WORK SESSION IN PREPARATION FOR IWRB MEETING NO. 8-15

November 16, 2015 at 1:30 pm
Idaho Water Center
Conference Rooms 602 B,C,D
322 East Front Street, Boise, Idaho 83720

WORK SESSION AGENDA

1. USGS Drought Study Status – *Presentation by Dr. Kyle Blasch , Director USGS Idaho Water Science Center*

2. Review of ESPA Comprehensive Managed Recharge Program - *Presentation by CH2M*

3. Water Supply Bank Update

4. Sustainability Policy

5. Proposal for Swan Falls Forecasting Tool

Americans with Disabilities

The meeting will be held in facilities that meet the accessibility requirements of the Americans with Disabilities Act. If you require special accommodations to attend, participate in, or understand the meeting, please make advance arrangements by contacting Department staff by email Deborah.Gibson@idwr.idaho.gov or by phone at (208) 287-4800.

USGS
science for a changing world

Idaho Water Science Center
Drought Water Year 2015

Idaho Water Resource Board
November 16, 2015
Boise, ID

Dr. Kyle Blasch

U.S. Department of the Interior
U.S. Geological Survey

Outline

- USGS Idaho Water Science Center
- Conditions During 2015
- Low Flow Project

USGS

Attributes of USGS Science

- Impartial science agency
- Rigorous, consistent scientific methods
- All data and information are publically available
- **The USGS does NOT:**
  - Manage any public lands
  - Have any regulatory authority
  - Make policy recommendations

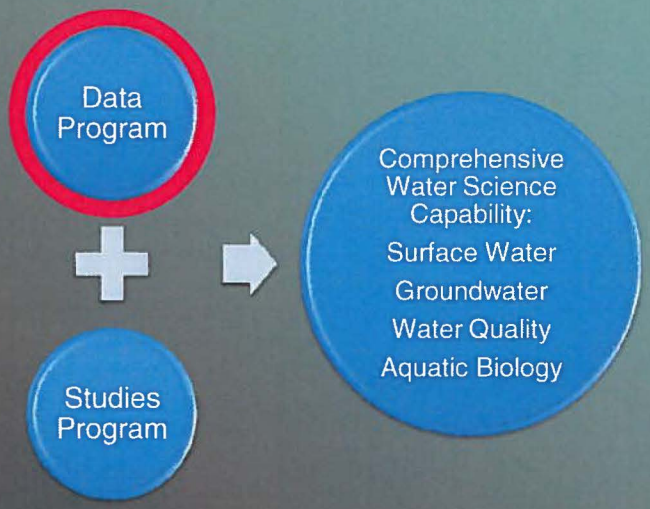
USGS

USGS Idaho Water Science Center (IDWSC)

- 4 Offices
  - Boise
  - Idaho National Laboratory
  - Idaho Falls
  - Post Falls
- 65 Staff

USGS

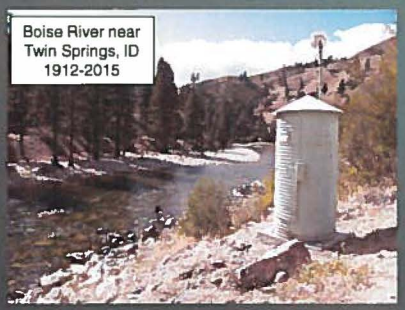
IDWSC: Two Primary Functions

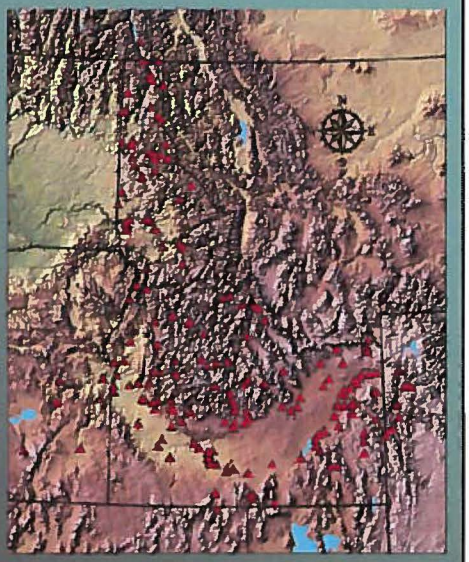


USGS

Statewide Streamgaging Network

- Currently 216 gages
- Network Cost - $3.8 million annually
- USGS contributes ~ $1.0 million annually



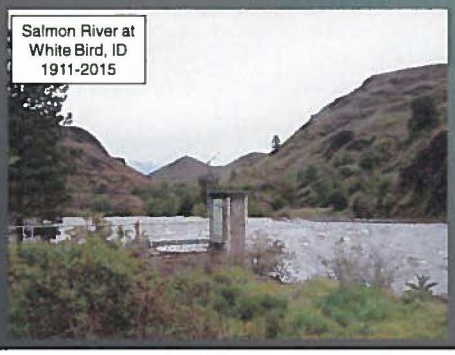


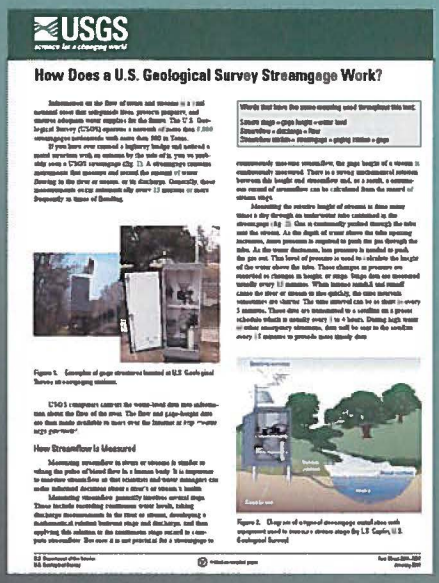
USGS

Statewide Streamgaging Network

Primary Cooperators:

- Idaho Department of Water Resources
- Numerous Water Districts throughout Idaho
- U.S. Bureau of Reclamation
- U.S. Army Corps of Engineers



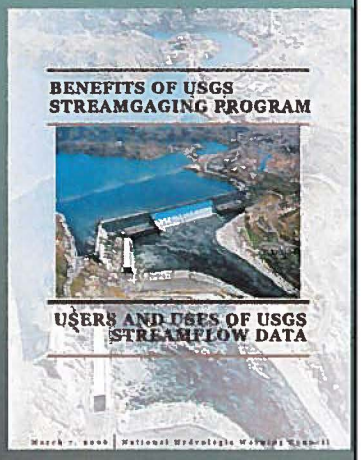


USGS

How Does a U.S. Geological Survey Streamgage Work?

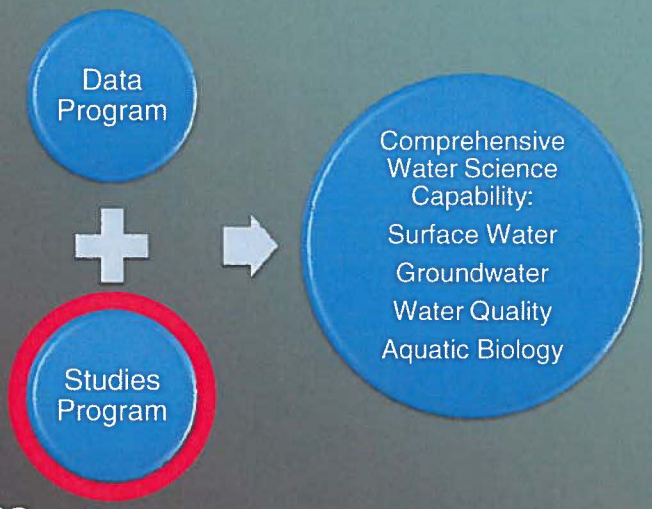
Uses of USGS Streamgage Data

- Managing water rights and water supplies
- Planning/design/operation of water-management systems
- Highway/bridge design
- Flood warnings
- Mapping floodplains
- Monitoring environmental conditions
- Protecting water quality
- Education and research
- Recreation planning



USGS

IDWSC: Two Primary Functions



USGS

Studies Program

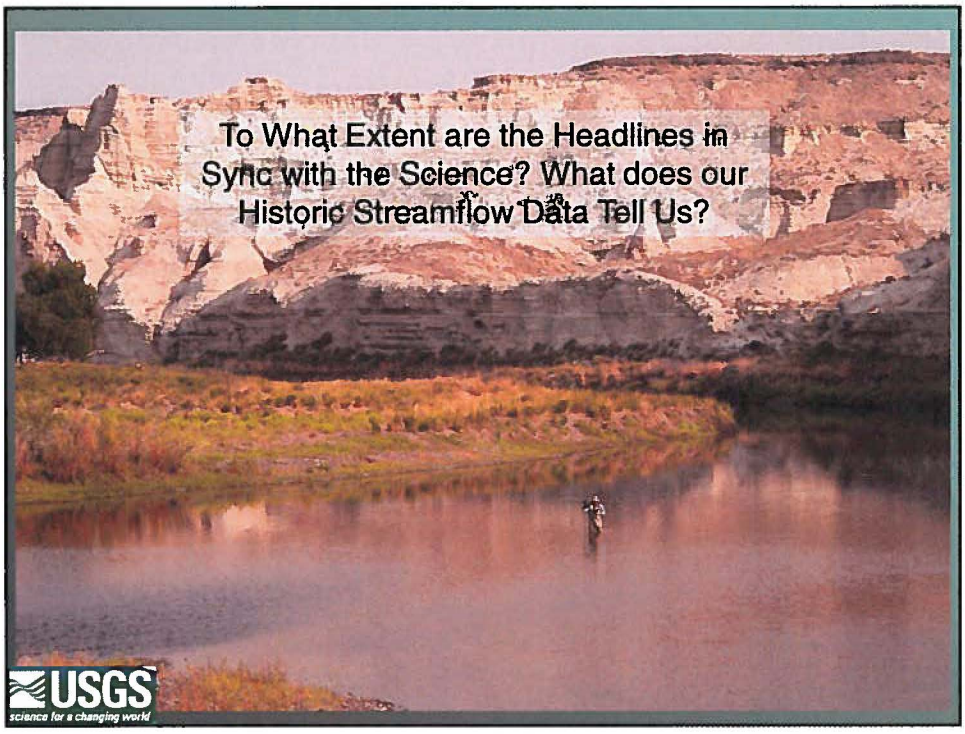
- Surface water, groundwater, and water quality
- Regional, statewide, and local issues
- Project duration is typically 1-3 years

USGS

Some of our current studies

- Characterization of streamflow and water quality in the Stibnite Mining District
- Couer d'Alene water quality evaluation
- Boise River TMDL's
- Gem County Ground Water Quality
- Hells Canyon Mercury study
- Idaho National Laboratory: Groundwater flow
- Owyhee streamflow and environmental DNA
- Wood River groundwater flow model

USGS

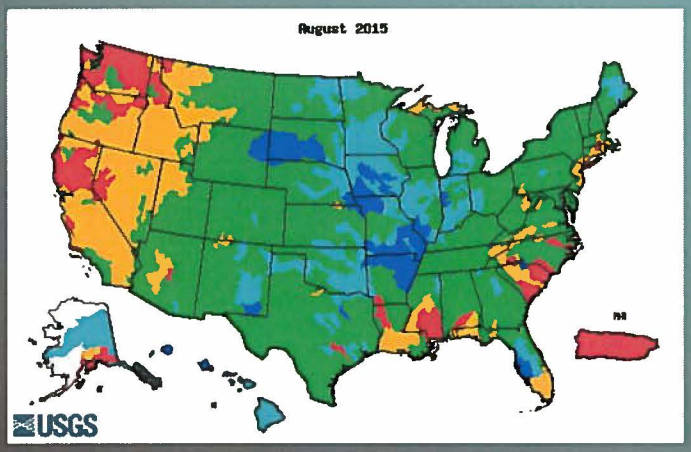


Drought Related Questions

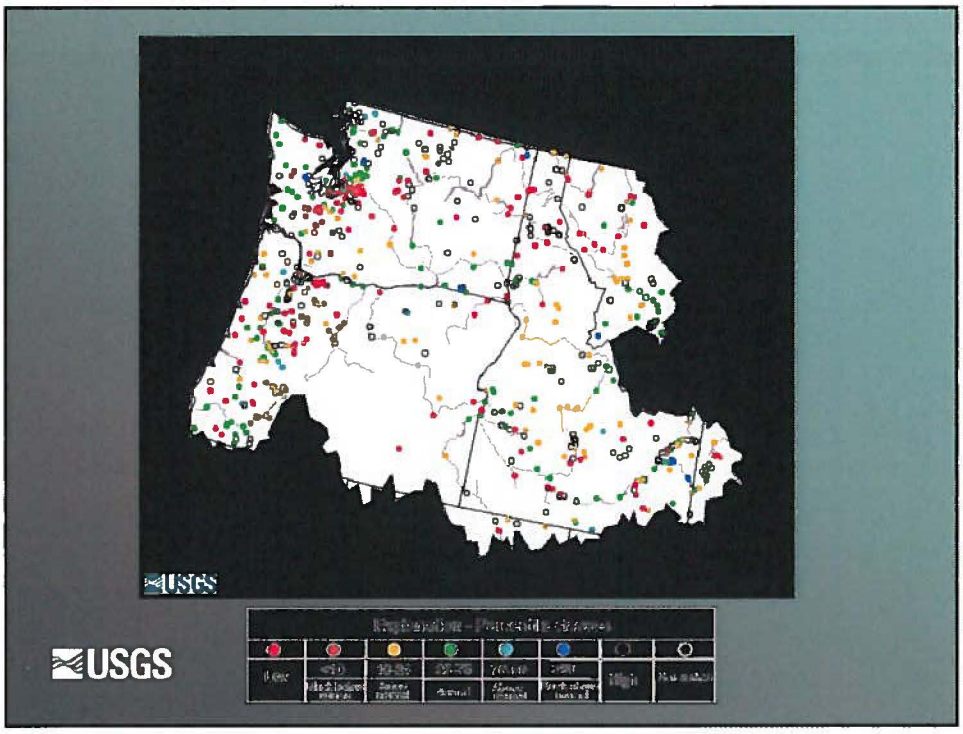
- Current streamflow runoff conditions in the northwest, and across the nation?
- How do the current conditions (2015) compare to historical observations?
- Do our historical streamflow records indicate trends toward less moisture, earlier spring snowmelt, and less baseflow in streams?

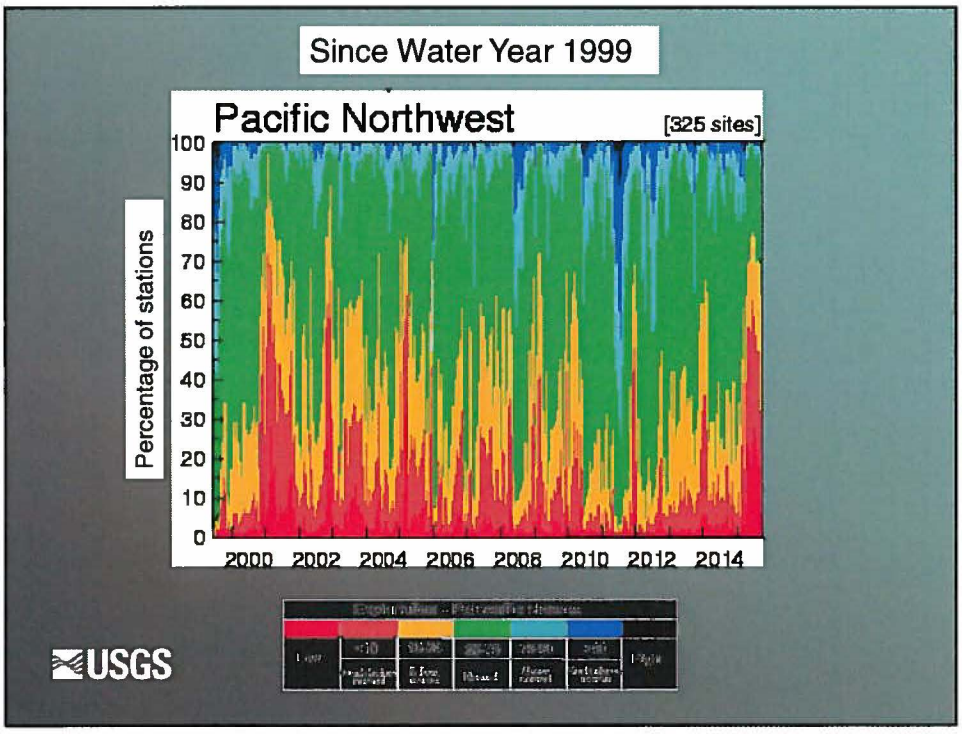
USGS

Streamflow Runoff, 2015

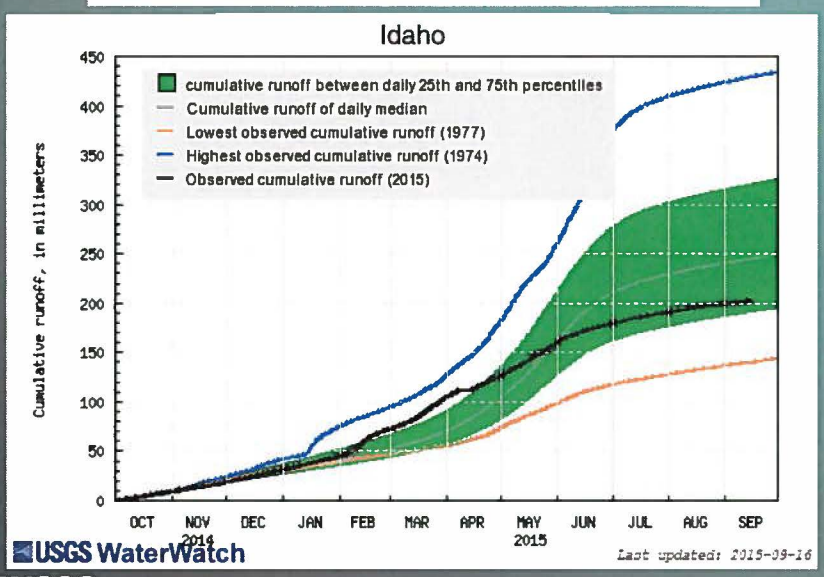


USGS


USGS
USGS

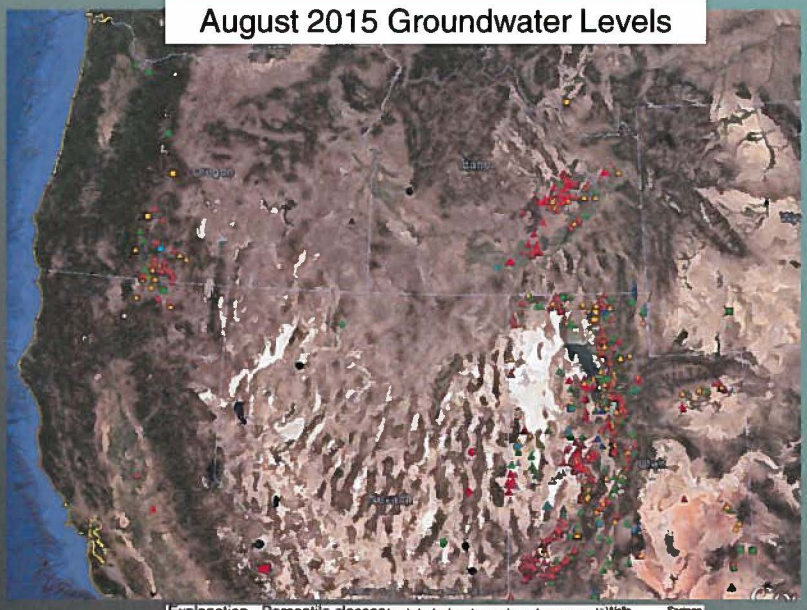

Since Water Year 1999
Pacific Northwest
[325 sites]
Percentage of stations
100
90
80
70
60
50
40
30
20
10
0
2000
2002
2004
2006
2008
2010
2012
2014
USGS

Cumulative Streamflow Runoff, WY 2015



USGS

August 2015 Groundwater Levels



USGS

Explanation - Percentile classes (symbol color based on most recent measurement)

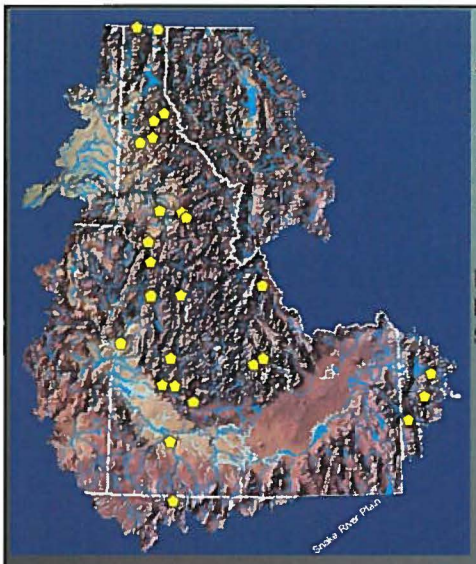
Low	<10 (Much Below Normal)	10-24 (Below Normal)	25-75 (Normal)	76-90 (Above Normal)	>90 (Much Above Normal)	High	Not Ranked

Wells: Real-Time, Continuous, Periodic Measurements

Springs

Statistical analyses of historical streamflow data for Idaho

USGS

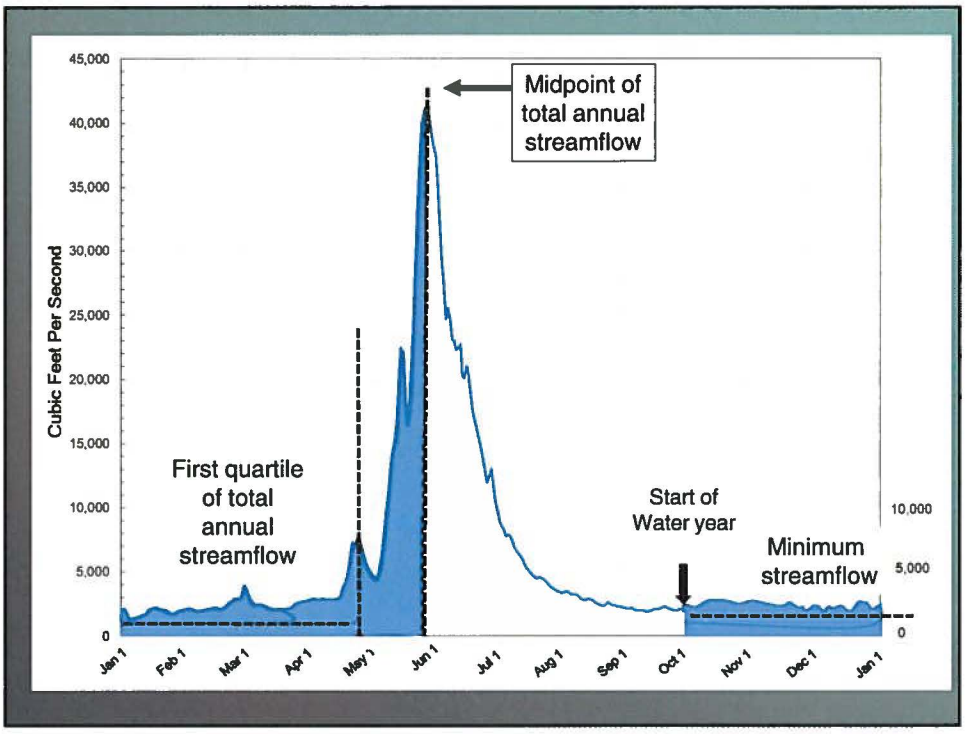


As of 2015

26 stations located on mostly unregulated streams with at least 48 years of continuous streamflow record

Period of record; 48 – 103 years
Basin size; 11 – 13,550 mi^2
Station elevation; 1,770 – 6,820 ft

USGS



Trend tested 26 stations individually for the period of record (POR) and collectively for the period 1967-2014 (48 years)

- Runoff parameters evaluated
  - Annual ***mean*** streamflow
  - Annual ***minimum*** daily streamflow
  - Date of the ***midpoint*** of annual total streamflow volume
  - Date of the ***first quartile*** of annual total streamflow volume discharge

USGS

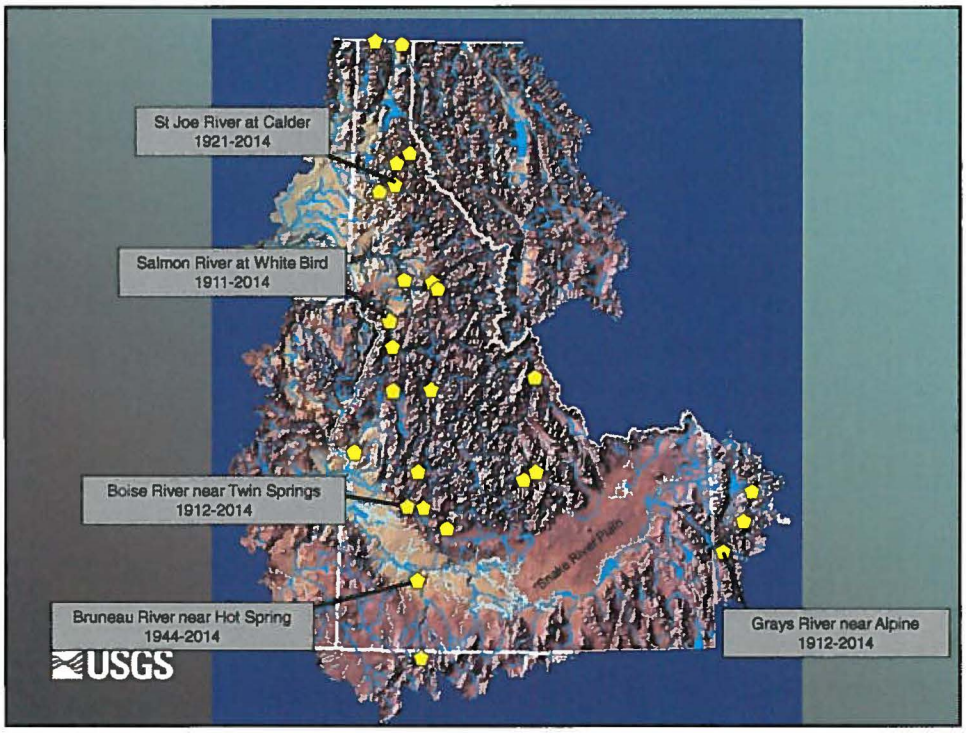
Regional Kendall Test

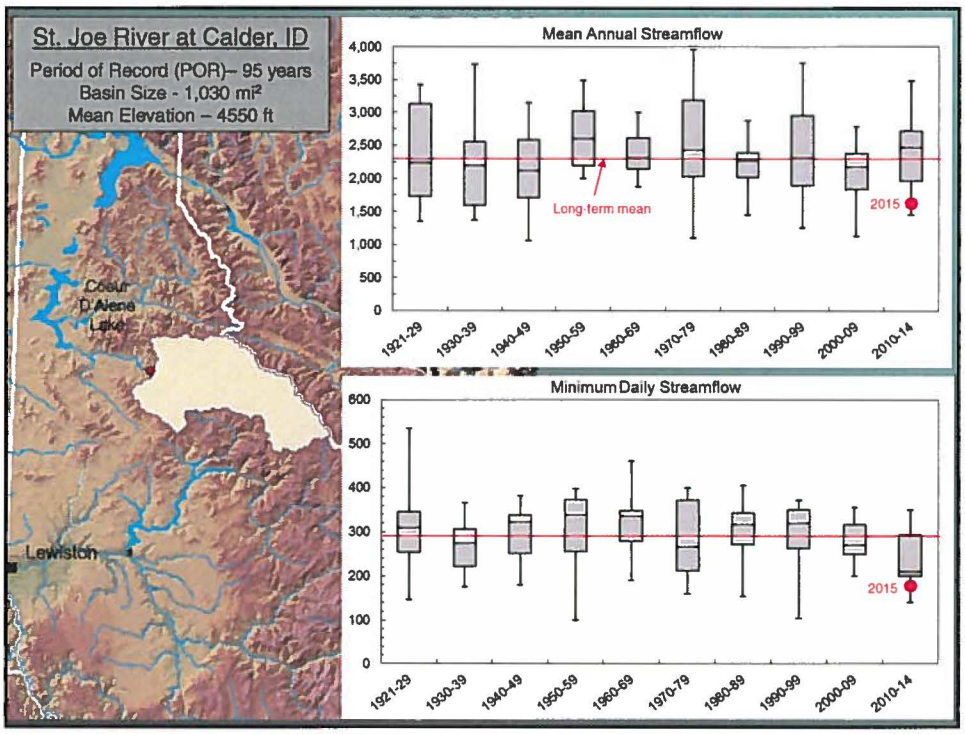
Median regional change based on 26 stations

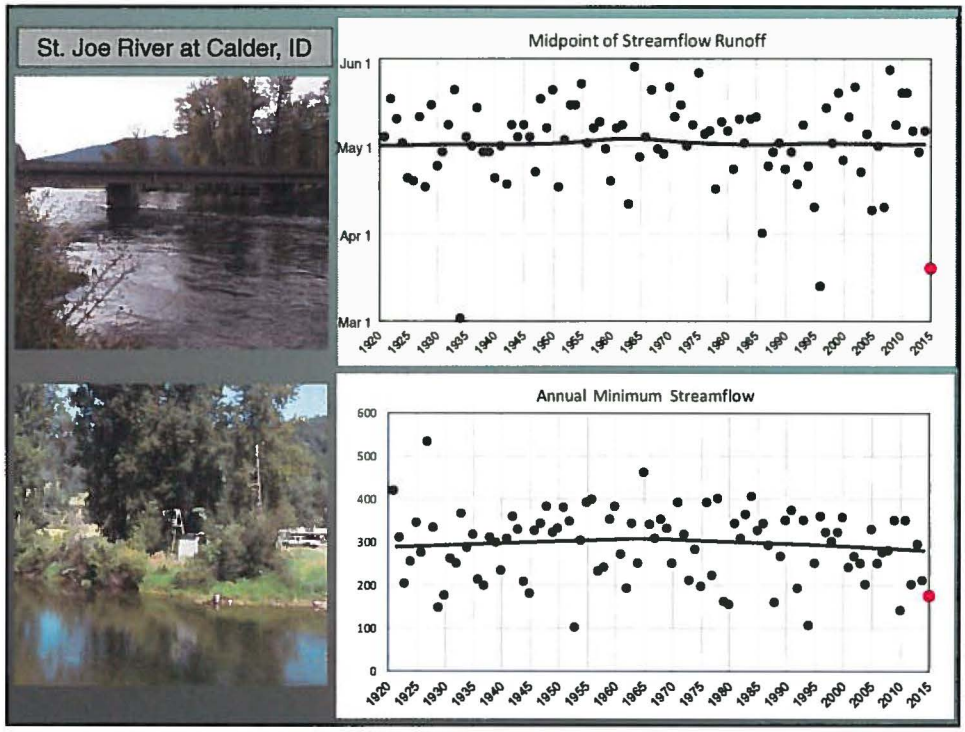
Trend tested at each location for 1967-2014 and combined to examine for a consistent trend across entire region.

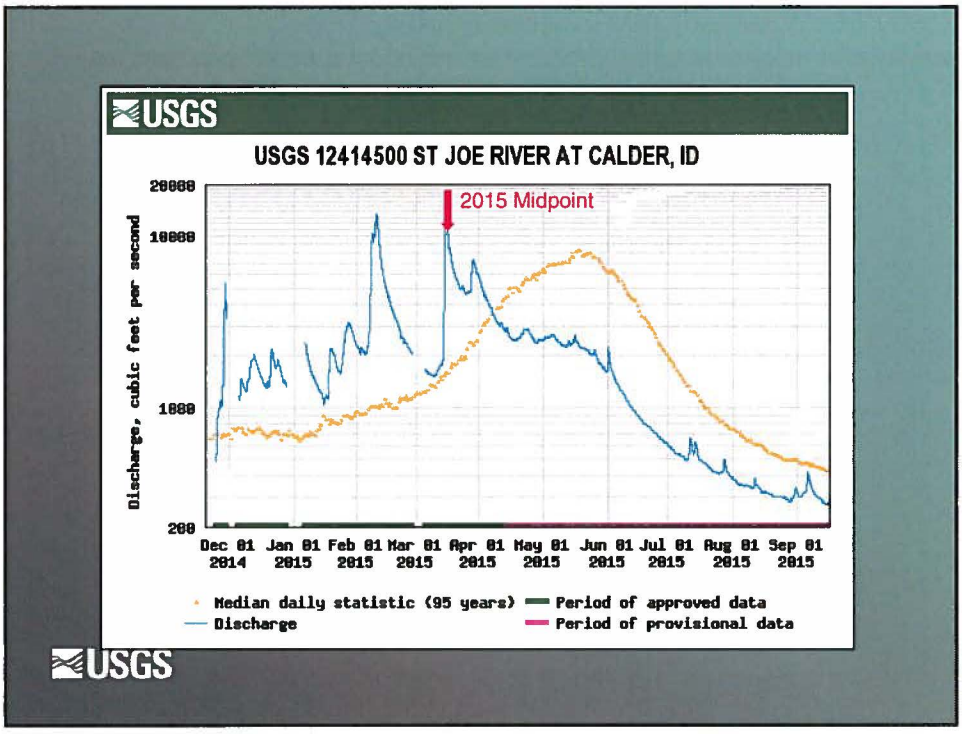
- Annual mean streamflow decreased by 12 percent ($p<0.001$).
- Annual minimum streamflow decreased by 16 percent ($p<0.001$).
- Date of the midpoint of annual total streamflow occurred 5.6 days earlier ($p<0.001$).
- Date of the first quartile of annual total streamflow occurred 3.6 days earlier ($p=0.06$).

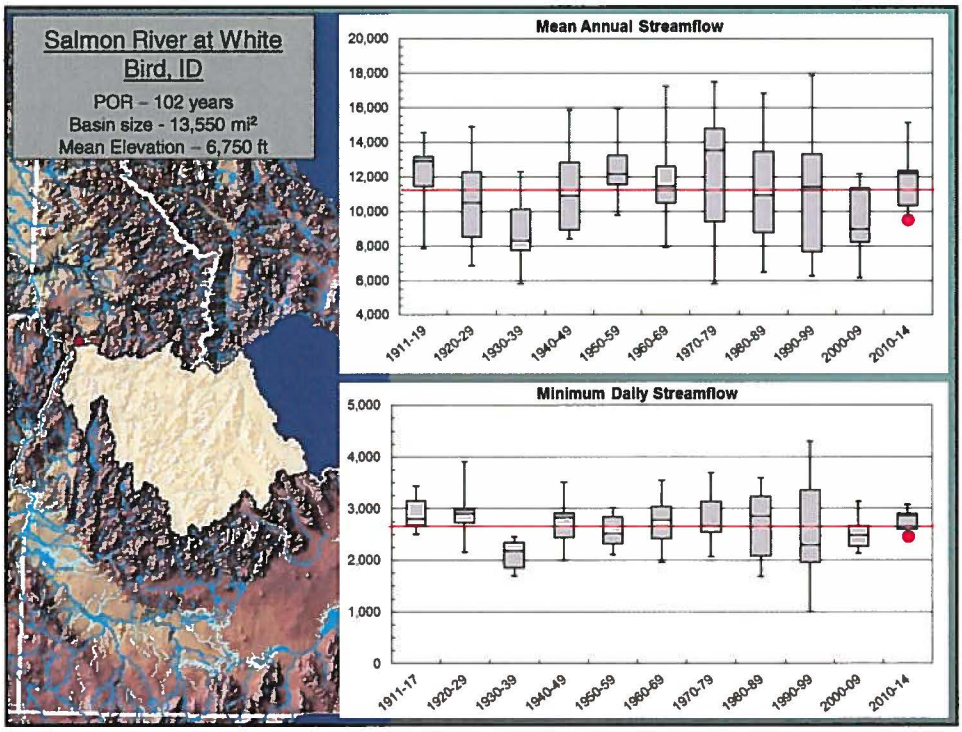
USGS



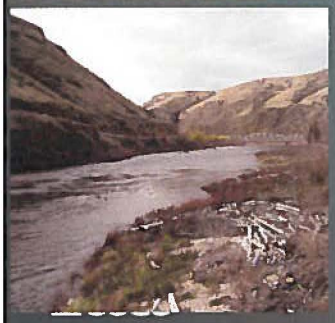

St. Joe River at Calder, ID
Period of Record (POR)– 95 years
Basin Size - 1,030 mi²
Mean Elevation – 4550 ft
Coeur D'Alene Lake
Lewiston
Mean Annual Streamflow
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Long-term mean
2015
1921-29
1930-39
1940-49
1950-59
1960-69
1970-79
1980-89
1990-99
2000-09
2010-14
Minimum Daily Streamflow
600
500
400
300
200
100
0
2015
1921-29
1930-39
1940-49
1950-59
1960-69
1970-79
1980-89
1990-99
2000-09
2010-14

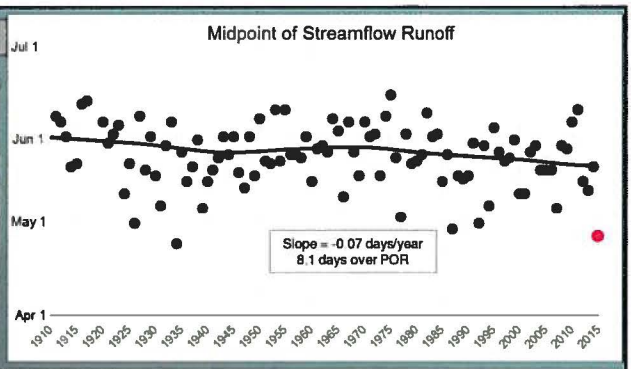

St. Joe River at Calder, ID
Midpoint of Streamflow Runoff
Jun 1
May 1
Apr 1
Mar 1
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
Annual Minimum Streamflow
600
500
400
300
200
100
0
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015

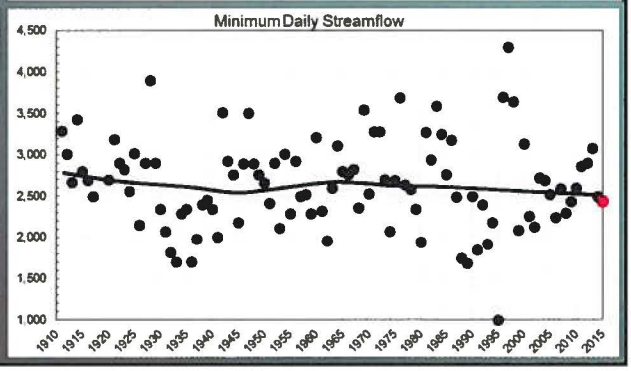

USGS
USGS 12414500 ST JOE RIVER AT CALDER, ID
2015 Midpoint
Discharge, cubic feet per second
20000
10000
1000
200
Dec 01 2014
Jan 01 2015
Feb 01 2015
Mar 01 2015
Apr 01 2015
May 01 2015
Jun 01 2015
Jul 01 2015
Aug 01 2015
Sep 01 2015
Median daily statistic (95 years)
Discharge
Period of approved data
Period of provisional data
USGS

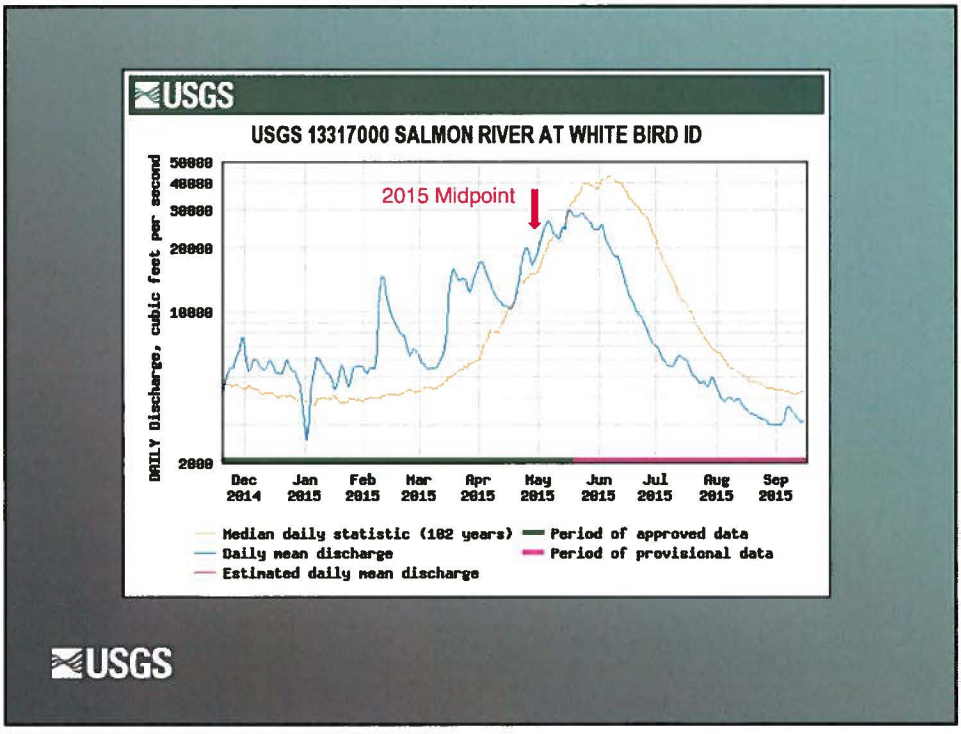

Salmon River at White Bird, ID
POR – 102 years
Basin size - 13,550 mi²
Mean Elevation – 6,750 ft
Mean Annual Streamflow
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
1911-19
1920-29
1930-39
1940-49
1950-59
1960-69
1970-79
1980-89
1990-99
2000-09
2010-14
Minimum Daily Streamflow
5,000
4,000
3,000
2,000
1,000
0
1911-17
1920-29
1930-39
1940-49
1950-59
1960-69
1970-79
1980-89
1990-99
2000-09
2010-14

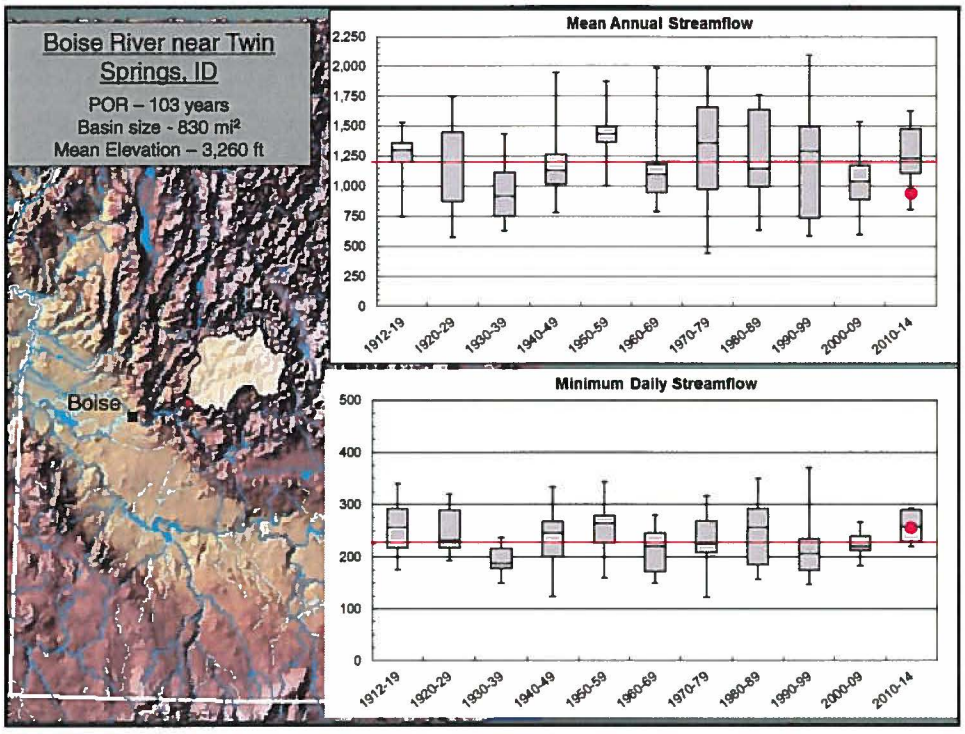
Salmon River at White Bird, ID

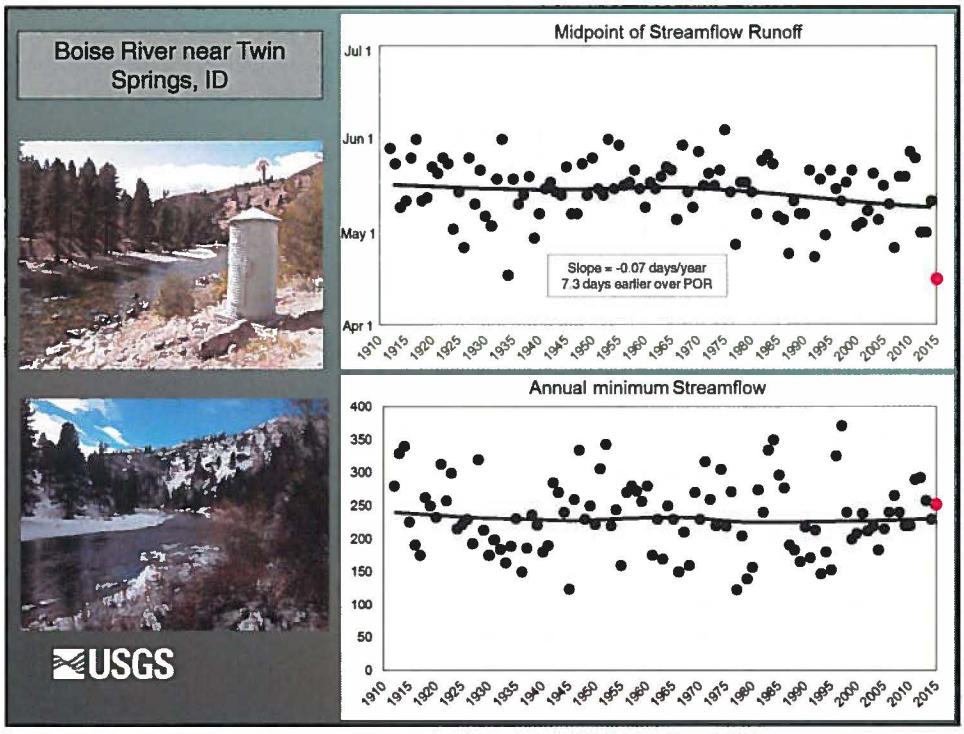


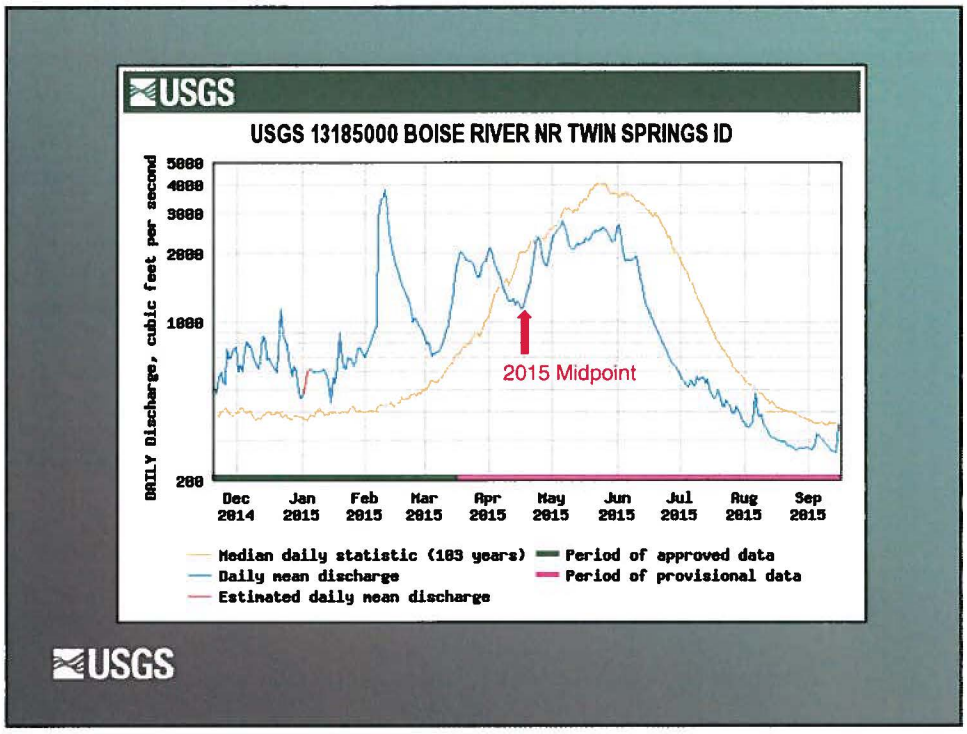


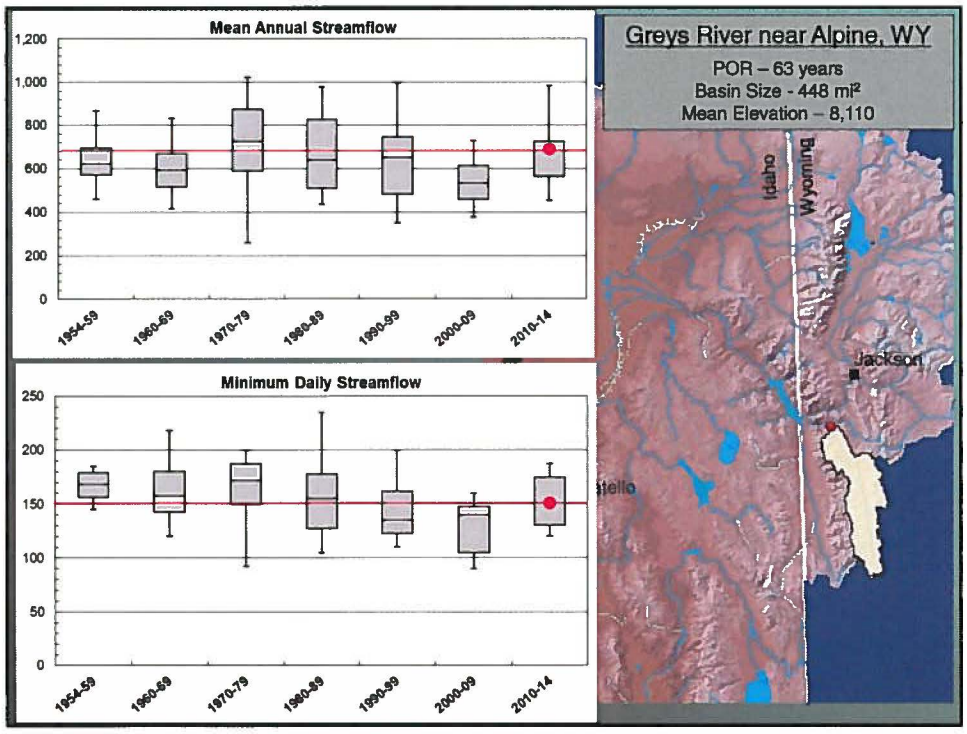


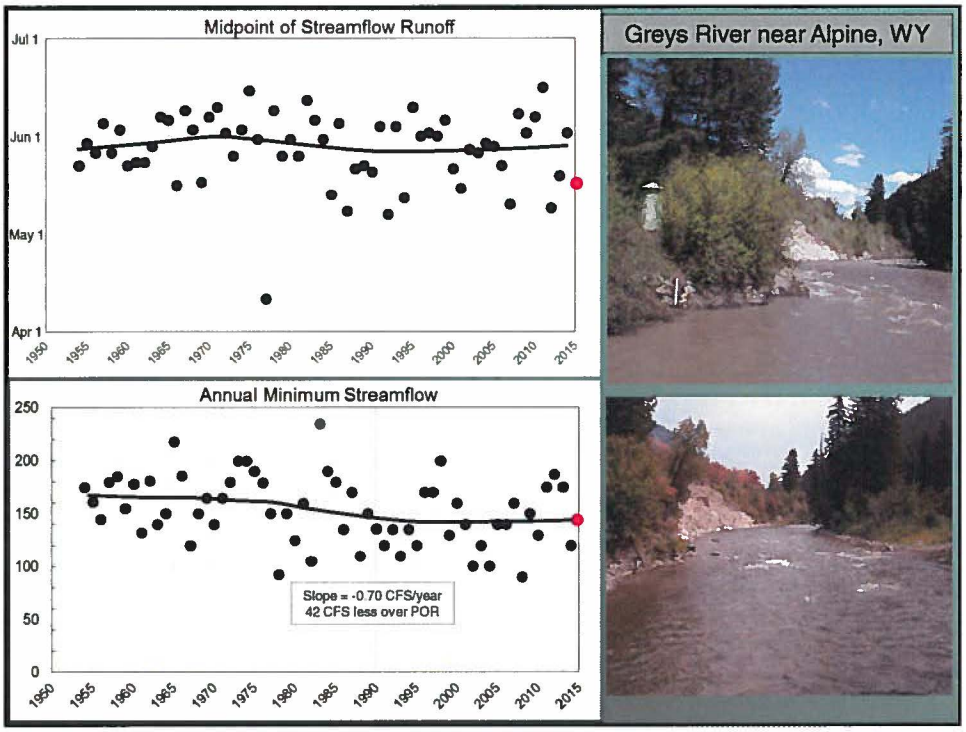


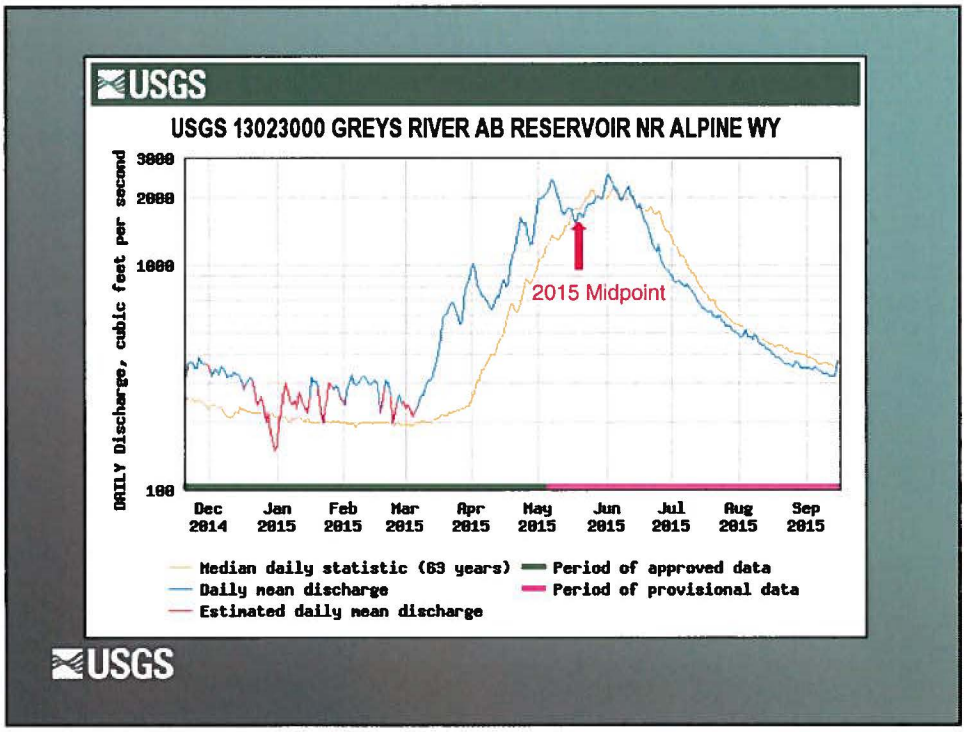

Boise River near Twin Springs, ID
POR – 103 years
Basin size - 830 mi²
Mean Elevation – 3,260 ft
Boise
Mean Annual Streamflow
2,250
2,000
1,750
1,500
1,250
1,000
750
500
250
0
1912-19
1920-29
1930-39
1940-49
1950-59
1960-69
1970-79
1980-89
1990-99
2000-09
2010-14
Minimum Daily Streamflow
500
400
300
200
100
0
1912-19
1920-29
1930-39
1940-49
1950-59
1960-69
1970-79
1980-89
1990-99
2000-09
2010-14

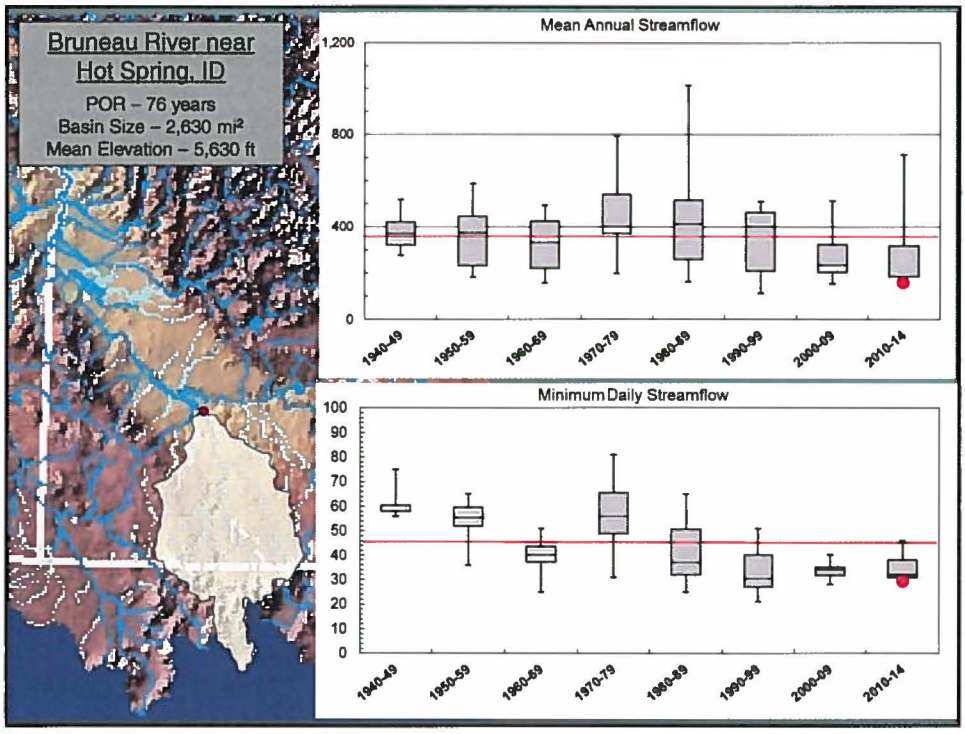

Boise River near Twin Springs, ID
USGS
Midpoint of Streamflow Runoff
Jul 1
Jun 1
May 1
Apr 1
Slope = -0.07 days/year
7.3 days earlier over POR
1910
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
Annual minimum Streamflow
400
350
300
250
200
150
100
50
0
1910
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015

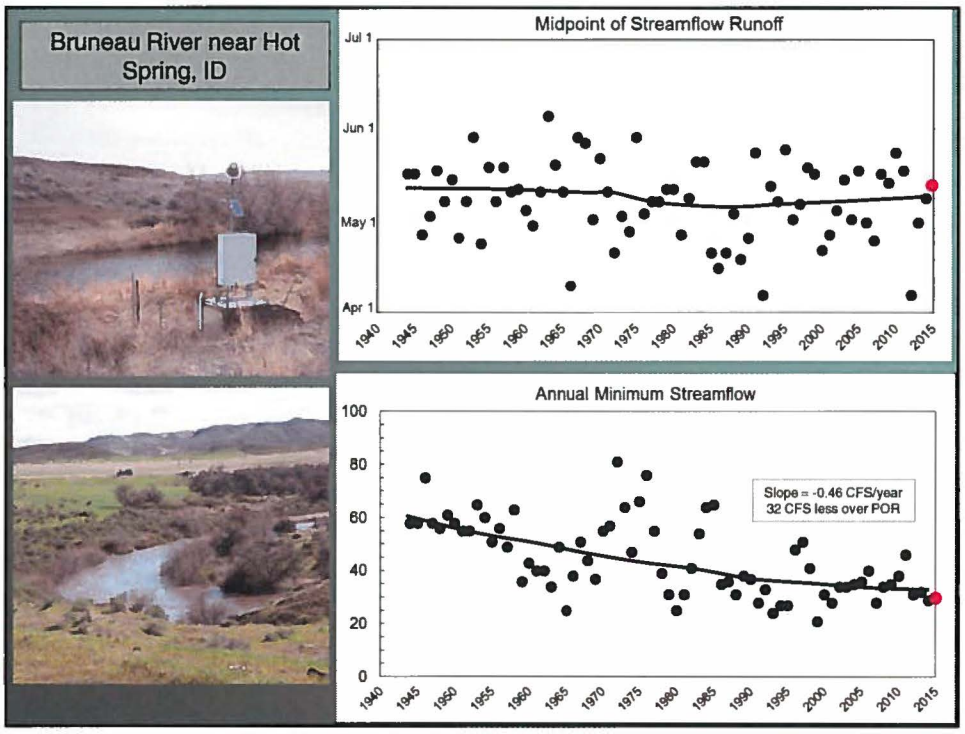

USGS
USGS 13185000 BOISE RIVER NR TWIN SPRINGS ID
DAILY Discharge, cubic feet per second
5000
4000
3000
2000
1000
200
2015 Midpoint
Dec 2014
Jan 2015
Feb 2015
Mar 2015
Apr 2015
May 2015
Jun 2015
Jul 2015
Aug 2015
Sep 2015
Median daily statistic (103 years)
Daily mean discharge
Estimated daily mean discharge
Period of approved data
Period of provisional data
USGS

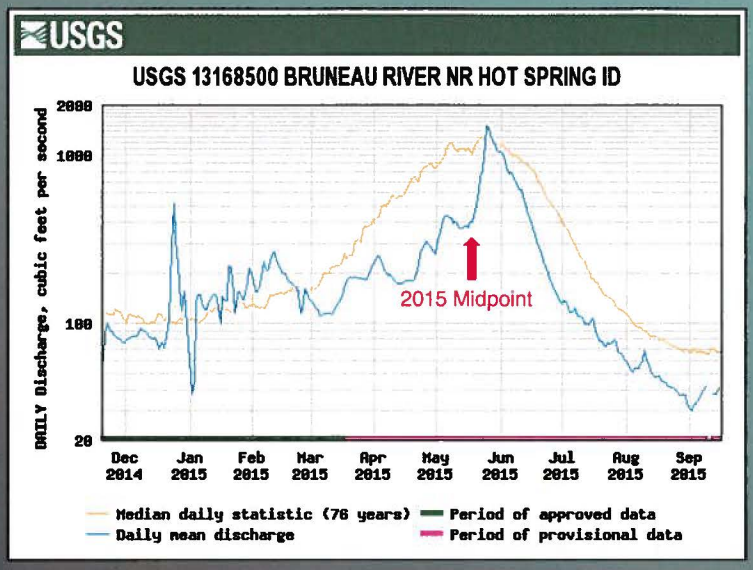

Mean Annual Streamflow
1,200
1,000
800
600
400
200
0
1954-59
1960-69
1970-79
1980-89
1990-99
2000-09
2010-14
Minimum Daily Streamflow
250
200
150
100
50
0
1954-59
1960-69
1970-79
1980-89
1990-99
2000-09
2010-14
Greys River near Alpine, WY
POR – 63 years
Basin Size - 448 mi²
Mean Elevation – 8,110
Idaho
Wyoming
Jackson


Midpoint of Streamflow Runoff
Jul 1
Jun 1
May 1
Apr 1
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
Annual Minimum Streamflow
250
200
150
100
50
0
Slope = -0.70 CFS/year
42 CFS less over POR
Greys River near Alpine, WY


USGS
USGS 13023000 GREYS RIVER AB RESERVOIR NR ALPINE WY
DAILY Discharge, cubic feet per second
3000
2000
1000
100
2015 Midpoint
Dec 2014
Jan 2015
Feb 2015
Mar 2015
Apr 2015
May 2015
Jun 2015
Jul 2015
Aug 2015
Sep 2015
Median daily statistic (63 years)
Daily mean discharge
Estimated daily mean discharge
Period of approved data
Period of provisional data
USGS


Bruneau River near Hot Spring, ID
POR – 76 years
Basin Size – 2,630 mi²
Mean Elevation – 5,630 ft
Mean Annual Streamflow
1,200
800
400
0
1940-49
1950-59
1960-69
1970-79
1980-89
1990-99
2000-09
2010-14
Minimum Daily Streamflow
100
90
80
70
60
50
40
30
20
10
0
1940-49
1950-59
1960-69
1970-79
1980-89
1990-99
2000-09
2010-14


Bruneau River near Hot Spring, ID
Midpoint of Streamflow Runoff
Jul 1
Jun 1
May 1
Apr 1
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015
Annual Minimum Streamflow
100
80
60
40
20
0
Slope = -0.46 CFS/year
32 CFS less over POR
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015



General Conclusions from Historical Evaluation

- As a group water years 2010-14 in Idaho were, in general, similar to long-term average conditions with respect to mean and minimum streamflows. However, during 2015, primarily in Central and Northern Idaho, snowmelt runoff occurred about 3-4 weeks earlier than normal.
- At a number of the stations evaluated, early onset of snowmelt runoff has resulted in "flashy" hydrographs during the winter and early spring, a decrease in the annual peak streamflow, and overall flattening of the streamflow hydrograph.
- Long-term trend estimates can change dramatically by including or excluding a few years at either end of the time series, particularly when computing trends over relatively short time periods.
- Records from long-term gaging stations on unregulated streams are a valuable tool for examining historical changes in streamflow patterns, basin runoff characteristics, and climatic changes. Unfortunately, lack of funding has resulted in the loss of many of these stations during the last 25 years.

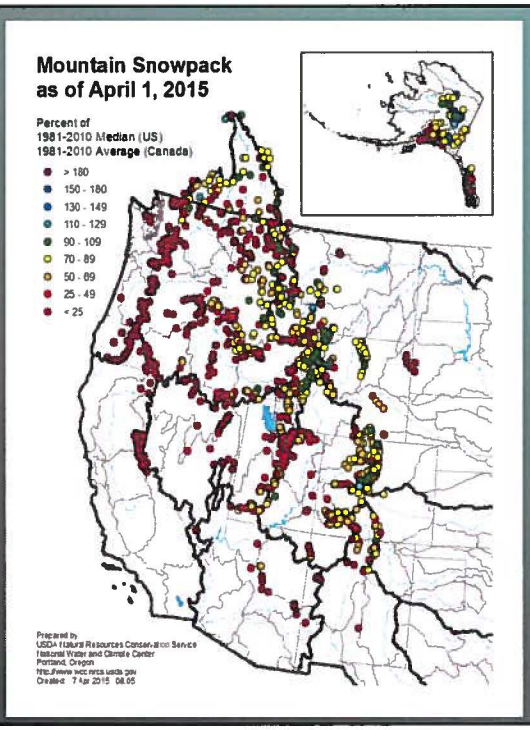
USGS

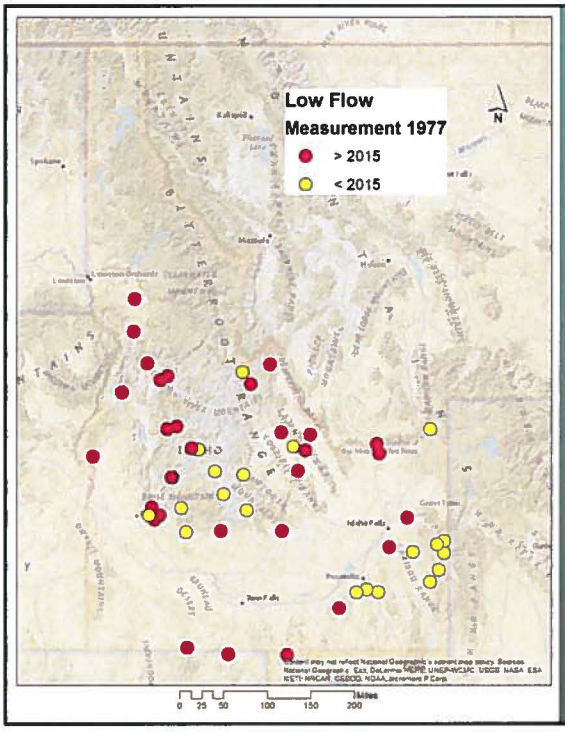
Low Flow Study – WY2015

- Collect streamflow and temperature measurements in low order streams throughout the west (ID, UT, NV, WA, OR, CA)
- 165 Sites in Idaho
- Sampled in August and September
- Conducted at sites with prior measurements (1977, 1987, 2001)
- Approximately 35 gages have additional measurements

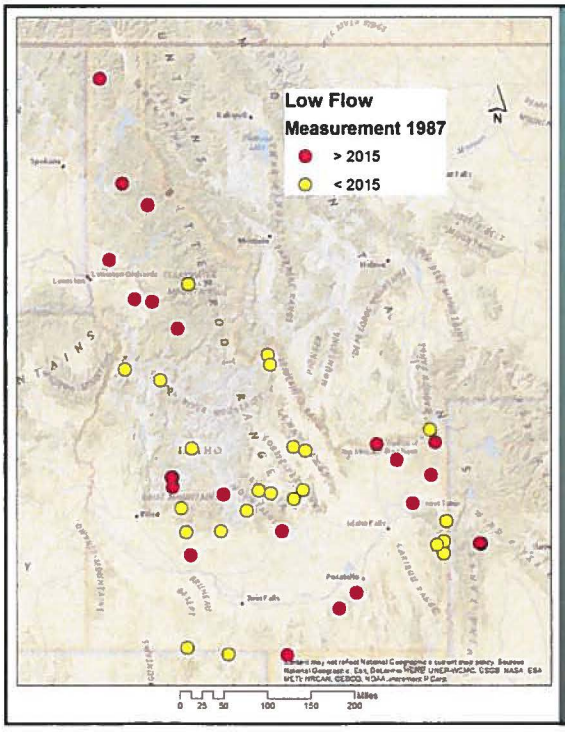
USGS

Snowpack 14/15

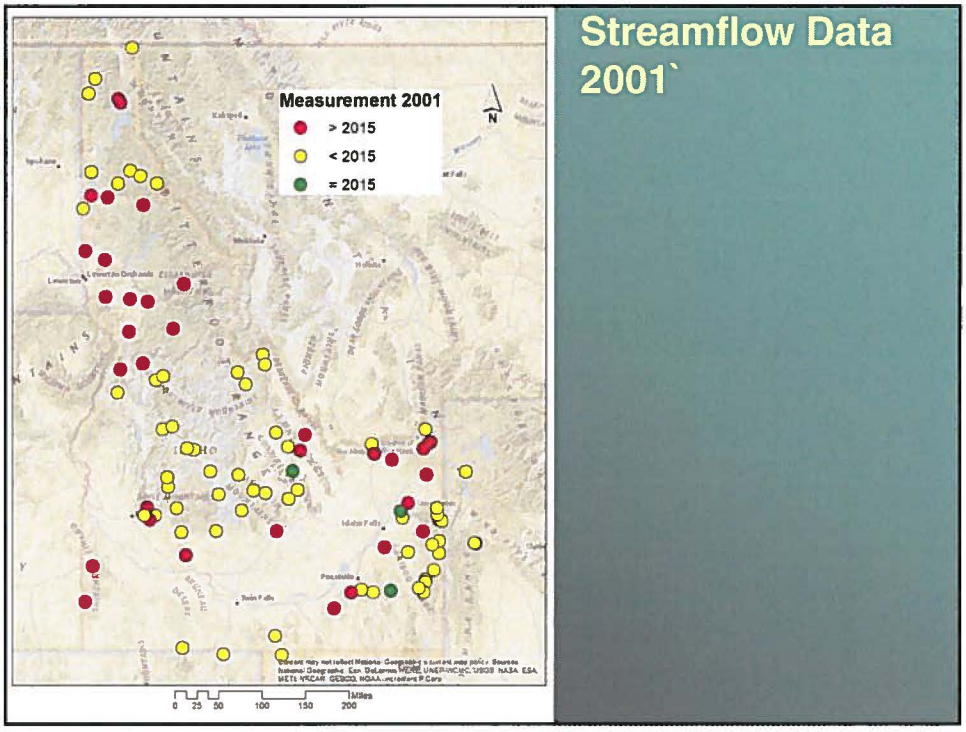




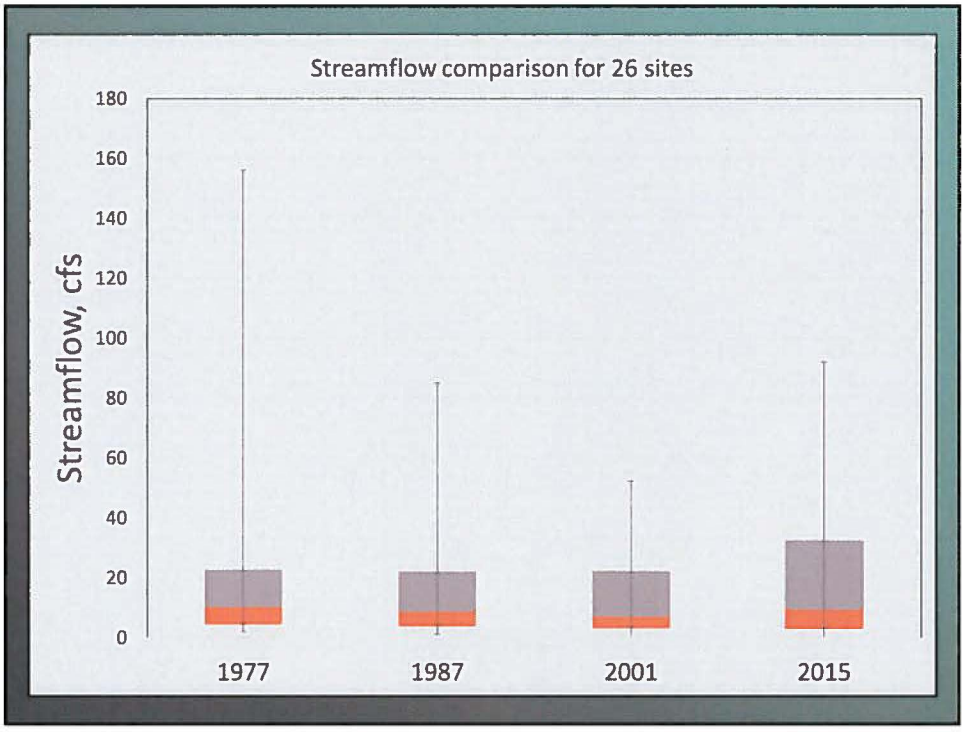
Streamflow 1977



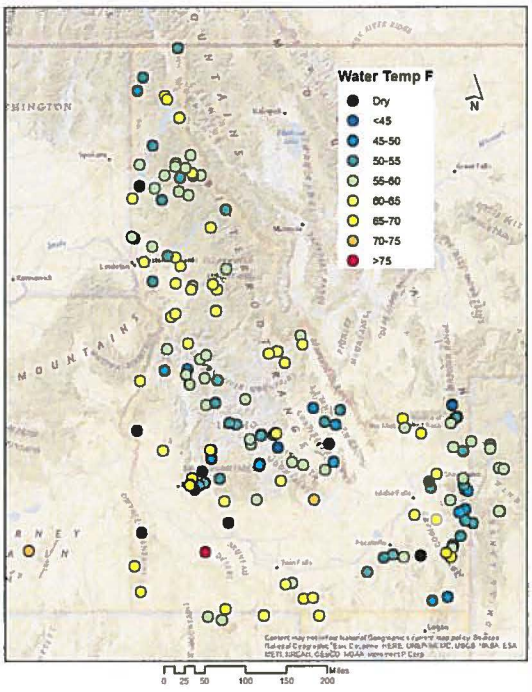
Streamflow Data 1987



Streamflow Data 2001`



Temperature Data



Low Flow Study – Analysis

- Explore relationships with environmental, geologic, geographic, and climatic factors Potentially collect additional data if continued drought conditions
- Analyze base-flow recession with active gages during this period

USGS


Questions
USGS
science for a changing world

DRAFT REPORT

Eastern Snake Plain Aquifer (ESPA)

Review of Comprehensive Managed Aquifer Recharge Program

PREPARED FOR

IDAHO WATER RESOURCE BOARD

PREPARED BY

ch2m

NOVEMBER 2015

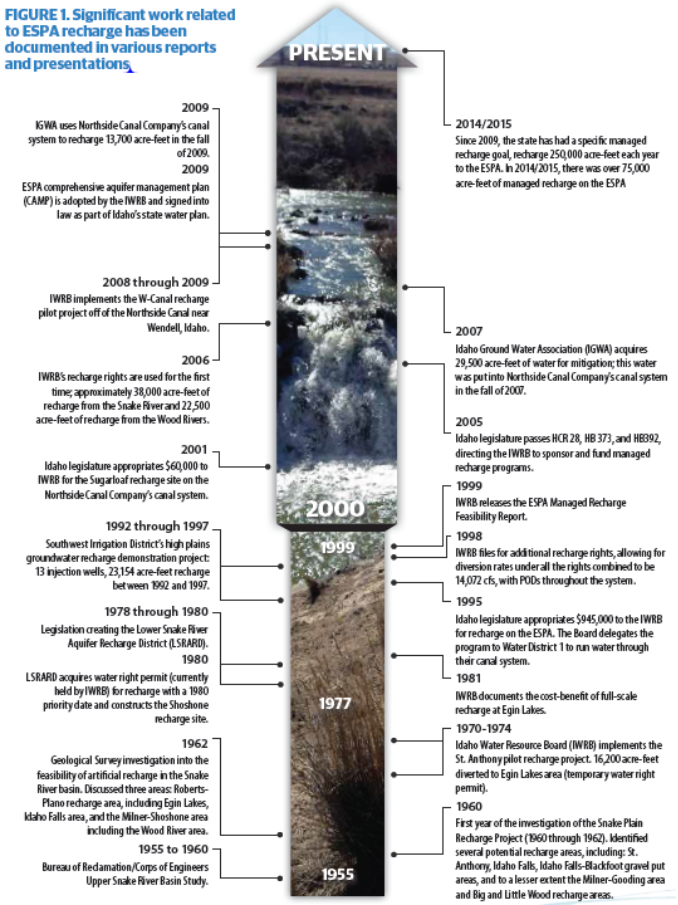
Project Objective and Overview

Objective

- Provide an independent, technical review of the state's managed recharge program

Overview

- Review and summarize existing reports
  - » *Summary of the recharge program and its evolution over time*
- Summarize basin hydrogeology and limits to managed recharge
- Summarize water rights and water supply availability for managed recharge



Results

- We believe the state is on the right path
- Sufficient water is available for recharging 150 to 250 thousand acre-feet annually
- To consistently achieve this goal, there may be site-specific improvements needed at recharge locations to overcome limitations, such as diversion, infiltration, and recharge capacity
  - » *Managed recharge site identification and canal system improvements/modifications to capitalize on the 500 to 1,000 cfs of water available nearly every day of every winter downstream of Minidoka.*
  - » *Canal capacity improvements upstream of Minidoka, combined with funding for operational flexibility to accommodate opportunistic availability of late-winter recharge upstream of Minidoka.*
  - » *Expansion of canal capacity at key points of diversion throughout the basin to capture water that is available for recharge in the spring.*
- The State is implementing an adaptive implementation strategy, per the 2009 ESPA CAMP, and we believe this approach is appropriate. This phased approach provides an opportunity to adapt to future conditions

Availability of water for managed recharge

Outline

- Policies guiding availability of water for managed recharge
- Physical and legal availability of water in Water District 01
- Methods of analysis
- Primary results
  - » *Timing and diversion rates*
  - » *Annual volumes and duration*
  - » *Limiting constraints*
- Other factors affecting recharge availability
  - » *Climate*
  - » *Capitalizing on availability: winter versus summer*
  - » *Fish and wildlife needs*
  - » *Water rights*
  - » *Recharge in tributary basins*

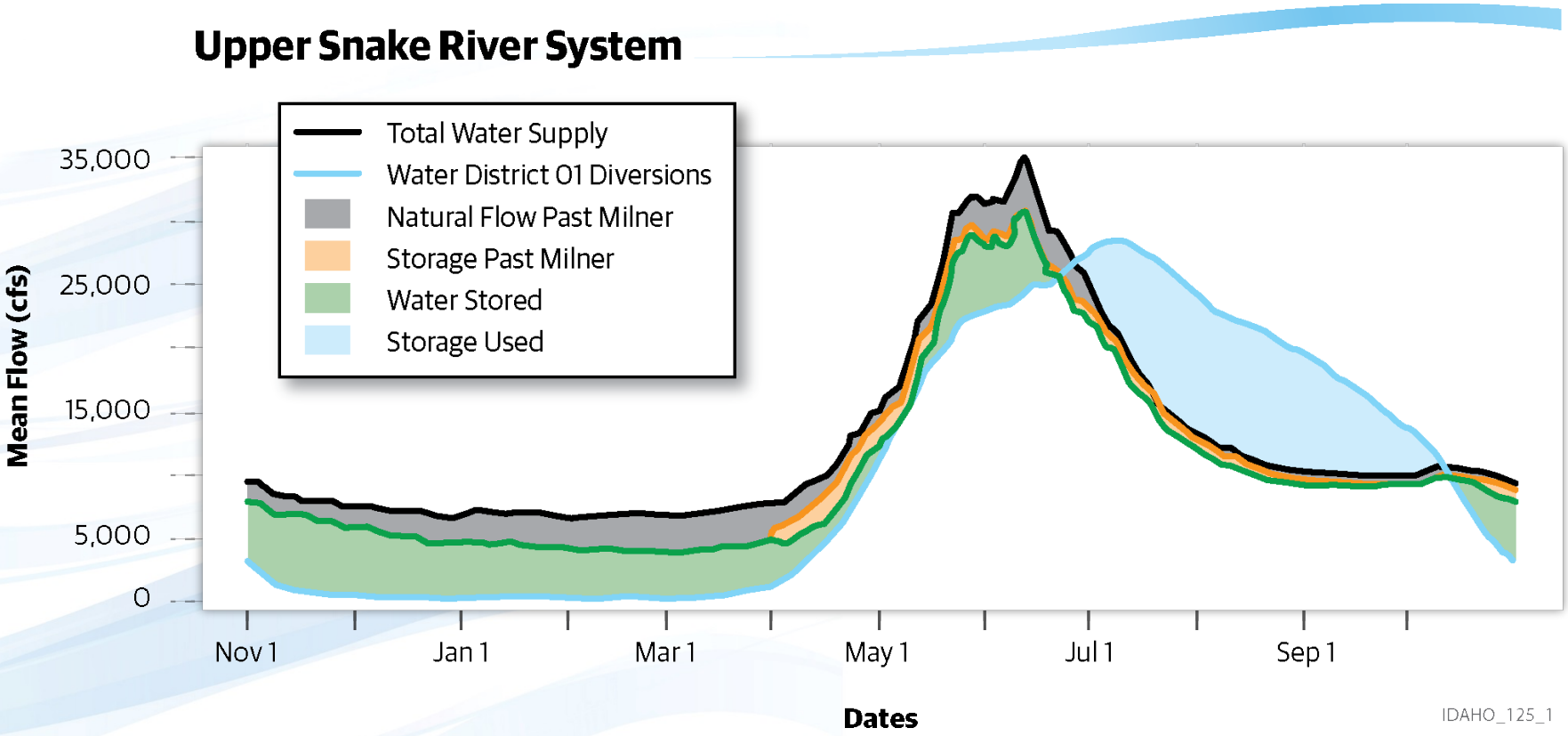
Policies governing water availability

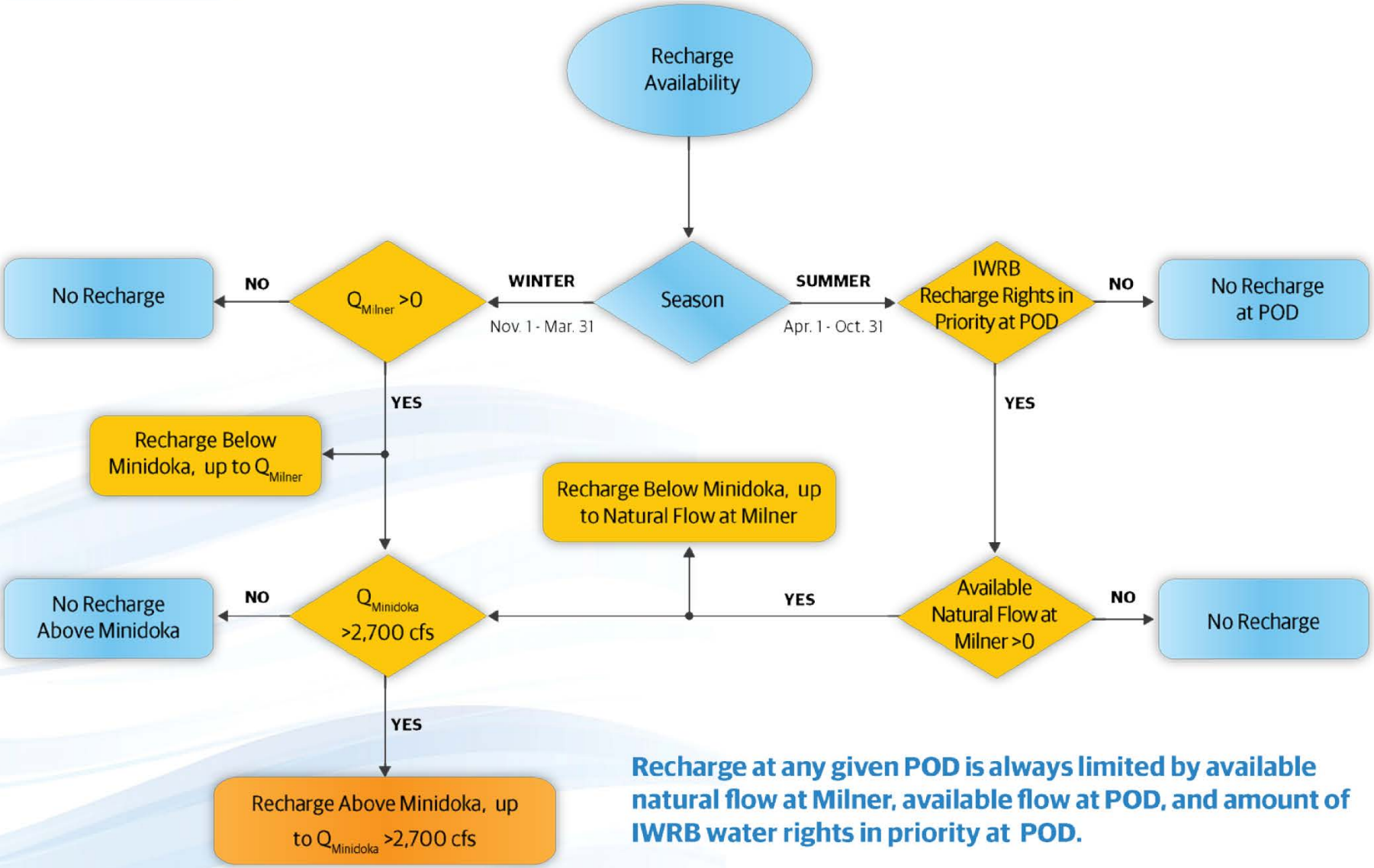
Managed recharge on ESPA…

- Is an opportunistic use of *available natural flow* in upper Snake River
- Shall not interfere with optimal storage in upper Snake reservoirs
- Will be conducted in accordance with prior appropriation doctrine
- Will be consistent with water-rights administration in WD01
- Shall not interfere with USBR's unsubordinated Minidoka power right
- Will be consistent with State Water Plan and ESPA CAMP

Physical and legal water availability

- Natural flow past Milner Dam is available for managed recharge





Recharge at any given POD is always limited by available natural flow at Milner, available flow at POD, and amount of IWRB water rights in priority at POD.

IDAHO_103_1

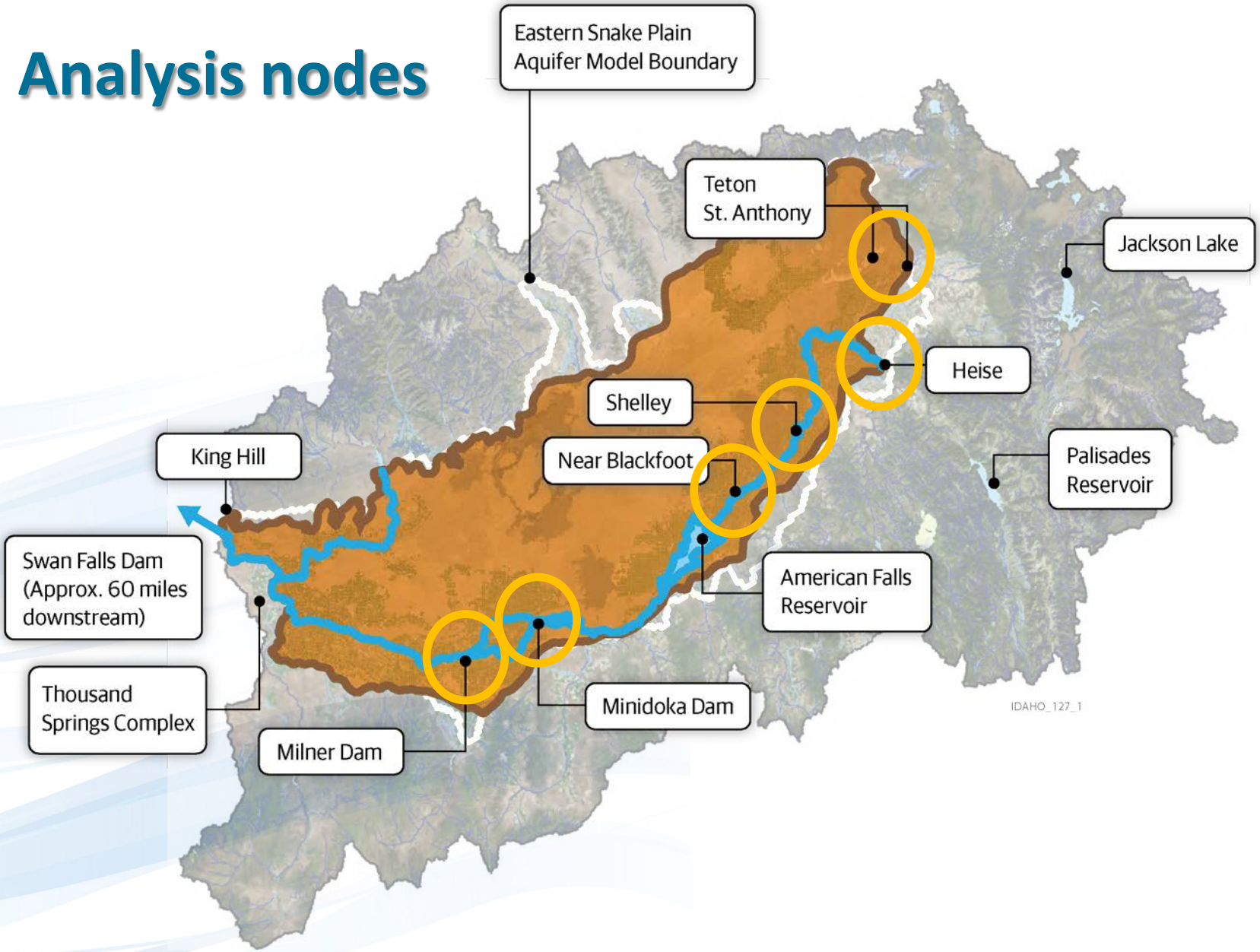
IWRB recharge rights

ID Number(s)	Type	Priority Date	Diversion (cfs)	Point(s) of Diversion
01-7054	Permit	8/25/1980	1,200	Any (by current water supply bank rental agreement)
01-7142	Application	3/20/1998	2,831	Milner
01-10609	Application	3/20/1998	3,738	Minidoka to Milner
01-10612	Application	3/20/1998	2,106	Menan to Blackfoot
01-10613	Application	3/20/1998	3,206	SF: Heise to Lorenzo
21-7577, 7578, 7580, 13160	Application	3/20/1998	2,191	HF: Fall River, Henrys Fork, Teton River
TOTAL			15,272	

Methods of analysis

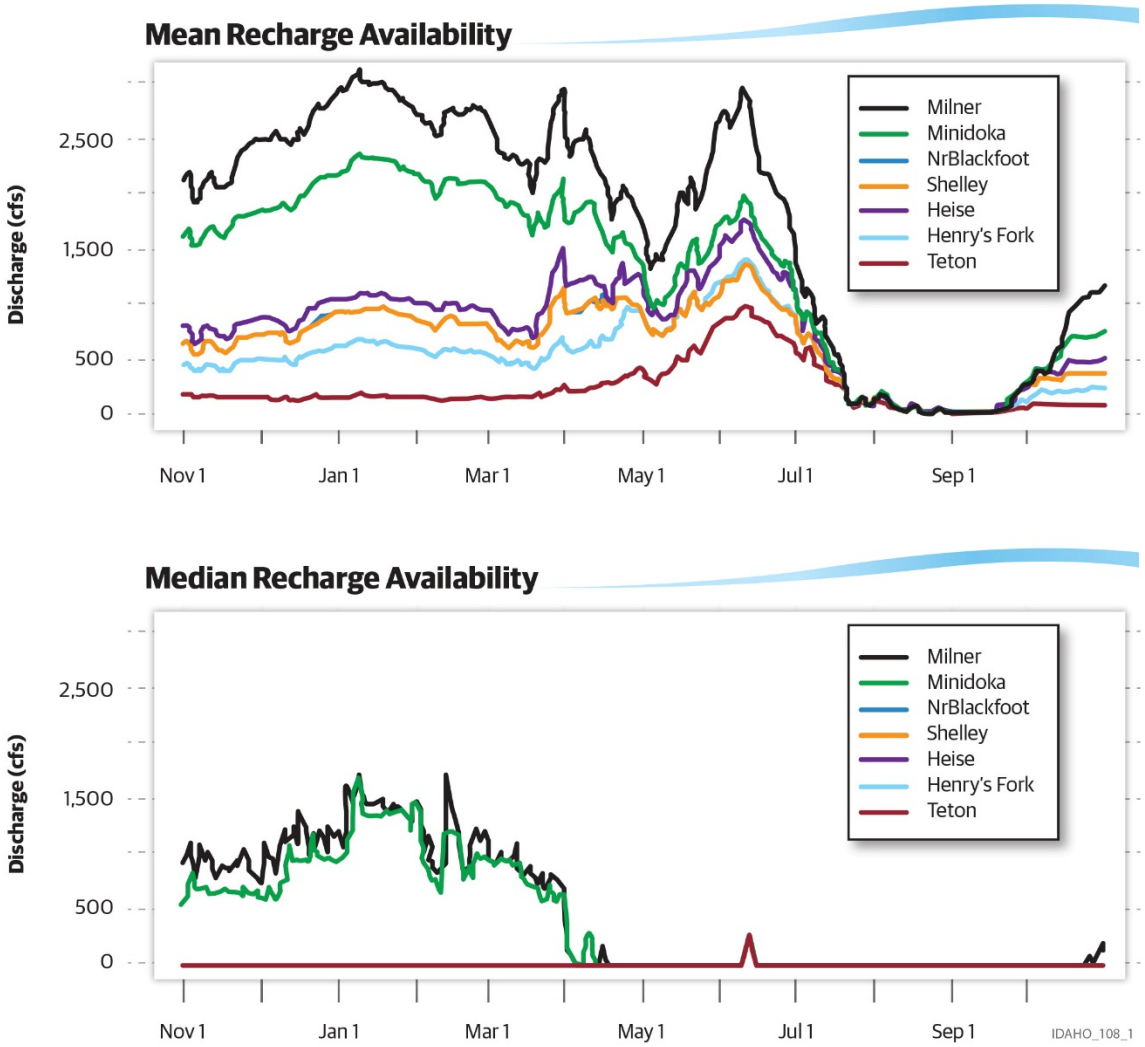
- Applied availability flow chart to WD01 accounting data.
- Assumed diversion occurs under IWRB 1980- and 1998-priority rights.
- Analyzed irrigation years 1980-2014 (*n* = 35 years).
- Used daily time step, but summarized statistics over irrigation years.
- Conducted analysis independently at seven system nodes:
  - » *Milner*
  - » *Minidoka*
  - » *Near Blackfoot*
  - » *Shelley*
  - » *Heise*
  - » *Henrys Fork at St. Anthony*
  - » *Teton River at St. Anthony*

Analysis nodes



Timing and Diversion Rates

- Availability generally decreases with distance upstream.
- ~1000 cfs available below Minidoka every day of winter during median year.
- Water not available during summer in about half of years.
- Water never available late August- late September.



Volume and Duration

MEDIAN STATS

- Volume:

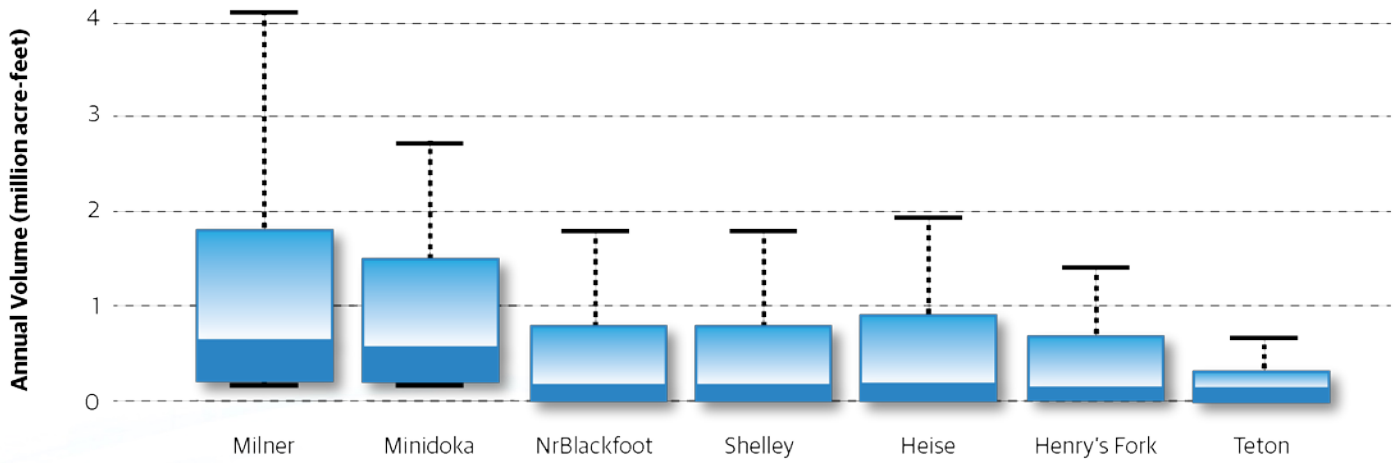
627k af/yr blw. Minidoka

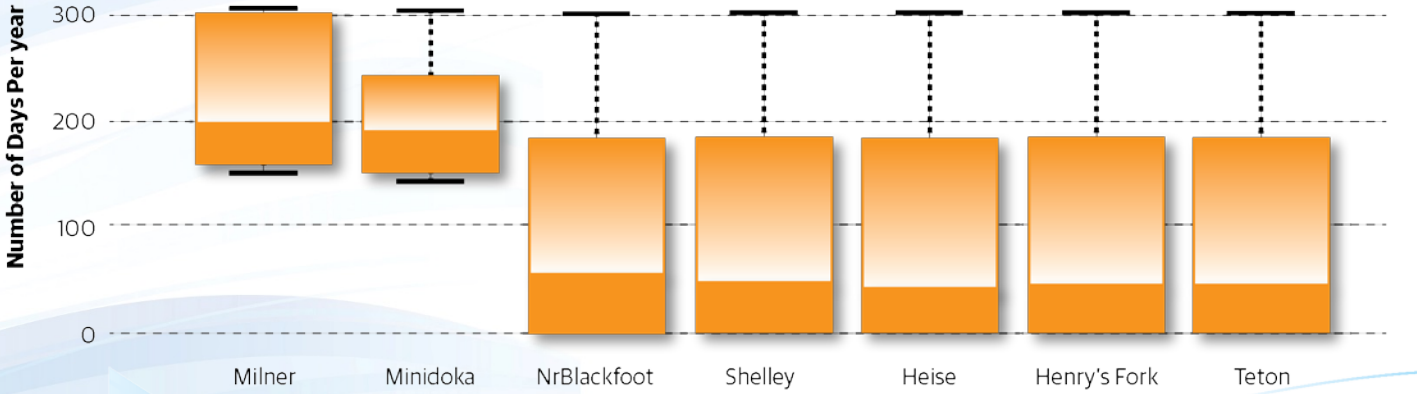
149k af/yr ab. Mindoka

- Duration:

205 days/yr blw. Minidoka (151 winter)

55 days/yr ab. Minidoka (3 winter)





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Limiting constraints: winter (151 days)

Median number of days limited by given constraint

Constraint	Milner	Mid-Valley	South Fork	Henrys Fork
No recharge: 0 flow at Milner	0	0	0	0
No recharge: Power right	NA	145	145	145
Recharge: flow at Milner	151	0	0	0
Recharge: Power right	NA	3	3	0
Recharge: flow at POD	151	0	0	0
Recharge: water rights div. rate	0	0	0	0

Limiting constraints: summer (214 days)

Median number of days limited by given constraint

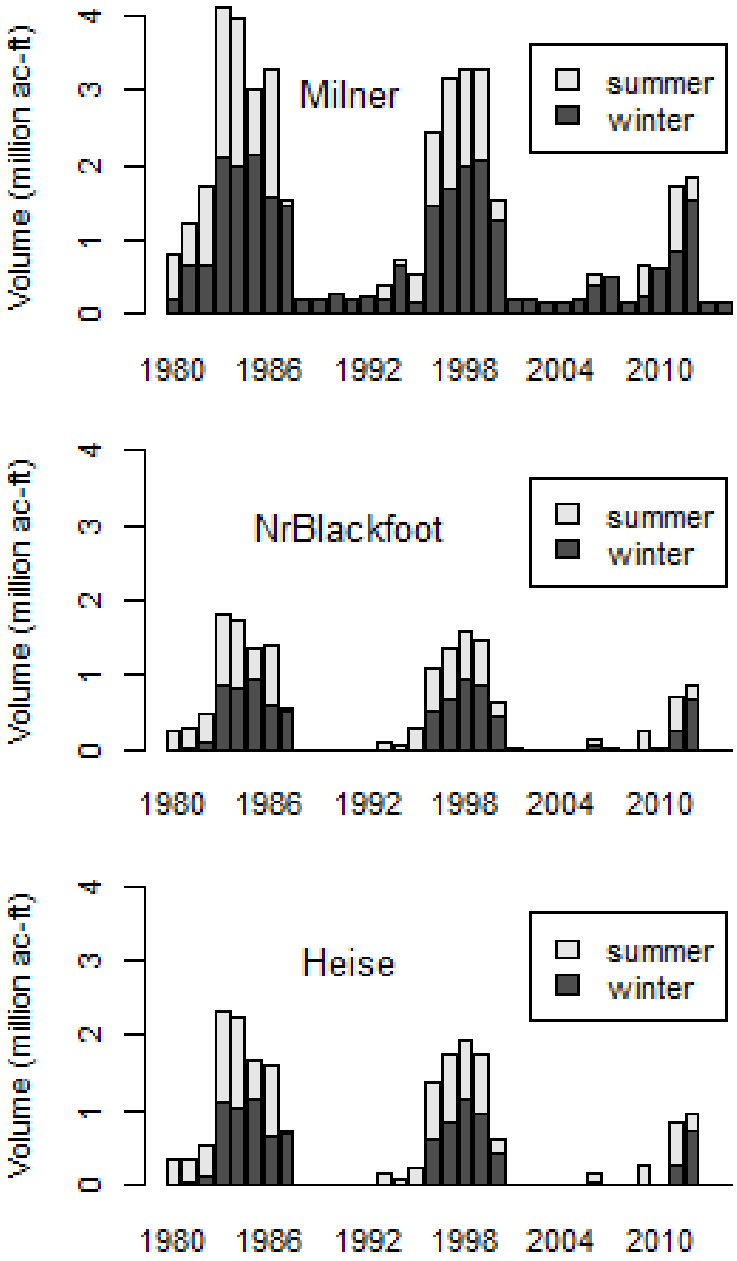
Constraint	Milner	Mid-Valley	South Fork	Henrys Fork
No recharge: water-rights priority	151	163	167	163
No recharge: 0 flow at Milner	0	0	0	0
No recharge: Power right	NA	0	0	0
Recharge: flow at Milner	31	11	13	10
Recharge: Power right	NA	0	0	0
Recharge: flow at POD	31	0	0	2
Recharge: water rights div. rate	0	6	3	1

Other factors: climate

- Winter water available below Minidoka in all years
- Winter water available above Minidoka in years with high carryover
- Summer water available only in high-runoff years, regardless of location
- Period of record is reason for small differences between our results and IDWR 2000-2012 analysis

Mean/median annual availability (ac-ft)

Climatic period	Below Minidoka	Above Minidoka
1980-2014	1,200,000 600,000	500,000 150,000
2000-2014	600,000 200,000	200,000 7,000



Capitalizing on availability

- Winter
  - » *Recharge 500-1000 cfs all winter downstream of Minidoka.*
  - » *Establish administrative and logistical flexibility to recharge upstream of Minidoka on short notice late in winter.*
  - » *Ice and snow in canals may limit opportunities for late-winter recharge.*
  - » *Canals in Henrys Fork basin that divert water during winter for sub-irrigation and stock water provide opportunity for late-winter recharge.*
- Summer
  - » *Canals already convey irrigation water when summer recharge becomes available during spring freshet.*
  - » *Expanding canal capacity at key locations may be needed to capitalize on summer recharge availability.*

Other factors: fish and wildlife needs

- Key stream reaches of concern
  - » *Henrys Fork: Downstream of Fall River*
  - » *South Fork Snake River: Heise to Menan*
  - » *Snake River: Menan to American Falls Reservoir*

- Primary streamflow needs
  - » *Sufficient winter flow for juvenile trout survival*
  - » *Spring-time freshet for channel and floodplain habitat maintenance*
- Potential effects of diversion for managed recharge
  - » *Minidoka power right prevents winter recharge except when flows are already high, minimizing potential effects of winter recharge.*
  - » *Substantial effects likely only if Minidoka power constraint is relaxed.*
  - » *Water-rights priorities limit spring-time recharge to those years when high flows have greatest potential to benefit channel and floodplain.*
  - » *Potential spring-timer effects are greatest in Shelley-American Falls reach.*

Other factors: water rights and tributary basins

- Permitted and pending water rights for managed recharge:
  - » *15,272 cfs IWRB + 3,985 cfs private = 19,257 cfs*
  - » *Available natural flow exceeded this on less than 0.5% of days in 1980-2014.*
- Henrys Fork traditional winter diversion (sub-irrigation, stock water)
  - » *17 private rights with priorities 1902 or earlier*
  - » *Maximum rate: 1,912 cfs*
  - » *Historic rate: 329 cfs mean = 98,000 ac-ft/yr incidental recharge*
  - » *Recommend encouraging this historic winter diversion but not counting it toward managed recharge goals.*
- Recharge in ESPA tributary basins:
  - » *will not reduce managed recharge water availability in WD01*
  - » *is neutral to ESPA unless it uses water that historically reached Snake River as surface flow*
  - » *is not helpful to ESPA if it simply offsets increased consumptive use (Wood R.)*

Conclusions

- Water is available almost every day of every winter below Minidoka.
- Power right prevents winter recharge above Minidoka in half of years.
- Water available system-wide in half of years for ~30 days in May-June.
- Future availability depends on whether climate includes sequences of wet years like 1980-1987 and 1995-1999.
  - » *If so, median availability is 600 kaf below Minidoka and 150,000 kaf above.*
  - » *If not, median availability is 200 kaf below Minidoka and 7,000 kaf above.*
- Need to recharge 500-1000 cfs downstream of Minidoka all winter and be able to divert late-winter water upstream on short notice.
- Using spring freshet may require expanded canal capacity.
- If all applications are permitted, existing recharge rights are sufficient.
- Canal capacity, administrative and physical logistics, weather, and fish/wildlife concerns may limit recharge before water supply does.

TO: Idaho Water Resource Board (IWRB)

FROM: Neeley Miller, Planning & Projects Bureau

DATE: November 6, 2015

RE: Sustainability Policy

Background

On September 5, 2012, Governor Otter sent a letter to the Idaho Water Resource Board ("Board" or "IWRB") requesting the Board develop a statewide water sustainability policy to assist with enhancing the reliability of water supplies into the future. On June 7, 2013 the Board replied to the Governor's request with a letter indicating the Board would develop this policy through the Board's Water Resource Planning Committee.

Between November 2013 and May 2014 the Water Resource Planning Committee met several times to develop a recommendation for integrating water sustainability into the Idaho State Water Plan. These meetings included presentations and panel discussions from experts on the topic of sustainability. At the May 2014 IWRB meeting, the Board reviewed a draft developed by staff in working with the Water Resource Planning Committee. There was discussion among the Board members as to whether the draft was responsive to the Governor's request for a sustainability policy. Board members requested that the sustainability policy language be remanded back to the Water Resource Planning Committee for additional work and consideration.

On May 1, 2015, Governor Otter sent a letter (attached) to Roger Chase, Chairman of the Board indicating that with respect to sustainability he is aware of the preliminary steps a committee of the Board has taken to broaden the Board's understanding of the concept of sustainability. On August 4, 2015 the Board replied (attached) to the Governor's letter indicating the Board would work to incorporate the Governor's additional guidance into the development of a statewide water sustainability policy that includes explicit strategies and milestones with the long-term objective of adding the sustainability policy to the State Water Plan.

The Board's Water Resource Planning Committee held meetings in August and October 2015 to consider the statewide water sustainability policy and the additional guidance provided by the Governor. Several legislators, including Senator Bair, Senator Siddoway, and Representative Raybould, attended the Board's October Planning Committee meeting and offered their perspectives on both the proposed sustainability policy, as well as the pro's and con's of bringing this proposed policy to the legislature for inclusion into the State Water Plan at this time. The Committee considered the perspectives of the legislators in developing the proposed

policy, timeline and process. The Water Resource Planning Committee recommends the Board consider for adoption the attached statewide water sustainability policy.

The Committee proposed path forward is as follows:

- Late October - Circulate policy to Governors office for review
- November 16 – present policy to full Water Resource Board & hear from stakeholders; report from Attorney General's Office regarding options for adoption (stand-alone vs. State Water Plan amendment)
- January – adopt as stand-alone policy (assumes we are given an OK from the Attorney General's Office)
- Include policy in State Water Plan at time of next revision

Action Items for today

1. Discuss proposed draft policy
2. Discuss proposed path forward
3. Comments from Attorney General's Office

C.L. "BUTCH" OTTER
GOVERNOR

May 1, 2015

Roger Chase
Chairman, Water Resources Board

Dear Roger,

I applaud your efforts to develop a managed recharge program designed to facilitate the use of available water to restore aquifer levels and address declining spring flows in the reaches of the Snake River above Swan Falls. Recent reports on the Murphy flow minimums emphasize the value of your work and additional efforts to sustain and restore the water resource to protect our State economy. I will continue to support funding efforts to encourage partnerships with water users to develop effective large scale projects to conserve and maximize the waters of the State. Such actions should be implemented in such a manner that allows the State to measure success through groundwater level changes and river flows. Your efforts on the Eastern Snake Plain provide the template for projects throughout the State.

With respect to sustainability, in September of 2012, I requested that the Board develop a working definition of "water resource sustainability" recognizing existing uses and the law, but not foreclosing future opportunities. This definition was then intended to guide policy development and actions. Since that time I am aware of the preliminary steps your sub-committee has taken. These steps have been useful in developing the Boards' understanding of the concept of sustainability and how that concept is becoming a bigger part of our daily lives. As we look around the West at our neighboring states, drought, climate variability, growth and other water resource related subjects command the headlines. A Western Governors Association meeting doesn't go by where water isn't at the top of the agenda. As Idahoans we still have the opportunity to protect and ensure our heritage, but we need to move forward.

In an effort to provide further guidance on this important subject, I would submit that the following definition of sustainability as the term relates to Idaho's water resource be the guiding definition as the Board moves forward with its policy development, planning and management of water:

Sustainability is **"the active stewardship of Idaho's water resources to satisfy current uses and assure future uses of this renewable resource in accordance with State law and policy."**

Stewardship embodies management, administration, and immediate action to sustain the resource, and by necessity includes reversal of the declining trends with the goal being overall enhancement of the State's water resources. We all must be good stewards of the natural resources of the State realizing that if we sustain our water supplies, future development will necessarily follow. I would request that the Board move forward expeditiously to achieve sustainability of the State's water resources through the development of explicit criteria and goals with the input from Idaho's waterusers. Our precious resource is in your expert hands.

As always – Idaho, "Esto Perpetua"

C.L. "Butch" Otter
Governor of Idaho

STATE CAPITOL • BOISE, IDAHO 83720 • (208) 334-2100

IDAHO WATER RESOURCE BOARD

August 4, 2015

The Honorable C.L. "Butch" Otter, Governor
State Capitol
P.O. Box 83720
Boise, Idaho 83720

RE: Sustainability

Dear Governor Otter,

By letter dated May 1, 2015, you provided the Idaho Water Resource Board (IWRB) with a definition of sustainability as the term relates to Idaho's water resources in an effort to provide further guidance on development of a statewide water sustainability policy.

You indicate in your letter that "Sustainability is the active stewardship of Idaho's water resources to satisfy current uses and assure future uses of this renewable resource in accordance with State law and policy." Additionally, you say that "stewardship requires management, administration and immediate action to sustain the resource, and by necessity includes reversal of the declining trends with the goal being overall enhancement of the State's water resources. "

Over the next year, the IWRB Planning Committee will work to incorporate your guidance into the development of a statewide water sustainability policy that includes explicit criteria and goals with the long-term objective of adding the sustainability policy to the State Water Plan.

The State Water Plan provides the framework for the conservation, management and optimum use of the water resource and waterways of Idaho in the public interest. The IWRB looks forward to working closely with your staff as we continue to plan for the optimum use of Idaho's water resources. Should you have any questions or concerns please contact Brian Patton of our staff at 287-4831.

Sincerely

Roger Chase

Roger Chase, Chairman

CC: Idaho Water Resource Board members
Gary Spackman, Director IDWR

SUSTAINABILITY POLICY FOR IDAHO'S WATER RESOURCES

Draft October 15, 2015

Sustainability is the active stewardship of Idaho's water resources to satisfy current uses and assure future use of this renewable resource in accordance with State law and policy.

Water is the foundation of Idaho's economy and culture; the lives and livelihoods of Idahoans depend on a reliable supply of water. Stewardship of Idaho's water resources begins with the realization that the water resources of the State are not inexhaustible and therefore it is necessary to manage, administer, and take immediate action to sustain, maintain and enhance the resource. Stewardship, by necessity, also includes taking affirmative steps to address declining trends in the resource where those trends exist and to establish policies that will prevent future unsustainable declines. The goal must be overall enhancement of the State's water resources for the good of the people of the State of Idaho.

The State of Idaho encompasses some of the most diverse and awe inspiring physical and geological features in the country. From the depths of Hells Canyon to the peak of Mount Borah, from sage brush deserts, to the extensive agricultural farm and ranch land, to alpine forests and meadows, to the cities and towns, the ecosystems of each of these varied areas all rely on the water resources of the State. The people of the State interact with and depend upon the water resources in these different landscapes in many different ways. Therefore, the water sustainability policy of the state of Idaho must embrace the diversity of the State, while recognizing the potential for a use or activity in one place to affect the water resources in another part of the State.

Sustainable water management strategies to meet current and future needs must be based on adequate knowledge regarding available supplies, existing use, competing economic and social demands, and future needs. Planning and management actions to promote water sustainability must be designed and implemented to provide certainty that existing water rights are protected and the economic vitality of Idaho is optimized.

The goal of sustainable use of water resources of the State must recognize that the goals of sustainable economic growth and protection of existing rights must coexist and are enhanced by measures that protect and maintain surface and ground water resources and the aquatic, riparian and human resources that depend on these water resources. Recognizing these needs will promote economic and environmental security and enhance the quality of life for the people of the State of Idaho.

Fundamental Strategies for a Sustainable Water Future:

- Ensure that all actions taken toward a sustainable water future protect and respect private property rights, both in the land and water rights
- Inventory Idaho's water supply, current uses, and future water supply needs
- Evaluate long-term and short-term trends in water availability for present and future uses
- Identify management alternatives and projects that optimize existing and future water supplies
- Prioritize and implement management alternatives and projects where competing demands and future needs are most critical
- Enhance water transfer mechanisms in Idaho law, policy and regulations to allow future economic opportunities to utilize existing water supplies, while protecting existing uses
- Utilize the Idaho Water Resource Board's Funding Program and prioritize allocation of funds for projects that ensure water sustainability across the state
- Identify water conservation measures that water users, municipalities, governmental agencies and other entities can undertake to help protect the water resources of the State and provide guidance to those entities on best practices to implement those conservation measures
- Recognize that conservation measures may reduce water supplies utilized by others in other parts of the resource
- Identify and provide funding for aquifer stabilization strategies throughout the state with due regard to the priorities of basin specific Comprehensive Aquifer Management Plans
- Pursue enhancement of surface water storage supply as a mechanism for meeting Idaho's future water needs
- A grassroots approach should be utilized in identifying problems and developing optimal solutions. The needs of individual basins must be taken into consideration in how the resource should be managed while recognizing the potential for decisions in one basin to affect the resources of another basin. An integrated and collaborative approach to water resource management is critical for the sound and efficient use of Idaho's water resources. The State of Idaho when appropriate should work together with, water users, tribes, local communities, neighboring states, and the federal government to resolve water issues.
- Protection of the quality of existing water supplies, particularly those ground water resources that are used for drinking water supplies, to ensure the vitality of local communities. This goal requires other state and local agencies to exercise their appropriate authorities to protect the water resources and to assist in meeting the goal of sustainable economic growth

Success Factors/Milestones:

- Respect for private property rights in accordance with State law and policy
- Identify number of basins where water supply and demand have been inventoried
- Identify number of basins where management alternatives have been identified and implemented to optimize existing and future water supplies, including surface water storage, ground water recharge, conservation measures and weather modification
- Obtain more accurate water supply, water measurement, and forecasting information.
- Disseminate water supply forecasts to water users in cooperation with other federal and state agencies
- Measure utilization of water bank and transfer procedures to allow sustainable use of the resource
- Determination and implementation of measures and policies to enhance the utility of the water bank and transfer procedures
- Financial programs and funding strategies that meet the future water resource needs of the State of Idaho. Secure funding and resources in cooperation with the Governor and legislature. Reliable on-going, long-term funding will be needed to enable and support active stewardship of Idaho's water resources.
- Basin aquifer stabilization - stabilization of ground water levels in basins where declines are occurring to restore and maintain sustainable aquifer levels
- Initiate and facilitate construction of additional surface water storage to meet current and future needs
- Use of adaptive management to identify and address uncertainties for success, including those related to data, modeling, and impacts of climate variability
- Balance water supply and demand – supply and demand must be in balance to support current and future use within a particular basin
- Improve data management – accurate and abundant data is necessary to assist with ensuring stewardship of Idaho's water resources to satisfy current and future uses
- Coordination with State and local entities on measures to protect and enhance ground water and surface water resources so that these resources are available for use by the people of the State of Idaho

MEMO

State of Idaho
Department of Water Resources
322 E Front Street, P.O. Box 83720, Boise, Idaho 83720-0098
Phone: (208) 287-4800 Fax: (208) 287-6700

Date: November 6, 2015

To: Idaho Water Resource Board

From: Sean Vincent

Subject: CH2M proposal for predictive tool development

CH2M and its subcontractor (Drs. Rob Van Kirk and Gary Johnson from the Henry's Fork Foundation) will be presenting a proposal during the November 16, 2015 Work Session for development of a spreadsheet tool for predicting the flows in the Snake River at the near Murphy Gage. In accordance with the State Water Plan, the minimum flows at the Murphy Gage are 3,900 cfs during irrigation season and 5,600 cfs during the non-irrigation season. The attached presentation will describe the work that will be performed by CH2M if they move forward with the work.

The proposal is being offered to the Idaho Water Resource Board for its consideration based on a recommendation to move forward with the work from the Swan Falls Technical Working Group. The Technical Working Group has been tasked with developing forecasting tools for the flows at Murphy by the Swan Falls Policy Group. Idaho Power Company and Idaho Ground Water Appropriators, Inc. have both verbally committed to providing a nominal amount of funding for this work effort and it is hoped that the Idaho Water Resource Board and the State of Idaho will consider contributing as well. Predictive tool development is a benefit to the State of Idaho in helping to implement the State Water Plan and it is consistent with the Water Resource Board's efforts to increase ESPA spring discharge via managed recharge and other aquifer stabilization efforts.

Forecasting Snake River Discharge at Murphy

Kevin Boggs and Rob Van Kirk

November 16, 2015

Agenda

The Challenge
The Solution
Existing Forecasting Tool
Forecasting Details
Questions

The Challenge

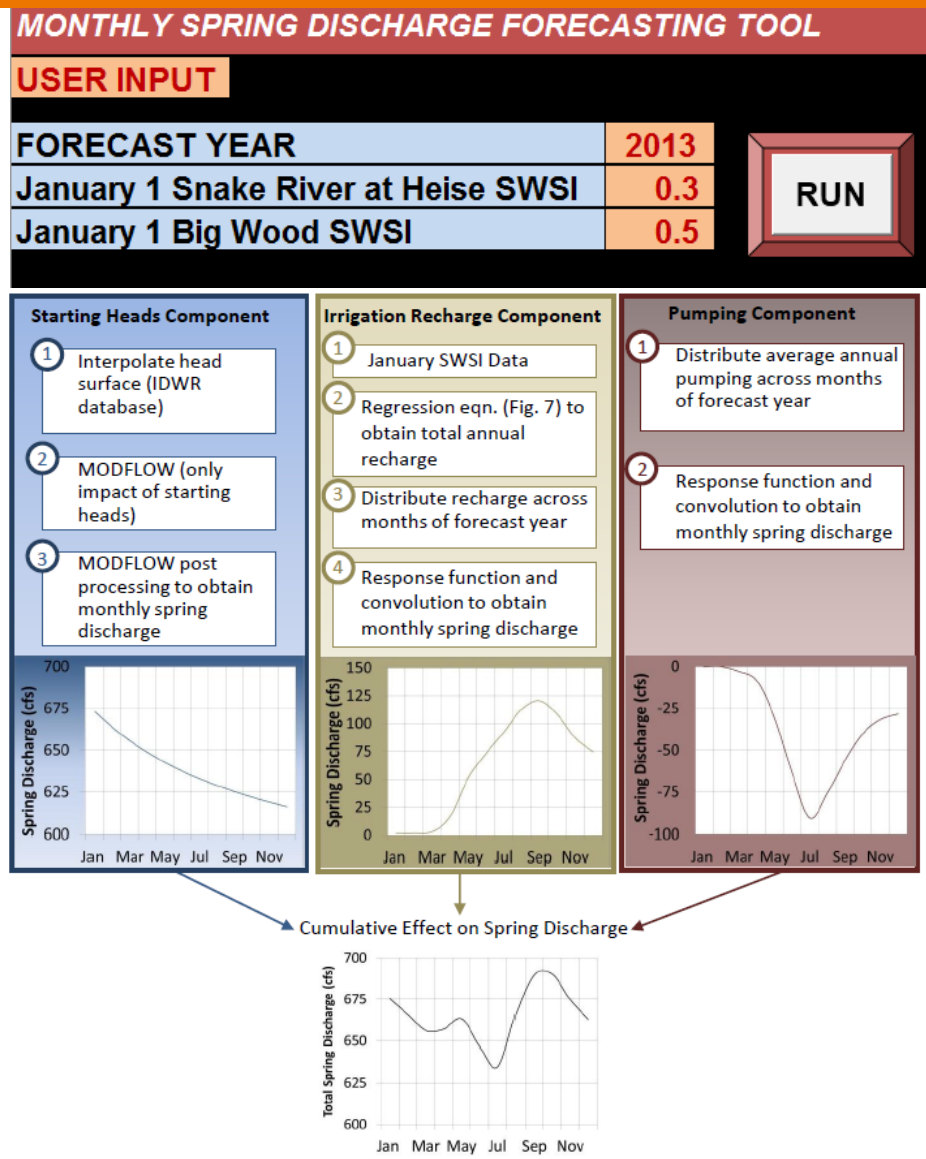
- Will Snake River discharge at the Murphy gage fall below minimum flow requirements?

The Solution

- Develop a tool that can be used to forecast daily Snake River discharge at Murphy

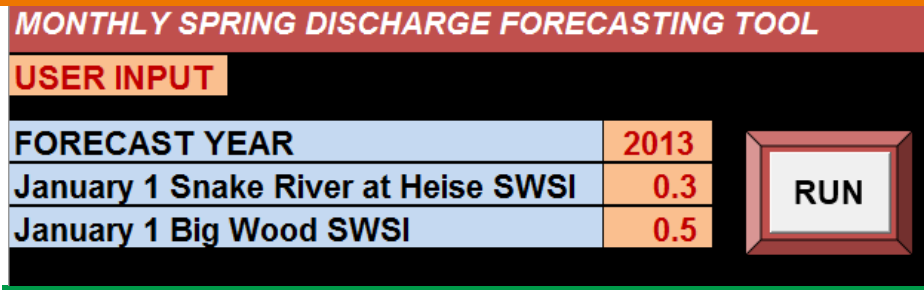
How? The Details

- **Existing Tool**
  - Monthly forecast at one spring
  - State's numerical model (ESPAM v. 2.0)
  - Uses "rough" avg. starting heads array
    - Any head value from Jan or Feb; calc. departure from avg. head (1992 through 2008 avg)
    - Added this departure from avg. to the avg. '92 through '08 heads and ran model
  - Forecasts total annual recharge from Northside and Big Wood using SWSI at Heise and Big Wood using correlation b/t two (92 to 08)
    - distributed across the year according to avg. monthly recharge for each entity
  - Avg. pumping w/in 50 miles



How? The Details

- **Existing Tool**
  - Monthly forecast at one spring
  - State's numerical model (ESPAM v. 2.0)
  - Uses "rough" avg. starting heads array
    - Any head value from Jan or Feb; calc. departure from avg. head (1992 through 2008 avg)
    - Added this departure from avg. to the avg. '92 through '08 heads and ran model
  - Forecasts total annual recharge from Northside and Big Wood using SWSI at Heise and Big Wood
    - distributed across the year according to avg. monthly recharge for each entity
  - Avg. pumping w/in 50 miles



Tool Upgrades

- Use ESPAM v. 2.1
- Develop monthly Snake River gains between Milner and King Hill
- Post processing and stats to estimate 3-day rolling average flow at the Murphy gage
- Include prediction uncertainty
- Combine the State's numerical model with a statistical forecasting approach (to forecast aquifer stresses)

More Details - Starting Heads

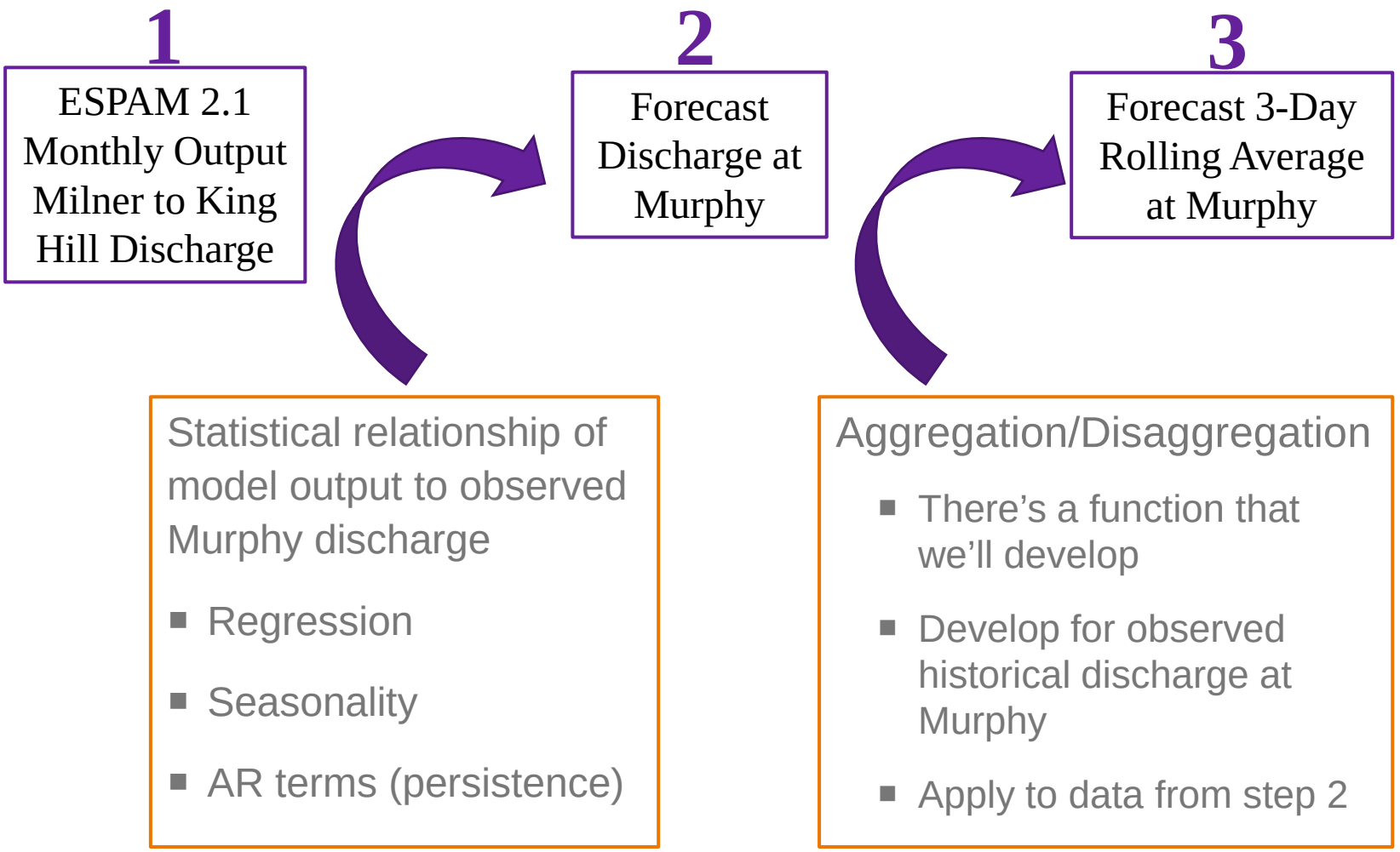
- Improve starting heads procedure
  - Review available observed water level data to assess whether an improved surface can be developed
  - Assess whether automating the procedure is possible

More Details – Predictor Variables

More thorough analysis of potential predictors of irrigation recharge of upcoming year..

- SWSI
- SWE
- Reservoir storage (Jackson, Palisades, American Falls)

Automate process to get from monthly to 3-day rolling average



More Details – The End Products

- Two tools
  - One that can be used each January
  - One that can be used each May
- Assess Sources of uncertainty
  - Uncertainty in prediction of irrigation recharge (model inputs or scenarios)
  - Statistical uncertainty associated with relating model output from Milner to King Hill to Murphy
  - Disaggregation procedure
- Quantify uncertainty (Bootstrapping/Monte Carlo simulation)
  - 3-day rolling average forecast (expected value)
  - Percentiles of the prediction interval
- Present the final output from the tool in graphically and numerically

Questions and Suggestions?