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Attorneys for Idaho Ground Water Appropriators, Inc. (IGWA)

STATE OF IDAHO

DEPARTMENT OF WATER RESOURCES

IN THE MATTER OF THE DISTRIBUTION OF WATER TO VARIOUS WATER RIGHTS HELD BY AND FOR THE BENEFIT OF A&B IRRIGATION DISTRICT, AMERICAN FALLS RESERVOIR DISTRICT #2, BURLEY IRRIGATION DISTRICT, MILNER IRRIGATION DISTRICT, MINIDOKA IRRIGATION DISTRICT, NORTH SIDE CANAL COMPANY, AND TWIN FALLS CANAL COMPANY	Docket No. CM-DC-2010-001 CM-MP-2009-006 CM-MP-2009-007 **Declaration of Sophia Sigstedt**

I, Sophia Sigstedt, declare the following:

1. I am over the age of 18 and competent to testify. If called upon to testify, I could testify to the following, all of which are within my own personal knowledge or based upon my professional judgment.

2. I am an American Institute of Hydrology Professionally Certified (No. 7015) Hydrogeologist with a specialization in groundwater. I have a master's degree in hydrology from the New Mexico Institute of Mining and Technology. My work includes hydrogeology, water resources engineering, and water resources planning and management. I have directed or contributed to several river-basin-scale water management studies that involved analysis of basin hydrology and water uses and the development of computer models to investigate implications of changes in hydrology, system operations, and water uses. My experience includes historical consumptive use analysis, evaluation of surface and ground water interactions, development of

protective terms and conditions for water users, settlement negotiations and expert witness testimony, and is set forth in greater detail in my resume, which is attached hereto as Exhibit A. I am employed by Lynker, 5445 Conestoga Court, Suite 100, Boulder, Colorado.

3. For several years I have worked as a technical consultant for Idaho Ground Water Appropriators, Inc. ("IGWA"). In that capacity I participate on the Eastern Snake Plain Hydrologic Modeling Committee, the Big Lost Modeling Technical Advisory Committee, and the Swan Falls Technical Working Group, and have testified as an expert witness in cases before the Idaho Department of Water Resources ("IDWR" or "Department"). I further provide IGWA with technical assistance on a variety of matters, including the Surface Water Coalition ("SWC") delivery call.

4. IGWA has three approved mitigation plans in the SWC delivery call: Docket No. CM-MP-2009-007 for the benefit of IGWA ("Storage Water Plan"); (2) Docket No. CM-MP-2009-006 for the benefit of IGWA ("Aquifer Enhancement Plan"); (3) Docket No. CM-MP-2016-001 for the benefit of IGWA ("2016 Plan").

5. The *Settlement Agreement Dated June 30, 2015, Between Participating Members of the Surface Water Coalition and Participating Members of Idaho Ground Water Appropriators, Inc.* ("2015 Agreement"); *Addendum to Settlement Agreement* dated October 19, 2015; *Second Addendum to Settlement Agreement* dated December 14, 2016; *Agreement* dated October 7, 2015; and the orders approving the Settlement Agreement as a mitigation plan, *Final Order Approving Stipulated Mitigation Plan* issued May 2, 2016 and *Final Order Approving Amendment to Stipulated Mitigation Plan* issued May 9, 2017, comprise the 2016 Plan.

6. Exhibit B, attached hereto, contains by best estimate and opinion of the amount of surplus reach gains for the Near Blackfoot to Minidoka reach of the Snake River which have resulted in 2024 due to past surplus ground water reduction and private recharge activities ("conservation activities") performed by IGWA ground water districts ("Districts"). Surplus reach gains in Exhibit B are expressed in acre-feet.

7. The estimates in Exhibit B were prepared by me using the process described in the Expert Report prepared by me in the March 14-15, 2024, administrative hearing held in IDWR Docket No. CM-MP-2016-001 regarding the alleged breach of the 2016 Plan by certain Districts in 2022, commonly referred to as the "2022 Breach" case. A true and correct copy of my Expert

Report, explaining the method used to prepare the Exhibit B estimates, is attached hereto as Exhibit C.

8. During the 2022 Breach case hearing I testified regarding the method I used to prepare the Exhibit B estimates. The modeling I performed was unrefuted by the SWC's expert witness, David Colvin.

9. The estimates in Exhibit B differ slightly from those described in the Expert Report in two respects. One, I modeled conservation activities performed by the Districts between 2016-2023, whereas the Expert Report modeling used conservation activities performed by the Districts between 2016 and 2022. Table 1 below shows the new conservation model inputs for 2023 in the same format as presented in the Expert Report. Second, surplus reach gains estimated in Exhibit B are based on conservation activities that are in excess of the increased 2016 Plan conservation targets imposed by the Department in August of 2023 (i.e., 240,000 ac-ft conservation target annually, rather than IGWA's understanding of 205,000 ac-ft of conservation).

Table 1: 2016-2023[1] IGWA Conservation Model Analysis
all values are in acre-feet (Af)

	Bingham	AFA	BJ	Carey	HFMAD	JC	MV	NS	IGWA Total
Actual Conservation Volume 2023	41,386	53,688	23,108	4,568	76,014	113,888	55,028	42,316	409,996
240,000 AF Conservation Target Surplus 2023	472	14,293	1,767	3,747	69,715	50,355	17,097	12,551	169,997
240,000 AF NB-M Reach Gain Surplus in 2024	-1,827	3,699	-507	52	869	1,241	801	698	5,025

[1]2021 not included due to settlement terms

10. In 2023 the Director issued the *Final Order Regarding April 2023 Forecast Supply (Methodology Steps 1-3)* on April 21, 2023, in the above captioned matter. The order predicted a total demand shortfall ("DS") of 75,200 ac-ft to the SWC, acknowledged IGWA's 2016 Plan and 2009 Storage Water Plan, and explained if IGWA mitigated under the 2009 Storage Water Plan that "IGWA's proportionate share of the predicted DS of 75,198 acre-feet is 63,645 acre-feet. When the *Final Order Regarding April 2024 Forecast Supply (Methodology Steps 1-3)* was issued on April 18, 2024, the Director predicted a DS of 74,100 ac-ft and acknowledged IGWA may elect to mitigate under either the 2016 Plan or the 2009 Storage Water Plan. However, with respect to the 2009 Storage Water Plan, the April 2024 order set the total 74,100 DS as IGWA's obligation, rather than IGWA's proportionate share of the DS.

11. I understand that IGWA's proportionate share volume of 63,645 ac-ft in the April 2023 As-Applied Order was determined by running ESPAM 2.2 under a steady-state simulation. After the April 2023 As-Applied Order was issued IGWA requested the Department provide

more detail regarding IGWA's proportionate share of the DS and provide a break-down of each Districts' proportionate share of the DS they would need to supply storage water for. I understand that the Districts' proportionate share of the 63,645 ac-ft storage water mitigation obligation was determined by also running ESPAM 2.2 under a steady-state simulation. IGWA requested that I determine IGWA and its Districts' proportionate share of the April 2024 DS of 74,100 ac-ft using ESPAM 2.2 under a steady-state simulation, as was done by the Department in 2023. IDWR provided the monthly transient superposition ESPAM run of Eastern Snake Plain Aquifer groundwater rights junior to March 31, 1954, curtailed within the area of common groundwater under the "April Background Information" in the Director's April 2024 order. To calculate IGWA Districts' proportionate share I split the IDWR MODFLOW.net file from the curtailment run by District based on their geographic boundaries as shown in Figure 1 below and ran steady state models for each District. For each District I extracted the Near Blackfoot to Minidoka reach gains and tabulated IGWA Districts' proportionate share in acre-feet (AF).

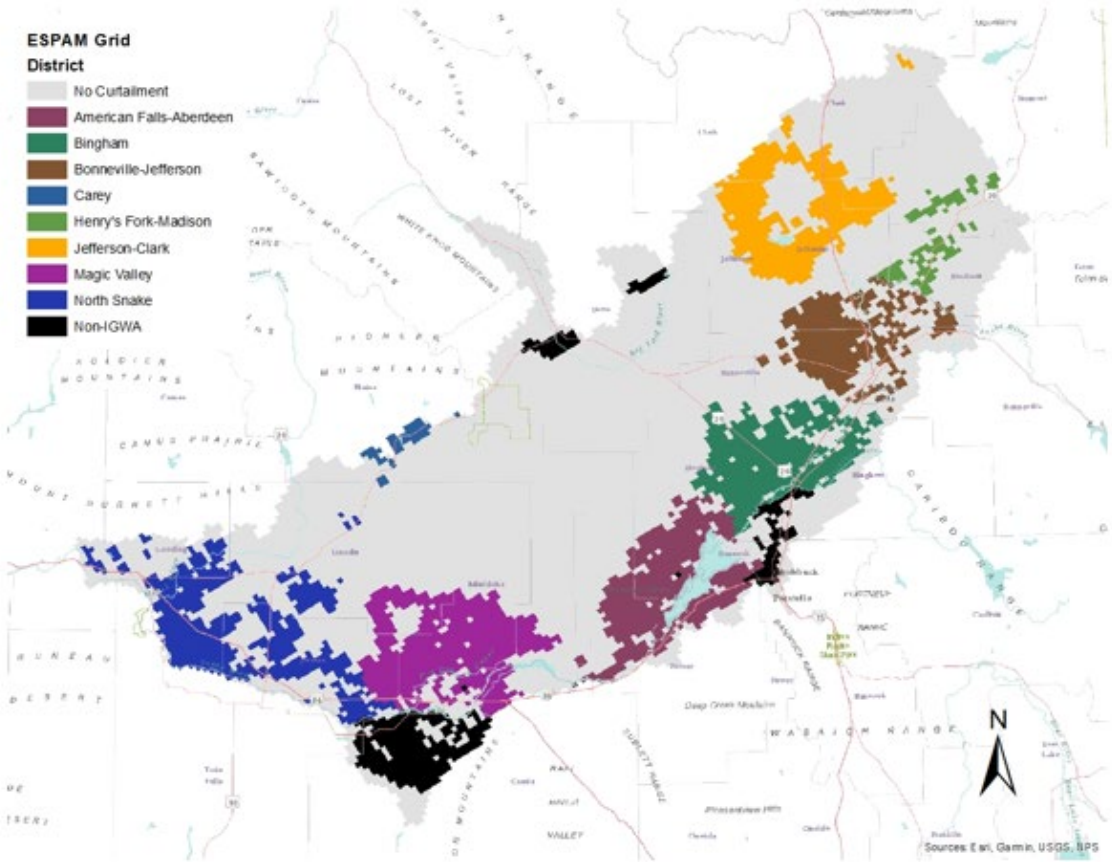


Figure 1: ESPAM model cells from IDWR March 31, 1954 curtailment analysis split by IGWA Districts.

12. Table 2 below shows the results of this modeling, with IGWA's proportionate share of the total April 2024 DS of 74,100 ac-ft being 66,102 ac-ft.

Table 2

District	ESPAM2.2 Steady-State Allocation		
	Steady State Impact	Proportionate Share	Share of Demand Shortfall
	AF	%	AF
American Falls Aberdeen	240,665	31.0%	22,998
Bingham	135,887	17.5%	12,986
Bonneville Jefferson	93,430	12.0%	8,928
Carey Valley	3,422	0.4%	327
Henry's Fork	1,024	0.1%	98
Jefferson Clark	71,765	9.3%	6,858
Madison	w/HF	w/HF	w/HF
Magic Valley	111,320	14.4%	10,638
North Snake	34,211	4.4%	3,269
TOTAL	691,723	89.2%	66,102

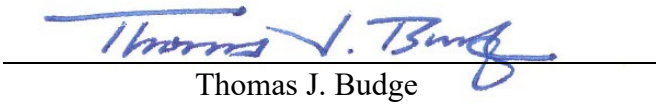
I declare under the penalty of perjury pursuant to the law of the State of Idaho that the foregoing is true and correct.

DATED this 2nd day of May, 2024.

Sophia C. Sigstedt

CERTIFICATE OF SERVICE

I hereby certify that on this 2nd day of May, 2024, I served the foregoing document on the persons below via email or as otherwise indicated:



Thomas J. Budge

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EXHIBIT A

Exhibit A

Sophia C. Sigstedt

Professional Hydrogeologist (PH-GW)

Education

M.S., Hydrology, New Mexico Institute of Mining and Technology, 2010

B.S., Environmental Science with Biology, New Mexico Institute of Mining and Technology, 2008

Years of Experience

15+

Employment History

Lynker, LLC, Hydrogeologist, 2015-Present

AMEC Environment & Infrastructure, Hydrogeologist, 2010-2015

NM Institute of Mining and Technology, Research Assistant, 2008-2010

NM Institute of Mining and Technology, Teaching Assistant, 2009

Laboratory of Biochemical and Biomedical Research, Research Assistant, 2007-2008

Summary

Sophia Sigstedt is a certified professional hydrogeologist by the American Institute of Hydrology. She has a M.S. in Hydrology and a B.S. in Environmental Science and Biology. She has over 15 years of experience. Professional experience includes hydrogeochemical evolution and water quality analysis, geochemical modeling, applications of stable isotopes to groundwater and water resource studies, radiocarbon dating of groundwater, numerical groundwater modeling, basin-scale water resource management, and conjunctive use management.

She has diverse experience in hydrology, water rights, water resources engineering, and water resources planning and management. She has been integral in several basin-scale water management studies involving development of hydrologic data, forecast of future water demands, and creation of planning models to investigate effects of changes in water management. Her work includes litigation support in a variety of water rights proceedings including historical consumptive use analysis, evaluation of surface/groundwater interactions, groundwater modeling, conjunctive administration of surface water and groundwater rights, stream depletion analysis, development of protective terms and conditions, settlement negotiations, and expert witness testimony.

Her hydrology graduate degree experience includes surface-water, vadose zone and groundwater hydrology with an emphasis in hydrogeology and hydrogeochemistry. Undergraduate background includes microbiology, environmental geology, toxicology, ecology and waste water treatment.

She has run stable isotopic analysis using mass spectrometry for the New Mexico Tech Stable Isotope Lab. She has taught laboratory and field techniques in hydrology at New Mexico Institute of Mining and Technology. Techniques included surveying, employing tensiometers and infiltrometers to quantify unsaturated flow, solute transport experiments, well hydraulic tests, and stream gauging.

Core Skills

Hydrogeologic and hydrogeochemical analysis performed using Modflow2K, Modflow-Surfact, Modflow-USG, MODPATH, PEST, IDSCU-AWAS, SAC-SMA, Lag/K, Snow-17, StateCU, RefET, Hydrus, Leapfrog, Netpath, Phreeqc, SaltNorm, Aquachem, ArcGIS, and RockWare.

Selected Project Experience Water Resources

Snake River Conjunctive Administration of Water Rights

Idaho Ground Water Appropriators, ID, 2012-2024

Ms. Sigstedt provides expert support in the evaluation of conjunctive administration of ground water rights with modeling of aquifer management and mitigation plans, consumptive use analysis, and analysis of historical water use. Ms. Sigstedt provides project support on the Eastern Snake Plain Aquifer Model and its development under the Eastern Snake Hydrologic Modeling

Committee, as well as, its application for conjunctive use management of water rights.

City of Boulder Water Supply Planning and Water Resources Engineering

City of Boulder, CO, 2020-2024

Ms. Sigstedt is project manager under contract with City of Boulder for water resources engineering and water supply planning services. Ms. Sigstedt provides evaluation of the city's water system and ability to meeting policy and planning goals, computer modeling of the city's water supply and water rights portfolio and water system operations, evaluation of climate change impacts, drought planning, water efficiency planning, evaluation and forecasting of water demands and technical analysis around water rights administration.

South Platte River & Boulder Creek Conjunctive Administration of Water Rights

City of Boulder, CO, 2010-2020

Ms. Sigstedt provides expert support in the evaluation of applications to the state focused on assessing the quantity and timing of depletions to streamflow. Ms. Sigstedt provides review and independent analysis of numerical modeling, consumptive use and historical use for technical support in the evaluation of conjunctive use management of water rights. This work includes analysis of certain water court cases and State Engineer proceedings to which the City of Boulder is a party.

Laramie County Control Area Hydrogeologic Model

Wyoming State Engineer's Office, WY, 2013-2014

Ms. Sigstedt developed a hydrogeologic model for management of the Laramie County Groundwater Control Area. Ms. Sigstedt was tasked with data review for model inputs and development of a hydrogeologic model of the High Plains Aquifer System using MODFLOW-SURFACT. Modeling included developing DCMIs, consumptive use for irrigation withdrawals, recharge estimates, and modeling stream flows (STR). The model was calibrated using PEST. The groundwater modeling analysis was used to determine the status of appropriable water in the county.

Determination of Appropriable Water for Salt Basin Groundwater System

New Mexico State Engineer's Office Interstate Stream Commission (ISC), NM, 2007-2010

Ms. Sigstedt acted as a hydrogeochemist for the analysis of the Salt Basin groundwater system to determine water resources available for appropriation by the State. For this project Ms. Sigstedt's primary tasks included developing a hydrogeochemical model based on environmental tracers collected from groundwater, surface water and precipitation sources within the basin. Ms. Sigstedt collected samples for carbon-14, tritium, oxygen and deuterium stable isotopes, and general ion chemistry analysis. Ms. Sigstedt analyzed the environmental tracers and general ion chemistry data to delineate recharge zones, identify groundwater flow paths and characterize fracture flow, estimate groundwater flow rates and permeability and elucidate the controls on the evolution of groundwater chemistry and the water quality distribution of the basin. The geochemical modeling was used to calibrate a basin-scale MODFLOW-SURFACT model.

Navajo Nation Zuni Basin Water Rights Adjudication

Navajo Nation, NM, 2011-2012

Ms. Sigstedt provided water resource management consulting for the Zuni basin. Ms. Sigstedt was tasked with DCMI estimates as well as the development of a hydrogeologic model. Three-dimensional geologic model built using Leapfrog Hydro. Groundwater model was run using MODFLOW-SURFACT and used to develop scenarios and determine impacts of claims on appropriable water in the basin.

Middle Rio Grande Conservancy District (MRGCD) Ad Valorem Tax Assessment

Bureau of Indian Affairs (BIA), NM, 2011

Ms. Sigstedt provided a detailed Ad Valorem tax assessment for properties with acreage benefitted by the Middle Rio Grande Conservancy District (MRGCD) water services. Ms. Sigstedt's analysis included identifying non-pueblo, irrigable acres evaluating the ad valorem and water services collections and providing a summary for both the residential and non-residential property for each county within the conservation District. Ms. Sigstedt's data compilation and mapping were performed with the use of Microsoft Access and ArcGIS.

National Weather Service Hydrologic Modeling and Support

National Oceanic Atmospheric Administration (NOAA), Federal, 2014-2017

Lynker under contract with NOAA calibrated and implemented models for use in NWS river, flood, and drought forecast processes. Ms. Sigstedt's work includes developing and modifying hydrologic inputs, understanding groundwater-surface

water interactions, consumptive use analysis and hydrologic model calibration. Ms. Sigstedt is currently involved in the Northwest River Forecast Center (NWRFC), Missouri Basin River Forecast Center (MBRFC), and the West Gulf River Forecast Center (WGRFC) calibration tasks, which involve calibration of the SAC-SMA, SNOW-17, and LAG/K hydrologic models. The task was completed using a variety of tools including the CHPS environment, GIS, and Python scripting.

Selected Project Experience Mineral Resources and Impact Analysis

Ollachea Mine Hydrology and Hydrogeology for Feasibility Study

Compania Minera Kuri Kullu, Peru, 2012

Ms. Sigstedt provided hydrology and hydrogeological characterization for the Ollachea underground gold mine site for operational planning. Ms. Sigstedt was tasked with the development of the hydrogeological modeling with MODFLOW-USG to determine impacts on local streamflow and estimate mine tunnel inflows used in the assessment of sizing the on-site waste water treatment plant.

Carmen de Andacollo Hydrogeologic Analysis of Tailings Expansion

Compania Minera TECK, Chile, 2012

Ms. Sigstedt provided hydrogeological characterization and analyses in support of expansion of the mine tailing facilities. As part of this effort Ms. Sigstedt provided consulting to the team in Santiago on water quality and geochemical evolution, stable isotope analysis and development of the hydrogeological modeling with MODFLOW-SURFACT.

Corani Mine Water Resources Environmental Impact Analysis

Bear Creek Mining Company, Peru, 2011

Ms. Sigstedt was tasked with the surface water and groundwater quality analysis. Analysis included water quality comparisons to environmental standards, temporal and spatial distributions of contaminants of concern using ArcGIS mapping, analysis of geochemical evolution through the use of Piper and Stiff diagrams, stable isotope analysis, and identifying and analyzing impacts from existing environmental liabilities. Ms. Sigstedt assisted in the groundwater model development of a MODFLOW-SURFACT model to determine wetland impacts at the mine site.

Antamina Mine Regional Hydrogeologic Integration and Geodatabase

Antamina, Peru, 2011

Ms. Sigstedt served as a hydrologist on a team charged with integrating all hydrogeologic data collected since site inception into an ArcGIS geodatabase, and compiling a hydrogeologic integration report. The hydrogeologic integration report involved summarizing all past work, identifying important data gaps, and developing a site-wide integrated hydrogeologic conceptual model that could be used to provide a framework for interpreting existing and newly acquired site data. Ms. Sigstedt's work focused primarily on hydrogeology and groundwater movement, water quality, geochemical evolution and developing the ArcGIS geodatabase.

Expert Testimony

Before the Department of Water Resources of the State of Idaho In the Matter of Distribution of Water to Various Water Rights Held by or for the Benefit of the *Surface Water Coalition,* June 6, 2023.

Before the Michigan Department of Environment, Great Lakes and Energy in the Matter of *Wetland Permit issued to Aquila Resources docket #18-013058* June 10, 2019.

Before the Department of Water Resources of the State of Idaho In the Matter of *Application for Transfer no. 79560 in the Name of North Snake Ground Water Dist., Magic Valley Ground Water Dist., and Southwest Irrigation Dist.* December 18th, 2014.

Appointed as an Expert to:

Big Lost Modeling Technical Advisory Committee (2022) ***Idaho***
Surface Water Coalition Technical Working Group (2015) ***Idaho***
Eastern Snake Hydrologic Modeling Committee (2014) ***Idaho***
Case no. 10CW306 Technical Working Group (2014) ***Colorado***
Swan Falls Technical Working Group (2013) ***Idaho***

Expert Reports & Publications

"Expert Report Hydrology, Water Rights, and Groundwater Modeling Evaluation of the Fifth Amended Final Order Regarding Methodology for Determining Material Injury to Reasonable In-Season Demand and Reasonable Carryover and the Final Order Regarding April 2023 Forecast Supply issued April 21, 2023, in the Matter of Distribution of Water to Various Water Rights Held by or for the Benefit of the Surface Water Coalition" Prepared for IGWA May 30, 2023.

"Expert Report of the Idaho Ground Water Appropriators, Inc (IGWA) Concerning Applications for Permit Nos. 36-17121 and 36-17122" Prepared for IGWA February 7th, 2020.

"Opinions to Date of Louis Rozaklis and Sophia Sigstedt Regarding Case No. 16CW3200 Application for Change of Water Rights and Appropriation of Return by Arapahoe County Water and Wastewater Authority, East Cherry Creek Valley Water and Sanitation District and United Water and Sanitation District" Prepared for City of Boulder, 2018.

"Engineering Report in the Evaluation of Consolidated Case Nos. 13CW3144 and 14CW3134: Application for Groundwater Rights and Augmentation Plan by Timbro Ranch and Cattle Company, LLC" Prepared for City of Boulder by Sophia C. Sigstedt, Lee T. Rozaklis, and Shaden A. Musleh, 2018.

"Opinions to Date of Louis T. Rozaklis and Sophia Sigstedt Regarding Case No. 14CW3068 Application for Change of Water Rights and Addition of Sources of Augmentation and Substitute Supply by the Town of Wiggins" Prepared for City of Boulder, 2017.

"Groundwater flow in an 'underfit' carbonate aquifer in a semiarid climate: application of environmental tracers to the Salt Basin, New Mexico (USA)", S.C. Sigstedt, F.M. Phillips, and A.B.O Ritchie, Hydrogeology Journal DOI 10.1007/s10040-016-1402-2, 2016.

"Evaluation of Hydrogeology and Groundwater Modeling of Case no. 13CW3144 Applications for Water Rights of Timbro Ranch & Cattle Company, LLC" prepared for City of Boulder by S.C. Sigstedt, Lynker Technologies, 2015.

"Water Right, Water Measurement, and Groundwater Modeling Evaluation of Rangen 2014 Delivery Call" Prepared for Idaho Ground Water Association by C.M. Brendecke & S.C. Sigstedt, Lynker Technologies, 2015.

"Hydrogeologic Study of the Laramie County Control Area" Prepared for the Wyoming State Engineer's Office by AMEC Environment & Infrastructure, Hinckley Consulting & HDR Engineering, Inc, 2014.

"Opinions to Date of Louis Rozaklis and Sophia Sigstedt Regarding Case No. 13-SE-18 Applications by 70 Ranch Resource Development, L.L.C.", Prepared for the City of Boulder, CO by AMEC Environment & Infrastructure, 2014.

"Nontributary Determination Huerfano County, Colorado Raton Basin", prepared for SWEPI LLP, by R. McGregor, D.S. Kaback, J. Clark & S. Sigstedt at AMEC Environment &Infrastructure, 2013.

"Opinions to Date of Louis Rozaklis, Shaden Musleh, Sophia Sigstedt, and Courtney Black Regarding Case No. 10CW306 Applications by the Arapahoe County Water and Wastewater Authority, United Water and Sanitation District, and East Cherry Creek Valley Water and Sanitation District", Prepared for the City of Boulder, CO by AMEC Environment & Infrastructure, 2013.

"Freeman 3-24 Well Nontributary Determination Huerfano County, Colorado Raton Basin, by R. McGregor, D.S. Kaback, J. Clark & S. Sigstedt at AMEC Environment &Infrastructure, 2013.

"Ollachea Gold Project PERU NI 43-101 Technical Report on Feasibility Study: Chapter 16.4 Hydrogeology", Prepared for Minera Kuri Kulla S.A. by AMEC Environment & Infrastructure, 2012.

"Environmental tracers in groundwater of the Salt Basin, NM, and implications for water resources" Sophia Sigstedt. New Mexico Institute of Mining and Technology, Socorro, NM. 2010.

EXHIBIT B

2016-2023[1] IGWA Conservation Model Analysis
all values are in acre-feet (AF)

	Bingham	AFA	BJ	Carey	HFMAD	JC	MV	NS	IGWA Total
Surplus NB-M Reach Gain 2024	-1,827	3,699	-507	52	869	1,241	801	698	5,025

[1]2021 not included due to settlement terms

EXHIBIT C

EXPERT REPORT

Hydrology and Groundwater Modeling Evaluation of IGWA's Settlement Agreement Performance, in the Matter of IGWA's 2016 Settlement Agreement Mitigation Plan

Prepared For Racine Olson, PLLP

On behalf of

Idaho Ground Water Appropriators, Inc.

February 15, 2024

Submitted To:

Idaho Ground Water Appropriators, Inc. (IGWA)
Attention: T.J. Budge, General Counsel

Submitted By:

Lynker
Sophia C. Sigstedt, Senior Hydrologist, PH-GW
Jim McCord, Lead Hydrogeologic Engineer, PhD, PE
5445 Conestoga Court, Suite 100
Boulder, Colorado 80301

Table of Contents

Figures

Tables

1 Introduction

This report has been prepared on behalf of Idaho Groundwater Appropriators, Inc. ("IGWA") in connection with the Surface Water Coalition's ("SWC") allegation that certain ground water districts (GWDs) breached a settlement agreement in 2022. The settlement agreement consists of the *Settlement Agreement Dated June 30, 2015, Between Participating Members of the Surface Water Coalition and Participating Members of Idaho Ground Water Appropriators, Inc.* ("2015 Agreement"), as amended by the *Addendum to Settlement Agreement* dated October 19, 2015, the *Second Addendum to Settlement Agreement* dated December 14, 2016, and the *Agreement* dated October 7, 2015, between A&B Irrigation District the Ground Water Districts. These documents are referred to collectively herein as the "Settlement Agreement."

The Settlement Agreement was submitted to the Idaho Department of Water Resources ("IDWR" or "Department") as a stipulated mitigation under the Conjunctive Management Rules, and subsequently approved by IDWR pursuant to the *Surface Water Coalition's and IGWA's Stipulated Mitigation Plan and Request for Order* filed March 9, 2016, the *Final Order Approving Stipulated Mitigation Plan* issued May 2, 2016, *Surface Water Coalition's and IGWA's Stipulated Amended Mitigation Plan and Request for Order* filed February 7, 2017, and the *Final Order Approving Amendment to Stipulated Mitigation Plan* issued May 9, 2017, in IDWR Docket No. CM-MP-2016-001. The Settlement Agreement, together with the orders approving it as a mitigation plan, are referred to herein as the "2016 Mitigation Plan."

The 2016 Mitigation Plan protects ground water district patrons from curtailment (referred to in the Settlement Agreement as "safe harbor") under the SWC delivery call. However, safe harbor is provided only if IGWA and the ground water districts abide by the terms of the Settlement Agreement. The paramount obligations are that (1) "Total ground water diversion shall be reduced by 240,000 ac-ft annually," and (2) "IGWA will supply 50,000 ac-ft of storage water" to the SWC yearly.

IGWA historically understood the 240,000 ac-ft reduction as being an aquifer-wide objective, of which IGWA's member ground water districts bore the largest share. IGWA's members represent approximately 80% of all groundwater diversions from the ESPA and tributary basins. Section 3.a.ii of the 2015 Agreement states, in relevant part: "Each Ground Water and Irrigation District with members pumping from the ESPA shall be responsible for reducing their proportionate share of the total annual ground water reduction or in conducting an equivalent private recharge activity."

From 2016 through 2022, IGWA accounted for groundwater diversions by A&B Irrigation District ("A&B") and Southwest Irrigation District ("SWID") in calculating the proportionate diversion reduction obligations of the signatory districts. By this calculation, the obligations of the signatory districts totaled approximately 205,000 acre-feet (the proportionate shares of A&B & SWID totaled approximately 35,000 acre-feet).

To measure compliance with each district's proportionate share, IGWA compared post-Settlement Agreement diversions against pre-Settlement Agreement diversions. Average groundwater pumping from 2010-2014 served as the "baseline" against which post-Settlement Agreement diversions were compared. The districts utilized averaging, which allowed their members to carry forward excess conservation to offset subsequent deficiencies, and vice versa.

In the spring of 2022, SWC notified IGWA, and later the director of IDWR ("Director"), that certain ground water districts had breached the 2016 Mitigation Plan in 2021. The alleged breach was resolved by a compromise settlement agreement between the parties dated September 7, 2022.

The SWC breach allegation was based on their assertion that diversions by A&B and SWID cannot be considered in calculating the proportionate diversion reduction obligations of the signature districts, and that averaging of groundwater diversions is not allowed to measure compliance with each district's groundwater conservation obligation. IGWA disputed the SWC's assertion. Litigation followed, with the Director ruling that diversions by A&B and SWID cannot be considered in calculating the proportionate diversion reduction obligations of the signatory ground water districts, and that averaging is not allowed for the purpose of measuring compliance. The Director's ruling is currently on appeal.

From 2016-2022, IGWA's members[1] conserved a total of 2,195,103 acre-feet, or 313,586 acre-feet annually on average, when compared to average pre-Settlement Agreement diversions from 2010-2014. During that period, IGWA's members had designed their conservation programs to conserve 205,000 acre-feet. Thus, IGWA's members conserved, on average, 108,586 acre-feet more than they understood was required.

The Director's ruling that averaging is not allowed disrupts the method IGWA used historically to measure compliance with the Settlement Agreement. It affords no credit for excess conservation, and it affords no opportunity to remedy deficiencies. This has caused IGWA to explore alternative methods of measuring compliance, as the Settlement Agreement does not prescribe any particular method.

In 2010, IDWR approved *IGWA's Mitigation Plan for Conversions, Dry-Ups, and Recharge* (the "Aquifer Enhancement Plan") in IDWR Docket No. CM-MP-2009-006. The Aquifer Enhancement Plan authorizes mitigation credit for activities that reduce groundwater withdrawals or add recharge to the ESPA, including conversions of farmland from groundwater to surface water irrigation, fallowing, and managed aquifer recharge. The Eastern Snake Plain Aquifer Model ("ESPAM") can be used to calculate the effects of such activities on Snake River reach gains that accrue to the SWC.

This report presents the Snake River reach gains that accrued to the SWC from years of excess conservation by IGWA members from 2016-2022, as well as reach deficits that accrued to the SWC in years of deficient conservation during that period, as calculated by ESPAM version 2.2, which is the current version in use by IDWR and represents the "best available science."

I have relied upon IGWA's Performance Summary Reports and spreadsheets, and amendments thereto, provided annually to the SWC and IDWR; additional data provided by Jaxon Higgs; my participation since 2012 as a member of the Eastern Snake Hydrologic Modeling Committee (ESHMC) which gives technical support to the Department on the development of the Eastern Snake Plain Aquifer Model (ESPAM); and my professional expertise as a hydrologist and groundwater modeler. To the extent that other information becomes available, the Director or the Department modifies any information presented, or new analysis and information becomes available, I reserve the right to modify or expand upon my opinions related to this case.

[1] American Falls-Aberdeen GWD, Bingham GWD, Bonneville-Jefferson GWD, Carey GWD, Jefferson-Clark GWD, Madison (Fremont-Madison) & Henry's Fork GWD, Magic Valley GWD, and North Snake GWD.

2 IGWA diversion reduction and recharge activities

Section 3.a.ii of the 2015 Agreement authorizes ground water districts to meet their proportionate share of the 240,000 acre-feet by "ground water reduction or in conducting an equivalent private recharge activity." Diversion reductions and aquifer recharge are referred to herein collectively as "groundwater conservation."

Table 1 shows the amount of groundwater conservation in 2022, as reported in IGWA's Performance Summary Report, whereby the signatory districts were collectively responsible to conserve ~205,000 acre-feet annually, as well as the annual conservation based on the increased diversion reduction obligations assigned by the Director in the Final Order Regarding IGWA's 2022 Mitigation Plan Compliance issued August 2, 2023 in IDWR Docket No. CM-MP-2016-001, whereby the signatory districts are collectively responsible to conserve 240,000 acre-feet annually. The "IGWA 2022 Mitigation Balance" column and the "IDWR 2022 Mitigation Balance" column reflect the difference between the conservation target actually used by the ground water districts from 2016-2022 (~205,000 acre-feet) versus the increased conservation target (240,000 acre-feet) imposed by the Director in 2023.

2022 Usage Analysis all values in acre-ft	IGWA Proportioning	[IGWA] Target Conservation	IDWR Proportioning	IDWR Target Conservation	Baseline	2022 Usage	Diversion Reduction	Accomplished Recharge/ Direct Delivery	Total Conservation	[IGWA] 2022 Mitigation Balance	IDWR 2022 Mitigation Balance
American Falls-Aberdeen	14.0%	33,715	16.4%	39,395	283,815	269,322	14,494	23,550	38,043	4,328	-1,352
Bingham	14.6%	35,015	17.0%	40,914	277,011	269,088	7,923	516	8,438	-26,577	-32,476
Bonneville-Jefferson	7.6%	18,264	8.9%	21,341	158,133	151,245	6,888	9,249	16,137	-2,127	-5,204
Carey	0.3%	703	0.3%	821	5,671	1,889	3,782	5	3,787	3,084	2,966
Jefferson-Clark	22.7%	54,373	26.5%	63,533	445,393	408,112	37,281	7,647	44,928	-9,444	-18,605
Henry's Fork[1]	2.2%	5,391	2.6%	6,299	69,979	62,381	7,598	3,000	11,774	6,383	5,475
Madison[2]	0.0%				78,095	76,919	1,176				0
Magic Valley	13.5%	32,462	15.8%	37,931	256,188	218,759	37,429	3,378	40,807	8,345	2,876
North Snake[3]	10.6%	25,474	12.4%	29,765	208,795	174,838	33,957	3,395	37,352	11,878	7,586
A&B[4]	9.0%	21,660	-	-	-	-	-	-	21,660	0	-
Southwest ID[4]	5.4%	12,943	-	-	-	-	-	-	12,943	0	-
Total:	**100%**	**240,000**	100%	**240,000**	1,783,080	1,632,553	150,527	50,739	235,869	-4,131	-38,734
Notes:											
(1) Includes mitigation for Freemont-Madison Irrigation District, Madison Ground Water District and WD100. Mitigating by alternative means.											
(2) Madison baseline is preliminary estimate, see note on district breakdown.											
(3) North Snake GWD baseline includes annual average of 21,305 acre-feet of conversions.											
(4) A&B ID and Southwest ID Total Conservation is unknown and assumed to meet target.											

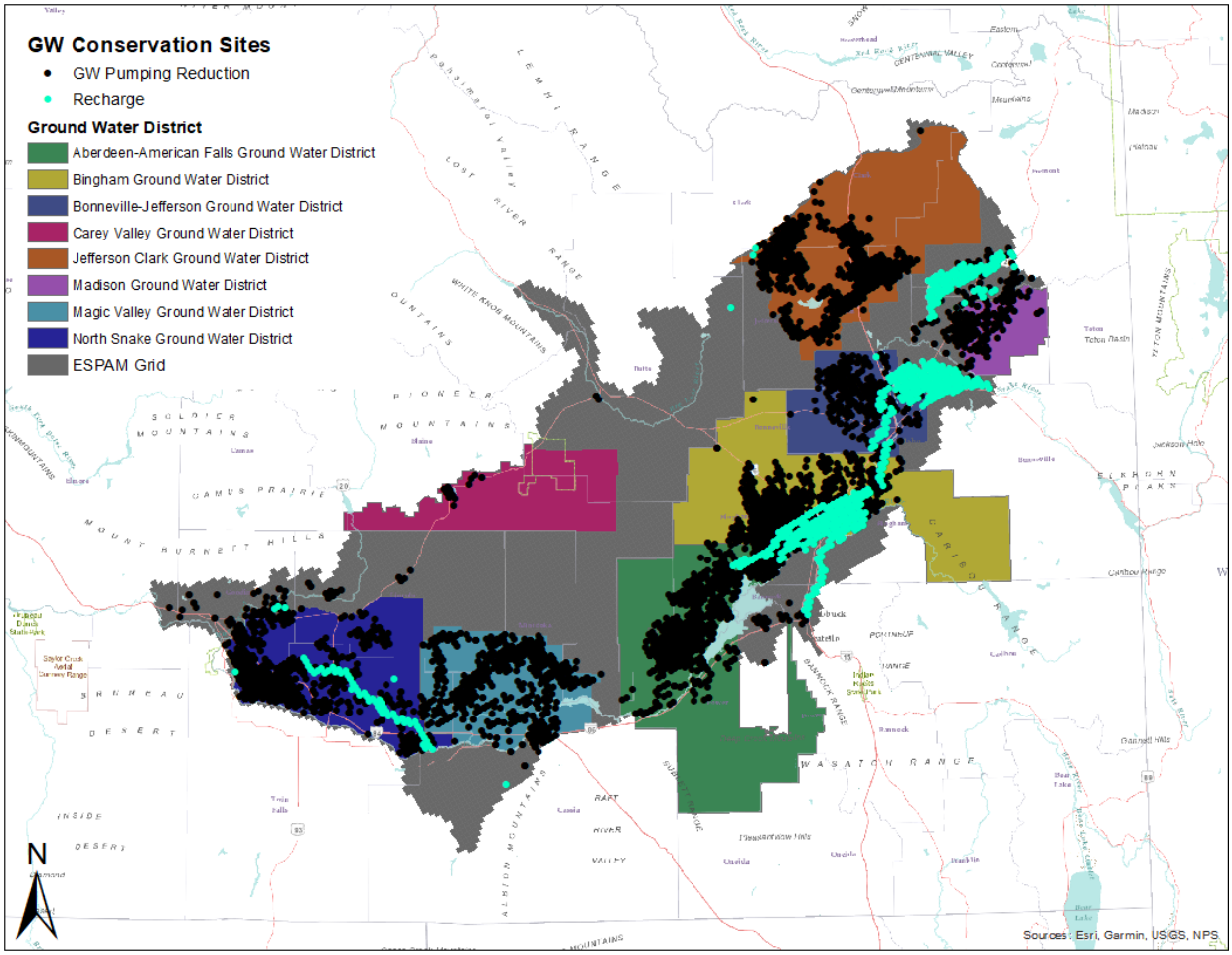
Table 1: IGWA Conservation Summary Based on 2022 Settlement Performance Report and 2023 IDWR Ruling

2.1 Modeling Inputs

To calculate the effect on the SWC of groundwater conservation surpluses and deficits from 2016-2022, I used ESPAM to model the effects on the Near Blackfoot to Minidoka reach of the Snake River. Table 2 shows the model inputs for groundwater diversion reductions and managed aquifer recharge from 2016-2022. For the purpose of this report, groundwater conservation data was parsed by ground water district and modeling was performed by individual ground water districts. Groundwater conservation was modeled based on reductions by WMIS location (for groundwater diversion reductions) and aquifer recharge site reported (for managed aquifer recharge). The compilation of diversion reductions and recharge sites as modeled are shown in Figure 1.

IGWA's 2016-2022 Summary Performance Reports submitted annually to the SWC and IDWR contains the diversion and recharge data for each district used in the modeling. Reach gains from diversion reductions and aquifer recharge were calculated based on the ESPAM model response to conservation at the WMIS location or recharge site. For example, recharge conducted at Milepost 31 was assigned to that model cell to calculate the effect on Near Blackfoot to Milner reach gains. All changes in WMIS diversions and reported recharge volumes as reported in the IGWA Summary Settlement Performance Reports for each ground water district were included in the modeling analysis. Annual diversion reductions were applied April through October. For this report, ESPAM 2.2 was used to model the effect on reach gains to the Near Blackfoot to Minidoka reach of the Snake River resulting from groundwater conservation excesses and deficiencies on a district-by-district basis.

Figure 1 IGWA GW Conservation Model Inputs



IGWA Conservation Model Input								
all values in acre-feet								
2015/2016								
	AFA GWD	Bingham	BJ GWD	MV GWD	JC GWD	Madison-HF	NS GWD	Carey
Diversion Reductions	21,836	15,146	2,540	24,112	22,574	26,763	31,228	4,899
ASCC	16,123	13,383	2,325		5,263			
Peoples Canal		3,000						
New Sweden Canal		1,801	2,307		4,078			
Snake River Valley Canal		2,701	2,148		4,187			
FMID West		2,000			7,000			
FMID Egin Lakes		1,801	353		800	3,000		
Jensen Grove		10,000						
GFCC			3,478		6,522			
AFRD/MP 31				5,100				
Birch Creek					343			
New Lavaside Canal		718						
Danskin Canal		184						
Riverside Canal		85						
Watson Canal		182						
Wearyrick Canal		186						
Dewey					4,000			
Total Conservation	**37,959**	**51,185**	**13,151**	**29,212**	**54,767**	**29,763**	**31,228**	**4,899**

2017								
	AFA GWD	Bingham	BJ GWD	MV GWD	JC GWD	Madison-HF	NS GWD	Carey
Diversion Reductions	45,224	50,766	21,531	28,872	67,878	30,661	37,836	4,535
ASCC	28,120	20,690	4,891		3,276			
Peoples Canal	811	2,811			862			
New Sweden Canal		17	5,020		5,101			
Snake River Valley Canal	1,847		20,458					
FMID West					27,762	3,000		
Jensen Grove	3,460	1,406			431			
GFCC					10,305			
NSCC					1,597			
AFRD/MP 31				8,000				
Birch Creek					2,322			
Blackfoot Canal	1,405	1,906			431			
Corbett Slough	382							
Burgess			6,464					
Osgood			497					
BMLCC			890					
Sandy Ponds							7,090	
Rudy		1,396						
Harrison		4,447	5,000		6,637			
New Lavaside		1,000						
Progressive			3,596					
North Rigby					154			
Farmers Canal	1,954							
Atchley Pump	454							
Dewey	742							
Fort Hall	1,431							
City of Gooding Site	10,021							
Total Conservation	**95,851**	**84,438**	**68,346**	**36,872**	**126,756**	**33,661**	**44,926**	**4,535**

2018								
	AFA GWD	Bingham	BJ GWD	MV GWD	JC GWD	Madison-HF	NS GWD	Carey
Diversion Reductions	10,512	27,661	20,865	39,195	69,555	49,870	38,614	4,284
ASCC	27,847	7,402						
Peoples Canal	3,148	7,717						
Snake River Valley Canal	6,473	1,250	6,500					
FMID West					15,004			
FMID Egin Lakes						7,151		
Jensen Grove	1,574							
AFRD/MP 31				6,100				
Blackfoot Canal	1,574	2,177						
Corbett Slough		241						
Burgess			5,000					
Sandy Ponds							3,822	
Monteview					1,218			
Harrison	7,242							
Dewey	838				879			
Marysville Canal	2,479							
Wilford Canal	1,719							
Cade Carter Pond	823							
City of Gooding Site	2,549							
New Lavaside		1,242						
Watson		113						
Wearyrick		173						
Riverside		185						
Total Conservation	**66,778**	**48,161**	**32,365**	**45,295**	**86,656**	**57,021**	**42,436**	**4,284**

2019								
	AFA GWD	Bingham	BJ GWD	MV GWD	JC GWD	Madison-HF	NS GWD	Carey
Diversion Reductions	35,243	44,244	19,030	61,001	52,922	57,537	51,530	4,787
ASCC	28,728	13,243						
Peoples Canal		4,414						
New Sweden Canal			10					
Snake River Valley Canal	1,200	2,207	13,093					
FMID West					4,544	3,000		
AFRD/MP 31				6,500				
Blackfoot Canal		2,207						
Sandy Ponds							4,890	
Monteview					1,451			
Harrison			1,000					
Dewey	2,044				838			
Marysville Canal	2,501							
Clen Atchley Pump	120							
Silkey Ditch	163							
Wilford Canal	2,110							
Cade Carter Pond	2,694							
Teton Bass Pond	724							
Mattson - Craig Canal	2,177							
Fort Hall	585							
Total Conservation	**78,289**	**66,316**	**33,133**	**67,501**	**59,755**	**60,537**	**56,420**	**4,787**

2020								
	AFA GWD	Bingham	BJ GWD	MV GWD	JC GWD	Madison-HF	NS GWD	Carey
Diversion Reductions	13,130	12,830	5,551	28,092	41,244	64,892	30,880	2,308
ASCC	18,840	13,115						
Peoples Canal	6,734	4,687						
New Sweden Canal								
Snake River Valley Canal	3,587	2,497	5,482					
FMID Egin Lakes					25,000	3,000		
AFRD/MP 31				6,634				
Blackfoot Canal	1,550	1,079						
Corbett Slough	480	334						
Sandy Ponds							4,839	
Monteview					1,213			
Hilton Spill	4,177	2,908						
Riverside	129	90						
Danskin	863	601						
Trego	200	140						
Wearyrick	176	122						
Watson	67	46						
Mecham	98	69						
Parsons	304	212						
Total Conservation	**50,336**	**38,729**	**11,033**	**34,726**	**67,457**	**67,892**	**35,719**	**2,308**

2022								
	AFA GWD	Bingham	BJ GWD	MV GWD	JC GWD	Madison-HF	NS GWD	Carey
Diversion Reductions	14,494	7,923	6,888	37,429	37,821	9,900	33,957	3,782
FMID Egin Lakes					4,545	2,200		
Jensen Grove					2,300			
NSCC							1,481	
Sandy Ponds							1,721	
City of Gooding Site	6,802							
Teton Bass Pond	66							
Cade Carter Pond	53							
Parkinson Pond and Cornelsen Pond						800		
Direct Delivery	16,629	516	9,249	3,378	802		192	5
Total Conservation	**38,044**	**8,439**	**16,137**	**40,807**	**45,468**	**12,900**	**37,351**	**3,787**

Table 2: IGWA Conservation Model Inputs

2.2 Modeling Approach

The purpose of the modeling analysis for this report was to determine benefits to SWC based on reach gains to the near Blackfoot to Minidoka reach of the Snake River that resulted from excess conservation by the IGWA ground water districts from 2016-2022. Excess conservation was determined based on diversion reductions or recharge above the Settlement Agreement conservation target. As detailed in Table 1, the amount of groundwater conservation that districts were required to conserve ("Target Conservation") each year differs depending on whether it is calculated using the conservation target actually implemented from 2016-2022 (~205,000 acre-feet)("IGWA's Conservation Target") or the increased conservation target imposed by the IDWR in August of 2023 ("IDWR Conservation Target"). The modeling analysis for this report considers excess conservation relative to both sets of groundwater conservation targets.

To determine the “Actual Conservation” Reach Gain volume, a model run was performed for each ground water district which included all conservation activities as actually implemented by IGWA members 2016-2022. Diversion volumes used in this model run are the diversion and recharge volumes contained in the Performance Summary spreadsheets (Table 2). Where spacial and temporal information for a given diversion reduction or recharge activity is available, that information is applied and honored in the model. Some WMIS locations are outside the ESPAM boundary and those volumes are applied to the nearest model cell. Some recharge locations and dates are estimated based on best available data. The total volume of conservation and recharge is consistent with that reported in the Performance Summary spreadsheets.

For comparison, ESPAM was run to simulate the minimum conservation activity required by the 2016 Mitigation Plan under both conservation targets (~205,000 ac-ft and 240,000 ac-ft) from 2016-2022. For each conservation target allocated to each ground water district, a model run was made where the model inputs for the actual conservation activities were modified using a multiplier that resulted in a total district-wide volume equivalent to the conservation target. For example, the North Snake GWD’s actual conservation volumes in 2022 in Table 1 show it performed 33,957 ac-ft of diversion reductions, 1,481 ac-ft of recharge at NSCC, 1,721 ac-ft of recharge at Sandy Ponds, for a groundwater conservation volume of 37,159 ac-ft. The IGWA conservation target only required North Snake GWD to conserve 25,474 ac-ft. To preserve the spacial and temporal components in the model, North Snake GWD’s diversion reduction, recharge at NSCC and Sandy Ponds volumes were modified using a multiplier. Such that under the 205,000 ac-ft model run, North Snake GWD’s inputs into the model were: 23,280 ac-ft of diversion reductions, 1,015 ac-ft of recharge at NSCC, and 1,179 ac-ft of recharge at Sandy Ponds. This process was done to create model inputs for the 205,000 ac-ft minimum conservation target run for all districts. The same method was used for the 240,000 ac-ft minimum conservation target run for all districts, but instead uses IDWR Target Conservation volumes to determine the multiplier and corresponding model input volumes. In 2022, several ground water districts delivered storage water directly to the SWC instead of using it to recharge the ESPA. These volumes were not modeled but were added directly to the reach gain benefits from the model analysis in 2022.

The excess benefits under each set of conservation targets were determined by the difference in near Blackfoot to Minidoka reach gains between the actual IGWA conservation and the target conservation resulting from both the 205,000 and the 240,000 acre-feet allocations.

The model was run for 2016 through 2022; however, no conservation activities were modeled for 2021 because the parties entered into a compromise settlement agreement to resolve their dispute over compliance with the Settlement Agreement that year. Thus, no excess credits or deficits from 2021 were included in the analysis, nor was storage water that IGWA delivered to the SWC under that settlement agreement included in the analysis. ESPAM2.2 was run in superposition mode using a monthly transient version for all model runs.

3 Results

3.1 Excess Reach Gain benefits determined based on Actual Conservation Compared to 205K Af Reduction Target, and 240K Af Reduction Target

Table 3 shows the reach gain surplus/deficit to the near Blackfoot to Minidoka reach in 2022 from (1) the volume of groundwater conservation implemented by each ground water district in 2022, and (2) excess groundwater conservation implemented by each district from 2016-2020. Table 3 shows these figures for each ground water district individually as well as a summary of the signatory districts as a whole. Table 3 shows the reach gain surplus/deficit based on both the target conservation figures actually utilized by the ground water districts from 2016-2022 (~205,000 acre-feet), and the increased target conservation figures imposed by the Director in 2022.

For example, IDWR calculated a conservation deficit of 5,204 acre-feet for Bonneville-Jefferson Ground Water District in 2022, using the Director's increased target conservation figures. However, excess conservation by Bonneville-Jefferson Ground Water District in prior years and direct delivery of 9,249 acre-feet created reach gains in 2022 that more than offset the impact of the conservation deficit that year, resulting in net gain to the reach of 10,362 acre-feet.

As a result of excess groundwater conservation prior to 2022 and direct deliveries in 2022, the mitigation activities of all but one ground water district (Bingham Ground Water District) generated a net positive gain to the Near Blackfoot to Milner Reach in 2022. The net reach gain deficit of Bingham Ground Water District was a modest 2,668 acre-feet based on the conservation target actually implemented in 2022, or 5,001 based on the increased conservation target imposed by IDWR in 2023.

Collectively, the mitigation of the ground water districts produced a net reach gain surplus in 2022 of 37,351 acre-feet or 32,533 acre-feet depending on which conservation target is used, as shown in Table 3.

2016-2022 IGWA Conservation Model Analysis							
all values are in acre-feet (Af)							
Bingham							
	2016 [1]	**2017**	**2018**	**2019**	**2020**	**2021**	**2022 [6]**
Actual Conservation Volume	51,185	84,437	48,161	66,316	38,728	-	8,439
205,000 AF Conservation Target Surplus/Deficit	16,170	49,422	13,146	31,301	3,713	-	-26,576
205,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit	2,283	12,131	11,306	13,466	9,677	5,239	-2,668
	2016 [1]	**2017**	**2018**	**2019**	**2020**	**2021**	**2022 [6]**
Actual Conservation Volume	51,185	84,437	48,161	66,316	38,728	-	8,439
240,000 AF Conservation Target Surplus/Deficit	10,271	43,523	7,247	25,402	-2,186	-	-32,475
240,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit	1,211	10,036	8,752	10,471	6,400	3,365	-5,001

American Falls-Aberdeen

	2016	2017	2018	2019	2020	2021	2022 [6]
Actual Conservation Volume	37,959	95,851	66,779	78,288	50,335	-	38,043
205,000 AF Conservation Target Surplus/Deficit	4,244	62,136	33,064	44,573	16,620	-	4,328
205,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit	1,079	11,288	14,665	16,338	15,438	8,214	20,105

	2016	2017	2018	2019	2020	2021	2022 [6]
Actual Conservation Volume	37,959	95,851	66,779	78,288	50,335	-	38,043
240,000 AF Conservation Target Surplus/Deficit	-1,436	56,456	27,384	38,893	10,940	-	-1,352
240,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit	-365	9,253	12,485	14,005	12,385	6,594	20,105

Bonneville-Jefferson

	2016 [2]	2017	2018	2019	2020	2021	2022 [6]
Actual Conservation Volume	13,152	68,346	32,365	33,133	11,033	-	16,137
205,000 AF Conservation Target Surplus/Deficit	-5,112	50,082	14,101	14,869	-7,231	-	-2,127
205,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit	582	1,766	4,680	5,409	5,236	3,371	11,067

	2016 [2]	2017	2018	2019	2020	2021	2022 [6]
Actual Conservation Volume	13,152	68,346	32,365	33,133	11,033	-	16,137
240,000 AF Conservation Target Surplus/Deficit	-8,189	47,005	11,024	11,792	-10,308	-	-5,204
240,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit	528	1,449	4,157	4,687	4,365	2,474	10,362

Carey

	2016	2017	2018	2019	2020	2021	2022
Actual Conservation Volume	4,899	4,535	4,284	4,787	2,308	-	3,782
205,000 AF Conservation Target Surplus/Deficit	4,196	3,832	3,581	4,084	1,605	-	3,079
205,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit	0	0	0	2	6	13	21

	2016	2017	2018	2019	2020	2021	2022
Actual Conservation Volume	4,899	4,535	4,284	4,787	2,308	-	3,782
240,000 AF Conservation Target Surplus/Deficit	4,078	3,714	3,463	3,966	1,487	-	2,961
240,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit	0	0	0	2	6	13	21

Jefferson-Clark

	2016 [3]	2017	2018	2019	2020	2021	2022 [6]
Actual Conservation Volume	57,624	126,756	86,656	59,755	67,457	-	44,928
205,000 AF Conservation Target Surplus/Deficit	3,251	72,383	32,283	5,382	13,084	-	-9,445
205,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit	1,253	1,215	1,858	2,178	2,225	2,166	2,600

	2016 [3]	2017	2018	2019	2020	2021	2022 [6]
Actual Conservation Volume	57,624	126,756	86,656	59,755	67,457	42,737	44,928
240,000 AF Conservation Target Surplus/Deficit	-5,909	63,223	23,123	-3,778	3,924	-20,796	-18,605
240,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit	1,229	943	1,426	1,778	1,593	1,457	1,875

Henry's Fork-Madison

	2016	2017	2018	2019	2020	2021	2022
Actual Conservation Volume	29,763	33,661	57,021	60,537	67,892	-	12,900
205,000 AF Conservation Target Surplus/Deficit	24,372	28,270	51,630	55,146	62,501	-	7,509
205,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit	0	11	74	186	335	503	610

	2016	2017	2018	2019	2020	2021	2022
Actual Conservation Volume	29,763	33,661	57,021	60,537	67,892	-	12,900
240,000 AF Conservation Target Surplus/Deficit	23,464	27,362	50,722	54,238	61,593	-	6,601
240,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit	0	11	71	179	324	489	594

Magic Valley							
	2016	**2017**	**2018**	**2019**	**2020**	**2021**	**2022** [6]
Actual Conservation Volume	29,212	36,872	45,295	67,501	34,726	-	40,807
205,000 AF Conservation Target Surplus/Deficit	-3,250	4,410	12,833	35,039	2,264	-	8,345
205,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit	-3	-34	-11	156	613	1,009	4,473
	2016	**2017**	**2018**	**2019**	**2020**	**2021**	**2022** [6]
Actual Conservation Volume	29,212	36,872	45,295	67,501	34,726	-	40,807
240,000 AF Conservation Target Surplus/Deficit	-8,719	-1,059	7,364	29,570	-3,205	-	2,876
240,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit	-9	-103	-183	-134	194	465	3,904

North Snake							
	2016 [4]	**2017**	**2018** [5]	**2019**	**2020**	**2021**	**2022**
Actual Conservation Volume	31,228	44,926	44,029	56,420	35,720	-	37,351
205,000 AF Conservation Target Surplus/Deficit	5,754	19,452	18,555	30,946	10,246	-	11,877
205,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit	0	8	53	163	332	540	848
	2016 [4]	**2017**	**2018** [5]	**2019**	**2020**	**2021**	**2022**
Actual Conservation Volume	31,228	44,926	44,029	56,420	35,720	-	37,351
240,000 AF Conservation Target Surplus/Deficit	1,462	15,160	14,263	26,654	5,954	-	7,585
240,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit	0	2	25	99	225	389	673

Total IGWA							
	2016	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Actual Conservation Volume	255,022	495,384	384,590	426,737	308,199	-	202,387
205,000 AF Conservation Target Surplus/Deficit	49,625	289,987	179,193	221,340	102,802	-	-3,010
205,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit	5,193	26,385	32,626	37,897	33,863	21,054	37,056
	2016	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
Actual Conservation Volume	255,022	495,384	384,590	426,737	308,199	-	202,387
240,000 AF Conservation Target Surplus/Deficit	15,022	255,384	144,590	186,737	68,199	-	-37,613
240,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit	2,595	21,591	26,734	31,088	25,492	15,245	32,533

[1] Bingham GWD 2016 volume includes 7,202 af of Fall 2015 recharge modeled

[2] Bonneville-Jefferson volume includes 3,412 af of Fall 2015 recharge modeled

[3] Jefferson Clark 2016 volume reflects sum of mitigation volume from diversion sheet (25,413 af) which is slightly higher than summary table (22,574) and 7,724 af of Fall 2015 recharge modeled

[4] North Snake GWD volume does not include 2,744 af of Sandy Ponds 2016 recharge not reflected in summary table

[5] North Snake GWD 2018 volume reflects sum of mitigation volume from diversion sheet (40,207 af) which is slightly higher than summary table (38,614)

[6] 2022 Direct delivery volumes were not modeled but are included in the "Actual Conservation Volume" and added directly to "Near Blackfoot to Minidoka Reach Gain Surplus/Deficit"

Table 3: 2016-2022 IGWA Conservation Model Analysis of SWC near Blackfoot to Minidoka Reach Gain Benefits. "Actual Conservation Volume" row displays actual groundwater conservation volumes performed by IGWA signatory district. The "205,000 AF Conservation Target Surplus/Deficit" row displays Actual Conservation Volumes minus IGWA's Conservation Target Volumes. The "205,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit" row displays the reach gain volume difference between the Actual Conservation run and the 205,000 ac-ft Conservation Target run. The "240,000 AF Conservation Target Surplus/Deficit" row displays Actual Conservation Volumes minus IDWR's Conservation Target Volumes. The "240,000 Af Near Blackfoot to Minidoka Reach Gain Surplus/Deficit" row displays the reach gain volume difference between the Actual Conservation run and the 240,000 ac-ft Conservation Target run.

4 Summary of Conclusions

1. IGWA historically understood the 240,000 ac-ft reduction as being an aquifer-wide objective, of which IGWA's member ground water districts bore the largest share (~205,000 acre-feet) which was allocated among IGWA's member ground water districts.
2. To measure compliance with each district's proportionate share, IGWA historically compared average post-Settlement Agreement diversions against average pre-Settlement Agreement diversions. Average groundwater pumping from 2010-2014 served as the "baseline" against which post-Settlement Agreement diversions were compared. The districts utilized averaging, which allowed their members to carry forward excess conservation to offset subsequent deficiencies, and vice versa.
3. The Director's ruling that averaging is not allowed disrupts the method IGWA used historically to measure compliance with the Settlement Agreement.
4. In 2010, IDWR approved *IGWA's Mitigation Plan for Conversions, Dry-Ups, and Recharge* (the "Aquifer Enhancement Plan") in IDWR Docket No. CM-MP-2009-006. The Aquifer Enhancement Plan authorizes mitigation credit for activities that reduce groundwater withdrawals or add recharge to the ESPA, including conversions of farmland from groundwater to surface water irrigation, fallowing, and managed aquifer recharge. The Eastern Snake Plain Aquifer Model ("ESPAM") can be used to calculate the effects of such activities on Snake River reach gains that accrue to the SWC.
5. Excess conservation from IGWA's mitigation activities 2016-2020 above Settlement Agreement target volumes offset deficits from 2022 activities in accounting of SWC benefits to the near Blackfoot to Minidoka reach.
6. From 2016-2022, IGWA's members conserved a total of 2,195,103 acre-feet, or 313,586 acre-feet annually on average, when compared to average pre-Settlement Agreement diversions from 2010-2014. During that period, IGWA's members had designed their conservation programs to conserve 205,000. Thus, IGWA's members conserved, on average, 108,586 acre-feet more than they understood was required.
7. Only Bingham ground water district shows a 2022 deficit in accounting of SWC benefits to the near Blackfoot to Minidoka reach when excess conservation is taken into account using either the 205,000 or 240,000 acre-feet targets.
8. IGWA as a whole does not show a 2022 deficit in accounting of SWC benefits to the near Blackfoot to Minidoka reach gain when excess conservation is taken into account using either the 205,000 or 240,000 acre-feet targets.

5 References

Settlement Agreement Dated June 30, 2015, Between Participating Members of the Surface Water Coalition and Participating Members of Idaho Ground Water Appropriators, Inc. ("2015 Agreement"), as amended by the *Addendum to Settlement Agreement* dated October 19, 2015, the *Second Addendum to Settlement Agreement* dated December 14, 2016, and the *Agreement* dated October 7, 2015, between A&B Irrigation District the Ground Water Districts.

Surface Water Coalition's and IGWA's Stipulated Mitigation Plan and Request for Order filed March 9, 2016, the *Final Order Approving Stipulated Mitigation Plan* issued May 2, 2016, *Surface Water Coalition's*

and IGWA's Stipulated Amended Mitigation Plan and Request for Order filed February 7, 2017, or the *Final Order Approving Amendment to Stipulated Mitigation Plan* issued May 9, 2017, in IDWR Docket No. CM-MP-2016-001

IGWA's Mitigation Plan for Conversions, Dry-Ups, and Recharge (the "Aquifer Enhancement Plan") in IDWR Docket No. CM-MP-2009-006

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