<p>that ensure that the goals and objectives of the Plan are achieved;</p> <p>(II) to ensure that new information resulting from changed or unforeseen circumstances, new scientific or technical information or information that is developed through the principles of adaptive management contained in the Plan, or future authorized changes to the Plan are integrated into the implementation of the Plan; and</p> <p>(III) to ensure the protection of the natural system consistent with the goals and purposes of the Plan, including the establishment of interim goals to provide a means by which the restoration success of the Plan may be evaluated throughout the implementation process.</p>

DRAFT for Discussion