



Efforts to Resolve Eastern Snake Plain Aquifer Issues

Presentation to the Idaho Soil & Water Conservation Commission
Boise, Idaho

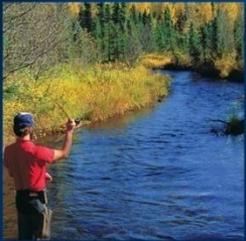
Brian Patton

January 26, 2016



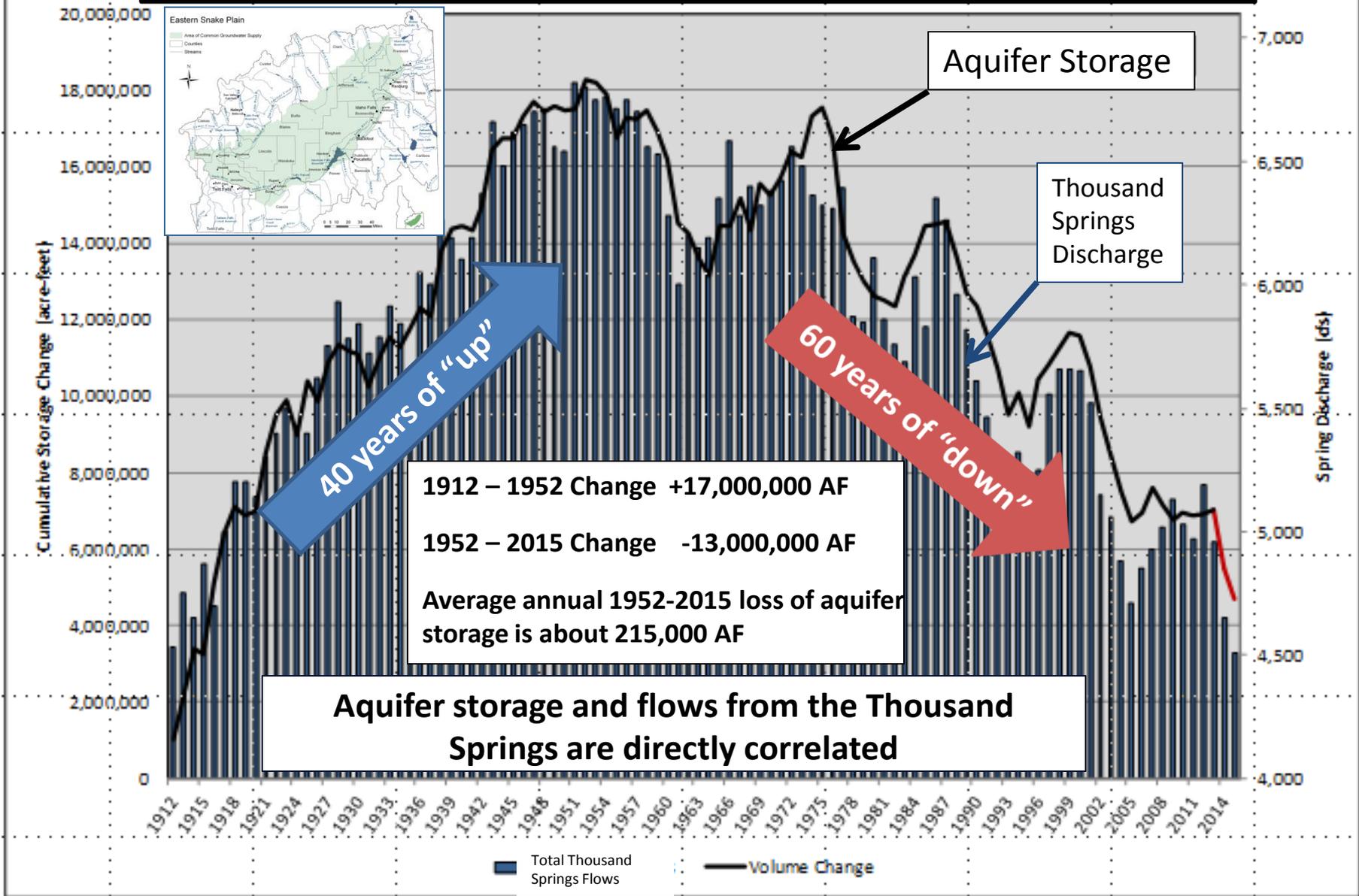
Topics

- ✓ Background
- ✓ Surface Water Coalition Settlement
- ✓ Managed Recharge



Recharge test – Wilson
Lake on North Side Canal
March 5, 2015

Volume Change of Water Stored Within the Eastern Snake Plain Aquifer and Thousand Springs Total Discharge





ESPA Annual Water Budget

“Goes-ins”

•Canal seepage	2.9 MAF
•Leakage from surface water-irrigated lands	2.4 MAF
•Non-Snake River seepage	0.6 MAF
•Tributary basin underflow	1.1 MAF
•Non-irrigated lands recharge	0.7 MAF

“Goes-outs”

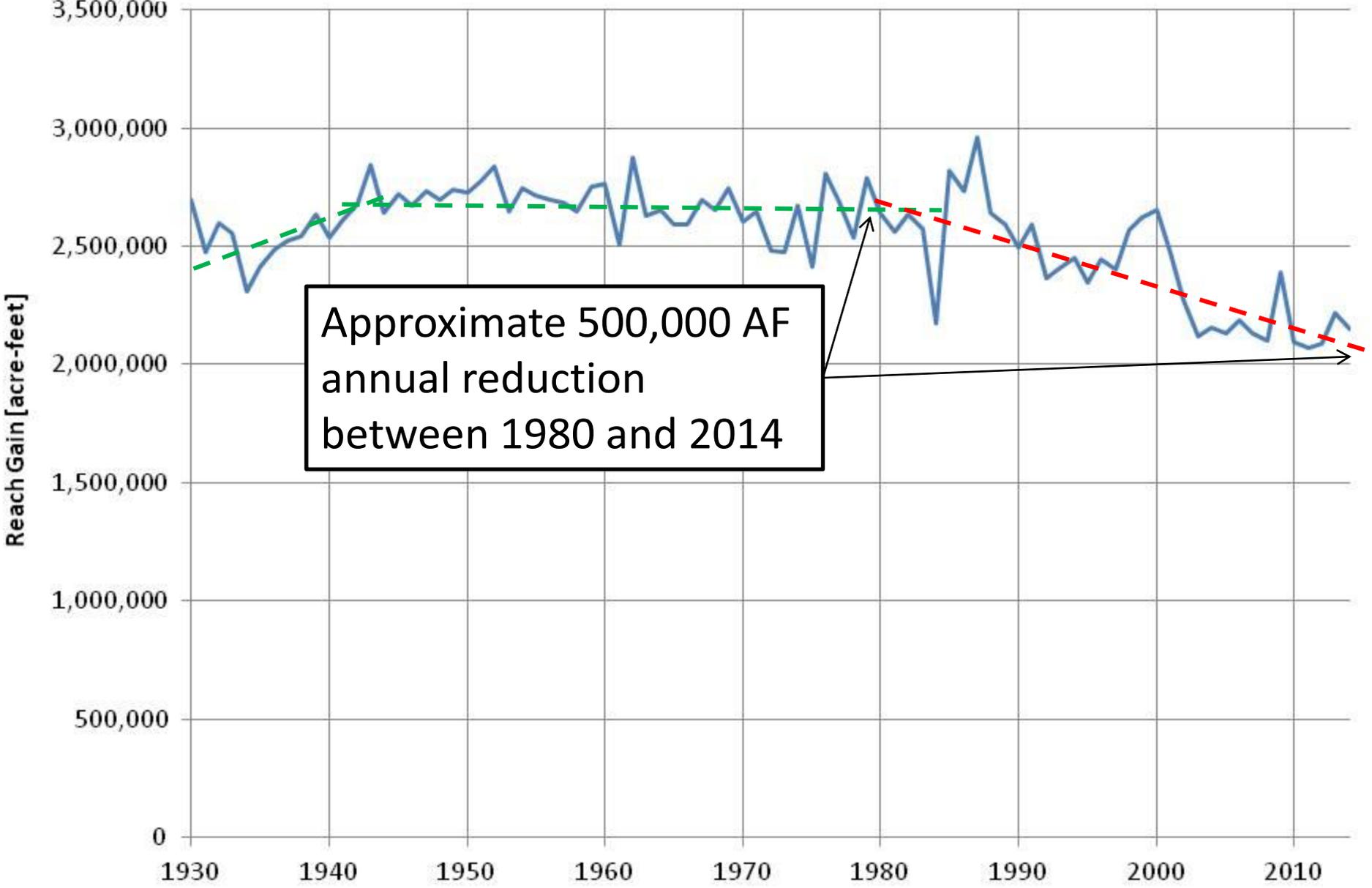
•Crop consumptive use on GW-irrigated lands	2.2 MAF
•Offsite/exchange/Mud Lake pumping	0.2 MAF
•Wetlands ET	0.1 MAF
•Urban pumping	0.1 MAF
•Net reach gains/losses upstream from Minidoka	1.0 MAF
•Spring flows below Milner	4.4 MAF

NET CHANGE IN AQUIFER STORAGE

(0.3 MAF)



Spring Flows in Blackfoot to Minidoka Reach



Approximate 500,000 AF
annual reduction
between 1980 and 2014

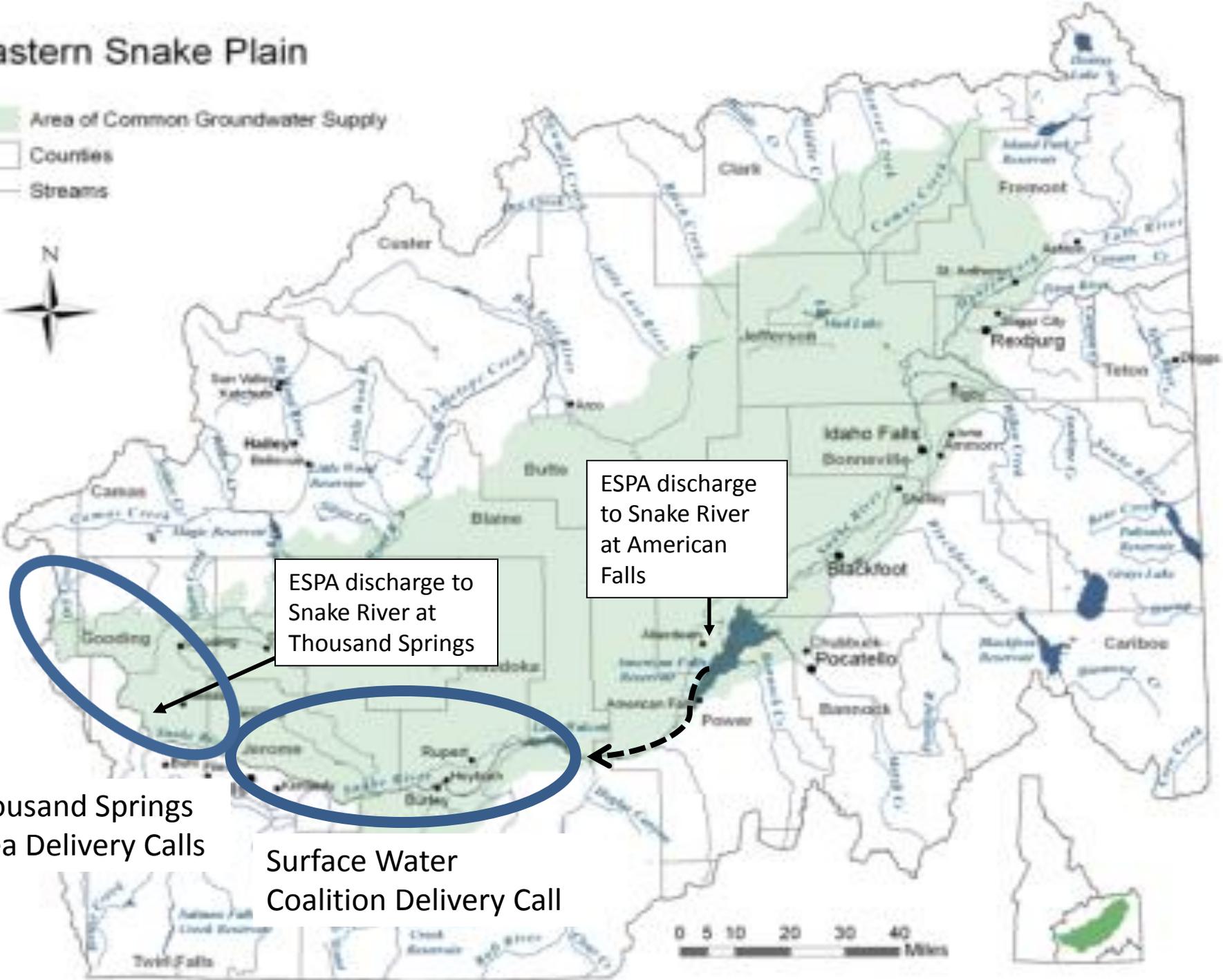
Note: 2013 and 2014 data values are preliminary.

Eastern Snake Plain

Area of Common Groundwater Supply

Courties

Streams



ESPA discharge to Snake River at Thousand Springs

ESPA discharge to Snake River at American Falls

Thousand Springs Area Delivery Calls

Surface Water Coalition Delivery Call



ESPA Stabilization and Swan Falls Agreement

State responsibility to ensure minimum flows at Murphy Gage just below Swan Falls Dam of:

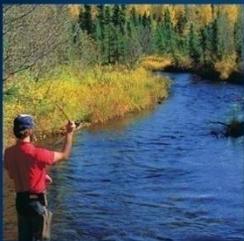
- ✓ 3,900 cfs (4/1 through 10/31) and
- ✓ 5,600 cfs (11/1 through 3/31)

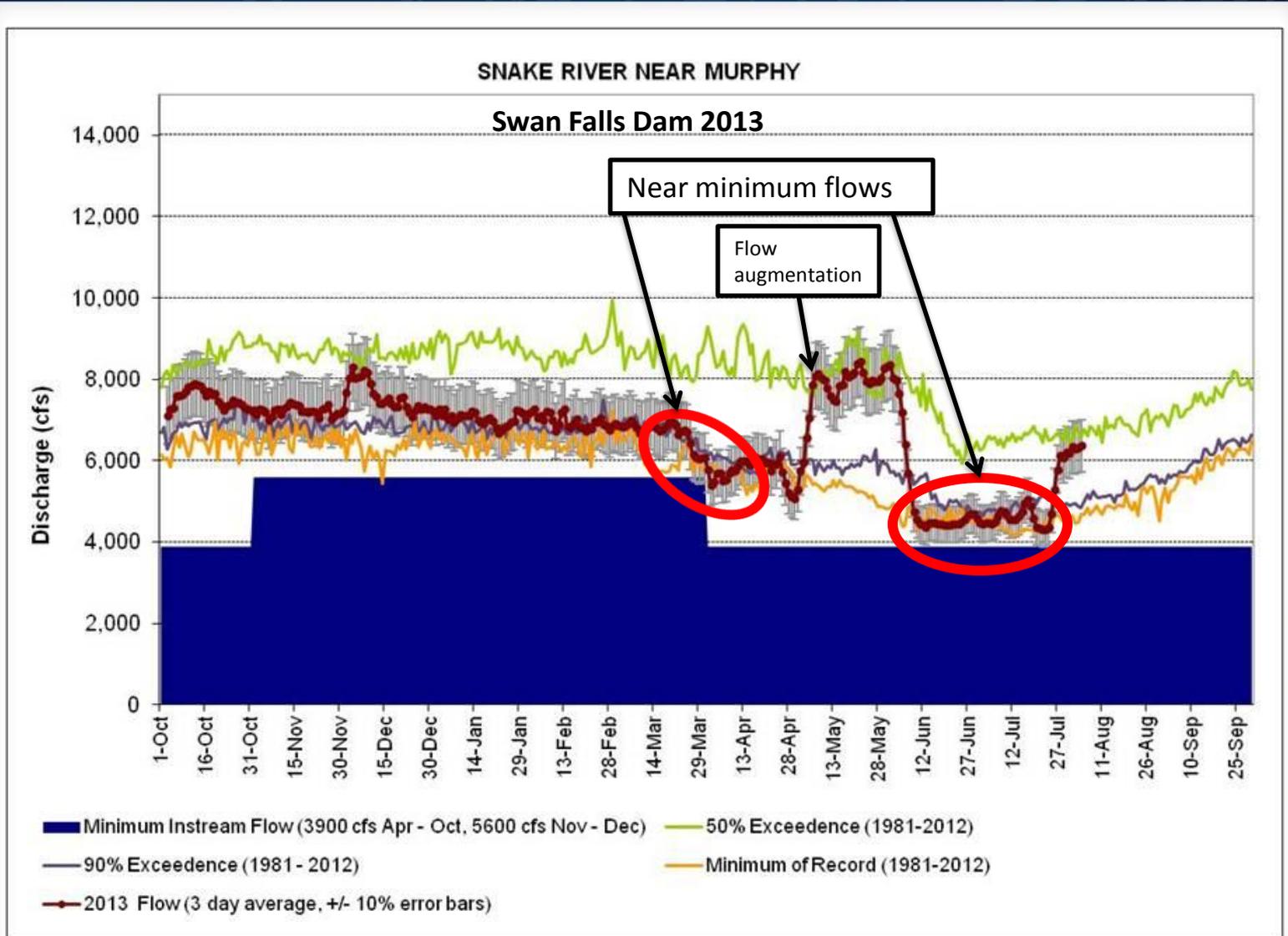
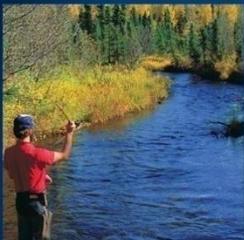


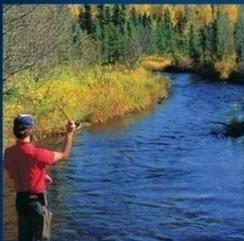
However, 180 miles Upstream at Milner Dam



- Water planning, policy, and practice provides for full development of Snake River above Milner Dam
- At times this reduces Snake River flow at Milner Dam to zero

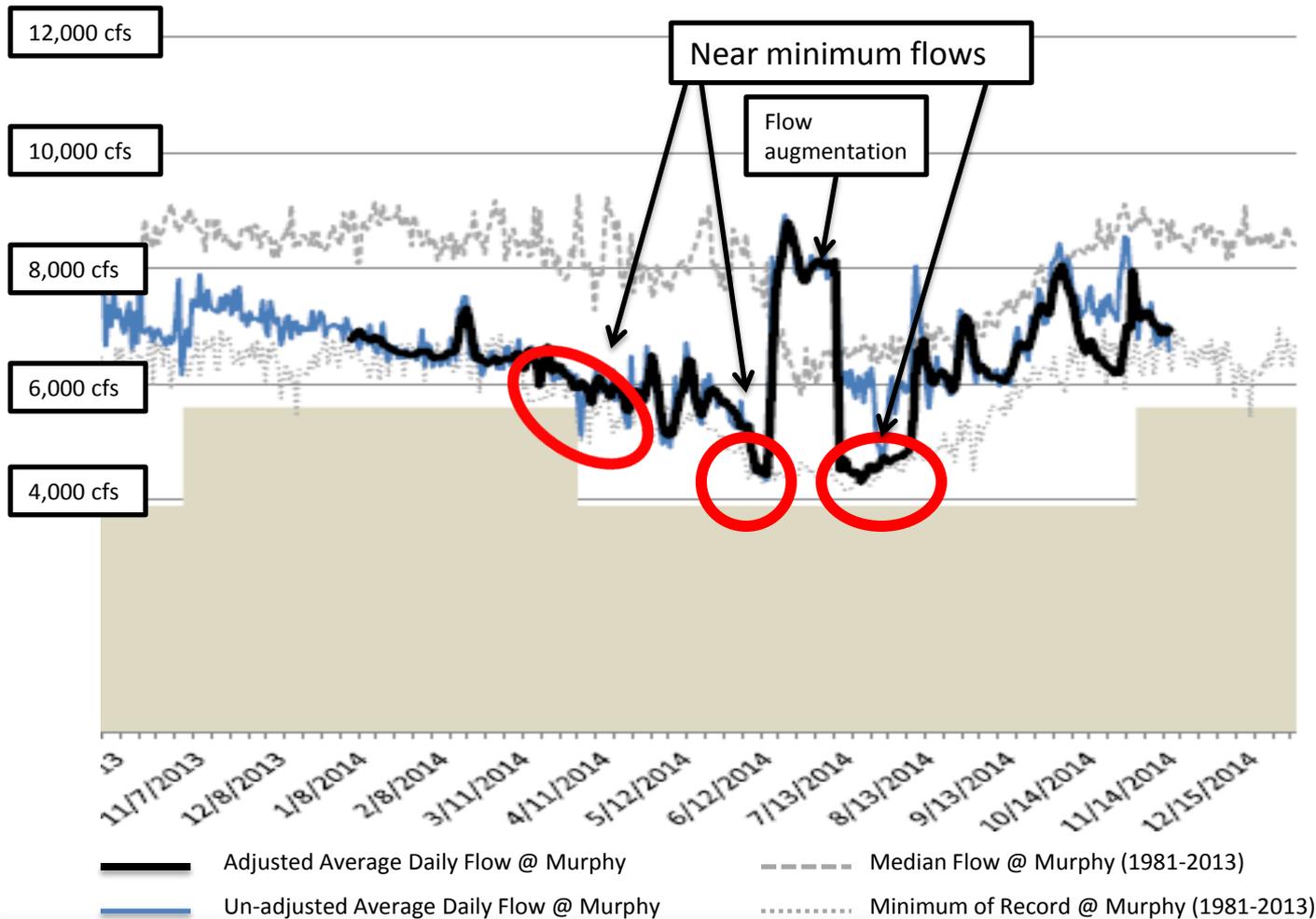


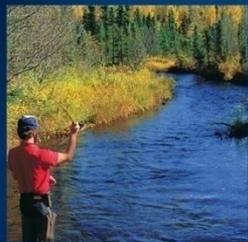




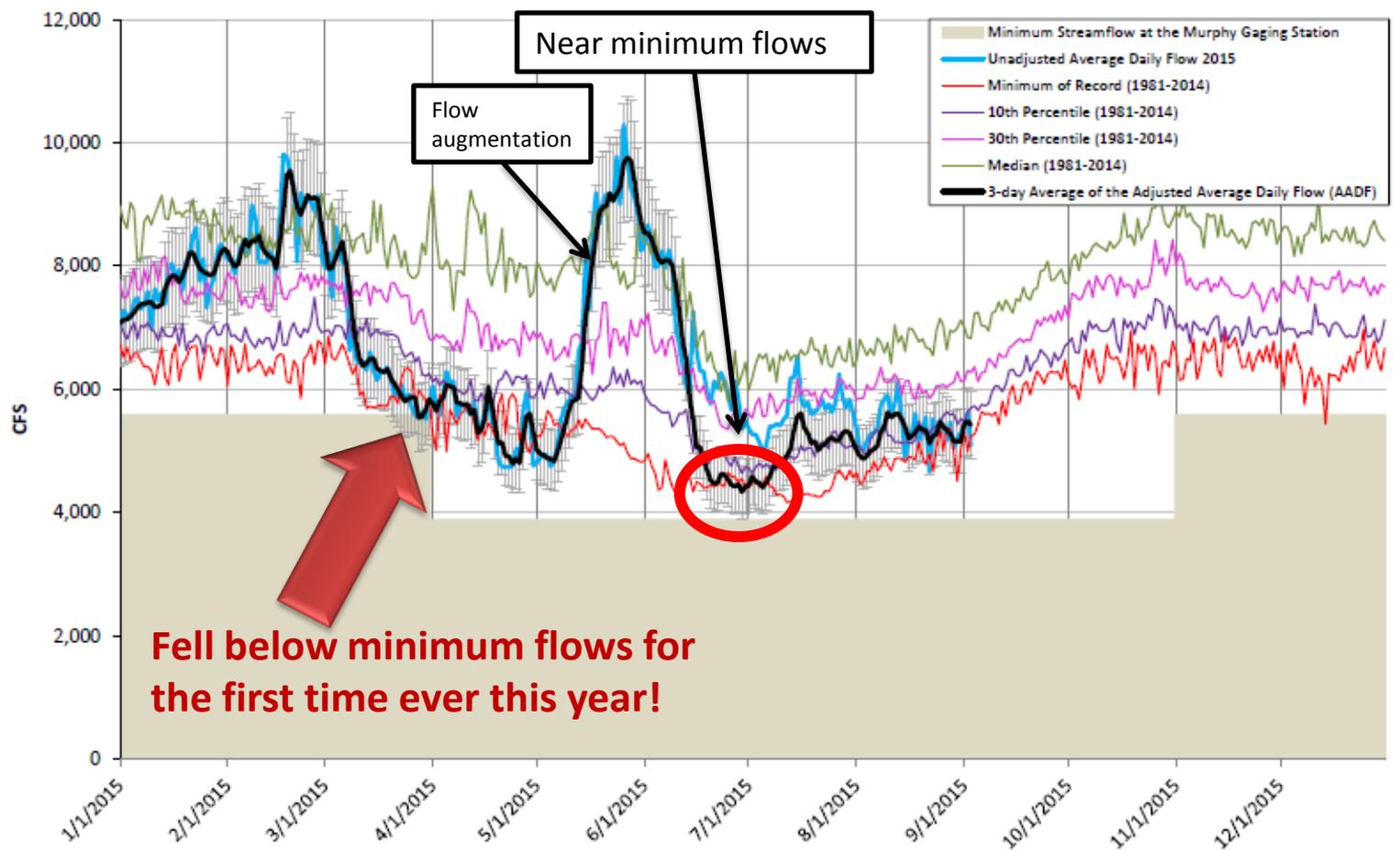
Snake River Near Murphy Gage

Swan Falls Dam - 2014

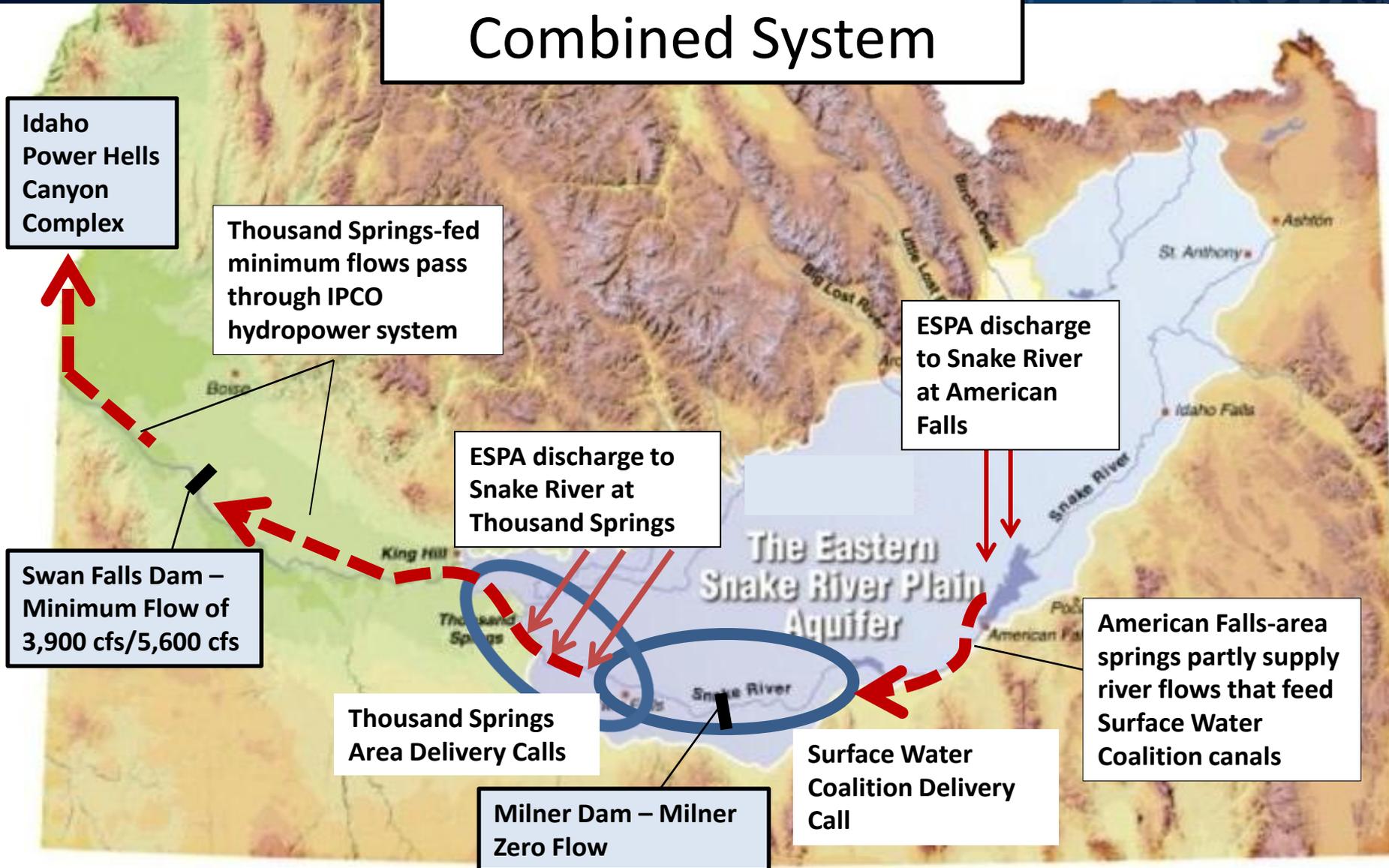




Snake River Near Murphy Gage - Swan Falls Dam - 2015

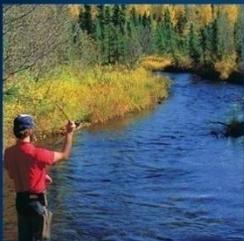


Combined System



Implications of Aquifer Situation

- ✓ ESPA can no longer meet all the uses that have been assigned to it – delivery calls determine what water uses come off the system
- ✓ ESPA must be managed to sustain spring flows sufficient to meet the Swan Falls minimum flows
- ✓ If economic damage is to be minimized, ESPA must be managed to sustain spring flows sufficient to reduce need for conjunctive water delivery calls
- ✓ Current situation is due partly to “deferred maintenance” of the ESPA
- ✓ Need to “re-build” ESPA



Surface Water Coalition Delivery Call

- Delivery Call Filed in 01/14/2005
- Final Order 09/05/2008
- Second Amended Methodology Order 06/23/2010
- Third Amended Methodology Order 04/16/2015
- Delivery Call Injury Based on Water Supply for Current Year
- Injury: (1) in-season; and (2) “reasonable carryover”
- **Because the Water Supply changes from year to year, so does the injury obligation**
- **Uncertainty is the great frustration of the Junior...and the Senior**

How Does the Methodology Work

IN-SEASON INJURY

- April – forecast the SWC’s water supply
- April - forecast the SWC’s demand (i.e. crop need)
- April – if demand > supply, in-season injury to the SWC exists and Juniors must mitigate or curtail
- July - repeat water supply/demand/injury analysis
- Aug/Sep - repeat water supply/demand/injury analysis at the “time of need”

CARRYOVER INJURY

- November - determine injury, if any, to SWC’s “reasonable carryover” (up to 125,000 acre-feet)
- If injury to “reasonable carryover” exists, Juniors must mitigate or curtail

What Has Changed with the Third Amendment?

- No finality for the Junior until the “time of need” – “mid-season adjustment” can be up or down
- Full obligation from the Area of Common Ground Water Supply
- New Prediction Models Tied to Aquifer Levels
- New Crop Distribution Data
- No “phased curtailment” of injury to “reasonable carryover”
- New Baseline Years, based on hotter and drier years

-
- **New Methodology provides more certainty to the Senior**
 - **New Methodology determines larger injuries**
 - **Shifts more risk to the junior**

Under the New Methodology the April Injury Determination was 89,000 acre-feet

Approximately 1982 Priority Date

Approximately 86,000 acres

But for the Stipulation leading to the Settlement, there would have been curtailment this year!

Summary of Demand Shortfall Projections as of May 3, 2015

	April As-Applied Order as Issued (4/16/15)	Estimated As- Applied using May 1 Forecast	Estimated July Mid- Season Adjustment w/ April Diversions & base- line years	Estimated July Mid- Season Adjustment w/ April Div. & 2012 Analog Year
A&B	0	0	0	0
AFRD2	-15,300	-35,464	-54,728	-67,938
BID	0	0	0	0
Milner	0	0	0	0
Minidoka	0	0	0	0
NSCC	0	0	-26,327	-184,543
TFCC	-73,700	-90,250	-170,259	-318,387
Total	-89,000	-125,714	-251,314	-570,868
Approx. Curtailment Priority Date	1982	1980	1974	1957
Approx. Curtailed Acres	86,000	121,000	259,000	594,000

These numbers are calculated using the 3rd Amended Methodology Order for the Surface Water Coalition Delivery Call. Natural flow supplies are predicted using the NRCS's May 1 50% Exceedance Forecast of April-July Runoff Volume at the Heise Gage (i.e. 2,239,000 AF).

Finalization of the Settlement Agreement - Timeline

- ◆ May – Preliminary Agreement Reached by Parties, Final Settlement Agreement by July 1
- ◆ June – IGWA held GWD Meetings to explain and generate support for the settlement agreement
- ◆ June – SWC held meeting to explain and generate support for the settlement agreement
- ◆ June – IGWA and SWC continue to meet to finalize settlement agreement
- ◆ July 2 - Parties agreed to final settlement, all signatures in
- ◆ August 1 – All irrigation districts, canal companies, and ground water districts subject to the agreement must sign as individual entities

Final Settlement Agreement

1. Objectives

- ◆ Mitigate for material injury to senior water users in the Surface Water Coalition (SWC) Delivery Call
- ◆ Provide safe harbor to participating ground water users in participating Ground Water Districts (GWD)
- ◆ Minimize economic impact to water users and State economy
- ◆ Increase reliability and enforcement of use, measurement, and reporting across the Eastern Snake Plain (ESP)
- ◆ Develop adaptive management plan to stabilize and enhance the Eastern Snake Plain Aquifer (ESPA) ground water levels

Final Settlement Agreement

2. Near Term Practices

- ◆ 110,000 AF storage water
 - Satisfied in-season mitigation obligation
 - All rental contracts in to WD01 by July 1
- ◆ \$1.1 Million dedicated to conversion projects



Final Settlement Agreement

3. Long Term Practices

- Consumptive use reduction of ground water by 240,000 AF
- Annual storage water delivery of 50,000 AF
- Irrigation season reduction: April 1 – October 31
- Mandatory Measurement Devices by 2018
- Support state sponsored recharge program of 250 KAF annually
- Additional support for the following: NRCS conservation programs; new conversion projects; management of Trust Water Rights; and participation in review and possible recommendations of changes to IDWR administrative processes on the ESPA.

Final Settlement Agreement – Goal and Benchmarks

3. Term Sheet Benchmarks and Ground Water Level Goal

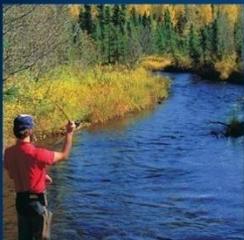
- **Goal:** “stabilize and ultimately reverse the trend of declining ground water levels and return ground water levels to levels equal to the average ground water levels from 1991-2001”
- **Benchmarks:** (1) by 2020 ground water levels will equal ground water levels in 2015; (2) by 2023 ground water levels will be halfway between 2015 ground water levels and goal; and (3) by 2026 goal is reached and ground water levels equal or exceed 1991-2001 average.
- **Metrics:** ground water levels are measured in 19 mutually agreed to sentinel wells

Recharge Goal: Stabilize & Rebuild ESPA

- ✓ HB 547 passed by 2014 Legislature allocates \$5 million annually from cigarette tax to Water Resource Board for “*statewide aquifer stabilization*”
- ✓ ESPA is first priority
- ✓ HB 479 (2014) allocated \$4 million one-time to Water Board for ESPA recharge infrastructure
- ✓ 2015 Legislature allocated additional one-time funds



Milepost 31 recharge basin
along Milner-Gooding Canal



Recharge Goal: Stabilize & Rebuild ESPA

- ✓ State Water Plan goal of 250,000 AF/year
- ✓ Component of SWC Settlement Term Sheet
- ✓ Component of draft Hagerman Valley/Thousand Springs Term Sheet
- ✓ Needed to maintain Swan Falls Minimum Flows
- ✓ Needed to maintain Idaho's economic viability

Recharge operations in
Twin Falls Canal
November 12, 2014



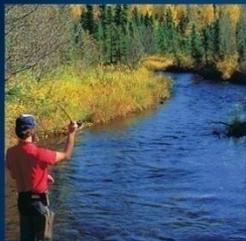
Factors That Define ESPA Recharge – two different water supply patterns

✓ Lower Valley at Milner:

- Downstream of all Upper Snake reservoirs
- Recharge water available all winter (Nov-Mar)
- Even in driest years 500 cfs spills past Milner

✓ Upper Valley upstream of American Falls:

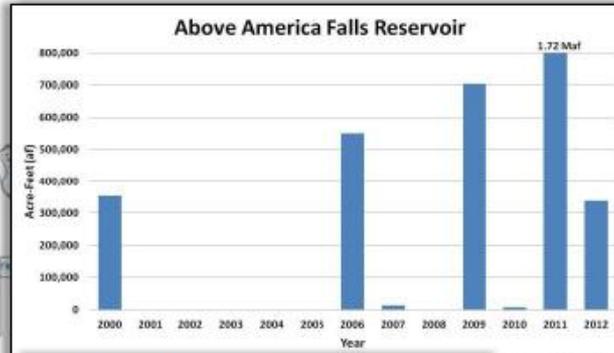
- Recharge water available during flood control releases from reservoirs
- Need to ensure reservoirs fill first
- Senior hydro right at Minidoka



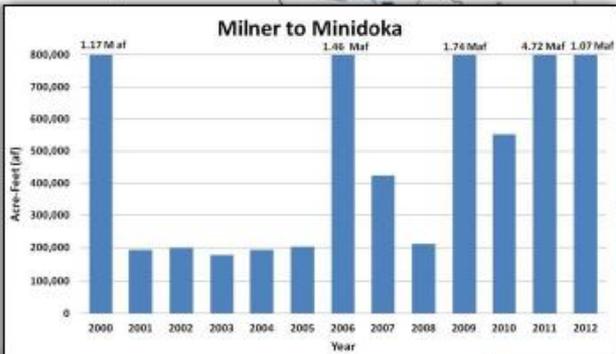
Water Available for Recharge 2000 - 2012

Eastern Snake Plain

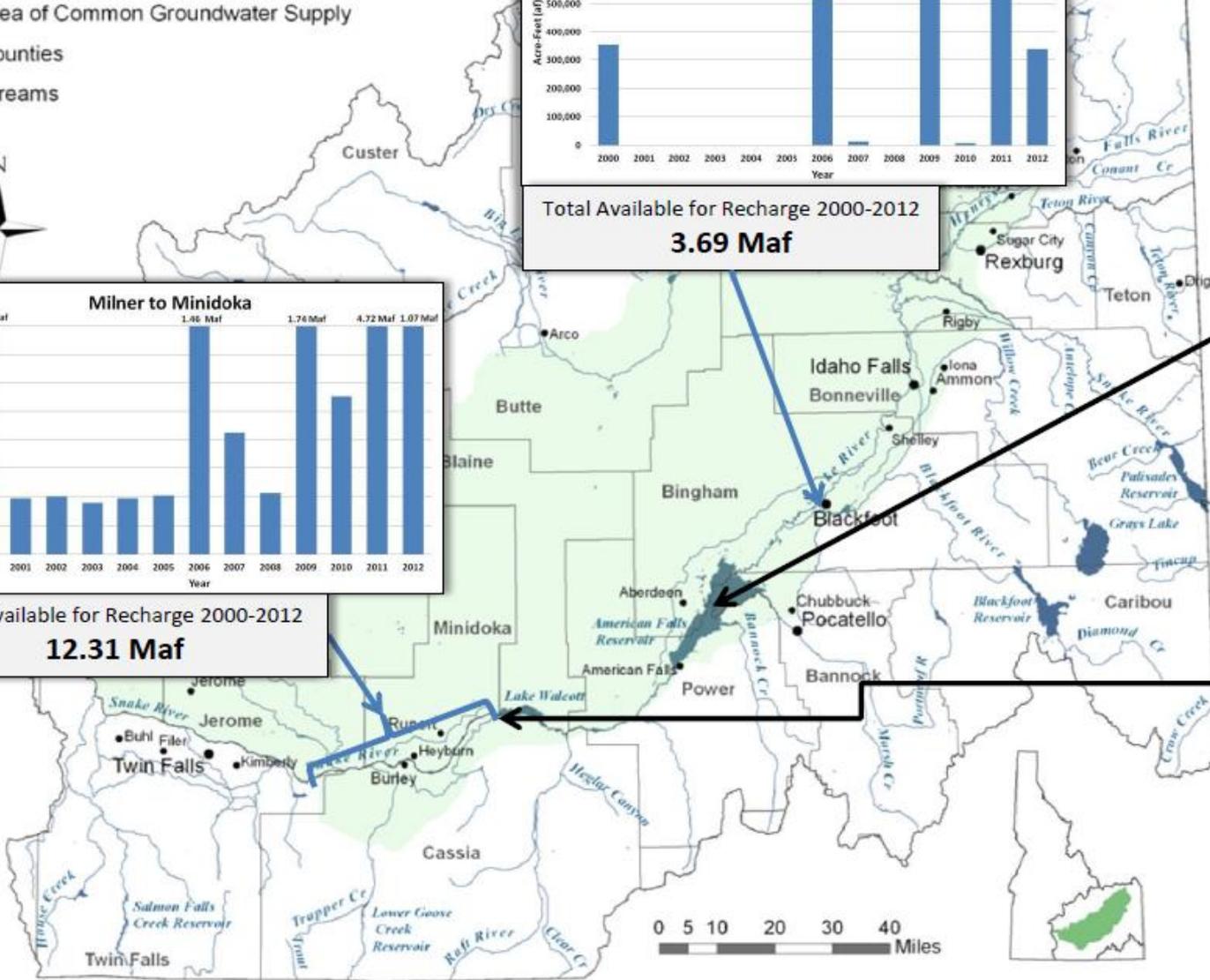
- Area of Common Groundwater Supply
- Counties
- Streams



Total Available for Recharge 2000-2012
3.69 Maf



Total Available for Recharge 2000-2012
12.31 Maf



American Falls Reservoir:
1.6 million AF
1921 priority

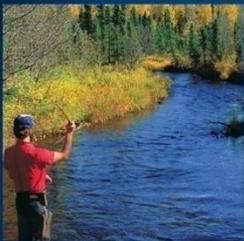
Unsubordinated
hydropower rights
at Minidoka Dam:
2,700 cfs
1909/1912 priority



Factors That Define ESPA Recharge – Water Rights

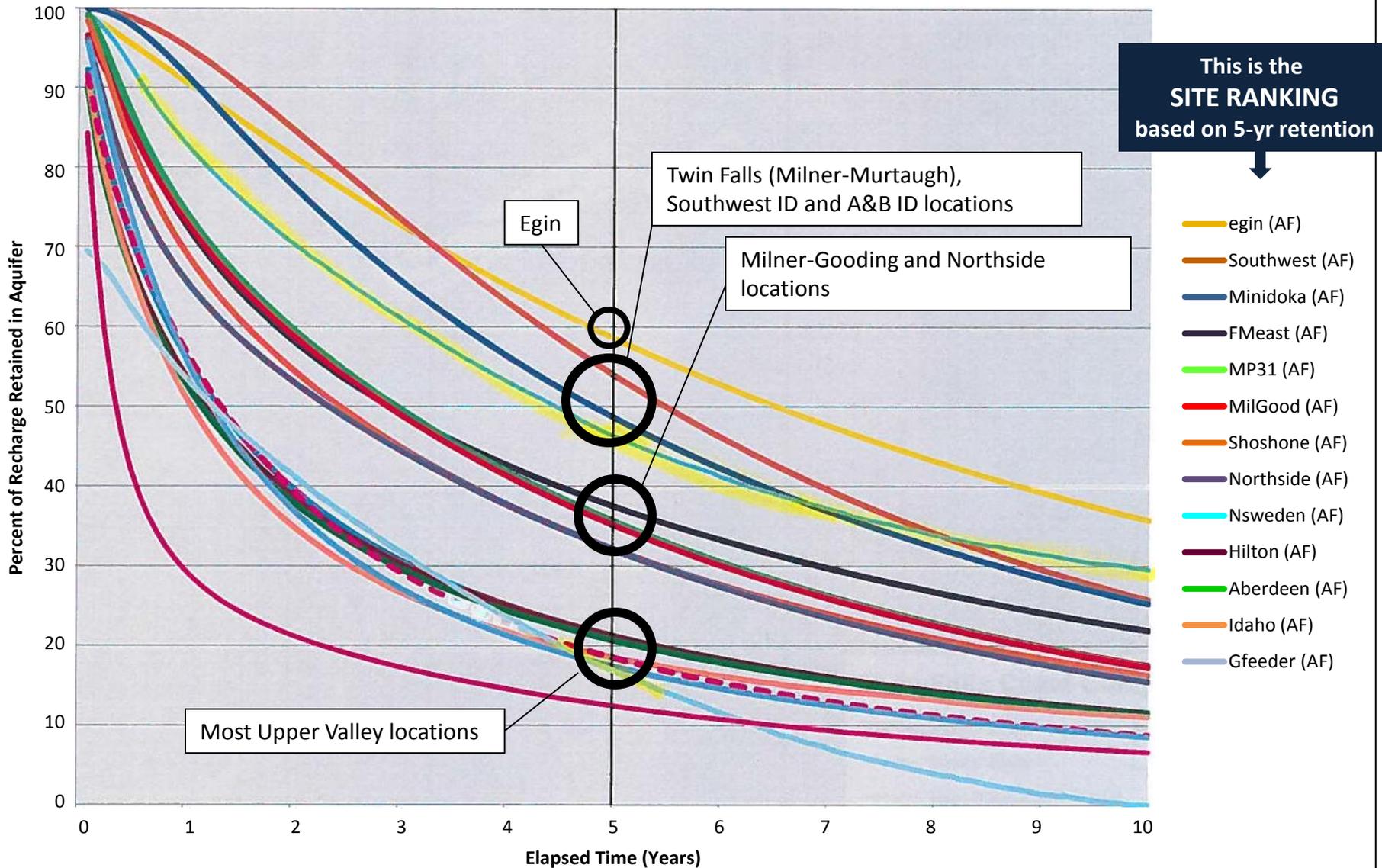
IWRB holds 1980-priority water right for recharge

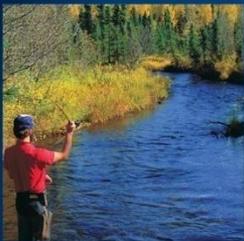
- 1,200 cfs
- Divert anywhere on Snake River
- Junior to irrigation and existing reservoirs
- Junior to Minidoka Hydropower (2700 cfs)
- Senior to Milner Hydropower
- Senior to other recharge rights
- Additional recharge water right applications in progress by IWRB and others



Retention of Recharged Water within the Aquifer

ESPAM 2.1 Ground Water Model





Factors that Define ESPA Recharge Water Rights & Water Supply

Eastern Snake Plain

- Area of Common Groundwater Supply
- Countries
- Streams

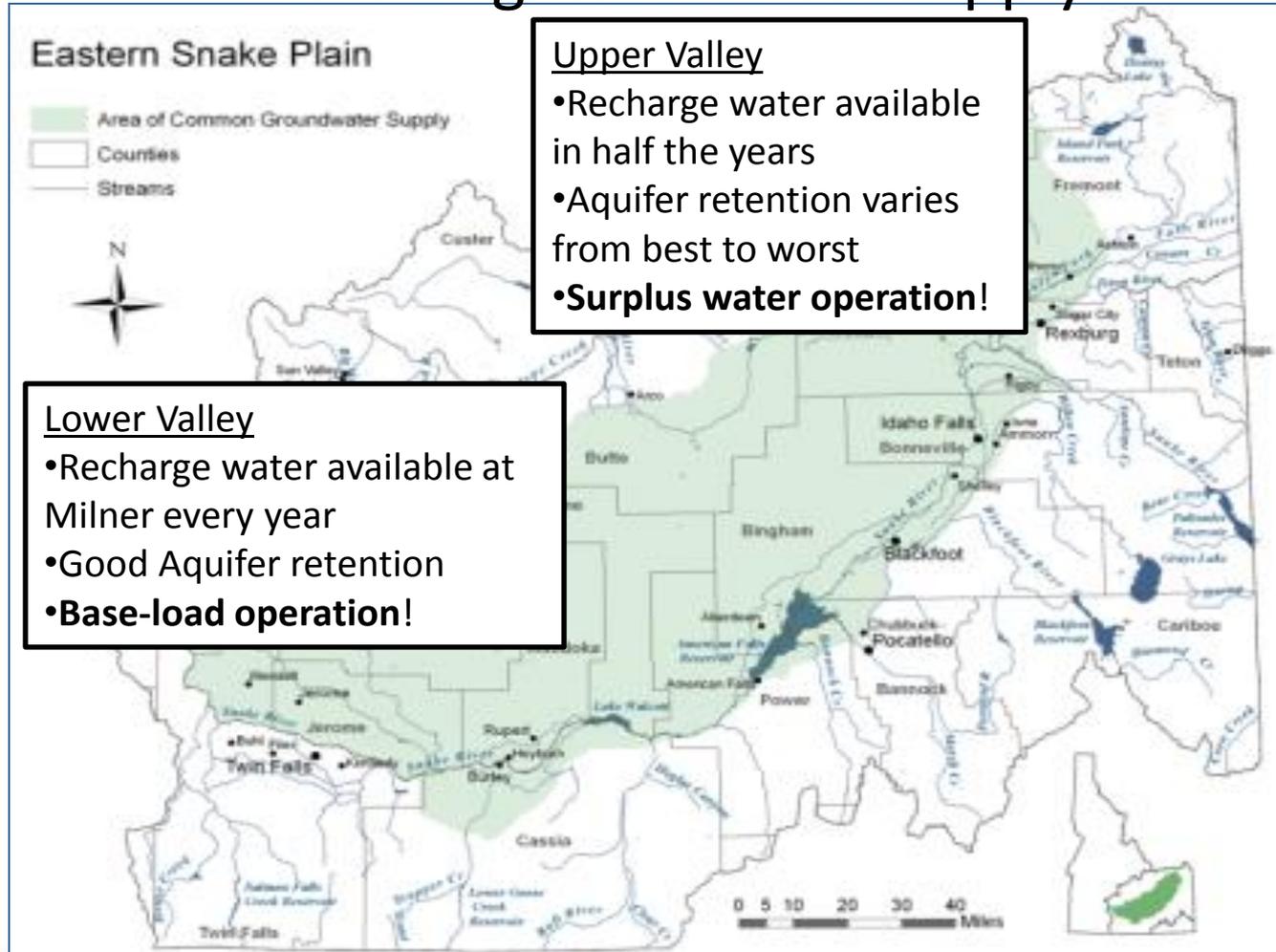


Lower Valley

- Recharge water available at Milner every year
- Good Aquifer retention
- Base-load operation!**

Upper Valley

- Recharge water available in half the years
- Aquifer retention varies from best to worst
- Surplus water operation!**

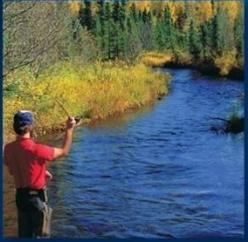


Factors that Define ESPA Recharge

How to get water in ground?

- Unlined canals that divert from river and cross the plain!
- Most cost effective way to divert & recharge large volumes of water – contract with canal companies & irrigation districts to carry water to recharge
- Supplement with spreading/spill basins
- Injection wells used in a few cases





Winter Recharge 2014-2015

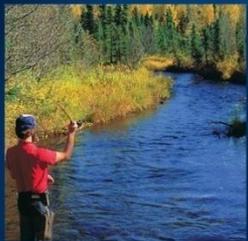
- Taking recharge from “pilot scale” to “full scale”
- Use existing canals to extent possible to deliver recharge water
- Water Board adopted incentivized payment schedules for canals –
MAKE RECHARGE A PARTNERSHIP!



Recharge at MP31 recharge basin/Milner-Gooding Canal – Jan 16, 2015

Winter Recharge 2014-2015

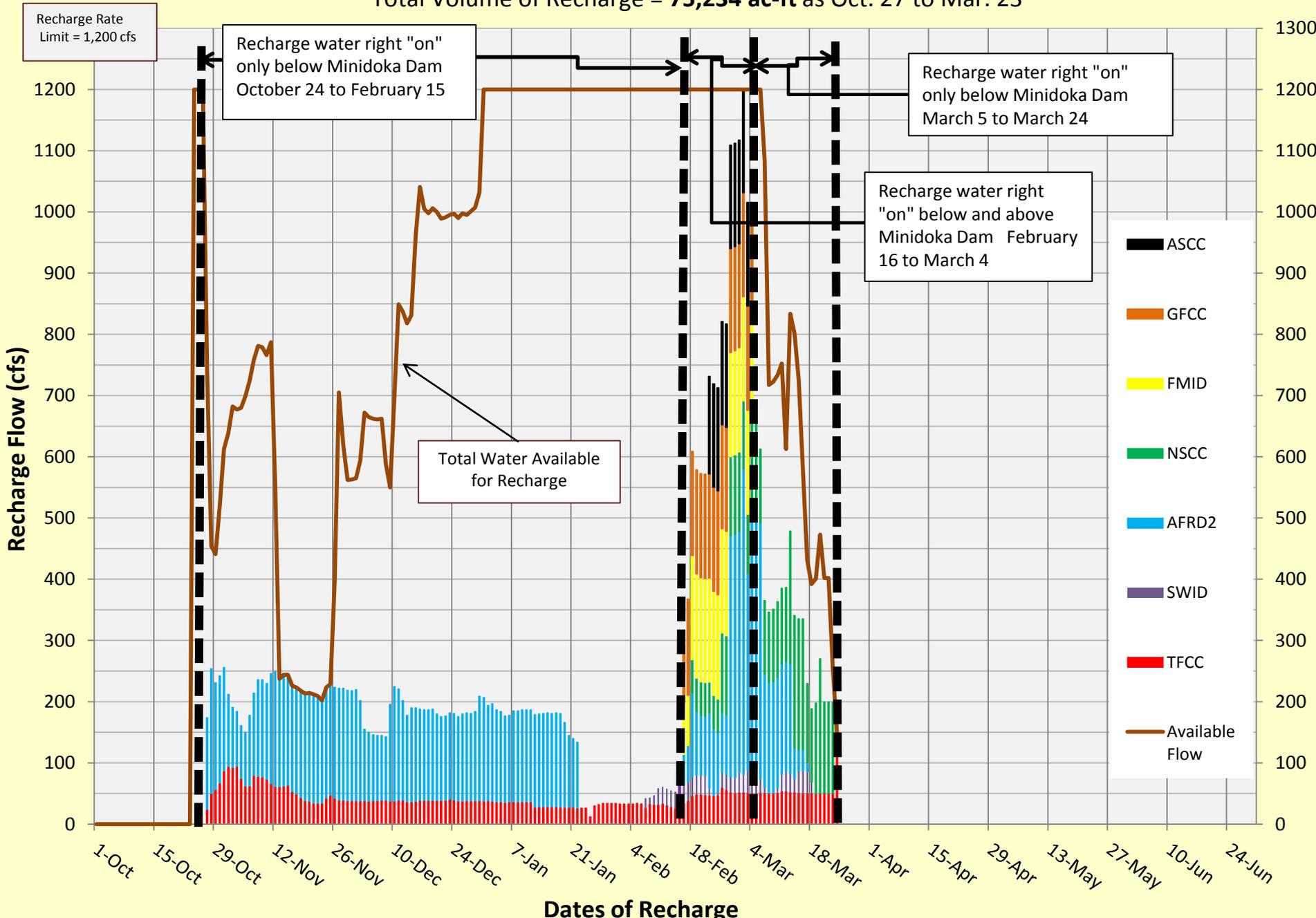
- Total ESPA recharge: 75,234 AF
- Amount below Minidoka: 61,068 AF
- Amount above American Falls: 14,166 AF
- Total spill past Milner Oct - Mar: ~ 300,000 AF



Recharge operations in
Aberdeen-Springfield
Canal & Hilton Spill
February 26, 2015

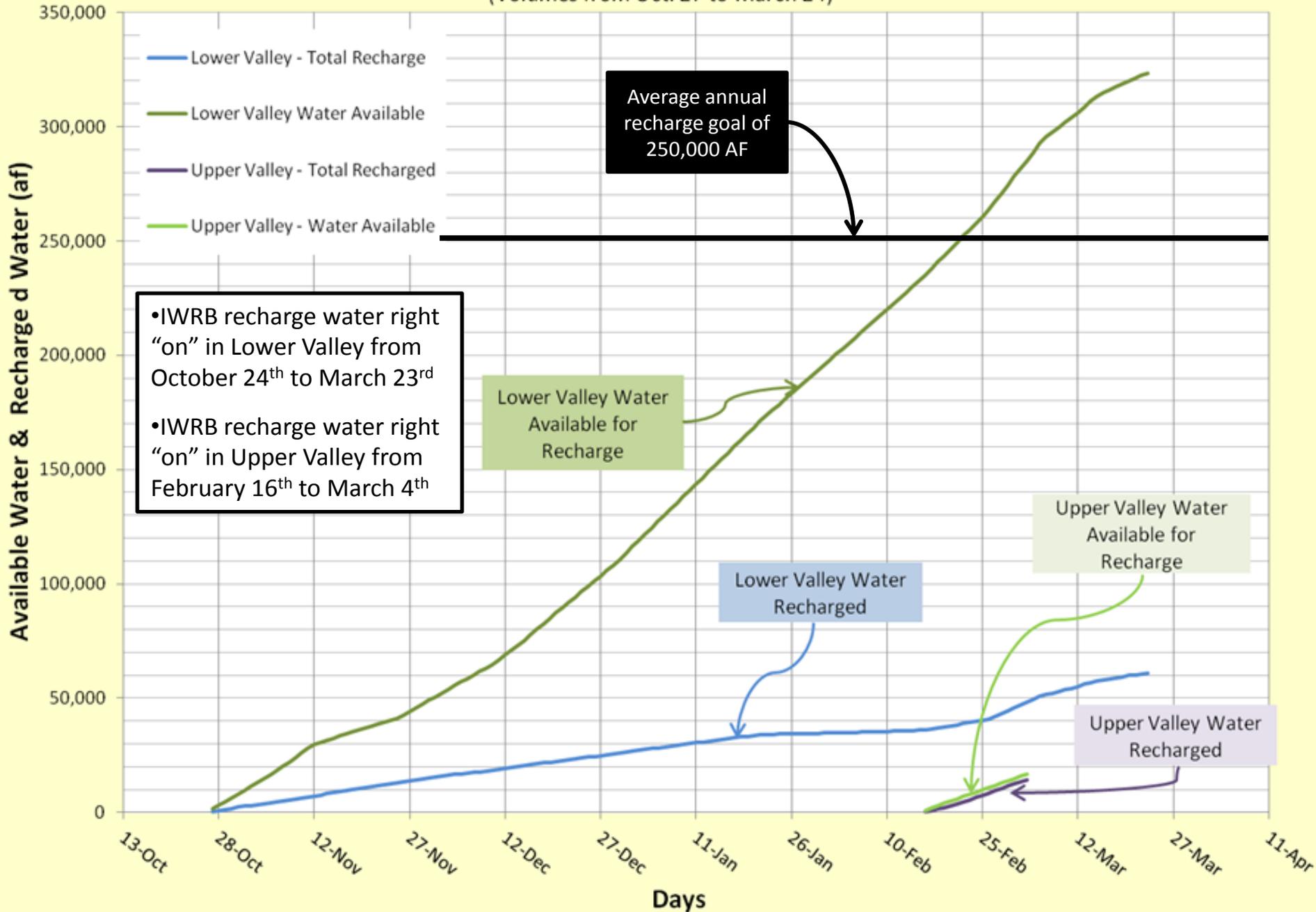
Total Water Board Recharge Rates During 2014 - 2015 Season

Total Volume of Recharge = 75,234 ac-ft as Oct. 27 to Mar. 23



ESPA Managed Recharge - 2014 - 2015 Season

(Volumes from Oct. 27 to March 24)



•IWRB recharge water right "on" in Lower Valley from October 24th to March 23rd
•IWRB recharge water right "on" in Upper Valley from February 16th to March 4th

Average annual recharge goal of 250,000 AF

Lower Valley Water Available for Recharge

Lower Valley Water Recharged

Upper Valley Water Available for Recharge

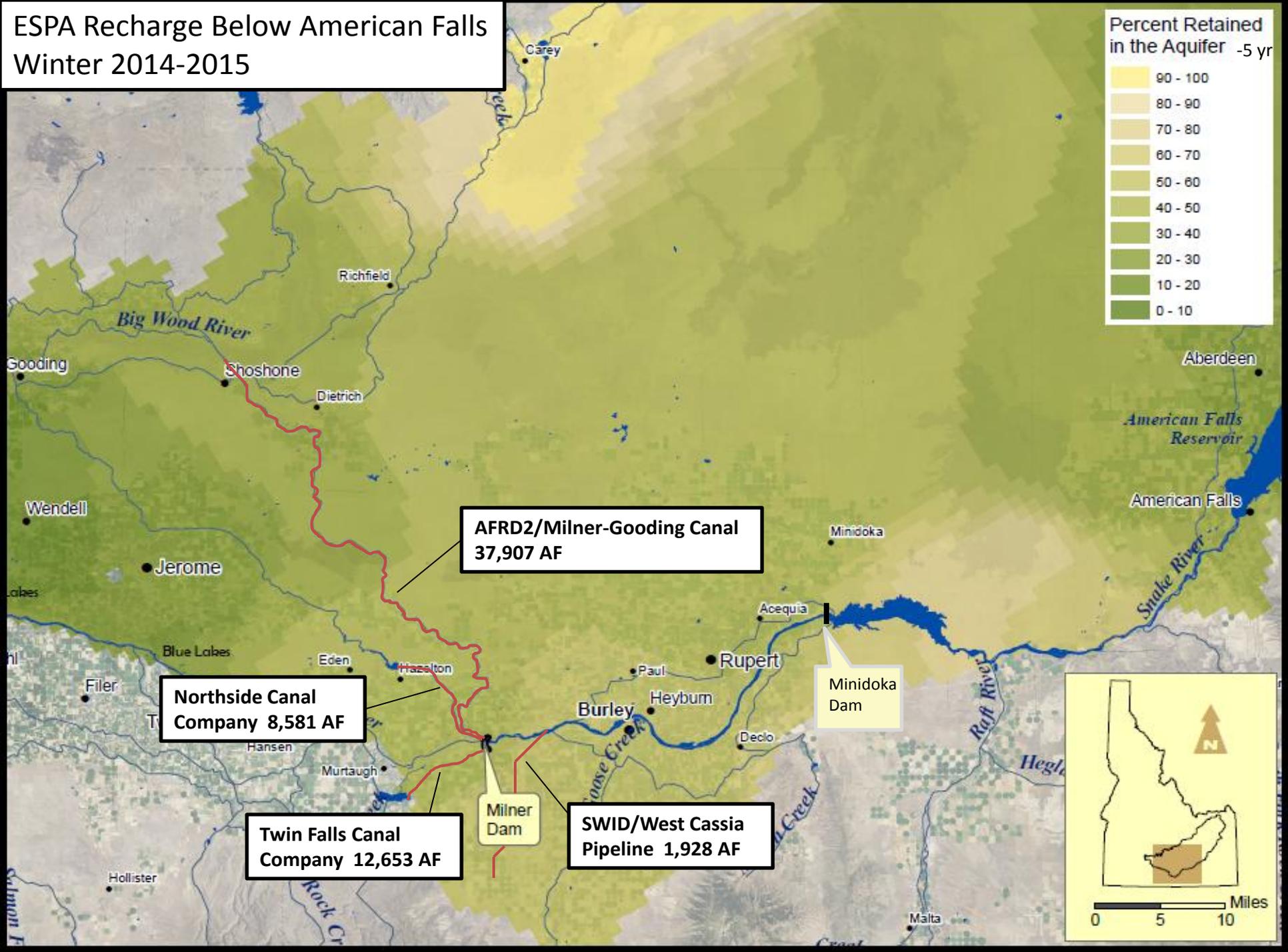
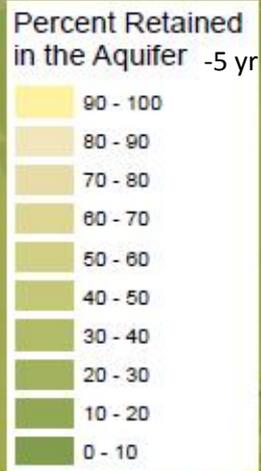
Upper Valley Water Recharged

ESPA Managed Recharge Summary

Oct 27th, 2014 to March 23rd, 2015

ESPA Area	Canal System	5-Year Retention Time (%)	Median Recharge Rate (cfs)	Days Recharged	Volume Recharged (Acre-feet)
Upper Valley	Aberdeen-Springfield Canal Company	~26	169	10	3,322
	Great Feeder Canal Company	~18	170	17	5,454
	Fremont Madison Irrigation District	~44	170	17	5,389
	Upper Valley Total				14,165
Lower Valley	American Falls Reservoir District No. 2 (Milner-Gooding Canal)	~40	153	118	37,907
	Northside Canal Company	~40	127	34	8,581
	Southwest Irrigation District	~55	25	47	1,928
	Twin Falls Canal Company	~50	39	148	12,653
	Lower Valley Total				61,069
TOTAL				75,234	

ESPA Recharge Below American Falls Winter 2014-2015



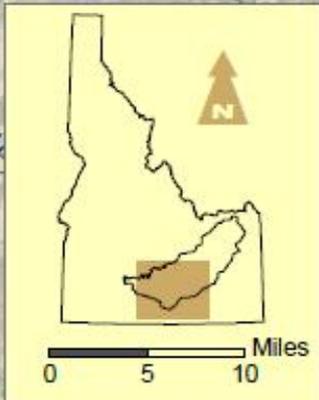
AFRD2/Milner-Gooding Canal
37,907 AF

Northside Canal Company
8,581 AF

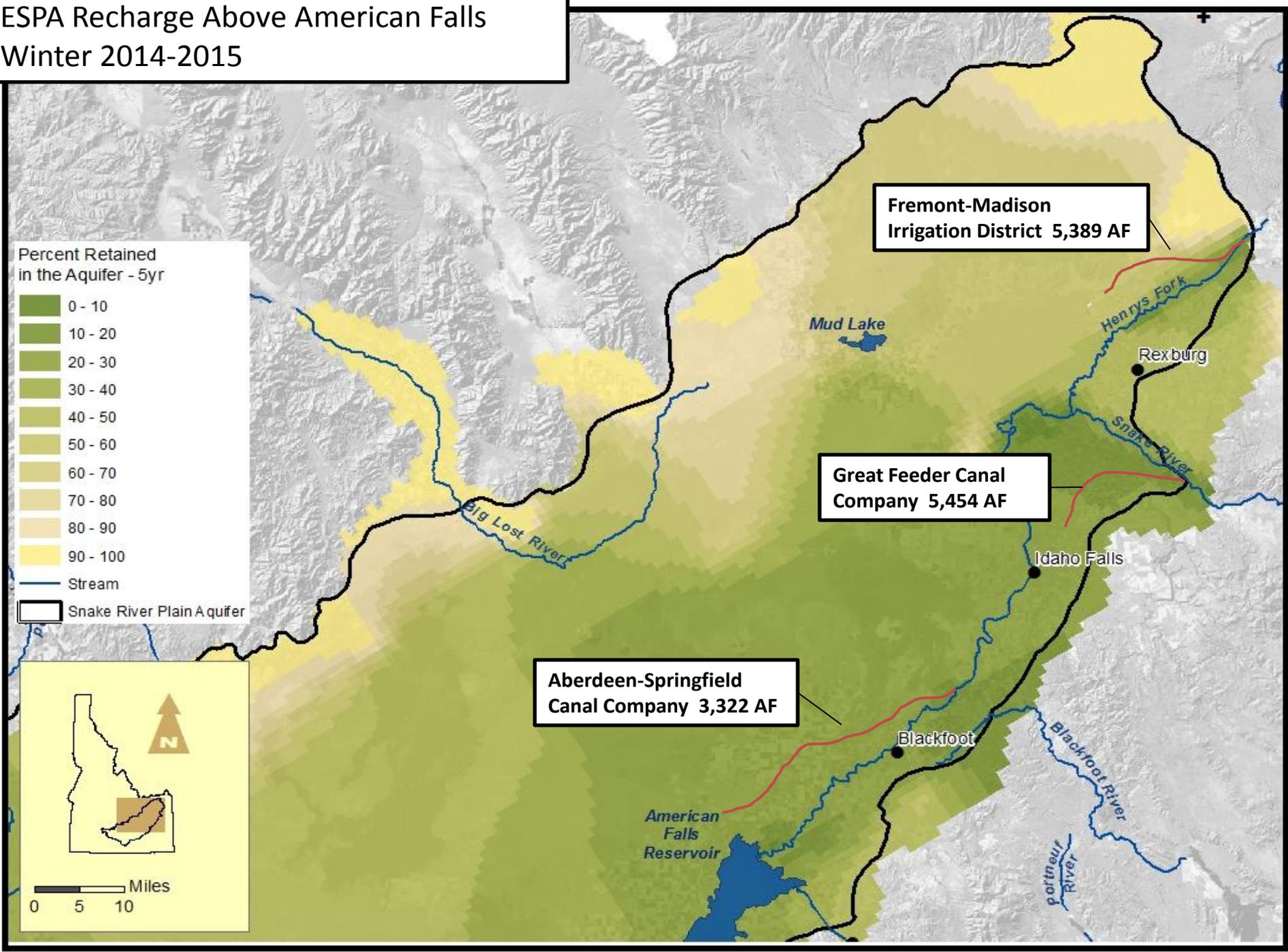
Twin Falls Canal Company
12,653 AF

SWID/West Cassia Pipeline
1,928 AF

Minidoka Dam



ESPA Recharge Above American Falls Winter 2014-2015



ESPA Recharge – Monitoring Program

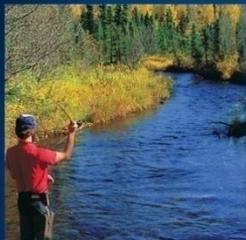
• QA/QC Program

- Recharge Flow Measurements
 - Cooperative Effort with:
 - Water District 01
 - Canal Companies
 - Idaho Power
 - IDWR Staff

• Water Level Monitoring

• Dye Testing

• Water Quality Monitoring

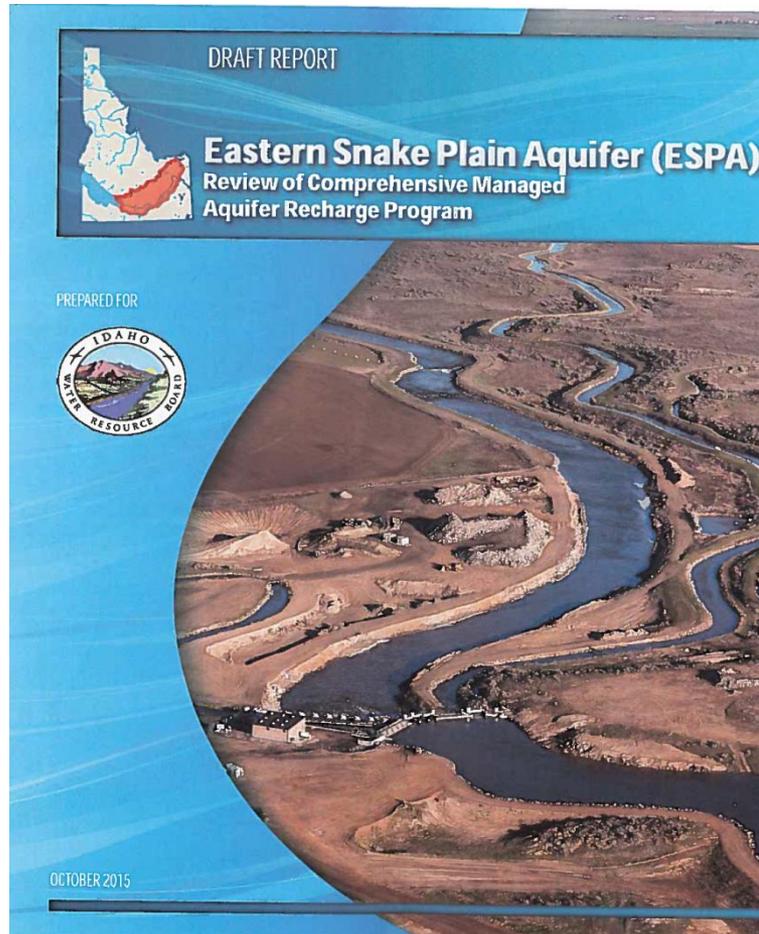


IDWR and NSCC staff measuring flows at the inlet to Wilson Lake on March 11th

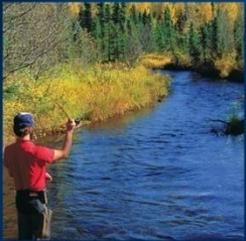


LSRARD and Idaho Power assisting IDWR staff with borehole camera Milner Reservoir test well.

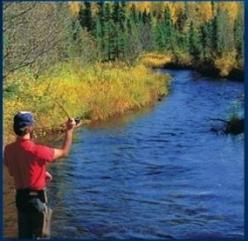
3rd Party Assessment



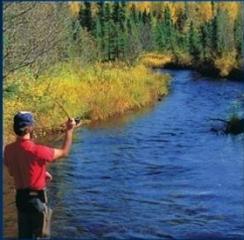
Key Finding by
CH2M-Hill:
“We believe
the state is on
the right path”



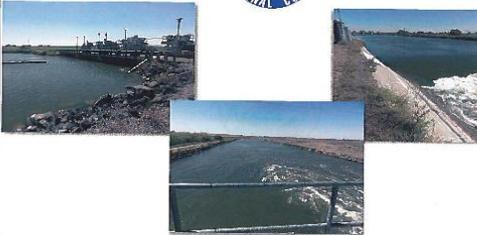
Working with Canal Company Partners to Improve Systems for Recharge



Working with Canal Company Partners to Improve Systems for Recharge



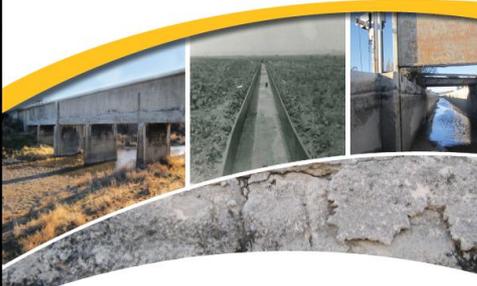
ASSESSMENT OF NEEDS AND COSTS
for
CONDUCTING AQUIFER RECHARGE DURING THE
OFF IRRIGATION SEASON
TWIN FALLS CANAL COMPANY



PREPARED BY
JUB
J-U-B ENGINEERS, INC.
December 2014
Project No. 60-14-1157

PREPARED FOR
AMERICAN FALLS RECHARGE
DISTRICT NO. 2

Concrete Evaluation of
the AFRD#2 Flume for
Winter Operations
JANUARY 2015



REPORT



DRAFT REPORT

North Side Canal Winter Recharge
Feasibility Assessment

Prepared for
North Side Canal Company, Ltd.

June 2015



ch2m
322 E Front Street
Suite 200
Boise, ID 83702

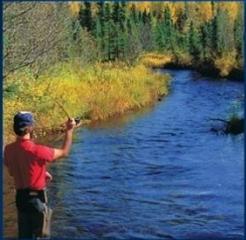
Budgeting & Projections

- IWRB adopted a Fiscal-Year 2016 Budget for aquifer stabilization (in round numbers):

- ✓ \$1 million for ESPA recharge operations
- ✓ \$7 million for ESPA recharge infrastructure development
- ✓ \$1 million for work in other priority aquifers

- Annual recharge projections

- ✓ Available water vs. available capacity
 - Through winter and spring
 - In different parts of the basin
- ✓ Estimate 80,000 AF for this recharge season (2015-2016)



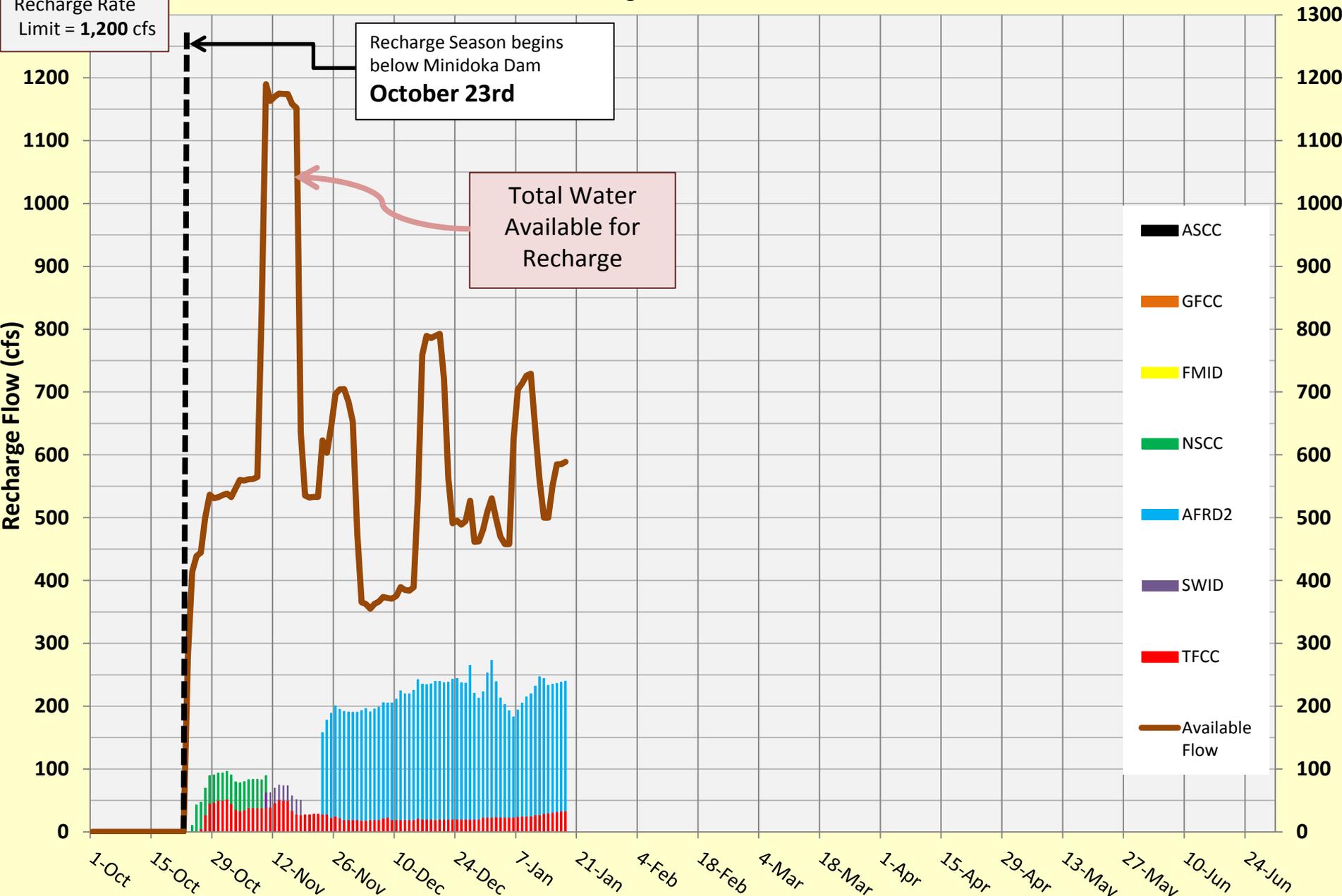
Total IWRB Managed Recharge Rates During 2015 - 2016 Season

Total Volume of Recharge = **28,699** af as of January 18, 2016

Recharge Rate
Limit = **1,200** cfs

Recharge Season begins
below Minidoka Dam
October 23rd

Total Water
Available for
Recharge



Preliminary Data

Dates of Recharge

IWRB ESPA Managed Recharge Summary

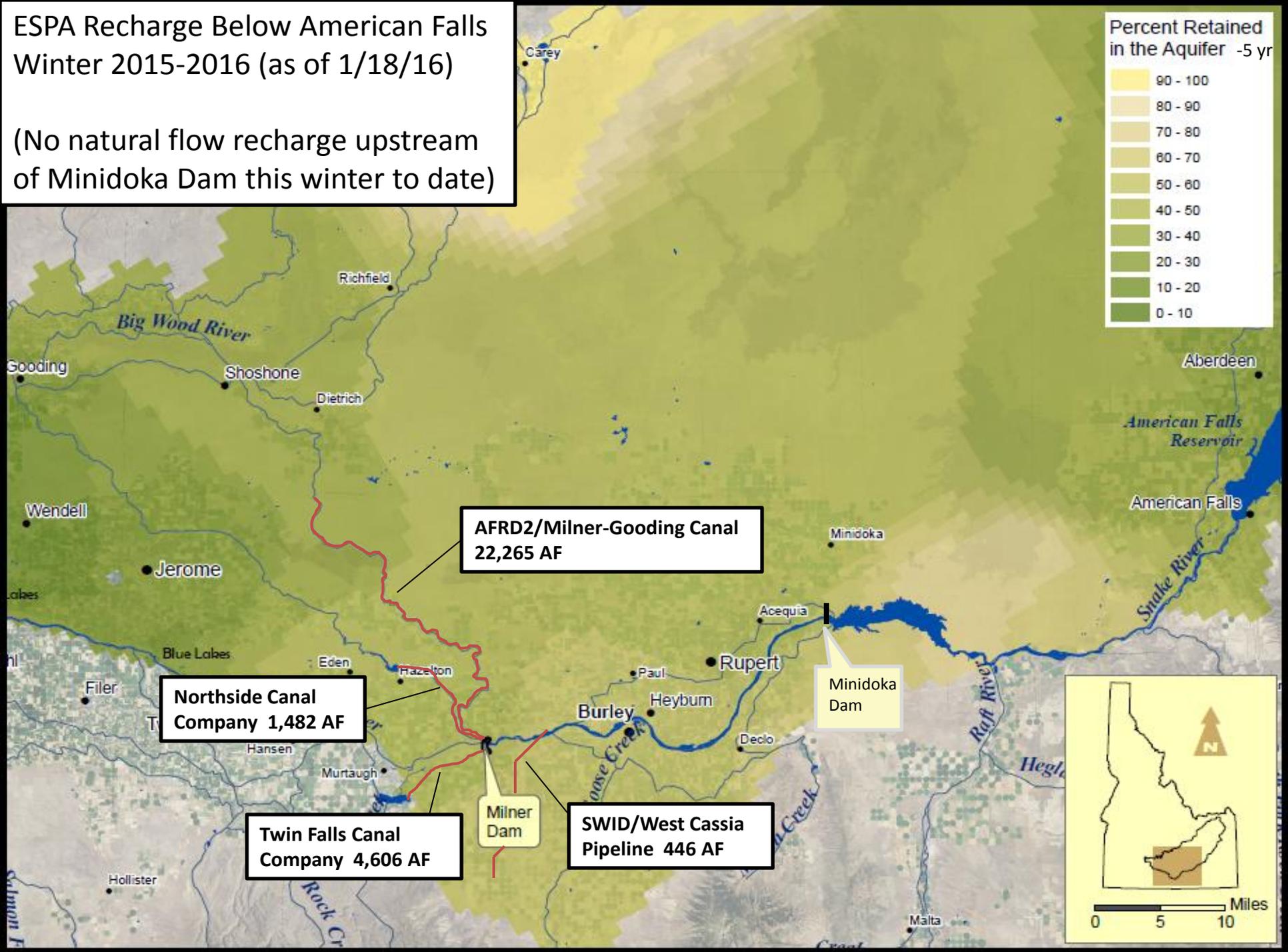
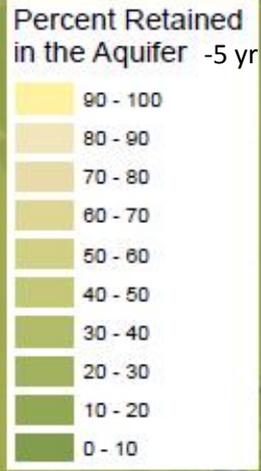
Oct. 23rd, 2015 – Jan. 18th, 2016

ESPA Area	Canal System	5-Year Retention Time (%)	Mean Recharge Rate (cfs)	Days Recharged	Volume Recharged (Acre-feet)
Lower Valley	American Falls Reservoir District No. 2 (Milner-Gooding Canal)	~36	196	57	22,163
	North Side Canal Company	~37	42	18	1,482
	Southwest Irrigation District	~54	25	9	446
	Twin Falls Canal Company	~45	27	85	4,602
TOTAL					28,693

*Preliminary Data

ESPA Recharge Below American Falls Winter 2015-2016 (as of 1/18/16)

(No natural flow recharge upstream
of Minidoka Dam this winter to date)



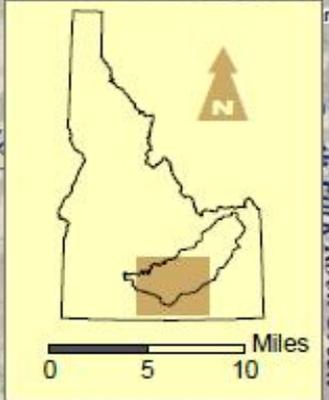
AFRD2/Milner-Gooding Canal
22,265 AF

Northside Canal Company
1,482 AF

Twin Falls Canal Company
4,606 AF

SWID/West Cassia Pipeline
446 AF

Minidoka Dam



Recharge Operations 2015-2016

Milner-Gooding Canal



Turn-out to MP31
recharge site
(Nov. 30, 2015)

New Mile28 Hydro Plant bypass
upstream side (above) and
downstream side (below)
(Nov. 30, 2015)



Frozen-over canal with water running
under ice (Dec. 29, 2015)



Recharge Operations 2015-2016

Twin Falls Canal



Measuring recharge flow in the Twin Falls Canal – Nov. 13, 2015



Recharge flow in the Twin Falls Canal – Nov. 30, 2015



Recharge water in Murtaugh Lake & de-icing system at gates Nov. 30, 2015

Recharge Operations 2015-2016

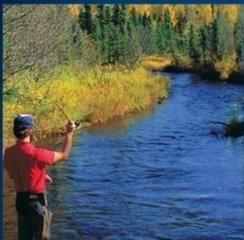
Northside Canal



Recharge flow in the Northside Canal – Nov. 4, 2015



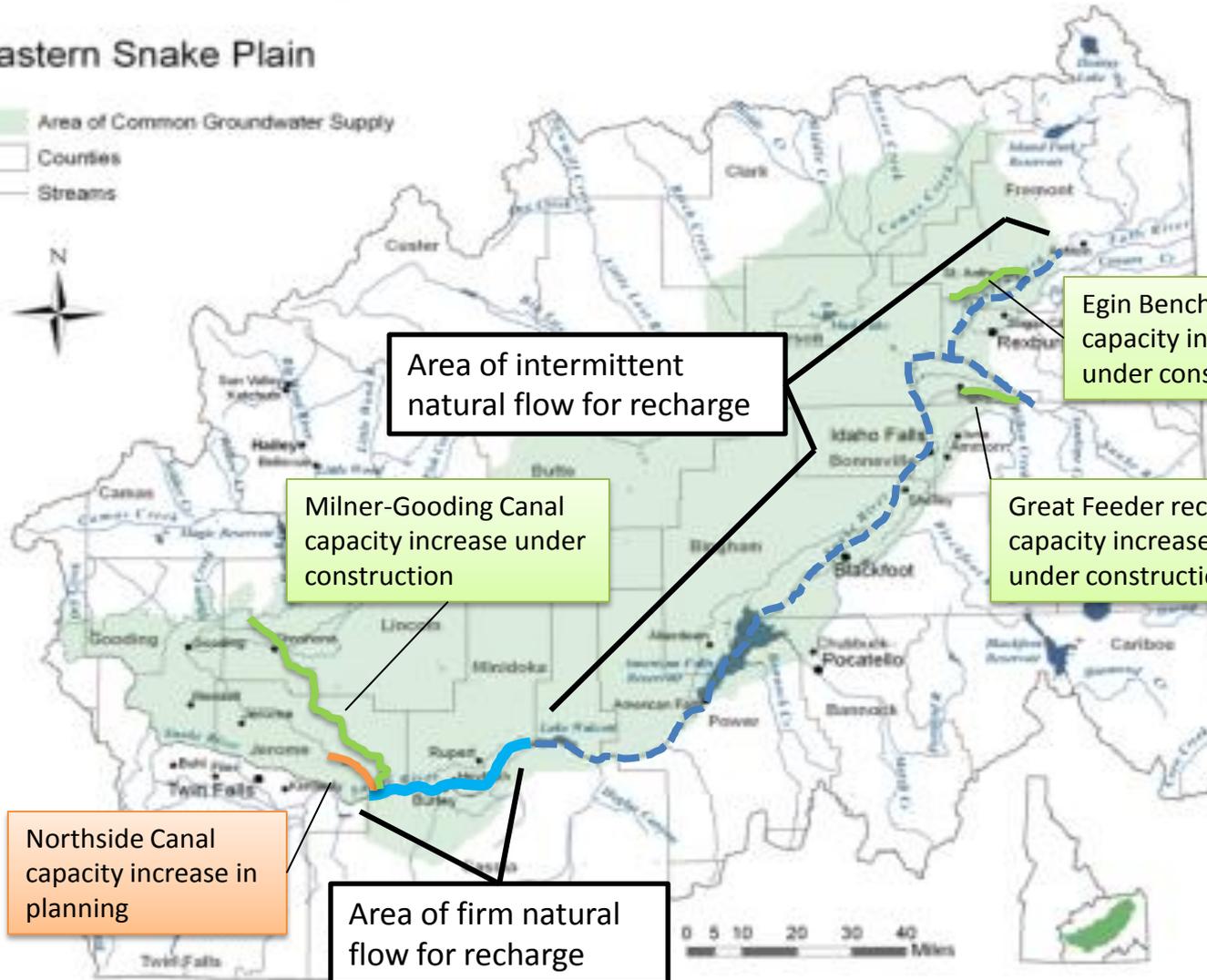
Recharge water in Wilson Lake
Nov. 4, 2015



Recharge Capacity Improvements

Eastern Snake Plain

- Area of Common Groundwater Supply
- Countries
- Streams



Area of intermittent natural flow for recharge

Milner-Gooding Canal capacity increase under construction

Northside Canal capacity increase in planning

Area of firm natural flow for recharge

Egin Bench recharge capacity increase under construction

Great Feeder recharge capacity increase under construction

Building to Increase Recharge Capacity

Milner-Gooding Canal – rehabilitating concrete channel near Shoshone so winter flows can be delivered to Shoshone Recharge Site



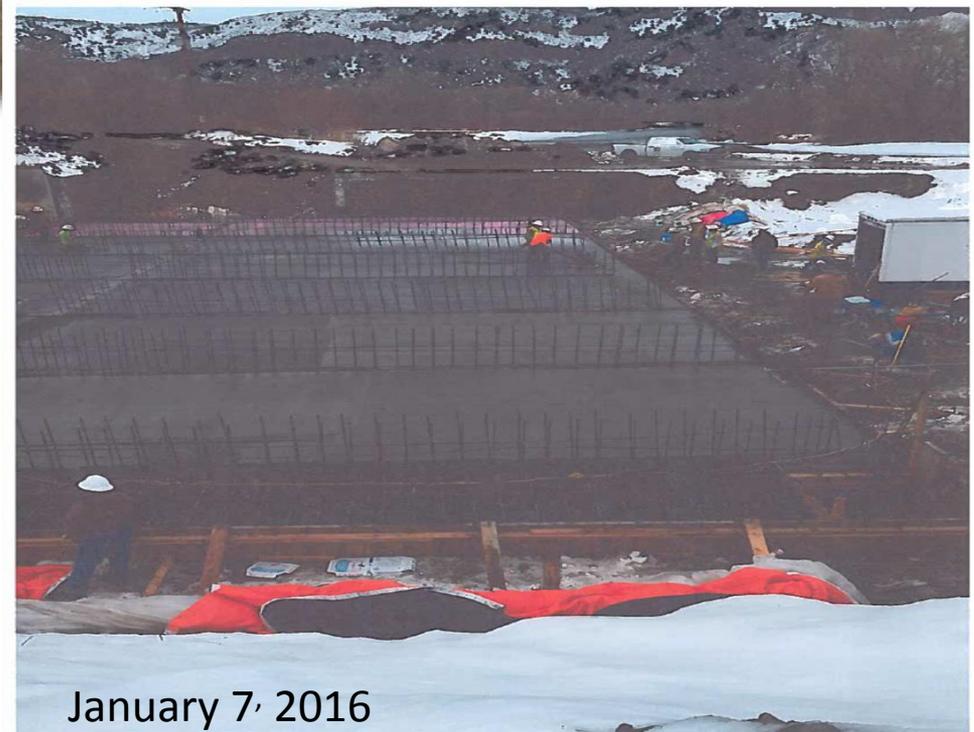
Milner-Gooding Canal – Mile 28 Hydro Plant recharge water bypass under construction

Building to Increase Recharge Capacity



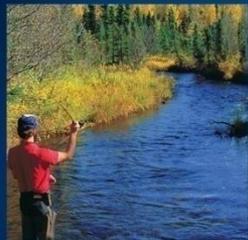
November 24, 2015

New canal under construction to the Egin Bench Recharge Site



January 7, 2016

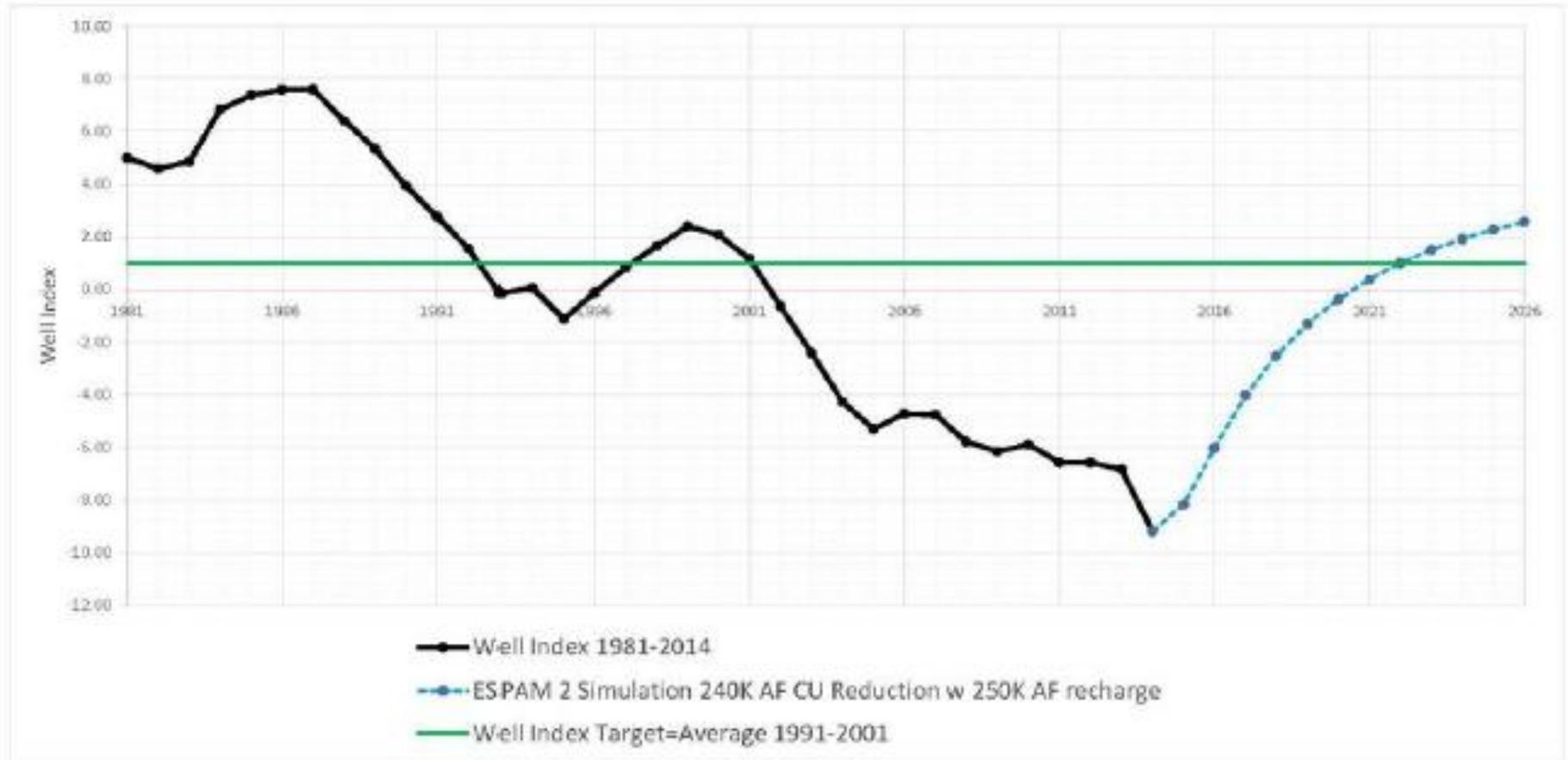
Recharge capacity increase at the Great Feeder Canal



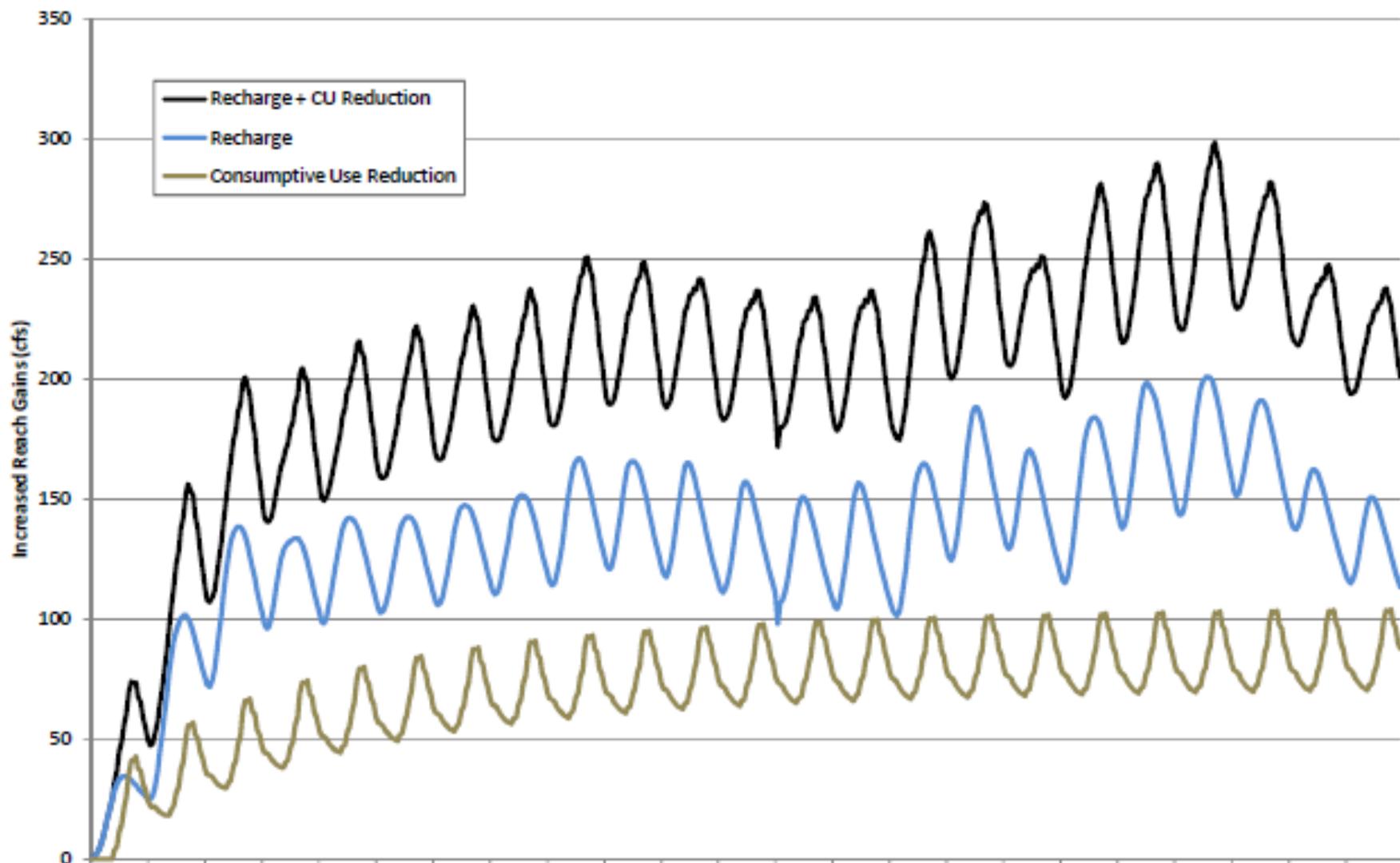
ESPA Recharge for Aquifer Stabilization and Recovery – Costs & Timeline

- 200,000 AF/year average in 2019 (+/-)
- 250,000 AF/year average full build-out in 2025 (+/-)
- \$40M capital cost
- \$3M/year ongoing, for operations, maintenance, and replacements
- Schedule contingent on adequate resources
- **Discussions underway about accelerating timeline**

Figure 1: IGWA-SWC Well Index with ESPAM2 Simulated Benefit from 240K AF of Consumptive Use Reduction & 250K AF Recharge



Increased Reach Gains: Swan Falls Minimum Flow



We need your help & support to get this done!



Measuring recharge
flow in Milner-
Gooding Canal
January 16, 2015

