# AGENDA

## IDAHO WATER RESOURCE BOARD

**Aquifer Stabilization Committee Meeting No. 4-24**
**Wednesday, November 6, 2024**
**Upon adjournment of Special Board Meeting No. 11-24**

Water Center
Conference Rooms 602 C & D
322 E. Front St.
BOISE

**Livestream available at https://www.youtube.com/@iwrb**

1. Introductions and Attendance
2. Butte & Market Lake Canal Company Engineering Capacity Analysis
3. ESPA Managed Recharge Standards & Procedures*
4. Other Items
5. Adjourn

Committee Members: Chair Dean Stevenson, Al Barker, Brian Olmstead, and Pat McMahon.

* Action Item: A vote regarding this item may be made at this meeting. Identifying an item as an action item on the agenda does not require a vote to be taken on the item.

**Americans with Disabilities**
The meeting will be held in person and online. If you require special accommodations to attend, participate in, or understand the meeting, please make advance arrangements by contacting Department staff by email jennifer.strange@idwr.idaho.gov or by phone at (208) 287-4800.

November 6, 2024

**BRAD LITTLE**
Governor

**JEFF RAYBOULD**
Chairman

**Idaho Water Resource Board**
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Boise, ID 83702-7374
208.287.4800
idwr.idaho.gov/iwrb



# IWRB ESPA Managed Aquifer Recharge Program Standards & Procedures

*The standards and procedures outlined in this document are intended to be advisory only and do not in themselves carry the force and effect of law. Additionally, this document may not include all procedures or guidance documents that solely affect internal processes. Any questions regarding the implementation of this document should be directed to Managed Aquifer Recharge Program staff using the contact information above.*

## I. OVERVIEW

The goal of the Idaho Water Resource Board's (IWRB) Managed Aquifer Recharge (MAR) Program (Program) is to augment aquifer recharge, enhancing water availability and predictability for users, as outlined in the Eastern Snake Plain Aquifer (ESPA) Comprehensive Aquifer Management Plan (CAMP). *See* IWRB, Eastern Snake Plain Aquifer (ESPA) Comprehensive Aquifer Management Plan (2009). The standards and procedures outlined below provide guidance to Program staff and transparency to stakeholders in pursuit of the goal.

## II. BACKGROUND

The IWRB has the authority to establish programs that address specific water resource issues deemed to be in the public interest, pursuant to Article XV, section 7 of the Idaho Constitution, and Idaho Code § 42-1734(4). Through the development of the ESPA CAMP, MAR was determined to be a tool to address the declines in the aquifer. The ESPA CAMP was adopted by the IWRB in 2008 and passed into law by the Idaho Legislature in 2009. The goal of the ESPA CAMP is to sustain the economic viability and the social and environmental health of the Eastern Snake River Plain by adaptively managing a balance between water use and supplies. In 2016 the Idaho Legislature passed Senate Concurrent Resolution No. 136 which acknowledged the following points:

- As a result of declines to ESPA water levels and total storage content, there is currently an insufficient water supply for some water users leading to water delivery calls, protracted litigation, and curtailment notices issued by the Idaho Department of Water Resources (IDWR).
- The current ESPA water levels and total storage content are inadequate to provide a reasonably safe supply of water for sustainable surface and ground water irrigation, aquaculture,

hydropower, municipal and industrial uses, the curtailment of which would cause severe economic harm to the State of Idaho.
- Sustaining the spring flows in the Thousand Spring reach of the Snake River is essential to maintaining the Murphy minimum stream flows.
- Stabilizing and enhancing the ESPA water level is in the public interest because it will lead to sustainable water supply for consumptive and nonconsumptive uses and minimize harm to Idaho's economy arising from water supply shortages.

S. Con. Res. 136, 63d Leg., 2d Reg. Sess. (Idaho 2016). The resolution established the goals that the State develop the capacity to achieve 250,000 acre-feet of average annual managed recharge on or before December 31, 2024, and established a goal of 250,000 acre-feet of average annual recharge across the ESPA for state funded managed recharge. *Id*.

This document provides a series of standards and procedures developed for the Program. The standards and procedures are divided into the following categories: Coordination, Site Metrics, Conveyance and Delivery, and Monitoring and Evaluation. Aligned with the adaptive management recommendations defined in the ESPA CAMP, this document will be updated periodically to reflect changing conditions, policy, and overall goals. Any substantive changes to the document will be approved by the IWRB.

## III. EFFECTIVE DATE

These standards and procedures shall become effective immediately. The Idaho Water Resource Board may modify or revoke these standards and procedures at any time.

Dated this _____ day of__________________ 2024.

_________________________________

Jeff Raybould
Chairman
Idaho Water Resource Board

# I. INTRODUCTION

The IWRB MAR Program has evolved significantly in the ten years since its creation. Based on experience from full-scale operations of the Program, procedural issues have been identified, which this document seeks to clarify. It is intended that this document will be updated periodically based on staff experience, evaluation of Program effectiveness, and changes in policy or goals. All substantive changes will be submitted for approval by the IWRB in accordance with the adaptive management recommendations defined in the ESPA CAMP. Some of the topics formalize standard procedures while others address more complex programmatic considerations and may require separate memorandums to provide the necessary background and methodologies.

It should be noted that these standards are specifically intended for ESPA MAR completed by or on behalf of the IWRB. Entities conducting MAR privately may not be subject to these standards.

# II. DEFINITIONS AND ABBREVIATIONS

**CAMP:** Comprehensive Aquifer Management Plan

**CFS:** cubic feet per second

**Contractor:** Any entity contracted to conduct MAR operations on behalf of the IWRB.

**ESPA:** Eastern Snake Plain Aquifer

**ESPAM:** Eastern Snake Plain Aquifer Model

**GWQMP:** Ground Water Quality Monitoring Plan

**IDEQ:** Idaho Department of Environmental Quality

**IDWR:** Idaho Department of Water Resources

**In-canal Recharge:** MAR conducted utilizing canal systems outside of the irrigation season.

**Infiltration Basin:** Any natural or constructed basin used to conduct MAR by filling with water and allowing it to seep into the ground.

**IWRB:** Idaho Water Resource Board

**Lower Valley:** For the purposes of this document, "Lower Valley" refers to the ESPA downstream (west) of American Falls Reservoir.

**MAR:** Managed Aquifer Recharge. For this document, Managed Aquifer Recharge is defined as adding 'new' water to the aquifer—water that would not naturally recharge or result from the normal use of a non-recharge MAR water right.

**Natural Flow:** Surface water diverted for MAR under a ground water recharge water right, water permit, or temporary approval.

**Off-canal MAR Sites:** Any MAR site that receives water from a canal or separate water delivery system.

**Private Recharge:** Recharge that is not associated with the IWRB.

**Recharge Well:** For the purposes of this document, "recharge well" refers to an injection well used as a method of delivery for MAR.

**Storage Water:** Surface water stored in the Upper Snake River Basin reservoir system under a storage water right or water permit.

**UIC Program:** Underground Injection Control Program

**Upper Valley:** For the purposes of this document, "Upper Valley" refers to the ESPA upstream (east) of American Falls Reservoir.

**Water Delivery System "System":** Connected infrastructure which is used to convey water and for which flow is measured as a sum of its parts. An example of this is a set of multiple canals which all share a common endpoint.

## III. STATUTORY FRAMEWORK

In addition to the constitutional articles and statutes cited above, further statutes and documents of relevance are identified below, providing the framework for this document. This section is not exhaustive, as other rules and statutory frameworks are provided in specific sections below.

Idaho Code § 42-234 establishes the basis for use of water to conduct managed recharge. The appropriation of water for purposes of recharge of ground water basins, in accordance with Idaho law and the Idaho State Water Plan, constitutes a beneficial use of water. I.C. § 42-234(1)–(2). To ensure managed recharge projects do not injure existing water rights, Idaho Code § 42-234(4) grants the IDWR Director "the authority to approve, disapprove, or require alterations in the methods employed to achieve ground water recharge." Proposals for managed recharge projects involving the diversion of natural flow water appropriated in accordance with Idaho Code § 42-234, in excess of ten thousand (10,000) acre-feet on an average annual basis, must be submitted to the IWRB for approval prior to construction commencement. I.C. § 42-1737(a).

The Idaho State Water Plan (Plan) states that "[m]anaged recharge may also be used as an adaptive mechanism for minimizing the impacts of variability in climate conditions." IWRB, Idaho State Water Plan § 1I, at 15 (2012). The Plan recognizes that managed recharge is one of the implementation strategies to ensure the sustainability of Idaho's water resources. *Id*. Recharging aquifers as a water supply alternative has significant potential to address water supply needs as well as conjunctive management issues. "The [IWRB] supports and assists in the development of managed recharge projects that further water conservation and increase water supplies available for beneficial use." *Id*. Specific to the ESPA, successful adaptive management strategies "will accomplish two goals: 1) ensure an adequate and sustainable water supply for existing and future uses, and 2) reduce conflicts between ground and surface water users." *Id*. § 4D, at 54. The Plan recognizes that recharge program effectiveness monitoring and evaluation results are key components to selecting and designing managed recharge strategies and projects. *See id*. § 4E, at 55.

Managed aquifer recharge is considered distinct from incidental ground water recharge. The legislature recognizes that incidental ground water recharge benefits are often obtained from the diversion and use of water for various beneficial purposes. However, such "incidental recharge may not be used as the basis for claim of a separate or expanded water right." I.C. § 42-234(5). To meet the goals established for the ESPA through the legislature and ESPA CAMP, the IWRB does not consider incidental ground water recharge as managed aquifer recharge.

## IV. PROGRAM OPERATIONS OVERVIEW

The IWRB recharge season is defined as August 1 through July 31. This period was determined based on when natural flow was historically available for MAR. Water used for MAR in the State of Idaho must have a beneficial use designated as Ground Water Recharge. Typically, there are two sources of water available to the ESPA MAR Program, natural flow and storage water.

Natural flow water can be diverted for MAR under an Idaho water permit or license with a beneficial use of Ground Water Recharge or a temporary approval of water use designated for recharge. *See* I.C. § 42-103, -104, 42-202A(4a). The oldest priority date for a IWRB recharge water right is 1980. The IWRB's recharge water rights are generally in priority outside of the irrigation season or when there are flood control releases from the reservoir systems. The recharge water rights are administered by the appropriate water district in accordance with the priority date on the permit or license. A temporary approval of water use cannot cause injury to existing water rights; one can only be used when all other water rights are met. Therefore, temporary approvals are only available to the IWRB MAR Program when there are flood control releases.

The IWRB will conduct MAR for other entities using storage water. The storage water must be transferred to the IWRB through the appropriate water district procedures. Storage water is generally available during the irrigation season but must be used by November 30th of the year the transfer takes place.

The IWRB utilizes infiltration basins and recharge wells ("off-canal" recharge sites) and canal conveyance losses for MAR. The Program generally contracts with entities such as canal companies or irrigation districts that own diversion infrastructure on the Snake River and its tributaries, to accomplish MAR. Except for specific sites, the IWRB does not own the infrastructure or dedicated recharge sites, and the IWRB is not accountable for contractor operations. Specific MAR site types may have statutory requirements such as those established by the IDWR UIC Program for recharge wells or by IDEQ for infiltration basins. This document establishes standards for the MAR Program outside of any additional statutory requirements.

## IV. COORDINATION STANDARDS & PROCEDURES

The IWRB relies on its contracted partners to perform managed aquifer recharge, requiring a high level of coordination between partners, the IWRB, and other governing agencies. The following standards serve to clarify the responsibilities of a contractor regarding communication and compliance with these entities. It cannot be guaranteed that the standards listed here are a comprehensive list of all legal requirements; it is ultimately the responsibility of the contractor to ensure compliance with all governing bodies.

1. COORDINATION WITH IWRB
    a. Any entity providing recharge services for the MAR Program must have a valid water conveyance contract with the IWRB, signed by a representative of both parties, prior to commencing recharge operations.
    b. The Contractor shall not divert recharge water until the IWRB has issued a notice to proceed specifically designating the date that the Contractor may begin diverting water for recharge, the contractual dollar limit per recharge season, and other key conditions related to IWRB recharge. The rate and/or volume of water the Contractor is authorized to divert for recharge may be modified by the IWRB to achieve the geographic distribution of recharge consistent with the ESPA CAMP.
    c. The Contractor may reduce or cease delivery of the IWRB's water at its discretion to provide for the needs of its shareholders. The Contractor shall notify the IWRB within 24 hours of ceasing delivery of the IWRB's water.

2. COORDINATION WITH OTHER AGENCIES
    a. All procedures, rules, regulations, laws or other requirements of local, state, and federal agencies must be complied with.
    b. Recharge infiltration basins developed or modified after January 1, 1985, must have and comply with an approved IDEQ ground water quality monitoring plan. *See* IDAPA 58.01.16.600; IDEQ, Guidance for Developing a Ground Water Quality Monitoring Program for Managed Recharge Projects by Land Application § 1, at 1 (2017).
    c. All recharge wells utilized for the MAR Program must have and comply with a permit issued by the UIC Program and comply with all other UIC Program requirements. *See* IDAPA 37.03.03. IDWR is responsible for the operation of the UIC Program.

d. Off-canal recharge sites located on Federal or State land must have an easement from the appropriate entity and a noxious weed abatement program in place, which is the sole responsibility of the Contractor.

## V. SITE METRICS STANDARDS & PROCEDURES

These standards provide minimum metrics that must be met for sites conducting IWRB MAR. Recharge sites, including but not limited to infiltration basins and recharge wells, that were utilized or funded prior to the adoption of this document could be exempt from these standards. Exemptions for existing recharge sites will be evaluated on a case-by-case basis.

1. WATER LEVELS

a. The pre-recharge ground water table should be a minimum of 30 feet below ground surface, as measured in the closest accessible well. This limit is recommended to protect subterranean infrastructure (e.g., basements, septic systems) and to ensure recharge water does not cause issues with flooding or sub-irrigating farmland, or with returning as surface water providing minimal benefit to the aquifer.

b. It is recommended that recharge operations cease when the ground water table elevation rises to 15 feet or less below ground surface during MAR operations, as measured in the closest accessible well.

c. If a recharge well is used to conduct MAR and the well is designed not to impact the upper most aquifer, 1.a and 1.b may not apply and will be assessed on a case-by-case basis.

d. If standing water is present in an infiltration basin prior to a recharge operation, the basin will not be used to conduct IDWR MAR. It is assumed that such a site does not offer the opportunity to increase recharge to, or storage in, the aquifer and therefore will not be used.

2. MINIMUM INFILTRATION VOLUME / DIVERSION RATE

a. A canal system used for IWRB MAR must have at least an average diversion rate of 20 cfs. This minimum is designed to ensure MAR is occurring at a sufficient rate to impact the aquifer and to reduce administrative oversite and operational costs. Other standards or procedures might necessitate a higher rate than defined here.

b. An individual "off-canal" recharge site must be capable of infiltrating at least 10 cfs per day or 600 acre-feet per month. This minimum is designed to ensure MAR is occurring at a sufficient rate or volume to impact the aquifer and to reduce administrative oversite and operational costs. Other standards or procedures might necessitate a higher rate or volume than defined here.

3. MAR LOCATION REQUIREMENTS

a. IWRB MAR locations must retain at least 15% of five-year volumetric recharge in the aquifer and/or have a 50% volumetric travel time exceeding four months to any reach of the Snake River or its tributaries. In this document, 50% volumetric travel time refers to the time required for 50% of the recharged volume to discharge to any modeled reaches of the Snake River. A primary goal of the Program as defined in the ESPA CAMP is to increase predictability for water users by managing for a reliable supply. Any site with a five-year retention of less than 15% or 50% volumetric travel time less than four months does not aid the Program in achieving that goal. Rapid returns to the Snake River result in minimal impact to the aquifer or the capture of water that would otherwise flow past the Upper Snake River Basin reservoir system.

i. The retention time and the travel time shall be determined by the most current, published version of the ESPAM model as determined by IDWR.
ii. The calculation methods used to determine these values are further defined in a supporting document included in Appendix A.
iii. Recharge basins and recharge wells that were utilized or funded prior to the adoption of this document or for which the minimum requirements were determined by a previous version of ESPAM may be exempt for this requirement. Exemptions will be evaluated on a case-by-case basis.

b. The primary purpose of recharge basins is for MAR when recharge water is available. Irrigated fields or pastures will not be considered as recharge basins for IWRB MAR.

## VI. CONVEYANCE AND DELIVERY STANDARDS & PROCEDURES

A goal of the MAR Program is to add additional, "new," water to the aquifer beyond what is provided by incidental recharge. The Program also aims to maximize geographical distribution, allowing for the greatest hydrologic benefits to the aquifer and the Snake River. However, the availability of IWRB recharge water changes from year to year. These standards intend to maximize Program goals while working with an unpredictable supply.

1. CONVEYANCE SYSTEMS

a. Entities contracted to deliver IWRB water for MAR are responsible for all operations, maintenance, management, and liability insurance for all aspects of the system(s) used to conduct MAR.
b. IWRB participation in significant maintenance or replacement expenses related to recharge facilities and systems will be considered on a case-by-case basis.
c. Canals being used to transport water for irrigation cannot simultaneously be used for IWRB MAR. Canals can be used to transport water to a designated recharge site when delivering irrigation water, however, water lost in the canal cannot be counted as IWRB recharge.
d. IWRB in-canal recharge shall not occur during the system's Average Irrigation Season. A canal system's Average Irrigation Season is defined by its average first and last irrigation diversion dates, referred to as the Average Start Date of Irrigation Diversion and the Average Last Date of Irrigation Diversion. The methodology for calculating the Average Start Date and the Average Last Date of Diversion are included in Appendix B.
e. Canals may still be used for recharge outside their Average Irrigation Season when transporting water for non-irrigation uses. In some cases, canal systems operate outside their Average Irrigation Season to deliver water for non-irrigation beneficial uses (e.g., stockwater). Diversions for these other uses are commonly less than they are for irrigation. A 'base flow' will be established to account for the water typically diverted water for the other beneficial uses. The volume of water considered MAR will be determined by subtracting the base flow and any spill out of the system from the total volume diverted from the source. The methodology for calculating the base flow is included in Appendix C.
f. Use of natural stream channels can only be used for IWRB MAR after consultation and approval by Program staff. If any flow is occurring in the stream channel, not attributed to the beneficial use of ground water recharge, the channel shall not be used for IWRB MAR.

2. CONVEYANCE FEES

a. Payment for conveyance of the IWRB's recharge right or other waters specifically identified for managed recharge purposes will be based on the reported flow and volume measurements submitted by the Contractor, and any adjustments based on measurements obtained by water district or IWRB staff.
b. Conveyance fees will be evaluated every five years in line with the recharge season.
c. Conveyance fees for conducting IWRB recharge will be established through an IWRB resolution at an IWRB board meeting. The current resolution can be found in Appendix D.

3. DISTRIBUTION OF IWRB RECHARGE WATER

a. To the extent possible, the IWRB shall manage geographical distribution of recharge in accordance with the ESPA CAMP goals, which may include prioritizing areas with greater retention rates and diversifying the location of IWRB MAR.
b. Distribution of available IWRB MAR water will be evaluated separately for the Upper Valley and the Lower Valley.
c. Any water transferred to the IWRB will be recharged at locations determined by the IWRB.
d. The IWRB shall not recharge storage water in a location that will reduce the rate of natural flow water available.

## VII. MONITORING AND EVALUATION STANDARDS & PROCEDURES

Comprehensive monitoring of IWRB recharge water quantity and quality is necessary to ensure compliance and to collect accurate data essential for assessing the impact of IWRB MAR on the aquifer. These standards outline the monitoring requirements for sites conducting IWRB MAR.

1. MONITORING OF IWRB RECHARGE WATER QUANTITY

a. Entities contracted to deliver IWRB water for MAR shall establish a water quantity monitoring plan and have the plan approved by the IWRB MAR Program before diverting water for recharge. The plan must include but is not limited to measurement of flow at the diversion(s) into the system, return flow out of the system, and measurement into any off-canal recharge sites.
b. The Contractor or designee shall measure daily flow rates of water delivered to the Contractor's canal system, individual recharge sites, and any spilled water. Daily recharge flow rates shall be reported to a representative of the Program on a regular basis but no less than once weekly during recharge operations.
c. Measurement of IWRB recharge water, including but not limited to the devices and methods used, must minimally meet IDWR Water Measurement Guidelines and Minimum Acceptable Standards and Requirements for Open Channel and Closed Conduit Measuring Devices. *See* IDWR, Water Measurement Guidelines (vers. 7.c June 2009); IDWR, Minimum Acceptable Standards and Requirements for Open Channel and Closed Conduit Measuring Devices (Mar. 2023).
d. A conversion factor of 1.9835 acre-feet per day (af/d) per cubic feet per second (cfs) shall be used when computing accomplished recharge. Miner's inches shall be defined as 50 inches equal to 1.0 cfs.
e. In the event a recharge report is delinquent for one week, the IWRB reserves the right to reallocate the Contractor's flow allocation as stipulated in its notice to proceed. In the event a

recharge report is delinquent for two consecutive weeks, the IWRB reserves the right to deduct 10% from the total conveyance payment.

f. The appropriate water district shall make the final determination concerning the quantity of water diverted for recharge.

2. MONITORING OF IWRB RECHARGE WATER QUALITY

a. Recharge infiltration basins developed or modified after January 1, 1985, must have and comply with an approved IDEQ ground water quality monitoring plan. *See* IDAPA 58.01.16.600; IDEQ, Guidance for Developing a Ground Water Quality Monitoring Program for Managed Recharge Projects by Land Application § 1, at 1 (2017).
b. Annual water quality summary reports for IWRB recharge will be compiled and submitted to IDEQ and the MAR Program.
c. Recharge well sites must comply with all UIC permit conditions and UIC Program requirements including water quality sampling and reporting. All required water quality reporting shall be submitted to both the UIC Program and the MAR Program.
d. Water quality monitoring associated with the IWRB MAR Program, including sampling and reporting, required for compliance with an approved GWQMP or UIC permit, will be funded or conducted by the IWRB MAR Program.
e. If IWRB recharge occurs concurrently with private recharge, the Program will organize and pay a proportionate share of monitoring costs associated with a monitoring plan.
f. Any costs not associated with IWRB MAR as outlined above shall be the sole responsibility of the Contractor.

3. EVALUATION

a. The IWRB, or designated representatives, reserve the right to inspect and verify all aspects of monitoring plans, diversion structures, off-canal recharge sites or review the work for compliance within the conveyance contract's scope of work during the terms of the contract.
b. Inspections shall allow the IWRB representatives to:
    - Ensure all monitoring plan requirements are being met.
    - Verify the measurement devices and methodologies are sufficient.
    - Ensure the system used for MAR is acceptable under the Program's site metrics criteria.
    - Ensure the system used to conduct IWRB MAR is in accordance with all IWRB standards and procedures.



For more information on the Departments and Programs mentioned above, please visit their websites:

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|---|---|
| Idaho Department of Environmental Quality | https://www.deq.idaho.gov/ |
| Idaho Department of Water Resources | https://idwr.idaho.gov/ |
| Idaho Water Resource Board | https://idwr.idaho.gov/iwrb/ |
| Underground Injection Control Program | https://idwr.idaho.gov/wells/injection-wells/ |

**REFERENCES**

Idaho Department of Environmental Quality. (2017). *Guidance for Developing a Ground Water Quality Monitoring Program for Managed Recharge Projects by Land Application*. Retrieved from https://www2.deq.idaho.gov/admin/LEIA/api/document/download/4853

Idaho Department of Water Resources. (2009). *State of Idaho Department of Water Resources Water Measurement Guidelines*. Retrieved from https://idwr.idaho.gov/wp-content/uploads/sites/2/water-measurement/IDWR-Water-Measurement-Reporting-Guidelines.pdf

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Idaho Water Resource Board. (2009). *Eastern Snake Plain Aquifer (ESPA) Comprehensive Aquifer Management Plan*. Retrieved from https://idwr.idaho.gov/wp-content/uploads/sites/2/iwrb/2008/20080129-ESPA-CAMP.pdf

Idaho Water Resource Board. (2012). *Idaho State Water Plan*. Retrieved from https://idwr.idaho.gov/wp-content/uploads/sites/2/iwrb/2012/2012-State-Water-Plan.pdf

# APPENDIX A

Methodology for Determination of Volumetric Retention and 50% Travel Time

# Background

A primary goal of the Idaho Water Resource Board (IWRB) Managed Aquifer Recharge (MAR) Program (Program) as defined in the Eastern Snake Plain Aquifer (ESPA) Comprehensive Aquifer Management Plan (CAMP) is to increase predictability for water users by managing for a reliable supply. In 2016, the Idaho Legislature passed Idaho Senate Concurrent Resolution No. 136 (S. Res. 136, 2016). The resolution recognized that stabilizing and enhancing the ESPA water level is in the public interest because it will lead to sustainable water supply for consumptive and nonconsumptive uses and minimize harm to Idaho's economy arising from water supply shortages. The resolution set a goal for the state to develop the capacity for 250,000 acre-feet of average annual managed recharge by December 31, 2024 and to achieve 250,000 acre-feet of average annual recharge across the ESPA through state-funded managed recharge. However, rapid returns of recharged water to the Snake River result in minimal impact to the aquifer or the capture of water that would otherwise flow past the ESPA reservoir system. The Program therefore requires that IWRB MAR locations must have a minimum of a 15% 5-year volumetric retention in the aquifer and/or a 50% volumetric travel time to a reach of the Snake River or one of its tributaries that is greater than four months.

# Overview of Procedure

This document outlines the methodology IWRB MAR Program staff follow to determine the 5-year volumetric retention and 50% travel time for recharge sites. Individual sites may have unique factors that require alterations or additions to this methodology. This methodology shall not inhibit IWRB MAR Program staff from performing additional site evaluations.

<u>5-Year Volumetric Retention</u>

The procedures to determine site retention utilize a 5-year volumetric retention map which illustrates the percentage (expressed as a decimal) of water retained in the Eastern Snake Plain Aquifer five years after a one-month recharge event, based on the recharge location.

The retention map data were generated by running the Eastern Snake Plain Aquifer Model version 2.2 (ESPAM2.2) in superposition mode for each active model cell. In this mode, external stresses on the aquifer, such as precipitation and irrigation, are excluded, and the model results focus solely on the impacts of the recharge event.

Recharge in each cell was simulated as a one-month event, followed by five years without additional recharge. The percentage of recharge retained in the aquifer was calculated by dividing the volume of water remaining in storage five years after the event by the volume of recharge that occurred during the initial one month of recharge.

<u>50% Travel Time to the Snake River</u>

The procedure to determine the 50% travel time to the Snake River uses the ESPA Model Transfer Spreadsheet (ETRAN) to evaluate returns to the Snake River. For the purposes of this document, a 50% volumetric travel time is defined as the time it takes for 50% of the water recharged to return to any modeled reaches of the Snake River. The ETRAN transfer tool is normally used to evaluate water right transfers by modeling effects on the Snake River of pumping water from the aquifer. This procedure instead models the addition of water to the aquifer to determine MAR's effects on the Snake River. This specific analysis is only used to determine percentage of returns of recharge water to the surface water system. This methodology is not intended to be used to evaluate or quantify specific reach impacts or impacts over short time intervals (anything less than trimesters).

## Procedure to Determine 5-Year Volumetric Retention

Retention for off-canal recharge sites must be calculated slightly differently than it is for in-canal recharge, however both methods use a 5-year volumetric retention map as their basis.

<u>Off-Canal Recharge Sites – Individual Grid Cell</u>
For off-canal recharge sites (e.g. infiltration basins and recharge wells), a single cell within the 5-year retention map is used. If a site overlaps multiple cells, the 5-year volumetric retention for the site should be taken from the map cell which the greatest portion of the site falls within.

<u>In-Canal Recharge – Length Averaged Linear Retention</u>
For in-canal recharge, the main canal of a system is evaluated, which most often spans several retention cells. Therefore, retention for in-canal recharge is calculated as a weighted average relative to the length of the canal within each of the overlapped retention cells. The steps for utilizing this method are as follows.

1. Create a shapefile which represents the main canal and intersect this with the ESPAM-based retention layer. This results in a table which includes the length of the canal within each retention grid cell.
2. Take the canal length within each grid cell divided by the total canal length to determine the proportion of the main canal in each grid cell.
3. Multiply each of these proportions by the retention value of the respective grid cell.
4. Add all of these products (the proportion times the retention value). This is the weighted average retention for the canal system, which is considered the retention for systems spanning multiple retention grid cells. If this value is equal to or greater than 15%, the criteria is met.

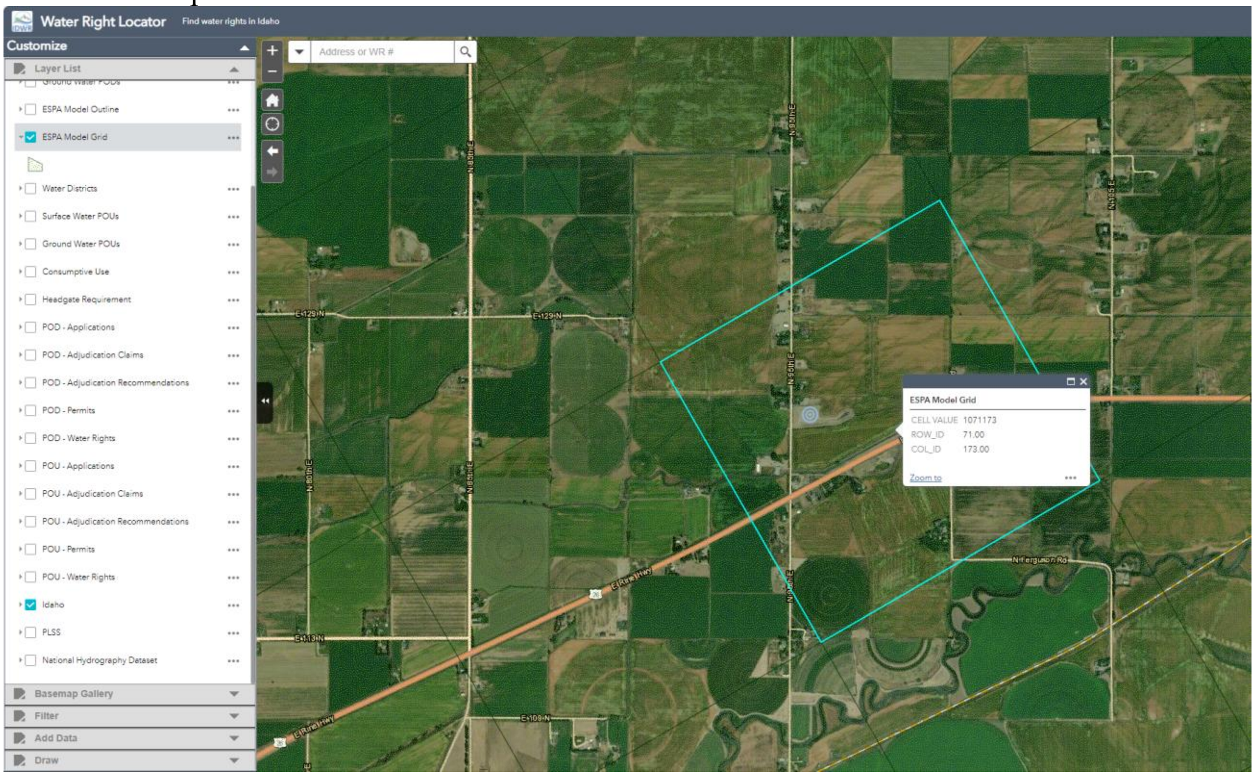
Image 1. Average linear retention steps 2–4.

| Retention | Section Length | Proportion | Weighted Retention | | | |
|---|---|---|---|---|---|---|
| Retention | Section Length | Section Length / Total Length | Retention*Proportion | | | |
| 0.2303 | 1654.346727 | 0.035848784 | 0.008255975 | | | Copied from Attribute Table |
| 0.221 | 2446.563811 | 0.053015693 | 0.011716468 | | | |
| 0.2122 | 2700.038131 | 0.058508342 | 0.01241547 | | | |
| 0.2038 | 2502.586415 | 0.054229672 | 0.011052007 | | | |
| 0.1956 | 2325.881176 | 0.050400566 | 0.009858351 | | | |
| 0.1872 | 2662.872462 | 0.057702982 | 0.010801998 | | | |
| 0.1782 | 2595.050798 | 0.056233324 | 0.010020778 | | | |
| 0.1527 | 2226.758125 | 0.048252624 | 0.007368176 | | | |
| 0.1175 | 2184.738953 | 0.047342092 | 0.005562696 | | | |
| 0.1682 | 2306.571802 | 0.049982143 | 0.008406996 | | | |
| 0.1372 | 2888.338025 | 0.062588697 | 0.008587169 | | | |
| 0.1029 | 2309.929445 | 0.050054901 | 0.005150649 | | | |
| 0.156 | 861.950103 | 0.018677985 | 0.002913766 | | | |
| 0.1221 | 336.083282 | 0.00728274 | 0.000889223 | | | |
| 0.0883 | 2193.743204 | 0.047537209 | 0.004197536 | | | |
| 0.0001 | 1231.545313 | 0.02668691 | 2.66869E-06 | | | |
| 0.054 | 355.677764 | 0.007707342 | 0.000416196 | | | |
| 0.0002 | 2560.491154 | 0.055484436 | 1.10969E-05 | | | |
| 0.0719 | 2178.761033 | 0.047212554 | 0.003394583 | | | |
| 0.0321 | 3026.432889 | 0.065581137 | 0.002105154 | | | |
| 0.0897 | 49.862605 | 0.001080495 | 9.69204E-05 | | | |
| 0 | 1529.705566 | 0.033147879 | 0 | | | |
| 0.0527 | 2444.661866 | 0.052974479 | 0.002791755 | | | |
| 0.0001 | 381.556232 | 0.008268114 | 8.26811E-07 | | | |
| 0.0696 | 193.770637 | 0.004198903 | 0.000292244 | | | |
| | | | | | | |
| **Total Canal Length:** | **46147.91752** | **Total Retention:** | **0.126308703** | | | |

# Procedure to Determine 50% Travel Time to the Snake River

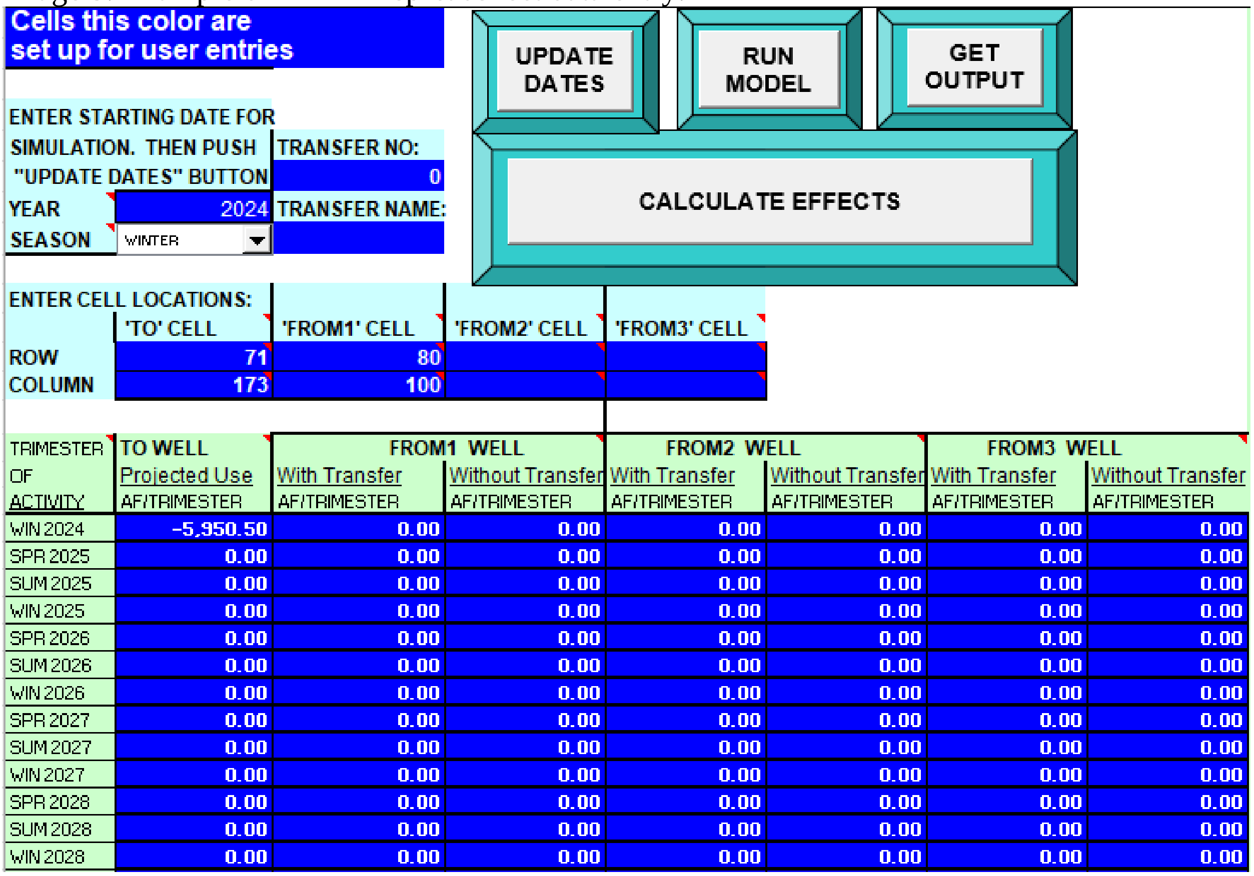
1. Download or open the current version of the ESPA Model Transfer Spreadsheet (ETRAN). This can be procured from the IDWR website at: https://idwr.idaho.gov/water-rights/transfers/resources/
   Alternatively, search for "ETRAN" on the IDWR home page.
2. Navigate to https://maps.idwr.idaho.gov/agol/WaterRightLocator/ and click the box next to "ESPA Model Grid" on the layer list dropdown menu on the left side of the screen to select this layer. Deselect the "POD - Water Rights" layer and the "POU – Water Rights" layers.
3. Use the Search Tool at the top of the screen or zoom in to the recharge site location on the map.
4. Click on the model grid cell which contains the recharge location. A pop-up will appear showing a Row ID and a Column ID. See Image 2 below.

Image 2. Water Right Locator Map used to find the “TO CELL” row and column ID’s as outlined in Steps 2-4.




5. In the most current version of ETRAN, in the “DataEntry” sheet, enter the row and column values from Step 4 in the “TO CELL” row and column cells. See Image 3 below for an example of Steps 5-8.
6. For the “’FROM1’ CELL”; enter any number between 1 and 104 for the row value and any number between 1 and 209 for the column value. These are arbitrary numbers that do not affect the results of the analysis, but these cells must be populated to run the model. A row value of 80 and column value of 100 were used in the example below.
7. In the “YEAR” cell, type in the current year and update the “SEASON” dropdown to the current season. The year and season won’t affect this analysis, but it is helpful in tracking how and when analyses were completed. Click “UPDATE DATES”.
8. Additionally, enter an estimated volume of recharge for the site in acre-feet (af) into the first cell in the “TO WELL” column. The amount entered will not affect the result of the analysis, but these cells have to be populated to run the model. Enter the value as a negative because recharge is adding water to the aquifer while the transfer tool models water pumped from the aquifer.

Image 3. Example of ETRAN spreadsheet data entry.



Cells this color are set up for user entries

UPDATE DATES | RUN MODEL | GET OUTPUT | CALCULATE EFFECTS

ENTER STARTING DATE FOR SIMULATION. THEN PUSH "UPDATE DATES" BUTTON

| | | | |
|---|---|---|---|
| | | TRANSFER NO: | 0 |
| YEAR | 2024 | TRANSFER NAME: | |
| SEASON | WINTER | | |

ENTER CELL LOCATIONS:

| | 'TO' CELL | 'FROM1' CELL | 'FROM2' CELL | 'FROM3' CELL |
|---|---|---|---|---|
| ROW | 71 | 80 | | |
| COLUMN | 173 | 100 | | |

| TRIMESTER OF ACTIVITY | TO WELL Projected Use AF/TRIMESTER | FROM1 WELL With Transfer AF/TRIMESTER | FROM1 WELL Without Transfer AF/TRIMESTER | FROM2 WELL With Transfer AF/TRIMESTER | FROM2 WELL Without Transfer AF/TRIMESTER | FROM3 WELL With Transfer AF/TRIMESTER | FROM3 WELL Without Transfer AF/TRIMESTER |
|---|---|---|---|---|---|---|---|
| WIN 2024 | -5,950.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SPR 2025 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SUM 2025 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WIN 2025 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SPR 2026 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SUM 2026 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WIN 2026 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SPR 2027 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SUM 2027 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WIN 2027 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SPR 2028 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SUM 2028 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WIN 2028 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

9. Click “RUN MODEL”, then “GET OUTPUT”, and finally “CALCULATE EFFECTS”. Once the model has finished running, the spreadsheet will auto-direct to the “Graphs Above Milner” tab. Click instead on the “Calculated Effects” tab.
10. Select the data from columns A-L, Total Effect with Transfer. See Image 4 below. Copy this data to a new, blank Excel workbook.

Image 4. Calculated Effects tab in ETRAN spreadsheet with data described in Step 10 highlighted.

| | A | B | C | D | E | F | G | H | I | J | K | L | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | |
| 3 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| 4 | | TOTAL EFFECT WITH TRANSFER (AF/four months) | | | | | | | | | | | TO W |
| 5 | | Ashton to | Heise to | Shelley to | Nr Blckft T | Neeley to | Dev. Wbl. | Buhl to | Kspr | Kspr to | Malad | Malad to | Ash |
| 6 | | Rexburg | Shelley | Nr Blckft | Neeley | Minidoka | Buhl | Kspr | | Malad | | Bancroft | Rex |
| 7 | WIN 2024 | -0.2 | -998.5 | -48.8 | -6.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 8 | SPR 2025 | -0.7 | -873.6 | -89.2 | -19.9 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 9 | SUM 2025 | -1.4 | -564.5 | -105.1 | -35.7 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 10 | WIN 2025 | -2.0 | -344.8 | -103.9 | -49.5 | -0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 11 | SPR 2026 | -2.6 | -213.8 | -94.3 | -59.0 | -0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 12 | SUM 2026 | -3.0 | -137.5 | -82.1 | -64.1 | -0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 13 | WIN 2026 | -3.3 | -92.2 | -70.0 | -65.5 | -0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 14 | SPR 2027 | -3.5 | -64.3 | -59.2 | -64.2 | -0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 15 | SUM 2027 | -3.7 | -46.5 | -49.9 | -61.2 | -0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 16 | WIN 2027 | -3.8 | -34.8 | -42.1 | -57.2 | -0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 17 | SPR 2028 | -3.8 | -26.8 | -35.7 | -52.7 | -0.5 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 18 | SUM 2028 | -3.9 | -21.1 | -30.4 | -48.1 | -0.5 | -0.1 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 19 | WIN 2028 | -3.9 | -17.1 | -26.0 | -43.6 | -0.5 | -0.1 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 20 | SPR 2029 | -3.9 | -14.0 | -22.3 | -39.3 | -0.4 | -0.1 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 21 | SUM 2029 | -3.8 | -11.8 | -19.3 | -35.4 | -0.4 | -0.1 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 22 | WIN 2029 | -3.8 | -10.0 | -16.7 | -31.8 | -0.4 | -0.1 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 23 | SPR 2030 | -3.8 | -8.6 | -14.6 | -28.5 | -0.4 | -0.2 | -0.1 | -0.1 | 0.0 | -0.1 | 0.0 | |
| 24 | SUM 2030 | -3.7 | -7.5 | -12.8 | -25.6 | -0.3 | -0.2 | -0.1 | -0.1 | -0.1 | -0.1 | 0.0 | |
| 25 | WIN 2030 | -3.6 | -6.6 | -11.2 | -23.0 | -0.3 | -0.2 | -0.1 | -0.1 | -0.1 | -0.1 | 0.0 | |
| 26 | SPR 2031 | -3.5 | -5.9 | -9.9 | -20.7 | -0.3 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | 0.0 | |
| 27 | SUM 2031 | -3.5 | -5.2 | -8.8 | -18.6 | -0.3 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | 0.0 | |
| 28 | WIN 2031 | -3.4 | -4.7 | -7.8 | -16.8 | -0.3 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | 0.0 | |

11. Take the sum of all the first trimester values in the first row of data across all reaches (columns). If the sum of these values is less than 50% of the estimated total recharge volume entered into the "TO WELL" cell in Step 8, then the minimum criteria is met. See Image 5 below.

Image 5. Excel analysis of ETRAN results.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | TOTAL EFFECT WITH TRANSFER (AF/four months) | | | | | | | | | | |
| | Ashton to | Heise to | Shelley to | Nr Blckft T | Neeley to | Dev. Wbl. | Buhl to | Kspr | Kspr to | Malad | Malad to |
| | Rexburg | Shelley | Nr Blckft | Neeley | Minidoka | Buhl | Kspr | | Malad | | Bancroft |
| WIN 2024 | -0.22852 | -998.495 | -48.7882 | -6.45672 | -0.01504 | -3.3E-05 | -1.9E-05 | -7.5E-06 | -5.8E-06 | -5.2E-06 | -4.2E-07 |
| SPR 2025 | -0.7387 | -873.627 | -89.1812 | -19.8954 | -0.05975 | -0.00023 | -0.00014 | -5.6E-05 | -4.4E-05 | -4E-05 | -3.4E-06 |
| SUM 2025 | -1.39798 | -564.543 | -105.128 | -35.7144 | -0.13378 | -0.00088 | -0.00054 | -0.00022 | -0.00018 | -0.00017 | -1.5E-05 |
| WIN 2025 | -2.0483 | -344.843 | -103.862 | -49.4717 | -0.22413 | -0.00241 | -0.00151 | -0.00063 | -0.00052 | -0.00049 | -4.4E-05 |
| SPR 2026 | -2.59618 | -213.83 | -94.3282 | -59.0176 | -0.31453 | -0.0053 | -0.00341 | -0.00144 | -0.00119 | -0.00115 | -0.00011 |
| SUM 2026 | -3.01543 | -137.519 | -82.1232 | -64.1227 | -0.39236 | -0.00997 | -0.0066 | -0.00281 | -0.00235 | -0.00231 | -0.00022 |
| WIN 2026 | -3.31823 | -92.1532 | -70.0236 | -65.5285 | -0.45091 | -0.01675 | -0.01134 | -0.00486 | -0.00412 | -0.0041 | -0.0004 |
| SPR 2027 | -3.52965 | -64.2661 | -59.1679 | -64.25 | -0.4886 | -0.02572 | -0.01778 | -0.00768 | -0.00657 | -0.00664 | -0.00066 |

| | | |
|---|---|---|
| Total Volume | -5950.5 | <Volume entered into ETRAN |
| 50% Volume | -2975.25 | <50% of Volume entered into ETRAN |
| Sum of First Trimester | =sum(B5:L5 | SUM(**number1**, [number2], ...) |
| Result: | | |
| Meets minimum of greater than 3 months. | | |


| | | |
|---|---|---|
| Total Volume | -5950.5 | <Volume entered into ETRAN |
| 50% Volume | -2975.25 | <50% of Volume entered into ETRAN |
| Sum of First Trimester | -1053.98 | |
| Result: | | |
| Meets minimum of greater than 3 months. | | |

# APPENDIX B

Methodology for Determination of Historical System Operation Dates

# Background

Whenever a water delivery system diverts water for any beneficial use, incidental aquifer recharge occurs as a byproduct. Therefore, incidental recharge occurs throughout the entirety of system's typical operation dates. This incidental recharge is recognized as a public benefit (Idaho Code 42-234) but is not considered Managed Aquifer Recharge (MAR). MAR is additional, or "new," water added to the aquifer which thereby increases aquifer storage.
To effectively perform MAR, the program utilizes systems outside their historical operation dates, also known as the Average Irrigation Season. This procedure aims to identify the typical annual dates when irrigation delivery operations occur within a system ('system operation dates' or 'Average Irrigation Season'). The goal is to differentiate managed aquifer recharge from historical incidental recharge generated through routine irrigation system operations. Recharge performed outside of the bounds of the calculated system's irrigation operation dates should then be considered new water added to the aquifer. This document provides a standardized, transparent methodology, based on historic practices of a system, that can be applied to all program partners conducting IWRB recharge.

# Overview of Procedure

The procedure to determine system operation dates examines median diversion time-periods in each calendar year from 1990 through 2015, inclusive. This time period is recent enough to take into account large-scale conversion from flood to sprinkler irrigation, it is after the construction of the reservoirs on the Snake River in the 1960s, but before MAR operations began in earnest in 2017, and it is broad enough to include wet periods (e.g. 1995 - 1999) and dry cycles (e.g. 1990 – 1992, 2001 – 2004). Use of the median value assists in smoothing out anomalous data to determine a long-term representative value.

These calculations provide a base for determining system operation dates. With the realization that a canal's operations could significantly alter over time, the system's operation dates could be altered with sufficient data or by resolution.
The proposed methodology provides a standardized method for determining when IWRB recharge could be conducted above "normal" system operations. Basic assumptions:

- The 26 years proposed for examination are representative of current operations and provide enough data to discern patterns.
- Only official, finalized data from the relevant diversion-reporting entity (e.g. USGS, Water District 1, etc) will be utilized.
- Collaboration with partners/operators and adaptive management will be essential. The goal is to add new water to the aquifer.

# Procedure to Determine Historical System Operation Dates

1. Obtain the historical diversion data for the system of interest, typically via authoritative sources (e.g. Water District 01, USGS, etc). In the case of Water District 01, the data is provided as "Flow (CFS)," also known as the "Sum of Flow (cfs)," through the system's headgate (example of the data shown in Image 1).
2. Record the first and last date of diversion into each system's headgate during each calendar year (example shown in Image 2).
    a. Some discretion by the reviewer will be necessary. In Image 2, the system continues to divert a small amount of water from October 29 – 31. This diversion rate is clearly distinct from the primary delivery operations that ended on October 28, and likely represents minimal, unintentional leakage through the headgate.
    b. If a system "pauses" during the normal delivery season, and then resumes a subsequent delivery operation, the date of the end of the final delivery operation would be used. These pauses are generally towards the end of the irrigation season.
    c. If a system participated in MAR operations during the historic time period analyzed those deliveries will be excluded.
3. The historical system operation dates are determined by calculating the median calendar date for the 26 years analyzed (1990-2015) for the first and last dates of diversion (example shown in Image 3).
4. Once the calculations are complete the results will be sent to the recharge partner for their review and feedback before being applied.

The following should also be considered when calculating system operation dates:

1. All diversions that drain to a common end, or otherwise serve the same general area, should be considered as a single system containing multiple points of diversion. The earliest first and latest last dates should be applied across all points of diversion.

    For example: Two separate canals drain to a single endpoint. One canal has historical system operation dates of April 1 through October 31, and the other operates only through the month of July. The system operation dates for both points of diversion would be April 1 through October 31. Both canals could be used to conduct MAR outside of the bounds of those dates.
2. IWRB staff, in consultation with the recharge partner, will have discretion to adaptively manage any unforeseen circumstances not covered by the method described above, with the primary goal of adding new water to the aquifer.

Image 1. Sample of Water District 01 (WD-01) system diversion data.

| SiteID | SiteType | Flow (CFS) | Gage Height (Feet) | HSTDate | Irrigation Year |
|---|---|---|---|---|---|
| XXXXXXX | D | 0 | 0 | 5/4/1991 | 1991 |
| XXXXXXX | D | 0 | 0 | 5/5/1991 | 1991 |
| XXXXXXX | D | 86 | 1.19 | 5/6/1991 | 1991 |
| XXXXXXX | D | 137 | 1.51 | 5/7/1991 | 1991 |
| XXXXXXX | D | 227 | 1.96 | 5/8/1991 | 1991 |
| XXXXXXX | D | 267 | 2.13 | 5/9/1991 | 1991 |
| XXXXXXX | D | 311 | 2.31 | 5/10/1991 | 1991 |
| XXXXXXX | D | 309 | 2.3 | 5/11/1991 | 1991 |
| XXXXXXX | D | 340 | 2.42 | 5/12/1991 | 1991 |
| XXXXXXX | D | 371 | 2.53 | 5/13/1991 | 1991 |
| XXXXXXX | D | 351 | 2.46 | 5/14/1991 | 1991 |
| XXXXXXX | D | 353 | 2.47 | 5/15/1991 | 1991 |
| XXXXXXX | D | 366 | 2.52 | 5/16/1991 | 1991 |
| XXXXXXX | D | 385 | 2.59 | 5/17/1991 | 1991 |
| XXXXXXX | D | 353 | 2.48 | 5/18/1991 | 1991 |
| XXXXXXX | D | 328 | 2.39 | 5/19/1991 | 1991 |
| XXXXXXX | D | 328 | 2.39 | 5/20/1991 | 1991 |
| XXXXXXX | D | 332 | 2.41 | 5/21/1991 | 1991 |
| XXXXXXX | D | 351 | 2.48 | 5/22/1991 | 1991 |
| XXXXXXX | D | 392 | 2.63 | 5/23/1991 | 1991 |

Image 2. Sample of determining end and start dates for "normal" operational deliveries in a given year.

| | A | B | |
|---|---|---|---|
| 1 | Date | Sum of Flow (CFS) | |
| 71 | 21-Oct | 372 | |
| 72 | 22-Oct | 372 | |
| 73 | 23-Oct | 375 | |
| 74 | 24-Oct | 375 | |
| 75 | 25-Oct | 375 | |
| 76 | 26-Oct | 375 | |
| 77 | 27-Oct | 375 | |
| 78 | 28-Oct | 180 | End of Irrigation |
| 79 | 29-Oct | 21 | |
| 80 | 30-Oct | 22 | |
| 81 | 31-Oct | 22 | |
| 82 | ⊟ 2001 | | No readings for diversions in April |
| 83 | ⊟ May | | |
| 84 | 1-May | 240 | Start of Irrigation |
| 85 | 2-May | 443 | |
| 86 | 3-May | 678 | |
| 87 | 4-May | 777 | |
| 88 | 5-May | 801 | |
| 89 | 6-May | 805 | |
| 90 | 7-May | 809 | |

Image 3. Sample of determining end and start dates for “normal” operational deliveries for a system.

Annual System Operation

| Year | Start | End |
|---|---|---|
| 1990 | 20-Apr | 18-Oct |
| 1991 | 6-May | 31-Oct |
| 1992 | 23-Apr | 21-Sep |
| 1993 | 11-May | 20-Nov |
| 1994 | 27-Apr | 31-Aug |
| 1995 | 18-Apr | 16-Dec |
| 1996 | 20-Apr | 30-Nov |
| 1997 | 24-Apr | 1-Nov |
| 1998 | 2-May | 31-Oct |
| 1999 | 3-May | 31-Oct |
| 2000 | 2-May | 28-Oct |
| 2001 | 1-May | 4-Sep |
| 2002 | 6-May | 5-Oct |
| 2003 | 2-May | 31-Oct |
| 2004 | 29-Apr | 28-Oct |
| 2005 | 3-May | 28-Oct |
| 2006 | 3-May | 28-Oct |
| 2007 | 1-May | 28-Oct |
| 2008 | 6-May | 31-Oct |
| 2009 | 9-Apr | 29-Oct |
| 2010 | 7-May | 29-Oct |
| 2011 | 6-May | 29-Oct |
| 2012 | 28-Apr | 27-Oct |
| 2013 | 4-May | 26-Oct |
| 2014 | 3-May | 31-Oct |
| 2015 | 23-Apr | 15-Oct |

Bounds of Historical System Operation Dates

| | |
|---|---|
| Median Start | 5/2 |
| Median End | 10/28 |

# APPENDIX C

Methodology for Determination of Historical Diversion Rates of Non-irrigation Water

# Background

Some water delivery systems have historically operated during the non-irrigation season to support uses such as stock water, subirrigation, and flow maintenance. These routine operations have provided incidental recharge to the aquifer as a byproduct. This incidental recharge is recognized as a public benefit (Idaho Code 42-234) but is not considered Managed Aquifer Recharge (MAR). MAR is additional, or “new,” water added to the aquifer which thereby augments aquifer storage. This methodology differentiates between managed aquifer recharge and historical incidental recharge resulting from routine non-irrigation operations.

Typically, a significant portion of a system’s capacity is used during irrigation operations, and it is common for some water to be returned to the river (“return flows”). However, when systems are used for routine non-irrigation purposes, only a fraction of the system capacity is utilized and commonly there are no return flows. This means that all water diverted during routine non-irrigation operations seeps into the aquifer and, as a byproduct, provides incidental aquifer recharge. Therefore, median diversion rates during the non-irrigation season provide a reasonable measure of historical incidental recharge rates. The lack of return flows also indicates there is additional room in the systems for MAR.

Some systems divert non-irrigation water consistently. Others only divert non-irrigation water during non-drought years under water rights that are senior to the IWRB recharge rights. During these drought years it is unlikely that IWRB recharge operations would occur under the Board’s current recharge diversion procedures.

A preliminary review of historical non-irrigation diversion rates shows significant annual variability within most systems, driven by factors such as water availability, weather conditions, canal operations, and demand. To introduce additional water into the aquifer, it is essential to quantify the incidental recharge that has historically occurred.

# Overview of Procedure

The procedure to determine historical diversion rates of non-irrigation water examines median monthly diversion rates during the non-irrigation season from calendar years 1990 through 2015. This time period is recent enough to take into account large-scale conversion from flood to sprinkler irrigation, it is after the construction of the reservoirs on the Snake River in the 1960s, but before MAR operations began in earnest in 2017, and it is broad enough to include wet periods (e.g. 1995 - 1999) and dry cycles (e.g. 1990 – 1992, 2001 – 2004). Use of the median value assists in smoothing out anomalous data to determine a long-term representative value. These calculations provide a base for determining non-irrigation diversions when water is available for MAR. With the realization that a canal’s operations could significantly alter over time, the determination of diversion rates for non-irrigation could be altered with sufficient data or by resolution.

Basic assumptions:

- The 26 years proposed for examination are representative of current operations and provide enough data to discern patterns.
- Only official, finalized data from the relevant diversion-reporting entity (e.g. Water District 1, USGS, etc) will be utilized.
- New water added to the aquifer is any additional water added above the amount provided by historical incidental recharge.
- Only years in which diversions occurred will be used in the determinations. Years in which diversions did not occur would have been too dry for IWRB managed aquifer recharge operations, as explained above.
- Any water recharged in systems above their historical incidental recharge rate will be considered new water added to the aquifer, and therefore to be managed aquifer recharge.
- Any water leaving the system would be deducted from the managed aquifer recharge volume.
- Cooperation with partners/operators and adaptive management will be essential. The goal is to add new water to the aquifer.

## Procedure to Determine Historical Incidental Recharge Rates

1. Obtain the historical daily diversion data for the system of interest, typically via Water District 01, USGS, or other authoritative sources. For example, the data is provided by Water District 01 as “Flow (CFS)” or the “Sum of Flow (cfs)” through the system’s headgate (example of the data shown in Image 1).
2. Using the daily cfs data from Step 1, calculate the monthly sum, in cfs, through the headgate for each month from irrigation year 1990 to 2015 (Image 2).
    a. Months in which a system participated in a managed recharge operation will be excluded as not indicative of a normal base flow.
    b. Months in which a system did not divert water will be excluded from the calculation as not representative of conditions that IWRB recharge water would normally be available.
3. Calculate the median monthly sum for each month over the evaluation period (1990-2015), taking into account the exclusions noted above.
4. Divide the monthly median values by the number of days in the respective month to determine the historical daily median baseflow (cfs) for each month. This is the Historical Incidental Recharge Rate.

Staff will verify the Historical Incidental Recharge Rate calculations with the recharge partner for their review and feedback before being applied.

For recharge to be counted as part of the IWRB program, the daily amount of water diverted for managed recharge would be subtracted by the Historical Incidental Recharge Rate (for that month) and any return flows for that day.

Other factors to be considered when calculating the historical incidental recharge rate:

1. All diversions that drain to a common end should be considered as a single system containing multiple points of diversion. The baseflow should be applied across all points of diversion.

   For example: Two separate canals drain to a single endpoint, or otherwise serve the same general area. One canal has a Historical Incidental Recharge Rate of 100 cfs whereas the other has 0 cfs. The total Historic Incidental Recharge Rate for both points of diversion would be 100 cfs. Therefore, a combined diversion of 101 cfs from both canals would result in 1 cfs of IWRB recharge, assuming no spill out of the system.
2. Both irrigation and non-irrigation operations may occur during "shoulder months" at the beginning and end of the irrigation season (e.g. April and October). The Historical Operation Dates will be calculated as detailed in the Determination of Historical System Operation Dates procedure. For the remainder of the shoulder month, the baseflow from the previous month will be utilized prior the start date, and the following month's baseflow will be utilized after the season's end date.

   For example: A system's historical incidental recharge rate for November is 20 cfs, as calculated under this document's procedures. The system's switch from irrigation to non-irrigation operations occurs on October 20, as calculated under the Determination of Historical System Operation Dates memo's procedures. A historical incidental recharge rate of 20 cfs would be applied from October 21 through November 30.
3. IWRB staff, in consultation with the recharge partner, will have discretion to adaptively manage any unforeseen circumstances not covered by the method described above, with the primary goal of adding new water to the aquifer.

Image 1. Sample of Water District 01 (WD-01) system diversion data.

| SiteID | SiteType | Flow (CFS) | Gage Height (Feet) | HSTDate | Irrigation Year |
|---|---|---|---|---|---|
| XXXXXXXX | D | 0 | 0 | 3/1/2010 | 2010 |
| XXXXXXXX | D | 10.54 | 0.24 | 3/2/2010 | 2010 |
| XXXXXXXX | D | 8.79 | 0.21 | 3/3/2010 | 2010 |
| XXXXXXXX | D | 24.27 | 0.43 | 3/4/2010 | 2010 |
| XXXXXXXX | D | 41.03 | 0.61 | 3/5/2010 | 2010 |
| XXXXXXXX | D | 62.2 | 0.8 | 3/6/2010 | 2010 |
| XXXXXXXX | D | 73.39 | 0.89 | 3/7/2010 | 2010 |
| XXXXXXXX | D | 74.68 | 0.9 | 3/8/2010 | 2010 |
| XXXXXXXX | D | 81.24 | 0.95 | 3/9/2010 | 2010 |
| XXXXXXXX | D | 93.6 | 1.04 | 3/10/2010 | 2010 |
| XXXXXXXX | D | 93.6 | 1.04 | 3/11/2010 | 2010 |
| XXXXXXXX | D | 111.1 | 1.16 | 3/12/2010 | 2010 |
| XXXXXXXX | D | 123.41 | 1.24 | 3/13/2010 | 2010 |
| XXXXXXXX | D | 123.41 | 1.24 | 3/14/2010 | 2010 |

Image 2. Sample of determining a system's "normal" diversion rate during non-irrigation operations.

| Calendar Year | Monthly Sum cfs |
|---|---|
| ⊕1996 | 70165.27 |
| ⊖1997 | |
| Jan | 292 |
| Feb | 1298 |
| Mar | 2047 |
| Apr | 5697 |
| May | 8911 |
| Jun | 8780 |
| Jul | 12041 |
| Aug | 8984 |
| Sep | 6530 |
| Oct | 4859 |
| Nov | 2625 |
| Dec | 1782 |
| ⊕1998 | 59826 |
| ⊕1999 | 62558.9 |
| ⊕2000 | 67422.2 |
| ⊕2001 | 59170.6 |
| ⊕2002 | 52643 |
| ⊕2003 | 64901.37 |
| ⊕2004 | 56106 |
| ⊕2005 | 54704 |
| ⊕2006 | 52788.45 |

Months of Interest in Each Year

Image 3. Sample of determining end and start dates for "normal" operational deliveries for a system.

Step 3

Step 4

| | Sum of Total cfs Through Headgate Per Month | | | | |
|---|---|---|---|---|---|
| Irrigation Year | November | December | January | Februrary | March |
| 2005 | | | | | |
| 2006 | | | | | 63 |
| 2007 | 170.55 | | | | 1718 |
| 2008 | | | | | 86.1 |
| 2009 | 4465.64 | 1450.19 | 3.1 | 2.8 | 1466 |
| 2010 | 1544.24 | | | | 3472 |
| 2011 | 2537.38 | 84 | | | 1353 |
| 2012 | 1520.28 | 275.76 | 167 | 159 | 2415 |
| 2013 | | | | | 519.2 |
| 2014 | 220.11 | | | | 1943 |
| 2015 | 395 | | | 898.75 | 3241 |
| Monthly Median Sum of cfs | 1381 | 1450.19 | 1612 | 1410 | 2048 |
| Historical Incidental Recharge Rate (cfs) | 46.03 | 46.78 | 52.00 | 49.91 | 66.07 |

**Any rate above that in the green row would be considered new water added to the aquifer.**

# APPENDIX D

IWRB Resolutions Approving Managed Aquifer Recharge Program Payment Schedules

BEFORE THE IDAHO WATER RESOURCE BOARD

| | | |
|---|---|---|
| IN THE MATTER OF EASTERN SNAKE PLAIN AQUIFER STABILIZATION AND MANAGED AQUIFER RECHARGE | ) ) ) ) ) ) | A RESOLUTION TO APPROVE A PAYMENT SCHEDULE FOR DELIVERY OF WATER FOR MANAGED RECHARGE IN THE UPPER VALLEY |

WHEREAS, the State of Idaho relies on spring discharge from the ESPA through the Thousand Springs to assist in meeting the minimum streamflow water rights at the Murphy Gage that were established under the Swan Falls Agreement; and

WHEREAS, the Eastern Snake Plain Aquifer (ESPA) has been losing approximately 200,000 acre-feet annually from aquifer storage since the 1950's resulting in declining ground water levels in the aquifer and declining spring flows from the aquifer; and

WHEREAS, stabilizing the ESPA will help sustain spring flows sufficient to maintain the minimum flows at the Murphy Gage and reduce conflicts between groundwater and surface water users; and

WHEREAS, House Bill 547 passed and approved by the 2014 legislature allocates $5 million annually from the Cigarette Tax to the Idaho Water Resource Board (IWRB) for statewide aquifer stabilization; and

WHEREAS, the Eastern Snake Plain Aquifer Comprehensive Aquifer Management Plan (ESPA CAMP), identified managed recharge as a key strategy for achieving the goal of aquifer stabilization and recovery; and

WHEREAS, the IWRB intends to provide financial incentives to maximize recharge of water available under its water right permit.

NOW THEREFORE BE IT RESOLVED that the IWRB adopts the following recharge delivery payment structure for canals that divert above American Falls Reservoir:

1) Base Rate – determined by 5-year aquifer retention zone in which the contracted canal companies or irrigation district is located (retention zone will be assigned using ESPAM2.1):
   - Greater than 40% retained in aquifer at 5 years — $6.00/AF delivered
   - 20% to 40% retained in aquifer at 5 years — $5.00/AF delivered
   - 15% to Less than 20% retained in aquifer at 5 years — $4.00/AF delivered

2) Cold Weather Incentive – an additional $1.00/AF for cold weather conveyance of IWRB recharge for water delivered between December 1st and March 31st.

Attachment No. 7, Meeting No. 1-16
Idaho Water Resource Board

3) Deliver Incentive – an additional $1.00/AF if the operator delivers recharge water over 75% of the days when the IWRB recharge right is in priority and IWRB issues a Notice to Proceed.

BE IT FURTHER RESOLVED that the allocation of water available for recharge above American Falls will be determined based on the following rating system. The available water will be divided equally between the top three rated entities with executed Water Conveyance Contracts with the Board. Water available in excess of the capacity of the top three rated entities will be available for delivery by other entities in order of their rating (highest to lowest).

The rating will be determined by the following point system:

1) Retention Rate (as determined by IDWR's ESPAM2.1):
   - Greater than 40% retained in aquifer at 5 years — 3 points
   - 20% to 40% retained in aquifer at 5 years — 2 points
   - 15% to Less than 20% retained in aquifer at 5 years — 1 points
2) Diversion Capacity:
   - 300 cfs or greater — 2.5 points
   - 200cfs to less than 300 cfs — 2.0 points
   - 100cfs to less than 200 cfs — 1.5 points
   - 50cfs to less than 100 cfs — 1.0 points
   - Less than 50 cfs — 0.5 points

BE IT FURTHER RESOLVED that the IWRB's ESPA managed recharge program will be limited to recharge of natural flow to avoid impacts to surface water storage above Milner Dam.

BE IT FURTHER RESOLVED that the IWRB authorizes execution of conveyance contracts with a term of one year.

BE IT FURTHER RESOLVED that the use of IWRB funds to develop infrastructure for recharge delivery shall be considered under separate resolutions.

BE IT FURTHER RESOLVED that the IWRB's ESPA managed recharge program will be coupled with a monitoring program approved by IDWR staff to verify the effects of managed recharge and, if necessary, modify the recharge program based on evaluation of the effects.

DATED this 22nd day of January 2016.

ROGER CHASE, Chairman
Idaho Water Resource Board

ATTEST ______________________
VINCE ALBERDI, Secretary

**BEFORE THE IDAHO WATER RESOURCE BOARD**

| IN THE MATTER OF ESTABLISHING A RECHARGE CONVEYANCE PAYMENT STRUCTURE AND DISTRIPUTION PLAN FOR THE LOWER VALLEY | RESOLUTION TO APPROVE ESPA MANAGED RECHARGE PROGRAM STANDARDS AND PROCESSES |
|---|---|

WHEREAS, the Eastern Snake Plain Aquifer (ESPA) has been losing approximately 216,000 acre-feet annually from aquifer storage since the 1950's resulting in declining ground water levels in the aquifer and declining spring flows from the aquifer; and

WHEREAS, the State of Idaho relies on spring discharge from the ESPA through the Thousand Springs to assist in meeting the minimum streamflow water rights at the Murphy Gage that were established under the Swan Falls Agreement; and

WHEREAS, the ESPA Comprehensive Aquifer Management Plan (CAMP) and the Idaho State Water Plan established managed recharge as being an appropriate means to enhance ground and surface water supplies, help maintain and increase aquifer levels, and change the timing and availability of water supplies to meet demand; and

WHEREAS, the 2016 Idaho Legislature passed and approved Senate Concurrent Resolution 136 directing the Idaho Water Resource Board (IWRB)to develop the capacity to achieve 250,000 acre-feet of annual average managed recharge to the ESPA by December 31, 2024; and

WHEREAS, House Bill 547 passed and approved by the 2014 legislature allocates $5 million annually from the Cigarette Tax to the IWRB for statewide aquifer stabilization; and

WHEREAS, Senate Bill 1402 passed and approved by the 2016 Legislature allocated $5 million in ongoing General Fund dollars and $2.5 million in Economic Recovery Reserve Funds to the IWRB's Secondary Aquifer Fund for statewide water sustainability and aquifer stabilization; and

WHEREAS, the IWRB intends to provide financial incentives to maximize recharge of water available under its water right permit.

NOW, THEREFORE BE IT RESOLVED that the IWRB adopts the following recharge delivery payment structure for canals that divert below Minidoka Dam (Lower Valley):

- Aug. 1st – Nov. 15th = $7/af
- Nov. 16th – Feb. 15th = $10/af
- Feb. 16th – Jul. 31st = $5/af; and

NOW, THEREFORE BE IT FURTHER RESOLVED that the IWRB shall have an annual meeting in the fall with the IWRB recharge partners to determine the recharge distribution plan for the upcoming recharge season to optimize IWRB natural flow recharge.

NOW, THEREFORE BE IT FURTHER RESOLVED that the IWRB will offer conveyance and operational contracts of up to 5-year terms and the designated rate will apply for the term of the conveyance and operational contract; and

NOW, THEREFORE BE IT FURTHER RESOLVED that the IWRB's ESPA managed recharge program will be coupled with a continuous monitoring program to verify the effects of managed recharge, and if necessary, modify the recharge program based on evaluation of the effects; and

NOW, THEREFORE BE IT FURTHER RESOLVED that the IWRB authorizes its chairman or designee, Brian Patton, Executive Officer to the IWRB, to execute the necessary agreements or contracts for IWRB ESPA Managed Recharge Program conveyance and operational fees.

DATED this 26th day of July, 2019.

ROGER W. CHASE, Chairman
Idaho Water Resource Board

ATTEST ____________________
VINCE ALBERDI, Secretary

November 6, 2024

**BRAD LITTLE**
Governor

**JEFF RAYBOULD**
Chairman

**Idaho Water Resource Board**
322 East Front Street
Boise, ID 83702-7374
208.287.4800
idwr.idaho.gov/iwrb

# IWRB ESPA Managed Aquifer Recharge Program Standards & Procedures

*The standards and procedures outlined in this document are intended to be advisory only and do not in themselves carry the force and effect of law. Additionally, this document may not include all procedures or guidance documents that solely affect internal processes. Any questions regarding the implementation of this document should be directed to Managed Aquifer Recharge Program staff using the contact information above.*

## I. OVERVIEW

The goal of the Idaho Water Resource Board's (IWRB) Managed Aquifer Recharge (MAR) Program (Program) is to augment aquifer recharge, enhancing water availability and predictability for users, as outlined in the Eastern Snake Plain Aquifer (ESPA) Comprehensive Aquifer Management Plan (CAMP). *See* IWRB, Eastern Snake Plain Aquifer (ESPA) Comprehensive Aquifer Management Plan (2009). The standards and procedures outlined below provide guidance to Program staff and transparency to stakeholders in pursuit of the goal.

## II. BACKGROUND

The IWRB has the authority to establish programs that address specific water resource issues deemed to be in the public interest, pursuant to Article XV, section 7 of the Idaho Constitution, and Idaho Code § 42-1734(4). Through the development of the ESPA CAMP, MAR was determined to be a tool to address the declines in the aquifer. The ESPA CAMP was adopted by the IWRB in 2008 and passed into law by the Idaho Legislature in 2009. The goal of the ESPA CAMP is to sustain the economic viability and the social and environmental health of the Eastern Snake River Plain by adaptively managing a balance between water use and supplies. In 2016 the Idaho Legislature passed Senate Concurrent Resolution No. 136 which acknowledged the following points:

- As a result of declines to ESPA water levels and total storage content, there is currently an insufficient water supply for some water users leading to water delivery calls, protracted litigation, and curtailment notices issued by the Idaho Department of Water Resources (IDWR).
- The current ESPA water levels and total storage content are inadequate to provide a reasonably safe supply of water for sustainable surface and ground water irrigation, aquaculture,

hydropower, municipal and industrial uses, the curtailment of which would cause severe economic harm to the State of Idaho.
- Sustaining the spring flows in the Thousand Spring reach of the Snake River is essential to maintaining the Murphy minimum stream flows.
- Stabilizing and enhancing the ESPA water level is in the public interest because it will lead to sustainable water supply for consumptive and nonconsumptive uses and minimize harm to Idaho's economy arising from water supply shortages.

S. Con. Res. 136, 63d Leg., 2d Reg. Sess. (Idaho 2016). The resolution established the goals that the State develop the capacity to achieve 250,000 acre-feet of average annual managed recharge on or before December 31, 2024, and established a goal of 250,000 acre-feet of average annual recharge across the ESPA for state funded managed recharge. *Id*.

This document provides a series of standards and procedures developed for the Program. The standards and procedures are divided into the following categories: Coordination, Site Metrics, Conveyance and Delivery, and Monitoring and Evaluation. Aligned with the adaptive management recommendations defined in the ESPA CAMP, this document will be updated periodically to reflect changing conditions, policy, and overall goals. Any substantive changes to the document will be approved by the IWRB.

## III. EFFECTIVE DATE

These standards and procedures shall become effective immediately. The Idaho Water Resource Board may modify or revoke these standards and procedures at any time.

Dated this _____ day of__________________ 2024.

___________________________________
Jeff Raybould
Chairman
Idaho Water Resource Board

## I. INTRODUCTION

The IWRB MAR Program has evolved significantly in the ten years since its creation. Based on experience from full-scale operations of the Program, procedural issues have been identified, which this document seeks to clarify. It is intended that this document will be updated periodically based on staff experience, evaluation of Program effectiveness, and changes in policy or goals. All substantive changes will be submitted for approval by the IWRB in accordance with the adaptive management recommendations defined in the ESPA CAMP. Some of the topics formalize standard procedures while others address more complex programmatic considerations and may require separate memorandums to provide the necessary background and methodologies.

It should be noted that these standards are specifically intended for ESPA MAR completed by or on behalf of the IWRB. Entities conducting MAR privately may not be subject to these standards.

## II. DEFINITIONS AND ABBREVIATIONS

**CAMP:** Comprehensive Aquifer Management Plan

**CFS:** cubic feet per second

**Contractor:** Any entity contracted to conduct MAR operations on behalf of the IWRB.

**ESPA:** Eastern Snake Plain Aquifer

**ESPAM:** Eastern Snake Plain Aquifer Model

**GWQMP:** Ground Water Quality Monitoring Plan

**IDEQ:** Idaho Department of Environmental Quality

**IDWR:** Idaho Department of Water Resources

**In-canal Recharge:** MAR conducted utilizing canal systems outside of the irrigation season.

**Infiltration Basin:** Any natural or constructed basin used to conduct MAR by filling with water and allowing it to seep into the ground.

**IWRB:** Idaho Water Resource Board

**Lower Valley:** For the purposes of this document, "Lower Valley" refers to the ESPA downstream (west) of American Falls Reservoir.

**MAR:** Managed Aquifer Recharge. For this document, Managed Aquifer Recharge is defined as adding 'new' water to the aquifer—water that would not naturally recharge or result from the normal use of a non-recharge MAR water right.

**Natural Flow:** Surface water diverted for MAR under a ground water recharge water right, water permit, or temporary approval.

**Off-canal MAR Sites:** Any MAR site that receives water from a canal or separate water delivery system.

**Private Recharge:** Recharge that is not associated with the IWRB.

**Recharge Well:** For the purposes of this document, "recharge well" refers to an injection well used as a method of delivery for MAR.

**Storage Water:** Surface water stored in the Upper Snake River Basin reservoir system under a storage water right or water permit.

**UIC Program:** Underground Injection Control Program

**Upper Valley:** For the purposes of this document, "Upper Valley" refers to the ESPA upstream (east) of American Falls Reservoir.

**Water Delivery System "System":** Connected infrastructure which is used to convey water and for which flow is measured as a sum of its parts. An example of this is a set of multiple canals which all share a common endpoint.

## III. STATUTORY FRAMEWORK

In addition to the constitutional articles and statutes cited above, further statutes and documents of relevance are identified below, providing the framework for this document. This section is not exhaustive, as other rules and statutory frameworks are provided in specific sections below.

Idaho Code § 42-234 establishes the basis for use of water to conduct managed recharge. The appropriation of water for purposes of recharge of ground water basins, in accordance with Idaho law and the Idaho State Water Plan, constitutes a beneficial use of water. I.C. § 42-234(1)–(2). To ensure managed recharge projects do not injure existing water rights, Idaho Code § 42-234(4) grants the IDWR Director "the authority to approve, disapprove, or require alterations in the methods employed to achieve ground water recharge." Proposals for managed recharge projects involving the diversion of natural flow water appropriated in accordance with Idaho Code § 42-234, in excess of ten thousand (10,000) acre-feet on an average annual basis, must be submitted to the IWRB for approval prior to construction commencement. I.C. § 42-1737(a).

The Idaho State Water Plan (Plan) states that "[m]anaged recharge may also be used as an adaptive mechanism for minimizing the impacts of variability in climate conditions." IWRB, Idaho State Water Plan § 1I, at 15 (2012). The Plan recognizes that managed recharge is one of the implementation strategies to ensure the sustainability of Idaho's water resources. *Id*. Recharging aquifers as a water supply alternative has significant potential to address water supply needs as well as conjunctive management issues. "The [IWRB] supports and assists in the development of managed recharge projects that further water conservation and increase water supplies available for beneficial use." *Id*. Specific to the ESPA, successful adaptive management strategies "will accomplish two goals: 1) ensure an adequate and sustainable water supply for existing and future uses, and 2) reduce conflicts between ground and surface water users." *Id*. § 4D, at 54. The Plan recognizes that recharge program effectiveness monitoring and evaluation results are key components to selecting and designing managed recharge strategies and projects. *See id*. § 4E, at 55.

Managed aquifer recharge is considered distinct from incidental ground water recharge. The legislature recognizes that incidental ground water recharge benefits are often obtained from the diversion and use of water for various beneficial purposes. However, such "incidental recharge may not be used as the basis for claim of a separate or expanded water right." I.C. § 42-234(5). To meet the goals established for the ESPA through the legislature and ESPA CAMP, the IWRB does not consider incidental ground water recharge as managed aquifer recharge.

## IV. PROGRAM OPERATIONS OVERVIEW

The IWRB recharge season is defined as August 1 through July 31. This period was determined based on when natural flow was historically available for MAR. Water used for MAR in the State of Idaho must have a beneficial use designated as Ground Water Recharge. Typically, there are two sources of water available to the ESPA MAR Program, natural flow and storage water.

Natural flow water can be diverted for MAR under an Idaho water permit or license with a beneficial use of Ground Water Recharge or a temporary approval of water use designated for recharge. *See* I.C. § 42-103, -104, 42-202A(4a). The oldest priority date for a IWRB recharge water right is 1980. The IWRB's recharge water rights are generally in priority outside of the irrigation season or when there are flood control releases from the reservoir systems. The recharge water rights are administered by the appropriate water district in accordance with the priority date on the permit or license. A temporary approval of water use cannot cause injury to existing water rights; one can only be used when all other water rights are met. Therefore, temporary approvals are only available to the IWRB MAR Program when there are flood control releases.

The IWRB will conduct MAR for other entities using storage water. The storage water must be transferred to the IWRB through the appropriate water district procedures. Storage water is generally available during the irrigation season but must be used by November 30th of the year the transfer takes place.
The IWRB utilizes infiltration basins and recharge wells ("off-canal" recharge sites) and canal conveyance losses for MAR. The Program generally contracts with entities such as canal companies or irrigation districts that own diversion infrastructure on the Snake River and its tributaries, to accomplish MAR. Except for specific sites, the IWRB does not own the infrastructure or dedicated recharge sites, and the IWRB is not accountable for contractor operations. Specific MAR site types may have statutory requirements such as those established by the IDWR UIC Program for recharge wells or by IDEQ for infiltration basins. This document establishes standards for the MAR Program outside of any additional statutory requirements.

## IV. COORDINATION STANDARDS & PROCEDURES

The IWRB relies on its contracted partners to perform managed aquifer recharge, requiring a high level of coordination between partners, the IWRB, and other governing agencies. The following standards serve to clarify the responsibilities of a contractor regarding communication and compliance with these entities. It cannot be guaranteed that the standards listed here are a comprehensive list of all legal requirements; it is ultimately the responsibility of the contractor to ensure compliance with all governing bodies.

1. COORDINATION WITH IWRB
   a. Any entity providing recharge services for the MAR Program must have a valid water conveyance contract with the IWRB, signed by a representative of both parties, prior to commencing recharge operations.
   b. The Contractor shall not divert recharge water until the IWRB has issued a notice to proceed specifically designating the date that the Contractor may begin diverting water for recharge, the contractual dollar limit per recharge season, and other key conditions related to IWRB recharge. The rate and/or volume of water the Contractor is authorized to divert for recharge may be modified by the IWRB to achieve the geographic distribution of recharge consistent with the ESPA CAMP.
   c. The Contractor may reduce or cease delivery of the IWRB's water at its discretion to provide for the needs of its shareholders. The Contractor shall notify the IWRB within 24 hours of ceasing delivery of the IWRB's water.

2. COORDINATION WITH OTHER AGENCIES
   a. All procedures, rules, regulations, laws or other requirements of local, state, and federal agencies must be complied with.
   b. Recharge infiltration basins developed or modified after January 1, 1985, must have and comply with an approved IDEQ ground water quality monitoring plan. *See* IDAPA 58.01.16.600; IDEQ, Guidance for Developing a Ground Water Quality Monitoring Program for Managed Recharge Projects by Land Application § 1, at 1 (2017).
   c. All recharge wells utilized for the MAR Program must have and comply with a permit issued by the UIC Program and comply with all other UIC Program requirements. *See* IDAPA 37.03.03. IDWR is responsible for the operation of the UIC Program.

d. Off-canal recharge sites located on Federal or State land must have an easement from the appropriate entity and a noxious weed abatement program in place, which is the sole responsibility of the Contractor.

## V. SITE METRICS STANDARDS & PROCEDURES

These standards provide minimum metrics that must be met for sites conducting IWRB MAR. Recharge sites, including but not limited to infiltration basins and recharge wells, that were utilized or funded prior to the adoption of this document could be exempt from these standards. Exemptions for existing recharge sites will be evaluated on a case-by-case basis.

1. WATER LEVELS
   a. The pre-recharge ground water table should be a minimum of 30 feet below ground surface, as measured in the closest accessible well. This limit is recommended to protect subterranean infrastructure (e.g., basements, septic systems) and to ensure recharge water does not cause issues with flooding or sub-irrigating farmland, or with returning as surface water providing minimal benefit to the aquifer.
   b. It is recommended that recharge operations cease when the ground water table elevation rises to 15 feet or less below ground surface during MAR operations, as measured in the closest accessible well.
   c. If a recharge well is used to conduct MAR and the well is designed not to impact the upper most aquifer, 1.a and 1.b may not apply and will be assessed on a case-by-case basis.
   d. If standing water is present in an infiltration basin prior to a recharge operation, the basin will not be used to conduct IDWR MAR. It is assumed that such a site does not offer the opportunity to increase recharge to, or storage in, the aquifer and therefore will not be used.

2. MINIMUM INFILTRATION VOLUME / DIVERSION RATE
   a. A canal system used for IWRB MAR must have at least an average diversion rate of 20 cfs. This minimum is designed to ensure MAR is occurring at a sufficient rate to impact the aquifer and to reduce administrative oversite and operational costs. Other standards or procedures might necessitate a higher rate than defined here.
   b. An individual “off-canal” recharge site must be capable of infiltrating at least 10 cfs per day or 600 acre-feet per month. This minimum is designed to ensure MAR is occurring at a sufficient rate or volume to impact the aquifer and to reduce administrative oversite and operational costs. Other standards or procedures might necessitate a higher rate or volume than defined here.

3. MAR LOCATION REQUIREMENTS
   a. IWRB MAR locations must retain at least 15% of five-year volumetric recharge in the aquifer and/or have a 50% volumetric travel time exceeding four months to any reach of the Snake River or its tributaries. In this document, 50% volumetric travel time refers to the time required for 50% of the recharged volume to discharge to any modeled reaches of the Snake River. A primary goal of the Program as defined in the ESPA CAMP is to increase predictability for water users by managing for a reliable supply. Any site with a five-year retention of less than 15% or 50% volumetric travel time less than four months does not aid the Program in achieving that goal. Rapid returns to the Snake River result in minimal impact

to the aquifer or the capture of water that would otherwise flow past the Upper Snake River Basin reservoir system.

i. The retention time and the travel time shall be determined by the most current, published version of the ESPAM model as determined by IDWR.
ii. The calculation methods used to determine these values are further defined in a supporting document included in Appendix A.
iii. Recharge basins and recharge wells that were utilized or funded prior to the adoption of this document or for which the minimum requirements were determined by a previous version of ESPAM may be exempt for this requirement. Exemptions will be evaluated on a case-by-case basis.

b. The primary purpose of recharge basins is for MAR when recharge water is available. Irrigated fields or pastures will not be considered as recharge basins for IWRB MAR.

## VI. CONVEYANCE AND DELIVERY STANDARDS & PROCEDURES

A goal of the MAR Program is to add additional, "new," water to the aquifer beyond what is provided by incidental recharge. The Program also aims to maximize geographical distribution, allowing for the greatest hydrologic benefits to the aquifer and the Snake River. However, the availability of IWRB recharge water changes from year to year. These standards intend to maximize Program goals while working with an unpredictable supply.

1. CONVEYANCE SYSTEMS

a. Entities contracted to deliver IWRB water for MAR are responsible for all operations, maintenance, management, and liability insurance for all aspects of the system(s) used to conduct MAR.
b. IWRB participation in significant maintenance or replacement expenses related to recharge facilities and systems will be considered on a case-by-case basis.
c. Canals being used to transport water for irrigation cannot simultaneously be used for IWRB MAR. Canals can be used to transport water to a designated recharge site when delivering irrigation water, however, water lost in the canal cannot be counted as IWRB recharge.
d. IWRB in-canal recharge shall not occur during the system's Average Irrigation Season. A canal system's Average Irrigation Season is defined by its average first and last irrigation diversion dates, referred to as the Average Start Date of Irrigation Diversion and the Average Last Date of Irrigation Diversion. The methodology for calculating the Average Start Date and the Average Last Date of Diversion are included in Appendix B.
e. Canals may still be used for recharge outside their Average Irrigation Season when transporting water for non-irrigation uses. In some cases, canal systems operate outside their Average Irrigation Season to deliver water for non-irrigation beneficial uses (e.g., stockwater). Diversions for these other uses are commonly less than they are for irrigation. A 'base flow' will be established to account for the water typically diverted water for the other beneficial uses. The volume of water considered MAR will be determined by subtracting the base flow and any spill out of the system from the total volume diverted from the source. The methodology for calculating the base flow is included in Appendix C.
f. Use of natural stream channels can only be used for IWRB MAR after consultation and approval by Program staff. If any flow is occurring in the stream channel, not attributed to the beneficial use of ground water recharge, the channel shall not be used for IWRB MAR.

2. CONVEYANCE FEES

a. Payment for conveyance of the IWRB's recharge right or other waters specifically identified for managed recharge purposes will be based on the reported flow and volume measurements submitted by the Contractor, and any adjustments based on measurements obtained by water district or IWRB staff.
b. Conveyance fees will be evaluated every five years in line with the recharge season.
c. Conveyance fees for conducting IWRB recharge will be established through an IWRB resolution at an IWRB board meeting. The current resolution can be found in Appendix D.

3. DISTRIBUTION OF IWRB RECHARGE WATER

a. To the extent possible, the IWRB shall manage geographical distribution of recharge in accordance with the ESPA CAMP goals, which may include prioritizing areas with greater retention rates and diversifying the location of IWRB MAR.
b. Distribution of available IWRB MAR water will be evaluated separately for the Upper Valley and the Lower Valley.
c. Any water transferred to the IWRB will be recharged at locations determined by the IWRB.
d. The IWRB shall not recharge storage water in a location that will reduce the rate of natural flow water available.

## VII. MONITORING AND EVALUATION STANDARDS & PROCEDURES

Comprehensive monitoring of IWRB recharge water quantity and quality is necessary to ensure compliance and to collect accurate data essential for assessing the impact of IWRB MAR on the aquifer. These standards outline the monitoring requirements for sites conducting IWRB MAR.

1. MONITORING OF IWRB RECHARGE WATER QUANTITY

a. Entities contracted to deliver IWRB water for MAR shall establish a water quantity monitoring plan and have the plan approved by the IWRB MAR Program before diverting water for recharge. The plan must include but is not limited to measurement of flow at the diversion(s) into the system, return flow out of the system, and measurement into any off-canal recharge sites.
b. The Contractor or designee shall measure daily flow rates of water delivered to the Contractor's canal system, individual recharge sites, and any spilled water. Daily recharge flow rates shall be reported to a representative of the Program on a regular basis but no less than once weekly during recharge operations.
c. Measurement of IWRB recharge water, including but not limited to the devices and methods used, must minimally meet IDWR Water Measurement Guidelines and Minimum Acceptable Standards and Requirements for Open Channel and Closed Conduit Measuring Devices. *See* IDWR, Water Measurement Guidelines (vers. 7.c June 2009); IDWR, Minimum Acceptable Standards and Requirements for Open Channel and Closed Conduit Measuring Devices (Mar. 2023).
d. A conversion factor of 1.9835 acre-feet per day (af/d) per cubic feet per second (cfs) shall be used when computing accomplished recharge. Miner's inches shall be defined as 50 inches equal to 1.0 cfs.
e. In the event a recharge report is delinquent for one week, the IWRB reserves the right to reallocate the Contractor's flow allocation as stipulated in its notice to proceed. In the event a

recharge report is delinquent for two consecutive weeks, the IWRB reserves the right to deduct 10% from the total conveyance payment.

f. The appropriate water district shall make the final determination concerning the quantity of water diverted for recharge.

2. MONITORING OF IWRB RECHARGE WATER QUALITY

a. Recharge infiltration basins developed or modified after January 1, 1985, must have and comply with an approved IDEQ ground water quality monitoring plan. *See* IDAPA 58.01.16.600; IDEQ, Guidance for Developing a Ground Water Quality Monitoring Program for Managed Recharge Projects by Land Application § 1, at 1 (2017).
b. Annual water quality summary reports for IWRB recharge will be compiled and submitted to IDEQ and the MAR Program.
c. Recharge well sites must comply with all UIC permit conditions and UIC Program requirements including water quality sampling and reporting. All required water quality reporting shall be submitted to both the UIC Program and the MAR Program.
d. Water quality monitoring associated with the IWRB MAR Program, including sampling and reporting, required for compliance with an approved GWQMP or UIC permit, will be funded or conducted by the IWRB MAR Program.
e. If IWRB recharge occurs concurrently with private recharge, the Program will organize and pay a proportionate share of monitoring costs associated with a monitoring plan.
f. Any costs not associated with IWRB MAR as outlined above shall be the sole responsibility of the Contractor.

3. EVALUATION

a. The IWRB, or designated representatives, reserve the right to inspect and verify all aspects of monitoring plans, diversion structures, off-canal recharge sites or review the work for compliance within the conveyance contract's scope of work during the terms of the contract.
b. Inspections shall allow the IWRB representatives to:
    - Ensure all monitoring plan requirements are being met.
    - Verify the measurement devices and methodologies are sufficient.
    - Ensure the system used for MAR is acceptable under the Program's site metrics criteria.
    - Ensure the system used to conduct IWRB MAR is in accordance with all IWRB standards and procedures.

For more information on the Departments and Programs mentioned above, please visit their websites:

| | |
|---|---|
| Idaho Department of Environmental Quality | https://www.deq.idaho.gov/ |
| Idaho Department of Water Resources | https://idwr.idaho.gov/ |
| Idaho Water Resource Board | https://idwr.idaho.gov/iwrb/ |
| Underground Injection Control Program | https://idwr.idaho.gov/wells/injection-wells/ |

**REFERENCES**

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Idaho Department of Water Resources. (2023). *State of Idaho Department of Water Resources Minimum Acceptable Standards and Requirements for Open Channel and Closed Conduit Measuring Devices*. Retrieved from https://idwr.idaho.gov/wp-content/uploads/sites/2/water-measurement/MinAcceptStandards-MeasDevices-2023Update.pdf

Idaho Water Resource Board. (2009). *Eastern Snake Plain Aquifer (ESPA) Comprehensive Aquifer Management Plan*. Retrieved from https://idwr.idaho.gov/wp-content/uploads/sites/2/iwrb/2008/20080129-ESPA-CAMP.pdf

Idaho Water Resource Board. (2012). *Idaho State Water Plan*. Retrieved from https://idwr.idaho.gov/wp-content/uploads/sites/2/iwrb/2012/2012-State-Water-Plan.pdf

# APPENDIX A

Methodology for Determination of Volumetric Retention and 50% Travel Time

# Background

A primary goal of the Idaho Water Resource Board (IWRB) Managed Aquifer Recharge (MAR) Program (Program) as defined in the Eastern Snake Plain Aquifer (ESPA) Comprehensive Aquifer Management Plan (CAMP) is to increase predictability for water users by managing for a reliable supply. In 2016, the Idaho Legislature passed Idaho Senate Concurrent Resolution No. 136 (S. Res. 136, 2016). The resolution recognized that stabilizing and enhancing the ESPA water level is in the public interest because it will lead to sustainable water supply for consumptive and nonconsumptive uses and minimize harm to Idaho's economy arising from water supply shortages. The resolution set a goal for the state to develop the capacity for 250,000 acre-feet of average annual managed recharge by December 31, 2024 and to achieve 250,000 acre-feet of average annual recharge across the ESPA through state-funded managed recharge. However, rapid returns of recharged water to the Snake River result in minimal impact to the aquifer or the capture of water that would otherwise flow past the ESPA reservoir system. The Program therefore requires that IWRB MAR locations must have a minimum of a 15% 5-year volumetric retention in the aquifer and/or a 50% volumetric travel time to a reach of the Snake River or one of its tributaries that is greater than four months.

# Overview of Procedure

This document outlines the methodology IWRB MAR Program staff follow to determine the 5-year volumetric retention and 50% travel time for recharge sites. Individual sites may have unique factors that require alterations or additions to this methodology. This methodology shall not inhibit IWRB MAR Program staff from performing additional site evaluations.

<u>5-Year Volumetric Retention</u>

The procedures to determine site retention utilize a 5-year volumetric retention map which illustrates the percentage (expressed as a decimal) of water retained in the Eastern Snake Plain Aquifer five years after a one-month recharge event, based on the recharge location.

The retention map data were generated by running the Eastern Snake Plain Aquifer Model version 2.2 (ESPAM2.2) in superposition mode for each active model cell. In this mode, external stresses on the aquifer, such as precipitation and irrigation, are excluded, and the model results focus solely on the impacts of the recharge event.

Recharge in each cell was simulated as a one-month event, followed by five years without additional recharge. The percentage of recharge retained in the aquifer was calculated by dividing the volume of water remaining in storage five years after the event by the volume of recharge that occurred during the initial one month of recharge.

<u>50% Travel Time to the Snake River</u>

The procedure to determine the 50% travel time to the Snake River uses the ESPA Model Transfer Spreadsheet (ETRAN) to evaluate returns to the Snake River. For the purposes of this document, a 50% volumetric travel time is defined as the time it takes for 50% of the water recharged to return to any modeled reaches of the Snake River. The ETRAN transfer tool is normally used to evaluate water right transfers by modeling effects on the Snake River of pumping water from the aquifer. This procedure instead models the addition of water to the aquifer to determine MAR's effects on the Snake River. This specific analysis is only used to determine percentage of returns of recharge water to the surface water system. This methodology is not intended to be used to evaluate or quantify specific reach impacts or impacts over short time intervals (anything less than trimesters).

## Procedure to Determine 5-Year Volumetric Retention

Retention for off-canal recharge sites must be calculated slightly differently than it is for in-canal recharge, however both methods use a 5-year volumetric retention map as their basis.

Off-Canal Recharge Sites – Individual Grid Cell
For off-canal recharge sites (e.g. infiltration basins and recharge wells), a single cell within the 5-year retention map is used. If a site overlaps multiple cells, the 5-year volumetric retention for the site should be taken from the map cell which the greatest portion of the site falls within.

In-Canal Recharge – Length Averaged Linear Retention
For in-canal recharge, the main canal of a system is evaluated, which most often spans several retention cells. Therefore, retention for in-canal recharge is calculated as a weighted average relative to the length of the canal within each of the overlapped retention cells. The steps for utilizing this method are as follows.

1. Create a shapefile which represents the main canal and intersect this with the ESPAM-based retention layer. This results in a table which includes the length of the canal within each retention grid cell.
2. Take the canal length within each grid cell divided by the total canal length to determine the proportion of the main canal in each grid cell.
3. Multiply each of these proportions by the retention value of the respective grid cell.
4. Add all of these products (the proportion times the retention value). This is the weighted average retention for the canal system, which is considered the retention for systems spanning multiple retention grid cells. If this value is equal to or greater than 15%, the criteria is met.

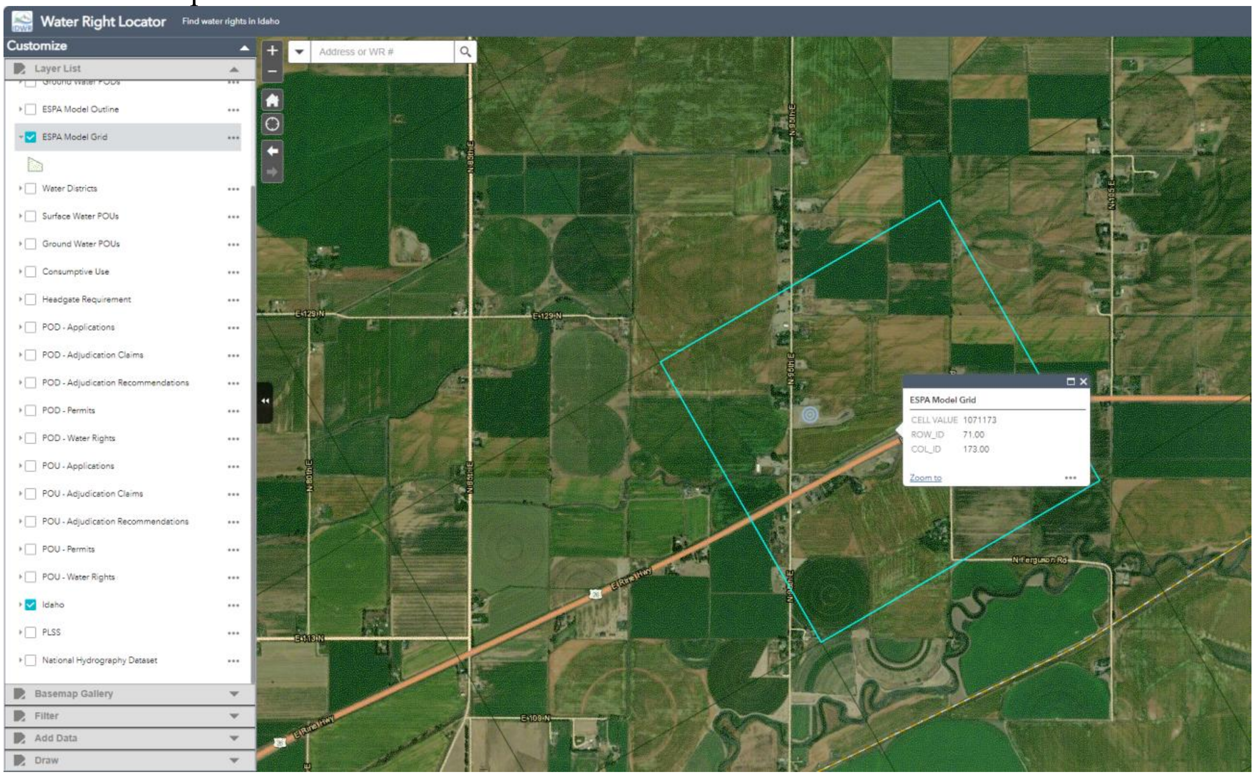
Image 1. Average linear retention steps 2–4.

| Retention | Section Length | Proportion | Weighted Retention | | | |
|---|---|---|---|---|---|---|
| Retention | Section Length | Section Length / Total Length | Retention*Proportion | | | |
| 0.2303 | 1654.346727 | 0.035848784 | 0.008255975 | | | Copied from Attribute Table |
| 0.221 | 2446.563811 | 0.053015693 | 0.011716468 | | | |
| 0.2122 | 2700.038131 | 0.058508342 | 0.01241547 | | | |
| 0.2038 | 2502.586415 | 0.054229672 | 0.011052007 | | | |
| 0.1956 | 2325.881176 | 0.050400566 | 0.009858351 | | | |
| 0.1872 | 2662.872462 | 0.057702982 | 0.010801998 | | | |
| 0.1782 | 2595.050798 | 0.056233324 | 0.010020778 | | | |
| 0.1527 | 2226.758125 | 0.048252624 | 0.007368176 | | | |
| 0.1175 | 2184.738953 | 0.047342092 | 0.005562696 | | | |
| 0.1682 | 2306.571802 | 0.049982143 | 0.008406996 | | | |
| 0.1372 | 2888.338025 | 0.062588697 | 0.008587169 | | | |
| 0.1029 | 2309.929445 | 0.050054901 | 0.005150649 | | | |
| 0.156 | 861.950103 | 0.018677985 | 0.002913766 | | | |
| 0.1221 | 336.083282 | 0.00728274 | 0.000889223 | | | |
| 0.0883 | 2193.743204 | 0.047537209 | 0.004197536 | | | |
| 0.0001 | 1231.545313 | 0.02668691 | 2.66869E-06 | | | |
| 0.054 | 355.677764 | 0.007707342 | 0.000416196 | | | |
| 0.0002 | 2560.491154 | 0.055484436 | 1.10969E-05 | | | |
| 0.0719 | 2178.761033 | 0.047212554 | 0.003394583 | | | |
| 0.0321 | 3026.432889 | 0.065581137 | 0.002105154 | | | |
| 0.0897 | 49.862605 | 0.001080495 | 9.69204E-05 | | | |
| 0 | 1529.705566 | 0.033147879 | 0 | | | |
| 0.0527 | 2444.661866 | 0.052974479 | 0.002791755 | | | |
| 0.0001 | 381.556232 | 0.008268114 | 8.26811E-07 | | | |
| 0.0696 | 193.770637 | 0.004198903 | 0.000292244 | | | |
| | | | | | | |
| **Total Canal Length:** | **46147.91752** | **Total Retention:** | **0.126308703** | | | |

# Procedure to Determine 50% Travel Time to the Snake River

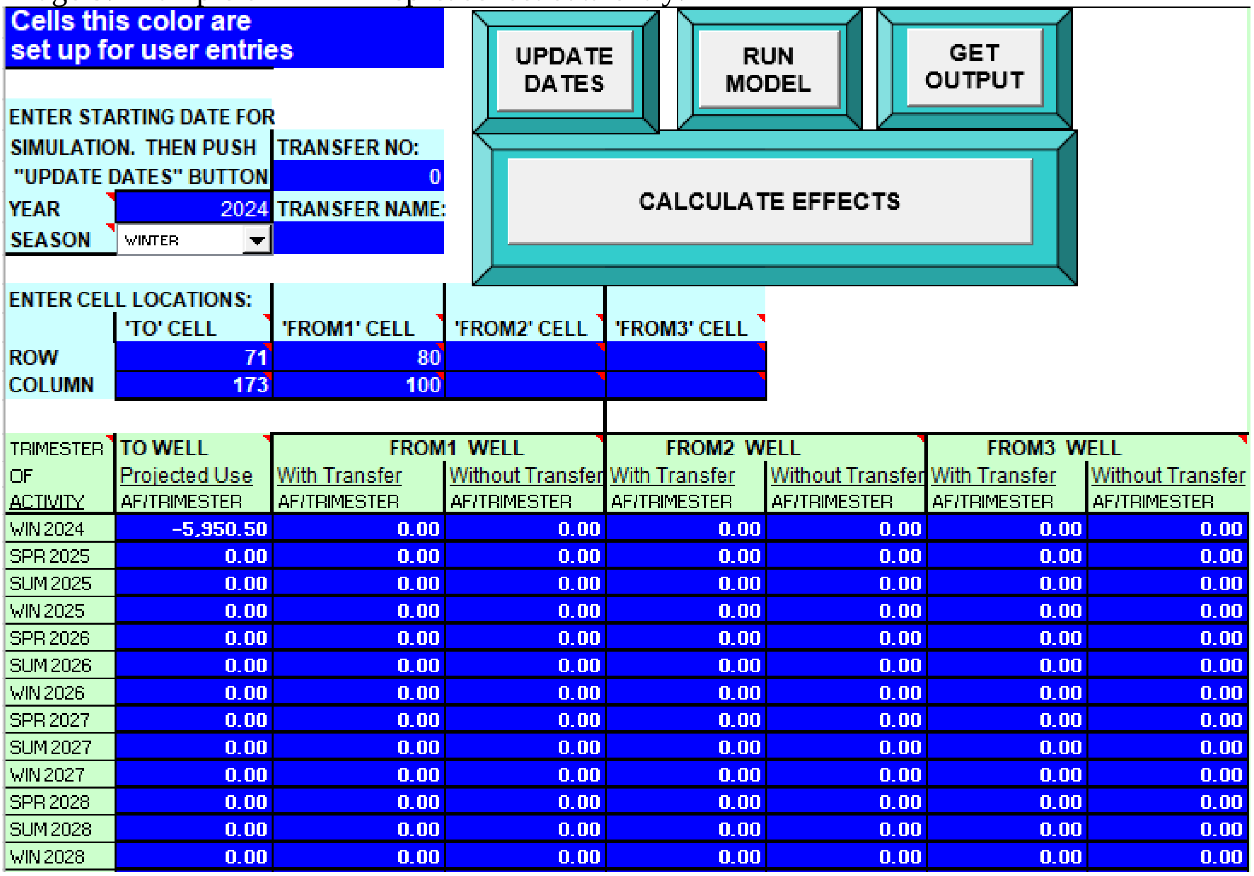
1. Download or open the current version of the ESPA Model Transfer Spreadsheet (ETRAN). This can be procured from the IDWR website at: https://idwr.idaho.gov/water-rights/transfers/resources/ Alternatively, search for "ETRAN" on the IDWR home page.
2. Navigate to https://maps.idwr.idaho.gov/agol/WaterRightLocator/ and click the box next to "ESPA Model Grid" on the layer list dropdown menu on the left side of the screen to select this layer. Deselect the "POD - Water Rights" layer and the "POU – Water Rights" layers.
3. Use the Search Tool at the top of the screen or zoom in to the recharge site location on the map.
4. Click on the model grid cell which contains the recharge location. A pop-up will appear showing a Row ID and a Column ID. See Image 2 below.

Image 2. Water Right Locator Map used to find the “TO CELL” row and column ID’s as outlined in Steps 2-4.




5. In the most current version of ETRAN, in the “DataEntry” sheet, enter the row and column values from Step 4 in the “TO CELL” row and column cells. See Image 3 below for an example of Steps 5-8.
6. For the “’FROM1’ CELL”; enter any number between 1 and 104 for the row value and any number between 1 and 209 for the column value. These are arbitrary numbers that do not affect the results of the analysis, but these cells must be populated to run the model. A row value of 80 and column value of 100 were used in the example below.
7. In the “YEAR” cell, type in the current year and update the “SEASON” dropdown to the current season. The year and season won’t affect this analysis, but it is helpful in tracking how and when analyses were completed. Click “UPDATE DATES”.
8. Additionally, enter an estimated volume of recharge for the site in acre-feet (af) into the first cell in the “TO WELL” column. The amount entered will not affect the result of the analysis, but these cells have to be populated to run the model. Enter the value as a negative because recharge is adding water to the aquifer while the transfer tool models water pumped from the aquifer.

Image 3. Example of ETRAN spreadsheet data entry.


Cells this color are set up for user entries

UPDATE DATES | RUN MODEL | GET OUTPUT | CALCULATE EFFECTS

ENTER STARTING DATE FOR SIMULATION. THEN PUSH "UPDATE DATES" BUTTON

YEAR: 2024

SEASON: WINTER

TRANSFER NO: 0

TRANSFER NAME:

| ENTER CELL LOCATIONS: | 'TO' CELL | 'FROM1' CELL | 'FROM2' CELL | 'FROM3' CELL |
|---|---|---|---|---|
| ROW | 71 | 80 | | |
| COLUMN | 173 | 100 | | |

| TRIMESTER OF ACTIVITY | TO WELL | FROM1 WELL | | FROM2 WELL | | FROM3 WELL | |
|---|---|---|---|---|---|---|---|
| | Projected Use AF/TRIMESTER | With Transfer AF/TRIMESTER | Without Transfer AF/TRIMESTER | With Transfer AF/TRIMESTER | Without Transfer AF/TRIMESTER | With Transfer AF/TRIMESTER | Without Transfer AF/TRIMESTER |
| WIN 2024 | -5,950.50 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SPR 2025 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SUM 2025 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WIN 2025 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SPR 2026 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SUM 2026 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WIN 2026 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SPR 2027 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SUM 2027 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WIN 2027 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SPR 2028 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| SUM 2028 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| WIN 2028 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

9. Click “RUN MODEL”, then “GET OUTPUT”, and finally “CALCULATE EFFECTS”. Once the model has finished running, the spreadsheet will auto-direct to the “Graphs Above Milner” tab. Click instead on the “Calculated Effects” tab.
10. Select the data from columns A-L, Total Effect with Transfer. See Image 4 below. Copy this data to a new, blank Excel workbook.

Image 4. Calculated Effects tab in ETRAN spreadsheet with data described in Step 10 highlighted.

| | A | B | C | D | E | F | G | H | I | J | K | L | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | |
| 3 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| 4 | | TOTAL EFFECT WITH TRANSFER (AF/four months) | | | | | | | | | | | TO W |
| 5 | | Ashton to | Heise to | Shelley to | Nr Blckft T | Neeley to | Dev. Wbl. | Buhl to | Kspr | Kspr to | Malad | Malad to | Ash |
| 6 | | Rexburg | Shelley | Nr Blckft | Neeley | Minidoka | Buhl | Kspr | | Malad | | Bancroft | Rex |
| 7 | WIN 2024 | -0.2 | -998.5 | -48.8 | -6.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 8 | SPR 2025 | -0.7 | -873.6 | -89.2 | -19.9 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 9 | SUM 2025 | -1.4 | -564.5 | -105.1 | -35.7 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 10 | WIN 2025 | -2.0 | -344.8 | -103.9 | -49.5 | -0.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 11 | SPR 2026 | -2.6 | -213.8 | -94.3 | -59.0 | -0.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 12 | SUM 2026 | -3.0 | -137.5 | -82.1 | -64.1 | -0.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 13 | WIN 2026 | -3.3 | -92.2 | -70.0 | -65.5 | -0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 14 | SPR 2027 | -3.5 | -64.3 | -59.2 | -64.2 | -0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 15 | SUM 2027 | -3.7 | -46.5 | -49.9 | -61.2 | -0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 16 | WIN 2027 | -3.8 | -34.8 | -42.1 | -57.2 | -0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 17 | SPR 2028 | -3.8 | -26.8 | -35.7 | -52.7 | -0.5 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 18 | SUM 2028 | -3.9 | -21.1 | -30.4 | -48.1 | -0.5 | -0.1 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 19 | WIN 2028 | -3.9 | -17.1 | -26.0 | -43.6 | -0.5 | -0.1 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 20 | SPR 2029 | -3.9 | -14.0 | -22.3 | -39.3 | -0.4 | -0.1 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 21 | SUM 2029 | -3.8 | -11.8 | -19.3 | -35.4 | -0.4 | -0.1 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 22 | WIN 2029 | -3.8 | -10.0 | -16.7 | -31.8 | -0.4 | -0.1 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | |
| 23 | SPR 2030 | -3.8 | -8.6 | -14.6 | -28.5 | -0.4 | -0.2 | -0.1 | -0.1 | 0.0 | -0.1 | 0.0 | |
| 24 | SUM 2030 | -3.7 | -7.5 | -12.8 | -25.6 | -0.3 | -0.2 | -0.1 | -0.1 | -0.1 | -0.1 | 0.0 | |
| 25 | WIN 2030 | -3.6 | -6.6 | -11.2 | -23.0 | -0.3 | -0.2 | -0.1 | -0.1 | -0.1 | -0.1 | 0.0 | |
| 26 | SPR 2031 | -3.5 | -5.9 | -9.9 | -20.7 | -0.3 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | 0.0 | |
| 27 | SUM 2031 | -3.5 | -5.2 | -8.8 | -18.6 | -0.3 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | 0.0 | |
| 28 | WIN 2031 | -3.4 | -4.7 | -7.8 | -16.8 | -0.3 | -0.2 | -0.2 | -0.1 | -0.1 | -0.1 | 0.0 | |

11. Take the sum of all the first trimester values in the first row of data across all reaches (columns). If the sum of these values is less than 50% of the estimated total recharge volume entered into the "TO WELL" cell in Step 8, then the minimum criteria is met. See Image 5 below.

Image 5. Excel analysis of ETRAN results.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | TOTAL EFFECT WITH TRANSFER (AF/four months) | | | | | | | | | | |
| | Ashton to | Heise to | Shelley to | Nr Blckft T | Neeley to | Dev. Wbl. | Buhl to | Kspr | Kspr to | Malad | Malad to |
| | Rexburg | Shelley | Nr Blckft | Neeley | Minidoka | Buhl | Kspr | | Malad | | Bancroft |
| WIN 2024 | -0.22852 | -998.495 | -48.7882 | -6.45672 | -0.01504 | -3.3E-05 | -1.9E-05 | -7.5E-06 | -5.8E-06 | -5.2E-06 | -4.2E-07 |
| SPR 2025 | -0.7387 | -873.627 | -89.1812 | -19.8954 | -0.05975 | -0.00023 | -0.00014 | -5.6E-05 | -4.4E-05 | -4E-05 | -3.4E-06 |
| SUM 2025 | -1.39798 | -564.543 | -105.128 | -35.7144 | -0.13378 | -0.00088 | -0.00054 | -0.00022 | -0.00018 | -0.00017 | -1.5E-05 |
| WIN 2025 | -2.0483 | -344.843 | -103.862 | -49.4717 | -0.22413 | -0.00241 | -0.00151 | -0.00063 | -0.00052 | -0.00049 | -4.4E-05 |
| SPR 2026 | -2.59618 | -213.83 | -94.3282 | -59.0176 | -0.31453 | -0.0053 | -0.00341 | -0.00144 | -0.00119 | -0.00115 | -0.00011 |
| SUM 2026 | -3.01543 | -137.519 | -82.1232 | -64.1227 | -0.39236 | -0.00997 | -0.0066 | -0.00281 | -0.00235 | -0.00231 | -0.00022 |
| WIN 2026 | -3.31823 | -92.1532 | -70.0236 | -65.5285 | -0.45091 | -0.01675 | -0.01134 | -0.00486 | -0.00412 | -0.0041 | -0.0004 |
| SPR 2027 | -3.52965 | -64.2661 | -59.1679 | -64.25 | -0.4886 | -0.02572 | -0.01778 | -0.00768 | -0.00657 | -0.00664 | -0.00066 |

| | | |
|---|---|---|
| Total Volume | -5950.5 | <Volume entered into ETRAN |
| 50% Volume | -2975.25 | <50% of Volume entered into ETRAN |
| Sum of First Trimester | =sum(B5:L5 | |
| | SUM(**number1**, [number2], ...) | |
| Result: | | |
| Meets minimum of greater than 3 months. | | |


| | | |
|---|---|---|
| Total Volume | -5950.5 | <Volume entered into ETRAN |
| 50% Volume | -2975.25 | <50% of Volume entered into ETRAN |
| Sum of First Trimester | -1053.98 | |
| Result: | | |
| Meets minimum of greater than 3 months. | | |

# APPENDIX B

Methodology for Determination of Historical System Operation Dates

## Background

Whenever a water delivery system diverts water for any beneficial use, incidental aquifer recharge occurs as a byproduct. Therefore, incidental recharge occurs throughout the entirety of system's typical operation dates. This incidental recharge is recognized as a public benefit (Idaho Code 42-234) but is not considered Managed Aquifer Recharge (MAR). MAR is additional, or "new," water added to the aquifer which thereby increases aquifer storage.
To effectively perform MAR, the program utilizes systems outside their historical operation dates, also known as the Average Irrigation Season. This procedure aims to identify the typical annual dates when irrigation delivery operations occur within a system ('system operation dates' or 'Average Irrigation Season'). The goal is to differentiate managed aquifer recharge from historical incidental recharge generated through routine irrigation system operations. Recharge performed outside of the bounds of the calculated system's irrigation operation dates should then be considered new water added to the aquifer. This document provides a standardized, transparent methodology, based on historic practices of a system, that can be applied to all program partners conducting IWRB recharge.

## Overview of Procedure

The procedure to determine system operation dates examines median diversion time-periods in each calendar year from 1990 through 2015, inclusive. This time period is recent enough to take into account large-scale conversion from flood to sprinkler irrigation, it is after the construction of the reservoirs on the Snake River in the 1960s, but before MAR operations began in earnest in 2017, and it is broad enough to include wet periods (e.g. 1995 - 1999) and dry cycles (e.g. 1990 – 1992, 2001 – 2004). Use of the median value assists in smoothing out anomalous data to determine a long-term representative value.

These calculations provide a base for determining system operation dates. With the realization that a canal's operations could significantly alter over time, the system's operation dates could be altered with sufficient data or by resolution.
The proposed methodology provides a standardized method for determining when IWRB recharge could be conducted above "normal" system operations. Basic assumptions:

- The 26 years proposed for examination are representative of current operations and provide enough data to discern patterns.
- Only official, finalized data from the relevant diversion-reporting entity (e.g. USGS, Water District 1, etc) will be utilized.
- Collaboration with partners/operators and adaptive management will be essential. The goal is to add new water to the aquifer.

# Procedure to Determine Historical System Operation Dates

1. Obtain the historical diversion data for the system of interest, typically via authoritative sources (e.g. Water District 01, USGS, etc). In the case of Water District 01, the data is provided as "Flow (CFS)," also known as the "Sum of Flow (cfs)," through the system's headgate (example of the data shown in Image 1).
2. Record the first and last date of diversion into each system's headgate during each calendar year (example shown in Image 2).
    a. Some discretion by the reviewer will be necessary. In Image 2, the system continues to divert a small amount of water from October 29 – 31. This diversion rate is clearly distinct from the primary delivery operations that ended on October 28, and likely represents minimal, unintentional leakage through the headgate.
    b. If a system "pauses" during the normal delivery season, and then resumes a subsequent delivery operation, the date of the end of the final delivery operation would be used. These pauses are generally towards the end of the irrigation season.
    c. If a system participated in MAR operations during the historic time period analyzed those deliveries will be excluded.
3. The historical system operation dates are determined by calculating the median calendar date for the 26 years analyzed (1990-2015) for the first and last dates of diversion (example shown in Image 3).
4. Once the calculations are complete the results will be sent to the recharge partner for their review and feedback before being applied.

The following should also be considered when calculating system operation dates:

1. All diversions that drain to a common end, or otherwise serve the same general area, should be considered as a single system containing multiple points of diversion. The earliest first and latest last dates should be applied across all points of diversion.

    For example: Two separate canals drain to a single endpoint. One canal has historical system operation dates of April 1 through October 31, and the other operates only through the month of July. The system operation dates for both points of diversion would be April 1 through October 31. Both canals could be used to conduct MAR outside of the bounds of those dates.
2. IWRB staff, in consultation with the recharge partner, will have discretion to adaptively manage any unforeseen circumstances not covered by the method described above, with the primary goal of adding new water to the aquifer.

Image 1. Sample of Water District 01 (WD-01) system diversion data.

| SiteID | SiteType | Flow (CFS) | Gage Height (Feet) | HSTDate | Irrigation Year |
|---|---|---|---|---|---|
| XXXXXXX | D | 0 | 0 | 5/4/1991 | 1991 |
| XXXXXXX | D | 0 | 0 | 5/5/1991 | 1991 |
| XXXXXXX | D | 86 | 1.19 | 5/6/1991 | 1991 |
| XXXXXXX | D | 137 | 1.51 | 5/7/1991 | 1991 |
| XXXXXXX | D | 227 | 1.96 | 5/8/1991 | 1991 |
| XXXXXXX | D | 267 | 2.13 | 5/9/1991 | 1991 |
| XXXXXXX | D | 311 | 2.31 | 5/10/1991 | 1991 |
| XXXXXXX | D | 309 | 2.3 | 5/11/1991 | 1991 |
| XXXXXXX | D | 340 | 2.42 | 5/12/1991 | 1991 |
| XXXXXXX | D | 371 | 2.53 | 5/13/1991 | 1991 |
| XXXXXXX | D | 351 | 2.46 | 5/14/1991 | 1991 |
| XXXXXXX | D | 353 | 2.47 | 5/15/1991 | 1991 |
| XXXXXXX | D | 366 | 2.52 | 5/16/1991 | 1991 |
| XXXXXXX | D | 385 | 2.59 | 5/17/1991 | 1991 |
| XXXXXXX | D | 353 | 2.48 | 5/18/1991 | 1991 |
| XXXXXXX | D | 328 | 2.39 | 5/19/1991 | 1991 |
| XXXXXXX | D | 328 | 2.39 | 5/20/1991 | 1991 |
| XXXXXXX | D | 332 | 2.41 | 5/21/1991 | 1991 |
| XXXXXXX | D | 351 | 2.48 | 5/22/1991 | 1991 |
| XXXXXXX | D | 392 | 2.63 | 5/23/1991 | 1991 |

Image 2. Sample of determining end and start dates for "normal" operational deliveries in a given year.

| | A | B |
|---|---|---|
| 1 | Date | Sum of Flow (CFS) |
| 71 | 21-Oct | 372 |
| 72 | 22-Oct | 372 |
| 73 | 23-Oct | 375 |
| 74 | 24-Oct | 375 |
| 75 | 25-Oct | 375 |
| 76 | 26-Oct | 375 |
| 77 | 27-Oct | 375 |
| 78 | 28-Oct | 180 |
| 79 | 29-Oct | 21 |
| 80 | 30-Oct | 22 |
| 81 | 31-Oct | 22 |
| 82 | ⊟ 2001 | |
| 83 | ⊟ May | |
| 84 | 1-May | 240 |
| 85 | 2-May | 443 |
| 86 | 3-May | 678 |
| 87 | 4-May | 777 |
| 88 | 5-May | 801 |
| 89 | 6-May | 805 |
| 90 | 7-May | 809 |

End of Irrigation (row 78, 28-Oct)

No readings for diversions in April

Start of Irrigation (row 84, 1-May)

Image 3. Sample of determining end and start dates for "normal" operational deliveries for a system.

| Year | Start | End |
|---|---|---|
| 1990 | 20-Apr | 18-Oct |
| 1991 | 6-May | 31-Oct |
| 1992 | 23-Apr | 21-Sep |
| 1993 | 11-May | 20-Nov |
| 1994 | 27-Apr | 31-Aug |
| 1995 | 18-Apr | 16-Dec |
| 1996 | 20-Apr | 30-Nov |
| 1997 | 24-Apr | 1-Nov |
| 1998 | 2-May | 31-Oct |
| 1999 | 3-May | 31-Oct |
| 2000 | 2-May | 28-Oct |
| 2001 | 1-May | 4-Sep |
| 2002 | 6-May | 5-Oct |
| 2003 | 2-May | 31-Oct |
| 2004 | 29-Apr | 28-Oct |
| 2005 | 3-May | 28-Oct |
| 2006 | 3-May | 28-Oct |
| 2007 | 1-May | 28-Oct |
| 2008 | 6-May | 31-Oct |
| 2009 | 9-Apr | 29-Oct |
| 2010 | 7-May | 29-Oct |
| 2011 | 6-May | 29-Oct |
| 2012 | 28-Apr | 27-Oct |
| 2013 | 4-May | 26-Oct |
| 2014 | 3-May | 31-Oct |
| 2015 | 23-Apr | 15-Oct |

Annual System Operation

| | |
|---|---|
| Median Start | 5/2 |
| Median End | 10/28 |

Bounds of Historical System Operation Dates

# APPENDIX C

Methodology for Determination of Historical Diversion Rates of Non-irrigation Water

## Background

Some water delivery systems have historically operated during the non-irrigation season to support uses such as stock water, subirrigation, and flow maintenance. These routine operations have provided incidental recharge to the aquifer as a byproduct. This incidental recharge is recognized as a public benefit (Idaho Code 42-234) but is not considered Managed Aquifer Recharge (MAR). MAR is additional, or "new," water added to the aquifer which thereby augments aquifer storage. This methodology differentiates between managed aquifer recharge and historical incidental recharge resulting from routine non-irrigation operations.

Typically, a significant portion of a system's capacity is used during irrigation operations, and it is common for some water to be returned to the river ("return flows"). However, when systems are used for routine non-irrigation purposes, only a fraction of the system capacity is utilized and commonly there are no return flows. This means that all water diverted during routine non-irrigation operations seeps into the aquifer and, as a byproduct, provides incidental aquifer recharge. Therefore, median diversion rates during the non-irrigation season provide a reasonable measure of historical incidental recharge rates. The lack of return flows also indicates there is additional room in the systems for MAR.

Some systems divert non-irrigation water consistently. Others only divert non-irrigation water during non-drought years under water rights that are senior to the IWRB recharge rights. During these drought years it is unlikely that IWRB recharge operations would occur under the Board's current recharge diversion procedures.

A preliminary review of historical non-irrigation diversion rates shows significant annual variability within most systems, driven by factors such as water availability, weather conditions, canal operations, and demand. To introduce additional water into the aquifer, it is essential to quantify the incidental recharge that has historically occurred.

## Overview of Procedure

The procedure to determine historical diversion rates of non-irrigation water examines median monthly diversion rates during the non-irrigation season from calendar years 1990 through 2015. This time period is recent enough to take into account large-scale conversion from flood to sprinkler irrigation, it is after the construction of the reservoirs on the Snake River in the 1960s, but before MAR operations began in earnest in 2017, and it is broad enough to include wet periods (e.g. 1995 - 1999) and dry cycles (e.g. 1990 – 1992, 2001 – 2004). Use of the median value assists in smoothing out anomalous data to determine a long-term representative value. These calculations provide a base for determining non-irrigation diversions when water is available for MAR. With the realization that a canal's operations could significantly alter over time, the determination of diversion rates for non-irrigation could be altered with sufficient data or by resolution.

Basic assumptions:

- The 26 years proposed for examination are representative of current operations and provide enough data to discern patterns.
- Only official, finalized data from the relevant diversion-reporting entity (e.g. Water District 1, USGS, etc) will be utilized.
- New water added to the aquifer is any additional water added above the amount provided by historical incidental recharge.
- Only years in which diversions occurred will be used in the determinations. Years in which diversions did not occur would have been too dry for IWRB managed aquifer recharge operations, as explained above.
- Any water recharged in systems above their historical incidental recharge rate will be considered new water added to the aquifer, and therefore to be managed aquifer recharge.
- Any water leaving the system would be deducted from the managed aquifer recharge volume.
- Cooperation with partners/operators and adaptive management will be essential. The goal is to add new water to the aquifer.

## Procedure to Determine Historical Incidental Recharge Rates

1. Obtain the historical daily diversion data for the system of interest, typically via Water District 01, USGS, or other authoritative sources. For example, the data is provided by Water District 01 as “Flow (CFS)” or the “Sum of Flow (cfs)” through the system’s headgate (example of the data shown in Image 1).
2. Using the daily cfs data from Step 1, calculate the monthly sum, in cfs, through the headgate for each month from irrigation year 1990 to 2015 (Image 2).
    a. Months in which a system participated in a managed recharge operation will be excluded as not indicative of a normal base flow.
    b. Months in which a system did not divert water will be excluded from the calculation as not representative of conditions that IWRB recharge water would normally be available.
3. Calculate the median monthly sum for each month over the evaluation period (1990-2015), taking into account the exclusions noted above.
4. Divide the monthly median values by the number of days in the respective month to determine the historical daily median baseflow (cfs) for each month. This is the Historical Incidental Recharge Rate.

Staff will verify the Historical Incidental Recharge Rate calculations with the recharge partner for their review and feedback before being applied.

For recharge to be counted as part of the IWRB program, the daily amount of water diverted for managed recharge would be subtracted by the Historical Incidental Recharge Rate (for that month) and any return flows for that day.

Other factors to be considered when calculating the historical incidental recharge rate:

1. All diversions that drain to a common end should be considered as a single system containing multiple points of diversion. The baseflow should be applied across all points of diversion.

   For example: Two separate canals drain to a single endpoint, or otherwise serve the same general area. One canal has a Historical Incidental Recharge Rate of 100 cfs whereas the other has 0 cfs. The total Historic Incidental Recharge Rate for both points of diversion would be 100 cfs. Therefore, a combined diversion of 101 cfs from both canals would result in 1 cfs of IWRB recharge, assuming no spill out of the system.
2. Both irrigation and non-irrigation operations may occur during "shoulder months" at the beginning and end of the irrigation season (e.g. April and October). The Historical Operation Dates will be calculated as detailed in the Determination of Historical System Operation Dates procedure. For the remainder of the shoulder month, the baseflow from the previous month will be utilized prior the start date, and the following month's baseflow will be utilized after the season's end date.

   For example: A system's historical incidental recharge rate for November is 20 cfs, as calculated under this document's procedures. The system's switch from irrigation to non-irrigation operations occurs on October 20, as calculated under the Determination of Historical System Operation Dates memo's procedures. A historical incidental recharge rate of 20 cfs would be applied from October 21 through November 30.
3. IWRB staff, in consultation with the recharge partner, will have discretion to adaptively manage any unforeseen circumstances not covered by the method described above, with the primary goal of adding new water to the aquifer.

Image 1. Sample of Water District 01 (WD-01) system diversion data.

| SiteID | SiteType | Flow (CFS) | Gage Height (Feet) | HSTDate | Irrigation Year |
|---|---|---|---|---|---|
| XXXXXXXX | D | 0 | 0 | 3/1/2010 | 2010 |
| XXXXXXXX | D | 10.54 | 0.24 | 3/2/2010 | 2010 |
| XXXXXXXX | D | 8.79 | 0.21 | 3/3/2010 | 2010 |
| XXXXXXXX | D | 24.27 | 0.43 | 3/4/2010 | 2010 |
| XXXXXXXX | D | 41.03 | 0.61 | 3/5/2010 | 2010 |
| XXXXXXXX | D | 62.2 | 0.8 | 3/6/2010 | 2010 |
| XXXXXXXX | D | 73.39 | 0.89 | 3/7/2010 | 2010 |
| XXXXXXXX | D | 74.68 | 0.9 | 3/8/2010 | 2010 |
| XXXXXXXX | D | 81.24 | 0.95 | 3/9/2010 | 2010 |
| XXXXXXXX | D | 93.6 | 1.04 | 3/10/2010 | 2010 |
| XXXXXXXX | D | 93.6 | 1.04 | 3/11/2010 | 2010 |
| XXXXXXXX | D | 111.1 | 1.16 | 3/12/2010 | 2010 |
| XXXXXXXX | D | 123.41 | 1.24 | 3/13/2010 | 2010 |
| XXXXXXXX | D | 123.41 | 1.24 | 3/14/2010 | 2010 |

Image 2. Sample of determining a system's "normal" diversion rate during non-irrigation operations.

| Calendar Year | Monthly Sum cfs |
|---|---|
| **1996** | **70165.27** |
| **1997** | |
| Jan | 292 |
| Feb | 1298 |
| Mar | 2047 |
| Apr | 5697 |
| May | 8911 |
| Jun | 8780 |
| Jul | 12041 |
| Aug | 8984 |
| Sep | 6530 |
| Oct | 4859 |
| Nov | 2625 |
| Dec | 1782 |
| **1998** | **59826** |
| **1999** | **62558.9** |
| **2000** | **67422.2** |
| **2001** | **59170.6** |
| **2002** | **52643** |
| **2003** | **64901.37** |
| **2004** | **56106** |
| **2005** | **54704** |
| **2006** | **52788.45** |

Months of Interest in Each Year (Jan–Apr and Nov–Dec)

Image 3. Sample of determining end and start dates for "normal" operational deliveries for a system.

| | Sum of Total cfs Through Headgate Per Month | | | | |
|---|---|---|---|---|---|
| Irrigation Year | November | December | January | Februrary | March |
| 2005 | | | | | |
| 2006 | | | | | 63 |
| 2007 | 170.55 | | | | 1718 |
| 2008 | | | | | 86.1 |
| 2009 | 4465.64 | 1450.19 | 3.1 | 2.8 | 1466 |
| 2010 | 1544.24 | | | | 3472 |
| 2011 | 2537.38 | 84 | | | 1353 |
| 2012 | 1520.28 | 275.76 | 167 | 159 | 2415 |
| 2013 | | | | | 519.2 |
| 2014 | 220.11 | | | | 1943 |
| 2015 | 395 | | | 898.75 | 3241 |
| Monthly Median Sum of cfs | 1381 | 1450.19 | 1612 | 1410 | 2048 |
| Historical Incidental Recharge Rate (cfs) | 46.03 | 46.78 | 52.00 | 49.91 | 66.07 |

Step 3 → Monthly Median Sum of cfs

Step 4 → Historical Incidental Recharge Rate (cfs)

**Any rate above that in the green row would be considered new water added to the aquifer.**

# APPENDIX D

IWRB Resolutions Approving Managed Aquifer Recharge Program Payment Schedules

BEFORE THE IDAHO WATER RESOURCE BOARD

| | | |
|---|---|---|
| IN THE MATTER OF EASTERN SNAKE PLAIN AQUIFER STABILIZATION AND MANAGED AQUIFER RECHARGE | ) ) ) ) ) ) | A RESOLUTION TO APPROVE A PAYMENT SCHEDULE FOR DELIVERY OF WATER FOR MANAGED RECHARGE IN THE UPPER VALLEY |

WHEREAS, the State of Idaho relies on spring discharge from the ESPA through the Thousand Springs to assist in meeting the minimum streamflow water rights at the Murphy Gage that were established under the Swan Falls Agreement; and

WHEREAS, the Eastern Snake Plain Aquifer (ESPA) has been losing approximately 200,000 acre-feet annually from aquifer storage since the 1950's resulting in declining ground water levels in the aquifer and declining spring flows from the aquifer; and

WHEREAS, stabilizing the ESPA will help sustain spring flows sufficient to maintain the minimum flows at the Murphy Gage and reduce conflicts between groundwater and surface water users; and

WHEREAS, House Bill 547 passed and approved by the 2014 legislature allocates $5 million annually from the Cigarette Tax to the Idaho Water Resource Board (IWRB) for statewide aquifer stabilization; and

WHEREAS, the Eastern Snake Plain Aquifer Comprehensive Aquifer Management Plan (ESPA CAMP), identified managed recharge as a key strategy for achieving the goal of aquifer stabilization and recovery; and

WHEREAS, the IWRB intends to provide financial incentives to maximize recharge of water available under its water right permit.

NOW THEREFORE BE IT RESOLVED that the IWRB adopts the following recharge delivery payment structure for canals that divert above American Falls Reservoir:

1) Base Rate – determined by 5-year aquifer retention zone in which the contracted canal companies or irrigation district is located (retention zone will be assigned using ESPAM2.1):
   - Greater than 40% retained in aquifer at 5 years — $6.00/AF delivered
   - 20% to 40% retained in aquifer at 5 years — $5.00/AF delivered
   - 15% to Less than 20% retained in aquifer at 5 years — $4.00/AF delivered

2) Cold Weather Incentive – an additional $1.00/AF for cold weather conveyance of IWRB recharge for water delivered between December 1st and March 31st.

Attachment No. 7, Meeting No. 1-16
Idaho Water Resource Board

3) Deliver Incentive – an additional $1.00/AF if the operator delivers recharge water over 75% of the days when the IWRB recharge right is in priority and IWRB issues a Notice to Proceed.

BE IT FURTHER RESOLVED that the allocation of water available for recharge above American Falls will be determined based on the following rating system. The available water will be divided equally between the top three rated entities with executed Water Conveyance Contracts with the Board. Water available in excess of the capacity of the top three rated entities will be available for delivery by other entities in order of their rating (highest to lowest).

The rating will be determined by the following point system:

1) Retention Rate (as determined by IDWR's ESPAM2.1):
   - Greater than 40% retained in aquifer at 5 years — 3 points
   - 20% to 40% retained in aquifer at 5 years — 2 points
   - 15% to Less than 20% retained in aquifer at 5 years — 1 points
2) Diversion Capacity:
   - 300 cfs or greater — 2.5 points
   - 200cfs to less than 300 cfs — 2.0 points
   - 100cfs to less than 200 cfs — 1.5 points
   - 50cfs to less than 100 cfs — 1.0 points
   - Less than 50 cfs — 0.5 points

BE IT FURTHER RESOLVED that the IWRB's ESPA managed recharge program will be limited to recharge of natural flow to avoid impacts to surface water storage above Milner Dam.

BE IT FURTHER RESOLVED that the IWRB authorizes execution of conveyance contracts with a term of one year.

BE IT FURTHER RESOLVED that the use of IWRB funds to develop infrastructure for recharge delivery shall be considered under separate resolutions.

BE IT FURTHER RESOLVED that the IWRB's ESPA managed recharge program will be coupled with a monitoring program approved by IDWR staff to verify the effects of managed recharge and, if necessary, modify the recharge program based on evaluation of the effects.

DATED this 22nd day of January 2016.

ROGER CHASE, Chairman
Idaho Water Resource Board

ATTEST ______________________
VINCE ALBERDI, Secretary

**BEFORE THE IDAHO WATER RESOURCE BOARD**

| IN THE MATTER OF ESTABLISHING A RECHARGE CONVEYANCE PAYMENT STRUCTURE AND DISTRIPUTION PLAN FOR THE LOWER VALLEY | RESOLUTION TO APPROVE ESPA MANAGED RECHARGE PROGRAM STANDARDS AND PROCESSES |
|---|---|

WHEREAS, the Eastern Snake Plain Aquifer (ESPA) has been losing approximately 216,000 acre-feet annually from aquifer storage since the 1950's resulting in declining ground water levels in the aquifer and declining spring flows from the aquifer; and

WHEREAS, the State of Idaho relies on spring discharge from the ESPA through the Thousand Springs to assist in meeting the minimum streamflow water rights at the Murphy Gage that were established under the Swan Falls Agreement; and

WHEREAS, the ESPA Comprehensive Aquifer Management Plan (CAMP) and the Idaho State Water Plan established managed recharge as being an appropriate means to enhance ground and surface water supplies, help maintain and increase aquifer levels, and change the timing and availability of water supplies to meet demand; and

WHEREAS, the 2016 Idaho Legislature passed and approved Senate Concurrent Resolution 136 directing the Idaho Water Resource Board (IWRB)to develop the capacity to achieve 250,000 acre-feet of annual average managed recharge to the ESPA by December 31, 2024; and

WHEREAS, House Bill 547 passed and approved by the 2014 legislature allocates $5 million annually from the Cigarette Tax to the IWRB for statewide aquifer stabilization; and

WHEREAS, Senate Bill 1402 passed and approved by the 2016 Legislature allocated $5 million in ongoing General Fund dollars and $2.5 million in Economic Recovery Reserve Funds to the IWRB's Secondary Aquifer Fund for statewide water sustainability and aquifer stabilization; and

WHEREAS, the IWRB intends to provide financial incentives to maximize recharge of water available under its water right permit.

NOW, THEREFORE BE IT RESOLVED that the IWRB adopts the following recharge delivery payment structure for canals that divert below Minidoka Dam (Lower Valley):

- Aug. 1st – Nov. 15th = $7/af
- Nov. 16th – Feb. 15th = $10/af
- Feb. 16th – Jul. 31st = $5/af; and

NOW, THEREFORE BE IT FURTHER RESOLVED that the IWRB shall have an annual meeting in the fall with the IWRB recharge partners to determine the recharge distribution plan for the upcoming recharge season to optimize IWRB natural flow recharge.

NOW, THEREFORE BE IT FURTHER RESOLVED that the IWRB will offer conveyance and operational contracts of up to 5-year terms and the designated rate will apply for the term of the conveyance and operational contract; and

NOW, THEREFORE BE IT FURTHER RESOLVED that the IWRB's ESPA managed recharge program will be coupled with a continuous monitoring program to verify the effects of managed recharge, and if necessary, modify the recharge program based on evaluation of the effects; and

NOW, THEREFORE BE IT FURTHER RESOLVED that the IWRB authorizes its chairman or designee, Brian Patton, Executive Officer to the IWRB, to execute the necessary agreements or contracts for IWRB ESPA Managed Recharge Program conveyance and operational fees.

DATED this 26th day of July, 2019.

ROGER W. CHASE, Chairman
Idaho Water Resource Board

ATTEST ____________________
VINCE ALBERDI, Secretary